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NARROWS PROJECT

FINAL ENVIRONMENTAL IMPACT STATEMENT

GLEN CANYON ENVIRONMENTAL STUDIES OFFICE

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PREPARED FOR:

SANPETE WATER CONSERVANCY DISTRICT

PREPARED BY:

FRANSON-NOBLE & ASSOCIATES, INC.

JANUARY 1995

SUBMITTED UNDER THE GUIDELINES OF THE SMALL RECLAMATION PROJECTS ACT, PL 84-984
UNITED STATES DEPARTMENT OF THE INTERIOR, BUREAU OF RECLAMATION

FINAL ENVIRONMENTAL IMPACT STATEMENT

Narrows Project

Sanpete County, Utah

Prepared for

Sanpete Water Conservancy District

by

Franson-Noble & Associates, Inc.

Submitted under the Guidelines of the
Small Reclamation Projects Acts (PL 84-984)

to

United States Department of the Interior
Bureau of Reclamation

This Environmental Impact Statement (EIS) is prepared in compliance with the National Environmental Policy Act (NEPA) and U.S. Bureau of Reclamation (Reclamation) NEPA procedures.

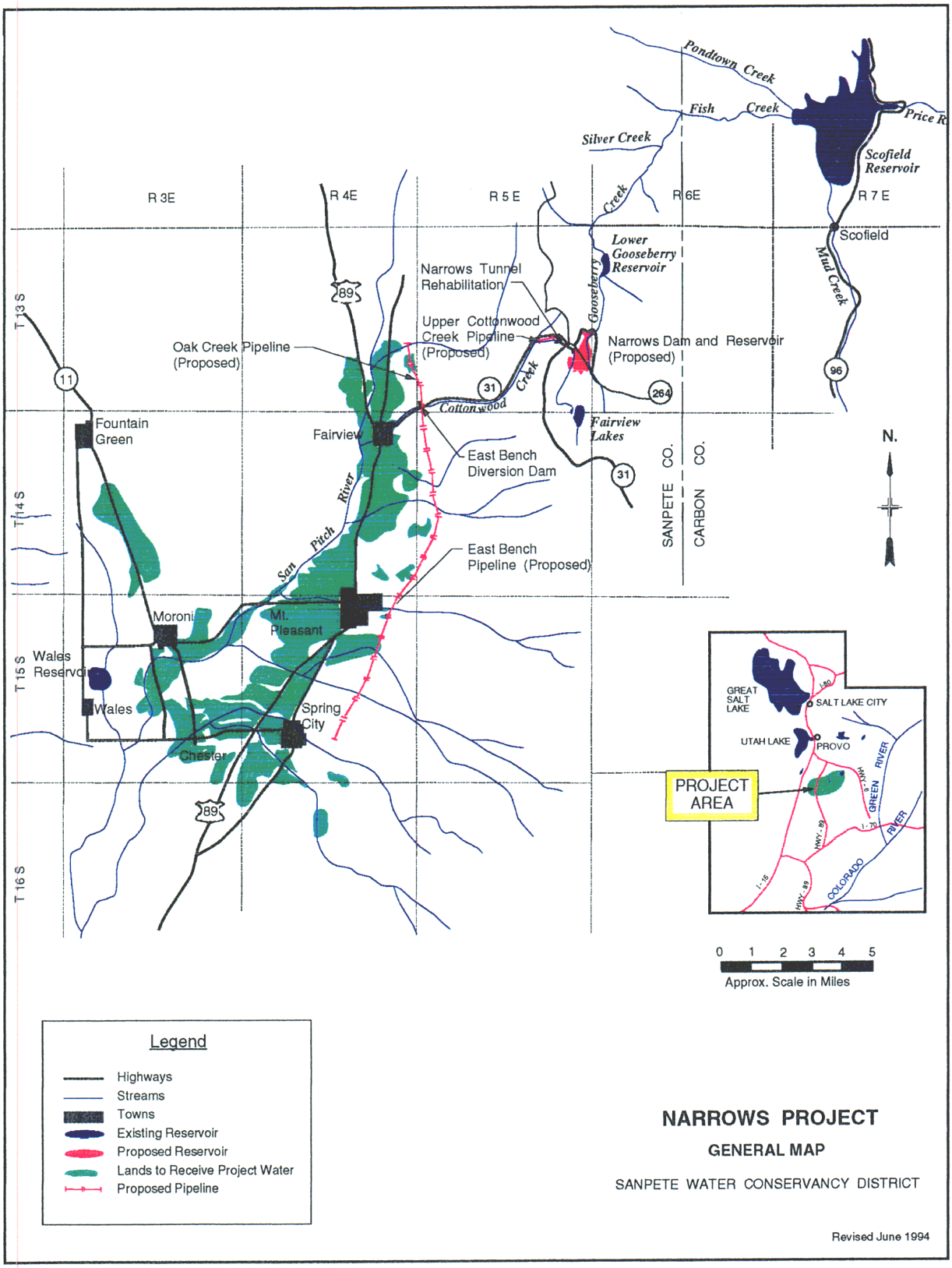
Sanpete Water Conservancy District is proposing to build a multiple purpose water development project that would provide water for irrigation and municipal use. Water from the project would come from a transmountain diversion from upper Gooseberry Creek and its tributaries which are located in the Price River drainage. Irrigation water shortages would be reduced from their present level of 30 percent to about 19 percent.

This EIS analyzes the impacts of Reclamation's Recommended Plan which would provide to north Sanpete County an average annual supply of 4,920 acre-feet of supplemental irrigation water for 15,420 acres of presently irrigated farmland and 480 acre-feet of water for municipal use. The service area encompasses about 49,000 acres. The project plan would include construction of Narrows Dam and Reservoir on Gooseberry Creek, pipelines to deliver the water to existing water distribution systems, rehabilitation of the existing Narrows Tunnel, and relocation of 2.9 miles of State Road (SR) 264. The project would also provide recreation opportunities and fish and wildlife improvements. In addition to the Recommended Plan, the EIS also analyzes the impacts of several alternatives, including the No Action Plan.

Applicable statutory and regulatory requirements to be satisfied by this document include: Executive Orders 11988 and 11990, Floodplain Management and Protection of Wetlands; Section 404 Clean Water Act of 1977; Endangered Species Act, Section 7 Consultation; Clear Air Act; Colorado River Basin Salinity Control Act; Archeological and Historic Preservation Act; Fish and Wildlife Coordination Act; National Environmental Policy Act; and Small Reclamation Projects Act.

For further information regarding this EIS, please contact the Regional Director, Bureau of Reclamation, 125 South State Street, Salt Lake City, Utah 84138, or call (801) 524-5580.

Date filed with Environmental Protection Agency:_____



NARROWS PROJECT

GENERAL MAP

SANPETE WATER CONSERVANCY DISTRICT

Revised June 1994

SUMMARY

SUMMARY DESCRIPTION OF NARROWS PROJECT

Project Purpose and Need

The Narrows Project is a multiple purpose water development project that would provide a supplemental irrigation water supply to presently irrigated lands and municipal water to project communities. The area immediately affected by the proposed development is the northern portion of Sanpete County located in central Utah (see Frontispiece Map). Social and economic conditions in the area are underscored by a century-long dependence upon agriculture which is severely limited by inadequate water supplies. The limited precipitation, averaging just above 4 inches during the summer months, makes irrigation essential to successful crop production. Yet the demand for irrigation water cannot be met by the fluctuating direct flows in local streams or the limited storage supplies presently available. Irrigated farmland within the project area currently experiences average shortages of about 30 percent of the annual diversion requirement. Municipal water supplies used for the irrigation of lawns and gardens also run short by a similar amount. Historically, when irrigation water runs low, high quality municipal water is used for this purpose. The Narrows Project would reduce the demand for this type of use.

There is also a shortage of outdoor recreation facilities near the project area and along the Wasatch Front. Existing recreation facilities including campgrounds, boat ramps, and reservoirs are overcrowded and inadequate. The Narrows Project would provide recreation facilities, including a campground, boat ramp, picnic sites, and restrooms, at the Narrows Reservoir. The recreation facilities are expected to draw heavy use from not only Sanpete, Carbon, and Emery Counties, but also from the Provo/Orem and metropolitan Salt Lake City areas. The reservoir is expected to develop into a popular flat-water fishery. A conservation pool would be provided to ensure successful over-wintering of fish.

History of the Project

In 1933, the U.S. Bureau of Reclamation recognized the need to develop a comprehensive water development plan on the Price River System to meet the water needs of both Carbon and Sanpete Counties. The plan which evolved became known as the Gooseberry Project Plan and provided identifiable benefits to both counties. The project would include a transbasin diversion of water from the Scofield Reservoir drainage of the Price--Green--Colorado River Basins to the San Pitch--Sevier River of the Great Basin. The dam and diversion works would be located in the Gooseberry Valley tributary to Scofield Reservoir. The service area would be situated in the San Pitch River drainage.

Originally, the Gooseberry Project Plan included three major features.

- A dam on Gooseberry Creek with feeder canals from Brooks Canyon and Cabin Hollow Creeks;
- A transmountain tunnel; and
- An enlarged Scofield Reservoir to provide water by exchange to support the unrestricted transmountain diversion of water from the Gooseberry Creek Dam site.

The Scofield portion of the Gooseberry Project Plan was completed separately and ahead of the other project features because the existing dam was unsafe and posed an immediate threat to the World War II effort. Reconstruction work on the original Scofield Dam and Reservoir began in 1943 and was completed in 1946. As a part of the reconstruction effort, and to facilitate the completion of the remaining Gooseberry Project features, the U.S. Bureau of Reclamation: (1) increased the existing storage capacity of Scofield Reservoir by over 30,000 acre-feet; (2) established an operational plan on the reservoir which specifically provided for the transmountain diversion features of the Gooseberry Project Plan; and (3) obtained a subordination of all Price River Water Users Association's water rights to the Gooseberry Project transmountain diversion rights.

Following the war, several planning efforts were undertaken to complete the Gooseberry Project Plan. In 1964, the transmountain tunnel feature was constructed. However, controversy soon developed over the final project feature--the construction of a dam on Gooseberry Creek. That controversy was resolved by: (1) a 1982 ruling by the Utah Supreme Court reaffirming the binding effect of the Scofield Reconstruction and Repayment Contracts; (2) a 1984 Settlement Agreement between the Carbon Water Conservancy District, the Price River Water Users Association, and the Sanpete Water Conservancy District concerning the building of storage and diversion works on the Price River System for transmountain diversion of Gooseberry Creek waters to the San Pitch River System; and (3) a 1989 Agreement with the U.S. Department of Justice whereby the United States subordinated its Federal reserved water rights to the Gooseberry Project Plan.

Alternatives

The alternatives for developing the Narrows Project's water rights to the Price River and its tributaries are described in this EIS. The Sponsors have performed detailed technical and economic analyses for several development and non-development alternatives which involve conservation, various design options, and different locations for the dam. A total of nine alternatives are presented in the statement. Plans studied in detail include the following:

- Recommended Plan
- Smaller Reservoir Plan
- No Action Plan

Design data are summarized and presented in Table S-1. A comparison of plans with their associated impacts and mitigation measures is summarized and presented in Table S-2.

Non-viable alternatives were studied in less detail. Those alternatives, which are described in general terms, include:

- Alternative Damsite Plan
- Year-round Release Plan
- Groundwater Development Without Import
- Central Utah Project
- Direct Diversion Without a Reservoir
- Conservation Without Development of Additional Water Supplies

Description of Alternatives

Recommended Plan

A supplemental water supply of 4,920 acre-feet would be developed for 15,420 acres of presently irrigated lands and 480 acre-feet of municipal water for users in north Sanpete County under the Recommended Plan. A dam and reservoir would be constructed on Gooseberry Creek and water would be diverted through an existing tunnel to Cottonwood Creek. Narrows Reservoir would have a total capacity of 17,000 acre-feet with 14,500 acre-feet of active capacity and 2,500 acre-feet of inactive and dead storage. The project includes the relocation of a portion of SR-264 and pipeline construction along the shoulder of SR-31. Both highways have been designated as National and State Scenic Byways. The existing Narrows Tunnel would be rehabilitated and pipelines would be constructed to deliver the water to existing water distribution systems. Recreation facilities would be developed and a minimum pool for fish habitat would be provided. Mitigation measures would be implemented to offset adverse impacts to wetlands, terrestrial wildlife, and stream fisheries. In addition to mitigation measures to offset project impacts, nine other specific measures would be included to enhance or improve fish and wildlife habitat.

Smaller Reservoir Plan

This alternative would be similar to the Recommended Plan except that the reservoir capacity would be limited to 7,900 acre-feet, less than half of that for the Recommended Plan. Of that amount, 5,400 acre-feet would be active capacity and 2,500 acre-feet would be inactive storage. The dam would be in the same location as that for the Recommended Plan. The average annual water supply under the Smaller Reservoir Plan would be reduced from 5,400 acre-feet to 4,900 acre-feet. In

Table S-1
Summary of Design Data for Narrows Project
Proposed Plan and Alternatives

Item	Unit	Alternative Reservoirs That Would Serve the Same Demands and Needs: Proposed Plan	Alternative Reservoirs That Would Serve the Same Demands and Needs: Smaller Reservoir	No Action Plan
Dam				
Height	feet	120	100	NA[1/]
Crest length	feet	550	425	NA
Crest width	feet	30	30	NA
Material volume	cu. yds.	363,000	220,000	NA
Discharge capacity				
Outlet works	cfs	305	210	NA
Spillway	cfs	775	775	NA
Reservoir capacity				
Active storage	acre-feet	14,500	5,400	NA
Inactive and dead storage	acre-feet	2,500	2,500	NA
Total	acre-feet	17,000	7,900	NA
Surface area				
At top of active capacity	acres	604	362	NA
At top of inactive and dead capacity	acres	144	144	NA
Average during recreation season[2/]	acres	454	238	NA
Drawdown				
Average annual	feet	12	16	NA
Average during recreation season[2/]	feet	9	14	NA
Maximum	feet	18	22	NA
Drawdown				
Average annual	acre-feet	5,058	4,059	NA
Average during recreation season[2/]	acre-feet	4,043	3,513	NA
Pipelines				
Oak Creek				
Length	miles	2.5	2.5	NA
Capacity	cfs	2.5	2.5	NA
Diameter	inches	10	10	NA
East Bench				
Length	miles	13.5	13.5	NA
Capacity	cfs	21.5	21.5	NA
Diameter	inches	27.18	27.18	NA
Upper Cottonwood Creek				
Length	miles	0.8	0.8	NA
Capacity	cfs	50	50	NA
Diameter	inches	30	30	NA
Narrows Tunnel Rehabilitation				
Length	feet	3,100	3,100	NA
Capacity	cfs	60	60	NA
Diameter	inches	36	36	NA
SR-264 Relocation				
Length	miles	2.9	2.9	NA
Width	feet	24	24	NA

1/ NA = Not applicable.
2/ June through September.

Table S-2
Comparison of Narrows Project Proposed Plan and Alternatives

Item	Unit	Alternative Reservoirs That Would Serve the Same Demands and Needs: Proposed Plan	Alternative Reservoirs That Would Serve the Same Demands and Needs: Smaller Reservoir	No Action Plan
Project structures and purposes				
Structural features				
Narrows Dam				
Material volume	cu. yds.	363,000	220,000	NA[1/]
Narrows Reservoir				
Capacity	acre-feet	17,000	7,900	NA
Activity storage	acre-feet	14,500	5,400	NA
Minimum pool	acre-feet	2,500	2,500	NA
Surface area	acres	604	362	NA
Tunnel rehabilitation	yes/no	yes	yes	NA
Pipelines	miles	17	17	NA
Relocated road	miles	2.9	2.9	NA
Water Supply				
Irrigation	acre-feet	4,920	4,420	NA
Municipal	acre-feet	480	480	NA
Project lands				
Supplemental service	acres	15,420	15,420	NA
Required for project features	acres	1,868	1,263	NA
Project impacts				
Settlement Agreement				
Terms met	yes/no	yes	yes	no
Water rights	yes/no	yes	yes	no
Colorado River water quality and quantity				
Annual salt-loading reduction	tons	1,580	1,414	0
Annual depletion from Colorado River System	acre-feet	5,557	4,974	0
Net increase in salinity concentration at Imperial Dam	milligrams/liter	0.55	0.50	0
Beneficial effects				
General recreation	recreation days	32,700	17,100	0
Campgrounds	units	60	40	0
Day-use areas	units	10	6	0
Minimum pool	acre-feet	2,500	2,500	0
Flatwater fishery (average during recreation season)	acres	454	238	0
Flatwater fishery	angler days	13,700	7,200	0
Winter flow provided for fishery stream	miles	6.1	6.1	0

Table S-2 (continued)
Comparison of Narrows Project
Proposed Plan and Alternatives

Item	Unit	Alternative Reservoirs That Would Serve the Same Demands and Needs: Proposed Plan	Alternative Reservoirs That Would Serve the Same Demands and Needs: Smaller Reservoir	No Action Plan
Adverse effects				
Cultural resource sites	no. affected	3	3	0
Endangered species				
Plants jeopardized	number	None	None	None
Fishes jeopardized 2/	number	None	None	None
Wildlife jeopardized	number	None	None	None
Stream fishery affected	miles	26.3	25.8	0
Wetlands affected	acres	100	72	0
Upland wildlife habitat loss	acres	487	269	0
Scofield Reservoir Average contents 3/	acre-feet	30,194	30,713	36,953
Mitigation				
Stream fishery channel/ habitat improvement	miles	3	3	0
Creation of spawning/ rearing habitat	stream miles	2.3	1.8	0
Wetlands created	acres	220	135	0
Upland habitat improvement	acres	1,690	790	0
Riparian corridor purchase and/or enhancement	miles	15.5	15.5	0
Project Cost	million dollars	17.3	15.5	NA

1/ NA = Not applicable.
2/ With implementation of conservation measures recommended by Fish and Wildlife Service in their final Biological Opinion dated March 25, 1992.
3/ Scofield Reservoir average contents based on average conditions for 1960-92 hydrologic period.

years with average or above average precipitation, the full 5,400 acre-foot water right would be available. However, in years with below average precipitation, the available water supply could be reduced by more than 70 percent.

Other features of the project would be the same as those for the Recommended Plan and would include construction of pipelines, rehabilitation of the existing Narrows Tunnel, and the relocation of SR-264. Recreation facilities would be provided at Narrows Reservoir. In addition, seven of the nine specific fish and wildlife measures included in the Recommended Plan would also be included in this plan.

No Action Plan

The No Action Plan represents the conditions of the affected area without development. It establishes the baseline for evaluating environmental impacts of providing a supplemental irrigation supply to north Sanpete County. It also establishes anticipated conditions in the affected areas without development and assumes that irrigation operations would continue according to historic use.

Under this alternative, the Narrows Dam and Reservoir would not be constructed. Without the dam construction, there would be no need to relocate Highway SR-264 and there would be no recreation facilities constructed at the reservoir site. The existing Narrows Tunnel would not be rehabilitated, and the risk of its complete collapse and failure would increase over time. If the tunnel were to collapse, some type of emergency funding measure would be required to repair it. The East Bench, Oak Creek, and Upper Cottonwood Creek Pipelines would not be built. Irrigated farmland in north Sanpete County would continue to experience an average annual water shortage of about 30 percent. The demand on municipal water supplies in Fairview, Mount Pleasant, Spring City, and Moroni would continue to increase as supplies for outdoor municipal uses run short and as population increases.

There would be no wetlands, wildlife, nor fisheries mitigation measures implemented under the No Action Plan because there would be no impact to existing wetlands and wildlife habitat. Stream flows in Cottonwood, Gooseberry, and Fish Creeks would remain unaltered from their present state. Under this plan there would be no flatwater fishery developed in the proposed reservoir basin.

Alternatives Considered and Eliminated From the Study

Several alternatives which were considered were determined to be nonviable. Those alternatives are summarized below.

Alternative Damsite Plan

An alternative damsite for the Narrows Dam was evaluated and presented at the public scoping meetings. That plan would serve the same purposes as the Recommended Plan. The dam would be located in the valley upstream from the Narrows Damsite. However, conditions set forth in the 1984 Compromise Agreement dictate site location and storage capacity of the project reservoir. If those conditions are not met, a breach of contract would result and the water rights agreement for the project would be null and void. The Sanpete Water Conservancy District received a letter from the attorney who represents the Carbon Water Conservancy District and the Price River Water Users Association which indicates that the damsite for this plan is not covered by and would breach the existing 1984 water rights agreement. Because of these institutional constraints, there are no water rights for the Alternative Damsite Plan.

Because the dam for the Alternative Damsite Plan has a very long crest length (about 5,000 feet) it is over 2.5 times more expensive than the dam for the Recommended Plan. A financial analysis of this alternative shows that the water users would be unable to repay the cost of this alternative. For the above reasons, this plan is considered to be nonviable and has been eliminated from further study.

Year-round Release Alternative

To minimize impacts to Cottonwood Creek, a year-round release alternative was considered. Under this alternative irrigation water would be released throughout the year, thus decreasing peak flows which could widen and potentially destabilize

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CHAPTER 1 - PURPOSE AND NEED

CHAPTER 1 - PURPOSE AND NEED

Introduction

The purpose of this document is to present the environmental impacts that would occur if any one of the alternatives to the Narrows Project were constructed and operated. The project is a multi-purpose water development that would provide a supplemental irrigation water supply for presently irrigated lands in north Sanpete County, Utah; additional municipal water for several small communities; recreation facilities; and fish and wildlife enhancement. It involves a transbasin diversion of water from Gooseberry Creek, a tributary of the Price River, to the San Pitch River System. The project would be funded, built, and operated by the Sanpete Water Conservancy District (SWCD), hereafter referred to as the "Sponsor" in this document. The Sponsor has filed a notice with the Bureau of Reclamation (Reclamation) indicating that it intends to apply for a Federal loan to construct the project under the provisions of the Small Reclamation Projects Act (SRPA) of 1956.

As part of the proposed plan, the Sponsor plans to release project water through the existing Narrows Tunnel which was built in 1964 as a precursor to the North Sanpete Watershed Work Plan; a plan sponsored by the U.S. Department of Agriculture to implement the final two portions of the Gooseberry Project Plan. Since that time, it has been used only by the Cottonwood-Gooseberry Irrigation Company because diversion features have not yet been constructed which would permit use by the SWCD users. Those features would be constructed under this proposed development.

Several significant issues were identified very early in the planning process. Because of this, the decision was made to not prepare an Environmental Assessment (EA) but to proceed directly to the preparation of an Environmental Impact Statement (EIS). The scoping process for the Narrows Project was initiated with public scoping meetings held on October 3 and 4, 1990, in Fairview and Price, Utah. Subsequent to the public scoping meetings, interagency scoping and coordination meetings were also held that same month in Provo and Price, Utah.

In preparing the Draft Environmental Impact Statement (DEIS), information was received from various Federal, State, and other agencies and organizations concerning the present environment and expected impacts of the project. The Fish and Wildlife Service (FWS) and the Forest Service (FS) provided planning aid memorandums concerning possible impacts of the project and also recommended recreation, fish and wildlife mitigation plans, which were incorporated into the proposed plan. Coordination is on-going with those two agencies. Information on the geology and mineral resources of the unit area and water quality data came from such agencies and organizations as the Environmental Protection Agency (EPA); the U.S. Geological Survey (USGS); the Corps of Engineers (COE); the Bureau of Mines; Utah State University; Brigham Young University; and the Southeastern Association of Governments. Franson-Noble & Associates, Inc.; Dames & Moore; and Engineering-Science, Inc.; all under contract, reported on socioeconomic conditions, geology, soils, vegetation, aquatic ecology, wetlands, water quality and terrestrial wildlife. Information on the historic and prehistoric cultural resources was

provided by the University of Utah. The State Historic Preservation Officer (SHPO) assessed the impacts of the proposed action on cultural resources in the project area.

Location and Climate

The Wasatch Plateau Range is the principal topographic feature of both Sanpete County and Carbon County. It separates them geographically north and south. The Great Basin, Colorado Plateau, and Rocky Mountains all converge near north Sanpete County. Sanpete Valley, where the land to be served by supplemental irrigation is situated, is about 8 miles wide and 33 miles long. Elevations in the valley range from 5,500 to 6,200 feet. These elevations include benches, terraces, washes, uplands, badlands, and flood plains--all cut from soft sedimentary rocks. The valley encompasses an area of some 170,000 acres. It is bordered on the east by the Wasatch Plateau and on the west by the San Pitch Mountains. It is drained by the San Pitch River, a northern tributary of the Sevier River, which drains that part of the Bonneville Basin lying south of the Great Salt Lake drainage. Head waters of the San Pitch River are located on the mountainous Wasatch Plateau at elevations reaching over 10,000 feet. The proposed reservoir and wetland mitigation sites are located near 9,000 feet. There the bedrock formations are sandstone, shale, and limestone.

Sanpete County is separated from the main Utah route (I-15) south to California by high mountains and plateaus. The project area includes lands surrounding the small rural communities of Fairview on the north, Mount Pleasant and Spring City on the south, and Moroni to the west. U.S. Highway 89 extends through the Narrows Project service area, connecting Fairview, Mount Pleasant, Ephraim, and Manti (the county seat) with Salt Lake City--about 130 miles to the north. Utah State Highway 30 connects Spring City, Moroni and Fountain Green, the other three principal communities in the area, with I-15 at Nephi. The damsite is within 2 miles of the intersection of two State highways (SR-31 and SR-264). Both highways have been designated as National and State Scenic Byways. SR-31 connects Fairview in the Sanpete Valley with Huntington in Emery County. SR-264 connects Scofield with SR-31 at Skyline Drive. U.S. Highway 50/6 extends through Carbon County. It connects Price, the county seat, with Salt Lake City--about 120 miles to the north.

The climate of the project service area is semiarid to arid. It is characterized by wide daily and annual variations in both temperature and precipitation. There are four, well-defined seasons. Precipitation in the valley varies with elevation, but ranges from 10 to 14 inches annually, mostly occurring as winter snow.

Authorization and Compliance with Environmental Regulations

The specific law under which the Sanpete Water Conservancy District was organized is the Utah Water Conservancy Act, Sections 73-9-1 to 73-9-43 (1990). This Act provides the Sponsor with the powers of eminent domain; the authority to hold water rights; to construct and operate irrigation works; the right to contract with the Federal Government and other political entities; the right to sell bonds; and the power to tax water users within the District. Under this Act, the irrigation

development would be constructed and operated. Funding for the environmental studies is provided by the Sponsor.

This document has been prepared to address the full range of potential environmental impacts that might occur if the Narrows Project were to be constructed. Reclamation serves as the lead Federal agency responsible for ensuring compliance with the National Environmental Policy Act (NEPA) of 1969.

Funding for the proposed project would be provided through the SRPA, Public Law (PL) 84-984, as amended. That law was enacted to encourage State and local participation in development of new and improvement of older projects, with emphasis on rehabilitation and betterment (R&B) of existing projects for purposes of significant conservation of water, energy, the environment, and water quality control. Key provisions of the small project legislation are simplified planning, review, and authorizing procedures; and provisions whereby the local sponsor would be in charge, and with their consultant, make the key decisions within broad Federal guidelines.

Project Water Rights

The Narrows Project would be operated according to Utah water law. Utah has a priority system to allocate surface waters for beneficial use. A priority date is assigned based upon the year an application is filed with the State Engineer. Use of the water is then prioritized, with the earliest priority date receiving the first call on water. Reclamation has assigned to the Sponsor three separate water rights specifically for the proposed development. All have a priority date of 1941 and total 17,000 acre-feet and 160 cubic feet per second (cfs). In a water right agreement dated June 8, 1984, and now known as the Compromise Agreement, the Price River Water Users Association (PRWUA) subordinated their water rights to those held by the Sponsor. The subordination was in exchange for other valuable considerations, including additional storage rights in Scofield Reservoir. This subordination does not affect all water users on the Price River, but just those parties who signed the 1984 agreement. As a result of that agreement, the Sponsor has the first right on Gooseberry Creek, subject to certain exceptions and conditions agreed to between the parties. Attachment D is a copy of that agreement.

Participating Organizations

The Sponsor would review and approve all plans of the Narrows Project. It would finance, construct, operate and maintain the project. The Sponsor would acquire all lands necessary for construction and operation of the project. It would contract with an engineering firm and others for studies and designs required to complete the project and negotiate agreements for the sale of water. The Sponsor is also required to comply with applicable county, State, and Federal rules and regulations regarding land use, water quality protection, and construction.

In addition to Reclamation's involvement in the project, other Federal agencies are involved in various development stages. Coordination, as described earlier, is on-going with COE and FWS regarding water quality, fish and wildlife measures, and

endangered species. The FS has been, and would continue to be, involved in all stages of the development process of Narrows Project.

The Utah Division of Water Quality has provided assistance and coordination in water quality 402 permits. The Utah Division of Wildlife Resources (UDWR) has provided assistance in identifying and evaluating environmental impacts associated with the Narrows Project, especially impacts to wetlands, fisheries, and terrestrial wildlife.

Local agencies involved in contracts and agreements with the Sponsor include: Carbon Water Conservancy District (CWCD); Price River Water Conservation District; and PRWUA.

Purpose of the Project

The purpose of the Narrows Project is to develop additional municipal water and a supplemental water supply for presently irrigated lands in north Sanpete County, Utah. Development of the proposed project would satisfy long-standing water rights and agreements by completing the original Gooseberry Project plan. The project would also provide recreation opportunities and fish and wildlife enhancement.

Need for the Project

The Sponsor cites the following needs for the proposed Narrows Project:

- Providing an increased and more dependable irrigation water supply;
- Providing additional municipal water;
- Honoring long-standing water rights contracts and agreements;
- Improving water conveyance facilities; and
- Improving recreation and fishery opportunities.

Increased Irrigation Water Supply

An increased and more dependable irrigation water supply is needed to improve and stabilize the agricultural sector of the local economy of Sanpete County. Since the average rainfall during the growing season is approximately 4 inches, crop production in the project area is entirely dependent upon irrigation. Although water users have made many improvements to water distribution systems over the years, water shortages, often exceeding 50 percent, still occur. The existing water supply is mainly spring runoff that occurs with alternating high and low flows which seldom coincide with the irrigator's ideal demand pattern. With frequent water shortages, the irrigator has been unable to implement crop rotation and other

practices necessary for optimum production. In order to have a firm, reliable water supply, additional storage facilities are needed.

Increased Municipal Water Supply

Most of the water for irrigation of lawns and gardens within the cities of Fairview, Mount Pleasant, Spring City, and Moroni comes from the same sources as commercial irrigated lands. Consequently, the supplies run short in mid to late summer. When irrigation water runs short, higher demands are made on the culinary systems to keep lawns alive. Mount Pleasant imposed restrictions on outdoor watering during the summer of 1994 because water supplies were critically low. By providing additional water for outdoor municipal use, the higher quality culinary water can be conserved for indoor use. Additionally, as the population continues to increase, the shortages would become more severe in these communities. The Narrows Project would provide additional water supply for population growth.

Water Rights Contracts and Agreements

During World War II, replacement of Scofield Dam was expedited because potential failure of the existing dam posed a threat to the war effort. The Secretary of the Interior recommended immediate construction of Scofield Dam. He indicated that the remaining features of the Gooseberry Project Plan would also be recommended for construction after the war. Both the reconstruction of Scofield Reservoir and the construction of a new dam on Gooseberry Creek are part of the original Gooseberry Plan that was developed in the 1930's.

In 1943, a Tripartite Contract was signed by representatives of the Carbon Water Conservancy District, Price River Water Conservation District, and the United States. The contract established needed water rights agreements so the Scofield Project could proceed and the remaining Gooseberry Project features could later be constructed. The Scofield Project was authorized in June 1943 and completed in 1946. The dam on Gooseberry Creek was never built.

In 1984, an agreement (now known as the 1984 Compromise Agreement) was reached between the Sanpete Water Conservancy District, Carbon Water Conservancy District, and the Price River Water Users Association. This followed long-standing controversy and litigation concerning water rights issues related to the flows of the Price River System and its tributaries (including Gooseberry Creek). As part of the agreement, the Price River Water Users subordinated their water rights so that the Sanpete Water Conservancy District could divert water on a first priority basis.

Construction of the Narrows Project would satisfy the above described agreements and commitments.

Water Conveyance Improvements

Poor condition of some irrigation facilities compound the problems associated with the low precipitation and limited irrigation water supply. One of those facilities,

the Narrows Tunnel, is an existing water conveyance tunnel about 3,100 feet long. It was constructed in 1964 to divert irrigation water to the Fairview area and to eventually serve as the outlet for Narrows Reservoir. Since its construction almost 30 years ago, the tunnel has experienced relatively severe stability problems. Steel sets with wooden lagging were installed in selected areas of the tunnel to support the areas experiencing stability problems. The steel sets, however, were widely spaced and loose rubble significantly loaded the wooden lagging between sets. With time, the lagging began to fail, permitting roof and rib sloughing over significant portions of the tunnel. When it became evident that the tunnel could eventually close, 36-inch corrugated metal pipe (CMP) was installed through the least stable tunnel sections to maintain a waterway. This measure is considered to be only temporary because the CMP would eventually collapse due to rust or excessive earth loads.

Recreation Opportunities

The demand for recreation is increasing rapidly in the area where the proposed project is located. The more popular activities are fishing, boating, swimming, water skiing, camping, picnicking, hunting, and horseback riding.

Boating also ranks as one of the more popular outdoor recreation activities in Utah and not enough flatwater boating and boat launching lanes are presently available in Sanpete and Carbon Counties for local users. Information from the 1992 Utah State Comprehensive Outdoor Recreation Plan (SCORP) suggests that additional water-based recreation areas are needed for the potential growth in demand for recreation users throughout the State.

This need was included in the top 10 recreation issues in Utah as identified in public meetings conducted by the Utah Division of Parks and Recreation in 1985 and 1990. The SCORP states that "As Utah's population continues to grow, so does the demand for recreation facilities and opportunities. Obviously, the recreation system in place in 1970 or even 1980 is no longer adequate in the 1990's."

In identifying priorities for recreation development, the SCORP states that: "Generally, those projects in or near major urban and rural service centers would rank higher, particularly if they are water-related with multiple uses . . . ."

The 1986 Land and Resource Management Plan for the Manti-La Sal National Forest indicates the demand for developed recreation sites ". . . is expected to triple over the next 50 years. At this rate, demand for the Manti-La Sal National Forest is expected to exceed supply at some sites starting in the year 1990."

The Management Plan also states that: "Some lands, especially those next to reservoirs on the Forest, possess a high recreational value."

Fisheries

According to the Utah Division of Parks and Recreation, the most popular outdoor recreation activity in Utah is fishing. Because many high mountain reservoirs do not

have a minimum pool to maintain fisheries, fishing is overcrowded and additional flatwater fishing areas are needed

Background

Irrigation concerns in Sanpete County were addressed as early as 1867 when Fairview Lakes were constructed. Water was first delivered from the lakes to Cottonwood Canyon by way of a ditch that discharged into White Pine Fork. This conveyance system was later replaced by the existing Narrows Tunnel.

In 1933, the Reclamation recognized the need to develop a comprehensive water development plan on the Price River System to meet the water needs of both Carbon and Sanpete Counties. The plan which evolved became known as the Gooseberry Project Plan.

Originally, the Gooseberry Project Plan included three major features--(1) a dam on Gooseberry Creek with feeder canals from Brooks Canyon and Cabin Hollow Creeks; (2) a transmountain tunnel; and (3) an enlarged Scofield Reservoir to provide water by exchange to support the unrestricted transmountain diversion of water at the Narrows Dam site.

Replacement of Scofield Dam was expedited during World War II because potential failure of the existing dam posed a threat to the war effort. The Scofield Project was begun in 1943 and completed in 1946. It replaced the existing unsafe dam to stabilize the water supply in Carbon County. In addition, the reservoir storage capacity was enlarged to store surplus flow, mostly flood waters of the Price River, so that the remainder of the Gooseberry Project could be constructed after the war.

A plan to complete the Gooseberry Project was formulated in 1953 by Reclamation. Portions of the original Gooseberry Plan which would serve Sanpete Valley and which were not constructed during World War II would be constructed. In 1964 a transmountain tunnel, today known as the Narrows Tunnel, was constructed with a loan from the Utah Board of Water Resources. But after the tunnel was completed, controversy developed over the use of the Gooseberry Creek water for transmountain diversion. Further work of the plan came to a halt. But, that controversy has now been resolved. Specifically:

- On July 29, 1982, the Utah Supreme Court affirmed a ruling of the trial court holding that the PRWUA and the CWCD were bound by the terms of a 1944 tripartite contract by and between Reclamation, the CWCD and the PRWUA.

- On June 8, 1984, the earlier described Compromise Agreement was entered into by and between the Sponsor, the CWCD and the PRWUA

- On January 7, 1985, the Utah State Engineer issued Memorandum decisions approving the water applications covering the Gooseberry Project waters--both for Scofield

Reservoir and for the proposed Narrows Project. That decision incorporated many of the terms agreed upon in the Compromise Agreement reached by and between the Sponsor and the UDWR over instream flows and fishery releases from the proposed Narrows Dam

- On July 13, 1989, an agreement was reached by and between the District and the United States of America, acting through its Department of Justice, resolving the reserved rights claims of the United States to the Gooseberry Project waters.

Relationships With Other Projects

The Bonneville and Great Basins of the Upper Colorado River Basin have been the subject of several projects, plans, and programs discussed below. The proposed development would operate in cooperation with existing projects.

Central Utah Project

As part of the master water development plan for Sanpete County, the Narrows Project is intended to provide a supplemental supply for the northern part of the county. Central Utah Project (CUP) water, delivered by the Sevier River, was to provide a supplemental supply for the southern portion of the county. However, recent developments indicate that it is doubtful that CUP water will be delivered to the Sevier River Basin.

Scofield Project

The new Scofield Reservoir facility, authorized June 24, 1943, included 30,000 acre-feet of replacement storage capacity (replacing the then existing 30,000 acre-foot structure), 8,000 acre-feet of dead storage (conservation pool), and 35,000 acre-feet of exchange capacity to support the unrestricted transmountain diversion of Gooseberry Creek water at or about the Narrows damsite. The near doubling in size of Scofield Reservoir was originally accomplished for the sole purpose of implementing the Gooseberry Project plan, a predecessor of the Narrows Project.

Fairview Lakes

Fairview Lakes would play an important role in providing wetlands and fishery mitigation for the Narrows Project. Through an operating agreement, releases would be made from Fairview Lakes to create additional wetlands and fish habitats.

Colorado River Salinity Control Program

To limit the salinity of the Colorado River and in response to the Federal Water Pollution Control Act (FWPCA) and its amendments (PL 92-500, 1972), the seven Colorado River Basin States adopted, and the EPA approved, salinity standards to meet numeric criteria listed below in Table 1-1.

Table 1-1
Numeric Criteria for the Lower Colorado River

Gaging Station	Annual Flow Weighted Concentration (mg/L)
Below Hoover Dam	723
Below Parker Dam	747
At Imperial Dam	879

The principal objective of the program is to improve downstream water quality in the lower Colorado River Basin, thereby assisting the Lower Basin States to meet salinity standards while the Upper Basin States continue to develop their compact-apportioned water. The Lower Basin States are Nevada, Arizona, and California. Upper Basin States are Wyoming, Colorado, Utah, and New Mexico. Utah's share of the Colorado River, with roughly one-fourth of the total Upper Colorado River supply, was guaranteed under a 1922 agreement known as the Colorado River Compact, hence the term "compact-apportioned water."

Recovery Implementation Program for Endangered Fish Species of the Upper Colorado River Basin

On January 21-22, 1988, the Secretary of the Interior, the governors of Wyoming, Colorado, and Utah, and the Administrator of the Western Area Power Administration were cosigners of a Cooperative Agreement to implement the "Recovery Implementation Program for Endangered Fish Species in the Upper Colorado River Basin." An objective of the Recovery program was to identify reasonable and prudent alternatives that would ensure the survival and recovery of the listed species, while providing for new water development in the upper Colorado River Basin.

The following excerpts are pertinent because they summarize the portions of the Recovery Program that address depletion impacts, consultation under Section 7 of the Endangered Species Act, and project proponent responsibilities:

> All future Section 7 consultations completed after approval and implementation of this program (establishment of the Implementation Committee, provision of Congressional funding, and initiation of the elements) will result in a one-time contribution to be paid to the Service by water project proponents in the amount of $10.00 per acre-foot based on the average annual depletion of the project . . . This figure will be adjusted annually for inflation . . . Concurrently with the completion of the Federal action which initiated the consultation, e.g., . . . issuance of a 404 permit, 10 percent of the total contribution will be provided. The balance . . . will be. . . due at the time the construction commences.

Of the one-time contribution, 50 percent would be used for acquisition of water rights to meet the instream flow needs of the endangered fishes (unless otherwise recommended by the Implementation Committee). The balance would be used to support other recovery activities for the Colorado River endangered fishes.

CHAPTER 2 - ALTERNATIVES INCLUDING PROPOSED ACTION

CHAPTER 2 - ALTERNATIVES INCLUDING PROPOSED ACTION

General Discussion

The purpose of this chapter is to describe the alternatives for developing the Narrows Project's water rights to the Price River and its tributaries. The project would include a transbasin diversion of water from the Scofield Reservoir drainage of the Price--Green--Colorado River Basins to the San Pitch--Sevier River of the Great Basin. The dam and diversion works would be located in the Gooseberry Valley tributary to Scofield Reservoir. The service area would be situated in the San Pitch River drainage.

Chapter 1 includes a description of court rulings, State Engineer memorandum decisions, and water right agreements. The 1984 Compromise Agreement and the January 7, 1985, Memorandum Decision issued by the State Engineer have the effect of imposing constraints on the range of alternatives that may be considered in developing and using the water rights for the Narrows Project. These constraints are summarized as follows:

- The center point of Narrows Dam is to be located on Gooseberry Creek north 624 feet and east 1,200 feet from the west quarter corner of Section 19, Township 13 South Range 6 East SLB&M.

- The transmountain diversion of water from Narrows Reservoir is limited to 5,400 acre-feet per year.

- The active capacity of Narrows Reservoir shall not exceed 14,500 acre-feet.

- The Sponsor shall maintain a minimum flow of 1.00 cfs immediately below Narrows Dam. If stream flow near the Gooseberry Creek Campground falls below 1.50 cfs, the Sponsor shall release up to an additional 0.25 cfs to help maintain a 1.50 cfs flow near the Gooseberry Creek Campground.

- The Narrows Dam shall be constructed to allow discharge form various elevations in the reservoir and releases shall be coordinated with the UDWR to optimize the water temperatures of the releases.

The Sponsors have performed detailed technical and economic analyses for several development and non-development alternatives which involve conservation, various design options, and different locations for the dam. A total of nine alternatives are presented in this statement. Plans studies in detail included the following:

- Recommended Plan

- Smaller Reservoir Plan
- No Action Plan

A summary of the design data for these alternatives is presented in Table 2-1. Nonviable alternatives, which were studied in less detail, include:

- Alternative Damsite Plan
- Year-round Release Plan
- Groundwater Development Without Import
- CUP Water
- Direct Diversion Without a Reservoir
- Conservation Without Development of Additional Water Supplies

Detailed Description Of Alternatives

Recommended Plan

A supplemental water supply would be developed for presently irrigated lands and municipal water users in north Sanpete County under the Recommended Plan. A dam and reservoir would be constructed on Gooseberry Creek and water would be diverted through an existing tunnel to Cottonwood Creek. Pipelines would be constructed to deliver the water to existing water distribution systems. Recreation facilities would be developed and a minimum pool for fish habitat would be provided. Mitigation measures would be implemented to offset adverse impacts to wetlands, terrestrial wildlife, and stream fisheries. In addition to mitigation measures to offset project impacts, other measures would be included to enhance or improve fish and wildlife habitat. The Frontispiece Map shows the Narrows Project general plan.

Water Supply and Use

Water that would be provided from the project would come from upper Gooseberry Creek and its tributaries which are located above Scofield Reservoir in the Price River drainage. The upper Gooseberry Creek drainage has an average annual flow of about 10,000 acre-feet. Of that amount, about 2,200 acre-feet per year is a transmountain diversion to the Cottonwood-Gooseberry Irrigation Company. That irrigation company also obtains an additional water supply from Boulger Canyon, a tributary to Huntington Creek.

The majority of the flow in upper Gooseberry Creek comes from direct snowmelt. Peak flows in May and June are several times greater than flows during the remainder of the year.

Table 2-1
Summary of Design Data for Narrows Project
Proposed Plan and Alternatives

Item	Unit	Alternative Reservoirs That Would Serve the Same Demands and Needs: Proposed Plan	Alternative Reservoirs That Would Serve the Same Demands and Needs: Smaller Reservoir	No Action Plan
Dam				
Height	feet	120	100	NA[1]
Crest length	feet	550	425	NA
Crest width	feet	30	30	NA
Material volume	cu. yds.	363,000	220,000	NA
Discharge capacity				
Outlet works	cfs	305	210	NA
Spillway	cfs	775	775	NA
Reservoir capacity				
Active storage	acre-feet	14,500	5,400	NA
Inactive and dead storage	acre-feet	2,500	2,500	NA
Total	acre-feet	17,000	7,900	NA
Surface area				
At top of active capacity	acres	604	362	NA
At top of inactive and dead capacity	acres	144	144	NA
Average during recreation season[2]	acres	454	238	NA
Drawdown				
Average annual	feet	12	16	NA
Average during recreation season[2]	feet	9	14	NA
Maximum	feet	18	22	NA
Drawdown				
Average annual	acre-feet	5,058	4,059	NA
Average during recreation season[2]	acre-feet	4,043	3,513	NA
Pipelines				
Oak Creek				
Length	miles	2.5	2.5	NA
Capacity	cfs	2.5	2.5	NA
Diameter	inches	10	10	NA
East Bench				
Length	miles	13.5	13.5	NA
Capacity	cfs	21.5	21.5	NA
Diameter	inches	27.18	27.18	NA
Upper Cottonwood Creek				
Length	miles	0.8	0.8	NA
Capacity	cfs	50	50	NA
Diameter	inches	30	30	NA
Narrows Tunnel Rehabilitation				
Length	feet	3,100	3,100	NA
Capacity	cfs	60	60	NA
Diameter	inches	36	36	NA
SR-264 Relocation				
Length	miles	2.9	2.9	NA
Width	feet	24	24	NA

1/ NA = Not applicable.
2/ June through September.

All of the project's irrigation supply, about 4,920 acre-feet per year, would be used on 15,420 acres to supplement the existing irrigation supply. This supplemental service would reduce shortages from their present level of 30 percent to about 19 percent. Project irrigation supplies, as with existing irrigation supplies, are expected to be used primarily for production of crops such as alfalfa and grass hay to support beef and dairy enterprises.

A total of 480 acre-feet per year of municipal water would be used in Fairview, Mount Pleasant, Spring City, and Moroni. This water would be used to supplement existing supplies for irrigation of lawns and gardens, thus preserving the high quality municipal water for indoor use.

Water sales contracts would require that the irrigators implement water conservation measures and improve the overall efficiency of their irrigation systems in order to be eligible to receive project water. These measures might include implementation of sprinkler irrigation, use of gated irrigation pipe, or some other high-efficiency irrigation technique. As a result, the irrigators would enhance their operations and would, at the same time, make the most efficient use of existing and project water supplies.

Construction Features and Project Operations

General

The principal construction features of the Narrows Project would be one reservoir and three pipelines. Narrows Dam and Reservoir (Figure 2-1) would be constructed on Gooseberry Creek and would provide storage for the project water supply. Oak Creek Pipeline would convey water to the Oak Creek Irrigation Company, north of the community of Fairview. East Bench Pipeline would convey project water from an existing diversion dam on Cottonwood Creek southward to areas of use along the east bench. Upper Cottonwood Creek Pipeline would carry project water from the Narrows Tunnel outlet to the confluence of Cottonwood Creek and Left Hand Fork to protect the stream channel from increased flows that would occur without the pipeline.

Other important features of the project would be the rehabilitation of the existing Narrows Tunnel and the relocation of SR-264. Recreation facilities, primarily for boating, camping, and picnicking, would be provided at Narrows Reservoir to help satisfy projected recreation needs in the area.

Specific fish and wildlife measures include:

- Restoring year-round flows in two small tributaries to Gooseberry Creek;
- Providing minimum flows in Gooseberry Creek below Narrows Dam;

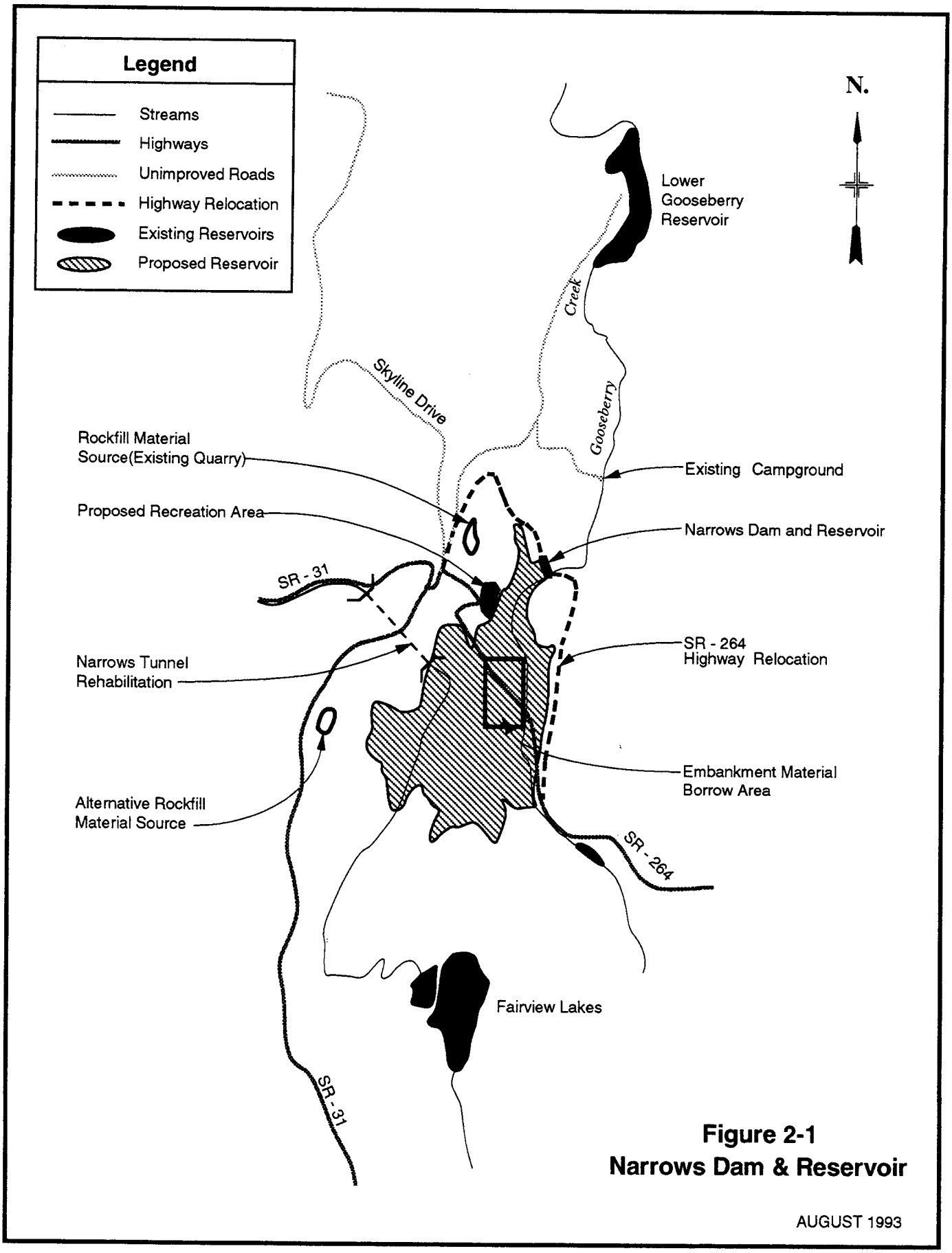

Figure 2-1
Narrows Dam & Reservoir

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- Providing a multiple-level outlet at Narrows Dam to regulate the temperature of releases to Gooseberry Creek from Narrows Reservoir;
- Stabilizing stream banks along middle Gooseberry Creek;
- Providing releases from the Narrows Reservoir for flushing flows and for fish habitat during critical periods;
- Acquiring private land with live streams passing though it and improving and protecting the stream channel and riparian zone;
- Providing winter releases to Cottonwood Creek;
- Providing summer flows in lower Cottonwood Creek;
- Constructing a pipeline in the upper Cottonwood Creek area to convey project water outside the stream channel;
- Providing a minimum pool in Narrows Reservoir for fish; and
- Reducing external phosphorus loading to Scofield Reservoir.

Mitigation and enhancement of upland habitat (quantified in terms of mule deer and Brewer's sparrow habitat units, each of which represent a group of wildlife species dependent on similar habitat) would be provided in the following ways:

- Participating in watershed and range improvement projects on the Manti-La Sal National Forest;
- Acquiring conservation easements around the Narrows Reservoir; and
- Acquiring and fencing private land adjacent to the Price River below Scofield Reservoir to protect wildlife habitat;

New wetlands would be created to mitigate for wetlands areas inundated by the reservoir.

Design and Operation

Narrows Dam and Reservoir

Narrows Dam and Reservoir would be constructed on Gooseberry Creek, about 9 miles east of Fairview, Utah (see Frontispiece Map). The dam would be a zoned earthfill embankment structure using locally available earth material. The embankment would have 3:1 (horizontal to vertical) slopes upstream and downstream. The proposed crest width of 30 feet would allow Highway SR-264 to cross the dam. The embankment zones would consist of a relatively impervious

core, a random zone both upstream and downstream of the core, and a rockfill zone on the upstream face for slope protection. The embankment would contain a total volume of 363,000 cubic yards of material.

Narrows Reservoir would have two outlets. A Gooseberry Creek outlet would be constructed through the dam to provide downstream releases for fisheries and emergency evacuation of the reservoir. This outlet would have a capacity of 305 cfs. Multiple level outlets would be provided to allow temperature control of water released to Gooseberry Creek. Narrows Tunnel, with a capacity of 60 cfs, would serve as the other reservoir outlet and would accommodate releases through the mountain ridge for the transbasin diversion.

Preliminary designs for the dam call for separate low-flow outlets at three different levels within the reservoir. These outlets would have their own gates and would be able to deliver up to a 10 cfs release even when the main outlet is being inspected or maintained.

The spillway would be a drop inlet (morning glory) structure and would have a discharge capacity of 775 cfs. The probable maximum thunderstorm flood could be safely stored in the reservoir without overtopping the dam. However, the spillway, in combination with the outlet works' discharge capacity, would protect the dam against the 100- and 10,000-year snowmelt floods.

The reservoir formed behind the dam would extend about 2 miles up Gooseberry Creek and would have a total capacity of 17,000 acre-feet and a water surface area of about 604 acres. All of the average annual storable flows to the reservoir, about 8,185 acre-feet, would come from Gooseberry Creek.

The reservoir's active capacity, or that portion of stored water that would be used to satisfy project water needs, would consist of 14,500 acre-feet. The dead and inactive capacities of about 2,500 acre-feet would form the reservoir's minimum pool and would not be drawn upon in order to benefit recreation and fishing use at the reservoir. The reservoir is designed for long-term carry-over storage. The dead and inactive storage would be more than adequate to store the 100-year inflow of sediment into the reservoir. Less than 20 acre-feet of sediment would accumulate in a 100-year period, which is less than 1 percent of the inactive capacity. A summary of the design data for Narrows Dam and Reservoir was shown in Table 2-1.

Narrows Reservoir would fluctuate on a seasonal basis as water is released during the irrigation season. The drawdown would average about 12 feet annually. Under existing water rights agreements, a maximum of 5,400 acre-feet (without evaporation) per year of project water would be released through Narrows Tunnel. The reservoir would provide long-term carryover storage for consecutive drought years.

Oak Creek Pipeline

The Oak Creek Pipeline would be an 10-inch-diameter polyvinylchloride (PVC) buried pipeline with a capacity of 2.5 cfs and a length of 2.5 miles. The pipeline

would convey water to the Oak Creek Irrigation Company, north of Fairview. A right-of-way 30 feet wide and 2.5 miles long would be required.

East Bench Pipeline

The East Bench Pipeline would convey project water from an existing diversion dam on Cottonwood Creek southward to areas of use along the east bench. The pipeline would have a total length of 13.5 miles and would have a capacity at its head of 21.5 cfs. The pipeline would include 1.4 miles of reinforced concrete pipe, 4.2 miles of concrete cylinder pipe, and 7.9 miles of PVC pipe. Pipe diameters would range from 27 to 18 inches. The pipeline would deliver water to the Spring Creek, Birch Creek, North Creek, Pleasant Creek, Twin Creek, Cedar Creek, and Horseshoe Irrigation Companies. Water delivered to each irrigation company would be discharged from the pipeline into the regulating pond for each company's pressurized irrigation system. This pipeline would also have a 30-foot-wide right-of-way.

Upper Cottonwood Creek Pipeline

A 50-cfs-capacity pipeline would be constructed from the Narrows Tunnel outlet to the confluence of Cottonwood Creek and Left Hand Fork. The 30-inch diameter pipeline would carry project water outside the stream to prevent damage to the channel. It would be constructed in the shoulder of SR-31 and would have a length of about 0.8 mile. At the tunnel outlet, a control structure would divide the flow. A portion of the flow, that desired for instream flow and the flow in excess of the pipeline capacity, would be released to Cottonwood Creek to improve the fishery. The remainder of the flow would be conveyed in the pipeline. The pipeline flow would be discharged into Cottonwood Creek at the confluence with Left Hand Fork. A special use permit would provide a right-of-way 30 feet wide and 0.8 mile long.

Narrows Tunnel Rehabilitation

The Narrows Tunnel is an existing water conveyance tunnel approximately 3,100 feet long. The tunnel, which was completed in 1968, was constructed to divert irrigation water to the Fairview area and to eventually serve as the outlet for Narrows Reservoir. Since its construction, the tunnel has experienced relatively severe stability problems. Steel sets with wooden lagging were installed in selected areas of the tunnel to support the unstable areas. The steel sets, however, were widely spaced and loose rubble significantly loaded the wooden lagging between sets. With time, the lagging began to fail, permitting roof and rib sloughing over significant portions of the tunnel. When it became evident that the tunnel could eventually close, 36-inch CMP was installed through the least stable tunnel sections to maintain a waterway. This measure is considered to be only a temporary fix because the CMP would eventually collapse due to rust or excessive earth loads.

The tunnel rehabilitation would be accomplished by mucking out the tunnel and installing steel sets and lagging for temporary support. Once the tunnel is fully open and clear, a 36-inch-diameter reinforced concrete pipe would be installed through the tunnel and backfilled to a height of 1 foot above the top of the pipe. The

backfill would provide lateral pipe support and protect the pipe from impact loads in the event that the temporary tunnel support deteriorates in the future. A control gate would be installed near the tunnel inlet to regulate releases through the tunnel. Following the rehabilitation, the tunnel would have a discharge capacity of 60 cfs.

State Road-264 Relocation

Narrows Reservoir would inundate about 0.8 mile of SR-264, which provides access between Fairview and Scofield, Utah. Under the project, the road would be relocated by constructing 2.6 miles of new road and providing asphalt surfacing for 0.3 mile of the existing gravel road to Lower Gooseberry Reservoir. The new road would cross Narrows Dam. The road relocation would increase the travel distance between Fairview and Scofield by 1.2 miles. The relocated road would have a total pavement width of 24 feet and would be designed to the same standard as the existing road.

Recreation Facilities

Public recreation facilities for the Narrows Project would be located along the northwest shore of Narrows Reservoir (see Figure 2-1). The facilities would include a boat ramp, boat slips, a day-use area with 10 picnic sites, restroom facilities, and a 60-unit campground. Access for the handicapped would be provided. Municipal water for the recreation facility would be supplied by developing a spring and pumping water to a new storage tank with a hydraulic ram. All recreation facilities would be constructed to FS standards. The FS would operate and maintain the recreation facilities.

Fishery Measures

A total of 11 fishery measures have been included in the project to mitigate for adverse impacts that have been identified with the project. To the extent possible, an attempt was made to mitigate "in place" and "in kind." The 11 mitigation measures are:

- **Restore Streamflow in Gooseberry Creek Tributaries** - Implementation of this aquatic mitigation procedure would consist of altering the release of water from Fairview Lakes, which is owned and operated by the Cottonwood-Gooseberry Irrigation Company. Presently, during the spring runoff period, water is stored in Fairview Lakes and released for irrigation use in the Fairview area. This release is a transbasin diversion of water to the San Pitch River drainage. With the historic operational pattern, the small tributaries to Gooseberry Creek located downstream from Fairview Lakes are dry several months each year. This mitigation measure involves providing year-round releases, averaging about 2.6 cfs, from Fairview Lakes into two of these tributaries to Gooseberry Creek. This amounts to an average flow of 1.3 cfs per channel. The total annual amount of water that is released from Fairview Lakes would not be

changed. However, the flow would be dispersed during the entire year rather than the present 18- to 20-week discharge period.

Water released from Fairview Lakes during the year would be captured and stored in Narrows Reservoir. Upon call by the Cottonwood-Gooseberry Irrigation Company, their water would be released through the Narrows Tunnel to the San Pitch River drainage. This mitigation measure not only provides aquatic mitigation benefits to the Narrows Project, but would provide both aesthetic and recreational benefits to Fairview Lakes. These benefits would be a result of the lakes being maintained at a higher water level during the prime summer recreational season.

The Sponsor would be responsible for entering into operating agreements necessary to implement these year-round releases. The Sponsor would also ensure that the releases are made according to environmental commitments. Approval of a loan under the SRPA would be contingent upon securing the agreements and an endorsement of the environmental commitments by the Sponsor.

Implementation of this mitigation measure would result in the creation of approximately 2.3 stream miles of spawning and rearing habitat for cutthroat trout.

- **Provide Minimum Flows Below Narrows Dam** - The Project plan calls for a minimum year-round release of 1 cfs from Narrows Reservoir to Gooseberry Creek. That flow, combined with flows from springs located immediately below the dam, is expected to produce a stream flow of at least 1.5 cfs at the Gooseberry Campground. If the flow at the campground is less than the expected 1.5 cfs, then up to an additional 0.25 cfs would be released to achieve that flow rate.

- **Provide a Multiple-Level Outlet at Narrows Dam** - A multiple-level outlet would be provided at Narrows Dam to regulate the temperature of water released to Gooseberry Creek. The outlet would be designed with a capacity of 10 cfs.

- **Stabilize Stream Banks Along Middle Gooseberry Creek** - This mitigation measure would involve narrowing the channel of Gooseberry Creek between Gooseberry Reservoir and Narrows Dam so it would provide better habitat with the reduced flows. It is expected that the channel would eventually narrow by itself due to the decreased flow. However, in order to expedite the process, certain man-made improvements would be made. Prior to construction of these improvements by the Sponsor, a detailed design would be developed by the Sponsor with coordination

with FS, the FWS, the COE, the UDWR, and the Utah Division of Water Rights. A 40-acre parcel of private land that the stream runs through would be acquired. Fencing would also be provided where needed to protect the stream from livestock. Middle Gooseberry Creek would be used as spawning and rearing habitat for cutthroat trout.

- **Provide Flushing Flows and Other Releases to Gooseberry Creek** - The project would provide releases from Narrows Reservoir to Gooseberry Creek in excess of the minimum 1 cfs release described above. These additional releases would be used to provide additional instream flows in excess of the 1 cfs minimum release or to flush accumulated silt and fine sediments from the streambed to enhance spawning habitat. The UDWR has expressed interest in using this water to provide additional inflow to Lower Gooseberry Reservoir during critical winter period when dissolved oxygen levels in the reservoir are low. The project would provide an average of 300 acre-feet per year of additional water for release to Gooseberry Creek. This water, released from carryover storage in Narrows Reservoir, could be used for fish habitat or flushing flows. The Project Sponsor in cooperation with the UDWR would determine the timing and quantity of water to be released each year. Because this water would be released to Gooseberry Creek, it would not count against the 5,400 acre-foot maximum transbasin diversion.

- **Acquire and/or Improve Stream Segments** - This measure would involve improving fishery habitat and fencing 15.5 miles of stream, 11.5 miles in the Price River drainage and 4 miles in the Spanish Fork River drainage. Most of these stream segments are on private land, therefore approximately 303 acres of right-of-way would be acquired. A corridor, averaging approximately 200-feet wide, would be acquired. Fishery habitat improvements such as riparian plantings and some minor channel work would be performed. About 2 miles of stream would be improved in conjunction with the Mud Creek wetland restoration area and 1 mile of stream would be improved in conjunction with the acquisition of 640 acres of wildlife habitat adjacent to the Price River below Scofield Reservoir. The various parcels of land would be contiguous with other public lands and would be managed in conjunction with those public lands. Memoranda of Understanding would be required between the Sponsor and the managing agencies. The corridor would be fenced with a pole top fence to protect the stream banks and riparian zone from damage caused by grazing. Where the adjacent land is used for grazing, selected stream access points for livestock watering would be provided or other alternative livestock watering means would be provided. Table 2-2 is a list of stream segments that have been

Table 2-2
Stream Segments to be Acquired and/or
Improved for Fishery Habitat

Stream Reach	Length of Stream (miles)	Proposed Managing Agency
Price River Basin		
Mud Creek	4.0	UDWR
Winterquarters Creek	2.5	UDWR
Pondtown Creek	2.0	FS
Fish Creek above Scofield Reservoir	1.0	FS
Price River below Scofield Reservoir	2.0	UDWR
Spanish Fork River Basin		
Starvation Creek	4.0	UDWR

recommended for this measure and the proposed managing agencies. Additional parcels would be identified and evaluated if necessary in order to achieve the mitigation goal. The streams improved and protected under this measure would provide habitat for all life stages of cutthroat, rainbow, and/or brown trout. A monitoring program would be established to ensure that the stream segments are acquired, improved, fenced, and maintained as planned.

- **Provide Winter Releases to Cottonwood Creek** - A release sufficient to maintain a minimum flow of 2 cfs would be made from Narrows Reservoir to Cottonwood Creek to increase the available fish habitat. Water released during the winter months would be stored in Wales Reservoir on a space-available basis.

- **Provide Summer Flows in Lower Cottonwood Creek** - A minimum instream flow of 2 cfs would be provided in lower Cottonwood Creek from the canyon mouth to the confluence with the San Pitch River. This measure would provide year-round flows in the stream which would support fish habitat and create a fishery for local residents and enhance the riparian corridor. This segment of stream has been historically dewatered during the irrigation season.

- **Construct Upper Cottonwood Creek Pipeline** - Upper Cottonwood Creek Pipeline would be constructed as described earlier in this chapter.

- **Provide a Minimum Pool in Narrows Reservoir** - A minimum pool of 2,500 acre-feet would be provided in Narrows Reservoir for fish habitat. This pool would not be drawn upon for

irrigation. At the minimum pool, the reservoir would have a surface area of 144 acres and a maximum depth of 58 feet.

- **Reduce External Phosphorus Loading to Scofield Reservoir** - This measure would help improve the water quality in Scofield Reservoir by reducing phosphorus loading and would be implemented in conjunction with the improvement of stream segments on tributary streams above Scofield Reservoir. About 9.5 miles of stream segments would be improved. The improvements would consist of bank stabilization, primarily through riparian plantings. The stream segments would also be fenced to protect them from grazing impacts. This measure would reduce the amount of sediment and animal waste and hence the amount of phosphorus flowing into the reservoir. Historically fish kills have occurred in Scofield Reservoir due to poor water quality. Phosphorus has been identified as the limiting nutrient in the eutrophication of the reservoir. Phosphorus loading occurs through several methods including inflow of sediments which are naturally high in phosphorus and animal waste. The Utah Division of Water Quality in a report entitled "Scofield Reservoir Restoration Through Phosphorus Control" concluded that:

> *The most pragmatic and effective means to control the further eutrophication of Scofield Reservoir, or possibly to effect a moderate reversal of the eutrophication process, appears to be a reduction of the phosphorus load to the lake.*

The Sponsor would have primary responsibility for implementation of all fishery measures described above. The Sponsor would be responsible for funding and acquiring all lands and rights-of-way. The Sponsor would fund and construct all improvements such as fencing and stream channel improvements. The Sponsor would provide water from its water rights or enter into operating agreements for all instream flows described above. This work would be performed concurrently with construction of other project facilities such as the dam, tunnel rehabilitation, and pipelines. All lands and rights-of-way would be acquired and initial construction of fishery measures will be completed prior to initial filling of the reservoir. The Sponsor would be responsible to fund all operation and maintenance costs of mitigation facilities. The Sponsor would be responsible to enter into a Memorandum of Agreement (MOA) with the UDWR and other appropriate agencies for all fishery measures. The MOA would clearly define the roles and responsibilities of the Sponsor, the UDWR, and other parties for implementation, monitoring, and maintenance of the fishery measures.

Wetlands Measures

Wetlands measures would be included in the project to mitigate for unavoidable adverse impacts to wetlands that have been identified with the project. Two alternative wetland mitigation sites have been identified. The actual mitigation that is implemented could be from one or a combination of both alternatives. Proposed wetland mitigation areas are shown in Figure 2-2. A brief description of each alternative follows.

- **Restore Wetlands Adjacent to Mud Creek Near Scofield** - This measure would entail purchasing about 220 acres of private land adjacent to Mud Creek, south of the town of Scofield. This land is a former wetland that has been severely damaged by cattle. It is anticipated that by removing the cattle the wetland vegetation would return on its own with little or no other outside measures. All or a portion of the required wetland mitigation could be performed at this site. This wetland area would be maintained by the Sponsor under an MOA with the UDWR.

- **Enlarge and Create New Wetlands Adjacent to Narrows Reservoir** - This alternative would include enlarging existing wetland areas and creating new wetlands adjacent to Narrows Reservoir. About 100 acres of new wetlands would be created adjacent to Narrows Reservoir. This would be accomplished by releasing water from Narrows Reservoir to inundate lands adjacent to existing wetlands. A new outlet from Fairview Lakes would be provided. The outlet would be designed to automatically begin releasing water once Fairview Lakes reaches a certain level. The releases would stop as the water level recedes in the fall. The water would be conveyed to and distributed within the wetland area by a system of open ditches. Some recontouring would be performed to ensure that the soils become saturated. All or a portion of the required wetland mitigation could be performed at this site. This wetland area would be maintained by the UDWR under a MOA with the Sponsor.

The wetlands measures would need to provide similar wildlife values as the 100 acres of wetlands that would be inundated by the reservoir. Careful monitoring of the mitigation sites would be conducted to ensure that the value of the mitigation sites is at least equal to the value of the wetlands lost. This determination would be accomplished by performing Habitat Evaluation Procedures (HEP) analyses of the sites and comparing habitat values.

The Sponsor would have primary responsibility for implementation of the wetlands measures described above. The Sponsor would be responsible for funding and acquiring all lands and rights-of-way. The Sponsor would provide and transplant any plantings needed. The Sponsor would be responsible to ensure that all fences are in good repair and are maintained properly. The Sponsor would also be

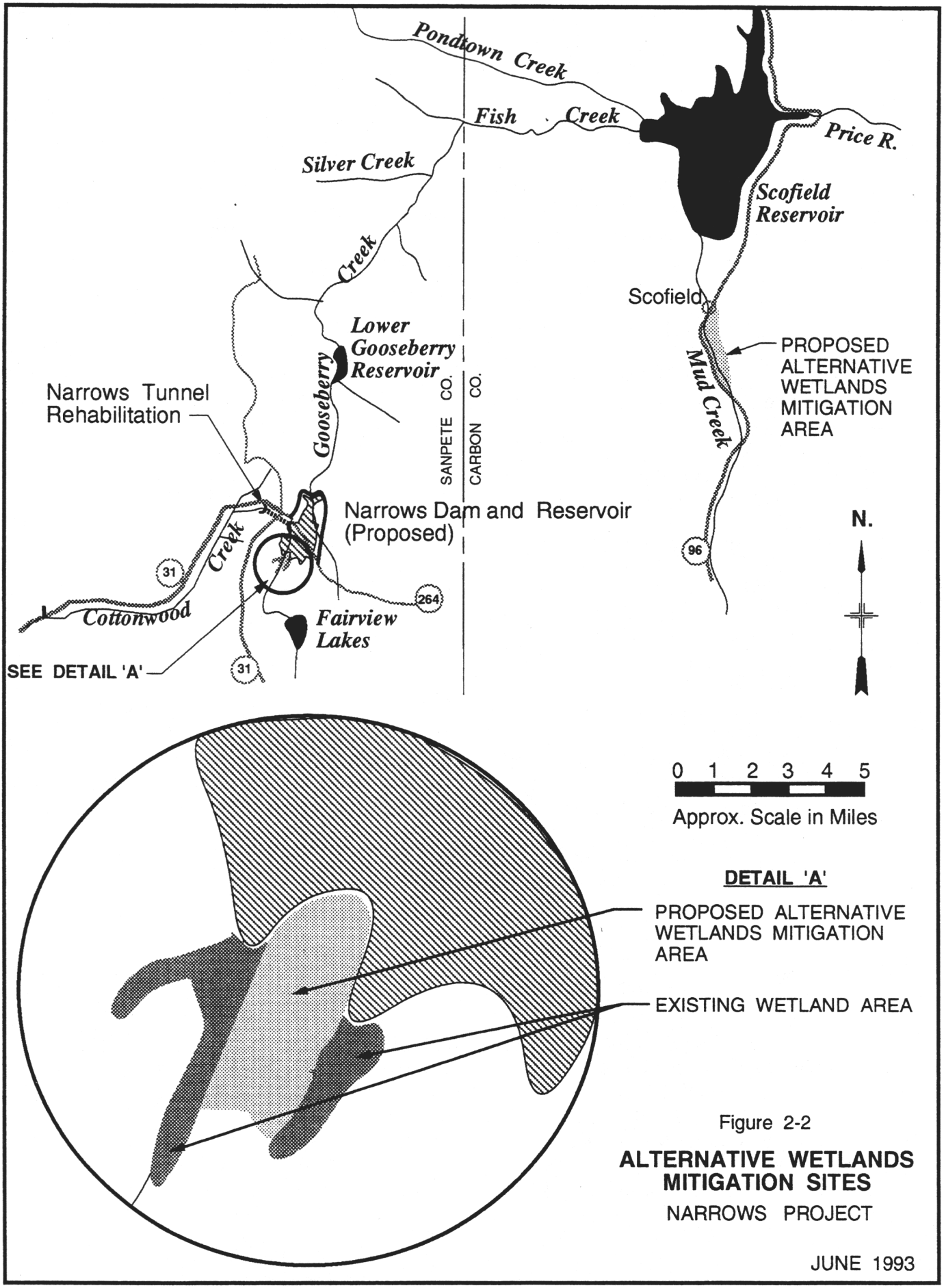

Figure 2-2

ALTERNATIVE WETLANDS MITIGATION SITES

NARROWS PROJECT

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responsible to install and maintain any diversion and/or irrigation facilities. This work would be performed concurrently with construction of other project facilities such as the dam, tunnel rehabilitation, and pipelines. All lands and rights-of-way would be acquired and initial construction of wetlands measures would be completed prior to initial filling of the reservoir. The Sponsor would also be responsible to fund the monitoring of the wetland mitigation. The Sponsor would be responsible to enter into Memorandums of Agreement with the UDWR, COE, and other appropriate agencies for all wetlands measures. The MOA's will clearly define the roles and responsibilities of the Sponsor, the UDWR, the COE, and other parties for implementation and maintenance of the wildlife measures.

Wildlife Measures

The wetlands measures described above would offset any losses to wetland habitat caused by inundation. Impacts to upland habitat (mule deer and Brewer's sparrow habitat) would be mitigated by the Project Sponsor in the following ways:

- Participation in watershed and range improvement projects on the Manti-La Sal National Forest such as the tarweed eradication program. Mitigation credit would be obtained by supplementing the FS's seed mixture with other species to provide bio-diversity and to improve habitat for impacted species. Seeds that could be added to the mixture include big sagebrush and a variety of forbs. The Project Sponsor could also assist the FS in increasing the treatment area.

- Acquisition of 150 acres of conservation easements adjacent to the Narrows Reservoir. These easements would include restrictions on land use that would benefit impacted species. In addition, the conservation easements would provide a setback of about 500 feet for any new development or construction on private land adjacent to the reservoir.

- Acquisition of 640 acres of private land adjacent to the Price River below Scofield Reservoir. Wildlife values would be enhanced by fencing the land to protect it from livestock grazing.

As with fishery mitigation, the goal of the wildlife mitigation would be to provide as near as possible full mitigation to each impacted species.

As part of the conservation easements for the 150 acres adjacent to Narrows Reservoir, certain restrictions on the landowners' use of their lands would be needed. These restrictions would include the prohibition of such things as further construction of residential structures; commercial uses such as motels, cafes, hunting or fishing clubs, subdivisions, etc.; livestock grazing; and the storing or use of pesticides, herbicides, or chemical agents, either directly or indirectly lethal to wildlife. In addition, these lands would be made available to the general public for hunting, fishing, or other recreational uses without permit or charge of fees by the

landowners. Specific measures or restrictions would be developed individually as part of the easement negotiation process with each involved landowner.

As part of the wildlife mitigation plan, a monitoring program would be developed. Existing wildlife values on mitigation lands would be identified using the same models that were used to identify project impacts. These same models would also be used to measure the success of any wildlife mitigation programs. If the proposed mitigation programs are not as successful as anticipated, additional mitigation would be required. This procedure would apply to both wetland and upland wildlife habitat.

The Sponsor would have primary responsibility for implementation of all wildlife measures described above. The Sponsor would be responsible for funding and acquiring all lands and easements. The Sponsor would provide seed to supplement the FS seed mixture for the watershed and range improvement projects. The Sponsor would fund and construct all improvements such as fencing. This work would be performed concurrently with construction of other project facilities such as the dam, tunnel rehabilitation, and pipelines. All lands and rights-of-way would be acquired and initial construction of wildlife measures would be completed prior to initial filling of the reservoir. The Sponsor would also be responsible for funding the mitigation monitoring. The Sponsor would be responsible to enter into Memorandums of Agreement with the UDWR, FS, and other appropriate agencies for all wildlife measures. The MOA's would clearly define the roles and responsibilities of the Sponsor, the UDWR, the FS, and other parties for implementation and maintenance of the wildlife measures.

Construction Materials

Locations of materials necessary for construction of Narrows Dam and Reservoir are shown in Figure 2-1. Most of the embankment material for the Narrows Dam would be obtained from the reservoir basin. Rockfill material for upstream slope protection would be obtained from an existing quarry on National Forest land near SR-264. An alternative rockfill material quarry site is located on private land and was also shown earlier in Figure 2-1. Granular material for drains would be hauled from commercial pits in Sanpete Valley, near Wales, Utah. Concrete for the outlet works, spillway, and other structures would be batched in Sanpete Valley and hauled to the damsite in transit mixers. Other materials such as pipe, steel gates and structures, electric motors, and operating and control equipment would be manufactured or processed outside the project area. The materials would be hauled to the construction sites by truck.

Lands for Project Features and Relocation

About 1,868 acres of land would be required for project features, wetland mitigation, fish and wildlife enhancement and mitigation, and material source areas. About 0.8 mile of SR-264 would be inundated by Narrows Reservoir, as described earlier in this chapter. The amounts of land by present ownership or administration and proposed project use are shown in Table 2-3. There would be no

Table 2-3
Recommended Plan
Right-of-Way Requirements for Project Features
(Unit--acres)

Project Feature/Type of Acquisition	Ownership or Administration		
	Private	Manti-La Sal Natl. Forest	Total
Narrows Dam & Reservoir			
Reclamation withdrawal		191	191
Perpetual easement	466		466
East Bench Pipeline			
Perpetual easement	51		51
Oak Creek Pipeline			
Perpetual easement	9		9
Upper Cottonwood Creek Pipeline			
Special use permit		3	3
SR-264 Relocation			
Reclamation withdrawal		34	34
Recreation area			
Reclamation withdrawal		12	12
Fishery mitigation			
Fee title purchase of Fishery mitigation area	90		90
Wildlife mitigation			
Fee title purchase of Fish and Wildlife enhancement area	640		640
Perpetual conservation easement adjacent to reservoir	150		150
Wetlands mitigation			
Perpetual easement or fee title	220		220
Material source area		2	2
Total	1,626	242	1,868

relocation of persons, families, businesses, farms, or nonprofit organizations resulting from construction of the Narrows Project.

National Forest System lands would be obtained for project uses by (1) Reclamation withdrawal, (2) FS right-of-way permits, or (3) FS special-use permits. The Sponsor would acquire private lands for project uses from owners by perpetual easement.

The acquisition of private lands required for fish and wildlife mitigation would be primarily by fee title. The conservation area adjacent to the reservoir would be created through conservation easements. These lands would be administered by the Sponsor under a cooperative agreement with the UDWR. To assure proper management of easement lands needed to mitigate fish and wildlife losses attributed to the project, certain restrictions on the landowners' use of their lands would be needed. Specific measures or restrictions, including those to protect fish and wildlife values, would be developed by the UDWR as part of the easement negotiation process with each involved landowner. If adequate easements cannot be secured, a fee-title acquisition of the lands would be made.

Access to Features

Construction access is fairly good for all project features. The proposed damsite is near an existing paved highway. This highway should be adequate for hauling materials and equipment to the site. Temporary haul roads would need to be constructed within the reservoir basin to move material from the borrow area to the damsite.

Construction Program

Construction of the Narrows Project would be under the supervision of the Sponsor, with overall supervision furnished by Reclamation's Regional Director in Salt Lake City, Utah. All recreational facilities in the National Forest would be built cooperatively by the Sponsor and the FS. Temporary construction offices would be located within the proposed reservoir basin.

Water Quality Protection Program

Several water quality permits must be obtained prior to construction of the project. The Clean Water Act of 1977 (PL 95-217) requires that section 402 permits be obtained from the EPA for the discharge of any waste water or process water into a waterway. A section 402 permit would be required for stormwater runoff during construction of the dam. In accordance with section 404 of PL 95-217, permits must be obtained from the COE to discharge dredge-and-fill material below the normal high water level of streams, associated wetlands, and other water bodies as well as dam construction. A section 404 permit would be required for construction of the dam and for stream crossings associated with the East Bench Pipeline. The Sponsor has applied for that permit and a copy of the application is found in Appendix F.

Approval by the Utah State Division of Water Quality is required before the installation of any sanitary or industrial pollution control facilities including

turbidity control equipment. This approval would also be obtained before dewatering, diversion, and other such facilities can be constructed. In addition, a temporary waiver of the turbidity standard would be requested from the State Division of Water Quality during those periods of construction when it is physically impossible to provide turbidity control. A State Engineer's permit to alter a natural stream channel would also be requested for the proposed dam.

Public Safety

The final design of Narrows Dam would be based on additional and extensive geologic investigation and would include full consideration of such factors as seismic history, geology, and the dam's material composition. In addition, final design data and specifications for the dam and dike would be reviewed by Reclamation and the State Engineer to ensure that it would be a safe and well designed structure fitting geological conditions of the site.

During construction, excavations would be mapped and studied to determine if geologic conditions were the same as had been indicated from subsurface investigations. If actual geologic conditions were found to differ from what had previously been predicted, designs would be changed to accommodate the existing conditions. Also, geologists and inspectors would report such hazardous conditions as potential slide or slump areas which might pose a danger to workers and equipment. All hazardous areas would be roped off and appropriate signs displayed to prevent accidents.

The Sponsor would develop a Safety of Dams program that would satisfy the requirements of the State of Utah. The District, with supervision by the State Engineer, would be responsible for monitoring structural performance and conducting safety inspections during construction and initial filling of the reservoir. Once the reservoir is operational, the State Engineer would conduct annual dam safety inspections. The District would prepare standing operating procedures and an emergency action plan prior to completion of construction. The designs, standing operating procedures, and emergency action plan would be reviewed by the State Engineer.

Criteria would be developed and strictly followed for filling the reservoir and monitoring the safety of the dam. Marker buoys and float lines would be installed around spillway intake structures and other areas that might be hazardous to boaters. In accordance with State Engineer requirements, a standard operating procedure would be prepared to ensure that the dam is operated in a safe manner. In addition, an emergency action plan would be prepared and distributed to public safety officials. This plan would describe procedures to be followed if an emergency involved the dam.

Costs and Financing

The Recommended Plan would cost approximately $17.3 million and would be funded by the Sponsor, the State of Utah, and the Federal Government. Approximately 65 percent of the total project cost would be financed by the Federal

government under the provisions of the Small Reclamation Project Act of 1956. The remaining 35 percent of the total project cost includes costs already incurred by the District and funding provided by the State of Utah.

Project Administration

On completion of construction, the Narrows Project would be administered by the Sponsor. The Sponsor would have overall responsibility for administration and would contract with the water users for repayment of reimbursable project costs.

Although a formal agreement has not been reached, it is anticipated that the FS would administer the recreation facilities at Narrows Reservoir under an operation agreement with the Sponsor.

Environmental Commitments and Measures

The Sponsor is including the following environmental measures as part of project development and operation. Environmental commitments are summarized in Attachment A, Environmental Commitments and Compliance.

Affected Rivers and Streams

Stream channel modifications in Gooseberry Creek have been included in the project plan to make the channel more suited for the project induced reduced flows. Year-round releases would be made from the reservoir to provide 1.5 cfs of instream flow at the FS campground above Lower Gooseberry Reservoir. An average of 300 acre-feet per year of additional water would also be released for channel maintenance. This water could also be used for fish habitat or flushing flows. A period of 1 or 2 years may be required before useful habitat would be developed within the modified channel. The Sponsor, in cooperation with the UDWR, would determine the timing and quantity of water to be released each year.

Affected Lands and Wetlands

Temporary construction areas--camps, shops, offices, and yard areas--would be located so as to minimize the removal of trees and vegetation. Should areas be located on National Forest System land, the sites would be approved by the FS. Where practical, these areas would be within the reservoir basin. On abandonment, all materials and debris would be removed from the site and construction area. Disturbed areas outside of the basin would be reshaped and revegetated with native grasses and trees. The movements of crews and equipment would be limited to established routes and, if temporary roads were necessary, the alignments would be restored. Borrow and riprap areas would be excavated so as not to pond water and, before being abandoned, the sides would be brought to stable slopes and shaped to give a natural appearance. Excess materials would not be disposed of in wetlands.

Surveys and studies to evaluate archaeological, historical, and paleontological resources have been completed on lands that would be utilized for the Narrows Project. No significant sites were found which would conflict with project

construction. The Sponsor would comply with Federal and State regulations, including SHPO clearance, designed to protect, preserve, restore, and maintain archaeological, historical, and paleontological resources on public land in the project area should construction activities uncover specimens or relics not visible at the time of surface surveys.

Measures described earlier in this chapter have been included in the project to mitigate for unavoidable adverse impacts to wetlands that have been identified with the project. These measures consist of enlarging existing wetland areas and/or creating new wetlands adjacent to Narrows Reservoir. The mitigation plan would create 220 acres of new wetlands. Wetland mitigation measures would restore 220 acres of degraded wetlands or create about 100 acres of new wetlands, depending on the mitigation alternative selected.

Affected Fish and Wildlife

Fish habitat measures have been included in the project to mitigate for adverse impacts that have been identified with the project and to enhance existing stream fisheries. These fishery measures were described earlier in this chapter, as were mitigation and enhancement of upland habitat caused by reservoir inundation. The wetlands measures described earlier would offset any losses to wetland habitat caused by inundation.

Endangered Species

In order to minimize the possible adverse effects on the Colorado squawfish, bonytail chub, humpback chub, and razorback sucker, the Sponsor has agreed to participate in the Recovery Implementation Program for Endangered Fish Species in the Upper Colorado River Basin (RIP). The RIP was developed by the FWS as part of a cooperative effort involving many agencies and organizations with an interest in management of Upper Colorado River Basin resources. The ultimate goal of the RIP is to recover and delist the Colorado squawfish, bonytail chub, and humpback chub, and to manage the razorback sucker. Execution of all provisions of the RIP is intended to offset some of the factors that led to the present status of the fish.

Pollution Control and Esthetics

Construction specifications would include provisions to limit noise, air, and water pollution. Whenever practicable, roads, borrow and riprap sources, and other facilities would be located so as to minimize their visual impacts. State and Federal water quality permits would be obtained by the Sponsors and would be followed during construction and operation. Irrigation water supplies would not be interrupted during construction of the project. During the recreation season, the average water level at Narrows Reservoir would cover 469 acres.

Smaller Reservoir Plan

This alternative would be similar to the Recommended Plan except that the reservoir capacity would be limited to 7,900 acre-feet. Of that amount, 5,400 acre-feet would be active capacity and 2,500 acre-feet would be inactive storage. The dam, with a crest length of 425 feet and crest width of 30 feet, would be in the same location as that for the Recommended Plan.

Water Supply and Use

The average annual water supply under the Smaller Reservoir Plan would be reduced to 4,900 acre-feet. In years with average or above average precipitation, the full 5,400 acre-foot water right would be available. However, in years with below average precipitation, the available water supply could be reduced by more than 70 percent because of the lack of long-term carryover storage.

Construction Features and Project Operations

General

As in the Recommended Plan, construction features of the Smaller Reservoir Plan would include one reservoir, three pipelines, rehabilitation of existing Narrows Tunnel and the relocation of SR-264. Recreation facilities would also be provided at Narrows Reservoir. Design data was presented earlier in Table 2-1 for this alternative.

Of the 11 specific fish and wildlife measures included in the Recommended Plan, 9 would be employed under the Smaller Reservoir Plan. Those measures, some with modifications, include:

- Provide minimum flows in Gooseberry Creek below Narrows Dam;
- Provide a multiple-level outlet at Narrows Dam to regulate the temperature of releases to Gooseberry Creek from Narrows Reservoir;
- Modify and/or stabilize stream banks and associated riparian zones along middle Gooseberry Creek;
- Acquire and/or improve stream segments to provide additional fish habitat;
- Provide winter releases to Cottonwood Creek;
- Provide summer flows in lower Cottonwood Creek;
- Construct a pipeline in the upper Cottonwood Creek area to convey project water outside the stream channel;

- Provide a minimum pool in Narrows Reservoir for fish; and
- Reduce external phosphorus loading to Scofield Reservoir.

Because of the reduced reservoir capacity, there would not be enough storage to include the following measures that would be part of the Recommended Plan.

- Providing year-round flows in two tributaries of Gooseberry Creek which are presently dewatered; and
- Providing an additional 300 acre-feet per year of releases from the Narrows Reservoir for channel maintenance and fish habitat.

In lieu of providing year-round flows in the Gooseberry Creek tributaries, 1.8 miles of spawning and rearing habitat would be replaced. This mitigation would require additional coordination with the UDWR. If improvement of existing stream segments is used as the method of replacing the habitat, as much as 5.4 miles of stream may need to be improved.

Mitigation and enhancement of upland habitat would be the same as that described for the Recommended Plan. New wetlands totaling about 75 acres would be created to mitigate for wetlands areas inundated by the reservoir.

Design and Operation

Narrows Dam and Reservoir

The design of Narrows Dam under the Smaller Reservoir Plan would be similar to that of the Recommended Plan but the dam would be 20 feet lower in height. The embankment would contain a total volume of 220,000 cubic yards of material.

Narrows Reservoir would have two outlets. A stream-level outlet would be constructed through the dam to provide downstream releases for fisheries and emergency evacuation of the reservoir. This outlet would have a capacity of 210 cfs. Narrows Tunnel, with a capacity of 60 cfs, would serve as the other reservoir outlet and would accommodate releases through the mountain ridge for the transbasin diversion.

The spillway would be a drop inlet (morning glory) structure and would have a discharge capacity of 775 cfs. The probable maximum thunderstorm flood could be safely stored in the reservoir without overtopping the dam. However, the spillway, in combination with the outlet works' discharge capacity, would protect the dam against the 100- and 10,000-year snowmelt floods.

The reservoir formed behind the dam would have a total capacity of 7,900 acre-feet and a water surface area of about 362 acres.

The reservoir's active capacity, or that portion of stored water that would be used to satisfy project water needs, would be 5,400 acre-feet. The dead and inactive capacities of about 2,500 acre-feet would form the reservoir's minimum pool and would not be drawn upon in order to benefit recreation and fishing use at the reservoir. The reservoir is designed for long-term, carry-over storage. The dead and inactive storage would be more than adequate to store the 100-year inflow of sediment into the reservoir.

A summary of the design data for this alternative was presented in Table 2-1.

Lands for Project Features and Relocation

About 1,270 acres of land would be required for project features, wetland mitigation, fish and wildlife enhancement and mitigation, and material source areas. The amounts of land by present ownership or administration and proposed project use for this alternative are shown in Table 2-4.

Recreation Facilities

Public recreation facilities for this alternative would be similar to those provided for the Recommended Plan. The facilities would also include a boat ramp, boat slips, and a day-use area. The day-use area would include 6 picnic sites, restroom facilities, and a 40-unit campground. Municipal water for the recreation facility would be the same as that described for the Recommended Plan. The FS would participate in the recreation facility design and the facilities would be constructed to their standards. The FS would operate and maintain the facilities if an agreement between them and the Project's Sponsor can be reached. If a suitable agreement between the two parties cannot be reached, the Sponsor would assume responsibility for management of the recreation area.

Other Project Features and Programs

Under the Smaller Reservoir Plan, the following features and programs would be the same as those described under the Recommended Plan. They include:

- Oak Creek, East Bench, and Upper Cottonwood Creek Pipelines;
- Narrows Tunnel Rehabilitation;
- SR-264 Relocation;
- Wildlife Measures; and
- Access to Features.

The construction program, water quality protection program, and measures to ensure public safety would also be similar to those incorporated into the Recommended Plan.

Table 2-4
Smaller Reservoir Plan
Right-of-Way Requirements for Project Features
(Unit--acres)

Project Feature/Type of Acquisition	Ownership or Administration		
	Private	Manti-La Sal Natl. Forest	Total
Narrows Dam & Reservoir			
Reclamation withdrawal		130	130
Perpetual easement	267		267
East Bench Pipeline			
Perpetual easement	51		51
Oak Creek Pipeline			
Perpetual easement	9		9
Upper Cottonwood Creek Pipeline			
Special use permit		3	3
SR-264 Relocation			
Reclamation withdrawal		34	34
Recreation area			
Reclamation withdrawal		7	7
Fishery mitigation			
Fee title purchase of fishery mitigation area	90		90
Wildlife mitigation			
Fee title purchase of Fish and Wildlife mitigation area	385		385
Perpetual conservation easement adjacent to reservoir	150		150
Wetlands mitigation			
Perpetual easement or fee title	135		135
Material source area		2	2
Total	1,087	176	1,263

Wetlands Measures - Wetlands measures would include the alternatives presented under the Recommended Plan. Under this alternative about 135 acres would be required for wetland mitigation. In determining the exact acreage to be provided, careful monitoring of the mitigation sites would be conducted to ensure that the value of the mitigation sites is at least equal to the value of the wetlands lost. This determination would be accomplished by performing HEP analyses of the sites and comparing habitat values.

Costs and Financing

The Smaller Reservoir Plan would cost about $15.5 million and would be funded by the Sponsor, the State of Utah, and the Federal Government. Approximately 65 percent of the total project cost would be financed by the Federal Government under the provisions of the Small Reclamation Project Act of 1956. The remaining 35 percent of the total project cost includes costs already incurred by the District and funding provided by the State of Utah.

Project Administration

Project Administration under the Smaller Reservoir Plan would be the same as that described for the Recommended Plan.

Environmental Commitments and Measures

Environmental commitments and measures for Affected Rivers and Streams, Affected Lands and Wetlands, Affected Fish and Wildlife, Endangered Species, and Pollution Control and Esthetics would be the same as those described above for the Recommended Plan.

No Action Plan

The No Action Plan, represents the conditions of the affected area without development. It establishes the baseline for evaluating environmental impacts of providing a supplemental irrigation supply to north Sanpete County. It also establishes anticipated conditions in the affected areas without development and assumes that irrigation operations would continue according to historic use.

Under this alternative, the Narrows Dam and Reservoir would not be constructed. Without the dam construction, there would be no need to relocate SR-264 and there would be no recreational facilities constructed at the reservoir site. The East Bench, Oak Creek, and Upper Cottonwood Creek Pipelines would not be built. The existing Narrows Tunnel would not be rehabilitated, and the risk of its complete collapse and failure would increase over time. If the tunnel were to collapse, some type of an emergency funding measure would be required to repair it. Irrigated farmland in north Sanpete County would continue to experience an average annual water shortage of about 30 percent. The demand on municipal water supplies in Fairview, Mount Pleasant, Spring City, and Moroni would continue to increase as supplies for outdoor municipal uses run short and as population increases. Water conservation measures would continue to be implemented.

There would be no wetlands, wildlife, nor fisheries mitigation measures implemented under the No Action Plan because there would be no impact to existing wetlands and wildlife habitat. Stream flows in Gooseberry and Fish Creeks would remain unaltered from their present state. Under this plan there would be no flatwater fishery developed in the proposed reservoir basin.

Alternatives Considered and Eliminated From the Study

Several alternatives which were considered were determined to be nonviable. Those alternatives are summarized below.

Alternative Damsite Plan

An alternative damsite for the Narrows Dam was evaluated and presented at the public scoping meetings. That dam would be located in the valley upstream from the Narrows damsite. However, conditions set forth in the 1984 Compromise Agreement dictate site location and storage capacity of the project reservoir. If those conditions are not met, a breach of contract would result and water-rights relative to the project would be forfeited. The Sponsor received a letter from the attorney who represents the CWCD and the PRWUA which indicates that the damsite for this plan is not covered by and would breach the existing 1984 water rights agreement. Because of these institutional constraints there are no water rights for the Alternative Damsite Plan.

Because the dam for the Alternative Damsite Plan has a very long crest length (about 5,000 feet) it is over 2.5 times more expensive than the dam for the Recommended Plan. A financial analysis of this alternative shows that the water users would be unable to repay the cost of this alternative. For the above reasons, this plan is considered to be non-viable and has been eliminated from further study.

Year-round Release Alternative

State and Federal resource agencies have expressed concern that releasing water into Cottonwood Creek, as described in the Recommended Plan, would significantly widen and destabilize the stream channel. These agencies have suggested that this impact could be avoided if the water could be released as a steady year-round flow. This year-round flow would be about one-sixth of the peak flow that would occur if the water were to be released in accordance with the irrigation demands.

In order to beneficially use the water in the project area, two options of the alternative were considered. One option would be to store water somewhere in the Sanpete Valley and then release it as needed during the irrigation season. A second option would be to exchange the water with the groundwater and pump it out of the groundwater aquifer as it is needed.

In order to provide surface storage in the Sanpete Valley, a 5,400 acre-foot reservoir would be required in addition to the Narrows Dam and Reservoir. The only reservoir site that would provide sufficient capacity is the Milburn Damsite, located on the San Pitch River about 3 miles north of Fairview, near Milburn. In order to

create a 5,400 acre-foot reservoir at this site, an 80-foot-high dam with a crest length of 2,000 feet would need to be constructed. The reservoir would have a surface area of 225 acres when full. Construction of this dam and reservoir would inundate about 1.3 miles of the San Pitch River and its associated riparian and wetland areas. In addition, 40 miles of the San Pitch River below the dam would be either completely or partially dewatered as a result of constructing the dam. This option was eliminated from further consideration because of the environmental impacts and the added costs associated with construction of this reservoir.

Under the groundwater exchange option, a total of about 45 cfs would be required to satisfy project demands. About 10 wells would be required to deliver the water to the various irrigation companies within the project area. Capacities of these wells would range from 0.5 to 7.5 cfs.

Existing well capacities in the area range from 20 gpm (0.04 cfs) to 1,680 gpm (3.75 cfs). Drawdown in the wells ranges from as little as 3 feet to over 300 feet with the average drawdown being about 70 feet. Drawdown in the larger wells ranges from about 18 to 40 feet. Using the average specific capacity of existing wells in the area, drawdown in new project wells could be expected to range from about 14 feet in a 0.5 cfs well to 214 feet in a 7.5 cfs well. The average drawdown is expected to be about 128 feet. The actual drawdown experienced could be greater or smaller, depending on the actual coefficient of transmissibility at the well site.

Drawdown of new project wells would be nearly double the drawdown of existing wells in the area, causing significant interference with existing wells. Nearly all wells in the area would experience reduced production and it is expected that many existing wells would dry up as the result of additional groundwater pumping. Such an impact to existing wells would not be permitted by the State Engineer.

The option that would require groundwater pumping to satisfy project demands was eliminated from further consideration for the following reasons:

- Although there is a large amount of groundwater beneath the Sanpete Valley, it is not readily retrievable because coefficients of transmissibility for the aquifer are quite low.

- Specific capacities of existing wells range from 2 gpm/ft to 42 gpm/ft, with most being in the lower range. The locations of the few wells with higher specific capacities are quite random and there are only four wells in the area with specific capacities in the 40 gpm/ft range. Therefore, it would not be possible to accurately predict where a high capacity well could be drilled.

- Because the expected drawdown of new project wells would be nearly double the drawdown of existing wells in the area, the new wells would cause significant interference with existing wells. Nearly all wells in the area would experience reduced production and it is very likely that many existing wells would dry up as the result of additional ground water pumping. This

> significant interference with existing wells would not be permitted by the State Engineer.

Because of the environmental impacts and additional costs caused by the surface storage site and because an exchange with groundwater is not feasible, the Year-round Release Plan was eliminated from further study.

Groundwater Development Without Import

As described above, the groundwater beneath the Sanpete Valley is not readily retrievable because coefficients of transmissibility for the aquifer are quite low. In addition, the State Engineer considers the ground water aquifer in north Sanpete County to be fully appropriated. Further development of groundwater in the area without import would impact existing water rights in downstream locations. The State Engineer's appropriation policy statement for that area states:

> The State Engineer believes that only a very limited quantity of underground water is available for beneficial use without impairing existing rights. Applications for this limited supply are to be allocated for domestic purposes of one family, irrigation of 0.25 acre, and a nominal amount of stockwater, or equivalent uses based on these parameters and water availability and limited to a maximum annual withdrawal of 2.0 acre-feet of water.

Therefore, groundwater development without importing for exchange cannot be considered as an alternative source of irrigation water for the area.

Central Utah Project Water

Recent developments with respect to CUP planning indicate that CUP water would not be available to Sanpete County. With Millard County withdrawing from the Central Utah Water Conservancy District (CUWCD), the CUWCD has dropped from further consideration all plans to deliver CUP water to the Sevier River Basin and hence, to Sanpete County.

Direct Diversion Without a Reservoir

In an effort to identify a project alternative that would be more cost effective and have fewer environmental impacts, the Sponsor investigated a plan that would divert water directly from Gooseberry Creek to Cottonwood Creek without construction of a reservoir. The Price River water users threatened law suit if the District continued to pursue that alternative because:

- The alternative did not comply with the terms of the 1984 agreement; and

- Deliverable amounts of water would be substantially reduced and not delivered when needed.

Therefore that alternative was dropped from further consideration.

Conservation Without Development of Additional Water Supplies

Conservation measures would help existing water supplies go farther and would help reduce present water shortages. However, conservation in and of itself does not eliminate the need for additional water development. There would be a need for additional water supplies with full implementation of conservation measures.

Conservation measures generally consist of measures which improve the efficiency of irrigation. By improving the efficiency, a greater portion of the applied water is used to meet the crop consumptive use and less water is lost to evaporation, phreatophyte growth, or surface and subsurface return flow. Improvements to water conveyance systems generally consist of measures such as lining of unlined canals and ditches and constructing pipelines to carry irrigation water instead of using open canals and ditches. Improvements to on-farm irrigation systems can also conserve water. These potential measures include installation of sprinkler irrigation systems and use of gated pipe for flood irrigation.

Land leveling is often used as a technique to improve on-farm efficiency; however, due to the topography and shallow depth of soils, it is generally not practical in the project area. Drip irrigation systems, which are highly efficient, are not considered practical for the alfalfa/grain rotation crops which are grown in the project area. Retirement of irrigated lands, which is generally not considered to be a conservation measure and is opposed by the Utah Department of Agriculture, was not considered as an option for water conservation because it does not meet the purpose and need of the project as described in Chapter 1.

Irrigators in the project area have already implemented extensive conservation measures to allow their scarce water supplies to go farther. Approximately 60 percent of the irrigated land within the project area is irrigated by sprinkler. About 75 percent of the land is served by improved conveyance facilities such as pipelines and lined canals and ditches. Using estimates of present levels of efficiency which are based on existing conveyance facilities and on-farm irrigation systems, there is a average annual shortage of about 15,000 acre-feet of irrigation water. It is estimated that placing the remainder of the canals and ditches in pipelines and converting the remainder of the on-farm systems to sprinkler irrigation would conserve about 8,000 acre-feet of water per year. Therefore, after conservation measures have been implemented to the maximum extent possible, there would still be a shortage of about 7,000 acre-feet per year and a need for the 4,920 acre-feet of irrigation water that would be developed by the project.

Irrigators in the project area have made many improvements to their irrigation systems over the past 10 to 20 years. It is expected that this trend will continue in the future with or without the project. Many farmers have plans underway at present to convert their irrigation systems to pressurized pipelines and sprinklers. Therefore,

conservation is included as part of the No Action Plan as well as both of the action alternatives and was eliminated as a stand-alone alternative to the project. In order to be eligible for project water, the Sponsor would require all recipients to implement conservation practices.

Summary of Comparisons of Alternatives

The Recommended Plan is compared in summary form to the other alternatives in Table 2-5. Alternatives that were deleted from consideration were discussed earlier. The Sponsor's and Reclamation's preferred and proposed alternative is the Recommended Plan.

Table 2-5
Comparison of Narrows Project
Proposed Plan and Alternatives

Item	Unit	Alternative Reservoirs That Would Serve the Same Demands and Needs: Proposed Plan	Alternative Reservoirs That Would Serve the Same Demands and Needs: Smaller Reservoir	No Action Plan
Project structures and purposes				
Structural features				
Narrows Dam				
Material volume	cu. yds.	363,000	220,000	NA[1/]
Narrows Reservoir				
Capacity	acre-feet	17,000	7,900	NA
Activity storage	acre-feet	14,500	5,400	NA
Minimum pool	acre-feet	2,500	2,500	NA
Surface area	acres	604	362	NA
Tunnel rehabilitation	yes/no	Yes	Yes	NA
Pipelines	miles	17	17	NA
Relocated road	miles	2.9	2.9	NA
Water Supply				
Irrigation	acre-feet	4,920	4,420	NA
Municipal	acre-feet	480	480	NA
Project lands				
Supplemental service	acres	15,420	15,420	NA
Required for project features	acres	1,868	1,263	NA
Project impacts				
Settlement Agreement				
Terms met	yes/no	yes	yes	no
Water rights	yes/no	yes	yes	no
Colorado River water quality and quantity				
Annual salt-loading reduction	tons	1,580	1,414	0
Annual depletion from Colorado River System	acre-feet	5,557	4,974	0
Net increase in salinity concentration at Imperial Dam	milligrams/liter	0.55	0.50	0

Table 2-5 (continued)
Comparison of Narrows Project
Proposed Plan and Alternatives

Item	Unit	Alternative Reservoirs That Would Serve the Same Demands and Needs: Proposed Plan	Alternative Reservoirs That Would Serve the Same Demands and Needs: Smaller Reservoir	No Action Plan
Beneficial effects				
General recreation	recreation days	32,700	17,100	0
Campgrounds	units	60	40	0
Day-use areas	units	10	6	0
Minimum pool	acre-feet	2,500	2,500	0
Flatwater fishery (average during recreation season)	acres	454	238	0
Flatwater fishery	angler days	13,700	7,200	0
Winter flow provided for fishery stream	miles	6.1	6.1	0
Adverse effects				
Cultural resource sites	no. affected	3	3	0
Endangered species				
Plants jeopardized	number	None	None	None
Fishes jeopardized[2/]	number	None	None	None
Wildlife jeopardized	number	None	None	None
Stream fishery affected	miles	26.3	25.8	0
Wetlands affected	acres	100	72	0
Upland wildlife habitat loss	acres	487	269	0
Scofield Reservoir Average contents[3/]	acre-feet	30,194	30,713	36,953
Mitigation				
Stream fishery channel/ habitat improvement	miles	3	3	0
Creation of spawning/ rearing habitat	stream miles	2.3	1.8	0
Wetlands created	acres	220	135	0
Upland habitat improvement	acres	1,690	790	0
Riparian corridor purchase and/or enhancement	miles	15.5	15.5	0
Project Cost	million dollars	17.3	15.5	NA

1/ NA = Not applicable.
2/ With implementation of conservation measures recommended by FWS in their final Biological Opinion dated March 25, 1992.
3/ Scofield Reservoir average contents based on average conditions for 1960-92 hydrologic period.

CHAPTER 3 - AFFECTED ENVIRONMENT & ENVIRONMENTAL IMPACT

CHAPTER 3 - AFFECTED ENVIRONMENT & ENVIRONMENTAL IMPACT

Introduction

The purpose of this chapter is to describe the existing conditions of the affected environment and to project environmental impacts which could occur with implementation of the three alternatives that were analyzed for the Narrows Project. Studies initiated by the Sponsor indicate that construction and operation of the project would produce three major areas of environmental concern: agriculture, wetlands, and the fish and wildlife resource. The analyses presented here in these two areas are summaries of detailed technical studies available for public inspection at the offices of Franson-Noble & Associates, Inc., American Fork, Utah.

Topography and Scenery

Existing Environment

The area where project features would be located is within the Manti-La Sal National Forest along the Wasatch Plateau and also in the Sanpete Valley. The dam and diversion works would be located in the Gooseberry Valley tributary to the Price River at an elevation of about 9,000 feet. The project service area is situated in the San Pitch River drainage and would involve a transbasin diversion from the Colorado River Basin to the Great Basin. Elevations range from 6,200 feet at Oak Creek to 5,500 feet at Chester and average 5,900 feet at Mount Pleasant.

Narrows damsite is within 2 miles of the intersection of two State highways, SR-31 and SR-264. Both highways have been designated as National and State Scenic Byways. SR-31 connects Fairview in the Sanpete Valley with Huntington in Emery County. SR-264 connects Scofield with SR-31 at Skyline Drive. These are major commuter routes for miners from the Sanpete Valley working in the coal mines on the east side of the Wasatch Plateau. SR-31 is a route for hauling livestock from the Sanpete Valley to the summer ranges.

Impacts

Recommended Plan

Temporary and permanent landscape disturbance would be apparent from the placement of project features such as the re-routing of SR-264 and the Narrows Dam structure. The Narrows Reservoir would be the most noticeable feature. The reservoir would have a surface area of 604 acres when full. However, during the recreation season the surface area would average 454 acres. A body of water is generally considered to be aesthetically pleasing, but as the reservoir is drawn down, mud flats around the reservoir would detract from its beauty.

The aquatic mitigation measures of restoring year-round flows in two small tributaries to Gooseberry Creek and maintaining Fairview Lakes at a higher elevation during the prime summer recreational season would also provide aesthetic benefits to the area.

During project construction, increased human activity, heavy machinery, and surface excavation would temporarily detract from the scenery. Such detractions would be visible in localized areas where construction would occur. Minor disruption of traffic on SR-264 is expected as the existing road would not be inundated until dam construction is completed and the relocated road is serviceable. Temporary disruption on SR-31 is also expected.

Smaller Reservoir Plan

Under the Smaller Reservoir Plan, temporary and permanent landscape disturbance would be the same as that described for the Recommended Plan. However, the Narrows Reservoir would have a surface area of 362 acres when full. During the recreation season, the surface area would average 238 acres.

Detractions from project construction would be the same as those described for the Recommended Plan.

No Action Plan

The natural beauty of the area would remain undisturbed. Impacts upon the landscape would not occur under this alternative.

Mitigation

Recommended Plan

Changes in topography and the natural shape of the landscape would be mitigated to the extent practical through the mitigation measures discussed in Chapter 2.

Smaller Reservoir Plan

Changes in topography and the natural shape of the landscape would be mitigated to the same extent as discussed in Chapter 2 for the Recommended Plan.

No Action Plan

Mitigation would not be necessary because there would be no changes in topography and the natural shape of the landscape under this alternative.

Residual Impacts

Recommended Plan

The primary residual impacts to topography and scenery associated with the Recommended Plan would be Narrows Reservoir, which would significantly alter the appearance of 604 acres. The rerouting of SR-264 around the reservoir would also permanently alter the landscape.

Smaller Reservoir Plan

The residual impacts to topography and scenery associated with the Smaller Reservoir Plan would be similar to those of the recommended plan except that the Narrows Reservoir would be smaller.

No Action Plan

There would be no residual impacts to topography and scenery under the No Action Plan.

Water Resources

Existing Environment

Gooseberry Creek, and its three unnamed tributaries, are located high in the Price River drainage. It is a tributary of Fish Creek, which flows directly into Scofield Reservoir. (See Frontispiece Map.) Other tributaries to Scofield Reservoir include Mud Creek and Pondtown Creek. The Price River, which flows out of Scofield Reservoir, is a tributary of the Green River - which is a tributary of the Colorado River. These three rivers are all located in the Colorado River basin.

Cottonwood Creek, located in the San Pitch River basin, is located on the opposite side of the divide from Gooseberry Creek. Cottonwood Creek and the San Pitch River are located in the Sevier River sub-basin of the Great Basin.

Typical of Wasatch Mountain streams, flows in these creeks are greatest in the spring, when snowmelt runoff is peaking. Peak flows during May and June are estimated to range from 15 to over 100 cfs in upper Gooseberry Creek near the proposed damsite. The flow declines considerably in late summer and reaches a minimum in late fall or winter. Late-season flows are estimated to be 1.5 to 5.0 cfs in upper Gooseberry Creek.

The average annual natural runoff volume of upper Gooseberry Creek, near the proposed damsite, is 8,980 acre-feet. Of this amount, an average of 1,795 acre-feet is presently stored in Fairview Lakes and diverted transmountain to Cottonwood Creek through the Narrows Tunnel. The remaining water continues down Gooseberry Creek to Fish Creek. An average of 37,000 acre-feet per year enters Scofield Reservoir from Fish Creek. The total inflow to Scofield Reservoir averages 52,000 acre-feet. The average total contents of Scofield Reservoir is about 44,750 acre-feet. All of these values are for the 1960 through 1992 hydrologic period.

An operational problem at Scofield Reservoir occurred during 1992. The lowest water surface elevation at Scofield Reservoir that year was 7587 with a reservoir capacity of 1,102 acre-feet. A major concern was that the water level would drop so low that it would clear the outlet structure grate. A second concern was the freezing temperatures which caused ice to form on the lake. This condition could result in there not being enough clearance beneath the ice for the water to pass over the old dam breach to the outlet. channel improvements and an electrical system to prevent freezing around the outlet structures were put in place. Other measures were also put on stand-by in case

reservoir levels dropped lower. The crises were finally averted by restricting reservoir releases, rationing irrigation water, eliminating the use of water for lawns and yards, and monitoring water tank levels.

Impacts

Recommended Plan

Operation of the Narrows Project would affect streamflows in Gooseberry Creek, Fish Creek, Price River, Green River, Colorado River, Cottonwood Creek, and a short reach of the San Pitch River. About 1 mile of Upper Gooseberry Creek and 4.3 miles of small streams in the proposed reservoir basin would be inundated by the reservoir. In addition, flows in the middle 3 miles of Gooseberry Creek would be reduced by about 90 percent. Year-round releases would be made from the reservoir to provide 1.5 cfs of instream flow at the FS campground above Lower Gooseberry Reservoir. An average of 300 acre-feet per year would also be released for channel maintenance or other instream flow purposes.

Table 3-1 provides a comparison of average monthly streamflows under the three project alternatives evaluated. Impacts to Lower Gooseberry Creek and Fish Creek would occur primarily during the spring snowmelt period. Impacts to the Price, Green, and Colorado Rivers would result from reduced spills from Scofield Reservoir. Regulated releases from Scofield would be affected only during multiple successive drought years, such as occurred in the early 1960's and the early 1990's.

Flows in Cottonwood Creek and a short reach of the San Pitch River would increase between 100 to 300 percent during the irrigation season, with the import of project water through Narrows Tunnel. The Upper Cottonwood creek Pipeline would convey these increased flows outside the stream channel between the tunnel outlet and the confluence with Left Hand Fork. Below this confluence, the stream channel has greater capacity to carry the increased stream flow. However, some degradation is expected and the stream channel could widen by 4 to 23 percent.

Depletions to the Price River drainage would average 5,557 acre-feet per year. Table 3-1 provides a comparison of preproject and project flows in Gooseberry Creek below the proposed dam. As shown in this table, the greatest impact would occur during the spring snowmelt runoff period. Releases from the reservoir to Gooseberry Creek would remain at least 1 cfs, except during periods when the reservoir is spilling or when flushing releases are made, when the flow would be greater.

Reductions in flow in the Price River and the Colorado River system would occur primarily as a result of decreased spills out of Scofield Reservoir. During most years, controlled releases from Scofield Reservoir would remain unaltered. However, under prolonged drought conditions, irrigation releases from Scofield Reservoir would be reduced due to lack of water in the reservoir. These reductions occurred in 5 of the 33 years simulated. The reductions for the 1960 through 1992 period averaged above 650 acre-feet or about 2 percent of the historical release. The maximum reduction would occur in 1992, when it would be nearly 9,665 acre-feet or 46 percent of the historical

TABLE 3-1
Average Monthly Streamflow Comparison
(unit–cfs)

Month	Recommended Plan			Smaller Reservoir Plan			No Action Plan		
	Average year (1968)	Wet year (1984)	Dry year (1977)	Average year (1968)	Wet year (1984)	Dry year (1977)	Average year (1968)	Wet year (1984)	Dry year (1977)
				Gooseberry Creek at Proposed Narrows Damsite					
October	1.0	1.0	1.0	1.0	1.0	1.0	2.0	4.7	1.6
November	1.0	1.0	1.0	1.0	1.0	1.0	1.5	3.3	1.4
December	1.0	1.0	1.0	1.0	1.0	1.0	1.4	4.2	0.7
January	1.0	1.0	1.0	1.0	1.0	1.0	1.3	2.4	1.0
February	1.0	1.0	1.0	1.0	1.0	1.0	1.3	2.4	1.2
March	1.0	1.0	1.0	1.0	1.0	1.0	1.4	2.4	1.2
April	1.0	1.0	1.0	1.0	1.0	1.0	3.5	5.3	5.5
May	5.9	79.3	5.9	1.0	87.2	1.0	45.3	102.9	15.1
June	10.5	100.0	1.0	37.7	102.0	1.0	61.8	92.8	6.5
July	1.0	1.0	1.0	1.0	1.0	1.0	7.2	12.8	3.0
August	1.0	1.0	1.0	1.0	1.0	1.0	4.9	6.0	1.5
September	1.0	1.0	1.0	1.0	1.0	1.0	3.2	4.3	0.9
				Gooseberry Creek Below Lower Gooseberry Reservoir					
October	2.9	5.8	2.4	2.9	5.8	2.4	4.1	10.2	3.0
November	3.1	5.9	2.2	3.1	5.9	2.2	3.8	8.8	2.7
December	3.2	5.4	2.1	3.2	5.4	2.1	3.8	9.0	1.9
January	3.6	6.2	2.1	3.6	6.2	2.1	4.0	7.8	2.1
February	3.7	6.1	2.2	3.7	6.1	2.2	4.1	7.6	2.4
March	3.7	5.2	2.3	3.7	5.2	2.3	4.2	7.0	2.6
April	4.6	6.4	6.5	4.6	6.4	6.5	7.5	11.2	10.9
May	38.2	172.5	0.9	33.3	180.5	0.9	82.1	199.3	12.9
June	34.8	156.9	3.9	62.0	159.0	3.9	92.1	162.0	9.8
July	5.9	9.9	1.5	5.9	9.9	1.5	12.8	24.1	3.8
August	5.6	4.9	1.3	5.6	4.9	1.3	10.0	10.7	2.0
September	3.9	3.6	1.9	3.9	3.6	1.9	6.4	7.4	1.9
				Fish Creek Above Scofield Reservoir					
October	9.4	18.9	7.6	9.4	18.9	7.6	10.6	23.3	8.2
November	9.5	17.3	7.9	9.5	17.3	7.9	10.2	20.2	8.4
December	8.4	15.6	7.5	8.4	15.6	7.5	9.1	19.2	7.3
January	9.1	16.3	5.5	9.1	16.3	5.5	9.5	17.9	5.6
February	10.6	19.0	5.3	10.6	19.0	5.3	11.1	20.6	5.5
March	14.1	17.3	5.4	14.1	17.3	5.4	14.6	19.1	5.7
April	17.8	43.7	24.5	17.8	43.7	24.5	20.7	48.5	29.0
May	211.7	614.5	11.4	206.8	622.5	6.5	255.6	641.3	23.5
June	173.5	360.8	8.5	200.7	362.8	8.5	230.8	365.8	14.4
July	29.6	51.4	4.6	29.6	51.4	4.6	36.5	65.7	6.8
August	17.6	21.6	3.5	17.6	21.6	3.5	22.0	27.4	4.1
September	12.2	17.3	3.5	12.2	17.3	3.5	14.7	21.0	3.5

TABLE 3-1 (continued)
Average Monthly Streamflow Comparison
(unit–cfs)

Month	Recommended Plan			Smaller Reservoir Plan			No Action Plan		
	Average year (1968)	Wet year (1984)	Dry year (1977)	Average year (1968)	Wet year (1984)	Dry year (1977)	Average year (1968)	Wet year (1984)	Dry year (1977)
				Price River Below Scofield Dam					
October	40.0	176.5	22.8	40.0	176.5	22.8	40.0	204.0	22.8
November	2.8	5.1	10.1	2.8	5.1	10.1	2.8	5.1	10.1
December	3.4	0.0	11.4	3.4	0.0	11.4	3.4	0.0	11.4
January	3.7	0.0	13.0	3.7	0.0	13.0	3.7	0.0	13.0
February	0.3	0.0	7.2	0.3	0.0	7.2	0.3	0.0	7.2
March	0.0	0.0	6.5	0.0	0.0	6.5	0.0	199.0	6.5
April	0.0	274.6	32.0	0.0	274.6	32.0	0.0	309.8	32.0
May	0.0	661.9	41.1	0.0	669.9	41.1	27.7	463.7	41.1
June	4.4	529.2	43.8	4.4	531.2	43.8	4.4	534.2	43.8
July	152.8	149.3	61.9	152.8	149.3	61.9	152.8	155.3	61.9
August	87.2	108.5	39.1	87.2	108.5	39.1	87.2	124.2	39.1
September	163.8	114.1	21.9	163.8	114.1	21.9	163.8	135.6	21.9
				Fairview Tunnel at Outlet					
October	2.0	2.0	2.0	2.0	2.0	2.0	0.0	0.0	0.0
November	2.0	2.0	2.0	2.0	2.0	2.0	0.0	0.0	0.0
December	2.0	2.0	2.0	2.0	2.0	2.0	0.0	0.0	0.0
January	2.0	2.0	2.0	2.0	2.0	1.3	0.0	0.0	0.0
February	2.0	2.0	2.0	2.0	2.0	0.2	0.0	0.0	0.0
March	2.0	2.0	2.0	2.0	2.0	0.2	0.0	0.0	0.0
April	0.0	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.0
May	0.6	1.2	0.0	0.6	1.2	0.0	0.6	1.2	0.0
June	4.3	12.3	8.8	4.3	12.3	8.8	4.1	12.1	8.6
July	45.3	45.0	43.3	45.3	45.0	25.3	14.7	12.4	0.3
August	43.5	45.5	33.1	43.5	45.5	0.2	13.4	16.3	0.2
September	17.4	24.9	0.1	17.4	24.9	0.1	1.6	10.3	0.1
				Cottonwood Creek at Mouth of Canyon					
October	3.3	5.1	3.1	3.3	5.1	3.1	1.3	3.1	1.1
November	3.6	5.0	3.3	3.6	5.0	3.3	1.6	3.0	1.3
December	3.4	4.8	3.2	3.4	4.8	3.2	1.4	2.8	1.2
January	3.4	4.7	3.0	3.4	4.7	2.3	1.4	2.7	1.0
February	3.6	4.6	3.2	3.6	4.6	1.4	1.6	2.6	1.2
March	4.0	4.7	3.3	4.0	4.7	1.5	2.0	2.7	1.3
April	3.7	8.1	3.2	3.7	8.1	3.2	3.7	8.1	3.2
May	45.0	117.1	4.9	45.0	117.1	4.9	45.0	117.1	4.9
June	46.6	63.4	12.8	46.6	63.4	12.8	46.4	63.2	12.6
July	49.4	53.5	44.6	49.4	53.5	26.6	18.8	20.9	1.6
August	46.0	49.2	34.0	46.0	49.2	1.1	15.9	20.0	1.1
September	19.1	27.9	1.0	19.1	27.9	1.0	3.3	13.3	1.0

release. The project would only impact storage releases. Direct flow rights would be unaffected by the project.

It should be noted, however, that the above reductions in storage releases are based on the 73,500 acre-foot Scofield Reservoir, which was enlarged to accommodate the Gooseberry Project (Narrows Project). Without this enlargement and the associated water rights agreements, the usable capacity of Scofield Reservoir would have remained at 30,000 acre-feet. As part of the reservoir enlargement, 7,800 acre-feet of inactive capacity was added to provide a minimum pool for fish habitat. An additional 35,700 acre-feet of active capacity was included to facilitate development of the remainder of the Gooseberry Plan without impacting water supplies in Carbon County. In conjunction with the reservoir enlargement, the Carbon water interests signed an agreement that they would operate the reservoir according to the Gooseberry Plan.

If the reservoir capacity had remained at 30,000 acre-feet and without the Narrows Project, the storage releases would have been reduced by an average of 970 acre-feet, which is about 3 percent of the average annual supply. These reductions would have occurred in 10 of the 33 years simulated with the largest single-year reduction being over 12,000 acre-feet. Therefore, the reductions in storage caused by the Narrows Project are in fact less than the reductions that would have occurred without the enlargement of Scofield Reservoir and the associated water right agreements.

Scofield Reservoir would operate at a lower level in dry years with implementation of the recommended plan as shown in Figure 3-1. Under project conditions, the average total contents of Scofield Reservoir would be reduced to about 38,000 acre-feet. Both the volume and frequency of high water overflow from the reservoir would be reduced. Impacts to Scofield Reservoir were documented in a detailed operation study which compares the operation of Scofield Reservoir with and without the Narrows Project. The operation study was reviewed and the State's comments on the study were addressed. Revisions were made to adequately reflect the operations of Narrows Dam and its impacts on Scofield Reservoir.

Figure 3-2 provides a comparison of the operation of Scofield Reservoir under the Future Without Project and a simulated operation of the reservoir had it not been enlarged to accommodate the Gooseberry Plan. Figure 3-2 also illustrates the effects of the inactive storage on the reservoir operation.

Releases through the Narrows Tunnel would increase under the recommended plan. In comparison to the natural peak flow and the existing channel capacity, the percent increase in flow due to project releases is reduced as the flow travels downstream. About 66 percent of the 5,400 acre-feet of project water that would be released to Cottonwood Creek would be diverted by an existing diversion structure near the mouth of Fairview Canyon for use along the east bench area of the Sanpete Valley. The remaining 1,800 acre-feet would flow into the San Pitch River where it would all be diverted within 3 miles of its confluence with Cottonwood Creek.

Figure 3-1

Scofield Reservoir

Operation Comparison

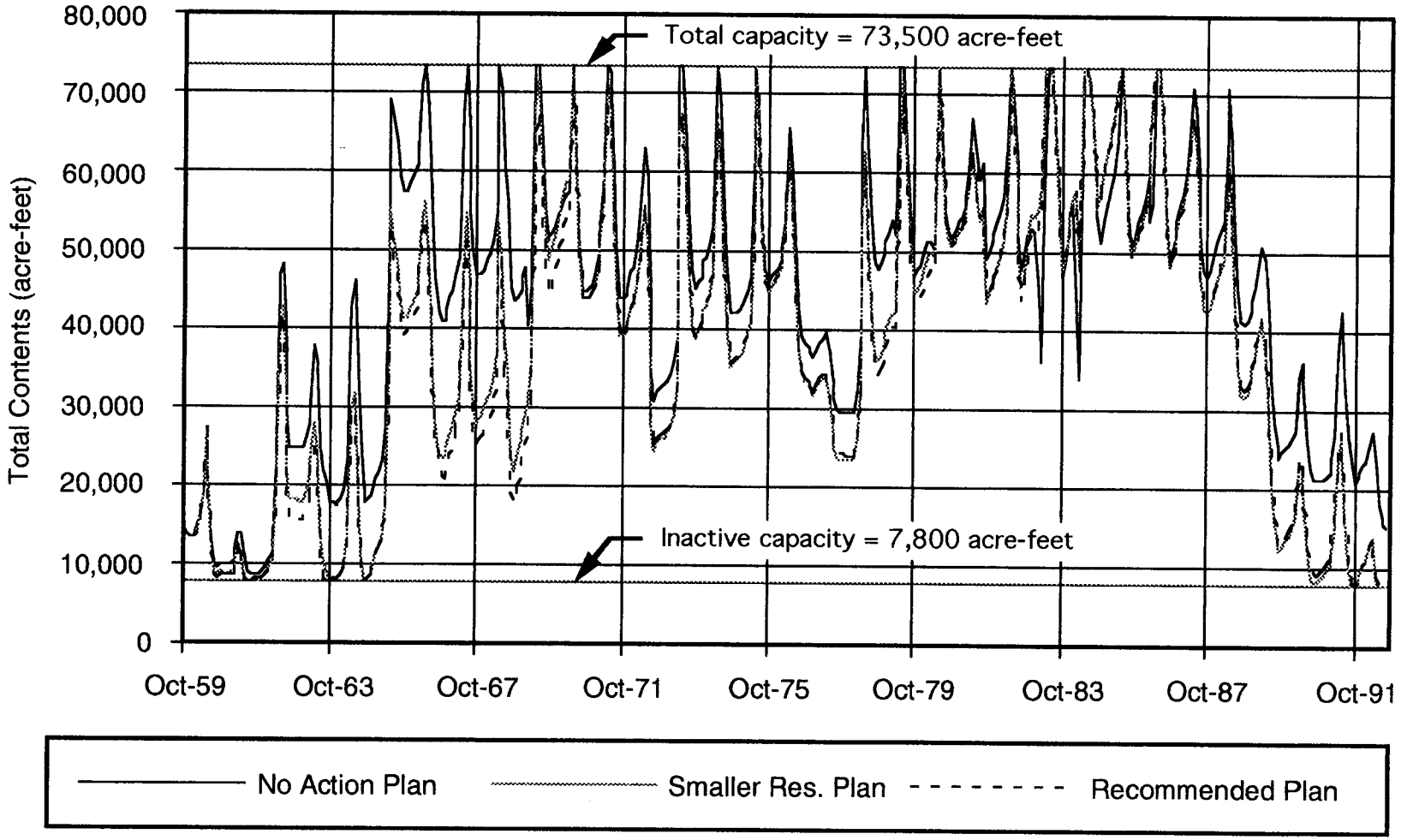
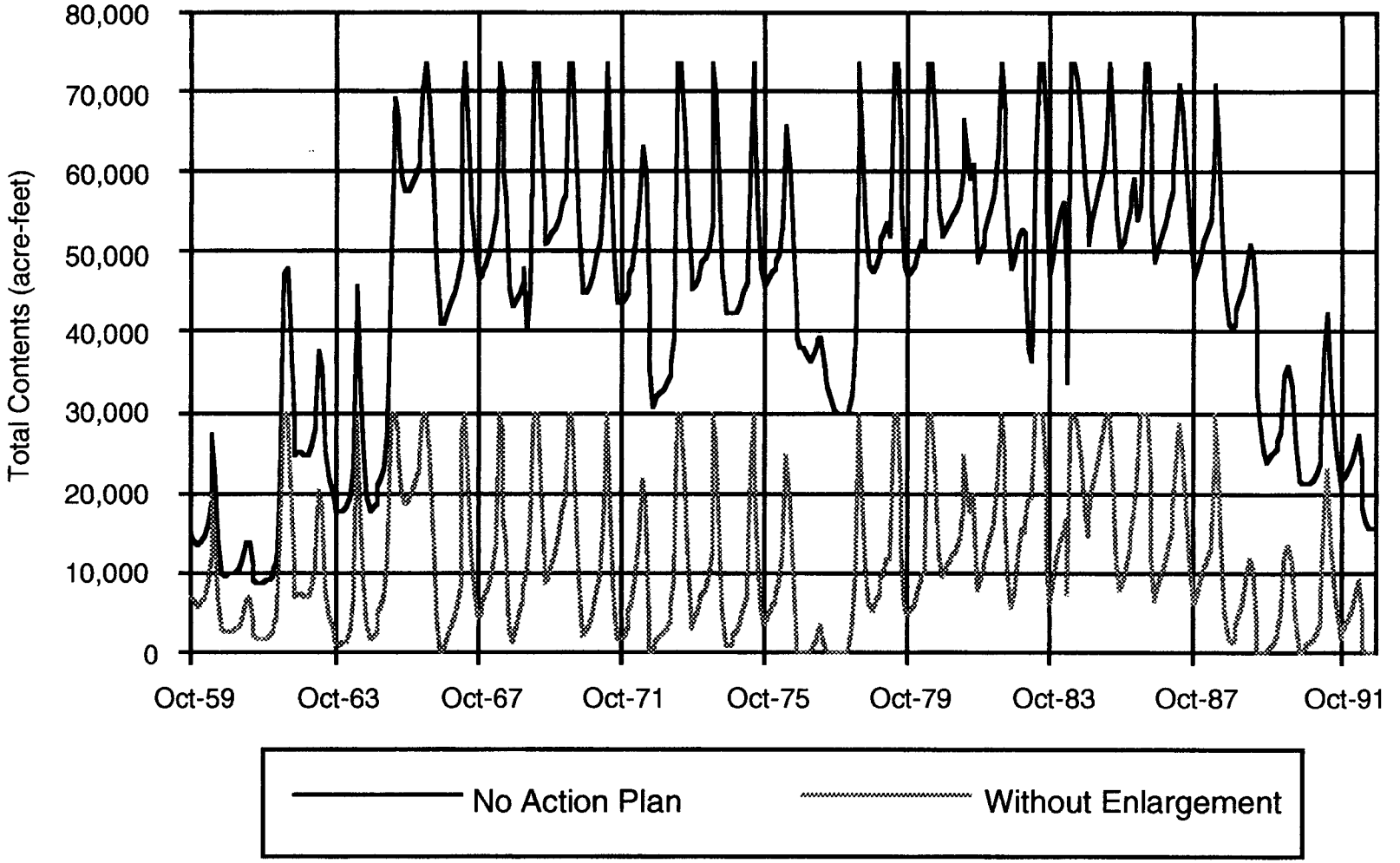


Figure 3-2

Scofield Reservoir

Operation Comparison Without Enlargement



Smaller Reservoir Plan

The impacts to water resources under the Smaller Reservoir Plan would be similar to those resulting from construction of the recommended plan. About 1 mile of Upper Gooseberry Creek and 3.8 miles of small streams in the proposed reservoir basin would be inundated. Because Narrows Reservoir would be smaller, it would spill more often, causing higher flows in certain years in Gooseberry and Fish Creeks in May and June. Because of the smaller reservoir, in drought years there would not be enough water stored to meet the maximum transbasin diversion of 5,400 acre-feet. During those years, the flow in Cottonwood Creek would be lower and project shortages would be greater. These differences in stream flows are shown in Table 3-1.

As shown in Figure 3-1, Scofield Reservoir would operate at a slightly higher level than under the Recommended Plan. The average contents would be about 38,500 acre-feet. Average reductions in storage releases to irrigators in the Price area would be about 610 acre-feet per year.

No Action Plan

Under the No Action Alternative, streamflows would remain as they are.

Streamflow Mitigation

Recommended Plan

Under the Recommended Plan a minimum flow of 1.0 cfs would be made from Narrows Reservoir to Gooseberry Creek to provide a total flow of 1.5 cfs at the FS campground. If the 1.5 cfs flow at the campground is not met, up to an additional 0.25 cfs would be released from the reservoir to meet the required flow.

Construction of the Upper Cottonwood Creek Pipeline would convey project releases outside the creek and would prevent degradation of the stream channel. A 2 cfs year-round flow in Cottonwood Creek would also be provided.

Smaller Reservoir Plan

Streamflow mitigation measures under the Smaller Reservoir Plan would be the same as those described for the Recommended Plan.

No Action Plan

There would be no streamflow mitigation measures under the No Action Plan because there would be no project induced impacts.

Residual Impacts

Recommended Plan

The residual impacts of the Recommended Plan include the inundation of 1.0 mile of Gooseberry Creek and 4.3 miles of unnamed tributaries. Flows in Gooseberry Creek

below Narrows Reservoir and Fish Creeks would be reduced as shown in Table 3-1. The flow in Cottonwood Creek below the confluence with Left Hand Fork would be increased. Scofield Reservoir would operate at a lower level in most years and reductions in storage releases to irrigators in the Price area would occur after several successive years of drought. However, these reductions would be about 320 acre-feet less than those that would have occurred if Scofield Reservoir had not been enlarged to accommodate the Gooseberry Project (Narrows Project).

Smaller Reservoir Plan

The residual impacts of the Smaller Reservoir Plan would be similar to those of the recommended plan except that slightly fewer miles of stream would be inundated and Scofield Reservoir would operate at a slightly higher level. Reductions in storage releases to irrigators in the Price area would be about 75 acre-feet less.

No Action Plan

There would be no residual impacts under the No Action Plan.

Water Quality

Existing Environment

Upper Gooseberry Creek

On the basis of data collected from upper Gooseberry Creek and Cottonwood Creek, where much of the flow is from Gooseberry Creek through the Narrows Tunnel, water quality appeared to be good. As shown in Table 3-2, the dominant chemical constituents were calcium and bicarbonate with other common ions being minor in concentration. Total dissolved solids were low, ranging from 220.0 to 230.8 mg/L.

Although the phosphate levels in these samples were less than 0.05 mg/L, previous studies conducted by the UDWR indicate that the 0.05 mg/L standard for streams is often exceeded. The predominance of this pollution indicator is probably related to wastes generated by sheep in the area and perhaps also to human recreational use of the area. At levels of 0.05 mg/L or greater, the Utah Department of Environmental Quality states that investigations should be conducted to develop more information concerning the source of the phosphate.

Lower Gooseberry Reservoir

In unpublished lake and stream surveys, the UDWR has expressed concern about nutrient loading of Lower Gooseberry Reservoir and its effect upon dissolved oxygen (DO) levels in the reservoir. DO levels during the winter are below minimum concentrations specified in the standards and show strongly decreasing trends within the reservoir away from stream inlets. The oxygen depletion of the reservoir is believed to be due to oxidation of organic material resulting from vegetation blooms.

Table 3-2
Inorganic Analysis of Project Inflows
(Unit--mg/L)
(Conductivity in μmhos/cm)

Constituents	Detection Limit	Cottonwood Creek	Gooseberry Creek
Calcium	1.0	52.5	38.0
Magnesium	1.0	22.0	12.0
Potassium	1.0	6.8	<1.0
Sodium	1.0	1.5	<1.0
Alkalinity (as $CaCo^3$)	10.0	219.3	147.5
Bicarbonate	10.0	267.5	180.0
Carbonate	10.0	<10.0	<10.0
Chloride	0.5	3.3	<0.5
Conductivity	10.0	459.0	330.0
Nitrate/Nitrite	0.01	0.13	<0.01
Phosphate, Total	0.01	0.04	0.04
Phosphate, Total (Dissolved)	0.01	0.013	0.04
Sulfate	5.0	28.0	<5.0
Total Dissolved Solids	1.0	230.8	220.0

Scofield Reservoir

Scofield Reservoir has been classified over the past several years as being mesoeutrophic or eutrophic. Eutrophication is a term applied to the organic degradation of a body of water, and is associated with elevated levels of carbon, nitrogen, phosphorus, and other inorganic nutrients. The degree of eutrophication is generally exhibited by the growth and appearance of the large colonies of algae in highly eutrophic waters, coupled with a green cast or color to the water. This generally occurs during the warm summer months.

The principal pollutants are nutrients, trace metals, and sediments associated with nonpoint sources, such as construction of roads and mine portals, domestic waste disposal, animal grazing, and natural deposits of rock containing phosphate.

Several independent studies of the water quality of Scofield Reservoir (listed in the Bibliography) show that phosphorus is the limiting nutrient. This means that all available phosphorus is used up in the production of algae or other cell bodies, while there still remains a surplus of carbon, nitrogen, and other nutrients. Thus, without the input of additional phosphorus into the system, no additional algal cells can form. About 53 percent of the phosphorus loading to Scofield Reservoir enters from Fish Creek according to a 1983 Utah Department of Health Study. Indications are that the

source of most of the phosphorus is naturally-occurring, phosphorus-laden soils in the upper watershed.

Fish kills in Scofield Reservoir have been reported during 11 years since 1960. Studies performed by the USGS indicate that it is likely that fish kills result from a combination of environmental factors that are intensified by decreased tributary inflow. These factors are: large populations of blue-green algae that release biological toxins; oxygen demands resulting from respiration and decomposition of algal populations; increased rate of warming of lake water; and increased volume of the anaerobic hypolimnion. The study concluded that fish kills occur 80 percent of the time the annual flushing rate for the reservoir is less than 0.85. No fish kills have been reported when the flushing rate was greater than 1.1. During the 1960-92 period, the annual flushing rate in Scofield Reservoir dropped below 0.85 four times.

Mass-balance mathematical modeling of Scofield Reservoir based on external phosphorus loading indicates that the average probability of eutrophication is about 79 percent under existing conditions. The average in-lake total phosphorus was 0.034 mg/L during the 12 years modeled (1978-89). The average annual inflow of phosphorus to Scofield Reservoir during that period was 7,182 kg. A study of impacts of Narrows Reservoir operations on Scofield Reservoir phosphorus loadings is described in the report by Cloward, Madden and Associates entitled Scofield Eutrophication Study, November 1991.

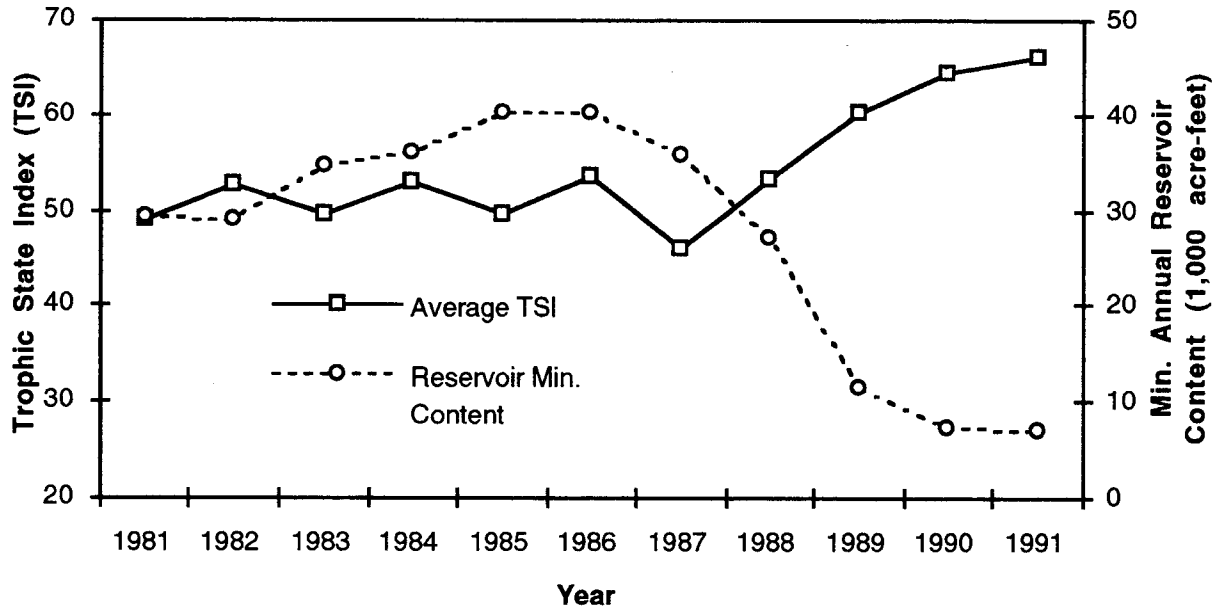
In addition to external phosphorus loading, Scofield Reservoir appears to also suffer from internal phosphorus loading. In-lake observations indicate a relationship between reservoir minimum annual content and the Carlson Trophic State Index (TSI). The TSI is a general measure of the level of eutrophication. TSI values greater than 50 are indicative of a eutrophic system. The average TSI value for the reservoir of 53.3 was reported by the Utah Department of Environmental Quality in report entitled *"Scofield Reservoir Restoration Through Phosphorus Control."* In general, it appears that there is an increase in TSI as the minimum annual reservoir content decreases. This increase in TSI is most likely due to internal loading of phosphorus that occurs within the reservoir during anaerobic conditions that occur with reduced reservoir levels. Figure 3-3 illustrates this relationship.

In 1984 the Deparment of Environmental Quality received a Clean Lakes Phase II grant pursuant to Section 314 of the Clean Water Act to rehabilitate Scofield Reservoir through a program to reduce total phosphorus loading to the reservoir. The Deparment of Environmental Quality had concluded that "the *most pragmatic and effective means to control the further eutrophication of Scofield Reservoir, or possibly to effect a moderate reversal of the eutrophication process, appears to be a reduction of the phosphorus load to the lake."* The restoration project consisted of installing stream revetments and checkdams, revegetation of denuded stream banks, replacing water diversion systems for irrigation, providing a fish cleaning station, and developing a public awareness and education program to alert people of the pollution problem and solicit their support in reducing phosphorus loads to the reservoir. Stream bank rehabilitation activities occurred on segments of Mud Creek and Fish Creek. The overall stream bank work was designed to reduce stream sediments and erosion through stream bank stabilization and revegetation of denuded soils in highly eroded areas.

Figure 3-3

Scofield Reservoir

Average Trophic State Index (TSI) vs. Minimum Annual Reservoir Content



A post-project monitoring program indicated that the project was initially effective. Stream bank stabilization and revegetation occurred in the project area. Visual observations indicated that sediments were being removed from the streams. Although there is insufficient empirical data to conclusively support the effects of implementation effort, the data when compared to "typical" instream phosphorus concentrations indicated a decline in total phosphorus concentrations. However, many aspects of the project were voluntary on the part of the landowners. Since the project completion, many of the project measures have not been maintained. In particular, one aspect included the fencing of Mud Creek to prevent cattle from entering the stream, damaging the stream banks, and defecating in the stream. This was initially effective, but the landowners presently keep the gates open, thus allowing cattle access to the stream.

Colorado River Salinity

At its headwaters in the mountains of north-central Colorado, the Colorado River has a salinity concentration of 50 mg/L. The concentration progressively increases downstream as a result of water diversions and salt contributions from a variety of sources. Annual salinity concentrations at Imperial Dam are expected to increase from the 1987 measured average level of 850 mg/L to an estimated average of 970 mg/L by the year 2010 unless additional control measures are implemented to prevent the salinity increase.

Impacts

Water quality impacts of significant concern that could occur as a result of construction and operation of the Narrows Project are:

- Degradation of existing water quality in the current anti-degradation segments of project area streams during construction;
- Potentially decreased DO levels and increased fish kills in Lower Gooseberry Reservoir due to decreased inflow;
- Increased potential for fish kills in Scofield Reservoir due to possible decreases in water quality; and
- An increase in average salinity levels in the Colorado River at Imperial Dam of 0.55 mg/L due to an average annual depletion of 5,557 acre-feet.

Recommended Plan

Water pollution would be minimized during construction. The contractor would be required to comply with applicable Federal and State laws, orders, and regulations concerning the control and abatement of water pollution. The contractor's construction activities would be performed by methods that would prevent entrance or accidental spillage of solid matter, contaminants, debris, and other objectionable pollutants and wastes into streams, lakes, and underground water sources. Such pollutants and wastes might include, but are not restricted to, refuse, garbage, cement, concrete, oil and other petroleum products. Sanitary wastes would be disposed of by approved methods.

One of the requirements of the construction contract would be to implement the best management practices (BMP's) specified in the Nonpoint Source Water Pollution Control Plan for Hydrologic Modifications in Utah, which is an addendum to the Utah Nonpoint Source management Plan. Specifically applicable sections such as Hydromod Planning Process, Measures to Control Construction Activities, and Impoundments in Appendix B would be implemented.

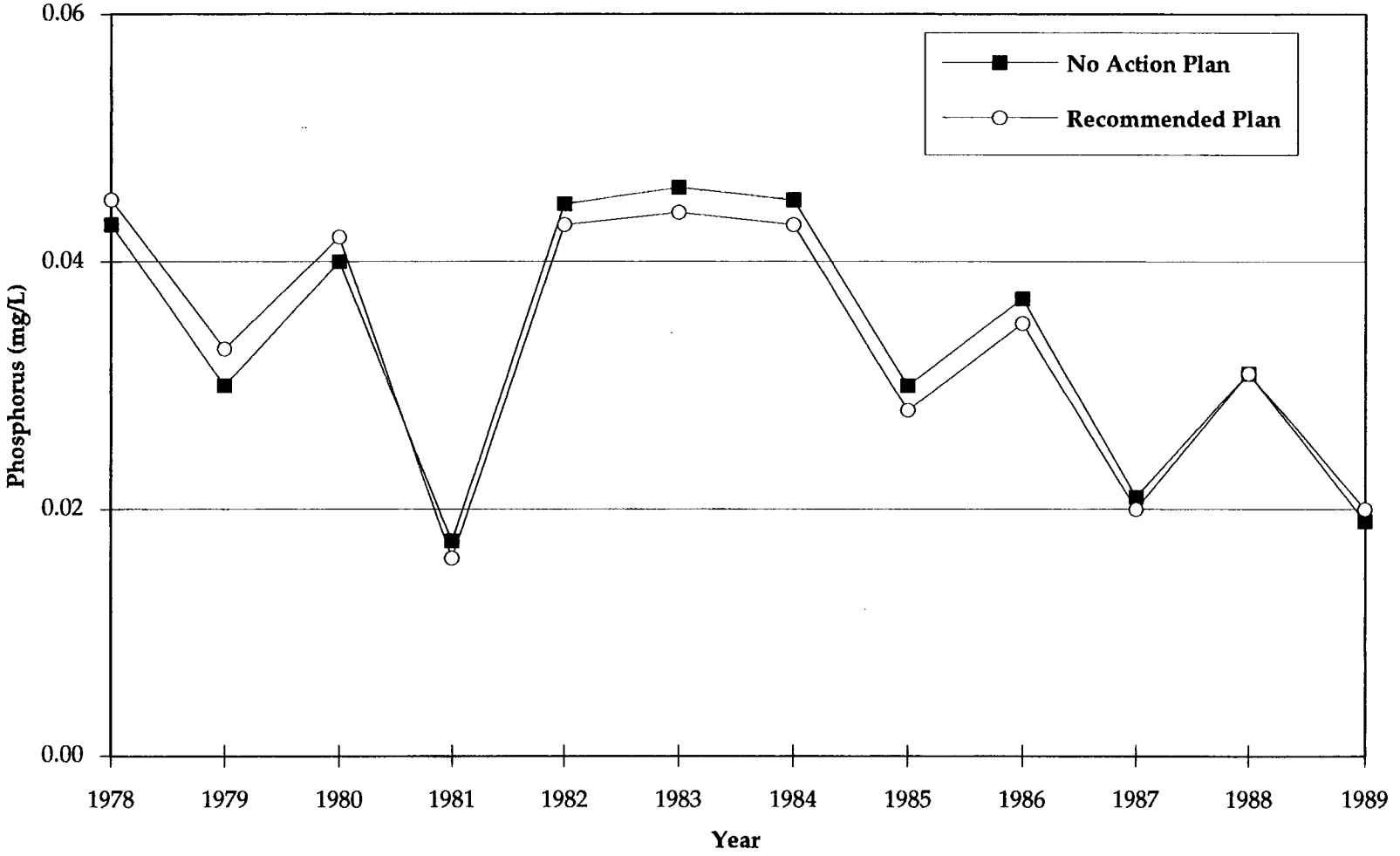
A temporary waiver of the turbidity standard would be requested from the State Division of Water Quality during those periods of construction when it is physically impossible to provide turbidity control.

The average annual inflow to Lower Gooseberry Reservoir from Gooseberry Creek would be reduced by 72 percent. Because the DO levels are greatest near the stream inlets, a decrease in inflow is expected to decrease the overall DO level of the reservoir, thus increasing the potential for fish kills.

Based on a mass balance analysis of external phosphorus loading, construction and operation of Narrows Dam and Reservoir would not have a detrimental effect on the eutrophication potential of Scofield Reservoir. With Narrows Reservoir in place, the average phosphorus level in Scofield would be 0.033 mg/L (Cloward, page 2) which is essentially the same as the present condition. Figure 3-4 shows a comparison of the

Figure 3-4

Scofield Reservoir In-Lake Total Phosphorus Comparison



future without project and project phosphorus level in Scofield Reservoir based on external loading.

The average flushing rate of Scofield Reservoir would increase slightly to 1.24. However, the flushing rate would drop below 0.85 in 5 of the 33 years studied, instead of 4 of 33 as would occur in the future without the project (see Figure 3-5). The critical low flushing rate would occur 15 percent of the time with the project as compared to 12 percent of the time without the project. During these periods of critical flushing rate, the probability of fish kills is higher.

Using a correlation of the data presented in Figure 3-3, a projection of TSI values in Scofield was developed for future without project and project conditions. A comparison of these projections is shown in Figure 3-6. As shown in the figure, the average TSI under the future without project condition would be 55.1. The average TSI in Scofield Reservoir under the recommended plan would be 56.3. The increase in TSI is due to the potential for increased internal phosphorus loading within the reservoir due to lower water levels. As shown in Figure 3-6, the TSI would be greater than 50 in essentially all years, with or without the project. A TSI of 50 or greater indicates that the reservoir is eutrophic. Therefore, it may be concluded that although implementation of the Recommended Plan would cause a slight increase in the average TSI for Scofield Reservoir, the reservoir would be eutrophic with or without the project.

Based on the above analyses, implementation of the recommended plan is expected to slightly increase the potential for fish kills in Scofield Reservoir unless mitigation is provided. However, unless measures are implemented to improve the water quality, Scofield Reservoir would be eutrophic with or without the project.

Implementation of the Recommended Plan would have a slight detrimental impact on Colorado River salinity. Construction and operation of Narrows Dam and Reservoir would remove about 1,580 tons of salt per year from the Colorado River system. However, the project would also cause a depletion of about 5,557 acre-feet of water. An increased salinity concentration of about 0.55 mg/L would occur at Imperial Dam.

Smaller Reservoir Plan

Water quality impacts under the Smaller Reservoir Plan would be similar to those of the Recommended Plan. The inflow to Lower Gooseberry and Scofield Reservoirs would be reduced by 5,317 acre-feet instead of 5,980 acre-feet under the recommended plan, which would indicate a slightly reduced impact to water quality in the two reservoirs. The depletion to the Colorado River would be reduced slightly to 4,974 acre-feet. This depletion would remove about 1,414 tons of salt per year from the Colorado River system, but would increase salinity concentration at Imperial Dam by about 0.50 mg/L.

No Action Plan

Under the No Action Plan, there would be no temporary water quality impacts to Gooseberry and Fish Creeks because there would be no heavy construction in the area. Low DO levels would continue to occur in Lower Gooseberry Reservoir. The total in

Figure 3-5

SCOFIELD RESERVOIR

COMPARISON OF FLUSHING RATES FUTURE WITHOUT AND PROJECT CONDITIONS

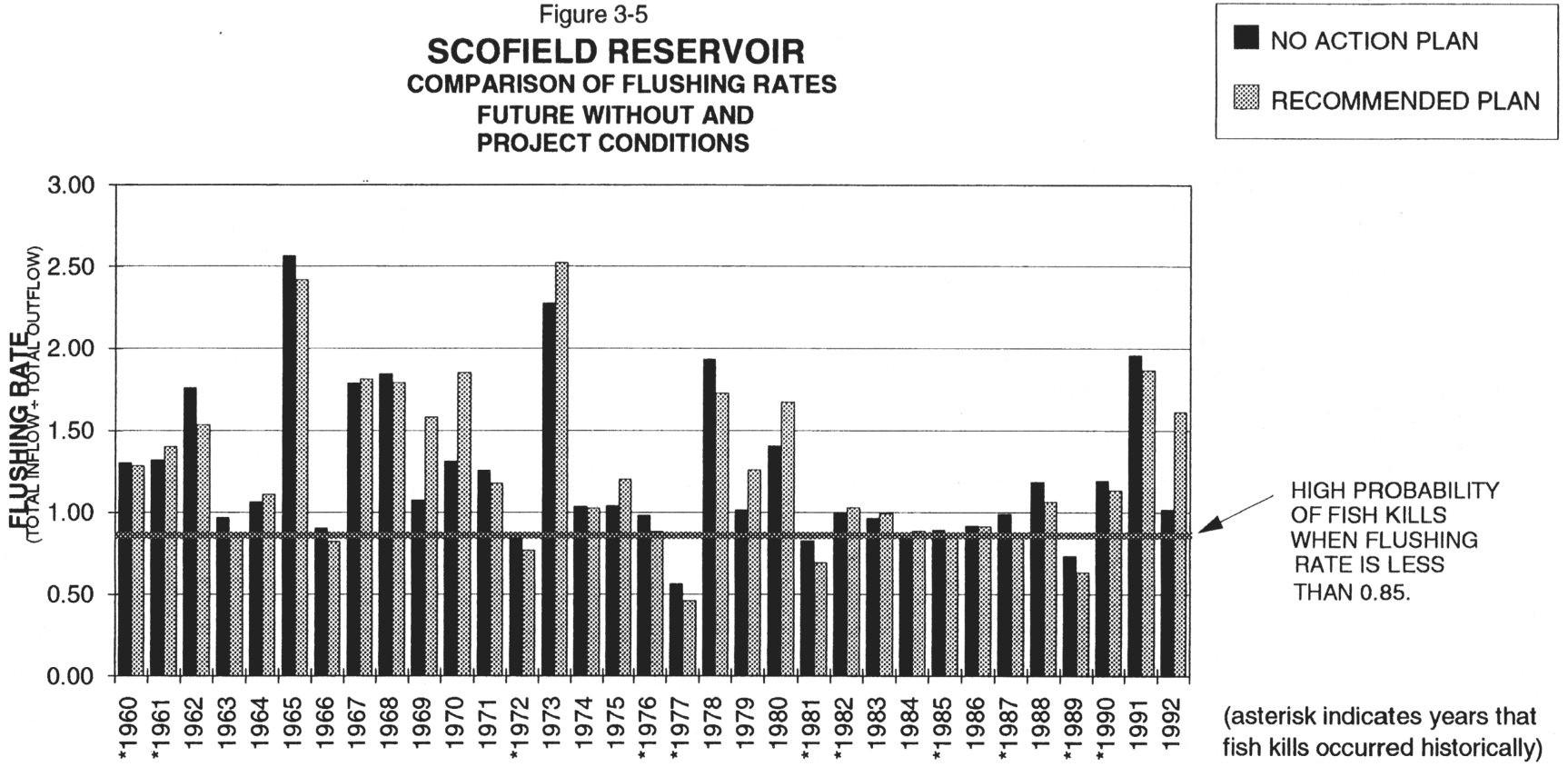
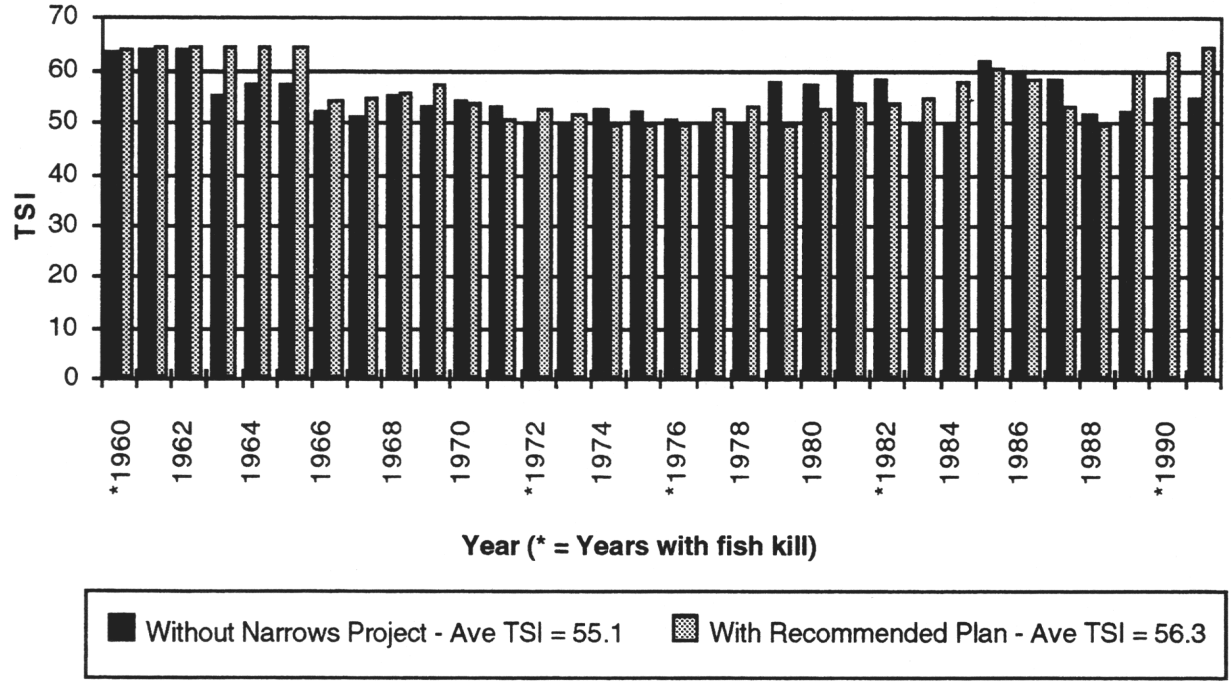


Figure 3-6
Scofield Reservoir Trophic State Index (TSI) Comparison



lake phosphorus level in Scofield Reservoir would continue to average 0.034 mg/L. The average probability of eutrophication would remain about 79 percent. The TSI would continue to average 55.1 and the reservoir would continue to be eutrophic. Fish kills would continue to occur in about 11 of 33 years. The average flushing rate would continue to be 1.22.

Salinity levels in the Colorado River would continue as at present under this alternative.

Water Quality Mitigation

Recommended Plan

Under the Recommended Plan, water quality measures would be implemented in an attempt to offset impacts to water quality in Lower Gooseberry and Scofield Reservoirs. These measures include stabilizing the Gooseberry Creek channel, providing 300 acre-feet of water from Narrows Reservoir to augment winter flows into Lower Gooseberry Reservoir, and making improvements to 9.5 miles of stream segments tributary to Scofield Reservoir to reduce external phosphorus loading.

The channel of Gooseberry Creek between Gooseberry Reservoir and Narrows Dam would be narrowed to stabilize the banks and provide better fish habitat with the reduced flows. It is expected that in time the channel would narrow by itself due to the decreased flow. However, in order to expedite the process, certain man-made improvements would be made. Prior to construction of these improvements, a detailed

design would be developed by the Sponsor with coordination with the FS, the FWS, the COE, the UDWR, and the Utah Division of Water Rights. A 40-acre parcel of private land that the stream runs through would be acquired. Fencing would also be provided where needed to protect the stream from livestock. In addition, a high percentage of the nutrients flowing into Lower Gooseberry would be caught in Narrows Reservoir.

The water quality in Scofield Reservoir would be improved by reducing phosphorous loading. This improvement would be realized in conjunction with the improvement of stream segments on tributary streams above Scofield Reservoir. About 9.5 miles of stream segments would be improved. The improvements would consist of bank stabilization, primarily through riparian plantings. The stream segments would also be fenced to protect them from grazing impacts. This measure would reduce the amount of sediment and animal waste and hence the amount of phosphorous flowing into the reservoir. Historically fish kills have occurred in Scofield Reservoir due to poor water quality. Phosphorous has been identified as the limiting nutrient in the eutrophication of the reservoir. Phosphorous loading occurs through several methods including inflow of sediments which are naturally high in phosphorous and animal waste. The Utah Division of Water Quality in a report entitled "Scofield Reservoir Restoration Through Phosphorous Control" concluded that "*the most pragmatic and effective means to control the further eutrophication of Scofield Reservoir, or possibly to effect a moderate reversal of the eutrophication process, appears to be a reduction of the phosphorous load to the lake.*"

Smaller Reservoir Plan

Water quality mitigation measures under the Smaller Reservoir Plan would be the same as those of the recommended plan.

No Action Plan

There would be no water quality mitigation under the No Action Plan since there are no net impacts to water quality.

Residual Impacts

Recommended Plan

Although it is not possible to quantify the net effect of the project plan on water quality in Lower Gooseberry and Scofield Reservoirs, it is generally believed that the mitigation measures described above would offset the adverse impacts caused by the project, leaving no residual project impact. The net effect of the project on Colorado River salinity would be an increased salinity concentration of about 0.55 mg/L at Imperial Dam.

Smaller Reservoir Plan

After mitigation, there would be no residual project impact on water quality in Lower Gooseberry and Scofield Reservoirs. The net effect of the project on Colorado River salinity would be an increased salinity concentration of about 0.50 mg/L at Imperial Dam.

No Action Plan

There would be no residual impacts to water quality under the No Action Plan.

Slope and Channel Stability

Existing Environment

A total of 104 landslides were identified from aerial photographs and during a 1991 field review along the slopes of a 6-mile reach of Cottonwood Creek. The review team was comprised of individuals from various government agencies and private consulting firms. The review was to determine the impact of projected flow increases from Narrows Tunnel on adjacent slopes of Cottonwood Creek. The state of activity of the slides was noted with 85 slides classified as "active" and 19 classified as "dormant." The certainty of landslide identification included 89 slides as "definite," 13 as "probable," and 2 as "questionable." The distances of the landslides from the tunnel portal ranged from 0.3 miles to 6.1 miles. It appears that landslide activity is not related to channel stability nor the flow in Cottonwood Creek but is caused by saturation from water sources on the hillsides. Dominant types of slope movement of the 104 landslides are shown in Table 3-3 below.

Table 3-3
Slope Movement[1/]

Type of Movement	No. of Landslides
Slump earthflow	8
Debris slide	64
Debris flow	8
Earthflow	1
Slump	22
Debris cone	1

1/ Based on the type of material involved in the movement (soil, rock, or debris) and the dominant type of movement (whether the material is sliding, flowing, falling) or a combination thereof.

Dominant discharge was used in the degradation analysis of channel stability of seven reaches of Cottonwood Creek. The location of these reaches is shown in Figure 3-7. The dominant discharge is comprised of the rainfall runoff and the tunnel releases. As shown in Table 3-4, the 2-year preproject and project flows for each stream reach are the

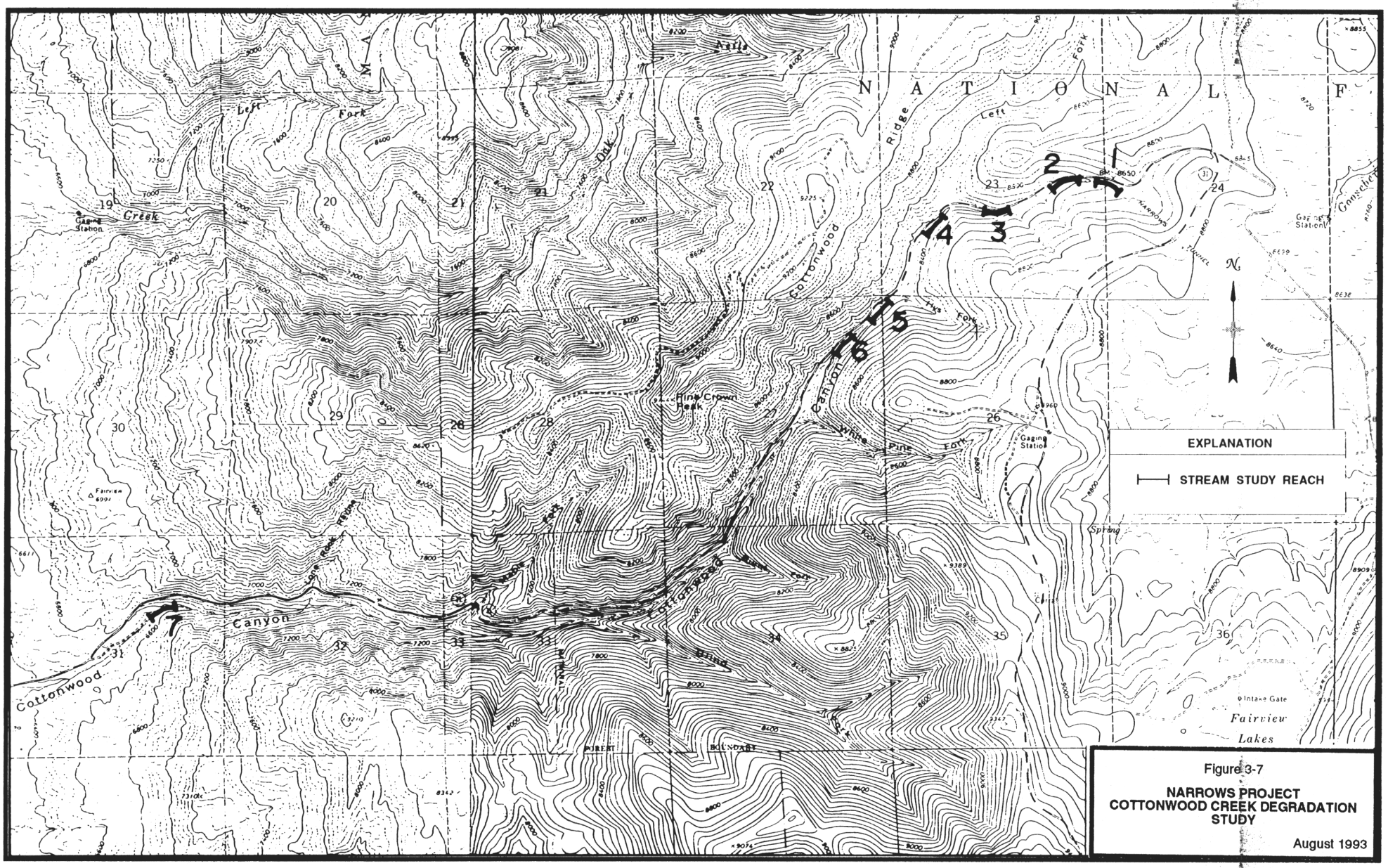


Figure 3-7

NARROWS PROJECT
COTTONWOOD CREEK DEGRADATION STUDY

August 1993

Table 3-4
Cottonwood Creek
Dominant Discharge[1/] Comparison
(Unit--cfs)

Reach No.	No Action Plan			Recommended Plan		
	Rainfall Runoff	Tunnel Release	Dominant Discharge	Rainfall Runoff	Tunnel Release	Dominant Discharge
1	Neg	15	15	Neg	60	60
2	15	15	30	15	60	75
3	25	15	40	25	60	85
4	90	15	105	90	60	150
5	90	15	105	90	60	150
6	90	15	105	90	60	150
7	220	15	235	220	60	280

1/ Defined as the discharge which, if allowed to flow constantly, would have the same overall channel shaping effect as the natural fluctuating discharges. It is the peak discharge having a recurrence interval of about 2 years.

sum of the rainfall runoff and the tunnel releases. Preproject, or No Action Plan, dominant discharge amounts ranged from 15 cfs to 235 cfs in the seven reaches analyzed.

Impacts

Recommended Plan

Implementation of the Recommended Plan would have no impact on the stability of the slopes in Fairview Canyon because the landslides are caused by saturation high on the hillsides.

Project dominant discharge amounts would range from 60 cfs to 280 cfs. The maximum additional vertical degradation expected under project operation would be less then 0.5 foot and is negligible. Table 3-5 summarizes the expected project impact--the difference in the pre-project and project vertical degradation. In addition to vertical degradation, the stream channel is expected to widen as a result of the increase in dominant discharge. The expected increase in channel width was estimated based on a comparison of pre-project and project width to depth ratios under the dominant discharge. Table 3-6 summarizes the expected increase in channel width due to implementation of the Recommended Plan. As shown in the table, the channel width would increase by 74 percent near the Narrows Tunnel outlet and by 4 percent near the mouth of the canyon.

Table 3-5
Vertical Degradation Limited by Armoring
(Unit--ft)

Reach No.	No Action Plan	Recommended Plan	Project Impact
1	0.04	0.12	0.08
2	0.20	0.36	0.16
3	0.32	0.67	0.35
4	0.26	0.36	0.10
5	0.11	0.15	0.04
6	0.19	0.26	0.07
7	0.46	0.62	0.16

Smaller Reservoir Plan

The impacts to slope and channel stability under the Smaller Reservoir Plan would be the same as those caused by the Recommended Plan.

No Action Plan

Slope and channel stability would continue as described above under "Existing Environment."

Mitigation

Recommended Plan

In order to avoid severe impacts to the upper portion of Cottonwood Creek channel, the Upper Cottonwood Creek Pipeline would be constructed to convey project flows outside the stream channel. This pipeline would extend from the Narrows Tunnel outlet to the confluence with Left Hand Fork. The remaining stream channel would be subjected to increased dominant discharge and would widen by 23 percent near the confluence with Left Hand Fork and by 4 percent near the mouth of the canyon. This stream widening could potentially destabilize the banks causing a long-term erosion situation.

Smaller Reservoir Plan

Mitigation for slope and channel stability for the Smaller Reservoir Plan would be the same as that described above for the Recommended Plan.

No Action Plan

There would be no mitigation for slope and channel stability under the No Action Plan because there would be no impacts.

Table 3-6
Summary of Cottonwood Creek Channel Widening Analysis
Based on Width-Depth Ratio

	No Action Plan					Recommended Plan						
Reach No.	Dominant Discharge (cfs)	Average Velocity (ft/sec)	Top Width (ft)	Average Depth (ft)	Width-Depth Ratio	Dominant Discharge (cfs)	Average Velocity (ft/sec)	Top Width (ft)	Average Depth (ft)	Width-Depth Ratio	Increase in Width (ft)	Percent Increase in Width
1	15	3.2	16.8	0.4	47	60	4.2	29.2	0.6	52	**12.4**	74
2	30	4.6	10.9	0.7	19	75	5.4	17.3	0.9	22	**6.3**	58
3	40	4.8	10.8	0.9	13	85	5.3	15.4	1.1	14	**4.6**	43
4	105	5.4	32.5	0.7	58	150	4.9	38.6	0.9	51	**6.1**	19
5	105	5.4	19.0	1.0	19	150	5.7	23.3	1.2	21	**4.3**	23
6	105	5.8	19.3	1.0	21	150	6.0	23.4	1.1	22	**4.1**	21
7	235	7.6	15.5	2.1	7.6	280	8.1	16.1	2.3	7.4	**0.6**	4

Residual Impacts

Recommended Plan

The residual impacts to slope and channel stability under the Recommended Plan would include subjecting the stream to increased dominant discharge which would widen the channel by 23 percent near the confluence with Left Hand Fork and by 4 percent near the mouth of the canyon. This stream widening could potentially destabilize the banks causing a long-term erosion situation.

Smaller Reservoir Plan

Residual impacts to slope and channel stability caused by the Smaller Reservoir Plan would be the same as those described above for the Recommended Plan.

No Action Plan

There would be no residual impacts to slope and channel stability under the No Action Plan.

Aquatic Ecology

Introduction

Most of the Narrows Project alternatives have the potential to affect aquatic resources in Gooseberry Creek, Fish Creek, three unnamed headwater tributaries to Gooseberry Creek, Cottonwood Creek, Gooseberry Reservoir, Fairview Lakes, and Scofield Reservoir. Cottonwood Creek is in the San Pitch River basin, whereas all of the others are in the Price River drainage. Cottonwood Creek flows into the San Pitch River downstream from Fairview, Utah, but the San Pitch River, within the project area, does not support a sport fishery because of low summer flows.

Flows in Gooseberry Creek, its unnamed tributaries, and Cottonwood Creek are presently affected by the operation of Fairview Lakes, which stores water during spring runoff. Water from the lakes is delivered during the irrigation season via one of the unnamed tributary streams and a canal to the Narrows Tunnel which discharges into Cottonwood Creek. The released water is then diverted for irrigation in Sanpete County. Lower Gooseberry Creek and Fish Creek downstream from the confluence with Gooseberry Creek are also affected by the operation and the limited regulation offered by Gooseberry Reservoir.

The State Engineer stipulates that a minimum of 1 cfs is to be released downstream from the proposed Narrows Dam and, if the flow is not 1.5 cfs at the Gooseberry campground, the Sponsor is required to release 1.25 cfs from the dam. It is also stipulated that the dam be constructed with a multiple-level outlet to regulate water temperature for the trout located downstream from the dam. In addition, the State Engineer stipulates that the project cannot divert any water from Cabin Hollow Creek. Water from Brooks Canyon and Cabin Hollow Creeks, however, may be diverted,

stored and used to provide minimum streamflows in Gooseberry Creek below the Narrows site.

A team, comprised of members from the Sponsor's engineering consulting firm; Reclamation; UDWR; and the FS, was assembled to analyze the impact to stream fisheries and develop mitigation recommendations. Potential effects that were included in the evaluation include: stream habitat loss associated with reservoir inundation, effects of project-induced flow changes on aquatic habitat (both beneficial and adverse), and project effects on reservoir aquatic habitat.

Existing Environment

Streams and reservoirs within the project area are shown on the Frontispiece Map. Aquatic resources vary considerably between the different reservoirs and stream segments that could be affected by the Narrows Project. Fish habitat study reaches are shown in Figure 3-8. A summary of aquatic resources present in the different stream segments and reservoirs are provided in the following sections of this document.

Gooseberry Creek (UDWR Class 3B - Unique)

Class 3 streams support the bulk of the stream fishing in Utah. Gooseberry Creek provides important spawning and nursery habitat. It also provides unique habitat to a cutthroat trout. The entire length of Gooseberry Creek has the potential to be affected either by reservoir inundation or by flow alterations. For ease of discussion, the stream has been divided into three segments -- Upper Gooseberry Creek, Middle Gooseberry Creek, and Lower Gooseberry Creek.

The Upper Gooseberry Creek segment extends from the confluence of the three unnamed tributaries near SR-264 downstream 1 mile to Narrows Gorge and averages approximately 11 feet in width. Average monthly flows for average, wet and dry years were shown earlier in Table 3-1. This stream segment supports a natural reproducing cutthroat trout population. The population is comprised of adult, juvenile, and young-of-the-year (YOY) fish. The standing crop of cutthroat trout in this stream segment averages about 38 pounds per acre. This stream segment contains numerous riffle areas that provide cutthroat trout spawning habitat. The value of this stream segment in providing yearling habitat is shown in population estimates of over 450 fish per mile (most were YOY) since 1971. The amount of weighted usable area (WUA) for the various cutthroat trout life stages in this stream segment is shown in Table 3-7. Asshown, this stream segment provides only extremely limited over-winter habitat for adult cutthroat trout. Major factors contributing to the poor habitat include low winter flows and limited pool habitat.

The Middle Gooseberry Creek segment is 3.0 miles in length and extends from the Narrows Gorge downstream to Gooseberry Reservoir. The Middle Gooseberry Creek segment has more flow than the upper segment because of inflow from numerous springs and seeps within and immediately downstream from Narrows Gorge. In addition, this stream segment receives flow from several tributary streams, including Brooks and Charlie Creeks. Average monthly flows that presently occur at the upper end of this stream segment were shown in Table 3-1. This stream segment also supports

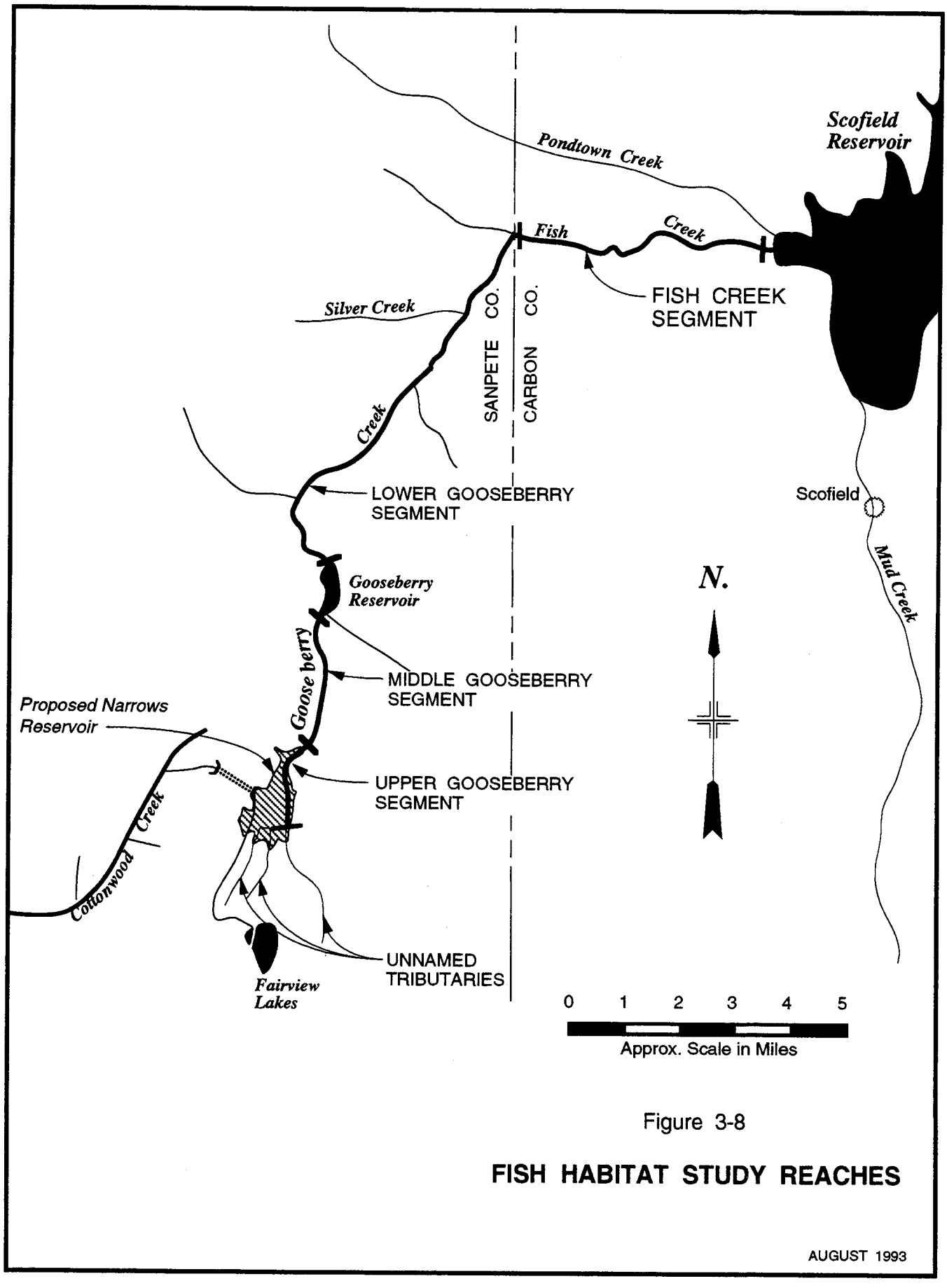


Figure 3-8

FISH HABITAT STUDY REACHES

AUGUST 1993

Table 3-7
Weighted Usable Area for
Cutthroat Life Stages in
Upper Gooseberry Creek with Existing Flows

Month	Life Stage	Average Weighted Usable Area (1,000 units)
January	Adult	8.4
	Juvenile	1.9
February	Adult	8.4
	Juvenile	1.9
March	Adult	8.7
	Juvenile	1.9
April	Adult	11.3
	Juvenile	3.3
May	Adult	11.7
	Juvenile	2.7
	Spawning	0.0
June	Adult	10.7
	Juvenile	2.5
	Spawning	0.0
July	Adult	13.2
	Juvenile	3.5
	Spawning	1.5
August	Adult	12.2
	Juvenile	3.7
	Spawning	1.3
	Fry	4.7
September	Adult	11.1
	Juvenile	3.0
	Fry	4.8
October	Adult	10.2
	Juvenile	2.0
November	Adult	8.9
	Juvenile	2.0
December	Adult	8.7
	Juvenile	1.9

a self-reproducing population of cutthroat trout. Aquatic habitat studies have been conducted on this stream segment and the total amount of WUA for the segment is provided in Table 3-8. As shown, the amount of adult and juvenile cutthroat trout habitat available in this stream segment during the September through March period is extremely limited.

The Lower Gooseberry Creek segment is the longest of the three segments and extends downstream 7.1 miles from Gooseberry Reservoir to the confluence with Fish Creek. Vehicle access to this segment is limited to two or three locations. As shown in Table 3-1, flow in this segment is approximately double the flow of the upper and middle segment. The total WUA for cutthroat and rainbow trout for the segment is provided in Tables 3-8 and 3-9, respectively. As shown, spawning habitat for cutthroat trout is presently quite limited in this stream segment. Although spawning habitat is quite low, it does not appear to be the limiting life stage as cutthroat trout YOY have been plentiful whenever the UDWR sampled the fish population. Both adult and juvenile cutthroat trout habitat is less during the September through March period than the amount of habitat available during the April through August period. Past fish population studies conducted by the UDWR indicate that the cutthroat trout standing crop normally ranges from 40 to 50 pounds per acre and indicates the stream segment supports a fair cutthroat population. Cutthroat trout numbers since 1971 have ranged from about 400 to 750 fish per mile. Sampling prior to 1991, has not indicated the presence of rainbow trout. However, sampling of the stream prior to the eradication of undesirable fish species in Scofield Reservoir resulted in the collection of adult and juvenile rainbow trout.

Fish Creek (UDWR Class 2 - Unique)

Class 2 waters are of great importance to the state fishery. These streams are productive streams with high aesthetic value and should be preserved. This segment of Fish Creek extends from the confluence of Gooseberry Creek downstream to Scofield Reservoir. In addition to a self-reproducing cutthroat trout population, this stream segment is also used as a spawning and rearing area by rainbow trout that migrate upstream from Scofield Reservoir (a limited number of adult rainbow trout remain in the stream). Therefore, this stream segment provides habitat for adult, juvenile, spawning, and fry life stages of both cutthroat trout and rainbow trout.

As shown earlier in Table 3-1, flow in this segment of Fish Creek is considerably greater than the flow of Gooseberry Creek. The amount of rainbow and cutthroat trout WUA in the segment is provided in Tables 3-10 and 3-11, respectively. As shown in Table 3-11, the existing flow regime provides only limited spawning habitat for cutthroat trout during 2 of the 4 months that spawning habitat is utilized. Population data indicate fair numbers of all cutthroat trout life stages in this segment of Fish Creek.

As shown in Table 3-10, this segment of Fish Creek also supplies a desirable habitat for rainbow trout. The amount of habitat for juvenile fish remains fairly uniform, with the lowest amount of habitat available during the low flow months (October through March). Fish population surveys have shown a wide range in standing crop estimates (3.5 to 105.7 pounds per acre), and overall the estimates have averaged almost 50 pounds of trout per acre. This level of fish biomass indicates that this segment of Fish

Table 3-8
Monthly Pre- and Post-Project Cutthroat Trout Habitat
In Middle and Lower Gooseberry Creek During Average Water Year[1/]

Month	Life Stage	Middle Gooseberry Creek			Lower Gooseberry Creek		
		Pre-project	Post-project	Change (%)	Pre-project	Post-project	Change (%)
January	Adult	62.9	57.6	8.4	355.4	344.7	-3.0
	Juvenile	18.0	16.7	7.2	61.6	60.9	-1.1
February	Adult	62.9	57.6	-8.4	359.0	348.5	-2.9
	Juvenile	18.0	16.7	-7.2	63.0	61.1	-3.0
March	Adult	64.7	57.6	-11.0	359.0	344.7	-4.0
	Juvenile	18.3	16.7	-8.7	62.6	60.9	-2.7
April	Adult	106.2	57.6	-45.8	404.9	393.1	-2.9
	Juvenile	30.1	16.7	-44.5	73.2	68.7	-6.1
May	Adult	205.8	57.6	-72.0	562.1	548.3	-2.5
	Juvenile	91.0	16.7	-81.6	75.0	56.0	-25.3
	Spawning	1.5	0.1	-93.3	0.0	0.0	-
June	Adult	202.6	57.6	-71.6	553.2	548.1	-0.9
	Juvenile	88.7	16.7	-81.2	79.6	56.1	-29.5
	Spawning	0.4	0.1	-75.0	0.0	0.0	-
July	Adult	144.4	57.6	-60.1	430.6	405.3	-5.9
	Juvenile	42.7	16.7	-60.9	71.3	73.4	+2.9
	Spawning	0.9	0.1	-88.9	0.0	0.0	-
August	Adult	127.4	57.6	-54.8	413.9	398.7	-3.7
	Juvenile	36.6	16.7	-54.4	73.0	70.4	-3.6
	Spawning	2.8	0.1	-96.4	0.0	0.0	-
	Fry	57.3	28.1	-51.0	65.3	73.1	+11.9
September	Adult	100.2	57.6	-42.5	397.3	355.4	-10.5
	Juvenile	28.4	16.7	-41.2	69.8	61.6	-11.7
	Fry	44.5	28.1	-36.9	73.6	67.1	-8.8
October	Adult	75.4	57.6	-23.6	362.2	327.4	-9.6
	Juvenile	20.9	16.7	-20.1	63.2	58.0	-8.2
November	Adult	66.4	57.6	-13.3	341.5	323.9	-5.2
	Juvenile	18.8	16.7	-11.2	60.0	57.5	-4.2
December	Adult	64.7	57.6	-11.0	348.5	330.9	-5.1
	Juvenile	18.3	16.7	-8.7	61.1	58.5	-4.3

1/ The amount of Weighted Usable Area is expressed in 1,000 units. Average water year is defined as 1968 flows.

Table 3-9
Monthly Pre- and Post-Project Rainbow Trout Habitat
In Lower Gooseberry Creek During Average Water Year[1/]

Month	Life Stage	Pre-project	Post-project	Change (%)
January	Adult	44.1	43.2	-2.0
	Juvenile	21.0	21.0	0.0
February	Adult	44.5	43.5	-2.2
	Juvenile	21.1	21.0	-0.5
March	Adult	44.5	43.2	-2.9
	Juvenile	21.1	21.0	-0.5
April	Adult	65.6	50.0	-23.8
	Juvenile	29.4	22.3	-24.1
May	Adult	142.1	133.0	-6.4
	Juvenile	49.7	51.9	+4.4
	Spawning	0.0	0.0	-
June	Adult	141.9	132.9	-6.3
	Juvenile	47.8	51.9	+8.6
	Spawning	0.3	0.0	-100.0
July	Adult	87.0	66.3	-23.8
	Juvenile	35.1	29.7	-15.4
	Spawning	0.0	0.0	-
August	Adult	79.4	56.3	-29.1
	Juvenile	35.3	25.2	-28.6
	Spawning	0.1	0.0	-100.0
	Fry	62.6	51.8	-17.3
September	Adult	54.4	44.2	-18.8
	Juvenile	24.3	21.0	-13.6
	Fry	49.7	48.8	-1.8
October	Adult	44.8	41.7	-6.9
	Juvenile	21.1	20.9	-0.9
November	Adult	42.9	41.4	-3.5
	Juvenile	21.0	20.9	-0.5
December	Adult	43.5	42.0	-3.4
	Juvenile	21.0	20.9	-0.5

1/ The amount of Weighted Usable Area is expressed in 1,000 units. Average water year is defined as 1968 flows.

Table 3-10
Monthly Pre- and Post-Project Rainbow Trout Habitat In Fish Creek During Average Water Year[1/]

Month	Life Stage	Pre-project	Post-project	Change (%)
January	Juvenile	170.7	171.0	+0.2
February	Juvenile	173.1	171.5	-0.9
March	Juvenile	187.2	185.0	-1.1
April	Juvenile	203.1	198.4	-2.3
May	Juvenile	239.5	239.6	<0.1
	Spawning	45.9	44.9	-2.2
June	Juvenile	240.2	238.8	-0.6
	Spawning	48.4	36.9	-23.8
July	Juvenile	224.0	219.5	-2.0
	Spawning	23.6	18.2	-22.9
August	Juvenile	202.6	197.9	-2.3
	Spawning	11.0	8.2	-25.5
	Fry	226.4	223.1	-1.5
September	Juvenile	183.7	179.0	-2.6
	Fry	219.0	214.9	-1.9
October	Juvenile	172.7	170.5	-1.3
November	Juvenile	171.1	170.8	-0.2
December	Juvenile	171.0	171.6	+0.4

1/ The amount of Weighted Usable Area is expressed in 1,000 units. Average water year is defined as 1968 flows.

Table 3-11
Monthly Pre- and Post-Project Cutthroat Trout Habitat In Fish Creek During Average Water Year[1/]

Month	Life Stage	Pre-project	Post-project	Change (%)
January	Adult	362.7	363.0	+0.1
	Juvenile	85.3	85.5	+0.2
February	Adult	370.4	365.7	-1.3
	Juvenile	85.8	85.3	-0.6
March	Adult	414.2	406.6	-1.8
	Juvenile	88.3	88.3	0.0
April	Adult	476.9	456.1	-4.4
	Juvenile	87.5	87.8	+0.3
May	Adult	666.4	694.6	+4.2
	Juvenile	226.7	235.4	+3.8
	Spawning	0.8	6.0	+650.0
June	Adult	680.8	714.1	+5.0
	Juvenile	231.2	229.4	-0.7
	Spawning	1.7	21.8	+1,182.4
July	Adult	603.4	575.2	-4.7
	Juvenile	91.3	88.3	-3.3
	Spawning	39.8	27.3	-31.4
August	Adult	489.6	454.1	-7.3
	Juvenile	87.4	87.8	+0.5
	Spawning	17.8	14.2	-20.2
	Fry	88.6	84.2	-5.0
September	Adult	415.2	387.8	-6.6
	Juvenile	88.2	87.6	-0.7
	Fry	82.2	81.3	-1.1
October	Adult	369.2	362.5	-1.8
	Juvenile	86.0	85.2	-0.9
November	Adult	364.5	362.8	-0.5
	Juvenile	82.1	85.3	+3.9
December	Adult	363.1	363.9	+0.2
	Juvenile	85.5	85.9	+0.5

1/ The amount of Weighted Usable Area is expressed in 1,000 units. Average water year is defined as 1968 flows.

Creek supports a good trout population. Fish populations conducted over the last 35 years have reported as few as 40 to as many as 4,000 fish per mile. Movement of spawners into the stream from Scofield Reservoir contributes to large increases in numbers and biomass in this stream segment.

Gooseberry Creek Tributaries

Three headwater tributaries join to form Gooseberry Creek. Together these three tributaries contain 7.5 stream miles. The three streams average approximately 4 feet in width. During late summer and early fall flow, major portions of the streams have little or no flow. The flowing reaches are used extensively by cutthroat trout for spawning and rearing of YOY fish. The standing crop of cutthroat trout in these tributary streams averages approximately 86 pounds per acre. Most of the trout are YOY or yearling fish, and fish numbers have averaged over 300 fish per mile. Even though the streams are small, the standing crop indicates their high value for cutthroat trout spawning and rearing habitat.

Cottonwood Creek (UDWR Class 3)

At the present time, upper Cottonwood Creek does not support a self-sustaining trout population because of low and intermittent flows during much of the year (Table 3-1). During the spring runoff and irrigation season, the upper segment contains adequate water for fish and UDWR maintains a rainbow trout fishery during that period by stocking catchable-size fish. As shown in Table 3-1, flows in the lower portion of Cottonwood Creek are considerably greater than in the upper segment. Sampling conducted by the UDWR in 1988 indicated that the lower segment of Cottonwood Creek supports excellent brown and cutthroat trout populations (approximately 210 pounds per acre).

Lower Gooseberry Reservoir

Lower Gooseberry Reservoir is an old reservoir that was created by the placement of a rock dam across Gooseberry Creek and is a popular fishing area. Recently, the FS upgraded the dam to meet appropriate dam safety criteria.

This approximately 270-acre surface area reservoir is managed as a catchable rainbow trout fishery and also supports a resident cutthroat trout population. A creel survey conducted in 1993 determined that, of the trout harvested from the lake, 3 percent were cutthroat trout and 97 percent were rainbow trout. During that year, it was estimated that the lake received over 25,000 hours of fishing pressure from which 9,300 trout were harvested. Two gill nets set in the lake in 1991 collected 104 cutthroat trout ranging from approximately 6.5 to 15.5 inches in length.

A large portion (30-40 percent) of the reservoir has a water depth of less than 3 feet. Areas with shallow water encourage the growth of phytoplankton and aquatic macrophytes which can contribute to low DO levels. Gooseberry Reservoir has a history of fish kills that have been attributed to low DO concentration. Generally, the reported fish kills have been confined to the lower portion of the reservoir near the dam where water exchange is the least.

When the FS recently upgraded the dam, a new outlet structure was constructed so that water could be released from near the bottom of the reservoir. Although the reservoir is quite shallow, release of water from near the bottom may improve the water quality.

Fairview Lakes

Fairview Lakes are owned and operated by the Cottonwood-Gooseberry Irrigation Company. The lakes are also managed as a catchable rainbow trout fishery by UDWR, with approximately 12,000 catchable rainbow trout stocked annually. The stocking usually occurs in early June and approximately 8,700 of the stocked trout are harvested. Approximately 13,000 hours of fishing pressure occurs annually on Fairview Lakes. Due to the low level of the lakes during the winter period, winter survival of the stocked rainbow trout does not normally occur. Even though Fairview Lakes are located adjacent to the project, they would not be directly affected. However, they could be affected by changes in fisherman usage, changes in UDWR fishery management programs, and possible mitigation measures.

Scofield Reservoir

Scofield Reservoir supports a good sport fishery consisting of cutthroat trout (natural reproduction) and rainbow trout (natural reproduction and stocking). Annually, the UDWR stocks approximately 600,000 3-inch rainbow trout into Scofield Reservoir. Based on a 1986 creel survey, an estimated 250,000 trout (both cutthroat and rainbow) were harvested from the lake, with an expenditure of about 347,000 hours of fishing pressure. This fishery resource represents a significant economic resource to the local area.

In the past, the reservoir has experienced periodic fish kills, usually winter kills associated with low DO levels. In 1991, a fish management program eradicated undesirable fish species.

Impacts

Recommended Plan

The proposed project would cause flow reductions in Gooseberry and Fish Creeks as shown earlier in Table 3-1. Flows in Middle Gooseberry Creek immediately downstream from the proposed dam are expected to be reduced by 91 percent, whereas flows downstream from Gooseberry Reservoir are expected to be reduced by 51 percent. In Fish Creek, flows are expected to be reduced approximately 18 percent.

The diversion of the 5,400 acre-feet of project water into Cottonwood Creek would cause over a 100-percent increase in the flow in Upper Cottonwood Creek (Table 3-1). As shown, the flows in Lower Cottonwood Creek would be increased slightly more than 60 percent. However, the increased flow would occur only during the July to October period and not during the low flow months.

Reservoir Inundation Effects

At maximum storage, the proposed Narrows Reservoir would inundate about 1 mile of Upper Gooseberry Creek and approximately 4.3 miles of the three headwater tributaries with permanent flow that join to form Gooseberry Creek.

Based on the width and length of the stream segments that would be inundated by the proposed reservoir, it is expected that 1.3 and 2.1 acres of aquatic habitat would be lost in Gooseberry Creek and the tributaries, respectively. Using the standing crop estimates, approximately 230 pounds of cutthroat trout would be lost, of which 22 percent would be in Gooseberry Creek and 78 percent would be in the tributary streams.

Flow Alteration Effects

Middle Gooseberry Creek Segment

As was shown in Table 3-1, preproject average monthly flows in this stream segment range from 1.3 to 61.8 cfs and averaged 11.2 cfs. The expected postproject flow of 1 cfs represents a 91 percent reduction in annual flow in this stream segment. As described above, this segment of Gooseberry Creek supports all life stages of cutthroat trout. Adult and juvenile cutthroat trout utilize the aquatic habitat throughout the year while cutthroat trout spawning habitat (including incubation) is utilized during May, June, July, and August, and fry are present in August and September.

Cutthroat trout habitat on a monthly basis for the four life stages under pre- and postproject flow regime was shown in Table 3-8. Adult and juvenile cutthroat trout habitat is quite limited during the existing low flow period, which in an average year extends from October through March. Even though more habitat may occur during the high flow months, the overall trout population would be expected to be controlled by available habitat during this 6-month period. As shown in Table 3-8, adult and juvenile cutthroat trout are expected to be reduced by as much as 72.0 and 81.6 percent, respectively in the high flow months. Conversely, during the low flow period (October through March), adult and juvenile cutthroat trout habitat in an individual month would be reduced up to 23.6 and 20.1 percent, respectively. On an average during this period, adult habitat would be reduced 12.9 percent while juvenile habitat would be reduced 10.8 percent.

Since spawning and fry life stages are in the stream segment during the spring and summer, the effect of flow reductions attributable to the project are much greater, with spawning habitat being reduced by almost 94 percent and fry habitat being reduced by almost 45 percent. If fry from cutthroat trout spawning upstream from the proposed dam are presently being carried into this stream reach, construction of the dam would prevent these fry from entering this reach of stream.

Since the project would eliminate large flows in this stream segment, it is expected that the width of the stream would be reduced, which may increase fry habitat. However, without the normal flushing flows, the stream can be expected to have more fine materials in the substrate, which could almost eliminate the small amount of cutthroat

trout spawning habitat that is projected to remain in the stream segment. Unless the configuration of the channel of the stream is altered, the stream segment would have limited value, and 50 to 75 percent of trout biomass may be lost. If the channel configuration is altered, then the loss of trout biomass may not be as great.

Lower Gooseberry Creek Segment

Operation of the proposed project would cause monthly flow reductions in this 7.1-mile stream segment that would range from 8 to 62 percent and average 51 percent (Table 3-1). The largest flow reductions would occur during the April through August period. However, due to tributary inflow between the proposed dam and this stream segment, the reductions are not as severe as they are in the segment immediately upstream from Lower Gooseberry Dam.

As previously discussed, this stream segment supports a self-reproducing population of cutthroat trout. The amount of habitat available for the four life stages on a monthly basis with pre- and postproject flow regimes was shown in Table 3-8. Similar to the upstream segment, existing habitat for adult and juvenile cutthroat trout is most restricted during the low-flow period which extends from October through March. As discussed for the previous stream segment, habitat during this period would be expected to be a major factor that controls trout biomass in the stream. As shown in Table 3-8, adult and juvenile habitat would be reduced up to 10.5 and 29.5 percent, respectively. However, during the low-flow months, adult and juvenile habitat reductions never exceed 10 percent in a specific month, and for the 6-month period average 5.0 and 3.9 percent, respectively. With these low reductions in adult and juvenile habitat, any change in the trout population would be expected to be difficult to detect.

Cutthroat trout spawning habitat is extremely limited with both pre- and postproject flow regimes. As described above, it appears that available spawning habitat is not a major problem, as young-of-the-year fish are normally abundant in this stream segment. Fry habitat is expected to be only slightly affected (0.9 percent increase) by the proposed project.

It is expected that the proposed project would cause less than a 5 percent reduction in the cutthroat trout population in this stream segment. This is well within the range of fluctuations in the trout population that presently occurs. Little or no opportunity exists to mitigate the adverse impact within this stream segment.

As discussed above, rainbow trout (adults and juveniles) were documented in this stream reach. The presence of these two life stages strongly suggests that rainbow trout are also using the stream for spawning and rearing habitat. The amount of rainbow trout habitat (WUA) for the four life stages in the entire stream reach was shown in Table 3-9. Similar to cutthroat trout, adult and juvenile rainbow trout habitat is most restricted during the low-flow period (October through March), and this would be expected to be a major factor that controls trout biomass in this stream segment. For this 6-month period, operation of the proposed project is expected to reduce rainbow trout adult and juvenile habitat by an average of 6.5 and 5.4 percent, respectively.

Rainbow trout spawning habitat is limited in this stream reach (Table 3-9). Implementation of the proposed project is expected to result in a slight increase (<7 percent) of spawning habitat. Rainbow trout fry habitat is abundant in this stream reach, and implementation of the proposed project is also expected to cause a slight increase (<8 percent) in fry habitat (Table 3-9). Neither increase is considered to be significant.

Fish Creek Segment

The proposed project would result in a 3 to 24 percent reduction in the monthly flow in this segment of Fish Creek. As with upstream segments, the largest reductions would occur during the April through August period when preproject flows are the highest. Flows during the low-flow months would be reduced 10 percent or less, and flow during the other months remains several times higher than the low-flow months. Reduction in high flows would reduce the sediment transport capacity of the stream, which could increase the amount of sediment within the steam channel.

The amount of cutthroat trout habitat available for the four life stages on a monthly basis with pre- and postproject flow regimes was shown in Table 3-11. Similar to the upstream segment, adult and juvenile cutthroat trout habitat is the lowest during the October through March period, and reduced habitat during this period would be expected to be a major factor that controls the cutthroat trout population in this stream segment. As shown in Table 3-11, adult and juvenile cutthroat trout habitat in a specific month may be reduced up to 7.3 and 3.3 percent, respectively, while in other months, available habitat may be increased. On an average for the 6-month low-flow period, adult cutthroat trout habitat is expected to be reduced by less than 1 percent while juvenile habitat would be increased by about 0.5 percent. Both of these changes are considered to be insignificant.

Between individual months, spawning and fry cutthroat trout habitat may be reduced or increased. Overall spawning habitat is expected to be increased by slightly more than 15 percent, while fry habitat would be reduced by about 3 percent. The increase in spawning habitat is considered to be a significant beneficial impact.

The amount of juvenile, spawning, and fry habitat for rainbow trout in this segment of Fish Creek, based on pre- and postproject flow regimes, was presented earlier in Table 3-10. Similar to the cutthroat trout, existing juvenile rainbow trout habitat is most limiting during the October through March period, and available habitat during this period would be a major factor that controls the abundance of juvenile rainbow trout in this stream segment. During this 6-month period, adult rainbow trout habitat would decrease between 0.5 and 2.7 percent in specific months, while juvenile rainbow trout habitat is expected to be increased by up to 0.4 percent and reduced up to 1.3 percent in specific months. Overall, adult and juvenile habitat reductions are expected to average about 1.3 and 0.5 percent, respectively. This is considered to be an insignificant impact.

Also as shown earlier in Table 3-10, impacts to rainbow trout spawning and fry habitats are expected to be a decrease of about 16 and 2 percent, respectively. If rainbow trout habitat in this stream segment is limiting, then the reduction in spawning habitat is a significant impact. If so, this effect would be carried into Scofield Reservoir, as it would

affect the number of rainbow trout entering the reservoir's fishery from natural reproduction.

Cottonwood Creek Segment

Flows in Cottonwood Creek would be increased during the July through October period (Table 3-1). Since flows would not be increased during the low-flow period, the upper portion of the stream would not be expected to support a resident fishery. It is expected that a fishery would continue to be maintained by UDWR by stocking catchable-size fish during the May through September period. The increased flows, however, would make fishing much more difficult.

Reservoir Fishery Effects

Reservoir fisheries that have the potential to be affected by the proposed project include Gooseberry Reservoir, Scofield Reservoir, Fairview Lakes, and the proposed Narrows Reservoir. Each are discussed below.

Lower Gooseberry Reservoir

Under the Recommended Plan, flows from Gooseberry Creek into Lower Gooseberry Reservoir would be substantially reduced. As shown in Table 3-1, most of the flow reduction would occur during the April through August period. Flow reduction during this period would reduce the exchange rate within the reservoir, and may affect water quality or aquatic habitat during this period. At the present time, Gooseberry Reservoir frequently experiences fish kills due to low DO levels. If the problem becomes more severe, it would be an adverse effect attributable to the project. If cutthroat trout spawning upstream from the proposed reservoir contributes to the abundance of cutthroat trout in Gooseberry Reservoir, the proposed project could affect the cutthroat trout population in that reservoir.

Fairview Lakes

Project operation would not change the amount of water (acre-feet) that is released from Fairview Lakes. The release would be spread over the entire year rather than the present 18- to 20-week discharge period. This would allow higher water levels later in the year. Both management programs would have a slightly beneficial effect on the overall quality of the fishery.

Scofield Reservoir

A primary concern regarding Scofield Reservoir as it relates to the Narrows Project has been that the decreased inflow to the reservoir resulting from the Narrows Project would further degrade the reservoir's water quality and increase the potential for fish kills. Additionally, implementation of the recommended plan would cause Scofield Reservoir to operate at a lower level and thus decrease the average surface area of the

flat water fishery. This reduced surface area would result in the loss of about 4,500 angler days per year.

Narrows Reservoir

It is expected that under the Recommended Plan, UDWR would manage Narrows Reservoir as a cutthroat trout fishery. Although natural reproduction is expected in the tributary streams upstream from the reservoir, UDWR may need to supplement existing reproduction with fingerling cutthroat trout stocking to ensure that maximum reservoir production occurs. As an example, UDWR is presently managing Cleveland Reservoir, located about 6 miles south-east of the proposed Narrows Reservoir site, for rainbow trout and maintaining the population by stocking fingerling rainbow trout. According to a creel census conducted at Scofield Reservoir in 1986, that reservoir received approximately 30 angler days of use per acre annually. If Narrows Reservoir were to receive similar pressure, it would support about 13,700 angler days annually.

Present policy of UDWR does not allow the creation of a reservoir fishery to replace or compensate for the loss of stream aquatic resources. However, the creation of the reservoir fishery would compensate for adverse effects that may occur on Gooseberry Reservoir and Scofield Reservoir. This represents a significant beneficial impact of the project.

Smaller Reservoir Plan

Impacts to aquatic resources under the Smaller Reservoir Plan would be similar to those generated by the Recommended Plan. The exception would be that 3.8 miles of tributaries to Gooseberry Creek would be inundated by the reservoir instead of the 4.3 miles inundated by the Recommended Plan. In addition, the Smaller Reservoir Plan would provide only 7,200 angler-days at Narrows Reservoir.

No Action Plan

Under the No Action Plan, project induced changes to existing conditions would not occur.

Aquatic Mitigation

Recommended Plan

As described in the previous sections, the proposed project would result in loss of cutthroat trout habitat attributable to reservoir inundation and flow alteration. The project would also result in more reservoir habitat for cutthroat trout. The reservoir cutthroat trout habitat that would be created by the project would compensate for any adverse impacts that may occur on Gooseberry or Scofield Reservoirs. Therefore, mitigation for reservoir habitat has not been proposed.

A total of 11 fishery improvement and mitigation measures have been proposed by the Sponsor to compensate for the adverse aquatic impacts that have been identified with the proposed project. To the extent possible, an attempt was made to mitigate "in place"

and "in kind." These measures have been developed by coordination with various Federal and State agencies and were described in detail in Chapter 2 of this document. Table 3-12 is a summary of the aquatic impacts and proposed improvement and mitigation commitments for the Recommended Plan.

Table 3-12
Aquatic Impacts and Mitigation Measures Recommended Plan

Impacts	Mitigation Commitment
Stream Fisheries	
Gooseberry Creek tributaries - Loss of 4.3 miles (spawning cutthroat).	Restore year-round flows in 2.3 miles of tributaries and stabilize 3.0 miles of middle Gooseberry Creek.
Upper Gooseberry Creek - Loss of 1.0 mile (all life stages cutthroat); Middle Gooseberry Creek - 72% reduction in average annual flow for 3.0 miles (all life stages cutthroat); Lower Gooseberry Creek - 47% flow reduction for 7.1 miles. (Decrease of 5% adult and 4% juvenile low-flow habitat for cutthroat); Fish Creek - Average 17% flow reduction of 6.0 miles. (Decrease of less than 1% adult and juvenile low-flow habitat for cutthroat. Overall increase of 15% spawning and 3% fry habitat for cutthroat. Decrease of 1.3% adult and 0.5% juvenile low-flow habitat for rainbow. Overall decrease of 16% spawning and 2% fry habitat for rainbow.)	Acquire, fence, and improve fishery habitat on the following stream segments: Mud Creek 4.0 miles Winterquarters Creek 2.5 miles Upper Fish Creek 1.0 mile Pondtown Creek 2.0 miles Price River below Scofield Reservoir 2.0 miles
Upper Cottonwood Creek - No summer flow increase, 2 cfs winter flow provided.	Construct Upper Cottonwood Creek Pipeline and provide 2 cfs winter release.
Lower Cottonwood Creek - Average 162% annual flow increase. Average 300% summer flow increase. Loss of 4.9 miles of habitat for all life stages for Rainbow, Cutthroat, and Brown Trout.	Provide 2 cfs minimum flow during irrigation season in lower Cottonwood Creek. Acquire (as necessary), fence, and improve fishery habitat on 4.0 miles of Starvation Creek.
Reservoir Fisheries	
Scofield Reservoir - Increased potential for poor water quality resulting in fish kills, loss of some natural reproduction in rainbows. Reduced surface area resulting in reduced standing crop of fish and loss of 4,500 angler days per year.	Reduce external phosphorus loading by improving riparian areas along Mud Creek, Winterquarters Creek, Upper Fish Creek, and Pondtown Creek. These measures will also improve habitat for all life stages of cutthroat and rainbow trout including spawning. Lost angler days would be replaced by fishery in Narrows Reservoir.
Lower Gooseberry Reservoir - Increased potential for poor water quality resulting in fish kills.	Provide 300 acre-feet of water from Narrows Reservoir to be used for instream flow augmentation in consultation with UDWR.
Fairview Lakes - Lower fishing pressure, less severe drawdown during fishing season.	Beneficial impact. No mitigation required.
Narrows Reservoir - New reservoir fishery.	Would provide approximately 13,700 angler days use.

Smaller Reservoir Plan

A summary of the nine fishery improvement and mitigation measures proposed for this alternative (all of which were described in greater detail in Chapter 2) is presented in Table 3-13.

Table 3-13
Aquatic Impacts and Mitigation Measures Smaller Reservoir Plan

Impacts	Mitigation Commitment
Stream Fisheries	
Gooseberry Creek tributaries - Loss of 3.8 miles (spawning cutthroat).	Provide 1.8 miles of replacement spawning habitat and stabilize 3.0 miles of middle Gooseberry Creek.
Upper Gooseberry Creek - Loss of 1.0 mile (all life stages cutthroat); Middle Gooseberry Creek - 72% reduction in average annual flow for 3.0 miles (all life stages cutthroat); Lower Gooseberry Creek - 47% flow reduction for 7.1 miles. (Decrease of 5% adult and 4% juvenile low-flow habitat for cutthroat); Fish Creek - Average 17% flow reduction of 6.0 miles. (Decrease of less than 1% adult and juvenile low-flow habitat for cutthroat. Overall increase of 15% spawning and 3% fry habitat for cutthroat. Decrease of 1.3% adult and 0.5% juvenile low-flow habitat for rainbow. Overall decrease of 16% spawning and 2% fry habitat for rainbow.)	Acquire, fence, and improve fishery habitat on the following stream segments: Mud Creek 4.0 miles Winterquarters Creek 2.5 miles Upper Fish Creek 1.0 mile Pondtown Creek 2.0 miles Price River below Scofield Reservoir 2.0 miles
Upper Cottonwood Creek - No summer flow increase, 2 cfs winter flow provided.	Construct Upper Cottonwood Creek Pipeline and provide 2 cfs winter release.
Lower Cottonwood Creek - Average 162% annual flow increase. Average 300% summer flow increase. Loss of 4.9 miles of habitat for all life stages for Rainbow, Cutthroat, and Brown Trout.	Provide 2 cfs minimum flow during irrigation season in lower Cottonwood Creek, Acquire (as necessary), fence, and improve fishery habitat on 4.0 miles of Starvation Creek.
Reservoir Fisheries	
Scofield Reservoir - Increased potential for poor water quality resulting in fish kills, loss of some natural reproduction in rainbows. Reduced surface area resulting in reduced standing crop of fish and loss of 4,500 angler days per year.	Reduce external phosphorus loading by improving riparian areas along Mud Creek, Winterquarters Creek, Upper Fish Creek, and Pondtown Creek. These measures will also improve habitat for all life stages of cutthroat and rainbow trout including spawning. Lost angler days would be replaced by fishery in Narrows Reservoir.
Lower Gooseberry Reservoir - Increased potential for poor water quality resulting in fish kills.	Stabilize 3.0 miles of middle Gooseberry Creek to reduce external phosphorus loading.
Fairview Lakes - Lower fishing pressure, less severe drawdown during fishing season.	Beneficial impact. No mitigation required.
Narrows Reservoir - New reservoir fishery.	Would provide approximately 7.200 angler days use.

No Action Plan

There would be no aquatic mitigation measures under the No Action Plan.

Residual Impacts

Recommended Plan

The intent of the aquatic mitigation measures described above is to provide full mitigation for all adverse impacts which would result in no residual impacts. There is

however, no proposed mitigation for adverse impacts that are expected to occur as a result of increased stream flow in Cottonwood Creek. This increased flow is expected to widen the stream channel by up to 24 percent and could cause long-term instability of the channel and banks. This channel widening and instability would adversely impact the fishery in about 4.9 miles of Cottonwood Creek.

Smaller Reservoir Plan

The residual impacts to aquatic resources caused by the Smaller Reservoir Plan would be equivalent to those of the Recommended Plan.

No Action Plan

The No Action Plan would cause no residual impacts to aquatic resources.

Geology and Seismicity

Existing Environment

The reservoir basin lies within a high-elevation, shallow valley in the Wasatch Plateau subprovince of the Colorado plateau. This subprovince represents the transition between the Colorado Plateau to the east and the Basin and Range Province to the west. Several ridges isolate the valley basin. The basin lies about 8,680 feet above sea level.

The proposed Narrows Dam and Reservoir area is underlain by the Cretaceous age North Horn formation. This formation consists primarily of interbedded sandy, clayey siltstone, silty claystone, silty sandstone, and limestone with occasional thin seams of coal. Bedrock crops out on the steeper slopes of the left abutment and in the drainage located immediately upstream of the left abutment. There is less exposure of bedrock on the right abutment. Unconsolidated sediments overlying bedrock consist primarily of a mixture of residual soil (weathered rock) and colluvium which generally consists of silty sand with some fine to coarse gravel. A geologic study performed by the Sponsor indicates that there is comparatively low potential for reservoir-induced landslide activity in the reservoir basin.

The North Horn formation is overlain by the Flagstaff Limestone formation which consists primarily of micro-crystalline limestone with thinly bedded shale and silty claystone. Abundant fossils are common within the limestone and the boundary between the formations is transitional. The Flagstaff Limestone formation is generally present in the higher elevations and beyond the actual limits of the proposed dam and reservoir. The Flagstaff Limestone formation is present at the downstream portal area of the existing Narrows Tunnel.

Bedrock is generally covered by a mantle of residual soils and/or colluvium. These unconsolidated sediments are about 5 to 10 feet in thickness with some areas in excess of 27 feet. The unconsolidated sediments are composed of a mixture of clay, silt and sand with minor amounts of organic deposits. Within the active stream channel of Gooseberry Creek and its tributaries, there are limited deposits of recent alluvial sand and gravel.

The structure of the Wasatch Plateau is dominated by a series of north-trending faults across the broad west-dipping monocline of the Plateau. The Sevier fault zone lies closet to the damsite at a distance of about 20 miles. The local structure is dominated by north-trending faulting around the site area. The dam and reservoir sites are located entirely on a down-dropped block between two fault traces, which is known as the Gooseberry Graben. Variation in orientation of beds indicates that the dam area is located on a westward-plunging synclinal fold with the axis running about 1,000 feet south of the proposed dam axis.

Three faults have been mapped in the vicinity of the Narrows Project. These faults, shown in Figure 3-9, are all north-trending normal faults, and from west to east are the West Gooseberry Fault, the Fairview Lakes Fault, and the East Gooseberry Fault.

Observed earthquakes in the region of the Narrows damsite date back to the year 1853, giving an historical data base of about 140 years. A network of seismograph stations throughout the region currently provides accurate location of any seismic event. Geologic evaluation of the Wasatch Plateau area indicates that existing faults are not active. Maximum seismic events for the area are, therefore, projected to be controlled by random background earthquakes -- that is, events not attributable to specific faults or geologic structures.

The largest earthquake recorded in the Wasatch Plateau Province is a magnitude 4.9 event. The maximum random earthquake event postulated for the Wasatch Plateau is a 5.5 event occurring beneath the site at a depth of 3 miles. Such an event would produce a maximum acceleration of approximately 0.35g. Earthquake activity related to mining activities would not be expected to produce events which exceed magnitude 4.5 and, therefore, would not produce the maximum earthquake. Earthquake epicenters are shown on Figure 3-10.

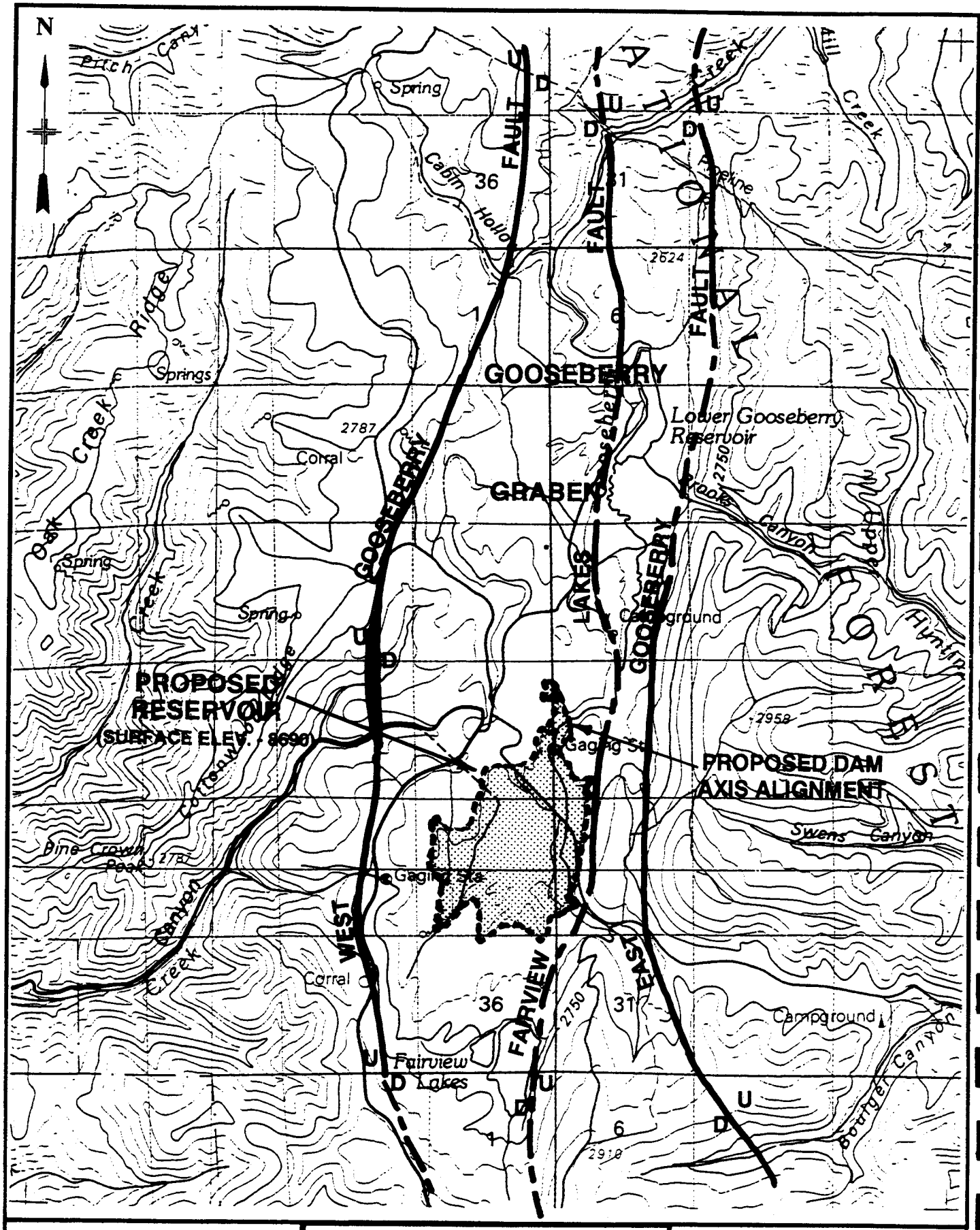
Impacts

Recommended Plan

From a geoseismic standpoint, the recommended Narrows Damsite is suitable for construction. No significant geologic hazards were found in the embankment or reservoir area and no seismic activity would be expected to occur from or be induced by this reservoir. Faults which occur in the site vicinity are believed to be inactive. However, design of project facilities would be based on a "maximum credible earthquake" (MCE). Preliminary studies indicate that the appropriate MCE would be of magnitude 5.5. Further review of the appropriate MCE would be performed prior to final design of the dam. During construction, detailed observations of the subsurface conditions would be monitored by qualified personnel.

Smaller Reservoir Plan

As described for the Recommended plan, no significant geologic hazards would be found in the embankment or reservoir area and no seismic activity would be expected



Legend

- Positively located
- Approximately located
- U Upthrown side
- D Downthrown side

Figure 3-9

Fault Location Map

Scale 1 : 96 000

Source: Adapted from Bureau of Land Management 30x60 minute quadrangle entitled "Nephi, Utah" - 1981.

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The structure of the Wasatch Plateau is dominated by a series of north-trending faults across the broad west-dipping monocline of the Plateau. The Sevier fault zone lies closet to the damsite at a distance of about 20 miles. The local structure is dominated by north-trending faulting around the site area. The dam and reservoir sites are located entirely on a down-dropped block between two fault traces, which is known as the Gooseberry Graben. Variation in orientation of beds indicates that the dam area is located on a westward-plunging synclinal fold with the axis running about 1,000 feet south of the proposed dam axis.

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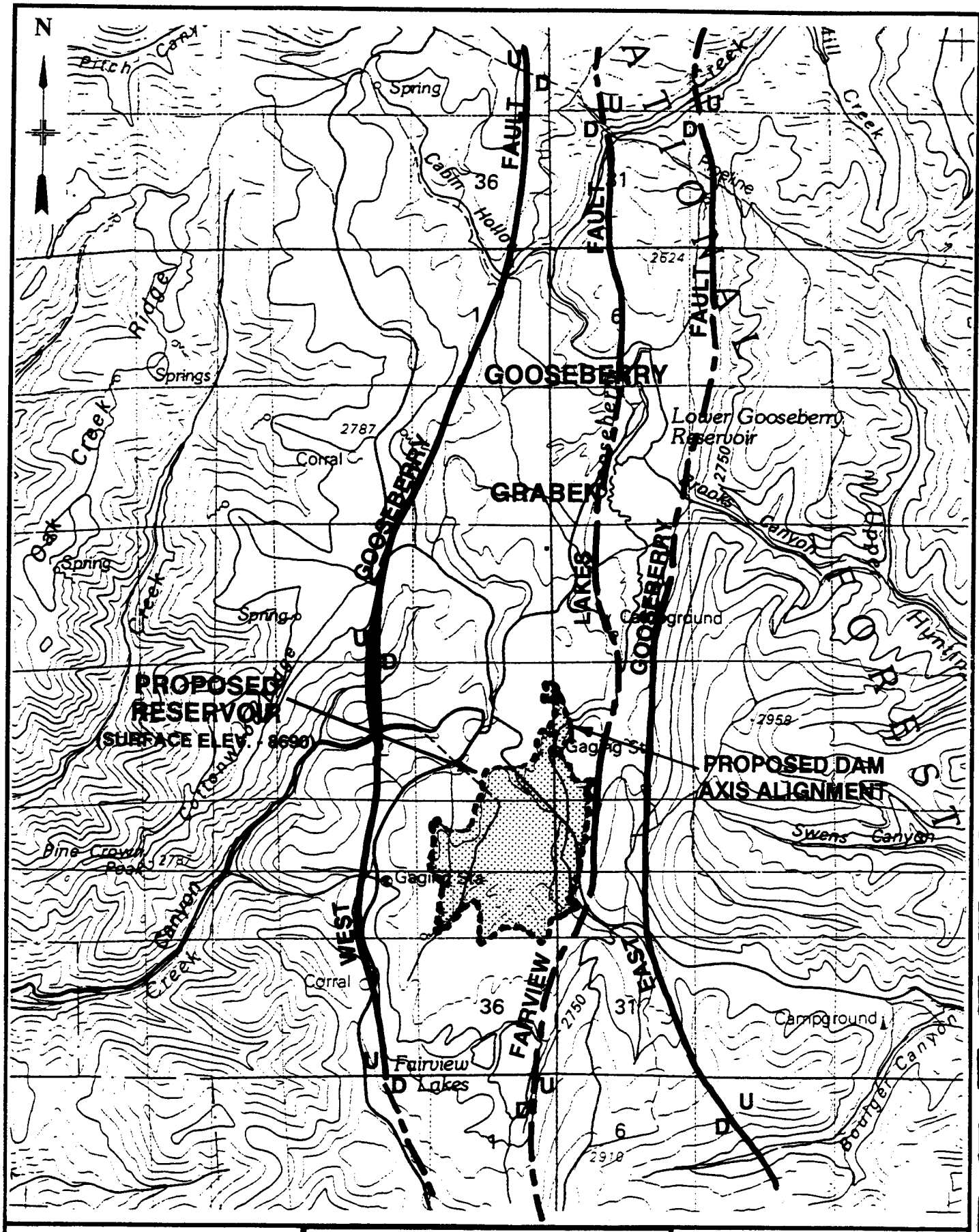

Legend

———	Positively located
- — -	Approximately located
U	Upthrown side
D	Downthrown side

Figure 3-9

Fault Location Map

Scale 1 : 96 000

Source: Adapted from Bureau of Land Management 30x60 minute quadrangle entitled "Nephi, Utah" - 1981.

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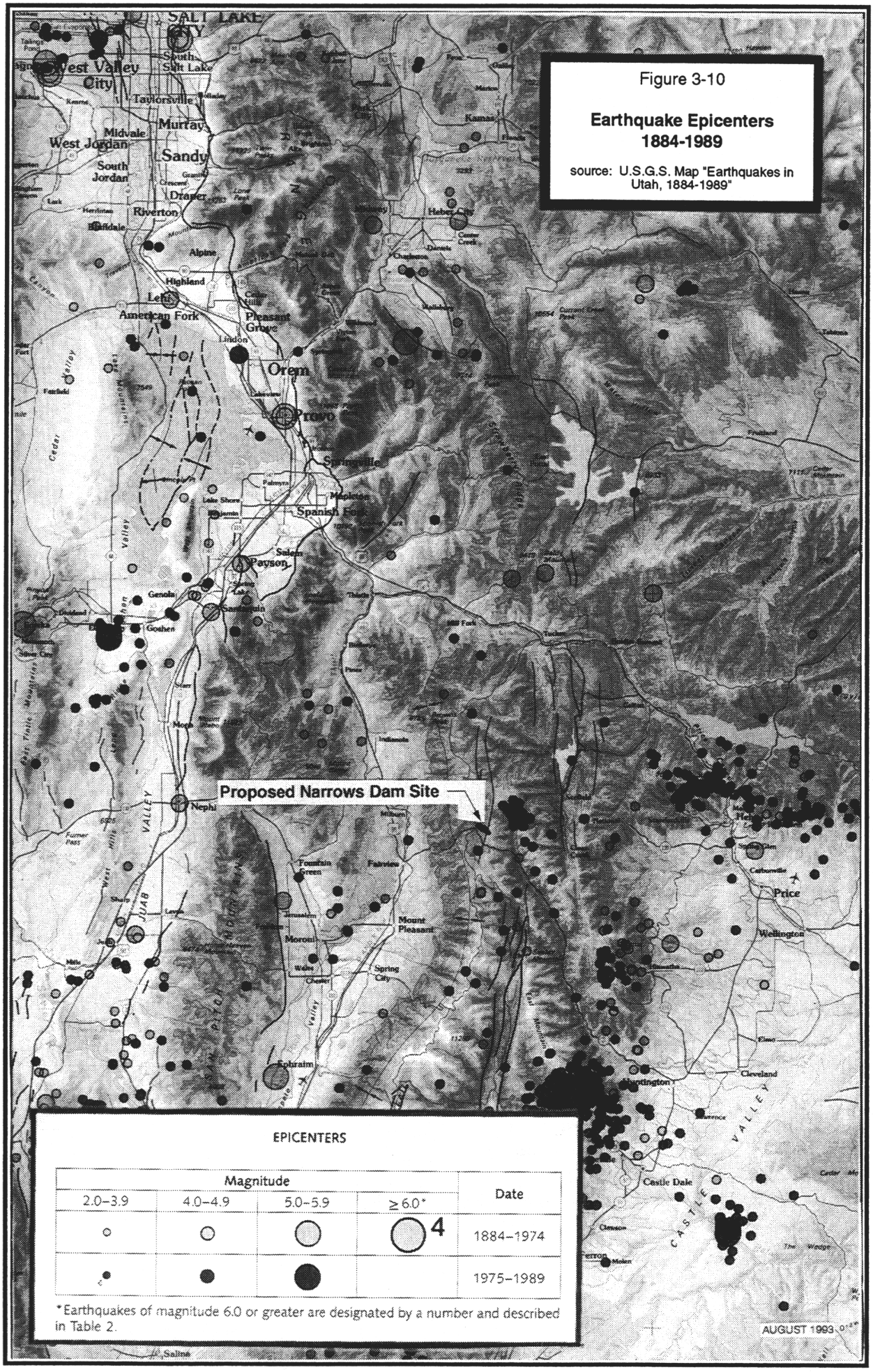
Figure 3-10
Earthquake Epicenters
1884-1989
source: U.S.G.S. Map "Earthquakes in Utah, 1884-1989"
Proposed Narrows Dam Site
EPICENTERS
Magnitude
2.0–3.9
4.0–4.9
5.0–5.9
≥6.0*
Date
4
1884–1974
1975–1989
*Earthquakes of magnitude 6.0 or greater are designated by a number and described in Table 2.
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to occur from or be induced by this alternative. Design of project facilities would be based on an MCE. Detailed observations of the subsurface conditions would be monitored by qualified personnel during construction.

No Action Plan

Geologic conditions and earthquake hazards would remain the same as present under this alternative.

Mitigation

There would be no geology nor seismicity mitigation measures under the Recommended Plan, the Smaller Reservoir Plan, nor the No Action Plan.

Residual Impacts

There would be no residual geology nor seismicity impacts under the Recommended Plan, the Smaller Reservoir Plan, nor the No Action Plan.

Soils

Existing Environment

Soils in the project service area and along the Oak Creek and East Bench Pipelines alignments have developed under semi-arid conditions. They are highly calcareous, high in inherent plant nutrients, have weak to moderate developed soil profiles, and a wide range of soil textures. They are derived principally from both old and recent alluvial materials eroded from geologic materials of the Wasatch Plateau. The lands are found on benches and terraces formed by the coalesced alluvial fans of the streams tributary to the San Pitch River. A broad area of valley fill material of deeper soils is found west of Mount Pleasant and in small cove areas at the base of the large alluvial fans. Valley fill is also found in the flat valley or river bottom areas west and southwest of Moroni.

Soils within the vicinity of the proposed Narrows Reservoir are mostly formed in colluvial, alluvial and residuum materials weathered from sedimentary rocks, limestone, sandstone and shale. Soils on the high ridges along the west side of the area are formed in materials derived primarily from limestone, while soils in the central and eastern sections of the project area are formed in materials dominated by sandstone, (silty) shale and some limestone.

Soils are dark colored, rich in bases, freely drained and cold. Mean annual soil temperature is less than 47° F and the mean summer soil temperature is less than 59° F. Average annual precipitation ranges from 20-25 inches and the growing season is approximately 90-100 days. All but two of the soil series described are in the Cryoboroll Great Group, Boroll Suborder and Mollisol Order of soil classification. The two exceptions, Fairview and Gooseberry series, are classified as being in the Cryaquoll Great Group, Aquoll Suborder and Mollisol Order.

The erosion hazard for the soils within the vicinity of the proposed reservoir ranges from severe to low with over 80 percent of the area being classified as having a moderate or low erosion potential. Precipitation runoff rates range from rapid to slow, with most of the area having a moderate to slow runoff rate. Average sediment yields in the vicinity of the proposed reservoir are estimated to be 73 tons per square mile per year. This value compares with an average sediment yield of 125 tons per square mile per year for the entire Fish Creek drainage.

Impacts

Recommended Plan

Under the Recommended Plan, about 604 acres of land would be inundated by Narrows Reservoir. An additional 32.4 acres would be disturbed by construction of SR-264 relocation and recreation area. Development of a rockfill material source area outside of the reservoir basin would disturb another 2.0 acres. Earthfill material source areas would be developed within the reservoir basin and contractor staging areas and tunnel spoil areas would also be located below the low water level of the reservoir basin.

The alignment of the proposed highway relocation crosses relatively gentle terrain and cut and fill slopes would be minimal. All cut and fill slopes would be revegetated to minimize erosion. Roadways in the recreation area would be paved to minimize dust and soil erosion. Following construction, the rockfill material source area would be recontoured, topsoil would be replaced, and the area would be revegetated. Virtually all runoff from disturbed areas would flow into Narrows Reservoir which would act as a trap for all upstream sediment. The current sediment load in Gooseberry Creek downstream from the proposed Narrows Reservoir would be reduced by about 400 tons per year with construction of the Recommended Plan.

The Upper Cottonwood Creek Pipeline would be constructed in a previously disturbed area along the shoulder of SR-31. Construction of the Oak Creek and East Bench Pipelines would disturb about 30 acres. As part of the construction process, the ground would be recontoured and revegetated with native plants to minimize erosion and to restore the natural appearance.

Smaller Reservoir Plan

Under the Smaller Reservoir Plan, about 362 acres of land would be inundated by Narrows Reservoir. The reservoir would reduce the sediment load to Gooseberry Creek by about 400 tons per year. Other impacts such as those caused by SR-264 relocation, pipeline construction, and development of material source areas would be the same as under the Recommended Plan.

No Action Plan

Under this alternative, soil erosion would continue at historical rates with about 73 tons per square mile per year of sediment entering Gooseberry Creek. Soil disturbance due to construction would not occur and soils within the study area would not be inundated.

Mitigation

Recommended Plan

Mitigation for disturbances to soils under the Recommended Plan would be accomplished by revegetating all cut and fill slopes to minimize erosion. Roadways in the recreation area would be paved to minimize dust and soil erosion. Following construction, the rockfill material source area would be recontoured, topsoil would be replaced, and the area would be revegetated.

Smaller Reservoir Plan

Mitigation for disturbances to soils under the Smaller Reservoir Plan would be similar to that proposed under the Recommended Plan.

No Action Plan

There would be no mitigation for disturbances to soils under the No Action Plan.

Residual Impacts

Recommended Plan

Residual impacts to soils under the Recommended Plan would include the inundation of 604 acres by Narrows Reservoir and the 32.4 acres that would be covered by the SR-264 relocation.

Smaller Reservoir Plan

Residual impacts to soils under the Smaller Reservoir Plan would include the inundation of 362 acres by Narrows Reservoir and the 32.4 acres that would be covered by the SR-264 relocation.

No Action Plan

There would be no residual impacts to soils under the No Action Plan.

Trace Element Analysis

Existing Environment

A trace element survey was conducted in accordance with current Reclamation practices to identify where concentrations of potentially toxic elements such as selenium, arsenic, and mercury would be likely to occur in irrigation return flows under project conditions. Accumulations of these substances can be harmful to humans and wildlife. A total of 11 soil samples were collected in 1990 and were analyzed by the USGS. The results are shown in Table 3-14 for arsenic, mercury, and selenium and are from three representative sites in the project area.

Table 3-14
Trace Elements
Total Concentrations in Soil

Site and Sample Number	Arsenic (ppm)	Mercury (ppm)	Selenium (ppm)
Upper Alluvial Fans Shallow Phase			
1	6.4	0.02	0.2
2	7.6	N0.02	0.2
Alluvial Fans Mod to Deep Phase			
3	6.2	0.02	0.2
4	6.3	0.02	0.2
5	5.3	N0.02	0.2
6	4.9	N0.02	0.1
Valley Fill Deep Phase			
7	4.0	N0.02	0.2
8	3.7	0.02	0.2
9	4.5	N0.02	0.2
10	5.0	N0.02	<0.1
11	5.6	N0.02	<0.1
Geometric Mean Concentration of 733 Western Soils[1/]	5.5	0.046	0.23
Common Range in Western Soils[2/]	1.2-22.0	0.0085-0.25	0.039-1.4

1/ Shacklette and Boerngen, USGS Paper 1270, 1984.
2/ Values chosen to represent an expected 95 percent range. (Tidball and Ebens, 1976).

Study results indicate that all three elements analyzed are present in low to moderate concentrations; therefore, further testing for these elements was not considered necessary.

Data was also gathered from the National Geochemical Data Base which contained extensive information on soils in the vicinity of the survey area. Most of the data was from the National Uranium Resource Evaluation Surveys conducted from 1976-1980. The primary objective of these surveys was to prospect for uranium; however, many other trace elements were also analyzed in the survey. Fifty-nine soil sampling sites from this data base were located in the vicinity of the survey area. Almost all sites were in Quaternary alluvium.

The data indicate that most trace elements are present in concentrations within the common range for western soils. Cobalt was the only element consistently present in concentrations outside the common range. However, cobalt is not considered hazardous in the alkaline soils of the region. Limited water analysis data indicate cobalt was not detected in the San Pitch River.

Table 3-15 summarizes the number of soil samples with noteworthy concentrations of trace elements. Although these elements were found at elevated concentrations at scattered sites, it appears that none of the elements are present in concentrations of concern in the existing project return flows.

Table 3-15
Sanpete Valley Soil Samples With
Uncommonly High Trace Element Concentrations

Element	Number of Samples	Number at Uncommonly High Concentration
Silver	59	20[1/]
Molybdenum	59	3[2/]
Uranium	59	6[2/]
Selenium	59	5[2/]

1/ Used 1,000 ppb as threshold value.
2/ Exceeds the expected 95 percent range. (Tidball and Ebens, 1976).

The data presented in Table 3-16 indicate that trace elements are present in low concentrations in groundwaters in or near the proposed Narrows Project. A review of the STORET data for the San Pitch River indicated the same trace elements present in the surface water in the Narrows Unit in low concentrations.

The data presented in Table 3-17, from the EPA STORET data base, indicates that water quality of the San Pitch River in the project area is generally acceptable. The San Pitch River shows some improvement in water quality through the project area, possibly due to high quality inflows from the Manti-La Sal drainage.

Impacts

Recommended Plan

Lands in the project area have been irrigated for more than 50 years and the results of the data gathered showed no significant quantities of trace or toxic elements in the groundwater and in the San Pitch River; therefore, no increase of potentially toxic trace elements is anticipated under project conditions.

Smaller Reservoir Plan

No increase of potentially toxic trace elements is anticipated under implementation of the Smaller Reservoir Plan.

Table 3-16
Comparison of Groundwater in the Narrows Project with Selected Standards

Element	EPA Standards, µg/L			Groundwater Concentrations, µg/L		
	Drinking Water[1/]	Aquatic Life[2/]	Irrigation Water[3/]	Number of Samples	Range	Mean
Aluminum		87	5000			
Arsenic	50	190	100	2	1-2	1.5
Barium	1000			2	80-100	90
Beryllium		5.3	100			
Boron			750	23	20-450	112
Cadmium	10	1.1	10	2	<1	<1
Chromium	50	210	100	2	<5	<5
Hex. Cr.		11				
Cobalt			50			
Copper	1000	12	200	2	<20-29	24.5
Cyanide	200	5.2				
DBCP	1					
Fluoride	1400-2400			28	<100-2700	382
Iron			5000	12	3-190	27.6
Lead	50	3.2	5000	2	<5	<5
Lithium			75	2	<10-20	15
Manganese	50		200	2	<5-41	23
Mercury	2	0.012		2	<0.5	<0.5
Molybdenum		96	10 200			
Nickel	45000			37	0-43000	12100
Nitrate	10	5	20	9	<1-5	2
Selenium	50	0.12		2	<2	<2
Silver				2	460-1800	1130
Strontium	20	300[4/]		12	1.1-23.6	5.3
Uranium[5/]			100			
Vanadium	5000	47	2000	2	<20	<20
Zinc						

1/ Primary or Secondary Standards.
2/ Freshwater Criteria.
3/ Adapted from Water Quality Criteria for Agriculture (1972).
4/ Canadian criteria.
5/ Data from National Geochemical Data Base.

No Action Plan

An increase of potentially toxic trace elements is not expected under the No Action Plan.

Mitigation

Mitigation is not proposed since it is anticipated there would be no significant increase of potentially toxic trace elements under any of the alternative plans.

Residual Impacts

There would be no residual impacts with respect to potentially toxic trace elements under any of the alternative plans.

Table 3-17
Water Quality Data for the San Pitch River near the Narrows Project Area

STORET Station Location	EC at 25 °C	SAR	Soluble Cations, (meq/L)				Soluble Anions, (meq/L)				Toxic Elements, (µg/L)			
			Ca	Mg	Na	K	CO_3	HCO_3	SO_4	Cl	Arsenic	Boron	Mercury	Selenium
Above Narrows Project														
San Pitch River 1 mile West of Milburn	1300.8	0.25	11.41	4.36	0.70	0.10	0.03	5.36	10.93	0.24	1.70	121	0.06	0.38
Cottonwood Creek 1.5 miles East of Fairview	459.0	0.19	2.63	1.80	0.29	0.04	0.00	4.38	0.58	0.09	0.93	89	0.05	0.40
Fountain Green Hatchery - East Outflow	426.0	1.00	1.70	1.48	1.26	0.03	0.00	4.36	0.10	0.14	1.00	50	0.10	1.00
Fountain Green Hatchery - West Outflow	431.9	0.28	2.30	1.48	0.39	0.03	0.00	4.30	0.16	0.11	1.00	50	0.10	1.00
Within Narrows Project														
San Pitch River above Moroni WWTP Outfall	791.8	0.64	3.06	4.50	1.25	0.09	0.01	6.76	1.41	0.81	2.47	75	0.14	0.97
San Pitch River 2.5 miles West of Mt. Pleasant	771.4	0.56	3.33	4.23	1.09	0.08	0.00	6.72	1.47	0.54	3.09	155	0.14	1.32
Just Below Narrows Project														
San Pitch River 1 mile West of Chester	1111.0	1.07	3.55	5.08	2.22	0.21	0.08	7.02	2.09	1.34	3.42	220	0.00	0.45
Below Narrows Project														
San Pitch River Northwest of Manti	1272.0	2.28	4.28	8.31	5.71	0.13	0.00	8.12	6.15	2.20	5.00	260	0.07	1.00
San Pitch River below Gunnison Reservoir	1630.8	2.46	2.61	10.26	6.23	0.14	0.28	9.26	6.17	3.86	6.00	No data	0.10	1.00
San Pitch River at U-137 Crossing	2591.3	6.78	4.26	6.85	15.99	0.14	0.07	6.87	5.73	11.59	5.54	349	0.15	1.07

Vegetation and Wildlife

Existing Environment

Vegetation

Vegetation of the study sites consists primarily of plant communities common to high elevation mountain areas. Historically, the area has been used for livestock grazing and other reservoir impoundments. Cattle and sheep were introduced into the area in the 1800's and subsequently overgrazed the area to the extent that rangeland restoration became necessary. In 1908, the FS established a controlled grazing plan for the Manti-La Sal National Forest. Cattle and sheep grazing is still allowed in the area.

Major plant community types occurring in the reservoir basin have been mapped (see Figure 3-11). The three major plant communities that would be affected most by reservoir inundation are: (1) Vasey Sagebrush, (2) Silver Sagebrush, and (3) Wetlands. There are also areas within the basin that have been previously disturbed by diverting water to Cottonwood Canyon through the existing Narrows Tunnel. In addition, there are those disturbed areas associated with SR-264 that crosses the north end of the basin.

The Narrows Reservoir basin was identified as being the area that would be most significantly impacted by the proposed project. For this reason, the basin was studied in more detail than the other areas associated with the project. Other areas would also be directly affected by the proposed project as a result of reservoir inundation, construction disturbance, and mitigation.

A summary of project feature areas that would be affected by the project is listed in Table 3-18. These acreages are somewhat different than those presented in Table 2-3 because Table 2-3 is a summary of right-of-way requirements; whereas, Table 3-18 summarizes areas that would be disturbed or affected by the project.

Table 3-18
Summary of Affected Vegetated Areas

Area	Acres
Reservoir Basin	604
Wetland Mitigation	220
Upland Mitigation	1,540
Fisheries Mitigation	90
Pipelines	32
SR-264 Relocation	20
Recreational Areas	12
Materials Source	2
Total	2,520

N

LEGEND

- Ar tr (Vasey Big Sagebrush)
- Ar ca (Silver Sagebrush)
- W (Wetlands)
- Po tr (Aspen)
- Sy or (Snowberry)
- Previously Disturbed
- S/F (Spruce/Fir)

SCALE 1"=1200'

Revised: 4/29/92

BRANSON-NOBLE & ASSOCIATES, INC. CONSULTING ENGINEERS
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SANPETE WATER CONSERVACY DISTRICT
NARROWS PROJECT

NARROWS RESERVOIR BASIN STUDY AREA
Fig 3-11
VEGETATION MAP

DESIGNED	DRAWN	CHECKED
PC	JPW	RMN

DRAWING NO.	DATE
	6/13/91

Vasey Sagebrush Community

This community is the driest of the three major plant communities in the basin. It exists on the more well-drained soils of the upland slopes. The Vasey Sagebrush Community comprises 55 percent (331 acres) of the reservoir basin. Dominant woody plant species of the community include Vasey sagebrush (*Artemisia tridentata* var. *vaseyana*), low rabbitbrush (*Chrysothamnus viscidiflorus*), and snowberry (*Symphoricarpos oreophilis*). Dominant forbs are Pacific aster (*Aster chilensis*), yarrow (*Achillea millefolium*) and orange sneezeweed (*Helenium hoopsii*). Finally, the dominant grasses are represented by slender wheatgrass (*Elymus trachycaulus*), Letterman needlegrass (*Stipa lettermanii*) and mountain brome (*Bromus carinatus*).

Range Analysis studies were conducted by the FS on federally owned land near the project area. Total annual production ranged from 682 to 949 dry lbs./acre.

Silver Sagebrush Community

The Silver Sagebrush Community lies immediately below (downslope) the Vasey Sagebrush Community and comprises 26 percent (156 acres) of the basin. The soils of this community occur on both level and sloped terrain, but are generally on the less well-drained and more flat areas. Consequently, they support more mesic shrub species i.e. silver sagebrush (*Artemisia cana*) and shrubby cinquefoil (*Potentilla fruticosa*). Forb species include penstemon (*Penstemon* spp.), varileaf phacelia (*Phacelia heteophylla*) and silver cinquefoil (*Potentilla anserina*). Grasses and grass-like species dominant in the area are orchardgrass (*Dactylis glomerata*). Kentucky bluegrass (*Poa pratensis*) and smallwing sedge (*Carex microptera*)..

Wetland Communities

Near the bottom of the basin, water collects and forms meadows, wetlands and ultimately small creeks that converge to Gooseberry Creek. Wetland communities generally form on three topographic positions in the area. These wetland communities are: wet meadows, riparian sedge wetlands, and willow thickets. The wet meadows are formed in topographic depressions located adjacent to some of the streamside vegetation and on higher ridges where seeps occur. They consist of plant species such as rushes (*Juncus* spp.), sedges (*Carex* spp.) and various hydric grasses, such as tufted hairgrass (*Deschampsia caespitosa*). Similar in species and composition are the riparian sedge wetlands which occur in a dendritic pattern along small drainages. They also consist of various rushes, sedges and grass species and form some of the narrow bands (usually 3-6 feet wide) of streamside vegetation common to the area. Less common in the reservoir basin are willow thickets. They occur primarily in the upper reaches of the proposed inundation level, usually along stream channels in the basin, and along Gooseberry and in Cottonwood Creeks. Willow species include Drummond's willow (*Salix drummondiana*), Booth willow (*S. boothii*) and Wolf willow (*S. wolfii*).

Former wetlands that are being considered as a mitigation alternative are located adjacent to Mud Creek near Scofield. In addition to Mud Creek, there are numerous springs that emerge from the side hill. The creek and springs should provide an ample water supply for wetland vegetation. This area, however, is presently over grazed, is

often comprised of weedy plant species, but has the potential of supporting stable wetland plant communities. In addition, the stream banks have been severely damaged by the numerous cattle that are kept on the land.

For a map showing the wetland communities within the basin study area, refer back to Figure 3-8.

Both the COE and EPA have jurisdiction over wetlands for the Narrows Project. The COE is responsible for issuing permits for activities in waters of the United States. The combined jurisdictional wetlands of the basin study area constitute 17 percent (100 acres) of the reservoir basin. Of the 100 wetland acres that exist in the reservoir basin, the riparian sedge and meadows comprise about 63 percent, whereas the willow thickets comprise nearly 37 percent. Previous wetland losses within the reservoir basin include less than 0.5 acre associated with construction of SR-264.

Previously Disturbed Areas

The total area that has been previously disturbed within the reservoir basin was calculated to be about 17 acres or 2 percent.

Table 3-19 is a summary of vegetation communities found in the reservoir basin.

Table 3-19
Vegetation Communities in the Reservoir Basin[1/]

Affected Type	Acres
Vasey Sagebrush	331
Silver Sagebrush	156
Wetland Communities	100
Previously Disturbed	17
Total	604

1/ An almost negligible amount (<1%; 0.18 acre) of aspen forest could be affected within the reservoir basin.

Plant Communities Adjacent to the Reservoir Basin

Major plant communities that exist within the immediate area, but are not within inundation areas include Vasey Sagebrush, Snowberry, Aspen, and Spruce/Fir (refer back to Figure 3-11).

Other Plant Communities

Other plant communities were studied as part of the existing environment which could be affected by the proposed project. Foothill areas along the west side of the Wasatch

Plateau would be dissected with the conveyance pipelines. Plant communities found in those areas include Valley Sagebrush, Scrub Oak, Grassland and Mountain Brush.

Wildlife

The procedures chosen by the biological team to evaluate the project are known as HEP, a "species habitat" approach to impact assessment and habitat quality. The program uses selected species for indicators to evaluate habitat for a host of other species with the assumption that these indicator (evaluation) species are functioning units of part of an ecosystem. Impact to a particular indicator species assumes that there would also be impacts to the group of the other species it represents.

Habitat Suitability Indices (HSI) were ascertained for each evaluation (indicator) species. These indices range from 0.0 to 1.0 with each increment of change identical to the next. An HSI value is linearly related to the carrying capacity of the species. An HSI of "1.0" would represent the optimum habitat for the particular evaluation species, whereas "0.0" would represent habitat that is unsuitable.

Most wildlife species of the general project area are not unique to this area, but are common in the Great Basin Desert valleys and Rocky Mountain ranges. There are about 364 species of terrestrial vertebrates that may inhabit the biogeographic area of southeastern Utah which includes the project area.

Approximately 88 bird species and 33 mammal species were found to utilize the habitats that would be disturbed by the proposed project. Evaluation species chosen to assess the impacts to habitat of the proposed project included Mule Deer, Beaver, Richardson Vole, Yellow Warbler, and Brewer's Sparrow. The Brewer's Sparrow was used because of the vegetative community it represented, not for the species. The technical team felt that the Brewer's Sparrow would reflect summer range needs for deer, elk and other species, as well as the sparrow. These wildlife species and the communities which they utilize are described below.

Mule Deer - Deer are of great public interest in the area and are plentiful in the reservoir area. It is excellent summer range and areas surrounding the reservoir basin and aspen forest are critical in summer because of fawning.

Beaver - The beaver is able to use a wide variety of wetlands habitat and is found at two different locations within the proposed reservoir basin.

Richardson Vole - The vole utilizes much of the wetland habitat in the area. These voles live primarily in moist areas with high densities of grasses and sedges.

Yellow Warbler - The yellow warbler also utilizes the wetland habitats in the area, but does not utilize the same grassy habitat as the vole. The warbler occurs in the deciduous shrub/scrub wetlands. The yellow warbler is also found in high abundance at the reservoir site.

Brewer's Sparrow - This sparrow nests and forages in the sagebrush and allows the evaluation to take the shrub habitat into consideration.

The baseline conditions within the reservoir basin are summarized under the No Action Plan in Table 3-20.

Table 3-20
Wildlife Habitat Summary Comparison within Reservoir Basin
(Without Mitigation)

Species	Cover Type(s)[1/]	No Action Plan			Recommended Plan			Smaller Reservoir Plan		
		Acres	HSI[2/]	HU[3/]	Acres	HSI[2/]	HU[3/]	Acres	HSI[2/]	HU[3/]
Mule Deer	PEM,PSS, USHE	587	0.23	135	0	0.00	0	246	0.23	57
Beaver	PEM,PSS	100	0.13	13	0	0.00	0	28	0.13	4
Richardson Vole	PEM	63	1.00	63	0	0.00	0	18	1.00	18
Yellow Warbler	PSS	37	0.70	26	0	0.00	0	10	0.70	7
Brewer's Sparrow	USHE	487	0.98	624	0	0.00	0	218	0.98	214

1/ PEM = Palustrine emergent wetland cover (herbaceous wetlands);
PSS = Palustrine scrub/shrub cover (shrubby wetlands); and
USHE = Shrub cover (Vasey sagebrush; silver sagebrush).
2/ A Habitat Suitability Index (HSI) of "1.0" represents the optimum habitat, whereas "0.0" represents unsuitable habitat.
3/ Habitat Unit = Habitat availability.

Impacts

Recommended Plan

Vegetation

A hydrologic study conducted on the potential impacts to the riparian vegetation of Gooseberry Creek by decreased flows suggested only a minor impact to the riparian vegetation. Flow measurement conducted by the State Engineer's office indicated the stream to be a "gaining stream." This means that the depth of the groundwater table adjacent to the stream corresponds directly with the water surface of the stream. That is, an increase or decrease in stream water level results in the corresponding increase or decrease in the elevation of the groundwater table. Moreover, the project plan includes channel modification work in the middle segment of Gooseberry Creek to keep the flow levels up. Because the depth of flow in the stream would not be significantly reduced under the project, the depth of the groundwater table adjacent to the stream should not be decreased. Therefore, the riparian vegetation should not be adversely affected by the project.

Hydraulic analyses were conducted on Cottonwood Creek to determine the effects of increased streamflow. These studies concluded that there would be some impact to the riparian zone adjacent to the stream. A total of 1.5 acres of riparian vegetation, mostly willows, would be lost due to an average 2.5-foot channel widening over 4.9 miles of stream. The channel widening would be 4.0 to 6.0 feet just below the outlet of the Upper Cottonwood Creek Pipeline and would decrease to less than 0.5 foot near the mouth of the canyon.

Areas along the foothills of the west side of the Wasatch Plateau would be dissected with the diversion pipelines. Plant communities i.e. big sagebrush, *(Artemisia tridentata* var.*tridentata)*, Gamble oak *(Quercus gambelii)*, grasslands and mountain brush communities along with their associated wildlife species would be disturbed by the conveyance pipelines. These disturbances, however, would be only temporary because the pipelines would be buried. Revegetation that reflects the existing plant community would be accomplished with a mixture of grasses, forbs, and shrubs. A total of 30 acres along a 17-mile-long alignment would be disturbed by the pipeline construction.

The reservoir basin was identified to receive the most significant impact by the proposed project. For this reason, the reservoir basin was studied in greater detail than the other areas associated with the project. The affected wetlands in this area occur in a dendritic pattern in the riparian zones along small drainages. As shown earlier in Table 3-17, plant communities that would be highly impacted by reservoir inundation are: Vasey Sagebrush, Silver Sagebrush, and Wetlands.

Of the 604 acres in the reservoir basin, the Vasey Sagebrush Community comprises 55 percent, the Silver Sagebrush Community 26 percent. The combined wetland communities constitute 17 percent of the total. Previously disturbed areas make up nearly all of the remaining 2 percent of the basin. Of the 100 wetland acres that exist in the reservoir basin, the riparian sedge and meadows comprise about 63 percent, whereas the willow thickets comprise nearly 37 percent.

Wildlife

Table 3-21 summarizes the impacts to wildlife habitat that would result from construction of the Recommended Plan. In an assumed worse-case situation in which the most habitat would be lost at one time, it would take the reservoir 2 years to fill to capacity.

In addition to the habitat inundated by the reservoir, there would be an additional 32 acres lost due to SR-264 relocation and construction of the recreation area. These areas are primarily Mule Deer and Brewer's Sparrow habitat. Temporary impacts would result from construction of the Upper Cottonwood Creek, Oak Creek, and East Bench Pipelines and from development of the rockfill material source area. These areas would be recontoured, covered with topsoil, and revegetated after construction.

Implementation of the fishery and wildlife mitigation measures would increase the amount of wildlife habitat on about 1,850 acres of land. Benefited species would include Mule Deer, Beaver, Richardson Vole, Yellow Warbler, and Brewer's Sparrow.

Table 3-21
Recommended Plan Impacts to Wildlife Habitat
(habitat units)

Species	No Action Plan	Recommended Plan	Net change
Mule Deer	135	0	-135
Beaver	13	0	-13
Richardson Vole	63	0	-63
Yellow Warbler	26	0	-26
Brewer's Sparrow	624	0	-477

Smaller Reservoir Plan

Vegetation

Impacts to vegetation resulting from implementation of the Smaller Reservoir Plan would be similar to those resulting from construction of the Recommended Plan. The primary difference would be the smaller amount of acreage (363 acres) that would be inundated by Narrows Reservoir. This area includes 151 acres of the Vasey Sagebrush Community, 118 acres of the Silver Sagebrush Community and 72 acres of wetlands. The affected wetlands in the reservoir basin occur in a dendritic pattern in the riparian zones along small drainages. Other impacts to vegetation would be similar to those experienced under the recommended plan.

Wildlife

Table 3-22 summarizes the impacts to wildlife habitat that would result under the Smaller Reservoir Plan.

Table 3-22
Smaller Reservoir Plan Impacts to Wildlife Habitat
(habitat units)

Species	No Action Plan	Smaller Reservoir Plan	Net change
Mule Deer	135	57	-78
Beaver	13	4	-9
Richardson Vole	63	18	-45
Yellow Warbler	26	7	-19
Brewer's Sparrow	624	214	-263

Permanent impacts caused by SR-264 relocation and construction of the recreation area would be the same as with the Recommended Plan. Temporary impacts due to construction of pipelines and development of material source areas would also be the same.

Implementation of the fishery and wildlife mitigation measures would increase the amount of wildlife habitat on about 1,510 acres of land. Benefited species would include Mule Deer, Beaver, Richardson Vole, Yellow Warbler, and Brewer's Sparrow.

No Action Plan

Vegetation and wildlife conditions are expected to remain as shown earlier under the baseline conditions presented in Table 3-20 if the project were not constructed and if there were no other future developments.

Vegetation and Wildlife Mitigation

Analyses were performed comparing the Habitat Units available with and without the proposed project. As mentioned previously, if the Narrows Dam were constructed, a mitigation plan would be implemented in an attempt to compensate with wetlands and upland communities all impacted wildlife habitat that would be lost by reservoir inundation.

Recommended Plan

Wetlands

Alternative wetland mitigation measures for the Recommended Plan were described in Chapter 2. The proposed wetland mitigation areas are in-kind and a detailed mitigation plan would be developed in conjunction with the Section 404 permitting process. In determining the exact acreage to be provided, careful monitoring of the mitigation sites would be conducted to ensure that the value of the mitigation sites is at least equal to the value of the wetlands lost. This determination would be accomplished by performing HEP analyses of the sites and comparing habitat values. Because plants require time to become fully established, it is anticipated to take 6 years from the time construction is initiated to achieve the desired wildlife habitat for the wetland mitigation.

Upland Wildlife Habitat

To accommodate the loss of habitat for mule deer and Brewer's Sparrow if the Narrows Reservoir were constructed, another mitigation plan would be implemented. Impacts to upland game (mule deer and Brewer's Sparrow habitat and the host of species which they represent) would be mitigated in the following ways:

- Participation in watershed and range improvement projects on the Manti-La Sal National Forest, such as the tarweed eradication program. Mitigation credit would be obtained by supplementing the FS's seed mixture with other species to provide bio-diversity

and to improve habitat for impacted species. Seeds that could be added to the mixture include big sagebrush and a variety of forbs. It is estimated that the project Sponsor would participate in the treatment of 900 acres. This measure is intended to primarily offset impacts to Brewer's Sparrow.

- Acquisition of conservation easements around the Narrows Reservoir. These easements would include restrictions on land use that would benefit impacted species. This measure would serve to protect wildlife values adjacent to the reservoir and prevent impacts that would occur if the land were developed.

- Acquisition of private land adjacent to the Price River below Scofield Reservoir. Wildlife values would be enhanced by fencing the land to protect it from livestock grazing. The primary objective of this measure would be to provide mule deer habitat. The lower Fish Creek acquisition would provide both summer and winter range depending on which side of the canyon is acquired. South facing slopes provide winter range in early winter and mild winters. The area would also provide riparian and fishery habitat. The wetland mitigation area near Scofield would also provide habitat for mule deer.

The wildlife mitigation program has been designed to provide as near as possible full mitigation to each impacted species.

Monitoring

A monitoring program would be implemented on a yearly basis using qualitative and quantitative sampling methods to monitor the progress of the mitigation plans. At the end of the predicted time when it is assumed that full mitigation should be achieved, the areas would be sampled using the same techniques that were used to gather the baseline information. Statistical comparisons would be made. If full mitigation standards are not achieved, steps would be taken to ensure that the goals are eventually met.

Smaller Reservoir Plan

Wetland and upland wildlife habitat mitigation measures under the Smaller Reservoir Plan would be similar to those described under the Recommended Plan except that the amount of acreage would be smaller, as described in Chapter 2. The proposed wetland mitigation areas are in-kind and a detailed mitigation plan would be developed in conjunction with the Section 404 permitting process.

No Action Plan

Under this alternative and assuming there would be no other future developments, conditions would be the same as the baseline conditions presented earlier in Table 3-20.

Residual Impacts

Because the wetland and upland wildlife mitigation measures are intended to provide full mitigation for project impacts, there would be no residual impacts.

Endangered Species

Existing Environment

Vegetation

No plant species currently receiving protection under the Endangered Species Act are known to exist in the project area.

Wildlife and Fish

A biological assessment of potential effects on endangered, threatened, and candidate species was conducted for the Narrows Project in accordance with Section 7(c) of the Endangered Species Act of 1973. Federally listed species addressed in the assessment included: Bald eagle *(Haliaeetus leucopiphalus)*, Colorado squawfish *(Ptychocheilus lucius)*, bonytail chub *(Gila elegans)*, humpback chub *(Gila cypha)*, and razorback sucker *(Xyrauchen texanus)*.

The existing environment in the Narrows Project area is described below for the following federally listed endangered bird and fishes.

Bald Eagle

The bald eagle was listed as an endangered species in 1967. Decline of the bald eagle is largely attributed to the loss of a suitable habitat; mortality from shooting, poisoning, and diseases; and reduced reproduction caused by environmental contaminants. Historically, the bald eagle was a resident of Utah, but currently occurs primarily as a winter visitant. Riparian areas and large roosting trees are important to the bald eagle. Winter concentrations are typically located on State and Federal waterfowl management areas within the State. Of the six known historic nest sites, none are in the vicinity of the proposed Narrows Project.

Colorado Squawfish

The Colorado squawfish evolved as the main predator in the Colorado River system. The diet of Colorado squawfish longer than 3 or 4 inches consists almost entirely of other fishes. The Colorado squawfish is the largest cyprinid fish (minnow family) native to North America and, during the pre-development times, may have grown as large as 6 feet in length and weighed nearly 100 pounds .

The Colorado squawfish currently occupies about 1,000 river miles in the Colorado River system and is presently found only in the upper Colorado River Basin above Glen Canyon Dam.

Bonytail Chub

Little is known about the biological requirements of the bonytail chub as the species greatly declined in numbers in the upper Colorado River Basin shortly after 1960. Until recently, the FWS considered the species extirpated from the upper Colorado River Basin. However, a recently collected specimen, which exhibits many bonytail characteristics, could indicate a small, extant population.

Humpback Chub

The humpback chub generally does not make migrational movements in the upper Colorado River and tends to reside throughout the year within a limited reach of river. The species is found in narrow, deep canyon areas, and is relatively restricted in distribution. It seldom leaves its canyon habitat.

Razorback Sucker

Historically, the razorback sucker was abundant throughout the Colorado River Basin. At present the only concentrations occur in the Green River in the upper basin and Lake Mohave in the lower basin. Catch-effort estimates suggest that adult razorback suckers are rarer than other native suckers and the endangered Colorado squawfish. There are no formal recovery goals for the razorback sucker. An immediate goal, however, is to prevent the species' extinction in the wild.

Impacts

Recommended Plan

General

The above referenced biological assessment concluded that there would be no impacts to the bald eagle nor to the spotted frog. However, because of the 5,557-acre-foot per year depletion to the Colorado River, it was concluded that the Narrows Project may affect the Colorado squawfish, bonytail chub, humpback chub, and razorback sucker. The FWS has issued a Biological Opinion (Attachment B) which concurs with this assessment. The fact that the project depletes flows during peak runoff periods is of concern to the FWS because this period is of great significance geomorphically and ecologically. Peak spring flows are very important for maintaining channel geomorphology, providing access to off-channel habitats and preserving suitable spawning substrates.

The FWS has determined that project depletion impacts can be offset by the one-time depletion charge and possible future implementation of other mitigation measures. The FWS Biological Opinion is that the proposed project, as described in this EIS, ". . . is not likely to jeopardize the continued existence of the Colorado squawfish, humpback chub, bonytail chub, and razorback sucker provided that the Conservation Measures described . . ." in the Biological Opinion are implemented. Those measures are summarized below.

Incidental Take

The FWS does not anticipate that the proposed project would result in any incidental take of Colorado squawfish, humpback chub, bonytail chub, razorback sucker, or bald eagle. Accordingly, no incidental take is authorized. Should any take occur, the Sponsor must re-initiate formal consultation with the FWS and provide detailed circumstances surrounding the take. This statement satisfies the requirements of the Endangered Species Act.

Smaller Reservoir Plan

The existing environment is the same for the Smaller Reservoir Plan as it is for the Recommended Plan.

As with the Recommended Plan, there would be no impacts to the bald eagle nor to the spotted frog. However, there would be a 4,957 acre-foot per year depletion to the Colorado River which could affect the Colorado squawfish, bonytail chub, humpback chub, and razorback sucker.

Incidental take of Colorado squawfish, humpback chub, bonytail chub, razorback sucker, or bald eagle is not anticipated under this alternative nor would it be authorized.

No Action Plan

There would be no endangerment to the bald eagle, Colorado squawfish, bonytail chub, humpback chub or the razorback sucker, under the No Action Alternative. Contributions to the RIP for Endangered Fish Species in the Upper Colorado River Basin would not be required.

Conservation Measures

Recommended Plan

The proposed Narrows Dam and Reservoir would deplete 5,557 acre-feet of Colorado River water. This would result in a one-time contribution to the RIP for Endangered Fish Species in the Upper Colorado River Basin. As an example, the 5,557-acre-foot depletion multiplied by FY 1995's depletion charge of $12.71 per acre-foot would result in a contribution of $70,629. The actual fee, however, will be the amount per acre-foot required in the year in which the fee is paid, multiplied by the amount of the depletion in acre-feet. The FWS has stated that in addition to the one-contribution, it is essential that sufficient progress be made towards recovery under the RIP before actual depletions occur. The FWS has issued a final draft biological opinion (February 11, 1992) to Reclamation on the operation of Flaming Gorge Dam. Acceptance and implementation of the reasonable and prudent alternative in that biological opinion will constitute progress under the RIP to offset the impacts of the Narrows Project. Elements of the reasonable and prudent alternative for the Flaming Gorge final draft biological opinion include:

- Refinement of dam operations so that flow and temperature regimes of the Green River more closely resemble natural conditions;

- A research program to allow for refinement of flows during the winter/spring season;

- Investigations into the feasibility of releasing warmer water during the late spring/summer season and into the feasibility of retrofitting river bypass tubes to facilitate higher spring releases;

- Legal protection of Green River flows from Flaming Gorge Dam to Lake Powell; and

- Initiation of further discussions with the FWS after completion of a 5-year research program to further refine winter and spring releases.

In the event that the reasonable and prudent alternative in the Flaming Gorge final draft biological opinion is not accepted or implemented by the time construction (as described earlier) of the Narrows Project begins, additional measures may be required to offset the effects of this depletion. Such measures could include:

- Acquisition of water, protection of instream flows;

- Habitat improvement/enhancement; or

- Other measures which would fully offset the depletion impacts of the project and avoid the likelihood of jeopardy.

Re-initiation of consultation would be required to discuss additional conservation measures in the event sufficient progress has not been achieved under the RIP. The Project Sponsor is aware of and agrees to this possible eventuality.

Smaller Reservoir Plan

It was assumed that the same criteria applied to the Recommended Plan to offset project depletion impacts could appropriately be applied to the Smaller Reservoir Plan. This would result in a one time contribution of $63,220, (4,974 acre-feet multiplied by 1995's depletion charge of $12.71), to the RIP for Endangered Fish Species in the Upper Colorado River Basin. Other conservation measures described for the Recommended Plan would also be implemented under this alternative.

No Action Plan

No conservation measures for endangered species would be implemented under the No Action Plan.

Residual Impacts

Under the provisions of the Endangered Species Act there would be no residual impacts to endangered species as a result of implementing either the Recommended Plan or the Smaller Reservoir Plan. In the event sufficient progress has not been achieved under the RIP, re-initiation of consultation would be required to discuss additional conservation measures.

Land Use

Existing Environment

Land ownership and use characteristics of Sanpete and Carbon counties are summarized in Tables 3-23 and 3-24, respectively. Federally owned land comprises approximately 50 percent of each county's total land, while privately owned land accounts for approximately 40 percent. Land in agricultural use accounts for 44 percent of land development in Sanpete County and 22 percent of land development in Carbon County. Of the total agricultural land in Carbon County, only 2 percent has been developed for cropland, the remainder is rangeland. Comparatively, 36 percent of the total agricultural land in Sanpete County has been developed for cropland. An inventory of prime agricultural land (PL 95-87) did not reveal any prime agricultural land in the project area.

Table 3-23
Land Ownership - Sanpete and Carbon Counties, 1992

Owner	Sanpete County[1/] (acres)	Sanpete County[1/] (percent)	Carbon County[2/] (acres)	Carbon County[2/] (percent)
Federal	590,484	58	61,819	49
State	36,736	4	99,002	10
Private	387,821	38	382,379	41
Total	1,015,041	100	943,200	100

1/ State Office of Plans and Budget, 1990 Census information.
2/ Southeastern Utah Association of Governments, 1990 Census information.

Table 3-24
Land Use Characteristics, Sanpete and Carbon Counties

Item	County	
	Sanpete[1/]	Carbon
Total acres	1,015,041	943,200[2/]
Urban (acres)	1,664	9,200[3/]
Percent of total	.16	.98
Agriculture (acres)	447,526	211,973
Percent of total acres	44	22[4/]
Cropland (acres)	161,109	4,239
Percent of agriculture acres	36	2
Rangeland (acres)	286,417	207,734
Percent of agriculture acres	64	98

1/ State Office of Plans and Budget, 1990 Census information.
2/ Southeastern Utah Association of Governments, 1990 Census.
3/ Utah State Agricultural Statistics, 1991.
4/ Social Assessment of Narrows Project, J. Lynn England, 1991.

Agricultural land use within the project area is based on the livestock economy of the area; principally, cattle and sheep operations, and a number of Grade A dairies. Other land uses include the turkey industry, large garden spots, potatoes, raspberries, and Christmas or ornamental trees.

The majority of the land area which would be inundated by the reservoir is privately owned; the dam, however, would be on Federal land. Some of the private land near the proposed dam and reservoir within the National Forest boundary has been subdivided for summer homes and recreation development. Such development must comply with the zoning and building codes of the Sanpete County commission, and the sanitation requirements of the Utah Department of Environmental Quality. The area adjacent to the proposed Narrows Reservoir is zoned as Forest Watershed 1-10 (1 dwelling per 10 acres). The primary areas now under development include the area approximately 2 miles east of Gooseberry Reservoir and the area on the north side of privately owned Fairview Lakes.

Another area of significant development pertains to about 150 to 200 memberships in the privately owned Fairview Lakes Association. The memberships include the right to use a specific lot in the area north and east of Fairview Lakes and south of the project area to park a trailer or construct a cabin. This area has been re-zoned and the 1 dwelling per 10 acres development ratio does not apply to this area as it has been developed with lots every 1+ acre each. About 50 cabins have been constructed within the past 5 years. The cabins are used during the winter as well as the summer since the general area is a popular cross-country skiing and snowmobiling area. Many of the other lots have one to three trailers parked on them for the summer season (June

through September). The private landowners also allow their members to use some of the area southeast of Fairview Lakes for recreation use.

In the mid-1940's, about 6,560 acres of federally owned land was withdrawn from the National Forest by Reclamation. This land, including all federally owned land which would be affected by the Narrows Dam and Reservoir, was withdrawn because of its potential as a reservoir site for the Gooseberry Project. Management and maintenance of this land has been assumed by the FS.

Portions of three sheep grazing allotments and four grazing permits occur in the area affected by the proposed Narrows Dam and Reservoir. These include the Swen's Canyon allotment, the Gooseberry-Cottonwood allotment, and the Beaver Dams allotment. Swen's Canyon allotment is in two drainages. That portion in the same drainage as the proposed Narrows Dam and Reservoir consists of 583 acres, all of which is suitable grazing land in fair range condition. Grazing capacity of that portion is about 575 sheep-months. Grazing on the Beaver Dams allotment is combined under the terms of a memorandum of understanding with permitees for non-use for range protection. One band of 1,300 sheep graze the combined allotment on a rest-rotation basis wherein land is rested at least 1 year in 5. Use averages 4,100 sheep months. Suitable grazing land was determined from conditions reflected during a range analyses conducted during 1976.

A summary of information concerning the three grazing allotments and four grazing permits is presented in Table 3-25. Range conditions and grazing were also discussed earlier in the vegetation section of this chapter.

Impacts

Recommended Plan

Major changes in land use are not anticipated under this alternative. Construction of summer homes outside of plotted subdivisions might be accelerated but would be limited by zoning restrictions of one dwelling per 10 acres. Development of the Fairview Lakes complex would continue as previously planned. Narrows Reservoir, SR-264 relocation, the recreation area, and the conservation easements adjacent to the reservoir would reduce the available grazing area by 786 acres. This area is about 10 percent of the suitable grazing acreage in the area. This reduction would create a need for the livestock operations to obtain about 240 AUM's of feed to replace the lost grazing acreage. Restrictions on the number of sheep and cattle allowed and/or realignment of grazing allotments may be required due to implementation of the Recommended Plan.

Smaller Reservoir Plan

As with the Recommended Plan, major changes in land use are not anticipated under this alternative. Narrows Reservoir, SR-264 relocation, the recreation area, and the conservation easements adjacent to the reservoir would reduce the available grazing area by 544 acres. This area is about 7 percent of the suitable grazing acreage in the area. This reduction would create a need for the livestock operations to obtain about

Table 3-25
Sheep Grazing Allotment in Project Vicinity[1/]

Allotment	Swen's Canyon	Gooseberry-Cottonwood	Beaver Dams
Permits	2	1	1
Acreage			
Federal	2,277	4,229	3,014
Private	0	384	940
Total	2,277	4,613	3,954
Suitable Grazing	1,888	3,096	2,631
No. of Sheep Allowed			
Federal	559	1,092	946
Private	400	755	124
Period of Use	July 1 - Sept 30 (3.0 months)	July 1 - Oct 5 (3.16 months)	July 1 - Oct 5 (3.16 months)
Sheep-Months[2/]			
Federal	1,677	3,451	2,989
Private	1,200	2,386	392
Condition of Suitable Grazing Land			
Good			
No. of acres	226	542	360
Percent	14	18	14
Fair			
No. of acres	1,257	2,088	1,551
Percent	64	67	59
Poor			
No. of acres	405	466	720
Percent	22	15	27

1/ Source: USFS (1992); Personal communication, U.S. Forest Service Supervisory Range Conservationist.

2/ Sheep-months = utilization of forage by one mature ewe with lamb at side for 1 month. A sheep-month is equal to 1/5 animal unit month (AUM).

166 AUM's of feed to replace the lost grazing acreage. Implementation of the Smaller Reservoir Plan would likely cause restrictions on the number of sheep and cattle allowed and/or realignment of grazing allotments in the area.

No Action Plan

Construction of summer homes on private land outside of platted subdivisions is expected to continue at the current rate, until development reaches the zoning restrictions of one dwelling per 10 acres. Development of the Fairview Lakes complex would continue as presently planned. Sheep and cattle grazing would continue as described for the existing environment.

Mitigation

There is no mitigation for land use impacts proposed for any of the project alternatives.

Residual Impacts

Recommended Plan

Suitable grazing acreage in the vicinity of Narrows Reservoir would be reduce by about 10 percent with implementation of the Recommended Plan. Construction of summer homes might be accelerated but would be limited by zoning restrictions of one dwelling per 10 acres outside of platted subdivisions.

Smaller Reservoir Plan

Residual impacts to land use under the Smaller Reservoir Plan would be similar to those of the Recommended Plan except that suitable grazing acreage would be reduce by about 7 percent.

No Action Plan

There would be no residual impacts to land use under the No Action Plan.

Recreation

Existing Environment

According to the Utah Division of Parks and Recreation 1992 SCORP, the most popular outdoor "individual" recreational activity in Utah is fishing, followed by walking, golf, and camping. As with other major reservoirs along the Wasatch Front, Gooseberry Reservoir, Beaver Dam Reservoir, and Fairview Lakes, are heavily fished and overcrowded.

Boating also ranks as one of the more popular outdoor recreation activities in Utah and not enough flatwater boating and boat launching lanes are presently available. Information from the Utah SCORP suggests that additional boating facilities are needed for the potential growth in demand for recreation users visiting the area.

For "family" activities, and favored activities are sightseeing, developed camping, primitive camping, and fishing among others. First choices for "new facilities" near

communities are: picnicking, fishing, special event areas, ice skating, and snowmobiling. Similar preferences are documented for Carbon County.

There are two developed FS campground facilities in close proximity to the project area. The Gooseberry and the Flat Canyon Campgrounds are both fee-areas, with a 92-day season of use from June 15 through September 15. Water, sanitation facilities, tables, fire grills and garbage pickup are provided at both sites.

Scofield and Joes Valley Reservoirs, both constructed by Reclamation, are in the same vicinity as the proposed Narrows Reservoir. Both reservoirs are heavily used for recreation. Scofield State Park receives an annual visitation of about 56,000 visitors. Annual revenues approach $30,000. Table 3-26 shows average annual recreation use for both reservoirs.

Table 3-26
Nearby Reservoirs Present Recreation Use1/

Reservoir	Average Annual Use (Visitor Days)
Joes Valley	89,967
Scofield	56,000

1/ Source: USBR reported recreation use data for 1982-90.

Recreation use of the reservoirs includes fishing, boating, camping, picnicking, summer home use, horseback riding, snowmobiling, and hunting. Although total recreation visitor days are available for these areas, there is no breakdown for the number of visitor days spent on each specific activity.

Gooseberry Reservoir, Beaver Dam Reservoir and Fairview Lakes are heavily fished. Gooseberry Creek in the immediate project area is utilized to a lesser degree by fishermen.

The proposed reservoir area is known as a very popular location for snowmobile enthusiasts. The Utah State Parks and Recreation Division maintains unloading, parking, and sanitation facilities along State Road 31, immediately west of the proposed reservoir area, from which snowmobiles embark for travel along groomed trails following Skyline Drive and State Road 31, as well as in the proposed reservoir area itself.

Dispersed recreation occurs outside of areas where facilities are built especially for recreation. It occurs mostly along or adjacent to roads, and includes activities such as driving for pleasure, camping, hiking or mechanized trail use, hunting, fishing, and wilderness travel. Based on the Recreation Opportunity Spectrum (ROS) system for classifying recreation opportunities as described in the 1986 Land and Resource Management Plan for the Manti-La Sal National Forest, the dispersed recreation opportunity within the proposed reservoir area would be classified as "Roaded Natural Appearing." There are nearly 414,000 acres of land with this classification within the Manti-La Sal National Forest. As indicated in Table 3-27, the 1980 recreation use of

these lands was about 524,000 visitor days or an average of 1.3 visitor days per acre per year. By the year 2030 the demand for this type of recreation use is expected to increase to about 1,600,000 visitor days per year or 3.8 visitor days per acre per year.

Other areas within the Gooseberry Creek and Fish Creek drainage, but outside the reservoir basin provide dispersed recreation opportunities classified as "Roaded Natural Appearing," "Semiprimitive Motorized," Semiprimitive Nonmotorized," and "Primitive." The 1980 and project demands for these types of recreation opportunities are summarized in Table 3-27.

Table 3-27
Manti-La Sal National Forest Dispersed Recreation
1980 Use and Estimated 2030 Demand

ROS Class	1980 Base		2030 Demand	
	RVD's	Gross Acres	RVD's	Gross Acres
Primitive	2,806	48,082	20,800	48,082
Semiprimitive Nonmotorized	18,162	117,891	58,256	117,891
Semiprimitive Motorized	158,194	831,807	473,287	831,807
Roaded Natural Appearing	524,036	413,672	1,587,912	413,672
Total	703,198	1,411,452	2,140,255	1,411,452

Impacts

Recommended Plan

Under this alternative, recreation facilities, including a 60-unit campground, boat ramp, 10 picnic sites, and restrooms, would be provided at the Narrows Reservoir. The recreation facilities would draw heavy use from not only Sanpete, Carbon, and Emery Counties, but also from the Provo/Orem and metropolitan Salt Lake City areas. The proposed Narrows Project would meet the demand for additional boating facilities in the area. In addition, it is expected that the reservoir would develop into an excellent flat-water fishery. A conservation pool would be provided to ensure successful over-wintering of fish.

Narrows Reservoir would increase the State and regional inventory for fishing, boating, and water play. The proposed project's facilities are expected to attract a total of 46,400 additional visitor days per year of total developed recreation use. Of this amount, 13,700 visitor days would be spent on fishing and the remainder on other general recreation activities. These use rates are based on use rates of Joes Valley and Scofield Reservoirs.

Construction of Narrows Dam and Reservoir and the associated recreation area and highway relocation would impact the loss of 237 acres of "Roaded Natural Appearing"

dispersed recreation are on National Forest System lands and 466 acres on private lands. This would result in the loss of about 910 visitor days at 1980 levels of use and about 2,670 visitor days at the project year 2030 levels of use. There is no evidence that would suggest that the project would have a measurable effect on dispersed recreation outside the immediate vicinity of the reservoir.

Implementation of the Recommended Plan would cause Scofield Reservoir to operate at a lower level, thus reducing the surface area available for fishing and other forms of recreation by about 7 percent. It is expected that this would result in the loss of 4,070 visitor days per year, including fishing, based on the Reclamation data referenced in Table 3-26 However, according to a 1986 creel survey by the UDWR, there would be a loss of 4,500 angler days of fisherman use. This estimate does not include other forms of recreation. This discrepancy is apparently due to the fact that the UDWR data is based on 1 year, whereas Reclamation's data is based on a long-term average.

It should be pointed out that if Scofield Reservoir had not been enlarged to accommodate the Gooseberry Plan, it would have had a much smaller surface area and would have been able to support much less recreation use. Using Reclamation's data, the recreation use of Scofield without enlargement would have been about 23,100 visitor days less. According to UDWR data, there would have been 25,900 angler days less fisherman use.

Utah Division of Parks and Recreation estimates that this loss could represent more than $5,000 in revenue loss to the State Park annually without mitigation. More frequent fish kills and accelerated eutrophication would also denigrate the park. However, water quality mitigation has been provided. While the total inventory of water-based recreation may be increased, some of it will be offset by a downgraded State Park at Scofield. The higher elevation Narrows Reservoir will have a shorter season of use at +9,000 elevation than will Scofield Reservoir at about 7,600 feet elevation. Greater snow cover will probably occur at 9,000 feet with less opportunity for year-round fishing (ice) as compared to Scofield State Park.

Smaller Reservoir Plan

Recreation facilities, under this alternative, would include a 40-unit campground, boat ramp, 6 picnic sites, and restrooms. The facilities are expected to attract 27,800 additional visitor days per year of developed recreation use. This number includes 7,200 visitor days spent on fishing. About 4,500 angler days per year would be lost at Scofield Reservoir according to UDWR data. According to Reclamation's data, 3,600 total recreation visitor days would be lost at Scofield Reservoir. About 560 visitor days of dispersed recreation use at 1980 use levels would be lost and about 1,650 visitor days at projected 2030 use levels.

No Action Plan

The existing recreational facilities in and around the project area are overcrowded. Under this alternative, the overcrowding would continue.

Mitigation

Recommended Plan

The Recommended Plan would attract a total of 46,400 additional visitor days per year of total recreation use, including 13,700 visitor days spent on fishing. These visitor days would more than offset the loss at Scofield Reservoir.

Smaller Reservoir Plan

The Smaller Reservoir Plan would attract a total of 27,800 additional visitor days per year of total recreation use, including 7,200 visitor days spent on fishing. These visitor days would more than offset the loss at Scofield Reservoir.

No Action Plan

There would be no mitigation for recreation under the No Action Plan.

Residual Impacts

Recommended Plan

The Recommended Plan would result in a net increase of 41,900 visitor days of recreation use in the project area. This includes a net increase of 9,200 visitor days spent on fishing.

Smaller Reservoir Plan

The Smaller Reservoir Plan would result in a net increase of 23,300 visitor days of recreation use in the project area. This includes a net increase of 3,700 visitor days spent on fishing.

No Action Plan

There would be no residual impacts to recreation under the No Action Plan.

Social and Economic Conditions

Existing Environment

Social and economic conditions in Carbon and Sanpete counties are underscored by a century-long dependence upon agriculture. Both valleys were originally developed for agricultural use. However, rich coal deposits discovered in Carbon County during the 1860's have now led the mining industry to become the principal economic activity in the area. Agriculture still remains the principal economic activity in Sanpete County. Lack of sufficient irrigation water and further concerns related to neglected long-standing agreements of water rights have renewed the Sanpete County water users determination to see the project completed.

Population in the two-county project area is 36,487 according to the 1990 Census. Carbon County had a 1980 population of 22,179 which deceased in 1990 to 20,228. Sanpete County's population in 1980 was 14,620 which increased to 16,259 in 1990. Carbon County's population loss is attributed to the decline in mining. The largest community in the two counties is Price with a 1980 population of 9,086 which decreased to 8,712 in 1990.

The College of Eastern Utah in Price and Snow College in Ephraim are significant cultural and economic resources for Carbon and Sanpete counties, respectively. The two counties have seen a high rate of unemployment since 1960 (refer to Table 3-28). The leading economic sectors in Carbon County are (in order of importance): mining, government, services, transportation and public utilities. Leading economic sectors in Sanpete County are: government, agriculture, services, manufacturing, and retail trade.

Table 3-28
Annual Unemployment Rates
(Unit -- %)

Locale	1950	1960	1970	1980	1990
Sanpete County	3.3	5.7	7.1	15.0	9.4
Carbon County	2.5	8.3	9.4	10.1	6.1
State of Utah	5.1	5.2	4.1	6.0	4.4

Because of a larger population base, Price rates higher on community facilities than do the north Sanpete County communities. Moroni and Spring City both have a particular need for improvements in police and fire protection, health care, housing, restaurants, daycare facilities, youth recreation facilities and cultural opportunities. The recent construction of the State Correctional Facility at Gunnison has effected a sharp upswing in housing demand in the project area--resulting in housing shortages. Educational facilities in the project area appear average based on statewide norms.

Agricultural in Sanpete County is a major significance to the economy of the county and has a sizable number of people involved. Since 1980, farms dropped in number by 1.4 percent while the number of acres in production grew by 5.6 percent. The average farm size grew from 549 acres to 588 acres. As shown earlier in Table 3-24, about 44 percent of the land in Sanpete County is used for agriculture. Of that amount, a total of 161,109 acres or 36 percent is in cropland.

Agriculture plays a much smaller role in Carbon County's economy. In Carbon County, only about 22 percent of its total acres is used for agriculture. Of that amount, 4,239 acres or 2 percent is in cropland. Since 1980, the number of farms increased by 4.5 percent, but the number of acres in production declined from 1,203 acres to 1,065 acres.

As discussed in earlier sections of this EIS, agriculture development is severely limited by inadequate water supplies. The limited precipitation, averaging just above 4 inches during the summer months, makes irrigation essential to successful crop production. Yet the demand for irrigation water cannot be met by the fluctuating direct flows in

local streams or the limited storage supplies presently available. Present irrigation practices in the project area encourage excessive early season diversion and low farm efficiency. Because of inadequate storage, there is a tendency to apply excessive water during spring and early summer when water is plentiful so as to obtain maximum soil moisture to sustain crops as long as possible after stream flows have diminished. Water supply studies show that shortages occurred during the years 1960 to 1989 on lands that would be served by the Narrows Project. Shortages during those years ranged from 3 to 44 percent of the diversion requirement. Because shortages are unpredictable, irrigators are unable to implement crop rotation and other practices necessary for optimum production. Table 3-29 below presents the annual diversion requirements of the lands within the Narrows Project area, quantifying the total water needs of presently irrigated lands and the extent to which these needs have been satisfied on an average annual basis.

Table 3-29
Average Diversion - Existing Supply and Remaining Demand
(Unit--acre-feet)

Average Head of Canal Diversion Requirement	Average Historical Supply	Average Shortage	Average Shortage (percent)
62,937	44,159	18,778	30

Principle crops grown in the project area in order of importance are: pasture, alfalfa hay, small grains (barley, oats, and wheat), and meadow hay. Under existing conditions, two crops of alfalfa are harvested each year and in some years, when weather conditions are favorable, three crops are harvested. One crop of meadow hay is normally harvested and the aftermath used as late summer and fall pasture. Small grains are used as rotation crops for hay and pasture. Small grains are also sometimes used as a nurse crop for alfalfa. The most common small grain crop is barley. Corn silage, which makes up less than 1 percent of the irrigated area, is raised primarily by dairymen and livestock feeding operations. Present and project crop distribution and yields in Sanpete County are summarized in Table 3-30.

Of the 15,420 acres of irrigated farmland within the Sanpete County project area, an estimated 9,252 acres are irrigated by sprinkler. The remaining acreage is flood irrigated. Water shortages within the project area average about 30 percent annually. Each pressurized pipeline distribution system generally has a regulating pond at its head. Water is diverted out of the streams into these ponds to provide system regulation and to allow sediments to settle out.

Irrigators in the Fairview area rely on the Narrows Tunnel to convey water stored in Fairview Lakes to Cottonwood Creek. As described in Chapter 2, the tunnel is in a critical state of disrepair.

Table 3-30
Summary Crop Distribution and Yields
Sanpete County

Crop/Unit	Distribution (%)[1/]	1990 Yields[2/]	Project Yields w/Full Water Supply[3/]	Project Yields Average
Pasture/AUM.	41	5.0	8.0	5.3
Alfalfa hay/ton	34	3.5	5.2	3.7
Small grains/bu.	10	80.0	85.0	82.0
Meadow hay/ton	8	2.0	2.5	2.2
Other crops	1	NA[4/]	NA	NA
Fallow and idle	6	NA	NA	NA

1/ Distribution would be essentially the same for present and project conditions.
2/ Estimates were generated by the Sponsor for this study.
3/ Estimates for irrigators purchasing enough project water to obtain a full water supply.
4/ NA = Not applicable.

The near doubling in size of Scofield Reservoir in 1946, allowing a full 35,000 acre-feet of additional active storage capacity, was originally accomplished for the purpose of implementing the Gooseberry Project Plan. Therefore, irrigation systems in the Price River area are not expected to be any worse off than they would be without the enlarged reservoir.

Impacts

Recommended Plan

Relatively few sociological impacts would result from the construction phase of the proposed project. The work force would come from the Wasatch Front and local communities in Sanpete and Carbon Counties for 2 years of summer work. Most of the workers would probably commute to the work site with some camping near the site. Agricultural earnings would be supplemented with short-term earnings from construction employment by a work force of 50 to 100 persons.

The overall economy in north Sanpete county would benefit modestly from the construction, especially service stations, restaurants and grocery stores. However, the benefits would be short-term. Economic benefits to Carbon County would also be of the same minor nature.

Environmental impacts related to agriculture in the proposed area include reduced water shortages to the north Sanpete area and the future of the Narrows Tunnel. Irrigation systems in north Sanpete County would receive significant benefits under the Recommended Plan. A total of 5,400 acre-feet of supplemental irrigation water would be delivered to project lands, reducing current shortages to 19 percent. Narrows Tunnel would be rehabilitated under this plan.

Following construction, farm land would become more productive. Under present conditions, two crops of alfalfa are harvested each season, except years of extreme

drought. Under project conditions, two crops would be harvested every year and many years, three crops per season could be harvested. Yields for other crops would also be increased, but the most significant effect would be on alfalfa yields. The increase in farm production would enhance the local economy.

Cropping patterns would not be significantly altered under project conditions. Irrigators who purchase the water, however, would be able to rotate their alfalfa crops more often and a few irrigators may expand their alfalfa acreage. The relatively small amount of water available for use on the project's 15,420 acres would result in insignificant changes to the crop distribution shown earlier in Table 3-29.

Farm incomes would be increased the first year of delivery of project water, since all land served is already in production. It is estimated that annual net farm income would be increased by about $325,000, which represents an 11 percent increase over the net farm income in the project area based on the 1987 census of agriculture for Sanpete County. During periods of drought, when proportionately more water is delivered, the economic impact would be much more significant than the 11 percent average annual increase would indicate.

The cost of project water to irrigators cannot accurately be determined until project financing has been secured and the project is completed. Factors such as loan interest rates and grants would affect the price of water. Preliminary estimates are that the water would cost about $35.00 per acre-foot.

Although project water would increase farm income, it is not expected that it would affect crop types, farm size, or farm type, since project water would average about 0.3 acre-feet per acre. Irrigation of project lands would benefit about 248 families (900 people) that receive some portion of their income from farming. The increased income for those families from project irrigation is estimated at $322,400 annually, or about $1,300 per family, representing a 11 percent increase in net farm income over nonproject conditions.

Increased municipal supplies would produce an economic benefit of about $46,000 per year.

Construction and operation of the Narrows Project would support the existing nature of the communities in north Sanpete County. The project would be consistent with current existing communities without introducing changes that are viewed negatively or as disruptive of the present life-style.

Implementation of the Recommended Plan would cause a reduction in the irrigation release from Scofield Reservoir by an average of 652 acre-feet per year which is about 2 percent of the average annual supply. However, this reduction is less than the 970 acre-feet per year average that would occur if Scofield Reservoir had not been enlarged and water right agreements executed to accommodate the Narrows Project.

Because municipal and industrial water demands generally have a higher priority of use, it is assumed that the 652-acre-foot reduction would come from irrigation water supplies. This reduced water supply would result in the loss of about $43,000 of farm

income per year in Carbon County. In order to maintain the same level of supply as the future without project condition, municipal and industrial users would need to increase their present share of Scofield Reservoir water by 2 percent. It is estimated that an additional 202 shares of Scofield water would need to be purchased from irrigators at an estimated cost of $202,000.

Recreation use of Narrows Reservoir under the Recommended Plan would generate about $172,000 of economic benefits per year. Decreased contents of Scofield Reservoir would cause a loss of $15,000 of economic benefits per year to Carbon County. However, the level of economic benefit due to recreation use of Scofield Reservoir would have been nearly $86,000 less if the reservoir had not been enlarged to accommodate the Gooseberry Plan.

Smaller Reservoir Plan

The relatively few sociological impacts that would result from the construction phase of the recommended plan and the modestly benefited overall economy in north Sanpete County would be the same for the Smaller Reservoir Plan.

Following construction, farm production and the impact on the local economy would be the same as that described for the recommended plan and shown earlier in Table 3-29. Crop distribution would not be affected by decreasing the average yield of the reservoir by 500 acre-feet. The smaller reservoir would also have a negligible affect on average crop yields because the shortage would occur only during drought years. The effect on crop yields during those years, however, would be significant. During the drought years, the amount of project water available would be reduced by more than 70 percent due to the lack of long-term carryover storage. This shortage could result in the loss of alfalfa stands, which represent a considerable investment to local irrigators.

Increased municipal supplies would produce an economic benefit of about $46,000 per year.

Increased income for the 248 families or about 900 people from project irrigation under the Smaller Reservoir Plan is estimated at $300,000 annually, or about $1,200 per family. This amount represents a 10 percent increase in net farm income over nonproject conditions.

Under the Smaller Reservoir Plan, recreation use of narrows Reservoir would generate about $103,000 of economic benefits per year. About $13,000 per year of economic benefit would be lost at Scofield Reservoir. Implementation of the Smaller Reservoir Plan would cause a reduction in the irrigation release from Scofield Reservoir by an average of about 609 acre-feet per year. This would result in the loss of about $40,000 of farm income per year in Carbon County. Municipal and industrial water users would need to acquire an additional 189 shares of Scofield Reservoir water at a cost of about $189,000.

No Action Plan

Without the Narrows Project, north Sanpete County would remain as stable in the next decade as it has in the past. It would be characterized by some gradual changes in population size, but little change otherwise. The city of Price has a greater potential for change, but the causes of the changes are largely external to the Price area. If mining, electrical power generation, or tourism should experience important growth in the near future, some corresponding changes could occur in Price.

Under the No Action Plan, agricultural impacts would include irrigation shortages which would continue to average about 30 percent annually. The condition of Narrows Tunnel would continue to deteriorate. Some type of emergency funding for reconstruction would be necessary in the event of total failure of the tunnel.

Mitigation

There are no additional social mitigation measures proposed under any of the project alternatives. The enlargement of Scofield Reservoir has already mitigated social and economic impacts on Carbon County. However, the project Sponsor would be willing to support water users in Carbon County in developing projects that would provide new water supplies or increase the efficiency of their present water use.

Residual Impacts

Recommended Plan

With implementation of the Recommended Plan annual net farm income would be increased by about $325,000. The Recommended Plan would cause a reduction in the irrigation release from Scofield Reservoir by an average of 652 acre-feet per year.

Smaller Reservoir Plan

Increased farm income under the Smaller Reservoir Plan is estimated at $300,000 annually. The Smaller Reservoir Plan would cause a reduction in the irrigation release from Scofield Reservoir by an average of about 609 acre-feet per year.

No Action Plan

There would be no residual social impacts from the No Action Plan.

Cultural Resources

Existing Environment

Under a contract with Dames and Moore, the University of Utah conducted a literature search and a survey for historic and prehistoric cultural resources in the proposed Narrows Dam and Reservoir area. Prior to the beginning of the survey, archeological site records and the National Register of Historic Places were consulted at the Utah

State Historical Society Antiquities Division to determine if known cultural resources would be adversely affected by the proposed Narrows Dam and Reservoir. The following narrative summarizes results of these surveys. Surveys have not been performed for the Upper Cottonwood Creek, Oak Creek and East Bench Pipeline alignments. A literature search and survey would be conducted prior to design of these facilities.

Prehistoric Aspects

Cultural resource surveys revealed two archaeological sites near the proposed Narrows Dam and Reservoir. These sites were open lithic scatters with few finished artifacts. There was no evidence of ground stone, ceramics, firepits, or structures located at the sites. Because of the absence of evidence suggesting activities other than tool manufacture or hunting, the prehistoric sites were probably only temporary camps. Additionally, there was a noticeable absence of scrapers and other bifacially-worked tools, suggesting that the sites did not serve as butchering stations. Findings support the idea that high altitude areas were utilized as temporary hunting grounds during the Archaic period.

In addition to the above, a total of 26 isolated finds were recorded throughout the valley, but in a clearly discernible pattern. Generally, they were small secondary flakes, mostly of white chert. Artifact density is heaviest in the western portion of the survey tract, especially on ridge spurs descending into the valley.

Historic Aspects

Historical resource surveys revealed one site consisting of a stone foundation. There is no evidence of there ever being a superstructure on the foundation.

Impacts

Recommended Plan

Under the Recommended Plan, two prehistoric sites and one historic site would be inundated by the Narrows Reservoir.

Smaller Reservoir Plan

Cultural resources impacts under this alternative and measures to protect the resource would be the same as those described above for the Recommended Plan.

No Action Plan

The identified prehistoric and historic cultural resources would remain as present under the No Action Plan.

Mitigation

Recommended Plan

It was evident from the survey and other supporting data cited earlier, that high altitude areas were an important component in aboriginal life, despite the minimal archeological attention thus far devoted to such areas. Because of the theoretical value of the survey area, it was recommended that both prehistoric sites be thoroughly collected, and a 1-by-1 meter pit be excavated at each site to test for subsurface deposition. Preliminary information suggests that the stone foundation does not qualify for nomination to the National Register of Historic Places, and that the structure is not architecturally significant. However, it was further recommended that a literature search be conducted to determine the importance of the historic site. These recommendations would be initiated prior to project construction. Neither recommendation would inhibit the construction of the proposed Narrows Dam and Reservoir (Attachment C - Cultural Resources Consultation).

On-ground surveys along the pipeline alignments would be performed by the Sponsor, prior to construction. The Sponsor would comply with Federal and State regulations, including SHPO clearance, designed to protect, preserve, restore, and maintain archaeological, historical, and paleontological resources on public land in the project area should construction activities uncover specimens or relics not visible at the time of surface surveys.

Smaller Reservoir Plan

Measures to protect the cultural resources would be the same as those described above for the Recommended Plan.

No Action Plan

There would be no cultural resources mitigation measures under the No Action Plan.

Air Quality and Noise Control

Existing Environment

The Narrows Dam and Reservoir area is located in a fairly remote and rugged mountainous terrain. The air quality associated with this area is generally excellent. Primary sources of existing air pollutants in the project area include campfires from area campgrounds and exhaust emissions from intermittent traffic and recreational vehicles. Dozens of summer homes are located in the vicinity of the project. High levels of dispersed recreation use of this area is common.

Noise in the proposed project area is generally low and not disturbing. Normal sources of noise include substantial vehicle traffic of cars, trucks, and busses commuting to the mines and power plants from the Sanpete Valley to Carbon and Emery Counties, recreational vehicles, commercial truck hauling, wind, and animal life.

Impacts

Recommended Plan

Air Quality

Air quality would experience short-term impacts during construction of the recommended plan. Fugitive dust emissions and emissions from internal combustion engines would be generated by excavation and earth moving traffic on unpaved surfaces. The contractor would, however, meet all applicable regulations concerning exhaust and dust control.

Following construction, long-term impacts on air quality would include some increased vehicle emissions and campfires because of additional recreational facilities that would result from the project. This, along with the increased use associated with project operations and maintenance, would contribute to some increased level of air pollutants. This impact would not be significant in the excellent overall air quality of the Narrows Project area.

Noise Effects

Noise effects during construction would result from additional traffic caused by commuting construction workers, material delivery trucks, and operation of construction equipment at the project site during a normal workday. Noise associated with increased recreation use in the project area may be offensive to some.

Measures to be Employed During Construction

Wherever and whenever necessary, the contractor would comply with all Federal regulations and take proper and efficient measures to reduce dust and exhaust pollution which might originate from construction and prevent it from becoming a nuisance to persons or causing damage to crops, cultivated fields, or dwellings. The contracting officer would be particularly critical of dust pollution resulting from the manufacture of concrete aggregate or excessive exhaust pollution resulting from improperly tuned engines or improperly equipped vehicles and equipment. The contractor would be held liable for any damage caused by dust and air pollution from construction operations.

The contractor would comply with all applicable Federal, State, and local laws, orders, and regulations concerning the prevention, control, and abatement of excessive noise. No operation producing high-intensity impact noise would be performed at night unless approved by the contracting officer. This would include such operations as using a jackhammer, pile driving, or blasting.

Smaller Reservoir Plan

Air quality and noise effects associated with this alternative and measures to be employed during construction would be the same as those described above for the Recommended Plan.

No Action Plan

Some vehicle traffic, recreationists, recreational vehicles, and animal life would continue to occur in the project area. Noise and air pollution is not expected to significantly increase under this plan.

Cumulative Impacts

Introduction

The following discussion addresses the proposed project's role in the assumed cumulative impacts to area resources in the Upper Colorado River Basin. Any analysis of cumulative impacts must deal with the issue of scope, both in terms of spatial and temporal scales. In the following discussions, these scales will vary depending upon the resource under evaluation.

Resources Considered but Not Evaluated

Since 1960, some 30 water resources projects have been built or are under construction by Reclamation in the Upper Colorado River Basin (Table 3-31). Reclamation estimates that those projects have provided full irrigation service to 158,460 acres with supplemental service to another 204,870 acres. These developments account for an estimated 62,776,000 megawatt hours of power generation and some 431,100 acre-feet of municipal and industrial water supplied. Recreational use associated with these projects, including sightseeing, picnicking, camping, boating, fishing, hunting, and other activities is estimated at 45,068,970 annual recreation days. In terms of average annual permanent employment opportunities, these projects are responsible for some 18,716 jobs.

Aside from providing a net increase of 41,900 annual recreation days, the Narrows Project would not affect the above resources. No new acres of cropland would be irrigated; no new power would be generated; and no new permanent jobs would be created. Because there would be no net change in existing levels of these resources in the Upper Colorado River Basin, it is assumed that there would be no cumulative impact from the proposed project and it has been determined that further analysis of cumulative impacts is not necessary.

Cumulative Resource Issues

Several resource issues have been affected by past Reclamation developments and would be affected by the proposed project; they thus have the potential to contribute to cumulative (additive) impacts within the region and beyond. These issues involve stream depletions that can impact fisheries and endangered native fishes, and changes in salt loading within the Colorado River. These issues are treated below under the headings of fisheries, threatened and endangered species, and water resources, use, and quality.

Table 3-31
Developments Included in Cumulative Impact Analysis

Development and Location (State)	Actual or Estimated Completion Date
CRSP Storage Units	
Wayne N. Aspinall Unit, Colorado	1977
Flaming Gorge Unit, Wyoming and Utah	1963
Glen Canyon Unit, Utah and Arizona	1965
Navajo Unit, Colorado and New Mexico	1963
CRSP Participating Projects	
Florida Project, Colorado	1963
Paonia Project, Colorado	1962
Silt Project, Colorado	1966
Smith Fork Project, Colorado	1963
Hammond Project, New Mexico	1975
Central Utah Project, Utah	
Bonneville Unit	2003
Jensen Unit	1989
Vernal Unit	1961
Upalco Unit	1990
Emery County Project, Utah	1965
Lyman Project, Wyoming	1980
Seedskadee Project, Wyoming	1/
Navajo Indian Irrigation Project, New Mexico	1987
San Juan-Chama Project, New Mexico	1976
Bostwick Park Project, Colorado	1971
Dallas Creek Project, Colorado	1989
Dolores Project, Colorado	1990
Frying Pan-Arkansas Project, Colorado	1977
Grand Valley Unit, Colorado (Colorado River Basin Salinity Control Project)	2006
Paradox Valley Unit, Colorado (Colorado River Basin Salinity Control Project)	1990
Animas-La Plata Project, Colorado and New Mexico (CRSP)	1997
Ruedi Reservoir Round 2 Water Sale, Colorado (Fryingpan-Arkansas Project)	1986
Lower Gunnison Basin Unit, Colorado (Colorado River Water Quality Improvement Program)	1995
Uinta Basin Unit, Utah (Colorado River Water Quality Improvement Program)	1998
Dolores Project Modifications	1996
Price - San Rafael Rivers Unit, Utah (Colorado River Water Quality Improvement Program/Colorado River Salinity Control Program)	2005
Narrows Project, Utah (Sanpete Water Conservancy District)	1997

1/ Fontenelle Dam and Reservoir were completed in 1964. Irrigation development has been deferred indefinitely.

Fisheries

The spatial scope of impacts to fishery resources in the current study is defined in part by interstate compacts for the delivery of prescribed amounts of water to the Lower Basin States via releases from Lake Powell. Within the Upper Basin, the cumulative impacts of several projects may be most significant at the level of individual drainages. For example, flows in the Price River have been depleted by earlier projects. At present there is no minimum flow requirement below Scofield Dam and at times the flow is completely shut off at the dam. The Narrows Project would not affect minimum flows of the Price River.

Many of the impacts to fishery resources from the 30 Reclamation projects in the Upper Basin are the direct result of water depletions. Depletions would occur as a result of the Narrows Project. These depletions are discussed below.

Threatened and Endangered Species

The same argument used for spatial scope for fisheries resources applies to endangered native fishes--the Upper Basin is a discrete water unit. The Colorado squawfish, bonytail chub, and the humpback chub are endemic to the Colorado River Basin including downstream portions of the Green, Yampa, Gunnison, San Juan, and Colorado Rivers. These species evolved in the Colorado River and its larger tributaries under conditions of warm water, large seasonal flow fluctuations, heavy sediment loads, extreme turbulence, and a wide range of dissolved solid concentrations. These conditions have been altered by man's activities, and all three species have experienced population declines. Below Glen Canyon Dam, approximately 15 reservoirs have controlled and altered the lower Colorado River to the point that the three species are rare or nonexistent.

In the Upper Colorado River Basin, the Colorado squawfish and bonytail and humpback chubs historically occupied some 1,350 miles of stream. Developments have inundated 364 miles of fish habitat and modified temperatures in 448 additional miles of stream (Table 3-32). The Glen Canyon Unit flooded 186 miles of streams in the upper basin and altered flow, temperature, and water quality in the 293 miles of Colorado River that flow through Marble and Grand Canyons. Although this reach was once considered significant native fish habitat, only a remnant population of humpback chub remain in the river between Lakes Powell and Mead. Navajo Reservoir on the San Juan River and Flaming Gorge Reservoir on the Green River inundated 72 and 137 miles of native fish habitat, respectively. The dams and reservoirs associated with the Wayne N. Aspinall Unit on the Gunnison River did not directly impact endangered fish habitat but may have indirectly affected downstream areas through changes in temperatures and flow.

Because of the potential for cumulative impacts from Reclamation projects, the FWS requested Section 7 consultation (Endangered Species Act) for various Colorado River Basin native fishes in 1980, on virtually all developments constructed, under construction, or in advanced planning stages. Consultation was made contingent on completing fishery studies funded by Reclamation. Study goals included collection of

Table 3-32
Loss of River Habitat for Endangered Fish Species in Upper Colorado River System from Reclamation Developments (Unit--miles)

Project and River	Eliminated by Inundation	Loss Due to Water Quality Change	Total
Wayne N. Aspinall Unit			
Gunnison River		50	50
Flaming Gorge Unit			
Green River	72	65	137
Glen Canyon Unit			
Colorado River	186	293[1/]	479
San Juan River	71		71
Navajo Unit			
San Juan River	35	40	75
Total	364	448	812

Development	Feature	Known Endangered Fish Habitat Location	Miles from Project
Grand Valley Unit	Irrigation systems improvements	Colorado River at Grand Junction, Colorado	0
Paradox Valley Unit	Brine well field	Colorado River at mouth of Dolores River, Utah	75
Animas-La Plata Project	Ridges Basin and Southern Ute Reservoirs	San Juan River near Aneth, Utah[2/]	100
Ruedi Reservoir Round 2 Water	Sale of reservoir water	Colorado River at Grand Junction, Colorado	120
Lower Gunnison Basin Unit	Irrigation system improvements	Gunnison River downstream from Delta, Colorado	15
Uinta Basin Unit	Irrigation system improvements	Green River above and below mouth of Duchesne River, Utah	25
Dolores Project Modifications	Irrigation system improvements	San Juan River confluence with McElmo Creek, Colorado	40

1/ Altered habitat in Lower Basin caused by Glen Canyon Dam.
2/ One juvenile squawfish collected in 1978.

data to support actions that would ensure continued existence of the fishes, while permitting orderly development of water resources for various States. Subsequently, several developments have received nonjeopardy opinions--the Animas-La Plata Project; the Lower Gunnison Basin, Paradox Valley, Grand Valley, the Uinta Basin Units; and the Dolores Project modifications. In 1990, the FWS reversed itself and declared that construction of the Animas-La Plata Project would jeopardize the existence of a small population of Colorado squawfish downstream from the project site. The FWS called for further study, and the issue remains unresolved at this time. The FWS has not provided an opinion on Reclamation's biological assessment of impacts associated with construction of the Price-San Rafael Salinity Control Project. In order to minimize the possible adverse effects of the Narrows Project on the Colorado squawfish, bonytail chub, humpback chub, and razorback sucker, the Sponsor would participate in the RIP for Endangered Fish Species in the Upper Colorado River Basin as described earlier.

Projects that have not directly inundated endangered fish habitat may have indirectly affected endangered fishes through depletions of mainstream flows and changes in water quality (Table 3-32). The Narrows Project would result in a 5,557-acre-foot depletion to the Colorado River.

Water Resources, Use, and Quality

During the last decade, Reclamation developed the Colorado River Simulation System (CRSS) model to improve estimates of individual and cumulative impacts from developments on salinity and requirements for future salt load reductions. One conclusion from the CRSS analysis is that hydrologic uncertainty cannot be reduced or simplified. The Colorado River Basin hydrologic record shows numerous wet and dry periods which cause the salinity in the river to vary by as much as 200 mg/L from average conditions. These fluctuations tend to mask the impacts of both development and salinity control projects.

Given these limitations, historical and project data can be used to estimate a range of salinity effects at Imperial Dam (Table 3-33). The range is due to effects from other developments on flow and salinity. The cumulative impact of the developments listed may be more than 200 mg/L. Nearly one-third of the increase is attributable to depletions caused by reservoir evaporation, but these reservoirs also tend to stabilize the riverflow and thereby reduce the seasonally high salinity that formerly occurred in the Colorado River.

Indirect Effects

An indirect effect, or secondary impact, associated with the project would be the probable increase in the early scheduling of summer-home construction in the vicinity of the reservoir. The area adjacent to the proposed reservoir is zoned Forest Watershed 1-10. While the 1-10 zone is not expected to change, the project would probably accelerate the scheduling of construction. It is anticipated that without the project, summer homes would continue to be constructed but not quite as soon as under project conditions.

Table 3-33
Stream Depletions and Salinity Changes

Project or Unit	Depletions (acre-feet/ year)	Change in salt loading (tons/year)	Range of Individual Project Salinity Impacts for 1941-2040[1/] (mg/L) Minimum	Maximum
Wayne N. Aspinall Unit	9,000	0	0.4	1.7
Flaming Gorge Unit	65,000	0	2.6	12.1
Glen Canyon Unit	525,000	0	20.8	91.2
Navajo Unit	26,000	0	1.1	4.9
Florida Project	14,000	11,500	1.1	4.1
Paonia Project	10,000	4,700	.6	2.5
Silt Project	6,000	13,200	.8	2.8
Smith Fork Project	6,000	2,800	.4	1.5
Hammond Project	10,000	7,900	.7	2.9
Central Utah Project				
Bonneville Unit	166,000	-21,600	5.8	27.7
Jensen Unit	15,000	33,200	2.0	7.1
Vernal Unit	12,000	27,700	1.7	5.9
Upalco Unit	12,000	6,200	.8	3.1
Emery County Project	8,000	0	.3	1.5
Lyman Project	10,000	0	.4	1.9
Seedskadee Project	281,000	0	11.3	50.6
Navajo Indian Irrigation Project	267,000	220,000	20.0	75.7
San Juan-Chama Project	110,000	-16,000	3.8	18.3
Bostwick Park Project	4,000	11,200	0.6	2.2
Dallas Creek Project	17,000	9,800	1.1	4.5
Dolores Project	81,000	50,650	5.4	21.5
Fryingpan-Arkansas Project	69,000	-3,500	2.7	12.4
Paradox Valley Unit	1,500	-180,000	-7.7	-23.2
Animas-La Plata Project	155,000	6,470	6.0	27.6
Ruedi Reservoir Round 2 Water Sale	49,000	-15,000	1.3	7.3
Lower Gunnison Basin Unit	-2,000	-141,000	-6.1	-18.7
Grand Valley Unit	0	-166,000	-7.2	-21.7
Uinta Basin Unit	0	-25,500[2/]	-1.1	-3.3
Dolores Project Modifications	0	-32,000	-1.4	-4.2
Price-San Rafael Rivers Unit	25,300	-161,000	- 5.9	-16.3
Narrows Project	5,557	-1,580	0.3	1.3
Total	1,957,357	-49,390	3/	3/

1/ Maximum annual range of salinity impact at Imperial Dam as predicted by the Colorado River Simulation System (CRSS) computer model developed by Reclamation. The range of effects considers the uncertainty of the hydrosalinity analysis as well as a wide range of hydrologic and development conditions. The maximum annual range represents the widest variation in salinity impacts possible by a project in any 1 year of operation. The average impact would fall about midway between these extremes.

2/ Mean of 21,000 to 30,000 tons of reduction expected from unit.

3/ Salinity impacts of the individual developments cannot be added directly because of synergistic effects.

Irreversible and Irretrievable Commitments of Resources

Renewable and nonrenewable resources would be irreversibly or irretrievably committed by construction and operation of the Narrows Project. Although it would be theoretically possible to reverse commitments of some of these resources, the Council on Environmental Quality has stated that ". . . construction and facility uses are basically

irreversible since a large commitment of resources makes removal or non-use thereafter unlikely." This section briefly describes these commitments for all alternatives, with the exception of the No Action Plan. Under that plan, there would be no commitment of resources other than moneys already spent, which are estimated to total just over $1 million.

Construction Materials

About 375,000 cubic yards of permeable and impermeable earth material, gravel, cobble, and riprap would be irretrievably committed for use in dam embankments and associated features. Much smaller amounts of concrete aggregate would be used. Imported cement and manufactured materials would be irretrievably committed to the project features. Fuels, explosives, and electrical power would be consumed in construction.

Land

Narrows Reservoir and other project features (damsite, recreation facilities, and road relocations) would permanently alter use on about 786 acres of land currently functioning primarily as rangeland and wildlife habitat. Geologic studies of the reservoir and damsite have not identified any critical mineral resources within the reservoir basin or damsite.

Water Resources

The Narrows Project would commit about 5,400 acre-feet of water from upper Gooseberry Creek, and its tributaries which are located in the Price River drainage, to project purposes. About 4,920 acre-feet would be used for irrigation and 480 acre-feet would be designated for municipal use in the northern Sanpete County area.

Under present Utah water law and the 1984 Settlement Agreement, commitments of water resources would essentially remain permanent, provided that they are beneficially used. Although the area's water resources would not be irretrievably or irreversibly committed, use of the project water would probably be long-term in nature.

Fish and Wildlife Habitat

The inundation by the reservoir of about 1 mile of UDWR Class 3B-Unique stream fishery in upper Gooseberry Creek and 4.3 miles of cutthroat trout spawning and rearing habitat in the Gooseberry Creek tributaries would be essentially irreversible. The commitment of land around the reservoir to recreation and wildlife uses would also be essentially irreversible, since to do otherwise could jeopardize the water quality of the reservoir as well as the proposed wildlife mitigation plan. Streamflow patterns resulting from project operation would be subject to change should water needs in service areas be modified, but current trends indicate that the proposed operational criteria would be long-term and would constitute a basically irreversible commitment.

Aesthetics

Narrows Project would irreversibly alter the scenery of the feature sites by the building of structures, excavation of landscape, and inundation of the reservoir. The construction scars would be revegetated where practical, but the visual impact, which could be unattractive to some people, would be permanent.

CHAPTER 4 - CONSULTATION AND COORDINATION

CHAPTER 4 - CONSULTATION AND COORDINATION

This chapter summarizes public involvement on the Narrows Project and will serve as the public involvement summary report.

Development of the Proposal

In formulating the alternatives, the Sponsor obtained planning and technical assistance and evaluation of the project purposes from several Federal and State agencies, including Reclamation, FWS, FS, COE, Utah Division of Water Resources, UDWR, Utah Department of Transportation, and the SHPO. Officials of Sanpete and Carbon Counties, and water users groups were also contacted.

Preparation of the Draft Environmental Impact Statement

In compliance with the NEPA, as amended, this document has been prepared to address the full range of potential environmental impacts that could occur if the Narrows Project were to be constructed. Reclamation serves as the lead Federal agency responsible for ensuring compliance with NEPA.

Project plans incorporated appropriate portions of the Colorado River Basin Salinity Control Act of June 24, 1974 (PL 93-320, as amended by PL 98-569), and the FWPCA Amendments of October 1972 (PL 92-500), as amended by the Clean Water Act of 1977 (PL 95-217). Under Public Law 95-217, the Sponsor would acquire a section 402 permit from the Utah Division of Water Quality. This DEIS is intended to fulfill the NEPA requirements for the issuance of a permit from the COE under section 404 of the Clean Water Act.

Construction specifications would include provisions to limit air pollution as required by the Clean Air Act and Amendments of 1970.

Under the Endangered Species Act of 1973 (PL 93-205), Section 7 Consultation, an Endangered Species Biological Opinion has been prepared by the FWS. Coordination is ongoing with the FWS, under the Fish and Wildlife Coordination Act of 1958 (PL 85-624). A final Fish and Widlife Coordination Act Report is attached to this final environmental impact statement.

As provided under the Archeological and Historic Preservation Act of 1974 (PL 93-291) and in the Utah State Antiquities Act of 1973, coordination is on-going with the SHPO regarding potential or listed National Register historical, archeological, or cultural sites.

Coordination, as provided under Executive Orders 11988 (Floodplain Management, 1977) and 11990 (Protection of Wetlands, 1977), is on-going with the FS, FWS, and the public.

Scoping Process

The scoping process for the Narrows Project was initiated with environmental scoping meetings held at Fairview and Price, Utah, on October 3 and 4, 1990, respectively. Notice of the scoping meetings was given through a Federal Register notice dated September 7, 1990, and through a news release dated September 24, 1990. In addition, 32 letters were sent to State and Federal agencies and environmental groups giving notice of the meetings. Three newspapers, the Salt Lake Tribune, the Mt. Pleasant Pyramid, and the Sun Advocate, published articles regarding the project and the upcoming scoping meetings. Concerned citizens were encouraged to attend the scoping meetings or express their concerns in writing.

A total of 55 persons attended the scoping meeting in Fairview and 49 attended the meeting in Price. Federal and State agencies were represented at each meeting. Representatives of local governments and various water user organizations were also in attendance. These public meetings included a presentation of the plan, followed by a question and answer session and a period of public discussion.

Subsequent to the public scoping meetings, an interagency scoping and coordination meeting to discuss fishery-related issues was held on October 15, 1990 at Provo. Representatives of the Sponsor, Reclamation, FS, FWS, and the UDWR were in attendance. Another scoping meeting was held with representatives of the FS on October 17, 1990, in Price. The purpose of that meeting was to discuss project-related issues that affect the Manti-La Sal National Forest.

At the suggestion of the UDWR, an interagency/interdisciplinary technicial team was formed to identify and address various environmental issues concerning development of the Narrows Project. The team included representatives from Reclamation, FWS, FS, COE, UDWR, Utah Division of Water Resources, and Utah Department of Transportation. Three sub-teams were also formed to address specific issues related to fisheries, vegetation and wildlife, and Cottonwood Canyon slope and stream channel stability. Over a period of 14 months, these teams met 19 times to consider environmental issues.

Review of Draft Environmental Impact Statement

The DEIS was released in February 1994. Approximately 200 copies were distributed for review to Federal, State, and local agencies and to water users organizations, conservation groups, educational institutions, news media, and individuals. Copies were also made available for public inspection at local libraries and college and university libraries. A partial distribution list is included in this statement. This list specifies agencies and organizations which received the draft statement and those who commented on it.

The review period began with publication of the notice of availability in the Federal Register of February 14, 1994. News releases announcing the hearings were provided to the local media on February 17. The review period officially ended

April 26, 1994. Written comments received after that date, however, have been accepted and considered in the preparation of this FEIS.

Formal public hearings were held March 30 and 31, 1994, to receive comments on the Draft Environmental Impact Statement. Notice of the hearings was made in the Federal Register of February 14, 1994. The hearings were held in the Carbon County Courthouse, Price, Utah, March 30 at 7 p.m.; and in the City Office, Mount Pleasant, Utah, March 31 at 7 p.m. The meetings adjourned at 9:15 p.m. and 8:30 p.m. respectively after all who wished had spoken. Mr. Scott Loveless, an attorney for the Department of the Interior, Salt Lake City, Utah, conducted the hearings. Ms. Jacqueline Murphy and Mr. Michael Stuver, Upper Colorado Region, Salt Lake City, Utah, and Messrs. Neil Nielson, David Peterson, Sanpete Water Conservancy District were present to officially represent Reclamation and the Project Sponsor, respectively, and to receive testimony.

A total of about 100 people attended the two hearings. Oral testimony was presented by 37 persons. Following is a list of those testifying, in the order which they appeared at each hearing.

March 30, 1994

Name	Representing
Senator Mike Dmitrich	Utah State Legislator
Representative Tom Matthews	Utah State Legislator
Commissioner Neil Breinholt	Carbon County Commission
John Serfustini	Carbon Water Committee
Richard Lee	Carbon Water Committee
Mayor Lou Colosimo	Price City
City Engineer Gary Sonntag	Price City
Jack Chiaretta	Carbon Canal Company
Robert Murdock	Carbon Water Committee
Tim Gwyther	Utah Power Plant, Helper, Utah
Lyle B. Bryner	Price River Distribution System
Commissioner Mike Milovich	Carbon County Commission
Mayor Paul Childs	Wellington City
Councilman Chuck Buchanan	Helper City
Lynna Topolovec	Citizen & Stowell Ditch Shareholder
Chief Kent Boyack	Prick City Fire Department
Philip Palmer	Price River Water Improvement District
Walt Borla	Carbon County Board of Education
Dale Mathis	Price-Wellington Control Board
Bill Howell	Southeastern Association of Governments
Randy Russell	Carbon County Future
Dave Lavanger	Businessman
Ron Cooper	Citizen
Fred Reimherr	Utah Trout Unlimited and the Federation of Fly Fishers

Councilman Lamont Williams	Price City and Price City Water Improvement District Board
Boyd Marsing	Rancher & Board Member, Price River Water Users Association

March 31, 1994

Name	Representing
Mayor Chesley Christensen	City of Mount Pleasant
Commissioner Keller Christenson	Sanpete County Commission
Jack Jensen	Citizen
John Mason	Citizen
Jack McAllister	Fairview Land and Livestock Company
Joseph Blain	Sanpete County Economic Development
Harris Cheney	Citizen
John Serfustini	Carbon Water Committee
Carly Burton	Utah Power & Light or Pacific Corp.
Glen Peel	Citizen
Lynn Brady	Farmer
Neil Breinholt	Carbon Water Committee, Utah Rural Economic Development Council, and Carbon County Commissioner

A verbatim transcript of each hearing was recorded by an official court reporter. Copies of the transcript can be purchased from the reporting service, Center Court Reporting, 40 South 100 West #203, Provo, Utah 84601. Copies are also available for public inspection at the location listed below:

Narrows Project Manager
Franson-Noble & Associates, Inc.
Consulting Engineers
6 South 100 West
American Fork, UT 84003

Summaries of concerns expressed orally at the hearings; comments received by Reclamation in letter form which were also read at the hearings; and written comments submitted by government entities, organizations, and individuals during the review period, all with Sponsor's responses follow. The EIS has been expanded and modified where appropriate to accommodate the input received in these comments.

Oral comments at the hearings centered on adequacy of alternatives; water rights and water use philosophy, including conservation; fish and wildlife issues; taking of private land for project purposes; geological concerns; and economic considerations. Since the same issues were raised in both oral and written comments (letters), the responses are presented only in the written comments section.

Written Comments and Responses

About 55 letters commenting on the DEIS have been received by Reclamation. Of those 55 letters, 10 were the prepared comments presented at the hearings. However, many who spoke based their comments on the written statements prepared by the Carbon Water Committee. The responses are grouped in five categories as follows: (1) Federal agencies, (2) State agencies, (3) local communities and private organizations and companies, (4) individuals, and (5) letters from the above listed categories not requiring a response. The original letters of comment are on file in the Upper Colorado Regional Office of the Bureau of Reclamation in Salt Lake City, Utah, and a copy of each, with responses to that letter, is included as Attachment G.

Distribution List

The names of those submitting written comments on the DEIS are preceded by an asterisk.

Distributed by the Deputy Commissioner's Office, Denver, Colorado, for review and comment.

Advisory Council on Historic Preservation
Department of Agriculture
  Forest Service
  National Environmental Coordinator, Environmental Activities Branch, Ecological Sciences Division
  National Environmental Coordinator, Soil Conservation Service,
Department of the Army
Department of Commerce
Department of Energy
Department of Health and Human Services
Department of Housing and Urban Development
Department of the Interior
  Bureau of Land Management
  Bureau of Indian Affairs
  Bureau of Mines
  Fish and Wildlife Service
  Geological Survey
  Office of Environmental Affairs
  National Park Service
  Natural Resources Library
*Department of Transportation
Environmental Protection Agency
Federal Energy Regulatory Commission
Federal Highway Administration
General Services Administration
House Postmaster
Interstate Commerce Commission
Office of Management and Budget

Senate Postmaster
American Fisheries Society
American Rivers
American Water Resources Association
Defenders of Wildlife
Ducks Unlimited, Inc.
Environmental Defense Fund, Inc.
The Fund for Animals, Inc.
National Audubon Society
National Water Resources Association
National Wildlife Federation
Natural Resources Defense Council, Inc.
The Nature Conservancy
Sierra Club
Trout Unlimited
The Wildlife Society

Distributed by the Deputy Commissioner's Office, Denver, Colorado, for information.

Senator Robert Bennett, U.S. Senate
Senator Orrin G. Hatch, U.S. Senate
Congressman Bill Orton, U.S. House of Representatives

Distributed by Upper Colorado Regional Office, Salt Lake City, Utah, for review and comment.

Federal

Department of Agriculture
*Forest Service, Manti-LaSal National Forest, Price and Uinta National Forest, Provo, Utah
*Soil Conservation Service, Salt Lake City and Richfield, Utah
Department of the Army
*Corps of Engineers, Sacramento, California; Bountiful, Utah
Department of Health and Human Services, Salt Lake City, Utah
Department of the Interior
*Bureau of Land Management, Salt Lake City, Utah
Bureau of Reclamation, Salt Lake City, Utah
*Fish and Wildlife Service, Salt Lake City, Utah
Geological Survey, Salt Lake City, Utah
Office of the Regional Solicitor, Salt Lake City, Utah
*Environmental Protection Agency, Denver, Colorado

Distributed by Upper Colorado Regional Office, Salt Lake City, Utah for review and comment

State

Governor, State of Utah, Salt Lake City, Utah
Lieutenant Governor, State of Utah, Salt Lake City, Utah
Attorney General, State of Utah, Salt Lake City, Utah
*Utah State Planning Coordinator, Salt Lake City, Utah
*Utah Department of Community & Economic Development, Salt Lake City, Utah
*Utah State Historical Society, Salt Lake City, Utah
*Utah Department of Transportation, Salt Lake City, Utah
Utah Department of Environmental Quality, Salt Lake City, Utah
*Utah Division of Water Quality, Salt Lake City, Utah
Utah Department of Natural Resources, Salt Lake City, Utah
*Utah Division of Parks and Recreation, Salt Lake City, Utah
*Utah Division of Wildlife Resources, Salt Lake City, Price and Springville, Utah
*Utah Division of Water Resources, Salt Lake City, Utah
*Utah Division of Water Rights, Salt Lake City and Price, Utah

Local Government Agencies

*Carbon County Commission, Price, Utah
*Sanpete County Commission, Manti, Utah
*Sanpete County Office of Economic Development, Manti, Utah
*Six County Association of Governments, Richfield, Utah
*Southeastern Utah Association of Governments, Price, Utah
Mayor Gary Anderson, Ephraim, Utah
Mayor Gerald K. Hansen, Fairview, Utah
Mayor Dean F. Hansen, Fountain Green, Utah
*Mayor Mike R. Dalpiaz, Helper, Utah
Mayor David Crosland, Moroni, Utah
*Mayor Chesley Christensen, Mt. Pleasant, Utah
*Mayor Lou Colosimo, Price, Utah
Mayor Robert Allred, Spring City, Utah
*Mayor Paul Childs, Wellington, Utah

Private Organizations and Interested Individuals

Birch Creek Irrigation Company, Fairview, Utah
Cottonwood Gooseberry Irrigation Company, Fairview, Utah
Carbon Water Conservancy District, Helper, Utah
*Price River Water Improvement District, Price, Utah
Price-Wellington Canal Company, Price, Utah
E. J. Skeen, Attorney, Price River Water Users Association, Salt Lake City, Utah
Fairview Lakes Association, Cleveland, Utah
Sanpete Water Conservancy District, Mt. Pleasant, Utah

Twin Creek Irrigation Company, Mt. Pleasant, Utah
Rock Dam Irrigation Company, Moroni, Utah
Carbon Emery Fish and Game Association, Price, Utah
Stonefly Society of the Wasatch, Salt Lake City and Kerns, Utah
Trout Unlimited, Salt Lake City, Utah; Wheatridge, Colorado
*Federation of Fly Fishers (Fishermen), Salt Lake City, Utah
Utah Chapter Sierra Club, Salt Lake City, Utah
Defenders of Our Utah Streams and Environment, Salt Lake City, Utah
Intermountain Water Alliance, Salt Lake City, Utah
League of Women Voters, Salt Lake City, Utah
Utah Audubon Society, Salt Lake City, Utah
Wasatch Mountain Club, Salt Lake City, Utah
Utah Wildlife Federation, Salt Lake City, Utah
Wilderness Society, Salt Lake City, Utah
Bill Lee, Lee's Red Angus, Fairview, Utah
*Richard Lee, Eli, Inc., Helper, Utah
Gregory B. Monson, Stoel Rives Boley Jones & Grey, Attorney, Utah Power & Light Company, Salt Lake City, Utah
Jack Barnett, Barnett Intermountain Water Consulting, Bountiful, Utah
Utah Fuel Company, Helper, Utah
J. Craig Smith, Wheately & Ranquist, Salt Lake City, Utah
George M. Haley, Haley & Stolebarger, Salt Lake City, Utah
Palisade State Park, Manti, Utah
Associated General Contractors, Salt Lake City, Utah
Leo L. Stewart, Mt. Pleasant, Utah
Lloyd F. Brady, Fairview, Utah
Jerry Nelson, Fairview, Utah
Bill Partner, Salt Lake City, Utah
Karen Hevel-Mingo, Salt Lake City, Utah
Glenn M. Davis, West Valley City, Utah
Lois Critchlow, Price, Utah
Jaylene Critchlow, Price, Utah
Ted Fitzgerald, Price, Utah
Lyle Bryner, Price, Utah
*Jack Chiaretta, Price, Utah
Stanley Cadez, Price, Utah
Allan F. Hansen, Fairview, Utah
Ralph B. Bench, Fairview, Utah
Lloyd Terry, Fairview, Utah
Chris Proctor, Salt Lake City, Utah
*Lynna Topolovec, Helper, Utah
*John E. Mason, San Francisco, California
John H. Cutler, San Francisco, California
Jon E. Burton, Salt Lake City, Utah
*David W. Levanger, Helper, Utah
*Jack McAllister, Mt. Pleasant, Utah
Cory Obert, Park City, Utah
Max E. Thomsen, West Valley City, Utah
*Doug DeVries, Bountiful, Utah

*Max G. Morgan, M.D., Price, Utah
Sharlene Lopes, Greystone, Englewood, Colorado
Vernon W. Jones, Price, Utah
Neil Breinholt, Price, Utah
Paul Burns, Price Utah
Jennifer Jones, FTRA, Arlington, Virginia
Carly Burton, Salt Lake City, Utah
Roger Rowley, Helper, Utah
Robert Davis, Price, Utah
Robert Radakovich, Price, Utah
Castle Valley Beef, Price, Utah
E. Odell Miner, Rocky Mountain Institute, Provo, Utah
Mark Brosseau, Tucson, Arizona
Gordon Elliott, Mount Pleasant, Utah
Ben Morin, Fairview, Utah
James E. Karkut, Parsons Behle & Latimer, Salt Lake City, Utah

Distributed by the Regional Director, Salt Lake City, Utah, for information.

Senator Robert Bennett, Salt Lake City, Utah
Senator Orrin G. Hatch, Salt Lake City, Utah
Congressman Bill Orton, Provo, Utah

State Legislators, Local

Senator Alarik Myrin, Altamont, Utah
*Senator Mike Dmitrich, Price, Utah
Senator Leonard M. Blackham, Moroni, Utah
Representative Michael R. Styler, Delta, Utah
*Representative Tom Mathews, Helper, Utah
Representative Bradley T. Johnson, Aurora, Utah

Libraries

College of Eastern Utah Library, Price, Utah
Ephraim Public Library, Ephraim, Utah
Gunnison Civic Library, Gunnison, Utah
Helper City Library, Helper, Utah
Manti City Library, Manti, Utah
Mt. Pleasant Library, Mt. Pleasant, Utah
Price City Library, Price, Utah
Snow College, Ephraim, Utah

Media

Deseret News, Salt Lake City, Utah
Mt. Pleasant Pyramid, Mt. Pleasant, Utah
The Daily Herald, Provo, Utah
The Sun Advocate, Price, Utah
Salt Lake Tribune, Salt Lake City, Utah
Manti Messenger, Manti, Utah
KMTI, Manti, Utah
KOAL, Carbonville, Utah
KRPX, Price, Utah
KUER (University of Utah), Salt Lake City, Utah

CHAPTER 5 - LIST OF PREPARERS

CHAPTER 5 - LIST OF PREPARERS

This EIS was prepared by Franson-Noble & Associates, Inc., for the Sponsor. The EIS was submitted under the guidelines of the Small Reclamation Projects Act, PL 84-984, to the United States Department of the Interior, Bureau of Reclamation. A list of persons who prepared various sections of the statement, significant background material, or participated to a significant degree in preparing the statement is provided in alphabetical order below.

Name	Qualifications	Participation
R. Scott Baddley	B.S., English; Writer-Editor, Franson-Noble & Associates, Inc., 1 year	DEIS writing/editing team
Fred R. Barnes	B.S., Civil Engineering; P.E., Senior Engineer, Franson-Noble & Associates, Inc., 3 years; Bureau of Reclamation, 30 years	Hydrology, hydraulics, and water quality
Quentin P. Bliss	M.S., Fishery Science; Fishery Biologist, Subconsultant/ Woodward-Clyde Consultants, 25 years	Fishery analysis
William S. Bliton	B.S., Geology; Geologist, Subconsultant/Woodward-Clyde Consultants, 28 years	Damsite analysis
Elwood H. Clark	B.S., Economics, Economist, Franson-Noble & Associates, Inc., years; Bureau of Reclamation, 30 years	Economic analysis
M. Gregory Cloward	M.S., Civil/Environmental Engineering, P.E.; Subconsultant/ Cloward, Madden and Associates, 30 years	Scofield Reservoir water quality impacts
Patrick D. Collins	Ph.D., Botany (Plant Ecology/ Taxonomy); Botanist, Subconsultant, Mt. Nebo Scientific, 16 years	Botanical resources data collection and analysis
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CHAPTER 6 - BIBLIOGRAPHY

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CHAPTER 7 - GLOSSARY OF TERMS

CHAPTER 7 - GLOSSARY OF TERMS

acre-foot	A measure of water volume -- 1 foot of water covering an acre in area.
activity occasion	Any activity by an individual at a recreation area for any length of time.
active storage	That portion of a reservoir capacity from which releases are made.
alluvium	A deposit of sand and gravel formed by flowing water.
animal unit month (AUM)	The amount of feed necessary to support one cow and her unweaned calf or five sheep for 1 month.
angler day	Any visit by an individual to a fishing area during any part or all of a 24-hour day.
autotrophic	Refers to organisms that are capable of producing organic substances from inorganic materials by means of energy received from outside the organism.
bedrock	The solid rock which underlies soil, sand, clay, or other loose surface material.
benthos	Organisms living in or on the bottom of a lake or stream.
biomass	The amount of living matter in the form of one or more kinds of organisms present in a particular habitat.
browse	Twigs, leaves, and young shoots of trees and shrubs on which animals feed; in particular, those shrubs which are utilized by big-game animals for food.
carrying capacity	The number of animals that can be maintained in a given habitat through the pinch-period--usually winter.
Celsius (centigrade)	°C = (°F-32)5/9.

coldwater fishery	Generally, water or a water system which has an environment suitable for salmonoid fishes such as trout.
cubic foot	A measure of a moving volume of water (ft^3/s) per second.
cultural resource	Any building, site, district, structure, or object significant in history, architecture, archeology, culture, or science.
dead storage	That portion of a reservoir capacity which constitutes the minimum pool. Because this portion of a reservoir is below the outlet works, it cannot be released. It is used for the benefit of recreation, fishery habitat, and silt deposition.
degradation	The geologic process wherein streambeds and flood plains are lowered in elevation by the removal of material. The opposite of aggradation.
ecosystem	A complex system composed of a community of fauna and flora taking into account the chemical and physical environment with which the system is interrelated.
endangered species	A species that is in danger of extinction throughout all or a significant portion of its range.
Fahrenheit	°F=(9/5 °C)+32.
fault	A break in the rocks in which there has been unequal movement of the two sides relative to each other.
fisherman day	An aggregate of 12 hours of fishing use by one or more individuals.
fish stream improvement	Improving a stream channel to make a new fish habitat or to enhance an existing habitat.
forbs	An herb other than grass.
fry	Fish between the egg and fingerling stage.

game fish	Those species of fish classified and managed by the State for sport fishing or angling.
gaging station	A location on a water channel where streamflows are recorded.
habitat evaluation procedure	"HEP" is a "species habitat" approach to impact assessment and habitat quality.
head	The difference in elevation between two bodies of water.
hectare	An area of land or water equal to 2.471 acres.
hunting day	A visit by an individual to an area for the purpose of hunting during any portion or all of a 24-hour day.
inactive storage	That portion of a reservoir's capacity which is neither dead storage nor active storage. It is normally not released because of the benefits to fish, recreation, and other uses, but can be since it is above the outlet works in the reservoir's profile.
irrigation water management	The art of timing and regulating irrigation water applications in a way that will satisfy the water requirement of the crop with minimum waste of water, soil, or plant nutrients.
invader plants	Species, often annuals, which are not part of the climax vegetation, that invade land when there is little or no competition from other plant species.
lateral	A small ditch used to deliver water from a canal to irrigation lands.
limnology	The scientific study of physical and chemical conditions in fresh waters.
macro-invertebrates	Animals lacking a backbone and internal skeleton, such as insects, worms, and crayfish.
mesophyte	A plant growing under medium condition of moisture.
metabolism	The sum total of the chemical transformations occurring in the body of a living organism.

minimum pool	The amount of inactive and dead storage in a reservoir.
mitigation	Actions to avoid, minimize, reduce, eliminate, or rectify the impact of a management practice.
National Register	The National Register of Historic Places is the federally maintained register of significant districts, sites, buildings, structures, architecture, archeology, and culture.
nongame fish	Those species of fish not classified as sport fish by the State.
periphyton	Organisms that live attached to underwater surfaces.
persons-at-one-time	A recreation capacity measurement term indicating the number of people who can use a facility or area at one time.
phreatophyte	A deep-rooted plant that grows in riparian zones and obtains water from the water table or the soil just above it.
phytoplankton	Passively floating plant life, primarily algae.
palustrine	Living or thriving in a marshy environment.
pipelines	A means of conveying water from a water source to a farm or group of farms. They are also used to convey water between fields or to sprinkler laterals.
reach	A finite length of a stream, river, or canal.
recruitment	The increase in population caused by natural reproduction or immigration.
recreation day	Twelve visitor hours, which may be aggregated continuously, intermittently, or simultaneously by one or more persons.
redd	The spawning ground or nest of various fishes.
riffle	A shallow water area across a stream bed causing broken water.

riparian (vegetation)	Living on the banks of a river or stream.
riprap	Stones placed on the face of a dam or on streambanks or other land surfaces to protect them from erosion.
salinity	A term referring to the quantity of dissolved mineral salts in solution.
salmonid	Of or related to the Salmonidae, the family of fishes including trout.
salt loading	Term used to express the amount of salt added to streams from any natural or manmade source.
sediment	Any usually finely divided organic and/or mineral matter deposited by water in nonturbulent areas.
seismicity	The phenomenon of earth movement which usually results in an earthquake.
sere	A series of ecological (vegetative) communities.
sheep month	Utilization of forage by one mature ewe with lamb at side for 1 month. A sheep month equals 1/5 animal unit month (AUM).
sprinkler irrigation	Application of water to the land surface by above ground sprinkler nozzles attached to either stationary, moving, or movable laterals.
supplemental service land	Irrigated land which receives project water in addition to a previous allotment from another source.
surface irrigation	Application of water to the land surface through the use of corrugations, furrows, graded borders, or level borders.
taxon (pl. taxa)	A group of genetically similar organisms.
thermal stratification	A temperature gradient within a body of water caused by warmer water occupying the upper level of the water and colder, denser water occupying the lower level.

threatened species	A species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.
trophic	Related to nutrition, particularly the types of food an organism requires.
trophic level	Place of an organism in the food chain.
trophy fish	In terms of trout, a fish that exceeds 14 inches.
visitor day	An aggregate of 12 hours of recreation use by one or more individuals.
water right	A legal permit issued by the State government which allows the holder to divert a specific amount of water for beneficial use.
weighted usable area	An expression of the quantity of fish habitat, in feet squared per 1,000 feet of river channel.
wetland	An area characterized by periodic inundation or saturation, hydric soils, and vegetation adapted for life in saturated soil conditions.
wildlife wetland habitat management	Retaining, creating, or managing wetland habitat for wildlife.
winter range (big game)	An area of land which has suitable vegetation and topographic conditions to support big game animals during the winter months when snow depth restricts use in other areas.

CHAPTER 8 - LIST OF ABBREVIATIONS AND ACRONYMS

CHAPTER 8 - LIST OF ABBREVIATIONS AND ACRONYMS

ASCS	Agriculture Stabilization and Conservation Service
ATV	all terrain vehicle
AUM	animal unit month
BLM	Bureau of Land Management
BMP	Best Management Practices
CEQ	Council on Environmental Quality
cfs	cubic feet per second
cm	centimeter
COE	U.S. Army Crops of Engineers
CMP	corrugated metal pipe
CRSS	Colorado River Simulation System
CUP	Central Utah Project
CUWCD	Central Utah Water Conservancy District
CWCD	Carbon Water Conservancy District
^{o}C	degrees Celsius (centigrade)
^{o}F	degrees Fahrenheit
DEIS	draft environmental impact statement
DEQ	Department of Environmental Quality
DO	dissolved oxygen
EA	environmental assessment
EIS	environmental impact statement
EPA	U.S. Environmental Protection Agency
FEIS	final environmental impact statement
FS	U.S. Forest Service
ft^3/s	cubic feet per second
FWPCA	Federal Water Pollution Control Act
FWS	U.S. Fish and Wildlife Service
gpm	gallons per minute
ha	hectare
HEP	Habitat Evaluation Procedures
HSI	Habitat Suitability Index
HU	habitat units
IFIM	instream flow incremental methodology
kg	kilogram
kg/ha	kilograms per hectare
km	kilometer
m	meter
MCE	maximum credible earthquake
mg	milligram
mg/L	milligram per liter
MOA	Memorandum of Agreement
N	sample size
NA	not applicable
NEPA	National Environmental Policy Act of 1969
N/ha	number per hectare
Nox	oxides of nitrogen

NPS	National Park Service
O&M	operation and maintenance
OSHA	Occupational Safety and Health Administration
PAOT	Persons At One Time
PHABSIM	Physical Habitat Simulation System
PRWUA	Price River Water Users Association
PVC	polyvinylchloride
R&B	rehabilitation and betterment
Reclamation	U.S. Bureau of Reclamation
RIP	Recovery Implementation Program
ROS	Recreation Opportunity Spectrum
ROW	right(s)-of-way
SCORP	State Comprehensive Outdoor Recreation Plan
SCS	Soil Conservation Service
SHPO	State Historic Preservation Officer
SO2	sulphur dioxide
SOx	oxides of sulfur
Sponsor	Sanpete Water Conservancy District
spp.	species (two or more)
sp.	species (one)
SR	State Route
SWCD	Sanpete Water Conservancy District
TDS	total dissolved solids
TSI	Trophic State Index
UDOT	Utah Department of Transportation
UDWR	Utah Division of Wildlife Resources
USDA	U.S. Department of Agriculture
USDI	U.S. Department of the Interior
USGS	U.S. Geological Survey
WUA	weighted usable area
YOY	young-of-the-year

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ATTACHMENT A - ENVIRONMENTAL COMMITMENT LIST

ATTACHMENT A

ENVIRONMENTAL COMMITMENT LIST

The following list summarizes major environmental commitments for the Narrows Project. These commitments would be included in construction contracts and other agreements to ensure their implementation. Mitigation measures would be concurrent with project construction. If environmental commitments are not kept, project funding would be withheld by Reclamation. Additionally, the 404 Permit issued by the COE could restrict filling of the reservoir if environmental commitments are not met.

1. Prior to initiation of final design and construction, detailed cultural resource surveys would be performed along the proposed alignments of the Upper Cottonwood Creek, Oak Creek, and East Bench Pipelines. If cultural resource sites are found, the pipelines would be re-routed where possible to avoid the impact. If the pipeline cannot be re-routed, appropriate mitigation would be developed through coordination with the SHPO.

2. Contractors would be required to cease work immediately if they should discover prehistoric, historical, or archeological evidence during construction. Work would not be resumed until such evidence is properly evaluated by qualified cultural resources specialists.

3. All construction activities would comply with applicable Federal and State laws, orders, and regulations relating to air and water quality. This would include obtaining proper permits, such as a 402 Storm Water Permit from the State of Utah, and complying with any limitations imposed by those permits. BMP's specified in the Nonpoint Source Water Pollution Control Plan for Hydrologic Modification in Utah would be implemented as a requirement of all construction contracts.

4. All construction contractors would be required to comply with Federal and State laws concerning the use of pesticides and hazardous wastes.

5. The asphalt road surface and road base would be removed from the reservoir basin.

6. All disturbed landscape would be rehabilitated immediately after project construction.

7. The Sponsor would have primary responsibility for implementation of all wildlife measures described in Chapter 2. The Sponsor would be responsible for funding and acquiring all

lands and easements. The Sponsor would provide seed to supplement the FS seed mixture for the watershed and range improvement project. The Sponsor would fund and construct all improvements such as fencing. This work would be performed concurrently with construction of other project facilities such as the dam, tunnel rehabilitation, and pipelines. All lands and rights-of-way would be acquired and initial construction of wildlife measures would be completed prior to initial filling of the reservoir. The Sponsor would also be responsible for funding the mitigation monitoring. The Sponsor would be responsible to enter into MOA's with the UDWR, FS, and other appropriate agencies for all wildlife measures. The MOA's would clearly define the roles and responsibilities of the Sponsor, the UDWR, the FS, and other parties for implementation and maintenance of the wildlife measures.

8. The Sponsor would have primary responsibility for implementation of the wetlands measures described in Chapter 2. The Sponsor would be responsible for funding and acquiring all lands and rights-of-way. The Sponsor would provide and transplant any plantings needed. The Sponsor would be responsible to ensure that all fences are in good repair and are maintained properly. The Sponsor would also be responsible to install and maintain any diversion and/or irrigation facilities. This work would be performed concurrently with construction of other project facilities such as the dam, tunnel rehabilitation, and pipelines. All lands and rights-of-way would be acquired and initial construction of wetlands measures would be completed prior to initial filling of the reservoir. The Sponsor would also be responsible to fund the monitoring of the wetland mitigation. The Sponsor would be responsible to enter into MOA's with the UDWR, COE, and other appropriate agencies for all wetlands measures. The MOA's would clearly define the roles and responsibilities of the Sponsor, the UDWR, the COE, and other parties for implementation and maintenance of the wildlife measures.

9. The Sponsor would have primary responsibility for implementation of all fishery measures described in Chapter 2. The Sponsor would be responsible for funding and acquiring all lands and rights-of-way. The Sponsor would fund and construct all improvements such as fencing and stream channel improvements. The Sponsor would provide water from its water rights or enter into operating agreements for all instream flows described in Chapter 2. This work would be performed concurrently with construction of other project facilities such as the dam, tunnel rehabilitation, and pipelines. All lands and rights-of-way would be acquired and initial construction of fishery measures would be completed prior to initial filling of the reservoir. The Sponsor

would be responsible to fund all operation and maintenance costs of mitigation facilities. The Sponsor would be responsible to enter into a MOA with the UDWR and other appropriate agencies for all fishery measures. The MOA would clearly define roles and responsibilities of the Sponsor, the UDWR, and other parties for implementation, monitoring, and maintenance of the fishery measures.

10. The Sponsor would comply with all existing policies and regulations requiring the preparation, submittal, and implementation of a water conservation plan.

11. The Sponsor has adopted a policy that would require all recipients to implement conservation practices in order to be eligible for project water.

The Sponsor has followed other mandates for environmental preservation, including those of Executive Order 11990, Protection of Wetlands; the 404 permitting process under the Clean Water Act; and Section 303 of that Act.

Executive Order 11990 - The Sponsor advocates the retention of wetlands and seeks to ensure that such lands are not irreversibly converted to other uses, unless other National interests override the importance of preservation or otherwise outweigh the environmental benefits derived from their protection.

The Sponsor routinely coordinated with the FWS, COE, and UDWR on issues concerning wetlands and emphasizes habitat replacement in-kind.

404 Permit Process, Clean Water Act - This report has been written with the intent of complying with the 404 b(1) guidelines and is intended to serve as the NEPA document for the 404 permit process. The Sponsor would make application to the COE for a dredge and fill permit under Section 404 of the Clean Water Act.

Section 303, Clean Water Act - The recommended plan for the Narrows Project would meet the objective of this Section, which directs the EPA to "develop comprehensive programs for preventing, reducing, or eliminating the pollution of navigable waters and ground waters."

The plan would meet antipollution requirements of the Clean Water Act, which defines "pollution" to mean the man-made or man-induced alteration of the chemical, physical, biological, and radiological integrity of water. The plan would reduce salt pollution by reducing salt-laden return flows, and would, accordingly, restore and maintain water quality as derived by EPA from the Act. The Clean Water Act's policies and regulations require that all existing instream beneficial uses be maintained and protected.

ATTACHMENT B - BIOLOGICAL OPINION

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Mountain-Prairie Region

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JAN 9 1995

Memorandum

To: Regional Director, Bureau of Reclamation, Upper Colorado Regional Office, Salt Lake City, Utah

From: Acting Regional Director, Region 6
U.S. Fish and Wildlife Service
Denver, Colorado

Subject: Final Amended Biological Opinion on the Proposed Narrows Project, Small Reclamation Project Act Loan

In accordance with section 7 of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq.) and the Interagency Cooperation regulations (50 CFR 402), this transmits the Fish and Wildlife Service's (Service) final biological opinion for impacts to federally listed endangered species for the Narrows Project. This opinion is provided to you as the lead Federal Agency regarding section 7 consultation on projects covered under this consultation. Copies of this opinion should be provided to the applicant because the Service has incorporated reasonable and prudent alternatives that should be included as conditions of any permits issued by the Bureau of Reclamation (Bureau) for this project.

Reference is made to your July 7, 1994, correspondence requesting reinitiation of formal section 7 consultation for the subject project. The Bureau requested reinitiation of consultation due to an increase in the estimated average annual water depletion for the proposed project and the fact that critical habitat was recently designated for the four endangered Colorado River fish species. The Service concurs that the average annual depletion of water from the Upper Colorado River Basin (Upper Basin) "may affect" the endangered Colorado squawfish (Ptychocheilus lucius), humpback chub (Gila cypha), bonytail (Gila elegans), and razorback sucker (Xyrauchen texanus) and "may affect" their critical habitat.

BIOLOGICAL OPINION

Based upon the best scientific and commercial information that is currently available, it is the Service's biological opinion that the proposed project as described below, is likely to jeopardize the continued existence of the Colorado squawfish, humpback chub, bonytail, and razorback sucker and result in the destruction or adverse modification of their critical habitat. The Service has developed reasonable and prudent alternatives to avoid the likelihood of jeopardy to the endangered fishes and to avoid destruction or adverse modification of their critical habitat.

PROJECT DESCRIPTION

The Narrows Project would develop supplemental irrigation water for currently irrigated lands in north Sanpete County, Utah. The 1992 biological opinion evaluated a proposed transbasin diversion of 5,400 acre-feet of water per year from the Price River drainage in the Colorado River Basin to the San Pitch River drainage in the Sevier River Basin. Recently, project sponsors have reevaluated the depletion and determined that it will be an average of 5,557 acre-feet per year. The project would involve construction of a dam on Gooseberry Creek, a tributary of the Price River, about 9 miles east of Fairview, Utah. Project sponsors are investigating two alternative dam configurations. While reservoir storage of the two dam configurations differs, both would entail the same average annual water depletion. Water stored in the reservoir would be released to north Sanpete County through the existing Narrows Tunnel, which would be rehabilitated for the project. The water would be conveyed by Cottonwood Creek to distribution pipelines at the mouth of Fairview Canyon and then distributed to individual fields.

Actual depletion will occur in Gooseberry and Fish Creeks, tributaries to the Price River. Depletions will occur year-round, but will be greatest during the high flow months of May and June. Fish Creek is impounded by Scofield Dam and actual depletion impacts to the Price and Green Rivers will be determined through alteration of releases from Scofield Reservoir. Since the Narrows Reservoir will capture runoff during spring high flows that would otherwise have gone to Scofield Reservoir, Scofield will spill less frequently and for shorter durations, lowering the volume of peak flows in the Price River below Scofield and in the Green River below the mouth of the Price (river mile 138). Figures from the project sponsor show that impacts will only be recognized during years when runoff is higher than normal and that the average base flow will be unchanged over the long term.

BASIS FOR BIOLOGICAL OPINION

This biological opinion addresses the average annual depletion of 5,557 acre-feet from the Upper Basin. The endangered Colorado squawfish, humpback chub, bonytail, and razorback sucker inhabit the Colorado River and the Green River from the confluence with the Colorado River upstream to near the Willow Creek confluence (Swallow Canyon). The main stem Green River and its tributary, the Yampa, contain the largest known riverine populations of Colorado squawfish and razorback sucker. Humpback chub have a limited, discontinuous distribution in canyon-bound habitats and persist in small numbers in Desolation and Whirlpool Canyons. The bonytail is extremely rare throughout the Upper Basin.

Water depletions in the Upper Basin have been recognized as a major source of impact to endangered fish species. Continued water withdrawal has restricted the ability of the Colorado River system to produce flow conditions required by various life stages of the fishes. Impoundments and diversions have reduced peak discharges by 48 percent since 1942, while increasing base flows by 21 percent in some reaches. These depletions along with a number of other factors have resulted in such drastic reductions in the populations of the Colorado squawfish, humpback chub, bonytail, and razorback sucker that the Service has listed these species as endangered and has implemented programs to prevent them from becoming extinct.

The importance of the Green River to rare and endangered fish was established by the "Recovery Implementation Program for Endangered Fish Species in the Upper Colorado River Basin" (Recovery Program) and recognized by many biologists as noted in the recovery plans for each of the species. The Green River and its tributaries were listed as the highest priority for recovery of the Colorado squawfish in the Colorado River Basin in the recently revised Colorado Squawfish Recovery Plan (U.S. Fish and Wildlife Service 1991). The Green River in Desolation and Gray Canyons and in Dinosaur National Monument (Dinosaur) is considered extremely important in the recovery of the humpback chub in the Humpback Chub Recovery Plan (U.S. Fish and Wildlife Service 1990a). The Bonytail Chub Recovery Plan (U.S. Fish and Wildlife Service 1990b) indicates that one of the last known riverine concentrations of bonytail was in the Green River within Dinosaur. In addition, the Green River supports the largest known population of razorback sucker in their natural riverine habitat (Lanigan and Tyus 1989).

The Recovery Program placed a high priority on habitat management in the Colorado, Green, and Yampa Rivers through protection of instream flows. Because of the importance of providing legal protection for instream flows, the Service considers, within the section 7 process, the legal protection of flows essential to offsetting project impacts.

Critical habitat has been designated for the Colorado squawfish, humpback chub, bonytail, and razorback sucker within the 100-year floodplain in portions of their historic range (59 F.R. 13374). Destruction or adverse modification of critical habitat is defined in 50 CFR 402.02 as a direct or indirect alteration that appreciably diminishes the value of critical habitat for both the survival and recovery of a listed species. In considering the biological basis for proposing critical habitat, the Service focused on the primary physical and biological elements that are essential to the conservation of the species without consideration of land or water ownership or management. The Service has identified water, physical habitat, and biological environment as the primary constituent elements. This includes a quantity of water of sufficient quality that is delivered to a specific location in accordance with a hydrologic regime that is required for the particular life stage for each species. Water depletions reduce the ability of the river system to provide the required water quantity and hydrologic regime necessary for recovery of the fishes. The physical habitat includes areas of the Colorado River system that are inhabited or potentially habitable for use in spawning and feeding, as a nursery, or serve as corridors between these areas. In addition, oxbows, backwaters, and other areas in the 100-year floodplain, when inundated, provide access to spawning, nursery, feeding, and rearing habitats.

Water depletions in the Upper Basin reduce the ability of the river to create and maintain these important habitats. Food supply, predation, and competition are important elements of the biological environment. Food supply is a function of nutrient supply and productivity, which could be limited by reduction of high spring flows brought about by water depletions. Predation and competition from nonnative fish species has been identified as a factor in the decline of the endangered fishes. Water depletions contribute to alterations in flow regimes that favor nonnative fishes. The Service

concludes that water depletions impact the primary constituent elements; however, reasonable and prudent alternatives have been developed by the Service that would avoid destruction or adverse modification to designated critical habitat.

BIOLOGICAL BACKGROUND

Colorado Squawfish

General Status

Historically, Colorado squawfish occurred in mainstream habitats of the Colorado River system. The species was found in the Colorado River from the Utah-Arizona border to the Sea of Cortez in Mexico, and the Salt and Gila Rivers of the Lower Colorado River Basin (Lower Basin). However, all Lower Basin populations are considered extirpated (Minckley 1973). In the Upper Basin, Colorado squawfish occurred in the Colorado, Green, Yampa, White, Dolores, Gunnison, San Juan, Uncompahgre, and Animas Rivers and in many smaller tributaries. Although still occurring in much of its former Upper Basin range, most areas contain only remnants of their former number, and few reproducing populations exist.

All life history phases of the Colorado squawfish are considered in this biological opinion and include migration, spawning, and larval recruitment to the adult life stage. These phases are closely related with specific flow events and habitat requirements. The recovery goals for Colorado squawfish established through the Recovery Program are to "maintain and protect self-sustaining populations and natural habitat."

Adults

Adult Colorado squawfish are widely distributed in the Yampa and Green Rivers, and the fish is considered more abundant in the Green River than any other location (Holden and Stalnaker 1975; Tyus et al. 1982a and 1982b; Behnke and Benson 1983; Tyus 1991a). In the mainstream Green River, adults are most prevalent in upper (i.e., near Ouray, Utah) and lower (i.e., near Labyrinth Canyon) sections (Tyus et al. 1987).

During the winter months, adult Colorado squawfish occupy a variety of low velocity habitats including slow runs, slackwaters, eddies, and backwaters (ephemeral along-shore embayments) (Valdez and Masslich 1989; Wick and Hawkins 1989). Colorado squawfish select certain river reaches in the Green and upper Yampa Rivers and generally remain active in these areas all winter (Valdez and Masslich 1989; Wick and Hawkins 1989). The fish presumably use ice as cover and some local movements are probably made to avoid floating ice jams (Valdez and Masslich 1989).

Flow fluctuations in the winter may affect fish use of preferred winter habitats. Movement patterns of radio-tagged fish suggested that such fluctuations result in greater movement of Colorado squawfish than in more stable conditions (Valdez and Masslich 1989; Wick and Hawkins 1989). Valdez and Masslich (1989) believed that a rapid change in river stage altered

locations of squawfish preferred microhabitats resulting in greater fish movement. Increased movement was hypothesized as resulting in increased energy expenditure and decreased body condition. Decreases in body condition during winter may affect ova development, number, and size.

In spring and early summer, adult Colorado squawfish are most often located in seasonally inundated shoreline habitats, including backwaters or bottomlands (Tyus 1990). Radio-tracking data indicated use of shoreline backwater habitat in the 1981 low-flow year and use of flooded bottomlands during the 1983 high-flow year (Tyus and Karp 1989). During the 2 high-flow years, 1983 and 1984, adult Colorado squawfish also used flooded shorelines (Tyus et al. 1987). From late April to May in 1985 and 1987, at flows of 8,000-10,000 cfs, they used the inundated portions of Old Charley Wash. Wick et al. (1983) noted during 1982 (an average-flow year) that adult Colorado squawfish used backwater and eddy habitats as runoff flows increased from early May through mid-June. In May, backwater habitat use occurred in backed-up tributary mouths and diked-off side channels. Adult squawfish moved to main channel habitats as the river level dropped.

Adult Colorado squawfish occupy a variety of habitats in mid-to-late summer but are most common in eddies, pools, runs, and shoreline backwaters over sand and silt substrates (Tyus et al. 1984 and 1987). Visual observations of fish in shallow water suggests that adults use sheltered microhabitats behind boulders, flooded vegetation, or other cover. During the summer, radio-tagged fish were most often located in deeper shoreline habitats where movements suggested heavy use of the eddy-run interface (Tyus et al. 1987).

Capture of introduced northern pike (Esox lucius) and channel catfish (Ictalurus punctatus) in habitats shared by adult Colorado squawfish (Wick et al. 1985; Tyus and Beard 1990) suggests a potential for competition and/or predation during times of resource limitation. Although Pimentel et al. (1985) found that Colorado squawfish did not prefer channel catfish as prey, observations of channel catfish lodged in throats of adult Colorado squawfish (McAda 1983; Pimentel et al. 1985; Wick et al. 1985) indicate that these introduced fish are eaten by Colorado squawfish, and some may cause mortality. However, little is known concerning conditions that either favor or impede nonnative fish. McAda and Kaeding (1989) found that during years of low annual runoff, numbers of nonnative fish increased; yet in years of moderately high runoff, their relative abundance decreased. Predacious fish of concern include channel catfish, northern pike, and walleye (Stizostedion vitreum).

Migration

The initiation of spawning migration is an important component of the reproductive cycle of the Colorado squawfish. Based on radio-tracking data (Wick et al. 1983; Tyus and McAda 1984; Tyus 1990), fish in the Green and Yampa Rivers initiated spawning migrations around the summer solstice; Green River fish initiated migrations about June 21 (range: May 23-July 22), and Yampa River fish migrated about June 15 (range: May 26-July 13). These movements included downstream migrations in the Yampa and White Rivers and upstream and downstream migrations in the Green River (Tyus et al. 1987; Tyus 1990).

Flows and water temperatures were highly variable during Colorado squawfish spawning migrations, and migrations were initiated earlier in low-water years (e.g., 1981) and later in higher water years (e.g., 1983). The earlier the spring peak flow occurred, the longer the interval before migration began (Tyus 1990). Initiation of spring migration occurred about 28 days after peak flow in the Yampa and Green Rivers (Tyus and Karp 1989). Migration was associated with water temperatures of at least 9 °C (average 14 °C).

Homing behavior in Colorado squawfish is suggested by long-distance movement patterns and repeated recaptures of the same fish on spawning grounds in subsequent years (Wick et al. 1983; Tyus 1985 and 1990). Fish use of more than one spawning area was not detected (Tyus 1990), supporting the idea of spawning fidelity in Colorado squawfish. Colorado squawfish spawning areas thus should be protected as unique habitats that are essential to the conservation of the species.

The migrations and homing behavior of Colorado squawfish mandate protection of known migration routes. Migrations of Colorado squawfish are vulnerable to stream blockage (Tyus 1984), as evidenced by the recent loss of 50 miles of occupied habitat in the White River due to blockage (Martinez 1986) at Kenny Reservoir. Lack of access to spawning grounds was implicated in the decline of Colorado squawfish (Joseph et al. 1977; Tyus 1984).

Spawning

Males generally mature at age 5 or 6 and females at age 6 or 7 (Hamman 1981; Vanicek and Kramer 1969; Seethaler et al. 1979). Most mature fish in the Green and Yampa Rivers migrate in spring to two locations identified as spawning areas. These include riffle and pool habitats in Yampa Canyon on the lower Yampa River and Gray Canyon on the Green River (Tyus and Karp 1989; Tyus 1990).

The annual spawning period (as indicated by the presence of migrating radio-tagged fish on spawning grounds, collections of ripe fish, or calculated dates of larval emergence in spawning reaches) lasts about 4 to 5 weeks. An optimum spawning period also was calculated by averaging the dates in which radio-tagged fish and ripe fish were present in the spawning reach and back-calculated dates of egg deposition. The length of the estimated optimal spawning period (about 26 days) was similar in both spawning areas for all years. Spawning generally occurred earlier in low-water years (1981, 1987, and 1988) and later in high-flow years (1983 and 1984). Discharge was variable between years during the optimum spawning period, but average temperatures ranged from about 22-25 °C (Tyus 1990). Others reported a peak in spawning after temperatures reach 20 °C (Haynes et al. 1984; Hamman 1982a; Holden and Stalnaker 1975; Tyus and McAda 1984). Spawning, both in the hatchery and in the wild, generally occurs from July-August but may extend into early August depending on flows and temperature.

Vanicek and Kramer (1969) first suggested that discharge and temperature influenced spawning in Colorado squawfish. Data from 1981 to 1988 indicated that spawning occurred during the period of declining flows following spring

peak runoff and increasing temperatures (Tyus 1990). This generally occurred about 26 days (range: 17-33 days) following migration. Peak discharge preceding spawn and mean minimum temperatures during spawn were highly correlated with the spawning period, ostensibly because discharge, temperature, and the spawning period are correlated. Spawning of Colorado squawfish is considered a result of complex environmental and biological influences and is not triggered by a single flow or temperature event (Tyus 1990). As an example, flow spikes from rainstorms during spring runoff also may influence ovulation and spawning in Colorado squawfish, as recently hypothesized by Nesler et al. (1988). Radio-tracking data suggest that all adult Colorado squawfish do not spawn each year, and male and female fish may require different stimuli for gonadal maturation (Tyus 1990), some of which appear to be flow related.

Breeding adults were most often concentrated in river reaches containing deep pools, eddies, and submerged cobble/boulder bars. Radio-tagged fish moved from pools or eddies to presumably spawn on bars and then returned to the former habitat (Tyus et al. 1987), behavior similar to that of spawning northern squawfish (Beamesderfer and Congleton 1981). Turbid riverine conditions precluded direct observations of egg deposition; yet, cobbles removed from the substrate during this time of year are clean of sediment and algae (Archer and Tyus 1984; U.S. Fish and Wildlife Service, unpublished data). There is substantial field and laboratory data showing that Colorado squawfish and other squawfish species require cleaned cobble surfaces for successful egg adhesion (Burns 1966; Patten and Rodman 1969; Hamman 1981). Hamman (1981) also noted hatching of Colorado squawfish larvae from cobble surfaces. The need for cleaned cobble and boulder substrates is supported by spawning of Colorado squawfish following peak flows and peak sediment transport (Tyus and Karp 1989). Spring scouring, a gradual decrease in summer flow, and a concomitant decrease in sediment load aid in preventing siltation of cobble bars. Thus, magnitude, timing, and duration of spring flows are considered potential limiting factors for successful reproduction by Colorado squawfish.

Temperature also affects egg development and hatching. In the laboratory, egg mortality was 100 percent in a controlled test at 13 °C. At 16-18 °C, development of the egg is slightly retarded, but hatching success and survival of larvae were higher. At 20-26 °C, development and survival through the larval stage were up to 59 percent (Hamman 1981).

Larvae and Postlarvae

Colorado squawfish eggs hatch in 4-5 days at 20-21 °C. Sac-fry emerge from cobble bars and drift downstream with declining flows (Tyus et al. 1982b and 1987; Haynes et al. 1985; Tyus 1987; Tyus and Haines 1991) to concentrate in shallow backwater habitats in the Green River. Newly emerged Colorado squawfish fry drift to the mouth of the Yampa River from the midpoint of the spawning grounds, river mile 16.5-18.2, in about 6 days after hatching (Tyus and Haines 1991). Nesler et al. (1988) also noted rapid downstream transport of larvae (3-15 days) following hatching. From 1979 to 1988, peaks in abundance of young Colorado squawfish occurred in the Green River about

100 miles downstream of the Yampa River spawning reach (Tyus et al. 1982b and 1987; Tyus and Haines 1991). Young fish presumably use river transport for dispersal from upstream spawning grounds to downstream nursery habitats (Tyus and McAda 1984; Tyus 1986; Nesler et al. 1988; Tyus and Haines 1991; Paulin et al. 1990). Gradually decreasing flows following spring runoff create productive nursery habitats which persist with summer-winter base flow conditions. Availability (quality and quantity) of these habitats in the Green River is considered essential for successful recruitment of the species.

Flow, river temperature, availability of backwater habitat, and predator abundance contribute to mortality of drifting larvae. Berry (1988) noted that larval Colorado squawfish acclimated to about 22 °C are adversely affected by cold water of 10 °C and 15 °C. Young Colorado squawfish are routinely collected in isolated pools in the Green River system (U.S. Fish and Wildlife Service, unpublished data). These pools form when decreasing flows strand bodies of water from the main channel. Natural fluctuations in river level are usually slow enough to make this a gradual process and thereby allow entrapped fish to escape. Abrupt fluctuations in river level, as is characteristic of the Green River and other regulated systems, could increase mortality of small fish by cutting off escape routes and thereby increasing potential for competitive interactions and exposure to terrestrial predation. Herons (Ardeidae), raccoons (Procyon lotor), garter snakes (Thamnophis spp.), and other animals were observed feeding on fish trapped in isolated pools (Erman and Leidy 1975; U.S. Fish and Wildlife Service, unpublished data).

Age-0 Colorado squawfish are most abundant in shoreline backwaters when water temperatures are the same or greater than the main river channel. Mark-recapture studies indicated a diel movement of postlarval (age-0 and age-1) fish between backwaters and the mainstream river in April, October, and November (Tyus 1991b).

Postlarval squawfish appear adaptable to changing conditions. During the winters of 1985-1986, 1987-1988, and 1988-1989, a significant overwintering mortality of age-0 Colorado squawfish was not detected (Tyus and Haines 1991). In addition, low flows in 1988 did not reduce standing crops (7.7 fish/100 m^2 seined) or growth of young Colorado squawfish. Total length of the fish in October 1988 (41.3 and 45.0 mm, upper and lower Green River, respectively) was similar to other years of best growth (Tyus and Haines 1991). Additionally, high spring catches of age-0 fish (6.5-28.9 fish/100 m^2 seined) showed good overwinter survival in some years. Laboratory studies (Thompson 1989) found that all age-0 Colorado squawfish survived simulated winter conditions when fed, and only smaller individuals with low lipid content died when starved 210 days at 3-4 °C. Thompson found that age-0 fish actively foraged in laboratory and field conditions, and it is assumed that healthy young survived the winters under 1985-1989 flow conditions (Tyus and Haines 1991).

Late summer and autumn are critical periods for growth and survival of young Colorado squawfish, and historical flows in the Green River system at this time are predictably low. Juvenile temperature tests showed that preferred temperatures ranged from 21.9-27.6 °C. The most preferred temperature for juveniles and adults was estimated at 24.6 °C. Temperatures near 24 °C also

are best for optimal development and growth of young (Miller et al. 1982b). Tyus et al. (1987) noted that abundance and growth of young Colorado squawfish in the Green River were negatively correlated with high, cooler late summer and autumn flows. During the late summer and autumn, catch and growth were highest in average flow years of 1979 and 1980 and lowest in abnormally high flow years of 1983 and 1984 (Tyus et al. 1987). In 1983 and 1984, unusually high releases from Flaming Gorge Dam in the late summer and autumn inundated backwater nursery areas, and survivorship of young Colorado squawfish was low. These relationships suggest that flows promoting growth and survival of small Colorado squawfish vary with time of year and that both reproduction and survival are highest in years when hydrographs more closely approximated natural flow conditions. This presumably relates to the availability of nursery backwater habitat in autumn (Tyus and Haines 1991).

A summer flow range of about 1,100-1,800 cfs maximized the number of backwaters in the upper Green River basin on aerial photography and videography (Pucherelli and Clark 1989). These authors also noted that flows above 1,800 cfs reduced numbers of backwaters at Island Park and Jensen during their study. High spring flows may be needed to maximize backwater formation, and gradually decreasing flows may be required to produce good nursery habitats (Pucherelli and Clark 1989).

Effects of competition and predation by introduced fish on growth and survival of young Colorado squawfish have yet to be adequately assessed, but the common use of backwater habitats and foods by young Colorado squawfish and small introduced fish species (e.g., channel catfish, green sunfish (Lepomis cyanellus), and red shiner (Notropis lutrensis) (Jacobi and Jacobi 1982; McAda and Tyus 1984; Muth, pers. comm.)) suggests a potential for negative interactions. Karp and Tyus (1990b) suggested that growth and survival of young Colorado squawfish may be adversely affected by the aggressive behavior of introduced green sunfish, red shiner, and fathead minnow (Pimephales promelas). This may be most acute when increases or decreases in river level reduces the availability of quality backwater habitat.

There is some indication that abundance of nonnative fish may be adversely affected by periods of high flow (Haynes et al. 1985; Minckley and Meffe 1987; T. Nesler, written communication). Still, the hypothesis that native Colorado River fish exhibit greater tolerance to extreme flooding was not adequately tested. In the Green River, abundance of Colorado squawfish and red shiner in backwaters was lowest in years of high summer flows (Haines and Tyus 1990).

Backwater nursery habitats were influenced by inundation and resuspension of organic material from shorelines during increased flows and ultimately influenced backwater nursery habitats. This energy source was important for standing crops of fish food organisms (Grabowski and Hiebert 1989). Backwaters in the Ouray area, where young Colorado squawfish were most abundant, were richer in food than upstream areas studied. Reduced water-level fluctuations in that area resulted in more stable backwater habitats and possibly reduced the export of nutrients and food (Grabowski and Hiebert 1989).

Juveniles

Colorado squawfish reach about 74 mm total length by age-2; their greatest growth occurs during their third and fourth years just prior to attaining maturity. Little is known about the habitat requirements of juveniles, but they were captured in a variety of shoreline habitats including backwaters and flooded bottomlands. Juvenile Colorado squawfish may be more numerous in the lower Green River (Tyus et al. 1987) because of the downstream drift of larvae. If so, a long-distance upstream movement by juveniles is needed to repopulate upstream areas. Because only large-sized fish are found in the upper Yampa River and the highest concentration of juveniles occur in the lower Green River, upstream movements probably occur during the late juvenile or early adult stages (Tyus 1986 and 1990; Tyus et al. 1987). These movements require unrestricted access, which is considered essential to the species.

Critical Habitat

Critical habitat has been designated within the 100-year floodplain of the Colorado squawfish's historical range in the following sections of the Upper Basin (59 F.R. 13374).

Colorado, Moffat County. The Yampa River and its 100-year floodplain from the State Highway 394 bridge in T. 6 N., R. 91 W., section 1 (6th Principal Meridian) to the confluence with the Green River in T. 7 N., R. 103 W., section 28 (6th Principal Meridian).

Utah, Uintah, Carbon, Grand, Emery, Wayne, and San Juan Counties; and Colorado, Moffat County. The Green River and its 100-year floodplain from the confluence with the Yampa River in T. 7 N., R. 103 W., section 28 (6th Principal Meridian) to the confluence with the Colorado River in T. 30 S., R. 19 E., section 7 (Salt Lake Meridian).

Colorado, Rio Blanco County; and Utah, Uintah County. The White River and its 100-year floodplain from Rio Blanco Lake Dam in T. 1 N., R. 96 W., section 6 (6th Principal Meridian) to the confluence with the Green River in T. 9 S., R. 20 E., section 4 (Salt Lake Meridian).

Colorado, Delta and Mesa Counties. The Gunnison River and its 100-year floodplain from the confluence with the Uncompahgre River in T. 15 S., R. 96 W., section 11 (6th Principal Meridian) to the confluence with the Colorado River in T. 1 S., R. 1 W., section 22 (Ute Meridian).

Colorado, Mesa and Garfield Counties; and Utah, Grand, San Juan, Wayne, and Garfield Counties. The Colorado River and its 100-year floodplain from the Colorado River Bridge at exit 90 north off Interstate 70 (river mile 238) in T. 6 S., R. 93 W., section 16 (6th Principal Meridian) to North Wash, including the Dirty Devil arm of Lake Powell up to the full pool elevation, in T. 33 S., R. 14 E., section 29 (Salt Lake Meridian).

New Mexico, San Juan County; and Utah, San Juan County. The San Juan River and its 100-year floodplain from the State Route 371 Bridge in T. 29 N., R. 13 W., section 17 (New Mexico Meridian) to Neskahai Canyon in the San Juan arm of Lake Powell in T. 41 S., R. 11 E., section 26 (Salt Lake Meridian) up to the full pool elevation.

Humpback Chub

General Status

Humpback chub originally inhabited the main stem Colorado River from what is now Lake Mead to the canyon areas of the Green and Yampa River Basins. They were considered less common than other endemic fish of the region but occur in fairly large numbers where reproducing populations exist. The greatest concentrations of humpback chub occur in the Grand Canyon portion of the Colorado and Little Colorado Rivers and Westwater/Blackrocks region of the Colorado River. Smaller populations and incidental catches are reported from the Yampa River; Desolation, Gray, and Whirlpool Canyons of the Green River; and Cataract Canyon of the Colorado River. The recovery goals for humpback chub established through the Recovery Program are to "maintain or establish and protect five self-sustaining populations, natural habitat, and two refugia."

Adults

Humpback chub occur in several canyon-bound sections of the Green River basin, including the lower portion of the Little Snake and Yampa Rivers and Whirlpool, Desolation, and Gray Canyons of the Green River (Holden 1978; Tyus et al. 1982a, 1982b, and 1987; Karp and Tyus 1990a; M. Moretti and E. Wick, pers. comm.). Surveys conducted prior to and after closure of Flaming Gorge Dam indicated that all three forms of Colorado River chubs were locally common in the Green River. This includes bonytail and roundtail chubs in the upper Green River above Ouray, Utah. Humpback chubs occurred in Desolation and Gray Canyons and in the Flaming Gorge basin of the upper Green River (Smith 1960; Holden 1978; Vanicek 1967; Seethaler et al. 1979). Although intensive netting and electrofishing efforts in the Green River mainstream by Service and Utah Division of Wildlife Resources biologists yielded over 500 chubs (Miller et al. 1982c; Tyus et al. 1987; M. Moretti, pers. comm.), status of humpback chub in that system is not well understood, due in part to confusion with specific identification of some fish (Tyus et al. 1987; Rosenfeld and Wilkinson 1989; M. Moretti, pers. comm.).

More intensive studies are needed to further evaluate the systematics of Colorado River chubs and to determine their habitat needs in the Green River basin. The morphological variation that occurs in some areas of sympatry may be induced by recent habitat change (Valdez and Clemmer 1982). If preferred spawning conditions and/or habitats are unavailable for one or more species, spawning might occur during other times and/or places that promote hybridization. Thus, the presence of intermediate forms in altered systems (e.g., Green River and Colorado River) and the paucity of such forms in some unaltered rivers (e.g., Yampa River and Little Colorado River) suggest that natural riverine environments are important for recovery of the humpback chub.

The following paragraphs summarize information on habitat use of humpback chub in Dinosaur, particularly Yampa Canyon (Tyus and Minckley 1988; Tyus and Karp 1989; Karp and Tyus 1990a) because little of this information is available for the mainstream Green River Basin.

During spring and early summer, humpback chub in the Green River Basin are most prevalent in high-gradient, whitewater reaches dominated by rocky runs, riffles, and rapids. Adult fish are most often collected in seasonally flooded shoreline eddies that are downstream of large boulders and upstream of rapids. Juveniles appear more common in smaller eddies in rocky shoreline runs. Humpback chub remain rare in Dinosaur, and only 133 juvenile and adult fish were captured during spring sampling efforts from 1986-1989 (Karp and Tyus 1990a). Feeding habits of humpback chub are relatively unknown in the Green River basin, but stomachs of a few fish contained hymenopterans and plant debris. Humpback chub also feed on Mormon crickets and presumably other foods at various levels within the water column (Karp and Tyus 1990a).

Although fall and winter habitat requirements of humpback chub are not well known, some observations in Dinosaur suggest that the fish remain in pools and eddies of impounded water and rapids in low flow conditions (Karp and Tyus 1990a). Minimum flows are thus required to maintain such habitats from midsummer through late winter, but specific flow levels for the Green River are not determined.

Spawning

Humpback chub generally spawn between temperatures of 16-20 °C but may also spawn in temperatures as low as 11.5 °C (Valdez and Clemmer 1982) and as high as 20.5 °C (Kaeding and Zimmerman 1983). Eggs are adhesive, but little is known about preferred substrate for egg deposition. Hatchery success diminishes as temperatures vary from their optimum of 20 °C (Hamman 1982a; Marsh 1985). The eggs generally hatch in 5-7 days at 19-20 °C (Hamman 1982a).

In Dinosaur, humpback chub spawn in spring and early summer following highest spring flows at river temperatures about 20 °C (Karp and Tyus 1990a). This included May and June in low (e.g., 1987 and 1989) and average (e.g., 1988) flow years, but extended into July during the 1986 high-flow year. Ripe fish are predominantly captured in shoreline eddy habitats in the upper 30 miles of the Yampa Canyon, and there is some indication that these fish remain in or near specific eddies for extended periods and return to the same eddy during the spawning season in different years (Karp and Tyus 1990a). It is unknown where humpback chubs deposit eggs, but the use of shoreline eddies that are associated with boulder/sand substrates is considered important to the breeding requirements of humpback chub in Dinosaur. Availability of shoreline eddy habitat is greatest with spring flooding and decreases thereafter with decreasing summer flows; these habitats are formed and maintained by spring runoff. Loss or reduction of spring runoff could reduce availability of spawning habitat and consequently adversely affect humpback chub reproduction. Habitat alternation also may promote hybridization with other species (Valdez and Clemmer 1982). Flow reductions (absence of spring peak) and decreased temperatures were implicated as factors curtailing successful spawn and increasing competition in the Colorado River (Kaeding and Zimmerman 1983).

Larval and Juvenile

Larval and young-of-year humpback chub are generally found in low velocity microhabitats associated with backwaters and eddies. Fish grow from 7.5-10.5 cm during their first year of life, and by age-2 many are 200 mm (8 inches). Males begin reaching sexual maturity at age-2 and females at age-3. Once humpback chubs reach sexual maturity, growth slows considerably.

Critical Habitat

Critical habitat has been designated within the humpback chub's historical range in the following sections of the Upper Basin (59 F.R. 13374).

Colorado, Moffat County. The Yampa River from the boundary of Dinosaur National Monument in T. 6 N., R. 99 W., section 27 (6th Principal Meridian) to the confluence with the Green River in T. 7 N., R. 103 W., section 28 (6th Principal Meridian).

Utah, Uintah County; and Colorado, Moffat County. The Green River from the confluence with the Yampa River in T. 7 N., R. 103 W., section 28 (6th Principal Meridian) to the southern boundary of Dinosaur National Monument in T. 6 N., R. 24 E., section 30 (Salt Lake Meridian).

Utah, Uintah and Grand Counties. The Green River (Desolation and Gray Canyons) from Sumners Amphitheater in T. 12 S., R. 18 E., section 5 (Salt Lake Meridian) to Swasey's Rapid in T. 20 S., R. 16 E., section 3 (Salt Lake Meridian).

Utah, Grand County; and Colorado, Mesa County. The Colorado River from Black Rocks in T. 10 S., R. 104 W., section 25 (6th Principal Meridian) to Fish Ford (river mile 106) in T. 21 S., R. 24 E., section 35 (Salt Lake Meridian).

Utah, Garfield and San Juan Counties. The Colorado River from Brown Betty Rapid in T. 30 S., R. 18 E., section 34 (Salt Lake Meridian) to Imperial Canyon in T. 31 S., R. 17 E., section 28 (Salt Lake Meridian).

Bonytail

Status and Distribution

Historically, the bonytail occurred throughout the Colorado River main stem and its major tributaries, including the Gila and Salt Rivers in the Lower Basin and the Green, Yampa, White, Gunnison, and San Juan Rivers in the Upper Basin. Recent collections indicate the fish is extremely rare and is extirpated from much of its former range, although individual fish are still occasionally collected from the Upper and Lower Basins. Supplemental stocking from hatchery fish and maintaining stocks in hatcheries may be necessary to preclude this species from becoming extinct. The recovery goal for bonytail (U.S. Fish and Wildlife Service 1990b) is to "prevent immediate extinction."

Adults

Habitat requirements of the bonytail in the Green River Basin are little known. Fish collections in Echo Park (Dinosaur) before and after closure of Flaming Gorge Dam indicated that the species was present in moderate numbers at the confluence of Yampa and Green Rivers (Vanicek 1967). But, more recent investigations in that area yielded few captures. Holden and Stalnaker (1975) reported the capture of 36 bonytails in the Yampa (lower 10 miles) and upper Green Rivers from 1968 to 1970. Holden and Crist (1981) collected one bonytail in the lower Yampa River in 1979, and Service biologists captured one suspected juvenile in 1987. Preliminary results of a radio-tracking study of adult bonytail introduced into the upper Green River in 1988 and 1989 indicate that the fish exhibit crepuscular movements and are somewhat quiescent during the day and night (S. Cranney, Utah Division of Wildlife Resources, pers. comm.).

Spawning

Bonytail spawning locations are unknown. Vanicek and Kramer (1969) believed spawning occurred in the Green River between mid-June and early July when water temperatures were near 18 °C. Similar to humpback chub, the optimum temperature for hatching success was reported at 20-21 °C (Hamman 1982b and 1985). Hatching success decreased considerably when temperatures varied ±10 °C. When temperatures are near optimum (20-21 °C) hatching occurs in 4-7 days (Hamman 1982b).

Larval and Juvenile

Little data exist on larval and juvenile bonytail in the wild because of their extreme rarity. Vanicek and Kramer (1969) reported mean total lengths of 55, 100, and 158 mm for age-1 through age-3 bonytail from the Green River. Still, like most larval fish, it is presumed that their survival and growth are dependent on low velocity habitats.

Bonytail drastically declined in the Echo Park area, presumably due to flow and temperature changes resulting from closure of Flaming Gorge Dam. A similar pattern was noted in the Colorado River downstream from Glen Canyon Dam (Utah State Department of Fish and Game 1964 and 1969). Although the preimpoundment poisoning of riverine habitat in the upper Green River in 1962 contributed to the decline of the bonytail in that system, fish collections in Dinosaur before and after the poisoning (Binns et al. 1963; Vanicek and Kramer 1969; Vanicek et al. 1970) suggested that the downstream extent of the poison was not the only factor in the dramatic decline of the species from the Echo Park area. Decreased temperatures and changing flow patterns caused by the construction and operation of Flaming Gorge Dam permanently altered the physical environment, and bonytail habitats may have been lost. Thus, Flaming Gorge Dam operations also could affect the future of bonytail reintroductions and recovery efforts in the Green River system.

Critical Habitat

Critical habitat has been designated within the bonytail's historical range in the following sections of the Upper Basin (59 F.R. 13374).

Colorado, Moffat County. The Yampa River from the boundary of Dinosaur National Monument in T. 6 N., R. 99 W., section 27 (6th Principal Meridian) to the confluence with the Green River in T. 7 N., R. 103 W., section 28 (6th Principal Meridian).

Utah, Uintah County; and Colorado, Moffat County. The Green River from the confluence with the Yampa River in T. 7 N., R. 103 W., section 28 (6th Principal Meridian) to the boundary of Dinosaur National Monument in T. 6 N., R. 24 E., section 30 (Salt Lake Meridian).

Utah, Uintah and Grand Counties. The Green River (Desolation and Gray Canyons) from Sumner's Amphitheater in T. 12 S., R. 18 E., section 5 (Salt Lake Meridian) to Swasey's Rapid in T. 20 S., R. 16 E., section 3 (Salt Lake Meridian).

Utah, Grand County; and Colorado, Mesa County. The Colorado River from Black Rocks in T. 10 S., R. 104 W., section 25 (6th Principal Meridian) to Fish Ford in T. 21 S., R. 24 E., section 35 (Salt Lake Meridian).

Utah, Garfield and San Juan Counties. The Colorado River from Brown Betty Rapid in T. 30 S., R. 18 E., section 34 (Salt Lake Meridian) to Imperial Canyon in T. 31 S., R. 17 E., section 28 (Salt Lake Meridian).

Razorback Sucker

General Status

Historically, razorback suckers were abundant throughout the Colorado River Basin, primarily in the main stem and the major tributaries from Wyoming to Mexico. At present, the largest concentrations occur in the Green River in the Upper Basin and Lake Mohave in the Lower Basin. Fish in reproductive condition also were captured in the Yampa, Colorado, and San Juan Rivers, which suggests the importance of these river systems. Although reproduction in the wild was documented, larvae were seldom captured and may not survive past 20 mm in size. The lack of recruitment places this species in a precarious situation. Because of its recent listing, there is no formal recovery goal for the razorback sucker. However, the immediate goal is to prevent their extinction in the wild.

Adults

In the Upper Basin, adult razorback suckers were captured predominantly from the upper Green River (mile 176-345) and in the lower 13 miles of the Yampa River (Azevedo 1962; Vanicek et al. 1970; Holden and Stalnaker 1975; Seethaler et al. 1979; McAda and Wydoski 1980; Miller et al. 1982a; Tyus et al. 1982b; Tyus 1987; Tyus and Karp 1990). Catch-effort estimates suggest that adult razorback suckers are rarer than other native suckers and the endangered Colorado squawfish.

Radio-tagged razorback suckers overwintered in the Jensen, Island Park, and Echo Park reaches of the Green River (McAda and Wydoski 1980; Valdez and Masslich 1989). In winter, razorback suckers used slow runs, slackwaters, eddies, and backwaters in the Green River, where local movements increased with flow fluctuation (Valdez and Masslich 1989).

Razorback suckers in breeding condition were captured primarily on several cobble/gravel/sand bars in the lower Yampa and upper Green Rivers (including Echo Park and the reach from Ashley Creek to near the lower boundary of Dinosaur) but also were collected in flooded shorelines, bottomlands, and tributary mouths (including Old Charley Wash, lower Ashley Creek and Duchesne River, and Stewart Lake Drain (Tyus and Karp 1990)). From 1987 to 1989 (low and moderate water years), most ripe fish (98 percent) were collected in riffle areas, but during the high water of 1986, 30 percent of all ripe or tuberculate razorback suckers were captured in flooded river bottoms of Old Charley Wash and Stewart Lake Drain. Twelve ripe adults were observed in Old Charley Wash in late May-early June 1986 at flows of about 19,000-20,000 cfs (Tyus and Karp 1990).

Migration

Razorback suckers exhibited both local and long-distance spring and summer movements (Tyus 1987; Tyus and Karp 1990). Two spawning migrations were detected with fish movement between lower Yampa and upper Green Rivers and movement between upper Green River and Ouray area (Old Charley Wash and lower Duchesne River (Tyus and Karp 1990)).

Spawning

Spawning of razorback suckers occurred during ascending and highest spring peak flows, as indicated by capture of ripe fish (Tyus and Karp 1989 and 1990). Ripe fish were captured in main channel habitats at water temperatures of about 14-15 °C (Tyus 1987; Tyus and Karp 1990). However, temperatures averaged 19.6 °C (range 17.5-21 °C) in flooded areas (Old Charley Wash and Stewart Lake Drain) in spring 1986 when ripe razorback suckers were present. Main channel temperatures were colder (mean 15.6 °C, range 15-16.5 °C) at this time, which suggests that razorback suckers may seek warmer habitats in the spring. Bulkley and Pimentel (1983) reported that razorback suckers preferred temperatures of about 22-25 °C and avoided temperatures of 8-15 °C. Razorback sucker eggs taken in the Green River experienced poor hatching at 11 °C due to fungus, but hatching was successful (80 percent or more) when incubated at 20 °C (U.S. Fish and Wildlife Service, unpublished data). Marsh (1985) noted optimal hatch in razorback sucker larvae incubated at 20 °C, but historic water temperatures in the upper Green River at Jensen did not average 20 °C until June-July (Smith and Green 1991). Thus, required spawning and incubation temperatures of razorback sucker are not well understood and continue to be studied.

Larval and Juvenile

The capture and artificial spawning of ripe razorback suckers in the lower Yampa and upper Green Rivers (Severson et al. 1990) and the tentative identification of larvae in upper Green River seine collections (R.T. Muth and D. Snyder, pers. comm.) suggest that razorback suckers reproduce successfully, but there is little recruitment there or elsewhere in the Colorado River Basin (Holden 1978; McAda and Wydoski 1980; Minckley 1983; Tyus 1987; Marsh and Minckley 1989; Tyus and Karp 1990). The existing standing crops of razorback sucker in the Green River are presumably old fish (Tyus, pers. comm.) that were spawned in the mid-1960's.

The apparent lack of widespread recruitment in the razorback sucker was attributed to habitat alteration, such as lower water temperatures (Marsh 1985) and predation by introduced common carp (Cyprinus carpio), green sunfish, channel catfish, flathead catfish (Pylodictus olivaris), and other nonnative fish (Minckley 1983; Brooks et al. 1985; Tyus 1987; Marsh and Langhorst 1988; Marsh and Minckley 1989). Predation by nonnative fish is believed to be a serious threat to the survival and recovery efforts of the razorback sucker. The absence of young fish in the Green River basin population also may be linked with the reduced availability of inundated shorelines due to curtailment of spring flooding. Naturally inundated lowlands, such as Old Charley Wash and the Stewart Lake area, that were readily accessible to razorback suckers in the spring are now less accessible due to blockage and low water levels following closure of Flaming Gorge Dam.

Habitat requirements of this species in riverine environments are not well known because of the scarcity of extant populations (Minckley 1983; Lanigan and Tyus 1989) and the absence of younger life history stages (McCarthy and Minckley 1987; Tyus 1987). Adult razorback suckers in the Green River basin are old individuals (Tyus 1987), and the low number of reproducing razorback suckers is considered limiting (Lanigan and Tyus 1989; Tyus and Karp 1990). Nonnative fish, high spring flows, warming river temperatures, and inundated shorelines and bottomlands all appear as factors that influence successful reproduction and recruitment in the razorback sucker.

Critical Habitat

Critical habitat has been designated within the 100-year floodplain of the razorback sucker's historical range in the following sections of the Upper Basin (59 F.R. 13374).

> Colorado, Moffat County. The Yampa River and its 100-year floodplain from the mouth of Cross Mountain Canyon in T. 6 N., R. 98 W., section 23 (6th Principal Meridian) to the confluence with the Green River in T. 7 N., R. 103 W., section 28 (6th Principal Meridian).
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> Utah, Uintah County; and Colorado, Moffat County. The Green River and its 100-year floodplain from the confluence with the Yampa River in T. 7 N., R. 103 W., section 28 (6th Principal Meridian) to Sand Wash at river mile 96 in T. 11 S., R. 18 E., section 20 (6th Principal Meridian).

Utah, Uintah, Carbon, Grand, Emery, Wayne, and San Juan Counties. The Green River and its 100-year floodplain from Sand Wash at river mile 96 at T. 11 S., R. 18 E., section 20 (6th Principal Meridian) to the confluence with the Colorado River in T. 30 S., R. 19 E., section 7 (6th Principal Meridian).

Utah, Uintah County. The White River and its 100-year floodplain from the boundary of the Uintah and Ouray Indian Reservation at river mile 18 in T. 9 S., R. 22 E., section 21 (Salt Lake Meridian) to the confluence with the Green River in T. 9 S., R 20 E., section 4 (Salt Lake Meridian).

Utah, Uintah County. The Duchesne River and its 100-year floodplain from river mile 2.5 in T. 4 S., R. 3 E., section 30 (Salt Lake Meridian) to the confluence with the Green River in T. 5 S., R. 3 E., section 5 (Uintah Meridian).

Colorado, Delta and Mesa Counties. The Gunnison River and its 100-year floodplain from the confluence with the Uncompahgre River in T. 15 S., R. 96 W., section 11 (6th Principal Meridian) to Redlands Diversion Dam in T. 1 S., R. 1 W., section 27 (Ute Meridian).

Colorado, Mesa and Garfield Counties. The Colorado River and its 100-year floodplain from Colorado River Bridge at exit 90 north off Interstate 70 in T. 6 S., R. 93 W., section 16 (6th Principal Meridian) to Westwater Canyon in T. 20 S., R. 25 E., section 12 (Salt Lake Meridian) including the Gunnison River and its 100-year floodplain from the Redlands Diversion Dam in T. 1 S., R. 1 W., section 27 (Ute Meridian) to the confluence with the Colorado River in T. 1 S., R. 1 W., section 22 (Ute Meridian).

Utah, Grand, San Juan, Wayne, and Garfield Counties. The Colorado River and its 100-year floodplain from Westwater Canyon in T. 20 S., R. 25 E., section 12 (Salt Lake Meridian) to full pool elevation, upstream of North Wash, and including the Dirty Devil arm of Lake Powell in T. 33 S., R. 14 E., section 29 (Salt Lake Meridian).

New Mexico, San Juan County; and Utah, San Juan County. The San Juan River and its 100-year floodplain from the Hogback Diversion in T. 29 N., R. 16 W., section 9 (New Mexico Meridian) to the full pool elevation at the mouth of Neskahai Canyon on the San Juan arm of Lake Powell in T. 41 S., R. 11 E., section 26 (Salt Lake Meridian).

REASONABLE AND PRUDENT ALTERNATIVES

On January 21-22, 1988, the Secretary of the Interior; the Governors of Wyoming, Colorado, and Utah; and the Administrator of the Western Area Power Administration were cosigners of a Cooperative Agreement to implement the Recovery Program (U.S. Fish and Wildlife Service 1987). An objective of the Recovery Program was to identify reasonable and prudent alternatives that would ensure the survival and recovery of the listed species while providing for new water development in the Upper Basin.

The following excerpts are pertinent to the consultation because they summarize portions of the Recovery Program that address depletion impacts, section 7 consultation, and project proponent responsibilities:

> "All future Section 7 consultations completed after approval and implementation of this program (establishment of the Implementation Committee, provision of congressional funding, and initiation of the elements) will result in a one-time contribution to be paid to the Service by water project proponents in the amount of $10.00 per acre-foot based on the average annual depletion of the project . . . . This figure will be adjusted annually for inflation [the current figure is $12.71 per acre-foot] . . . . Concurrently with the completion of the Federal action which initiated the consultation, e.g., . . . issuance of a 404 permit, 10 percent of the total contribution will be provided. The balance . . . will be . . . due at the time the construction commences . . . ."

It is important to note that these provisions of the Recovery Program were based on appropriate legal protection of the instream flow needs of the endangered Colorado River fishes. The Recovery Program further states:

> ". . . it is necessary to protect and manage sufficient habitat to support self-sustaining populations of these species. One way to accomplish this is to provide long term protection of the habitat by acquiring or appropriating water rights to ensure instream flows . . . . Since this program sets in place a mechanism and a commitment to assure that the instream flows are protected under State law, the Service will consider these elements under Section 7 consultation as offsetting project depletion impacts."

Thus, the Service has determined that project depletion impacts, which the Service has consistently maintained are likely to jeopardize the listed fishes, can be offset by (a) the water project proponent's one-time contribution to the Recovery Program in the amount of $12.71 per acre-foot of the project's average annual depletion, (b) appropriate legal protection of instream flows pursuant to State law, and (c) accomplishment of activities necessary to recover the endangered fishes as specified under the Recovery Implementation Program Recovery Action Plan (Plan). The Service believes it is essential that protection of instream flows proceed expeditiously, before significant additional water depletions occur.

With respect to (a) above (i.e., depletion charge), the applicant will make a one-time payment which has been calculated by multiplying the project's average annual depletion (5,557 acre-feet) by the depletion charge in effect at the time payment is made. For Fiscal Year 1995 (October 1, 1994, to September 30, 1995), the depletion charge is $12.71 per acre-foot for the average annual depletion which equals a total payment of $70,629.47 for this project. The depletion charge will be adjusted annually for inflation on October 1 of each year based on the previous year's Composite Consumer Price Index. The Service will notify the applicant of any change in the depletion

charge by September 1 of each year. Ten percent of the total contribution ($7,063), or total payment, will be provided to the Service's designated agent, the National Fish and Wildlife Foundation (Foundation), at the time of issuance of the Federal approvals from the Bureau. The balance will be due at the time the construction commences. The payment will be included by the Bureau as a permit stipulation. Fifty percent of the funds will be used for acquisition of water rights to meet the instream flow needs of the endangered fishes (unless otherwise recommended by the Implementation Committee); the balance will be used to support other recovery activities for the Colorado River endangered fishes. All payments should be made to the Foundation.

National Fish and Wildlife Foundation
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In a letter dated December 14, 1994, the Sanpete Water Conservancy District agreed to this payment (Appendix A).

Each payment is to be accompanied by a cover letter that identifies the project and biological opinion that requires the payment, the amount of payment enclosed, check number, and any special conditions identified in the biological opinion relative to disbursement or use of the funds (there are none in this instance). The cover letter also shall identify the name and address of the payor, the name and address of the Federal Agency responsible for authorizing the project, and the address of the Service office issuing the biological opinion. This information will be used by the Foundation to notify the payor, the lead Federal Agency, and the Service that payment has been received. The Foundation is to send notices of receipt to these entities within 5 working days of its receipt of payment.

In order to further define and clarify processes outlined in sections 4.1.5, 4.1.6, and 5.3.4 of the Recovery Program, an additional section 7 agreement and the Plan addressing section 7 consultation on depletion impacts was developed (U.S. Fish and Wildlife Service 1993). The section 7 agreement establishes a framework for conducting all future section 7 consultations on depletion impacts related to new projects and those associated with historic projects in the Upper Basin. Procedures outlined in the section 7 agreement will be used in conjunction with the Plan to determine if sufficient progress is being accomplished in the recovery of the endangered fishes to enable the Recovery Program to serve as a reasonable and prudent alternative to avoid jeopardy. The Plan was finalized on October 15, 1993, and will be reviewed annually.

In accordance with the agreement, the Service has agreed to assess impacts of projects that require section 7 consultation and determine if progress toward recovery has been sufficient for the Recovery Program to serve as a reasonable and prudent alternative. If sufficient progress is being achieved, biological opinions will be written to identify activities and accomplishments of the Recovery Program that support it as a reasonable and prudent alternative. If sufficient progress in the recovery of the endangered fishes has not been achieved by the Recovery Program, actions from the Plan will be identified

which must be completed to avoid jeopardy to the endangered fishes. For historic projects, these actions will serve as the reasonable and prudent alternative as long as they are completed according to the schedule identified in the Plan. For new projects, these actions will serve as the reasonable and prudent alternative so long as they are completed before the impact of the project occurs. The Narrows Project is considered a new project.

The evaluation by the Service to determine if sufficient progress has been achieved considered (a) actions which result in a measurable population response, a measurable improvement in habitat for the fishes, legal protection of flows needed for recovery, or a reduction in the threat of immediate extinction; (b) status of fish populations; (c) adequacy of flows; and (d) magnitude of the project impact. In addition, the Service considered support activities (funding, research, information and education, etc.) of the Recovery Program if they help achieve a measurable population response, a measurable improvement in habitat for the fishes, legal protection of flows needed for recovery, or a reduction in the threat of immediate extinction. The Service evaluated progress separately for the Colorado River and Green River subbasins; however, it gave due consideration to progress throughout the Upper Basin in evaluating progress toward recovery. The Service determined that for depletions greater than 3,000 acre-feet sufficient progress has not been achieved.

Based on current Recovery Program accomplishments (Appendix B), the Service has determined that sufficient progress has not been achieved under the Recovery Program so that it could serve as the reasonable and prudent alternative to avoid jeopardy to the endangered fishes caused by the impacts of this project. For sufficient progress to be achieved the following items for the Green River below the Duchesne River must be achieved within the established timeframes in the September 8, 1994, Plan:

I.B.1. Initially identify year-round flows needed for recovery while providing experimental flows (September 1997).

I.B.2.b. Assess legal and physical availability of water (December 1997).

I.B.3. Legally protect identified flows (September 1998).

For new projects, the responsibility for implementation of elements of the reasonable and prudent alternative rests with the Recovery Program. The above measures must be implemented prior to construction of the project. Recovery Program participants are responsible for carrying out activities outlined in the Plan.

The Bureau should condition their permit to retain jurisdiction in the event that the Recovery Program is unable to implement the identified Plan items. As long as the lead Federal Agency has discretionary authority over the project, reinitiation of section 7 consultation may be required so that a new reasonable and prudent alternative can be developed by the Service.

INCIDENTAL TAKE

Section 9 of the Endangered Species Act, as amended, prohibits any taking (harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or attempt to engage in any such conduct) of listed species without a special exemption. Under the terms of section 7(b)(4) and section 7(0)(2), taking that is incidental to and not intended as part of the agency action is not considered taking within the bounds of the Endangered Species Act, provided that such taking is in compliance with the incidental take statement.

The Service does not anticipate that the proposed action will result in any incidental take of the endangered fishes.

CONCLUSION

This concludes the Service's biological opinion on the impacts of the proposed project. This opinion was based upon the information described herein. If new information becomes available, new species listed, or should there be any changes in the average annual amount of water depleted by this project (5,557 acre-feet per year) or any other change which alters the operation of the projects from that which is described in your correspondence and which may affect any endangered or threatened species in a manner or to an extent not considered in this biological opinion (see 50 CFR 402.16), formal section 7 consultation should be reinitiated.

Thank you for your cooperation in the formulation of this biological opinion and your interest in conserving endangered species.

Joe Webster

Joseph J. Webster

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APPENDIX A

BOARD MEMBERS
DAVID L. PETERSON, CHAIRMAN
L. GROVER CHILDS
R. KIRBY BENCH
NEIL NIELSON
DAVID COX
DON L. CHRISTENSEN
BOYD SUNDERLAND

SANPETE WATER CONSERVANCY DISTRICT

December 14, 1994

Mr. Reed Harris
Field Supervisor, U.S. Fish
and Wildlife Service
Lincoln Plaza
145 East 1300 South, Suite 404
Salt Lake City, Utah 84115

Subject: Draft Amended Biological Opinion - Narrows Project

Dear Mr. Harris:

The Sanpete Water Conservancy District (District) has reviewed the Draft Amended Biological Opinion on the Narrows Project as transmitted to the Bureau of Reclamation by Memorandum of December 6, 1994.

The District hereby agrees to pay the $12.71 per acre-foot depletion charge (Fiscal Year 1995 value) which will be used in accomplishment of the Recovery Implementation Program Recovery Action Plan for the endangered fishes of the Colorado River System. Based on the estimated 5,557 acre-foot depletion, the total depletion charge would be $70,629.47. It is the District's understanding that 10 percent of the total depletion charge will be payable at the time the District receives Federal approval of the project through the Bureau of Reclamation and that the balance will be due at the time construction commences.

Sincerely,

David L. Peterson
President

APPENDIX B

ACTIVITIES AND ACCOMPLISHMENTS OF THE RECOVERY IMPLEMENTATION PROGRAM RELATED TO SECTION 7 CONSULTATIONS UPPER COLORADO RIVER BASIN MAY 1994

Background

The Fish and Wildlife Service (Service) will determine whether progress by the Recovery Implementation Program (Program) provides a reasonable and prudent alternative based on the following factors:

a. Actions which result in a measurable population response, a measurable improvement in habitat for the fishes, legal protection of flows needed for recovery, or a reduction in the threat of immediate extinction.

b. Status of fish populations.

c. Adequacy of flows.

d. Magnitude of the impact of projects.

The Service will assess the impacts of projects that require Section 7 consultations and determine if accomplishments under the Program are sufficient for it to serve as a reasonable and prudent alternative. Generally, sufficient progress will be evaluated separately for the Colorado and Green River Subbasins, although due consideration will be given to progress throughout the Upper Colorado River Basin.

Colorado River Subbasin Accomplishments

A. Accomplishments which result in a measurable population response, a measurable improvement of habitat, legal protection of flows, or a reduction in the threat of immediate extinction:

1. Execution of an agreement by the Bureau of Reclamation (Reclamation), Service, and Colorado Water Conservation Board to provide a permanent commitment of 10,000 acre-feet of Ruedi Reservoir releases to and through the 15-mile reach.

2. Establishment of refugia for the Colorado squawfish and razorback sucker from the Colorado River.

3. Agreement by Reclamation and the Colorado Water Conservation Board to provide an additional 10,000 acre-feet of water from Ruedi Reservoir on a year-to-year basis. The additional water has been/will be provided in 1991, 1992, 1993, and 1994. A longer term arrangement of water from the Ruedi Reservoir is being developed.

4. Reoperation of the Aspinall Unit to provide test flows and enhance endangered fish habitat conditions in the Gunnison and Colorado Rivers.

B. Status of fish populations:

	Colorado River	Gunnison River
Colorado squawfish	small; stable	small; declining
Humpback chub	healthy	N/A
Bonytail	extirpated	extirpated
Razorback sucker	small; declining	extirpated

C. Adequacy of flows:

1. Winter--adequate; legal protection yet to be provided.

2. Spring--duration and magnitude of peak spring flows is less than adequate; legal protection yet to be provided.

3. Summer-Fall--generally adequate with shortages in the 15-mile reach; legal protection partially provided.

Green River Subbasin Accomplishments

1. Actions which result in a measurable population response, a measurable improvement of habitat, legal protection of flows, or a reduction in the threat of immediate extinction:

a. Reoperation of Flaming Gorge Project to enhance endangered fish habitat in the Green River pursuant to the biological opinion on the reoperation of the Flaming Gorge Project.

b. Partial establishment of refugia for razorback sucker from the Green and Yampa Rivers.

2. Status of fish populations:

	Green	Yampa/Little Snake	White
Colorado squawfish	stable; possible increase	stable	stable
Humpback chub	small/stable ?	small/stable ?	N/A
Bonytail	extirpated	extirpated	N/A
Razorback sucker	small/declining	small/declining	very rare/ declining

3. Adequacy of flows:

   a. Service flow recommendations being implemented pursuant to Flaming Gorge biological opinion; legal protection yet to be provided.

   b. Yampa River/Little Snake River--current flows adequate with some localized shortages in late summer and early fall; legal protection yet to be provided.

   c. White River--current flows adequate; legal protection yet to be provided.

   d. Duschesne--flow requirement unknown.

Major Recovery Program Support Activities (Basinwide):

Support activities (funding, research, I and E, etc.) in the Program that contribute to sufficient progress to the extent they help achieve a measurable population response, a measurable improvement in habitat for the fishes, legal protection of flows needed for recovery, or a reduction in the threat of immediate extinction.

1. Signing of a cooperative agreement to implement the Recovery Program.

2. Resolutions supporting the Recovery Program made by water user groups in Utah, Colorado, Wyoming, and several major environmental groups.

3. Active participation by all cooperators in implementing the Recovery Program, including meeting all funding commitments and seeking funds from Congress necessary to implement the program.

4. The expenditure of $21.8 million from FY 89 to FY 94 to implement the Recovery Program work plans. These work plans have provided funding for numerous high priority recovery activities and studies related to the endangered Colorado River fishes.

5. Commitment by members of the Recovery Program to develop and implement in a timely manner the Recovery Implementation Program Recovery Action Plan, which will give priority consideration to implementing recovery actions which will result in significant protection and improvement of the endangered fish populations in their habitat.

6. Development of an enforcement agreement between the Service and the State of Colorado to protect instream flows acquired under the Recovery Program for the endangered fishes.

7. Finalization of a policy by the Colorado Water Conservation Board for protection of instream flow until uncertainty concerning habitat needs and compact development are resolved.

ATTACHMENT C - CULTURAL RESOURCES CONSULTATION

State of Utah
Department of Community & Economic Development
Division of State History
Utah State Historical Society

Norman H. Bangerter
Governor
Max J. Evans
Director

300 Rio Grande
Salt Lake City, Utah 84101-1182
(801) 533-5755
FAX: (801) 364-6436

April 29, 1992

Richard M. Noble, P.E.
Vice President
Franson-Noble & Associates
P. O. Box 69
American Fork, Utah 84003

RE: Narrows Project

In Reply Please Refer to Case No. 92-0594

Dear Mr. Noble:

The Utah State Historic Preservation Office received the above referenced letter on April 23, 1992. After review of your letter, attached reports and our site file information, the Preservation Office has the following information for your consideration.

1. Besides the original 1979 there has only been one minor survey in the project area, and it located no new historic properties. Therefore the project area contains only three know sites.

2. In reviewing the map from the 1979 survey and the project plans from the 1992 project update, the area of potential effect appears to have changed. If this is the case, the Utah Preservation Office would recommend that a survey be conducted of those areas not looked at in 1979. Also our office would recommend that the three sites be rechecked to determine there condition, our files don't indicate if any of proposed mitigation took place. We are unsure of present site condition.

3. Our office lastly recommends that as plans are developed that any information about displaying artifacts, if they are found, be developed in conjunction with the Fairview Museum.

Board of State History: Douglas D. Alder • Marilyn C. Barker • Dale L. Berge • Boyd A. Blackner
Hugh C. Garner • Peter L. Goss • David D. Hansen • Dean L. May • Amy Allen Price • Penny Sampinos • Jerry Wylie

This information is provided on request to assist the Sanpete Water Conservancy District with its Section 106 responsibilities as specified in 36CFR800. If you have questions or need additional assistance, please contact me at (801) 533-7039.

Sincerely,

James L. Dykman
Regulation Assistance Coordinator

JLD:92-0594 BUR OF REC

ATTACHMENT D - 1984 COMPROMISE AGREEMENT

AGREEMENT

THIS AGREEMENT, made and entered into the 8th day of June, 1984, by and between the SANPETE COUNTY WATER CONSERVANCY DISTRICT, a Utah Water Conservancy District, herein referred to as "Sanpete" and the CARBON WATER CONSERVANCY DISTRICT, a Utah Water Conservancy District, and the PRICE RIVER WATER USERS ASSOCIATION, a Utah non-profit corporation, collectively herein referred to as "Carbon".

W I T N E S S E T H :

WHEREAS, there has been a long standing controversy concerning the building of storage and diversion works on the Price River System for transmountain diversion of Gooseberry Creek water to the San Pitch River System; and

WHEREAS, the parties hereto desire to compromise and settle the controversy and their respective claims to such water.

NOW, THEREFORE, in consideration of the mutual covenants herein contained, IT IS AGREED:

I

DEFINITIONS

A. "Scofield" means the Scofield Reservoir near Scofield, Utah.

B. "Tripartite Contract" means that contract dated October 11, 1943 among the Carbon Water Conservancy District, the Price River Water Conservation District, and the United States of

America, relating to the reconstruction of Scofield Dam and describing the Gooseberry Plan. The Price River Water Users Association is successor to the Price River Water Conservation District.

C. The expression "prior water rights" as used in this Agreement means the right to the use of the water of the Price River System having priorities earlier than September 6, 1941.

D. "Narrows Site" means the approximate location for a proposed dam to be constructed on Gooseberry Creek, the center of which is located:

North 625 feet and East 1200 feet from the West Quarter corner of Section 19, Township 13 South, Range 6 East, SLB&M.

E. "Narrows Project" means a successor project to the Gooseberry Plan and constitutes a substitute for the allocation of water for the Gooseberry Plan as mentioned in the Tripartite Contract. The Narrows Project is the project proposed by this Agreement and contemplates the building of storage and diversion works at or above the location of the Narrows Site, to store Gooseberry Creek water for transmountain diversion to the San Pitch River System.

F. "Tunnel" means that transmountain diversion tunnel located in Section 24, Township 13 South, Range 5 East, SLB&M which diverts water from the Price River System to the San Pitch River System.

II

WATER RIGHT FILINGS

A. Price River Water Users Association covenants and represents that it is the owner of the following water applications on file in the office of the Utah State Engineer for the diversion, storage, and use of Price River System water:

APPLICATION NO.	CLAIMED DATE OF PRIORITY	NATURE AND AMOUNT OF CLAIMED RIGHT
1035 (91-2)	Aug. 30, 1906	Storage 12,020 acre-feet
8989a (91-78)	Oct. 11, 1937	Storage 17,980 acre-feet
13334 (91-126)	Feb. 13, 1940	Direct Flow 50 second-feet

B. Sanpete covenants and represents that it is the owner of record of the following water applications on file in the office of the Utah State Engineer for the diversion, storage and use of Price River System water, subject to the Assignment Agreement dated July 22, 1975, between Sanpete and the United States of America:

APPLICATION NO.	CLAIMED DATE OF PRIORITY	NATURE AND AMOUNT OF CLAIMED RIGHT
14025 (91-130) Change Application a-9237	Jan. 16, 1941	Storage 30 second feet
14026 (91-131) Change Application a-9236	Jan. 16, 1941	Storage 17,000 acre-feet
14477 (91-132) Change Application a-9238	Sept. 6, 1941	Storage 130 second feet

C. Sanpete covenants and represents that it is the owner of the following application on file in the office of the Utah State Engineer for the diversion, storage, and use of Price River System water:

APPLICATION NO.	CLAIMED DATE OF PRIORITY	NATURE AND AMOUNT OF CLAIMED RIGHT
9593 (91-87)	Oct. 12, 1937	Storage 15,000 acre-feet

III

SUBORDINATION OF WATER RIGHTS

The Price River Water Users Association water rights, evidenced by Application Numbers 1035 (91-2), 8989a (91-78), and 13334 (91-126), shall be subordinated, to the extent hereinafter provided, to the Sanpete water rights evidenced by Application Number 14025 (91-130), Change Application a-9237; Application Number 14026 (91-131), Change Application a-9236; and Application Number 14477 (91-132), Change Application a-9238, to divert and store on a first priority basis in each year all water of Gooseberry Creek and its tributaries arising above the Narrows Site, and to the extent provided in Article IV, paragraph A (3) the waters from Brooks and Cabin Hollow Creeks, and to convey by transmountain diversion up to 5,400 acre-feet of water from storage at the Narrows Site each year for use in the San Pitch River System, subject to the rights of the Cottonwood Gooseberry Irrigation Company for Fairview Lakes.

IV

DISTRIBUTION OF WATER

A. NARROWS PROJECT

1. The active capacity of the reservoir for the Narrows Project shall not exceed 10,000 acre-feet to provide for the transmountain diversion to the San Pitch River System. If requirements are made of Sanpete to release or bypass water for minimum streamflow purposes in Gooseberry Creek below the Narrows Site the active storage capacity of the reservoir for such purposes may be increased as necessary, but shall not exceed 4,500 acre-feet of additional storage capacity. The total active storage capacity shall not exceed 14,500 acre-feet.

2. The 5,400 acre-feet of water to be diverted to the San Pitch River System as provided in Article III shall be measured at the outlet of the tunnel, without deduction for reservoir evaporation, seepage, or storage losses, provided however, that any seepage that would have been intercepted by the tunnel before construction of the Narrows Project shall not be charged against the 5,400 acre-feet. Any additional seepage water resulting from the construction of the Narrows Project shall be charged against the said 5,400 acre-feet.

3. Water from Brooks Canyon and Cabin Hollow Creeks may be diverted, stored and used to provide minimum streamflows in Gooseberry Creek below the Narrows Site.

B. SCOFIELD

1. Application Number 14683 (91-135) in the name of the United States of America, Bureau of Reclamation shall be approved to permit Carbon to use the additional storage capacity of 35,000 acre-feet of water in Scofield Reservoir in addition to the

present storage rights evidenced by Application Numbers 1035 (91-2), and 8989a (91-78).

2. Carbon shall release from storage in Scofield Reservoir water sufficient to satisfy prior water rights, which otherwise would be impaired by the diversion and storage by the Narrows Project. Any and all water stored in the active capacity of Scofield Reservoir shall be subject to such release. The total active capacity of Scofield Reservoir would have to be depleted, and all direct flow water passed through the reservoir to satisfy prior water rights, before any call could be made upon Sanpete to pass through the direct flow waters originating above the Narrows Site. Such releases shall be in such quantity and at such times as may be required to satisfy prior water rights as determined by the Utah State Engineer.

3. Storage releases from Scofield shall be limited to 30,000 acre-feet annually for use by Carbon, exclusive of replacement waters needed to supply prior water rights interfered with by Sanpete's diversion and use of water for the Narrows Project.

V

APPROVALS, WITHDRAWALS, AND REJECTION OF APPLICATIONS

A. The United States of America shall withdraw Application Number 9594 (91-88).

B. The State Engineer shall approve Application Number 14683 (91-135).

C. Within thirty (30) days of approval of this Agreement by the United States of America, the State Engineer may reject the Price River Water Improvement District's Application Number 38882 (91-3557).

D. Sanpete shall within thirty (30) days of approval of this Agreement by the United States of America, withdraw Application Number 9593 (91-87).

E. The parties agree that no protest shall be filed to any of the foregoing approvals, withdrawals, rejections, dismissals or assignments or to any further change applications or permits from any state or federal agencies necessary to carry out the purpose and intent of this Agreement.

VI

DISMISSAL OF PENDING SUIT

Carbon shall file a Motion for Voluntary Dismissal, with prejudice, within thirty (30) days of approval of this Agreement by the United States of America, of the lawsuit entitled Price River Water Users Association, et al, vs United States, et al, Civil No. C-83-0407W, now pending in the United States District Court for the District of Utah, Central Division, upon the grounds that the issues have been settled by this Agreement, and to seek joinder in the motion by other plaintiffs to said case.

VII

MEASURING DEVICES AND OUTLET STRUCTURES

The parties hereto shall install and maintain outlet structures and measuring devices to measure and deliver water in accordance with this Agreement. The expense of such installation and maintenance, as part of the Narrows Project, shall be borne by Sanpete. Such devices shall be approved as to location, type, size and quality by the Utah State Engineer. Each party reserves the right to inspect and test at their own expense, at any reasonable time, any and all facilities for the measurement and delivery of water.

VIII

AGREEMENTS NOT SUPERSEDED OR AMENDED

This Agreement shall not supersede, amend or otherwise modify the rights of the United States of America under the Tripartite Contract, except the Narrows Project shall be substituted for the Gooseberry Plan as mentioned therein; nor shall it amend the repayment contract dated February 28, 1944, between the United States of America and the Carbon Water Conservancy District involving Scofield Reservoir and the Assignment Agreement dated July 22, 1975, between Sanpete and the United States of America.

IX

ADMINISTRATION

All waters stored and diverted pursuant to this Agreement shall be administered by the Utah State Engineer.

X

SUCCESSORS BOUND

This agreement shall be binding upon the parties hereto and upon the successors and assigns of the parties.

XI

INCORPORATION BY REFERENCE

The parties agree that the terms and conditions of this Agreement may be incorporated, by reference, in and made a specific part of the State Engineer's Memorandum Decisions on Sanpete's Application Numbers 14025 (91-130), 14026 (91-131) and

14477 (91-132), as amended, and the Application of the United States of America, Number 14683 (91-135).

XII

APPROVAL OF THE UNITED STATES

This Agreement is subject to the approval of the United States of America.

IN WITNESS WHEREOF, the parties hereto have executed this Agreement the day and year first above written.

SANPETE COUNTY WATER
CONSERVANCY DISTRICT

By: _____

Its: _____

ATTEST:

_____
Secretary

CARBON WATER CONSERVANCY DISTRICT

By: _____

Its: _____

ATTEST:

_____
Secretary

PRICE RIVER WATER USERS ASSOCIATION

By: Lyle B Baynes

Its: President

ATTEST:

Jane B. O'Brien

Secretary

The foregoing Agreement is approved this 28 day of Jun, 1984.

UNITED STATES OF AMERICA

By: [signature]

Title

W R McCabe

RESOLUTION

BE IT AND IT IS HEREBY RESOLVED by the Board of Directors of the SANPETE WATER CONSERVANCY DISTRICT, at a meeting held on the 7th day of June, 1984, that the President and Secretary of said District be, and they are hereby authorized and empowered to execute on behalf of the District an Agreement with the CARBON WATER CONSERVANCY DISTRICT and the PRICE RIVER WATER USERS ASSOCIATION bearing the above date settling controversies between Carbon County water users and Sanpete County water users on the terms and conditions set out in said agreement presented and considered at this meeting.

CERTIFICATION

I, Janice Petersen, Secretary of SANPETE WATER CONSERVANCY DISTRICT, hereby certify that the foregoing is a true and correct copy of a resolution adopted by the directors of the said District at a regular meeting of the SANPETE WATER CONSERVANCY DISTRICT held on the 7th day of June, 1984.

Janice Petersen, Secretary
SANPETE WATER CONSERVANCY DISTRICT

EXHIBIT "B"

JUL 11 1984
WATER RIGHTS

RESOLUTION

BE IT AND IT IS HEREBY RESOLVED by the Board of Directors of the PRICE RIVER WATER USERS ASSOCIATION, at a meeting held on the 8th day of June, 1984, that the President and Secretary of said association be, and they are hereby authorized and empowered to execute on behalf of the Association an Agreement with the SANPETE COUNTY WATER CONSERVANCY DISTRICT bearing the above date settling controversies between Carbon County water users and Sanpete County water users on the terms and conditions set out in said agreement presented and considered at this meeting.

CERTIFICATION

I, ANN B. O'BRIEN, Secretary of PRICE RIVER WATER USERS ASSOCIATION, hereby certify that the foregoing is a true and correct copy of a resolution adopted by the directors of the said District at a special meeting of the PRICE RIVER WATER USERS ASSOCIATION held on the 8th day of June, 1984.

Ann B. O'Brien
ANN B. O'BRIEN, Secretary
PRICE RIVER WATER USERS ASSOCIATION

EXHIBIT "C"

JUL 11 1984
WATER RIGHTS

RESOLUTION

BE IT AND IT IS HEREBY RESOLVED by the Board of Directors of the CARBON WATER CONSERVANCY DISTRICT, at a meeting held on the 8th day of June, 1984, that the President and Secretary of said District be, and they are hereby authorized and empowered to execute on behalf of the District an Agreement with the SANPETE COUNTY WATER CONSERVANCY DISTRICT bearing the above date settling controversies between Carbon County water users and Sanpete County water users on the terms and conditions set out in said agreement presented and considered at this meeting.

CERTIFICATION

I, the undersigned Secretary of the CARBON WATER CONSERVANCY DISTRICT, hereby certify that the foregoing is a true and correct copy of a resolution adopted by the directors of the said District at a special meeting of the CARBON WATER CONSERVANCY DISTRICT held on the 8th day of June, 1984.

Secretary

EXHIBIT "D"

ATTACHMENT E - FISH AND WILDLIFE COORDINATION ACT REPORT

GOOSEBERRY NARROWS DAM PROJECT
SANPETE COUNTY, UTAH

A FISH AND WILDLIFE COORDINATION ACT REPORT

PREPARED BY

UNITED STATES DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
UTAH FIELD OFFICE
SALT LAKE CITY, UTAH

WITH ASSISTANCE FROM

UTAH DEPARTMENT OF NATURAL RESOURCES
DIVISION OF WILDLIFE RESOURCES
SALT LAKE CITY, UTAH
SPRINGVILLE, UTAH
PRICE, UTAH

OCTOBER, 1994

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INTRODUCTION

This Coordination Act Report has been developed in concert with the Environmental Impact Statement being prepared by the Bureau of Reclamation (Reclamation) for the proposed Narrows Dam Project (Narrows). The report evaluates the impacts of the proposed Narrows Project on fish and wildlife resources, and recommends appropriate mitigation in concert with The Fish and Wildlife Coordination Act (16 U.S.C. 661 et seq.) and the U.S. Fish and Wildlife Service Mitigation Policy (Federal Register, Vol. 46, No. 15, January 23, 1981 (as modified February 4, 1981)). Endangered Species Act (16 U.S.C. 1531 as amended) requirements have been addressed in a separate Biological Opinion from the U.S. Fish and Wildlife Service (Service) to Reclamation, dated March 25, 1992. National Environmental Policy Act (NEPA) documentation is being prepared by the Sanpete Water Conservancy District (District) for Reclamation.

The Narrows project is proposed by the District. It would develop a supplemental irrigation water supply for presently irrigated lands and provide municipal water to project communities in northern Sanpete County, Utah. The project would include a transbasin diversion of 6.7×10^6 cubic meters (m^3) (5,400 acre-feet {af}) per year from the Price River (Colorado River drainage) to the San Pitch River drainage (Great Basin). The District plans to apply to Reclamation for a Small Reclamation Project Act Loan. The District also needs a 404 permit for the project from the U.S. Army Corps of Engineers (Corps).

In January of 1991 two teams of specialists from various State and Federal agencies were formed to review plans for the Narrows and assist in the identification of impacts and the development of mitigation plans. A fisheries team was formed to look at aquatic impacts and fisheries issues. This team consisted of a consultant for the District and members from the Service, Reclamation, Corps, U.S. Forest Service (USFS), and Utah Division of Wildlife Resources (UDWR). A wetlands/wildlife team was formed to evaluate impacts to wetlands and wildlife habitat. The team consisted of a consultant for the District and members from the Service, Reclamation, Corps, USFS, and UDWR. Agency representatives on both teams were not necessarily the same.

Information in this report is based on preliminary documents prepared for the District in coordination with the two teams. These include draft reports on Aquatic Ecology (Woodward - Clyde Consultants, December 1991), Vegetation and Wildlife Impacts (Mt. Nebo Scientific, February 1992), the Preliminary Draft Environmental Impact Statement (Reclamation, August 1993), and other information in Service files.

DESCRIPTION OF THE STUDY AREA

The basin which would be inundated by the proposed reservoir lies in a high elevation, shallow valley in the Wasatch Plateau. The basin, isolated by several ridges, is 2,646 meters (m) (8,680 feet {ft}) above sea level. Vegetation consists of plant communities common to high elevation mountain meadow areas, including Vasey sagebrush, Silver sagebrush, and

various wetland community types. The majority of the reservoir basin is privately owned, although the actual dam site is in the Manti-LaSal National Forest.

Historically the area has been used for livestock grazing. Cattle and sheep were introduced into the area in the late 1800's and subsequently overgrazed the area so that rangeland restoration became necessary. The USFS established a controlled grazing plan for the Manti National Forest in 1908. Sheep still graze in the area.

The Sanpete Valley, which will receive water from the proposed project, lies at an elevation of 1,676-1,890 m (5,500-6,200 ft). It is bordered on the east by the Wasatch Plateau and on the west by the San Pitch Mountains. U.S. Highway 89 extends through the project area, connecting Fairview, Mt. Pleasant, Ephraim, and Manti (the county seat) with Salt Lake City, approximately 209 kilometers (km) (130 miles {mi}) to the north (Figure 1). The estimated population of Sanpete County in 1990 was 16,259. Government, agriculture, services, manufacturing and retail trade are the leading economic sectors. Approximately 44 percent of the land in Sanpete County is in agricultural use, with 36 percent of the total agricultural land developed for crops.

DESCRIPTION OF THE PROJECT

The Narrows project is designed to bring supplemental irrigation water to the Sanpete Valley and to provide supplemental municipal water for irrigation of lawns and gardens. The District also cites the need for honoring long-standing water rights contracts and agreements, for improving water conveyance facilities, and improving recreation and fishery opportunities. The project area consists of the Sanpete Valley and the headwaters area of the Price River (Figure 2). Sanpete Valley contains approximately 68,800 hectares (ha) (170,000 acres {ac}) of land, of which 24,280 ha (60,000 ac) are currently irrigated. About 6,230 ha (15,400 ac) of currently irrigated land would be eligible to receive project water. Currently these lands experience moderate to severe late season irrigation water shortages, averaging 2.3×10^7 m^3 (19,000 af) per year. The project would provide 6.7×10^6 m^3 (5,400 af) of water per year, of which 6.07×10^6 m^3 (4,920 af) would go to irrigation and 5.9×10^5 m^3 (480 af) to municipal supplies.

The proposed action includes construction of a dam on Gooseberry Creek, a tributary of the Price River, approximately 14.5 km (9 mi) east of Fairview, Utah. The proposed dam would be a zoned earthfill embankment, 37 m (120 ft) high, with a crest length of 168 m (550 ft) and a crest width of 9 m (30 ft). The dam would have 3:1 horizontal to vertical slopes upstream and downstream. The dam would impound a reservoir with a capacity of 2.1×10^7 m^3 (17,000 af), with 1.8×10^7 m^3 (14,500 af) of active storage and 3.1×10^6 m^3 (2,500 af) of dead storage. The maximum reservoir surface area is approximately 244 ha (604 ac). At an average water surface during the recreation season (June through September) the reservoir would cover 184 ha (454 ac). The water surface will fluctuate an average of about 3.7 m (12 ft) vertically each year, with a maximum fluctuation of 5.5 m (18 ft) per year.

An alternative, smaller reservoir, would consist of a dam at the same location that would be 30.5 m (100 ft) high, with a crest length of 129.5 m (425 ft) and a crest width of 9 m (30 ft). The impounded smaller reservoir would have a capacity of 9.7×10^6 m^3 (7,900 af), with 6.7×10^6 m^3 (5,400 af) of active storage and 3.1×10^6 m^3 (2,500 af) of dead storage. The maximum reservoir surface area would be 146 ha (362 ac), with an average of 96.3 ha (238 ac) during the recreation season. The water surface would fluctuate an average of 4.9 m (16 ft) vertically per year, with a maximum fluctuation of 6.7 m (22 ft) per year.

An existing tunnel, which currently conveys water from Fairview Lakes into Cottonwood Creek, would be rehabilitated to carry releases from Narrows Reservoir into Cottonwood Creek. The water would be carried in a pipeline for the upper 1.3 km (0.8 mi) of Cottonwood Creek to prevent degradation of the stream channel. At the mouth of Fairview Canyon some of the flow would be diverted into two pipelines, which would convey project water north to Oak Creek and south to Spring City (Figure 2). Project water would also be diverted into Cottonwood-Gooseberry Irrigation Company's existing pressurized irrigation system for use in the Fairview area. The remainder of the project water would flow into the San Pitch River where it could be diverted into existing canals and ditches. A stream-level emergency outlet would also be constructed through the dam to provide downstream releases into Gooseberry Creek for fisheries and emergency evacuation of the reservoir.

The Narrows Reservoir would inundate about 1.3 km (0.8 mi) of the Skyline Coal Mine Road, which provides access between Fairview and Scofield. Under the project, 4.2 km (2.6 mi) of new road would be constructed across the Narrows Dam. Asphalt surfacing would also occur on 0.5 km (0.3 mi) of existing gravel road to Lower Gooseberry Reservoir.

The District studied several other alternatives to meet project needs, but found them to be nonviable. These included using an alternative dam site, providing year-round releases from the new reservoir, additional groundwater development within Sanpete County, using Central Utah Project water, and direct diversion without a reservoir. The District was hampered by the fact that a 1984 water rights settlement agreement dictates the dam location and storage capacity and because the State Engineer has closed the Sanpete Valley to further ground water development due to downstream water rights interests. Other alternatives were eliminated because of economics, including construction of a storage reservoir in the Sanpete Valley and developing a conveyance system to deliver Central Utah Project water to the area.

On-farm conservation measures, including improved irrigation methods such as canal lining, sprinklers, and gated pipe will be required for participants to be eligible for project water. For the most part, due to existing irrigation water shortages, these measures have already been implemented. Without these conservation measures, the supplemental irrigation demand would be 2.8×10^7 m^3 (23,000 af) per year, versus the 1.5×10^7 m^3 (12,300 af) per year that the project is based on.

EVALUATION METHODOLOGY

Terrestrial Resources

Evaluation of terrestrial resources included baseline vegetation mapping and identification of plant and animal species occurring in the potentially affected area. A "Habitat Evaluation Procedures" (HEP) analysis was then used to assess pre-project conditions and impacts to wildlife and their habitats from project development.

Vegetation mapping was achieved by using aerial photography and contour maps on the ground. Plant species lists were compiled from previous reports and verified by District employees on the ground. Wildlife species lists were generated by UDWR, then verified by the District through field observation and animal live-trapping studies.

Use of HEP analysis was chosen by the Wetlands and Wildlife Team biologists as the best tool to quantify project impacts to wetlands, wildlife and their habitats. This is a process developed by the Service and is based on the assumption that habitat quality and quantity can be numerically described on a nonmonetary basis (USFWS, 1980). This species-habitat approach to impact assessment uses selected species as indicators to evaluate habitat for a representative group of species. It is assumed that impacts to indicator species represent impacts to the broader groups as functioning ecosystem units. The HEP process evaluates habitat quality for the selected species and allows for the development of Habitat Suitability Indices (HSI). These indices range from 0.0 to 1.0, with the values being related linearly to the habitat carrying capacity for the species. An HSI value of 1.0 represents optimum habitat for the species, while 0.0 represents unsuitable habitat. Comparison of pre- and post-project HSI values allows for a quantitative determination of impacts to the evaluation species and the groups they represent.

The Wetlands and Wildlife Team determined the species to be evaluated based on the habitat types and wildlife species lists prepared by the District. An attempt was made to identify species which were important or common to the impacted areas. These species were then put into feeding and reproductive guilds, and representative species for which HSI models were available were chosen from these guilds for evaluation. The guilds used are shown in Tables 1 and 2, with chosen indicator species bolded. Indicator species chosen were the montane vole (Microtus montanus)(to represent the closely related Richardson's vole, Microtus richardsoni), yellow warbler (Dendroica petechia), beaver (Castor canadensis), mule deer (Odocoileus hemionus), and Brewer's sparrow (Spizella breweri). It should be noted that, while the mule deer was considered an important species, application of the mule deer model in this situation was not totally appropriate since it is primarily based on winter habitat variables, whereas the reservoir basin is primarily used as summer habitat. Therefore the Brewer's sparrow model was used to evaluate habitat used by mule deer.

District personnel collected data, including quantitative and qualitative habitat variables, and analyzed the HSI models to determine HSI indices. All field parameters were obtained by multiple samplings. Means and standard deviations were calculated for each parameter and an attempt was made to obtain statistically adequate samples for each parameter. Average

Annual Habitat Units were determined for each species by multiplying the determined HSI by the acreage of the cover type(s) used in the evaluation area. The models used and raw data collected are available from the Service.

Aquatic Resources

Analysis of impacts to aquatic resources included evaluating the effects of reservoir inundation, flow alterations on streams, and the effects of the project on reservoir fisheries.

Effects of reservoir inundation were evaluated by assessing the number of stream kilometers (miles) and trout biomass (kilograms {pounds}) and numbers that would be lost to direct inundation by the Narrows project. Standing crop estimates prepared by UDWR provided biomass estimates.

Flow alteration effects will include flow reductions in Middle and Lower Gooseberry and Fish Creeks and a flow increase in Cottonwood Creek. The Instream Flow Incremental Methodology (IFIM) (Bovee, 1982) was chosen by the Fisheries Team to determine the effects flow alterations would have on weighted usable area (WUA) of aquatic habitats. WUA is a measure of usable microhabitat present in a stream reach. It is determined for each life stage of each species evaluated in an analysis and is defined as the microhabitat area per unit length of stream, most often expressed as ft^2 WUA/1,000 ft stream. This procedure uses computer models which combine stream hydraulic characteristics and habitat utilization characteristics for various life stages of a species (Physical Habitat Simulation System (PHABSIM)) (Milhous et al., 1984) to predict changes in WUA with changes in flow. The UDWR used the Habitat Quality Index method to compare project impacts and project-induced mitigation improvements and to provide recommendations for mitigation for stream impacts. The number of Habitat Units present in stream segments which would be impacted by the Narrows project and those which could be used as potential mitigation sites were estimated and compared (Appendix B).

Data on stream channel characteristics was collected in the field by District representatives and Fisheries Team members and the analysis was performed by the District. Five to nine transects were taken across the stream channel at several locations in five different stream reaches (stations) which could be affected. Field measurements were compared with model predictions for calibration. Good calibration was achieved for all stations. The models used and raw data collected are available from the Service.

Reservoir fishery effects were determined by evaluating the number of angler days per year that could be affected by the Narrows project on reservoirs in the Gooseberry and Fish Creek watersheds, including the proposed reservoir.

FISH AND WILDLIFE RESOURCES WITHOUT THE PROJECT

Terrestrial Resources

Vegetation in the reservoir basin area consists mainly of Vasey sagebrush (Artemisia tridentata v. vaseyana) and silver sagebrush (Artemisia cana) communities. The Vasey sagebrush is the driest plant community in the basin, existing on well-drained soils on upland slopes. Other dominant species include low rabbitbrush (Chrysothamnus viscidiflorus), snowberry (Symphoricarpos oreophilis), Pacific aster (Aster chilensis), slender wheatgrass (Elymus trachycaulus), and Letterman needlegrass (Stipa lettermanii). It encompasses approximately 134 ha (331 ac) of the basin.

The silver sagebrush community type lies downslope of the Vasey sagebrush community and comprises approximately 63.1 ha (156 ac) of the basin. The topography is generally flatter and the soils less well drained than with the Vasey sagebrush type. More mesic species, including shrubby cinquefoil (Potentilla fruticosa), Penstemon spp., orchardgrass (Dactylis glomerata), and Kentucky bluegrass (Poa pratensis) are found in this community.

The majority of the rest of the basin (40.5 ha {100 ac}) is in wetland vegetation types. These include wet meadows, riparian sedge wetlands, and willow thickets. Wet meadows are formed in topographic depressions adjacent to some of the streamside vegetation and seeps. Plant species include rushes (Juncus spp.) and sedges (Carex spp.) and grass species. Riparian sedge wetlands are similar in species and composition, including various rush, sedge, and grass species. They usually form 0.9-1.8 m-wide (3-6 ft-wide) bands of vegetation adjacent to streams. Willow thickets are less common, along stream channels in the basin and along Gooseberry and Cottonwood Creeks. Species include Drummond's (Salix drummondiana), Booth (Salix boothii) and Wolf (Salix wolfii) willows.

Approximately 6.9 ha (17 ac) in the reservoir basin have been previously disturbed by the water diversion tunnel to Cottonwood Creek, and the State road that crosses the north end of the basin.

Plant communities in the Sanpete Valley area which could be temporarily disturbed by pipeline construction include Valley sagebrush, Scrub oak, Grassland and Mountain Brush types.

Approximately 88 bird and 33 mammal species were found to utilize habitats that could be disturbed by the proposed project and adjacent areas. The reservoir basin provides summer habitat for mule deer and elk (Cervus canadensis). Elk use the aspen forests surrounding the reservoir basin for calving. The aspen forest also provides nesting habitat for a variety of passerine and raptorial birds. The linear riparian corridors are important wildlife habitats, providing nesting habitat for a variety of nongame birds, hiding cover for larger animals, and movement corridors for many species. UDWR estimates that up to 70 percent of species in Utah utilize riparian habitats, with some species being dependent on them.

The species picked for HEP analysis were chosen because they were known to use the different vegetation communities in the reservoir basin which will be affected if the project is constructed. Richardson's (meadow) vole uses wet meadow and sedge habitats, which

comprise many of the wetlands in the basin. Beaver also use this type of habitat, damming natural streams and creating additional wetlands. The yellow warbler utilizes the deciduous shrub/scrub wetland habitat. Mule deer range throughout the reservoir basin in summer using a variety of habitat types. The Brewer's sparrow which nests and forages in the sagebrush habitats was chosen as a HEP representative species for the habitat types found in the basin, including summer range for mule deer, that are not wetlands habitat. Table 3 gives acreages of the various vegetation and habitat types in the basin to be disturbed and details the habitat units (HUs) of each of the indicator species which were found to occur in the reservoir basin.

Because the land use of the reservoir basin consists primarily of some sheep grazing activities and light recreation, little change is expected to occur in the existing habitat and wildlife resources in the future without the project.

Aquatic Resources

Stream Fisheries

Stream segments in the area of the project which could be impacted include Gooseberry Creek along with its upper tributaries, Fish Creek and Cottonwood Creek (Figure 3). All three of these provide important recreational fisheries use and contain naturally reproducing game fish populations. Gooseberry and Fish Creeks have characteristics which are unique in the State. Fishery values must be maintained.

Gooseberry Creek and its tributaries are categorized by UDWR as a Class 3B-Unique stream. Class 3 streams are important from the standpoint of supporting fishing pressure, and fisheries should be considered a primary use. The B indicates that the stream provides important spawning and nursery habitat. Unique identifies streams that provide unique physical, chemical and biological values to the fishery. Gooseberry Creek has been divided into three segments (Upper, Middle, and Lower), which are 1.6, 4.8 and 11.4 km (1.0, 3.0, and 7.1 mi) in length, respectively. Three unnamed tributaries combine to form the Upper Gooseberry segment.

Upper Gooseberry Creek supports a naturally reproducing cutthroat trout (Oncorhynchus clarki) population, comprised of adult, juvenile, and young-of-the-year (YOY) fish. Numerous riffle areas provide cutthroat trout spawning habitat. UDWR estimates indicate that the standing crop of cutthroat trout in this segment averages about 42.5 kilograms (kg) per ha (38 pounds {lbs} per ac). This stream segment provides important rearing habitat for cutthroat, with over 720 fish per km (450 fish per mi) (mostly YOY) counted by UDWR. This segment provides only marginal overwinter habitat for cutthroat trout due to low winter flows and limited pool habitat.

The *Middle Gooseberry Creek* segment receives inflow from numerous springs and seeps, as well as several tributary streams. Average flows are consequently higher than in the Upper segment. This segment also supports a reproducing population of cutthroat trout.

The *Lower Gooseberry Creek* segment is downstream from the existing Lower Gooseberry Reservoir. Flow in this segment is double the flow of the Upper and Middle segments. Both cutthroat and rainbow (Oncorhynchus mykiss) trout use this segment. Rainbow trout apparently use this section for spawning a few weeks each year, while cutthroats are year-round residents. Spawning habitat for both species is not abundant in this segment, although YOY have been found to be plentiful, so this does not appear to be a limiting factor. More habitat is available for adult and juvenile trout from April through August than during the rest of the year. UDWR has found that the cutthroat standing crop averages 45- 57.5 kg per ha (40-50 lbs per ac). No estimate of standing crop for rainbows has been made, but both adults and juveniles have been collected in this stream segment.

The three *Gooseberry headwater tributaries* contain 12 stream km (7.5 stream mi). During late summer and early fall major portions of these streams have low flow or are dry. The flowing reaches have high value as cutthroat trout spawning and rearing of YOY habitat. Standing crop in these tributaries averages approximately 97.5 kg per ha (86 lbs per ac), with most being YOY or yearling fish.

Fish Creek is rated by UDWR as Class 2-Unique. Class 2 waters are of great importance to the state fishery, indicating productive streams with high aesthetic value. This segment of Fish Creek extends from the confluence with Gooseberry Creek to Scofield Reservoir. In addition to a self-reproducing cutthroat trout population, this segment also provides spawning and rearing habitat for rainbow trout that migrate upstream from Scofield Reservoir. Thus this stream segment provides habitat for adult, juvenile, spawning, and fry life stages of both species. The UDWR surveys have shown a wide range of standing crop values, with an average of almost 57.5 kg of trout per ha (50 lbs per ac).

The 16 km (10 mi) segment of *Lower Fish Creek* (sometimes considered the upper segment of the Price River) between Scofield Dam and its confluence with the White River forming the Price River, is heavily used as a fishery. It is stocked mainly with brown trout (Salmo trutta), but also contains rainbow and cutthroat trout. UDWR is working to make this stretch a blue ribbon brown trout fishery. At present, the standing crop of all trout species in this segment averages 278 kg per ha (244 lbs per ac).

Cottonwood Creek is rated Class 3B by UDWR, indicating that this segment supports natural reproduction. This segment extends from the Narrows tunnel outlet to the mouth of the canyon. Presently the upper part of the segment doesn't support a self-sustaining trout population due to low or intermittent flows during much of the year. A rainbow trout fishery is maintained by stocking catchable-sized fish during the period in which there is adequate water. Flows in the lower portion of this segment are higher year-round and support a standing crop of approximately 237 kg per ha (210 lbs per ac) of rainbow and brown trout.

Nongame fish in the upper sections of Gooseberry Creek include redside shiner (Richardsonius balteatus) and mountain sucker (Catostomus platyrhynchus). Lower Gooseberry Creek below Gooseberry Reservoir and portions of Fish Creek were poisoned in 1991 to kill nongame fish which were causing problems with the fishery in Scofield Reservoir.

Reservoir Fisheries

Reservoirs in the project vicinity are shown on Figure 3. *Lower Gooseberry Reservoir* has a surface area of approximately 109 ha (270 ac) and is managed as a catchable rainbow trout fishery. It also supports a resident cutthroat trout population. It is estimated that 25,000 trout were harvested in 1982, with 31 percent being cutthroat and the remainder rainbows. A large portion of the reservoir is shallow, which has led to problems with low dissolved oxygen (DO) concentrations and resultant fish kills. Recent steps have been taken by the USFS to improve water quality by releasing water from the bottom of the reservoir.

Fairview Lakes are owned and operated by the Cottonwood-Gooseberry Irrigation Company, with water being delivered via the Narrows Tunnel to Cottonwood Creek. The lakes are managed as a catchable rainbow trout fishery, with approximately 12,000 fish stocked every year, and 8,700 harvested. Stocked trout do not generally survive the winter due to the low level of the lakes during this period.

Scofield Reservoir has a storage capacity of 8.1×10^7 m^3 (65,800 af) and an annual surface area averaging 923 ha (2,282 ac). Approximately 9.9×10^6 m^3 (8,000 af) of the reservoir is available as a conservation pool as the reservoir cannot be further drawn down. It provides water for irrigation, culinary and industrial uses to the Price River Valley. The reservoir supports naturally reproducing cutthroat trout and natural and stocked rainbow trout. UDWR stocks approximately 600,000 3-inch rainbows into the reservoir each year. Approximately 250,000 rainbow and cutthroats were caught in 1986. The reservoir has experienced periodic fish kills resulting from low DO levels. The occurrence of fish kills is increasing due to declining water quality.

No changes in stream segment or reservoir management are predicted in the future without the project.

FISH AND WILDLIFE RESOURCES WITH THE PROJECT

Terrestrial Resources

Approximately 244 ha (604 ac) of wildlife habitat, including 40.5 wetland ha (100 ac), in the reservoir basin will be inundated by dam construction under the proposed project. Under the smaller alternative, 147 ha (363 ac) would be inundated. Also inundated will be 6.9 km (4.3 mi) (6.1 km {3.8 mi} under the smaller reservoir alternative) of linear stream channel riparian corridors. This habitat will be lost over a 2-5 year period after dam closure while

the reservoir fills. All HUs for indicator species in the reservoir basin will eventually be lost. In addition to habitat inundated by the reservoir, an additional 13 ha (32 ac) would be lost to highway relocation and recreational construction, including campground, boat ramp, picnic site, and restroom facilities.

Riparian vegetation in affected downstream segments will be impacted by the change in water regime. It could be killed by the lowering of the water table and narrowing of stream channels, or flooded by large increases in flow. Hydraulic analyses were performed on Gooseberry and Cottonwood Creeks by the District (Barnes, September 12 and 27, 1991). The maximum reduction in depth of flow for Gooseberry Creek was projected to be 0.15-0.27 m (0.5-0.9 ft), which would occur in May, during normal spring runoff. Since Gooseberry Creek is a gaining stream, the depth of the ground water table adjacent to the stream is directly linked with the water surface of the stream. In Cottonwood Creek 0.6 ha (1.5 ac) of riparian habitat, mostly willows, throughout the affected stream segments will be lost to channel widening due to higher flows. The linear riparian corridors lost to reservoir development may be replaced by wetland vegetation surrounding the reservoir which will not provide the same critical wildlife values. Due to fluctuating reservoir levels it will be hard to reestablish trees around the reservoir.

Wildlife in the area will be directly impacted by loss of habitat to the reservoir and associated activities such as roadbuilding, or indirectly impacted through increased human activities, including recreational uses such as fishing, boating and off-road vehicle use, constructing cabins and increasing traffic throughout the area. A small area of aspen (Populus tremuloides) forest will be disturbed when the road is rerouted over the new dam. Bisection of the aspen grove by the rerouted road and increased traffic through the area may cause elk to desert their calving areas. Although less than 0.4 ha (one ac) of actual disturbance to the aspen habitat is proposed, the road will divide and fragment the existing unbroken block of forest, which could create passage problems for big game and will give interior forest-nesting birds smaller areas of suitable nesting habitat. Nesting raptors may be subject to harassment in addition to loss of prey base from the flooded meadows. Loss of hiding cover may cause many medium- and large-sized animals to discontinue traveling through the basin.

Construction of a water distribution system in the Sanpete Valley will temporarily disturb plant communities including Valley sagebrush/grass, scrub oak, grassland and mountain brush. These disturbances will be temporary as the pipelines will be buried underground and the linear nature of the disturbance will cause relatively small areas to be disturbed per unit area. A total of 12.1 ha (30 ac) along the 27.4 km (17 mi) pipeline alignment would be disturbed. These disturbed areas will be reseeded following completion of construction and wildlife impacts should be minimal.

UDWR has identified a potential impact of the project on an existing crop depredation program in northern Sanpete County. They have determined that increasing alfalfa production through use of project water will encourage mule deer to remain at low elevations

during summer to feed on agricultural fields, exacerbating an existing problem. Crop depredations could increase, requiring UDWR to spend additional time removing problem deer and to pay additional damages for crop depredations. UDWR will also have to pay for fencing for any new haystacks developed due to greater alfalfa production. It estimates that additional depredation expenses could increase by as much as $2,000 over the existing program costs of approximately $20,000. No mitigation for this project impact has been identified by UDWR at this time.

Aquatic Resources

Stream Fisheries

Operation of the dam will affect flows in Gooseberry, Fish and Cottonwood Creeks. The Upper Gooseberry Creek segment (1.6 km {one mi}) and 6.9 km (4.3 mi) of the tributary streams will be inundated. Under the smaller reservoir alternative 6.1 km (3.8 mi) of the Gooseberry Creek tributaries would be inundated. All other aquatic impacts should be the same under both alternatives.

Flows in the Middle Gooseberry Creek segment will be reduced by an average of 91 percent. The State Engineer has stipulated that a minimum of 0.03 cubic meters per second (cms) (one cubic foot per second {cfs}) be released from the Narrows Dam so that the segment will not be totally dewatered. If the flow at the Gooseberry Campground (approximately one mile below the dam site) is not 0.04 cms (1.5 cfs), then 0.035 cms (1.25 cfs) must be released from the dam. Flows in Lower Gooseberry Creek are expected to be reduced by as much as 62 percent, with an average flow reduction of 51 percent. Fish Creek flows will be reduced by an average of 18 percent, and up to 24 percent. Flows in the upper part of Cottonwood Creek would be increased by up to 1000 percent through the diversion of project water. Flows in the lower section would increase by up to 550 percent.

Table 4 shows the pre- and post-project flows for Gooseberry Creek, Fish Creek, the Price River, and Cottonwood Creek. Tables 5-9 show changes in WUA for cutthroat and rainbow trout in Gooseberry and Fish Creeks with the implementation of the project. Changes range from a monthly decrease of less than one percent to 100 percent.

In general, the decrease in flow in the *Middle Gooseberry segment* will have the greatest impacts during the spring and summer when flow is normally the highest. This is the time when cutthroat spawning occurs. Flow will be reduced to 0.03 cms (one cfs) from average flows of 1.27 and 1.76 cms (45 and 62 cfs) in May and June, respectively. Spawning and fry habitat will be seriously reduced (by 94 and 45 percent, respectively). Fry will also be prevented from being carried downstream by the dam. Adult (-72 percent) and juvenile (-81.6 percent) habitat will also be reduced during this period. Without flushing flows the width of the stream will reduce and more fine materials will accumulate in the substrate, which could eliminate any remaining spawning habitat. Fifty to 75 percent of trout biomass could be lost from this segment.

Lower Gooseberry Creek will also suffer the largest flow reduction from April to August. However, due to tributary inflow, reductions will not be as severe. Flows will be reduced from approximately 2.29 to 1.05 cms (81 to 37 cfs) in May and from 2.78 to 1.05 cms (98 to 37 cfs) in June. The low flow period, from October through March, is considered to be the most restrictive for providing trout habitat. Flows would be reduced from 8-32 percent at this time. During this period adult and juvenile cutthroat trout habitat would be reduced by 10.5 and 29.5 percent respectively. Reductions of adult and juvenile habitat of less than 10 percent will occur during other times of the year. Rainbow trout adult and juvenile habitat is projected to be reduced by 6.5 and 5.4 percent, respectively, during the low flow period. Implementation of the proposed project is expected to slightly increase rainbow spawning and fry habitat.

During the low flow period average flow will be reduced between 5 and 8 percent in *Fish Creek*. Habitat is expected to be reduced by up to 7.3 and 3.3 percent,respectively, for adult and juvenile cutthroat trout. For rainbow trout habitat may be reduced by up to 2.7 and 1.3 percent, for adults and juveniles, respectively. Spawning habitat could decrease by 16 percent for rainbows and increase by approximately the same amount for cutthroats. Fry habitat would change by less than 3 percent for both species.

Flows in *Lower Fish Creek* will not be directly affected by construction of the Narrows, but will be indirectly affected by changes in operation of Scofield Reservoir. Because the Narrows will capture runoff during spring high flows that would otherwise have gone to Scofield Reservoir, Scofield will spill less frequently and for shorter durations, lowering the volume of peak flows in Lower Fish Creek, and consequently in the Price and Green Rivers downstream. Controlled releases from Scofield Reservoir would remain unaltered during most years. However, under prolonged drought conditions, irrigation releases would be reduced due to lack of water in the reservoir. In simulations using data for the years 1960-1992, reductions would have occurred in 5 of the 33 years if the Narrows Project had been in place.

Flows in *Cottonwood Creek* will increase dramatically during water delivery, from July to October (Table 4). Because flows will not be increased during the low flow period the upper portion will still support a catch and release fishery. However, fishing will be more difficult due to higher flows. The self-sustaining fishery in the lower portion of the creek could be affected by impacts to riparian vegetation or streambank sloughing due to high flows. An engineering stability report (Barnes, September 12, 1991) was prepared for the District, which showed that the increased flows will degrade the channel by up to 0.1 m (0.36 ft) in certain segments. The District has committed to place a pipe in the upper 1.3 km (0.8 mi) of the stream to convey irrigation releases during the summer season. Thus, project impacts in this segment will be avoided. Change in flows could affect the lower 7.9 km (4.9 mi) of Cottonwood Creek. An IFIM analysis has not been done on Cottonwood Creek, so exact reductions in habitat for fish life stages, due to the project are unknown.

Reservoir Fisheries

Flow of Gooseberry Creek into *Lower Gooseberry Reservoir* will be substantially reduced, particularly during spring and summer months. Flow reduction during this period may reduce the exchange rate in the reservoir, affecting water quality and leading to more severe fish kill problems. The project could also affect the cutthroat trout population in the reservoir by decreasing recruitment from upstream.

Fairview Lakes will not be directly affected by the project, but changes in management and fishing pressure may occur due to coordination of operation with the Narrows. Effects on the fishery could be beneficial due to reduced fishing pressure and greater availability of water due to operational changes.

A study prepared for the District (Cloward, Madden & Associates, November 1991) has shown that probability of eutrophication of *Scofield Reservoir* is slightly lower with the project conditions (from 79.3 to 78.0 percent). This is due to reduced sediment entering Scofield. However, sediments currently existing in the reservoir will continue to act as a nutrient sink, and reduction of incoming sediments due to the project will not improve the situation. After project construction, sediments would be intercepted in the Narrows Reservoir or build up in the contributing stream channels as discussed above.

Another concern is that decreased inflow may degrade water quality and increase the number of periodic fish kills. A comparison of Scofield Reservoir flushing rates under future without-project and project conditions showed an increase in projected fish kills from four in 30 years to five in 30 years. This is based on the assumption that fish kills occur 80 percent of the time when the annual flushing rate is less than 0.85 (Stephens, 1985). Decreased inflow will also result in a lower average surface area for the reservoir which will reduce the standing crop of fish in the reservoir. This loss of fish biomass would result in the loss of approximately 4,500 angler days per year.

The loss of spawning habitat for rainbow trout in Fish Creek could affect the fishery in Scofield Reservoir by reducing the number of rainbows entering the Scofield population from natural reproduction. It is not known what proportion of the rainbow trout existing in Scofield Reservoir come from natural production.

The *Narrows Reservoir* will be operated so that it will be at its highest level following spring runoff and water would be released so that most of the 6.7×10^6 m^3 (5,400 af) would be delivered by the end of September. It is expected that UDWR will manage the reservoir for a cutthroat trout fishery, though sterile rainbows may also be stocked. Natural cutthroat reproduction is expected under the proposed project alternative in the remaining segments of the three tributary streams, but this may need to be supplemented by stocking of fingerling cutthroats and rainbows. UDWR has expressed concern that, due to existing demand, there may not be enough hatchery stock available to meet demand in the new reservoir. The reservoir may support approximately 13,700 angler days of fishing annually (7,200 days

under the smaller reservoir alternative), if managed similarly to other reservoirs in the area.

Endangered Species

The Service determined that the endangered bald eagle (Haliaeetus leucocephalus) and the endangered Colorado squawfish (Ptychocheilus lucius), razorback sucker (Xyrauchen texanus), humpback chub (Gila cypha) and bonytail chub (Gila elegans) could occur in the area of the project. Reclamation prepared a Biological Assessment (BA) with a determination that the project "may affect" the four endangered Colorado River fish through the $6.7x10^6$ m^3 (5,400 af) depletion. The Service prepared a Biological Opinion (March 25, 1992) based on the BA which concluded that the Narrows project would not jeopardize the continued existence of the fish species with the implementation of a designated Conservation Measure. The Conservation Measure requires the payment of a depletion charge into the Recovery Implementation Program (RIP) established by the Service to recover the endangered Colorado River fish. If sufficient progress is not made in the RIP through the ongoing reoperation of Flaming Gorge Dam, additional steps may need to be taken by the District to offset the Narrows depletion. Since the Biological Opinion was prepared the District has changed its estimate of average annual water depletion to $6.85x10^6$ m^3 (5,557 af). The Service is preparing a revised Biological Opinion at this time. Additional mitigation measures may be required under the RIP in the amended Biological Opinion. These measures are not included in this document, but would need to be added to the District's final mitigation plan.

A category 2 candidate species, the spotted frog (Rana pretiosa) could also occur in the project vicinity. The District conducted a survey for this species in historic habit in the Sanpete Valley. Two frogs were found near Oak Creek at the northern terminus of the proposed water delivery pipeline. It is not expected that the project will have an adverse effect on this species (Hovingh, 1992).

Since the Biological Assessment was prepared the roundtail chub (Gila robusta), a fish which occurs in the lower Price River, has been added to the list of species which are candidates for threatened or endangered species listing. It is not known how this species could be impacted by lowered flows in the Price River.

DISCUSSION/PROPOSED MITIGATION

The main impacts of the Narrows project will occur on fish and wildlife resources in the reservoir basin and adjacent downstream segments of Gooseberry Creek and Cottonwood Creek. Proposed fish and wildlife mitigation measures as detailed in the Draft Environmental Impact Statement are described below. These measures were developed through coordination of the two technical teams and adopted by the District. They are referenced in the following text as the District's proposed mitigation, but it should be understood that these measures were developed with input from all interested agencies. Where there are differences between the project proposal and the small reservoir alternative,

information pertaining to the small reservoir alternative is shown in parentheses. The District's intention is to totally mitigate all impacts, where possible. To the extent possible, the District attempted to find mitigation measures which could be implemented "in place" and "in kind".

Flooding of the reservoir basin will destroy all HUs of indicator species present, as shown in Table 3. Wetland areas to be destroyed, including 6.9 km (4.3 mi) of the Gooseberry Creek tributaries (6.1 km {3.8 mi}) and the 1.6 km (one mi) Upper Gooseberry Creek segment, provide habitat units for the Richardson's vole, yellow warbler, mule deer and beaver. The District has proposed two alternatives to mitigate for wetlands losses. One alternative would involve enlarging existing wetlands and creating new wetlands adjacent to the Narrows Reservoir. Under this proposal approximately 44.5 ha (110 ac) of new wetlands will replace the hectares (acres) lost, including riparian habitat lost to flooding along Cottonwood Creek. Habitat units lost for all wetland habitat types will be replaced onsite adjacent to the reservoir according to the District's plan. However, the Corps has not accepted this plan as mitigation for wetland losses at this time. The District has proposed another alternative for full or partial mitigation that consists of purchase and restoration of wetlands adjacent to Mud Creek, a tributary to Scofield Reservoir. Approximately 89 ha (220 ac) of private lands containing degraded wetlands would be purchased. Most of the degradation has been caused by cattle which would be removed to facilitate enhancement of the wetlands. Figure 4 shows the location of the alternative wetland mitigation sites.

Conversion of upland habitat adjacent to the reservoir for wetland replacement would remove additional HUs for mule deer and Brewer's sparrow. This is reflected in the acreage of impacted HUs shown in Table 3 and will need to be mitigated if this alternative is chosen for wetlands mitigation. If the Mud Creek alternative wetland mitigation is chosen, these additional HUs would not be required.

The District has proposed mitigation measures to replace lost upland shrub HUs for mule deer and Brewer's sparrow. Proposed measures include acquiring 60.7 ha (150 ac) of conservation easements with land use restrictions adjacent to the reservoir basin, which would avoid future adverse impacts, but would not mitigate for project impacts. Offsite mitigation through participating in other projects in the Manti-LaSal National Forest such as reclaiming areas infested with tarweed (Media glomerata) to native shrub/grass habitats is also proposed. It is not known if these rehabilitated areas would meet the specific habitat needs of mule deer and Brewer's sparrow lost due to the project. Specific projects have not been committed to as yet. The District has also committed to acquire 259 ha (640 ac) of private land adjacent to Lower Fish Creek (Price River) below Scofield Reservoir. The sections also contain some upland sagebrush habitats whose protection could compensate somewhat for upland habitats including elk calving and mule deer fawning areas lost to the project. Wildlife values would be enhanced by fencing.

Other project impacts include impacts to stream fisheries, stream channels and riparian habitat corridors in downstream segments of Gooseberry and Cottonwood Creeks.

The 4.8 km (3 mi) Middle Gooseberry segment will be largely dewatered. The channel will become narrower and shallower. Sediments will also accumulate due to low flow conditions. The District proposes to mitigate riparian habitat losses onsite by placing constrictions in the channel to prevent the water surface from dropping and modifying stream banks so that overbank flooding will still be possible. Riparian plantings will be used in areas where vegetation has been damaged or destroyed. Buildup of fine sediments in the stream channel will be minimized by providing flushing flow releases from the Narrows Dam when necessary. The District has proposed to acquire a 16.2 ha (40 ac) parcel of private land that this segment of the creek runs through.

Impacts to stream fisheries in the inundated segments in Upper Gooseberry will be total, and they will be severe in the Middle Gooseberry segment. Other impacted stream segments will not be as directly affected. To mitigate onsite for lost fisheries the District will restore year-round flows in two of the Gooseberry Creek tributaries through releases from Fairview Lakes. This will result in the creation of approximately 3.7 km (2.3 mi) of spawning and rearing habitat for cutthroat trout, which will partially mitigate for the 8.5 km (5.3 mi) lost in the Upper Gooseberry segments. Under the smaller reservoir alternative, this mitigation measure will not be available and the District will need to provide an additional stream segments for cutthroat spawning habitat elsewhere.

The District has proposed to release water from the Narrows Dam for flushing sediments and for fish habitat during critical periods to avoid some fishery losses in the Middle Gooseberry segment. An average of 3.7×10^5 m^3 (300 af) would be available for release each year. UDWR has also suggested that the water might be used as an instream flow supplement during the winter period to help prevent fish kills in Lower Gooseberry Reservoir. The District and UDWR would determine the timing and amount of water to be released.

Through these measures, spawning and rearing habitat for cutthroat trout will be able to be maintained in the Middle Gooseberry segment. However, habitat for adult and juvenile trout will be lost throughout 6.4 km (4 mi) of stream in the Upper and Middle segments. The District has proposed to acquire stream segments in a 1:1 ratio with the mileage of impacted streams. The District proposed to acquire approximately 20.2 ha (50 ac) of private land containing live fishery streams. A corridor, approximately 61 m (200 ft) wide, would be acquired along a total of 6.4 km (4 mi) of stream. The project might include parcels from several different streams. In the DEIS, the District identified five stream segments that may be available for purchase. The acquired stream corridors would be fenced with a pole top fence to exclude grazing. These stream segments would provide habitat for all life stages of cutthroat trout.

The purchase of the State section in the Lower Fish Creek area could also contribute to mitigation of fishery impacts associated with the project, particularly to stream segments suitable for adult and juvenile occupancy. This section of Fish Creek currently provides habitat for adult and juvenile cutthroat, rainbow and brown trout.

The District has proposed to prevent stream degradation from increased flows in Upper Cottonwood Creek by construction of a 1.3 km (0.8 mi) pipeline to convey reservoir releases. A winter release of 0.056 cms (2 cfs) would also be made from the Narrows Reservoir to Cottonwood Creek during the winter months (October through March) to increase fish habitat during that period and to provide mitigation for stream channel widening that would occur due to high summer flows. No mitigation was proposed for loss of fishery habitat in Lower Cottonwood Creek.

Lower stream flows and their impacts on fisheries in Gooseberry and Fish Creeks may affect reproduction and recruitment into the Lower Gooseberry and Scofield Reservoir populations. This could impact recreational use of the two reservoirs. The District calculates that 4,500 angler days per year will be lost at Scofield Reservoir but does not calculate potential losses at Lower Gooseberry Reservoir. Creation of a new fishery on the Narrows Reservoir would provide approximately 13,700 angler days of use, according to the District, offsetting losses at other reservoirs. The smaller reservoir alternative would provide approximately 7,200 days of angler user.

The District has committed to a monitoring program to evaluate the progress of wildlife and wetlands mitigation plans, both qualitatively and quantitatively to ensure that lost HUs and wetland acreages are replaced. Statistical comparisons will be made and additional mitigation measures would be required if full mitigation standards are not achieved. A similar monitoring program for aquatic mitigation measures was not included in the Draft EIS.

The Service and UDWR believe that the types of mitigation proposed in the DEIS are appropriate. However, the two agencies were concerned about inadequacies in the amount of mitigation proposed, as not all impacts were proposed to be totally mitigated. The Corps will determine whether the amount of mitigation proposed for wetland resource losses is appropriate. Mitigation for upland wildlife species will be total replacement of lost HUs. The main concern of the Service and UDWR was the adequacy of proposed aquatic mitigation measures, particularly for losses of stream segments that support fisheries. In a letter dated September 21, 1994 (see Appendix B), the UDWR has recommended measures, including some already committed to by the District, to be taken to totally mitigate for these losses in both the Price River Basin and the Sanpitch River Basin. The Service concurs with the recommendations of UDWR. The District voted on September 7, 1994 to incorporate those additional measures not contained in the DEIS into their mitigation plan in the Final EIS. Therefore the cost estimate (Appendix A) and the Aquatic Impacts and Mitigation Measures (Table 10) include these additional measures, as described below.

Affected streams in the **Price River Basin** (Gooseberry Creek, and Fish Creek) will suffer losses to fishery values; in some segments the losses will be complete. The UDWR recommended the following measures to offset project impacts. Acquisition and fencing of 4.0 miles of Mud Creek would complement the proposed wetland mitigation project in this area. These projects together would mitigate for both wetlands and stream impacts, as well as potentially benefitting water quality in Scofield Reservoir by reducing nutrients entering

the reservoir from the Mud Creek drainage. UDWR recommended that two miles of Lower Fish Creek be acquired, fenced and enhanced. This would be done in conjunction with the acquisition of a section of State School trust lands which is proposed as mitigation for upland impacts. It is also recommended that 2.5 miles of Winterquarters Creek, and one mile of Pondtown Creek within the USFS boundary, be acquired, fenced, and/or enhanced for improvement of stream and riparian habitat conditions.

Recommendations for the **Sanpitch River Basin** include piping the irrigation flows in the upper 0.8 miles of Cottonwood Creek and providing a minimum 2 cfs instream flow for this stretch during the winter season. For enhancement of the segment of Cottonwood Creek from the canyon mouth to the confluence with the Sanpitch River, UDWR recommended a 2 cfs minimum instream flow during the irrigation season. This will provide year-round flows for fish habitat and enhance the riparian corridor. Currently, this stream segment is dewatered during the irrigation season. UDWR also recommended enhancement of 4 miles of Starvation Creek, from the confluence of Bennion Creek to the confluence with Soldier Creek in Spanish Fork Canyon to improve water quality and riparian habitat. Enhancement may include bank stabilization, revegetation, or other measures.

RECOMMENDATIONS

Properties acquired for mitigation, whether for upland wildlife, wetlands, or aquatic wildlife, could be managed under the following strategies: acquisition for protection, acquisition for enhancement, conservation easements for protection, conservation easements for enhancement, enhancement of USFS property and enhancement of UDWR property. Mitigation for this project will probably includes a combination of several or all of these strategies.

The following recommendations also need to be addressed in the Final EIS to complete the mitigation plan:

1. The above recommendations apply to the preferred (large reservoir) alternative. If the small reservoir alternative is chosen, additional mitigation will be required for the loss of cutthroat trout spawning habitat which could not be replaced by restoration of headwater streams from Fairview Lakes. At the time this alternative is chosen, additional mitigation measures will be developed in coordination with the Service and UDWR.

2. Acquisition of private lands should preferably be made by fee title. In areas adjacent to the reservoir basin easements would be appropriate. In the Final EIS the District should identify the appropriate management entities for specific properties being considered for acquisition. Conditions of easements should also be specified in the Final EIS.

3. As part of the mitigation plan the District must develop a comprehensive monitoring and maintenance program to ensure that aquatic and wildlife habitat replacement values are being met. This program will address monitoring procedures, responsible parties, and steps to be taken if mitigation efforts do not prove successful. It should also include an Operation and Maintenance account with adequate funding to ensure that mitigation requirements are met. This plan should be included as part of the Final EIS.

4. Reclamation will ensure that language in the Small Reclamation Project Loan repayment contract stipulates that mitigation will be concurrent with project construction.

5. Any additional measures for wetland mitigation required by the Corps should be included in the Final mitigation plan.

6. Any additional measures for impacts to listed fish species required by the Amended Biological Opinion should be included in the Final mitigation plan.

7. The Final EIS should list detailed mitigation commitments for all project impacts. Specifics such as management entities for the various stream segments, and specific enhancement measures to be taken in each area should be listed. If there are any areas where a specific final mitigation strategy has yet to be determined a timetable for development should be included, along with a list of agencies to be consulted for concurrence.

Appendix A includes a preliminary cost analysis of the mitigation plan including costs for mitigation as proposed by the District in the DEIS as well as costs for additional mitigation measures approved by the District as discussed above. Costs are estimated since property acquisition costs may vary.

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APPENDIX A

MITIGATION COST ESTIMATE (PREFERRED ALTERNATIVE)

Mitigation Item	Quantity	Unit	Unit Price	Cost
Wetland Mitigation Area (adjacent to reservoir)	110	acre	500	55,000
Plantings for Wetland Mitigation Area	lump sum	lump sum	10,000	10,000
or				
Wetland Mitigation Area *(Mud Creek)	220	acre	500	110,000
Fencing on Mud Creek	2	mile	13,000	26,000
Wildlife Conservation Easement Adjacent to Reservoir	150	acre	400	60,000
Acquire State Section on Price River below Scofield Reservoir	640	acre	350	224,000
Fencing for State Section	4	mile	13,000	52,000
Acquire Middle Gooseberry land	40	acre	350	14,000
Fencing on Middle Gooseberry	0.25	mile	13,000	3,250
Middle Gooseberry Channel rehab	3	mile	10,000	30,000
Upper Gooseberry Tributaries Planting & Channel Improvements	lump sum	lump sum	10,000	10,000
Reseeding on Forest Service lands	900	acre	30	27,000
Monitoring Aquatic and Wildlife Mitigation	lump sum	lump sum	50,000	50,000
Endangered Fish Depletion Fee (1995 Cost)	5,557	acre-feet	12.71	70,629.47

Acquire Stream Segments (2 mi *Mud Creek, 1 mi Lower Fish Creek, 1 mi Upper Fish Creek, 2.5 mi Winterquarters Creek, 2 mi Pond-town Creek, 4 mi Starvation Creek)	303	acre	500	151,500
Fence Fishery Segments	25	mile	13,000	325,000
Enhance Stream Segments	13.5	mile	15,000	202,500

TOTAL (Wetlands Alternative Adjacent to Reservoir) 1,284,879.47

TOTAL (Mud Creek Wetland Alternative) 1,355,879.47

*2 miles of Mud Creek will be purchased for mitigation of aquatic impacts. If the Mud Creek wetlands mitigation alternative is chosen, an additional 2 miles of stream will be purchased and fenced.

APPENDIX B

UTAH NATURAL RESOURCES
Wildlife Resources
1596 West North Temple • Salt Lake City, UT 84116-3195 • 801-533-9333

memorandum

SEP 28 1994

September 21, 1994

Mr. Reed Harris
U.S. Fish and Wildlife Service
Lincoln Plaza
145 East 1300 South, Suite 404
Salt Lake City, Utah 84115

Subject: Final Comments, Fish and Wildlife Coordination Act Report, Narrows Project

Dear Reed:

We have reviewed the subject draft Fish and Wildlife Coordination Act Report dated June 1994 for the proposed Narrows Project in Utah. Contained herein are the Division of Wildlife Resources' (Division) final comments regarding the document. We have provided additional information and mitigation recommendations which have been derived since the draft report was issued.

Through previous consultation among our agencies, the Division had recommended that mitigation for stream impacts occur on a 3:1 or 2:1 linear basis whenever the project sponsor proposed improvement of existing stream segments as a mitigation method, by either fencing to protect riparian and stream bank areas, or through other unidentified methods. Since that time, Division staff have refined the recommendation to account for project impacts and project-induced mitigation improvements using the Habitat Quality Index method. For this analysis, Division staff used existing file data, published reports, and professional judgement to estimate the number of Habitat Units present in stream segments which would or could be affected by the Narrows project, either as impacted streams or as potential mitigation sites. Both pre- and post-project Habitat Units were estimated using those methods.

Table 1 presents the Division's recommended mitigation for impacts to stream fishery resources of the Proposed Large Dam Alternative of the Narrows Project which had previously been recommended in concept at 3:1 or 2:1 linear ratios. All other proposed mitigation recommendations in the draft report would

remain unchanged, unless specifically modified herein. Also shown is the analysis of Habitat Units for each stream segment under existing and Post-Project conditions. Specific recommendations regarding the types of improvements which should be implemented follow.

Price River Basin

The recommendation to acquire and fence 4.0 miles of Mud Creek is intended to complement the proposed wetland mitigation project also along Mud Creek. Together these two projects would not only mitigate wetland and stream impacts, but could potentially benefit water quality in Scofield Reservoir by trapping and reducing nutrients entering Scofield Reservoir from the Mud Creek drainage. The recommendation regarding Lower Fish Creek is to acquire, fence and enhance two miles. Much of this would be accomplished in concert with the proposed mitigation for upland impacts of acquiring a section of State School Trust lands. Acquiring and fencing 2.5 miles of Winterquarters Creek would allow for improvement of stream and riparian conditions. One mile of Pondtown Creek within the U.S. Forest Service boundary is also recommended for acquisition and fencing or enhancement.

Sanpitch River Basin

Piping most of the irrigation flows from the tunnel outlet downstream 0.8 miles to discharge into Cottonwood Creek will avoid an impact from high project releases, and will allow for enhancement of summer flows in the upper 0.8 mile reach of Cottonwood Creek. Providing a 2 cfs minimum instream flow in the winter season to this same reach of stream will provide for establishment of year-round flows and a naturally reproducing complement of fish species. The enhancement measure proposed for the lower Cottonwood Creek, from the canyon mouth to the confluence of the San Pitch River, is to provide a 2 cfs minimum instream flow during the irrigation season. This will provide year-round flows in the stream, which will provide some fish habitat, will create a fishery for local residents, and enhance the riparian corridor. Presently this reach of stream is de-watered during the irrigation season.

Enhancement along the 4 miles of Starvation Creek, from the confluence of Bennion Creek down to the confluence with Soldier Creek (Utah County, Spanish Fork Canyon) will improve water quality and riparian habitat of the stream. Enhancement can

include, but is not limited to, bank stabilization, especially where the road confines the stream channel and causes bank erosion, and revegetation in appropriate locations.

Mitigation recommendations for the Small Dam Alternative would be similar to the recommendations provided for the Large Dam Alternative, with the exception that additional mitigation for loss of cutthroat trout spawning habitat would need to be provided in lieu of the restoration of headwater streams from Fairview Lakes. The Division proposes that a final mitigation plan for that impact would be developed in consultation with the project sponsor at that time, if the Smaller Dam Alternative is selected.

The only other comment we have on the report is that the 2 cfs minimum streamflow release from the Narrows Tunnel to the headwaters of Cottonwood Creek during the "winter" should actually be a commitment to maintain the 2 cfs minimum flow in the stream from the end of one irrigation season to the beginning of the next. This should be noted in the report, rather than beginning and ending on a fixed date regardless of when irrigation deliveries equal to or greater than the 2cfs minimum begin and end.

We appreciate the efforts of your staff in working closely with Division staff during the past several years on this project. Please contact Mark Holden or Catherine Quinn at 538-4700 if you have any questions regarding these comments.

Sincerely,

Robert G. Valentine
Director

RGV/MH/kj

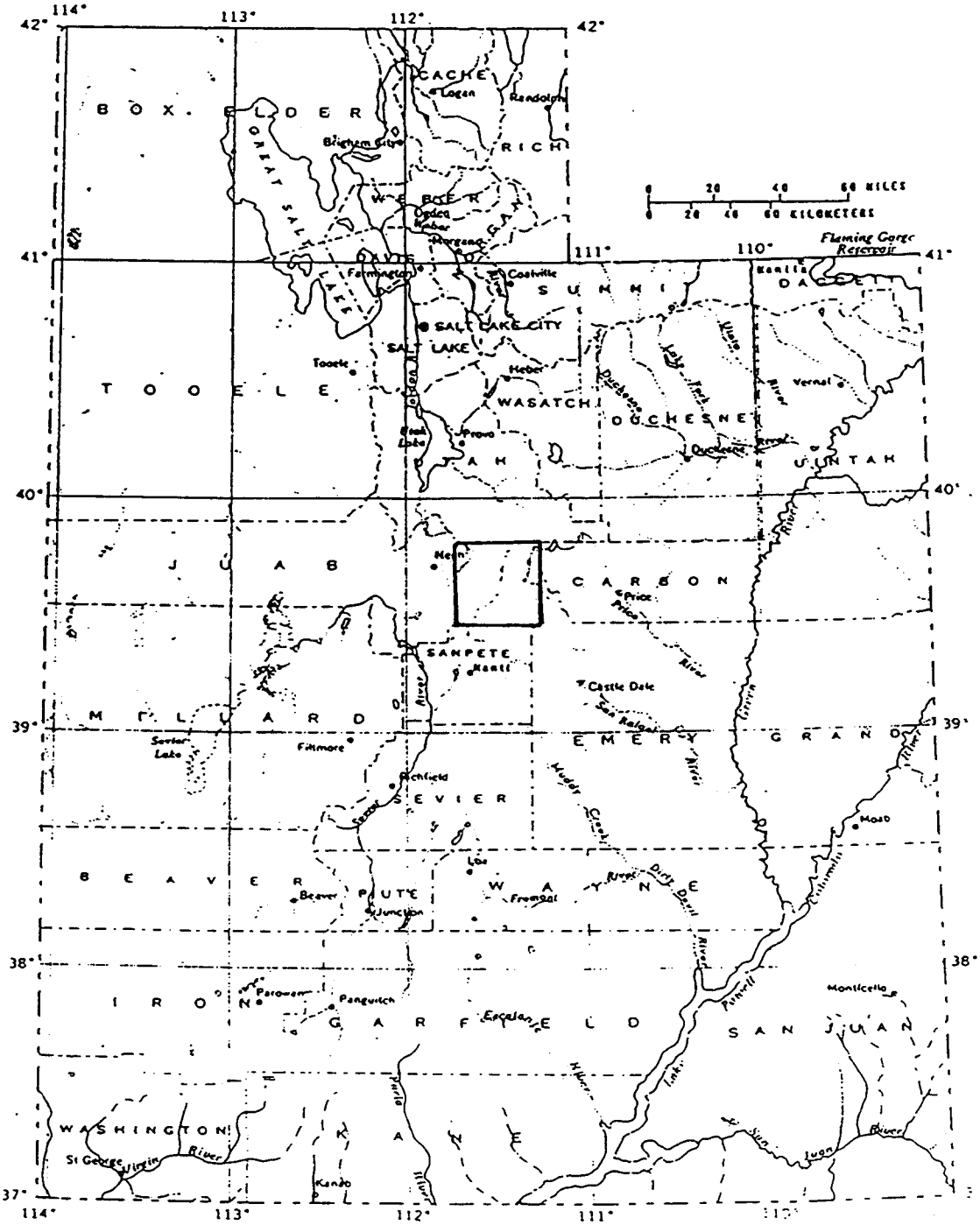
cc: Richard Noble, Franson-Noble Associates
Manti-LaSal National Forest Supervisor

WMH\WP\MITRECC.FWS

TABLE 1
ESTIMATION OF HABITAT QUALITY INDEX UNITS ON AFFECTED
AND POTENTIAL MITIGATION REACHES, PREFERRED ALTERNATIVE

Stream	Miles Affected	Existing HUs/mi	HUs Post Project	Change in HUs/mi	HUs to Replace	Replacement HUs Gained
Price River Basin						
Middle Gooseberry C.	4	139	0	-139	556	-----
Lower Gooseberry Cr.	2	203	132	-71	142	-----
Total HUs Lost					**698**	
Mud Creek	4	79	160	81	----	324
Lower Fish Creek	2	312	350	38	----	76
Upper Fish Creek	1	432	517	85	----	85
Winterquarters Creek	2.5	35	77	42	----	105
Pondtown Creek	2	50	103	53	----	106
Total HUs Replaced						**696**
Sanpitch River Basin						
Cottonwood Creek	4.9	79	13	-66	322	----
Total HUs Lost					**322**	
Upper Cottonwood Cr.	0.8	4	202	198	----	158
Lower Cottonwood Cr.	1.2	0	40	40	----	48
Starvation Creek	4	82	111	29	----	116
Total HUs Replaced						**322**

Figure 1 - General Project Location Map



PROJECT AREA

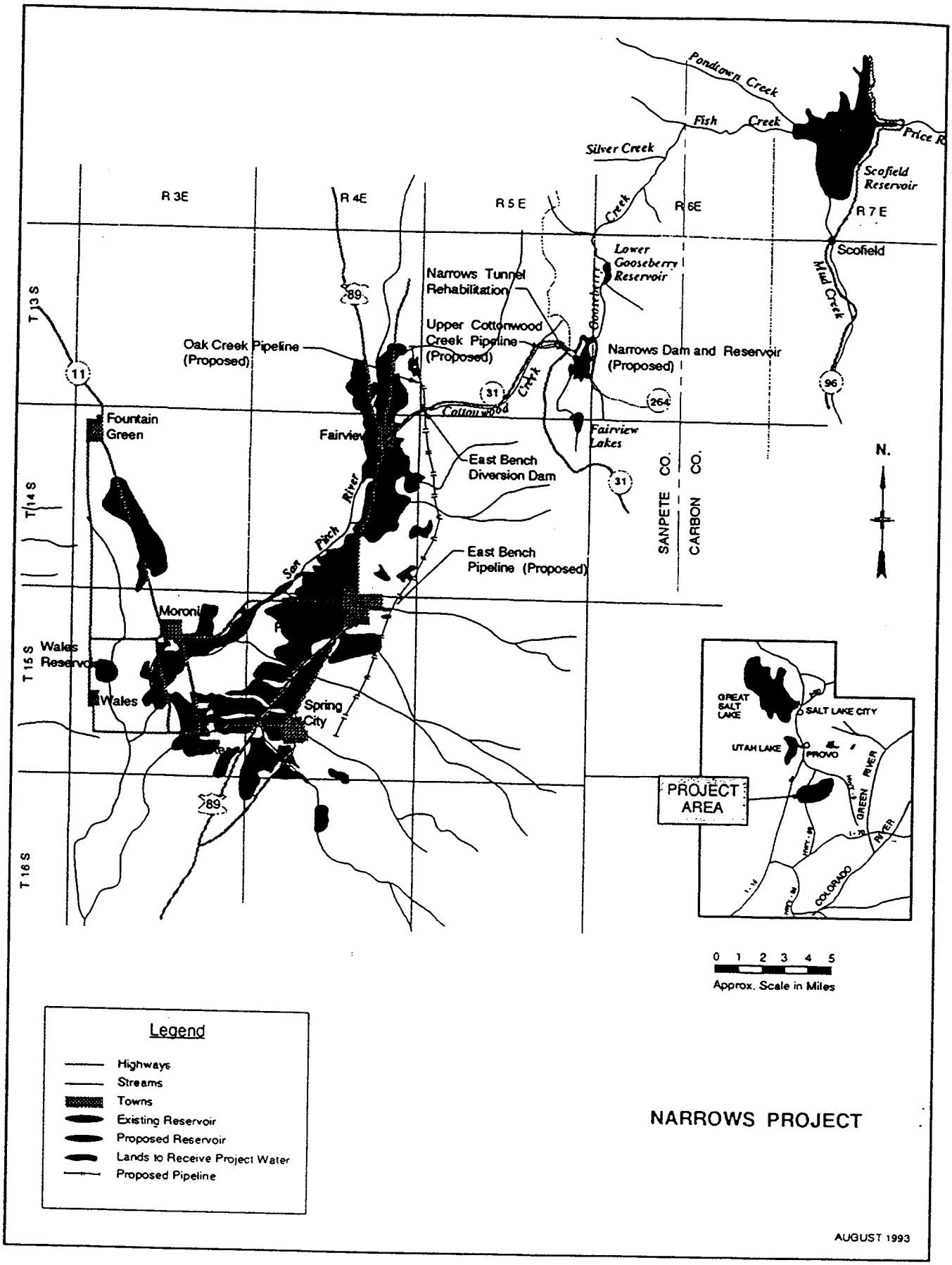


Figure 2. Narrows Project Area and Water Distribution System

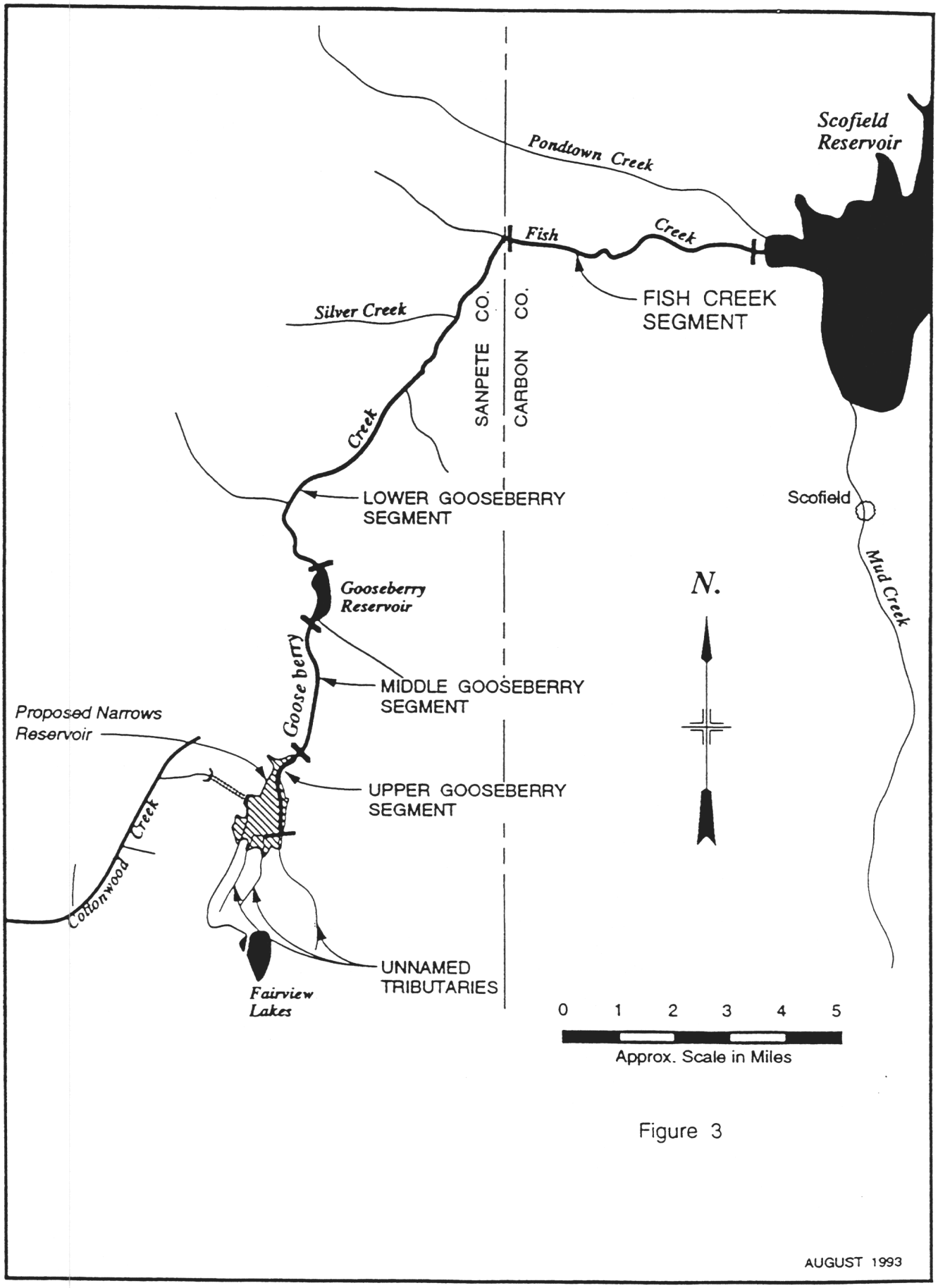


Figure 3

Figure 3. Streams and Reservoirs in the Narrows Project Area

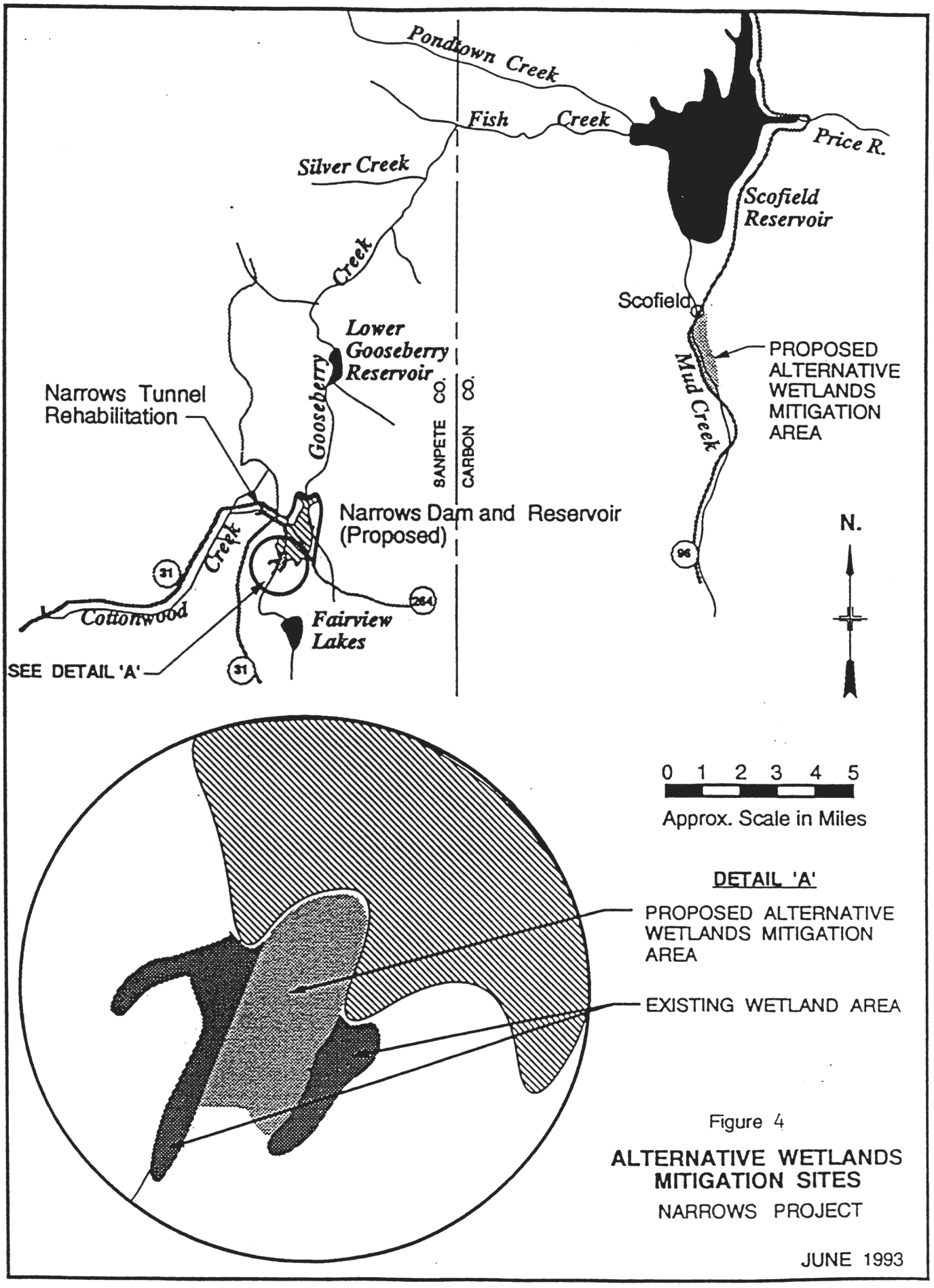


Figure 4

ALTERNATIVE WETLANDS MITIGATION SITES

NARROWS PROJECT

JUNE 1993

TABLE 1: Wildlife Feeding Guilds for the Narrows Basin Study.

COVER	FEEDING TYPES: CARNIVORE	INSECTIVORE	HERBIVORE	OMNIVORE
AERIAL		Common Nighthawk Poor-will Townsend's Solitaire Tree Swallow Small Footed Myotis Western Pipistrelle		
SHRUB LAYER		Willow Flycatcher		Mtn. Bluebird Greentailed Towhee **Brewer's Sparrow** Sage Sparrow
TERRESTRIAL SURFACE	Cooper's Hawk Gt. Horned Owl Northern Harrier	Killdeer Vagrant Shrew Northern Flicker Sagebrush Lizard Short-horned Lizard Western Garter Snake	Broadtail Hummingbird Montane Vole Jumping Mouse Deer Mouse Uinta Ground Squirrel Cottontail Rabbit Least Chipmunk Moose Elk **Mule Deer**	Magpie Raven Rock Wren Coyote
TERRESTRIAL SUBSURFACE	Badger		Pocket Gopher	
RIPARIAN/ WETLAND	Belted Kingfisher	Tiger Salamander Northern Leopard Frog Water Shrew Common Snipe Yellow Warbler	Green-winged Teal Cinnamon Teal Mallard Canada Goose Sandhill Crane American Dipper **Beaver** **Montane Vole**	

Bolded names were evaluation species.

TABLE 2: Wildlife Reproductive Guilds for the Narrows Basin Study

COVER TYPES	REPRODUCTIVE GUILD SPECIES
SHRUB	
Vegetation	Green-tailed Towhee, **Brewer's Sparrow**, Willow Flycatcher, **Yellow Warbler**
Bareground	Cottontail, Deer Mouse, Common Nighthawk, Poor-will, Sagebrush Lizard, Short-horned Lizard
RIPARIAN/WETLAND	
Vegetation	**Montane Vole**, Harvest Mouse, Common Snipe, Vagrant Shrew, Water Shrew, Tiger Salamander, Northern Leopard Frog, Western Garder Snake, Green-winged Teal, Cinnamon Teal, Mallard
Organic Litter	Northern Harrier, Poor-will, Jumping Mouse, **Beaver**
Bareground	Killdeer
Bank	Belted Kingfisher, Muskrat, Dipper
SUBSURFACE	
Borrow	Badger, Uinta Ground Squirrel, Least Chipmunk, Pocket Gopher

Bolded names were evaluation species.

TABLE 3: Baseline Habitat Conditions Within the Narrows Reservoir Basin for (A) Affected Areas; and (B) Evaluation Species.

(A) AFFECTED AREAS

Vegetation type (HEP cover type)

Reservoir inundation	Acres
Vasey sagebrush (USHE)	331
Silver sagebrush (USHE)	156
Wetlands (PEM, PSS)	100
Aspen	0.19
Previously disturbed	17
Subtotal	604.19
Potential Disturbance in wetland mitigation area	
Vasey sagebrush	110.00
TOTAL	714.19

(B) EVALUATION SPECIES

(Smaller Reservoir Alternative in Parentheses)

Species	Cover Type(s) Used	Acres	HSI	HUs
Richardson's vole	PEM	63 (18)	1.00	63 (18)
Yellow warbler	PSS	37 (10)	0.70	26 (7)
Beaver	PEM,PSS	100 (28)	0.13	13 (4)
Mule deer	PEM,PSS, USHE	587 (246)	0.23	135 (57)
Brewer's sparrow	USHE	487[a](218)	0.98	624 (214)

HEP = Habitat Evaluation Procedures
PEM = Palustrine emergent wetland cover (herbaceous wetlands)
PSS = Palustrine scrub/shrub cover (shrubby wetlands)
USHE = Shrub cover (Vasey sagebrush; silver sagebrush)
HSI = Habitat Suitability Index
HUs = Habitat Units
a = all USHE habitat type areas, including area disturbed for mitigation

TABLE 4

Average Existing and Projected Flows

(unit—cfs)

Month	Recommended Plan			Smaller Reservoir Plan			No Action Plan		
	Average year (1968)	Wet year (1984)	Dry year (1977)	Average year (1968)	Wet year (1984)	Dry year (1977)	Average year (1968)	Wet year (1984)	Dry year (1977)
Gooseberry Creek at Proposed Narrows Damsite									
October	1.0	1.0	1.0	1.0	1.0	1.0	2.0	4.7	1.6
November	1.0	1.0	1.0	1.0	1.0	1.0	1.5	3.3	1.4
December	1.0	1.0	1.0	1.0	1.0	1.0	1.4	4.2	0.7
January	1.0	1.0	1.0	1.0	1.0	1.0	1.3	2.4	1.0
February	1.0	1.0	1.0	1.0	1.0	1.0	1.3	2.4	1.2
March	1.0	1.0	1.0	1.0	1.0	1.0	1.4	2.4	1.2
April	1.0	1.0	1.0	1.0	1.0	1.0	3.5	5.3	5.5
May	5.9	79.3	5.9	1.0	87.2	1.0	45.3	102.9	15.1
June	10.5	100.0	1.0	37.7	102.0	1.0	61.8	92.8	6.5
July	1.0	1.0	1.0	1.0	1.0	1.0	7.2	12.8	3.0
August	1.0	1.0	1.0	1.0	1.0	1.0	4.9	6.0	1.5
September	1.0	1.0	1.0	1.0	1.0	1.0	3.2	4.3	0.9
Gooseberry Creek Below Lower Gooseberry Reservoir									
October	2.9	5.8	2.4	2.9	5.8	2.4	4.1	10.2	3.0
November	3.1	5.9	2.2	3.1	5.9	2.2	3.8	8.8	2.7
December	3.2	5.4	2.1	3.2	5.4	2.1	3.8	9.0	1.9
January	3.6	6.2	2.1	3.6	6.2	2.1	4.0	7.8	2.1
February	3.7	6.1	2.2	3.7	6.1	2.2	4.1	7.6	2.4
March	3.7	5.2	2.3	3.7	5.2	2.3	4.2	7.0	2.6
April	4.6	6.4	6.5	4.6	6.4	6.5	7.5	11.2	10.9
May	38.2	172.5	0.9	33.3	180.5	0.9	82.1	199.3	12.9
June	34.8	156.9	3.9	62.0	159.0	3.9	92.1	162.0	9.8
July	5.9	9.9	1.5	5.9	9.9	1.5	12.8	24.1	3.8
August	5.6	4.9	1.3	5.6	4.9	1.3	10.0	10.7	2.0
September	3.9	3.6	1.9	3.9	3.6	1.9	6.4	7.4	1.9
Fish Creek Above Scofield Reservoir									
October	9.4	18.9	7.6	9.4	18.9	7.6	10.6	23.3	8.2
November	9.5	17.3	7.9	9.5	17.3	7.9	10.2	20.2	8.4
December	8.4	15.6	7.5	8.4	15.6	7.5	9.1	19.2	7.3
January	9.1	16.3	5.5	9.1	16.3	5.5	9.5	17.9	5.6
February	10.6	19.0	5.3	10.6	19.0	5.3	11.1	20.6	5.5
March	14.1	17.3	5.4	14.1	17.3	5.4	14.6	19.1	5.7
April	17.8	43.7	24.5	17.8	43.7	24.5	20.7	48.5	29.0
May	211.7	614.5	11.4	206.8	622.5	6.5	255.6	641.3	23.5
June	173.5	360.8	8.5	200.7	362.8	8.5	230.8	365.8	14.4
July	29.6	51.4	4.6	29.6	51.4	4.6	36.5	65.7	6.8
August	17.6	21.6	3.5	17.6	21.6	3.5	22.0	27.4	4.1
September	12.2	17.3	3.5	12.2	17.3	3.5	14.7	21.0	3.5

TABLE 4 (continued)

(unit--cfs)

Month	Recommended Plan			Smaller Reservoir Plan			No Action Plan		
	Average year (1968)	Wet year (1984)	Dry year (1977)	Average year (1968)	Wet year (1984)	Dry year (1977)	Average year (1968)	Wet year (1984)	Dry year (1977)
Price River Below Scofield Dam									
October	40.0	176.5	22.8	40.0	176.5	22.8	40.0	204.0	22.8
November	2.8	5.1	10.1	2.8	5.1	10.1	2.8	5.1	10.1
December	3.4	0.0	11.4	3.4	0.0	11.4	3.4	0.0	11.4
January	3.7	0.0	13.0	3.7	0.0	13.0	3.7	0.0	13.0
February	0.3	0.0	7.2	0.3	0.0	7.2	0.3	0.0	7.2
March	0.0	0.0	6.5	0.0	0.0	6.5	0.0	199.0	6.5
April	0.0	274.6	32.0	0.0	274.6	32.0	0.0	309.8	32.0
May	0.0	661.9	41.1	0.0	669.9	41.1	27.7	463.7	41.1
June	4.4	529.2	43.8	4.4	531.2	43.8	4.4	534.2	43.8
July	152.8	149.3	61.9	152.8	149.3	61.9	152.8	155.3	61.9
August	87.2	108.5	39.1	87.2	108.5	39.1	87.2	124.2	39.1
September	163.8	114.1	21.9	163.8	114.1	21.9	163.8	135.6	21.9
Fairview Tunnel at Outlet									
October	2.0	2.0	2.0	2.0	2.0	2.0	0.0	0.0	0.0
November	2.0	2.0	2.0	2.0	2.0	2.0	0.0	0.0	0.0
December	2.0	2.0	2.0	2.0	2.0	2.0	0.0	0.0	0.0
January	2.0	2.0	2.0	2.0	2.0	1.3	0.0	0.0	0.0
February	2.0	2.0	2.0	2.0	2.0	0.2	0.0	0.0	0.0
March	2.0	2.0	2.0	2.0	2.0	0.2	0.0	0.0	0.0
April	0.0	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.0
May	0.6	1.2	0.0	0.6	1.2	0.0	0.6	1.2	0.0
June	4.3	12.3	8.8	4.3	12.3	8.8	4.1	12.1	8.6
July	45.3	45.0	43.3	45.3	45.0	25.3	14.7	12.4	0.3
August	43.5	45.5	33.1	43.5	45.5	0.2	13.4	16.3	0.2
September	17.4	24.9	0.1	17.4	24.9	0.1	1.6	10.3	0.1
Cottonwood Creek at Mouth of Canyon									
October	3.3	5.1	3.1	3.3	5.1	3.1	1.3	3.1	1.1
November	3.6	5.0	3.3	3.6	5.0	3.3	1.6	3.0	1.3
December	3.4	4.8	3.2	3.4	4.8	3.2	1.4	2.8	1.2
January	3.4	4.7	3.0	3.4	4.7	2.3	1.4	2.7	1.0
February	3.6	4.6	3.2	3.6	4.6	1.4	1.6	2.6	1.2
March	4.0	4.7	3.3	4.0	4.7	1.5	2.0	2.7	1.3
April	3.7	8.1	3.2	3.7	8.1	3.2	3.7	8.1	3.2
May	45.0	117.1	4.9	45.0	117.1	4.9	45.0	117.1	4.9
June	46.6	63.4	12.8	46.6	63.4	12.8	46.4	63.2	12.6
July	49.4	53.5	44.6	49.4	53.5	26.6	18.8	20.9	1.6
August	46.0	49.2	34.0	46.0	49.2	1.1	15.9	20.0	1.1
September	19.1	27.9	1.0	19.1	27.9	1.0	3.3	13.3	1.0

Table 5
Weighted Usable Area for
Cutthroat Life Stages in
Upper Gooseberry Creek with Existing Flows

Month	Life Stage	Average Weighted Usable Area (1,000 units)
January	Adult	8.4
	Juvenile	1.9
February	Adult	8.4
	Juvenile	1.9
March	Adult	8.7
	Juvenile	1.9
April	Adult	11.3
	Juvenile	3.3
May	Adult	11.7
	Juvenile	2.7
	Spawning	0.0
June	Adult	10.7
	Juvenile	2.5
	Spawning	0.0
July	Adult	13.2
	Juvenile	3.5
	Spawning	1.5
August	Adult	12.2
	Juvenile	3.7
	Spawning	1.3
	Fry	4.7
September	Adult	11.1
	Juvenile	3.0
	Fry	4.8
October	Adult	10.2
	Juvenile	2.0
November	Adult	8.9
	Juvenile	2.0
December	Adult	8.7
	Juvenile	1.9

Table 6
Monthly Pre- and Post-Project Cutthroat Trout Habitat In Middle and Lower Gooseberry Creek During Average Water Year[1/]

Month	Life Stage	Middle Gooseberry Creek			Lower Gooseberry Creek		
		Pre-project	Post-project	Change (%)	Pre-project	Post-project	Change (%)
January	Adult	62.9	57.6	8.4	355.4	344.7	-3.0
	Juvenile	18.0	16.7	7.2	61.6	60.9	-1.1
February	Adult	62.9	57.6	-8.4	359.0	348.5	-2.9
	Juvenile	18.0	16.7	-7.2	63.0	61.1	-3.0
March	Adult	64.7	57.6	-11.0	359.0	344.7	-4.0
	Juvenile	18.3	16.7	-8.7	62.6	60.9	-2.7
April	Adult	106.2	57.6	-45.8	404.9	393.1	-2.9
	Juvenile	30.1	16.7	-44.5	73.2	68.7	-6.1
May	Adult	205.8	57.6	-72.0	562.1	548.3	-2.5
	Juvenile	91.0	16.7	-81.6	75.0	56.0	-25.3
	Spawning	1.5	0.1	-93.3	0.0	0.0	-
June	Adult	202.6	57.6	-71.6	553.2	548.1	-0.9
	Juvenile	88.7	16.7	-81.2	79.6	56.1	-29.5
	Spawning	0.4	0.1	-75.0	0.0	0.0	-
July	Adult	144.4	57.6	-60.1	430.6	405.3	-5.9
	Juvenile	42.7	16.7	-60.9	71.3	73.4	+2.9
	Spawning	0.9	0.1	-88.9	0.0	0.0	-
August	Adult	127.4	57.6	-54.8	413.9	398.7	-3.7
	Juvenile	36.6	16.7	-54.4	73.0	70.4	-3.6
	Spawning	2.8	0.1	-96.4	0.0	0.0	-
	Fry	57.3	28.1	-51.0	65.3	73.1	+11.9
September	Adult	100.2	57.6	-42.5	397.3	355.4	-10.5
	Juvenile	28.4	16.7	-41.2	69.8	61.6	-11.7
	Fry	44.5	28.1	-36.9	73.6	67.1	-8.8
October	Adult	75.4	57.6	-23.6	362.2	327.4	-9.6
	Juvenile	20.9	16.7	-20.1	63.2	58.0	-8.2
November	Adult	66.4	57.6	-13.3	341.5	323.9	-5.2
	Juvenile	18.8	16.7	-11.2	60.0	57.5	-4.2
December	Adult	64.7	57.6	-11.0	348.5	330.9	-5.1
	Juvenile	18.3	16.7	-8.7	61.1	58.5	-4.3

1/ The amount of Weighted Usable Area is expressed in 1,000 units. Average water year is defined as 1968 flows.

Table 7
Monthly Pre- and Post-Project Rainbow Trout Habitat
In Lower Gooseberry Creek During Average Water Year1/

Month	Life Stage	Pre-project	Post-project	Change (%)
January	Adult	44.1	43.2	-2.0
	Juvenile	21.0	21.0	0.0
February	Adult	44.5	43.5	-2.2
	Juvenile	21.1	21.0	-0.5
March	Adult	44.5	43.2	-2.9
	Juvenile	21.1	21.0	-0.5
April	Adult	65.6	50.0	-23.8
	Juvenile	29.4	22.3	-24.1
May	Adult	142.1	133.0	-6.4
	Juvenile	49.7	51.9	+4.4
	Spawning	0.0	0.0	-
June	Adult	141.9	132.9	-6.3
	Juvenile	47.8	51.9	+8.6
	Spawning	0.3	0.0	-100.0
July	Adult	87.0	66.3	-23.8
	Juvenile	35.1	29.7	-15.4
	Spawning	0.0	0.0	-
August	Adult	79.4	56.3	-29.1
	Juvenile	35.3	25.2	-28.6
	Spawning	0.1	0.0	-100.0
	Fry	62.6	51.8	-17.3
September	Adult	54.4	44.2	-18.8
	Juvenile	24.3	21.0	-13.6
	Fry	49.7	48.8	-1.8
October	Adult	44.8	41.7	-6.9
	Juvenile	21.1	20.9	-0.9
November	Adult	42.9	41.4	-3.5
	Juvenile	21.0	20.9	-0.5
December	Adult	43.5	42.0	-3.4
	Juvenile	21.0	20.9	-0.5

1/ The amount of Weighted Usable Area is expressed in 1,000 units. Average water year is defined as 1968 flows.

Table 8
Monthly Pre- and Post-Project Cutthroat Trout Habitat In Fish Creek During Average Water Year[1/]

Month	Life Stage	Pre-project	Post-project	Change (%)
January	Adult	362.7	363.0	+0.1
	Juvenile	85.3	85.5	+0.2
February	Adult	370.4	365.7	-1.3
	Juvenile	85.8	85.3	-0.6
March	Adult	414.2	406.6	-1.8
	Juvenile	88.3	88.3	0.0
April	Adult	476.9	456.1	-4.4
	Juvenile	87.5	87.8	+0.3
May	Adult	666.4	694.6	+4.2
	Juvenile	226.7	235.4	+3.8
	Spawning	0.8	6.0	+650.0
June	Adult	680.8	714.1	+5.0
	Juvenile	231.2	229.4	-0.7
	Spawning	1.7	21.8	+1,182.4
July	Adult	603.4	575.2	-4.7
	Juvenile	91.3	88.3	-3.3
	Spawning	39.8	27.3	-31.4
August	Adult	489.6	454.1	-7.3
	Juvenile	87.4	87.8	+0.5
	Spawning	17.8	14.2	-20.2
	Fry	88.6	84.2	-5.0
September	Adult	415.2	387.8	-6.6
	Juvenile	88.2	87.6	-0.7
	Fry	82.2	81.3	-1.1
October	Adult	369.2	362.5	-1.8
	Juvenile	86.0	85.2	-0.9
November	Adult	364.5	362.8	-0.5
	Juvenile	82.1	85.3	+3.9
December	Adult	363.1	363.9	+0.2
	Juvenile	85.5	85.9	+0.5

1/ The amount of Weighted Usable Area is expressed in 1,000 units. Average water year is defined as 1968 flows.

Table 9
Monthly Pre- and Post-Project Rainbow Trout Habitat In Fish Creek During Average Water Year 1/

Month	Life Stage	Pre-project	Post-project	Change (%)
January	Juvenile	170.7	171.0	+0.2
February	Juvenile	173.1	171.5	-0.9
March	Juvenile	187.2	185.0	-1.1
April	Juvenile	203.1	198.4	-2.3
May	Juvenile	239.5	239.6	<0.1
	Spawning	45.9	44.9	-2.2
June	Juvenile	240.2	238.8	-0.6
	Spawning	48.4	36.9	-23.8
July	Juvenile	224.0	219.5	-2.0
	Spawning	23.6	18.2	-22.9
August	Juvenile	202.6	197.9	-2.3
	Spawning	11.0	8.2	-25.5
	Fry	226.4	223.1	-1.5
September	Juvenile	183.7	179.0	-2.6
	Fry	219.0	214.9	-1.9
October	Juvenile	172.7	170.5	-1.3
November	Juvenile	171.1	170.8	-0.2
December	Juvenile	171.0	171.6	+0.4

1/ The amount of Weighted Usable Area is expressed in 1,000 units. Average water year is defined as 1968 flows.

Table 10

Narrows Project
Aquatic Impacts and Recommended Mitigation Measures

Impacts	Mitigation Commitment
Stream Fisheries	
Gooseberry Creek tributaries - Loss of 4.3 miles (spawning cutthroat).	Restore year-round flows in 2.3 miles of tributaries and stabilize 3.0 miles of middle Gooseberry Creek.
Upper Gooseberry Creek - Loss of 1.0 mile (all life stages cutthroat); Middle Gooseberry Creek - 72% reduction in average annual flow for 3.0 miles (all life stages cutthroat); Lower Gooseberry Creek - 47% flow reduction for 7.1 miles. (Decrease of 5% adult and 4% juvenile low-flow habitat for cutthroat); Fish Creek - Average 17% flow reduction of 6.0 miles. (Decrease of less than 1% adult and juvenile low-flow habitat for cutthroat. Overall increase of 15% spawning and 3% fry habitat for cutthroat. Decrease of 1.3% adult and 0.5% juvenile low-flow habitat for rainbow. Overall decrease of 16% spawning and 2% fry habitat for rainbow.)	Acquire, fence, and improve fishery habitat on the following stream segments: Mud Creek 4.0 miles Winterquarters Creek 2.5 miles Upper Fish Creek 1.0 mile Pondtown Creek 2.0 miles Price River below Scofield Reservoir 2.0 miles
Upper Cottonwood Creek - No summer flow increase, 2 cfs winter flow provided.	Construct Upper Cottonwood Creek Pipeline and provide 2 cfs winter release.
Lower Cottonwood Creek - Average 162% annual flow increase. Average 300% summer flow increase. Loss of 4.9 miles of habitat for all life stages for Rainbow, Cutthroat, and Brown Trout.	Provide 2 cfs minimum flow during irrigation season in lower Cottonwood Creek, Acquire (as necessary), fence, and improve fishery habitat on 4.0 miles of Starvation Creek.
Reservoir Fisheries	
Scofield Reservoir - Increased potential for poor water quality resulting in fish kills, loss of some natural reproduction in rainbows. Reduced surface area resulting in reduced standing crop of fish and loss of 4,500 angler days per year.	Reduce external phosphorus loading by improving riparian areas along Mud Creek, Winterquarters Creek, Upper Fish Creek, and Pondtown Creek. These measures will also improve habitat for all life stages of cutthroat and rainbow trout including spawning. Lost angler days would be replaced by fishery in Narrows Reservoir.
Lower Gooseberry Reservoir - Increased potential for poor water quality resulting in fish kills.	Provide 300 acre-feet of water from Narrows Reservoir to be used for instream flow augmentation in consultation with UDWR.
Fairview Lakes - Lower fishing pressure, less severe drawdown during fishing season.	Beneficial impact. No mitigation required.
Narrows Reservoir - New reservoir fishery.	Would provide approximately 13,700 angler days use.

ATTACHMENT F - 404
PERMIT APPLICATION

APPLICATION FOR DEPARTMENT OF THE ARMY PERMIT

(33 CFR 325)

OMB APPROVAL NO. 0702-0036
Expires 30 June 1989

The Department of the Army permit program is authorized by Section 10 of the River and Harbor Act of 1899, Section 404 of the Clean Water Act and Section 103 of the Marine, Protection, Research and Sanctuaries Act. These laws require permits authorizing activities in or affecting navigable waters of the United States, the discharge of dredged or fill material into waters of the United States, and the transportation of dredged material for the purpose of dumping it into ocean waters. Information provided on this form will be used in evaluating the application for a permit. Information in this application is made a matter of public record through issuance of a public notice. Disclosure of the information requested is voluntary; however, the data requested are necessary in order to communicate with the applicant and to evaluate the permit application. If necessary information is not provided, the permit application cannot be processed nor can a permit be issued.

One set of original drawings or good reproducible copies which show the location and character of the proposed activity must be attached to this application *(see sample drawings and instructions)* and be submitted to the District Engineer having jurisdiction over the location of the proposed activity. An application that is not completed in full will be returned.

1. APPLICATION NUMBER *(To be assigned by Corps)*

2. NAME AND ADDRESS OF APPLICANT

Sanpete Water Conservancy District
1484 South 70 West
Mount Pleasant, UT 84647

Telephone no. during business hours

A/C ( ) _____ *(Residence)*
A/C (801) 462-2519 *(Office)*

3. NAME, ADDRESS, AND TITLE OF AUTHORIZED AGENT

Richard M. Noble
Franson-Noble & Associates, Inc.
P.O. Box 606
American Fork, UT 84003

Telephone no. during business hours

A/C ( ) _____ *(Residence)*
A/C (801) 756-0309 *(Office)*

Statement of Authorization: I hereby designate and authorize _____ to act in my behalf as my agent in the processing of this permit application and to furnish, upon request, supplemental information in support of the application.

SIGNATURE OF APPLICANT	DATE

4. DETAILED DESCRIPTION OF PROPOSED ACTIVITY

4a. ACTIVITY

See attached description.

4b. PURPOSE

The purpose of the proposed project is to develop 5,400 acre-feet of water for delivery to Sanpete County for irrigation and municipal use.

4c. DISCHARGE OF DREDGED OR FILL MATERIAL

See attached description.

5. NAMES AND ADDRESSES OF ADJOINING PROPERTY OWNERS, LESSEES, ETC., WHOSE PROPERTY ALSO ADJOINS THE WATERWAY

See attachment.

6. WATERBODY AND LOCATION ON WATERBODY WHERE ACTIVITY EXISTS OR IS PROPOSED

See attached description.

7. LOCATION ON LAND WHERE ACTIVITY EXISTS OR IS PROPOSED

ADDRESS: 9 miles east of Fairview, Utah on State Road 31
See Figures 1 and 2 and attached description.

STREET, ROAD, ROUTE OR OTHER DESCRIPTIVE LOCATION

COUNTY STATE ZIP CODE

Sanpete Water Conservancy District

LOCAL GOVERNING BODY WITH JURISDICTION OVER SITE

8. Is any portion of the activity for which authorization is sought now complete? ☐ YES ☒ NO
If answer is "Yes" give reasons, month and year the activity was completed. Indicate the existing work on the drawings.

9. List all approvals or certifications and denials received from other federal, interstate, state or local agencies for any structures, construction, discharges or other activities described in this application.

ISSUING AGENCY	TYPE APPROVAL	IDENTIFICATION NO.	DATE OF APPLICATION	DATE OF APPROVAL	DATE OF DENIAL
Manti-La Sal National Forest	Special Use Permit			Oct. 5, 1993	

Applicant will apply for 402 permits prior to construction.

10. Application is hereby made for a permit or permits to authorize the activities described herein. I certify that I am familiar with the information contained in this application, and that to the best of my knowledge and belief such information is true, complete, and accurate. I further certify that I possess the authority to undertake the proposed activities or I am acting as the duly authorized agent of the applicant.

/s/ David Peterson
SIGNATURE OF APPLICANT

DATE

/s/ Richard M. Noble
SIGNATURE OF AGENT

11/28/94
DATE

The application must be signed by the person who desires to undertake the proposed activity (applicant) or it may be signed by a duly authorized agent if the statement in Block 3 has been filled out and signed.

18 U.S.C. Section 1001 provides that: Whoever, in any manner within the jurisdiction of any department or agency of The United States knowingly and willfully falsifies, conceals, or covers up by any trick, scheme, or device a material fact or makes any false, fictitious or fraudulent statements or representations or makes or uses any false writing or document knowing same to contain any false fictitious or fraudulent statement or entry, shall be fined not more than $10,000 or imprisoned not more than five years, or both.

Do not send a permit processing fee with this application. The appropriate fee will be assessed when a permit is issued.

4a. ACTIVITY

The activity is to construct a zoned earthfill embankment dam on Gooseberry Creek, 9 miles east of Fairview, Utah. The dam will be 120 feet high with a crest length of 550 feet (Figure 3). Also included are borrow and reservoir preparation activities within the reservoir site. This activity includes construction of pipelines in Sanpete County for the delivery of project water. Work is scheduled to commence in the summer of 1995 and will be completed by the winter of 1996.

Dam Construction Activity Affecting Stream and Wetland Areas

Dam foundation excavation will be the first work associated with this 404 permit application. Gooseberry Creek will be left undisturbed during excavation and reconstruction of the right side (facing downstream) of the dam foundation. Abutment excavation will proceed concurrently with the foundation excavation. The outlet works will be constructed in the right abutment. Following completion of the outlet works, Gooseberry Creek will be diverted through it, bypassing the dam foundation. With Gooseberry Creek diverted through the outlet works, the left side of the dam foundation will be excavated.

A small (less than 3 feet high) cofferdam may be constructed to train the stream into the temporary channel connecting to the outlet works. This could affect as much as 3,000 square feet of stream and wetlands. The estimated volume of cofferdam embankment to be placed in Gooseberry Creek and adjacent wetland within the reservoir basin is 200 cubic yards.

The footprint of the dam within wetland and stream areas is estimated to be 39,000 square feet. The total estimated volume of embankment material to be placed above the existing wetlands and stream within the footprint of Narrows Dam is 83,400 cubic yards. The total dam volume is estimated at 363,000 cubic yards.

The combined jurisdictional wetlands of the basin study area constitute 17 percent (100 acres) of the reservoir basin. Of the 100 wetland acres that exist in the reservoir basin, the riparian sedge and meadows comprise about 63 percent, whereas the willow thickets comprise nearly 37 percent. Wetlands within the reservoir basin are shown on Figure 4. The permanent impact on the reservoir basin streams and wetlands will be mitigated as described in the Final Environmental Impact Statement for the Narrows Project, Chapter 2.

Borrow Area in Narrows Reservoir Basin

There is a borrow area within the reservoir basin. Development of this area will affect wetlands and Gooseberry Creek. However, the impacts will occur with development of the reservoir regardless of whether the borrow area is used. The east side of this borrow area is parallel to Gooseberry Creek. It is estimated that 6.5 acres of stream and wetland areas will be impacted by excavation of borrow material. During excavation of the borrow area, portions of Gooseberry Creek

4a. ACTIVITY (continued)

within the borrow area will be moved to the east using a membrane-lined channel. Following closure of the dam, Gooseberry Creek will be used to fill the reservoir basin and the membrane liner will be removed.

Increased Discharge of Transbasin Water to Cottonwood Creek and the Upper Cottonwood Pipeline

Flows in Cottonwood Creek will increase between 100 and 300 percent during the irrigation season. These flows will be conveyed outside the channel between the Narrows Tunnel outlet and the confluence with Left Hand Fork in a 50-cfs-capacity pipeline. This 30-inch-diameter, 0.8-mile-long pipeline will carry project water outside the stream to prevent damage to the channel.

The construction of Upper Cottonwood Creek pipeline will disturb approximately 160 square feet of wetland riparian at the outfall to Cottonwood Creek. After construction, this area should return to its previous condition with only seeding of the disturbed area. There will be a single discharge structure at the end of the pipe that will result in a permanent impact to the riparian area near Cottonwood Creek. Plan drawings of this pipeline and a profile drawing of the discharge structure are shown on Figure 5.

Pipeline Drainage Crossings in Sanpete Valley

Plan drawings for the East Bench and the Oak Creek Pipelines are shown on Figures 6 through 11. These pipelines will cross 28 drainages along the east side of the Sanpete Valley. Most of the drainages are dry, or the water from them is diverted for irrigation above the crossings.

At each crossing, the topsoil will be stripped and stockpiled. The pipeline and appurtenant structures will be installed and the topsoil replaced. The width of the crossing disturbances are estimated at 15 feet. A typical trench cross section for the pipelines in shown on Figure 12. The average length of the crossings is estimated at 30 feet. Total disturbed wet areas in drainages is estimated at 12,600 square feet. These areas will be reseeded and a weed abatement program conducted for a minimum of 2 years following construction.

Ponds used for East Bench and Oak Creek Pipelines

There will be 12 ponds used to regulate and deliver water to project water subscribers (refer to Figures 6 through 11). Some minimal disturbance will occur near each pond as the pipeline and laterals are constructed to each pond. The estimated disturbed areas near ponds is 5,400 square feet (15 feet times 30 feet times 12 ponds). These areas will be reseeded and a weed abatement program conducted for a minimum of 2 years following construction.

4a. ACTIVITY (continued)

Middle Gooseberry Creek Stabilization

As part of the fishery and riparian mitigation for the Narrows Project it is proposed to make stream alterations to Middle Gooseberry Creek between Narrows Dam and Lower Gooseberry Reservoir. Although not a part of the 404 permit application, this work is an integral part of the Narrows Project mitigation and is described here for clarification. A stream alteration permit application will be submitted for this work once final plans have been formulated.

Stabilization of the creek will involve narrowing the channel so it will provide better habitat with the reduced flows. It is expected that the channel would eventually narrow by itself due to the decreased flow. However, in order to expedite the process, certain man-made improvements will be made. Prior to construction of these improvements by the project sponsor, a detailed design will be developed by the sponsor. This design will be coordinated with the U.S. Forest Service, Fish and Wildlife Service, the Corps of Engineers, the Utah Division of Wildlife Resources, and the Utah Division of Water Rights.

4c. DISCHARGE OF DREDGED OR FILL MATERIAL

The total estimated volume of embankment material to be placed above the existing wetlands and stream within the footprint of Narrows Dam is 83,400 cubic yards. Approximately 38,000 cubic yards of material will be excavated from the foundation. None of this excavation will be discharged to a stream channel. The total volume of the dam embankment is 363,000 cubic yards, most of which will be obtained from the reservoir basin.

The Narrows Dam and Reservoir are to be constructed according to State of Utah *"Administrative Rules for Dam Safety"* and will be designed by qualified licensed professional engineers.

Trench excavation will occur at each of the 28 drainage crossings for the East Bench and Oak Creek Pipelines. Including excavation for blowoff/drain lines, it is estimated that 2,500 cubic yards of material will be removed. An equivalent quantity of backfill will be used at these 28 drainage crossings. The areas will be restored to surrounding natural grades.

5. NAMES AND ADDRESSES OF ADJOINING PROPERTY OWNERS, LESSEES, ETC., WHOSE PROPERTY ALSO ADJOINS THE WATERWAY

The Narrows Dam site and a large portion of the reservoir area is located within the Manti-La Sal National Forest. All the Federal lands within the reservoir basin and the dam site are Reclamation withdrawal lands and are designated for this project. State Road 264 runs through the reservoir area. The remaining lands within the reservoir basin and dam site belong to either the Fairview Land Company the Collard Family Trust. Only Fairview Land Company land is adjacent to the waterway or wetlands. The project sponsor has a flood easement with the Fairview Land Company. Following are the addresses of those entities with interest in the dam and reservoir sites:

Jack McAllister, President
Fariview Land Company
140 West 400 North #44
Mt. Pleasant, Utah 84647

Manti-La Sal National Forest
Price Ranger District
599 West Price River Drive
Price, Utah 84501

Carol C. Dixon, Trustee
Collard Family Trust
2228 East 900 South Circle
Salt Lake City, Utah 84108

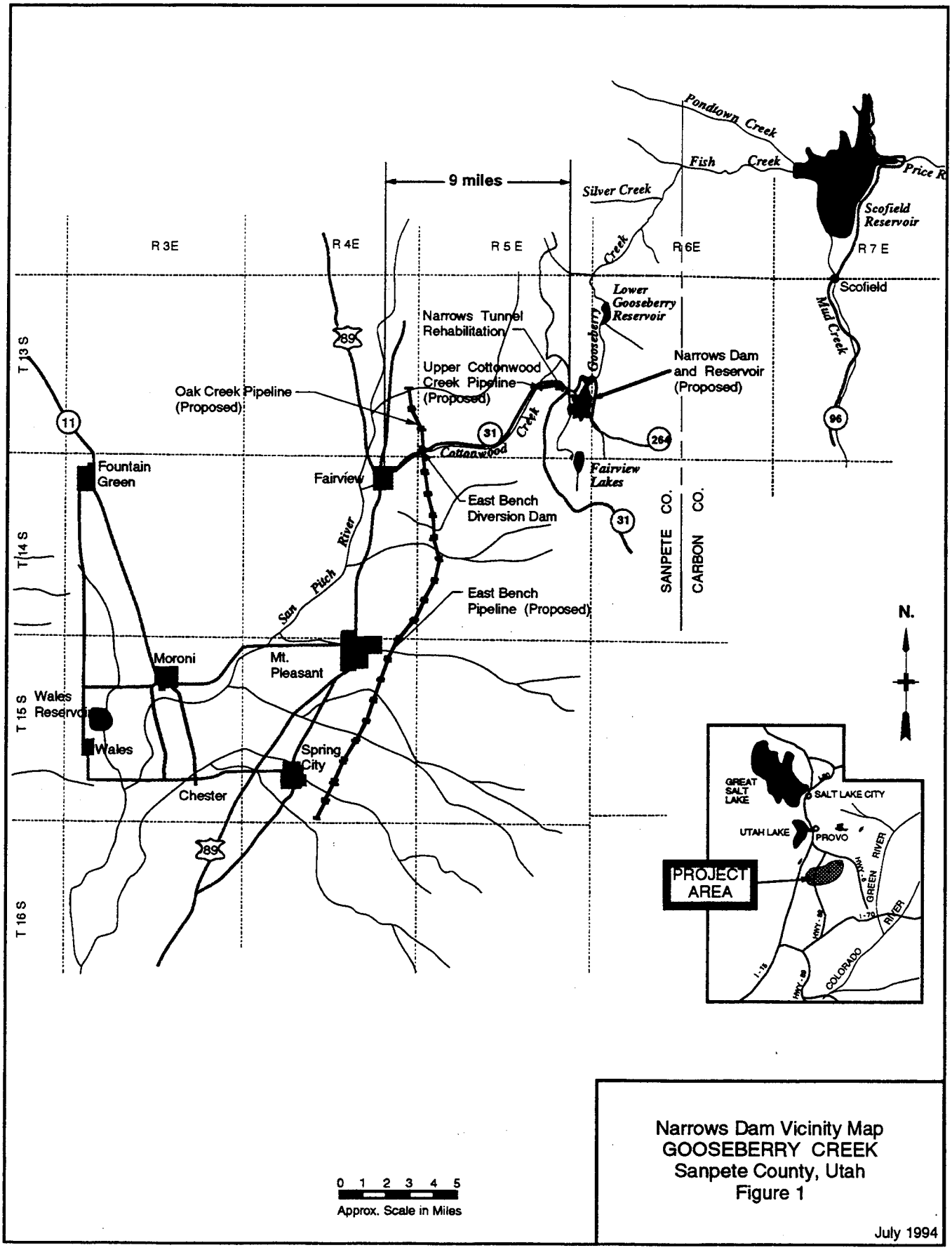
Utah State Department
of Transportation
District 3
708 South 100 West
Richfield, Utah 84701

A listing of property owners associated with the pipeline drainage crossings and ponds in Sanpete County is attached.

6. WATERBODY AND LOCATION ON WATERBODY WHERE ACTIVITY EXISTS OR IS PROPOSED

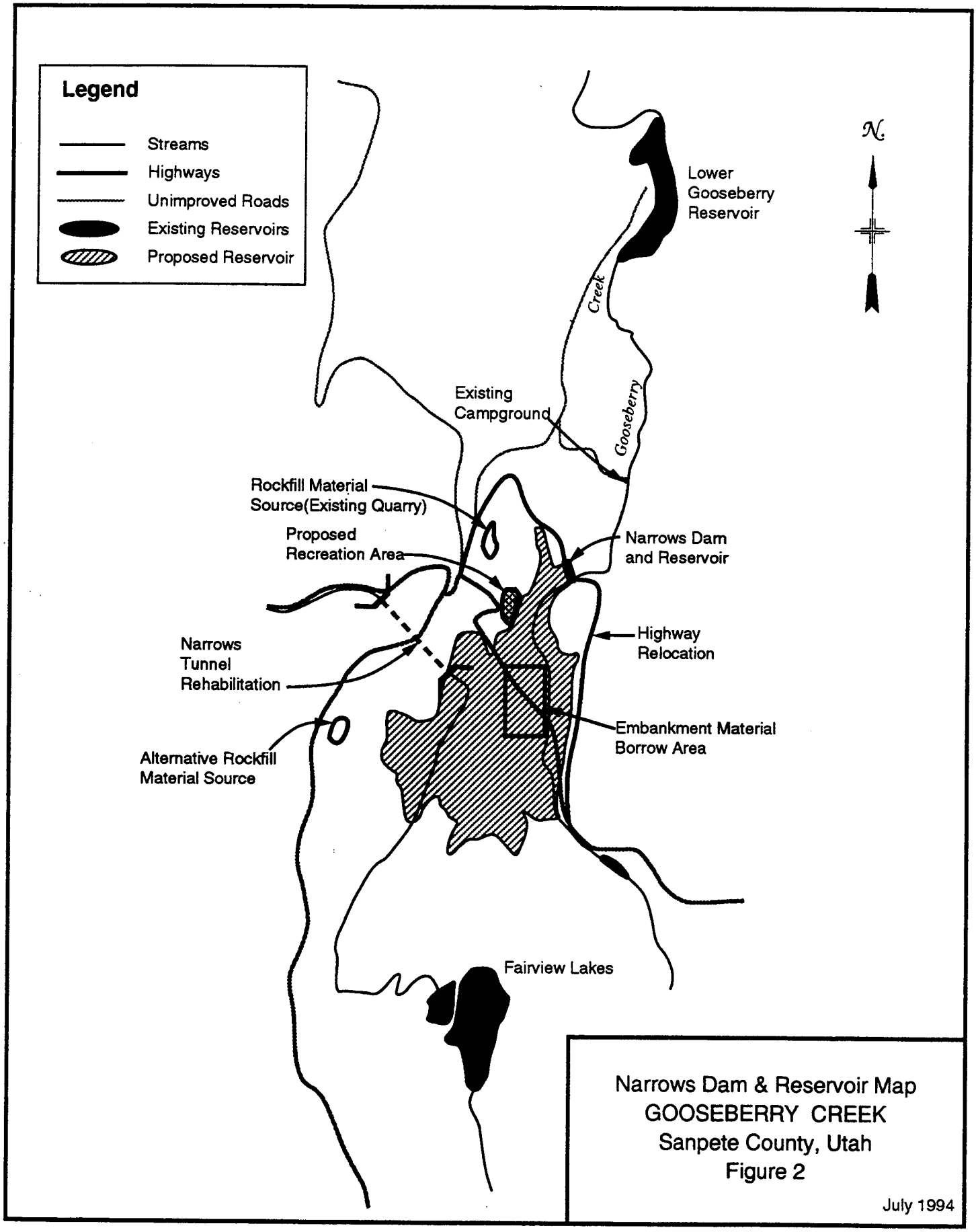
Narrows Dam and Reservoir - Gooseberry Creek, Sanpete County, Utah. Refer to Figures 1 and 2 for location.

East Bench and Oak Creek Pipelines - drainages on east bench of Sanpete Valley near Cottonwood Creek. Refer to Figures 1 and 6 through 11 for location.



Narrows Dam Vicinity Map
GOOSEBERRY CREEK
Sanpete County, Utah
Figure 1

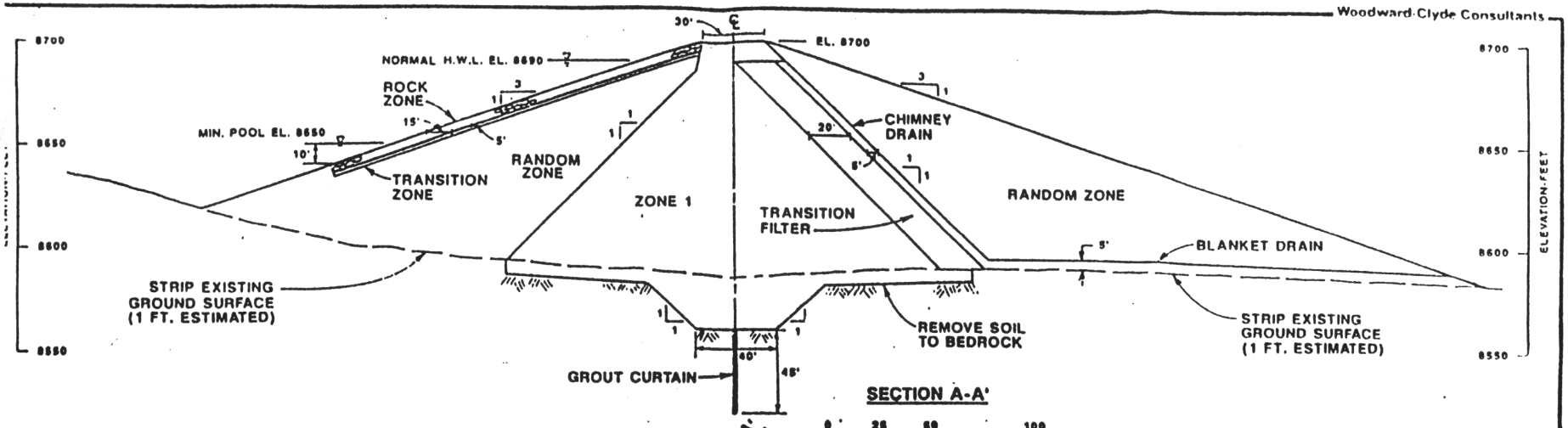
July 1994



Narrows Dam & Reservoir Map
GOOSEBERRY CREEK
Sanpete County, Utah
Figure 2

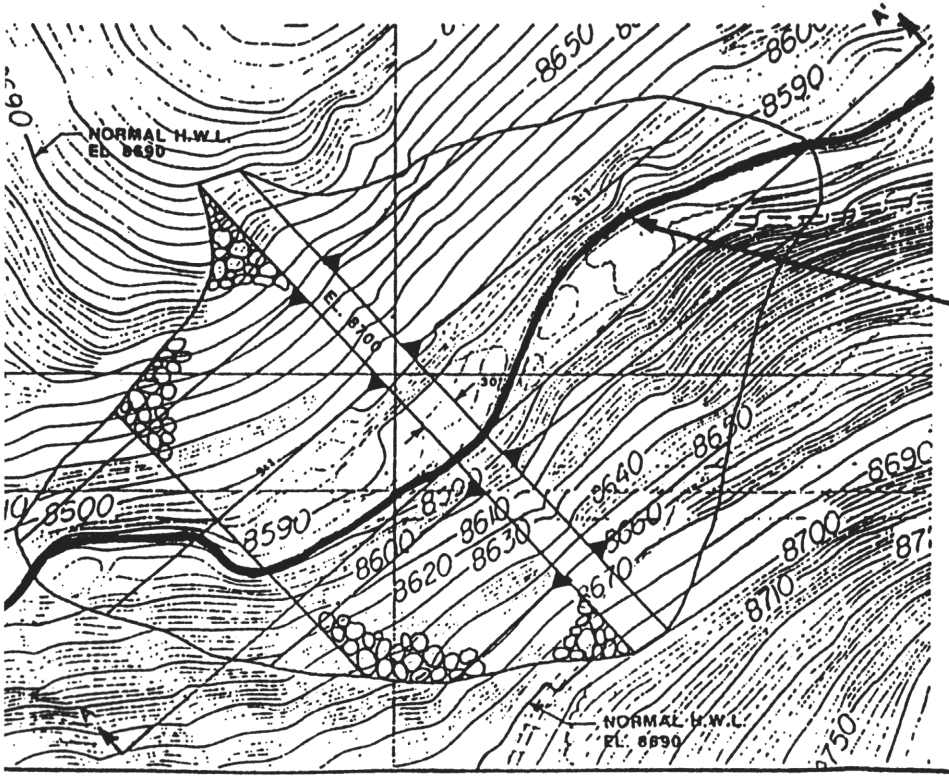
July 1994

Woodward-Clyde Consultants



SECTION A-A'

0 25 50 100
SCALE IN FEET



0 50 100 200
SCALE IN FEET

PLAN VIEW

DRAFT

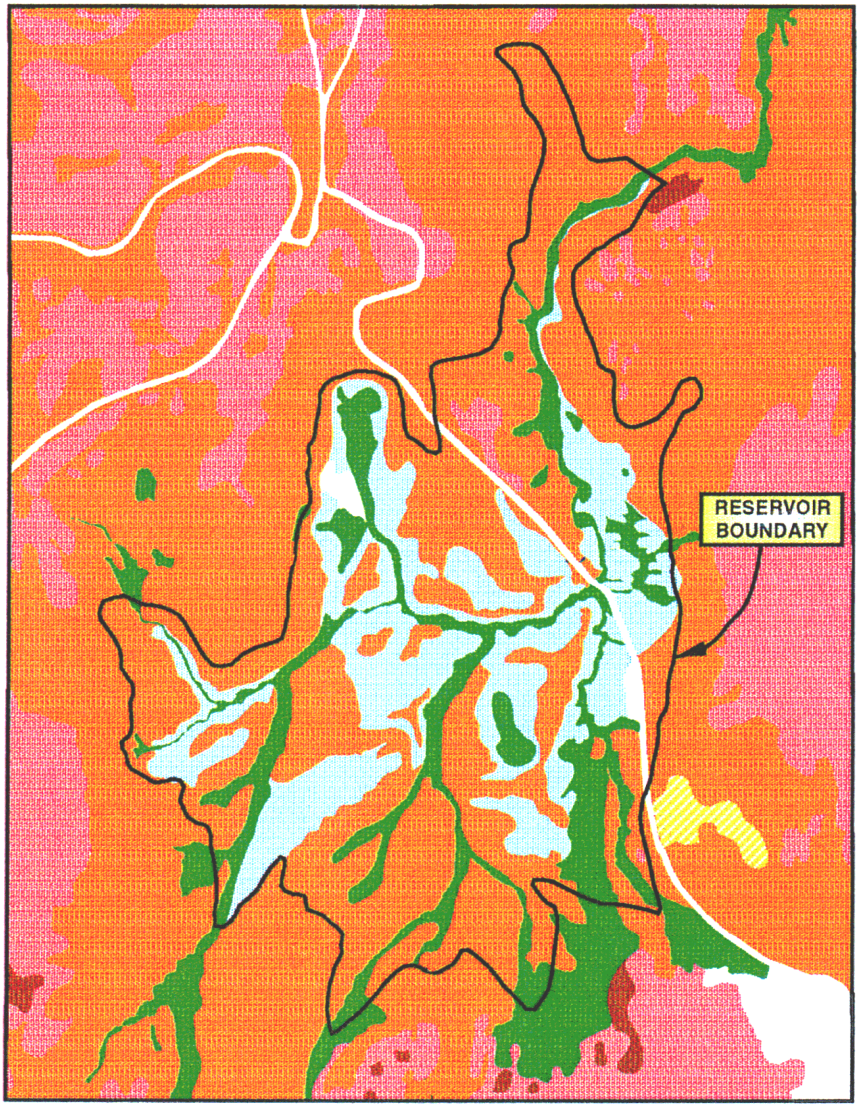
FOR COMMENTS & DISCUSSION ONLY
NOT FOR DISTRIBUTION

NOTES:

1. THIS FIGURE SHOWS GEOMETRY AND DIMENSIONS USED FOR COST ESTIMATES, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES.
2. BASE MAP FROM TOPO BY OLYMPUS AERIAL SURVEYS, INC. DATED OCT. 12, 1979.

Narrows Plan & Cross-Section
GOOSEBERRY CREEK
Sanpete County, Utah
Figure 3

July 1994



N

LEGEND

- Ar tr (Vasey Big Sagebrush)
- Ar ca (Silver Sagebrush)
- W (Wetlands)
- Po tr (Aspen)
- Sy or (Snowberry)
- Previously Disturbed
- S/F (Spruce/Fir)

SCALE 1"=1200'

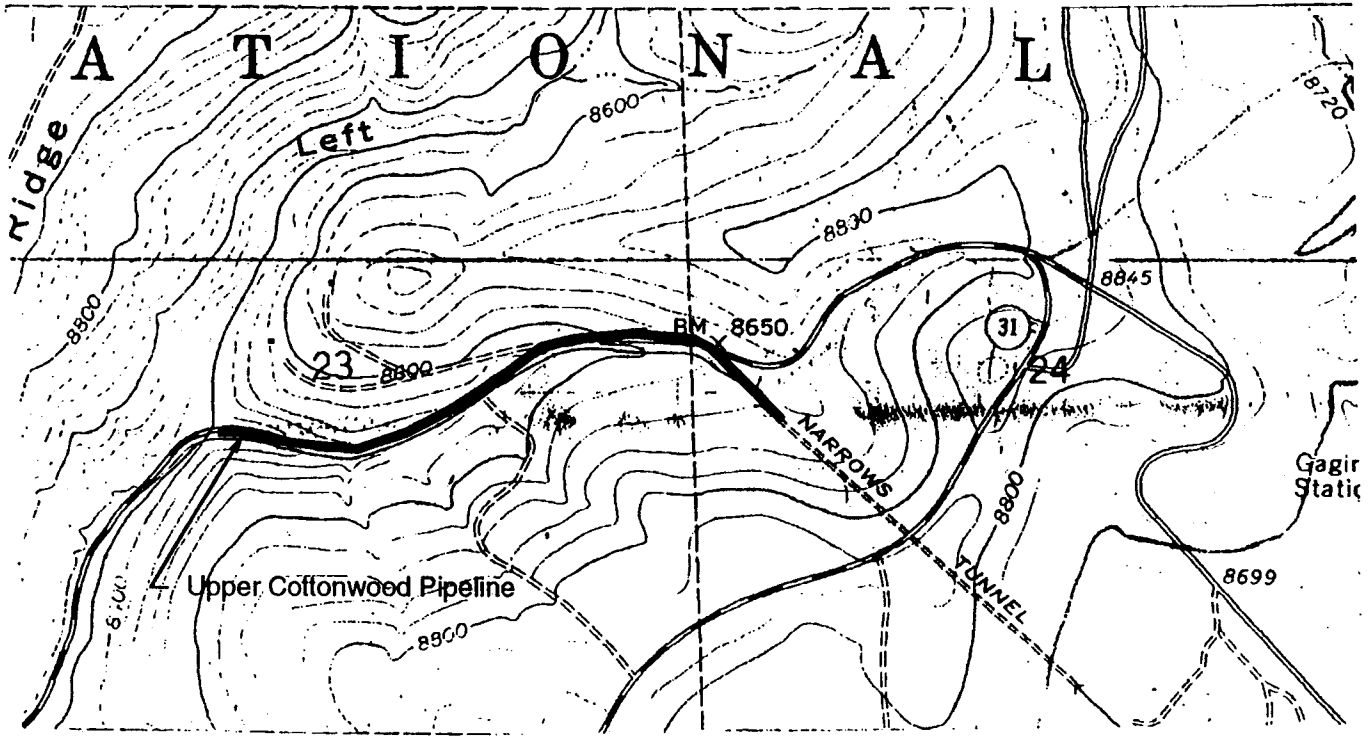
Revised: 4/29/92

FRANSON-NOBLE & ASSOCIATES, INC. CONSULTING ENGINEERS
6 SOUTH 100 WEST, AMERICAN FORK, UTAH (801) 756-0309

SANPETE WATER CONSERVACY DISTRICT
NARROWS PROJECT

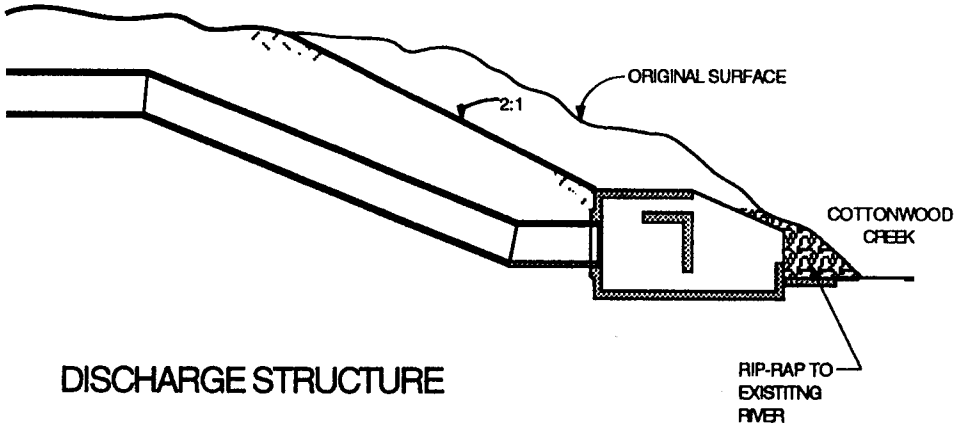
NARROWS RESERVOIR BASIN STUDY AREA
Fig 4
VEGETATION MAP

DESIGNED	DRAWN	CHECKED
PC	JPW	RMN
DRAWING NO.	DATE	
	6/13/91	



PIPELINE-PLAN

T. 13 S. R.5 E. section 23 and 24



DISCHARGE STRUCTURE

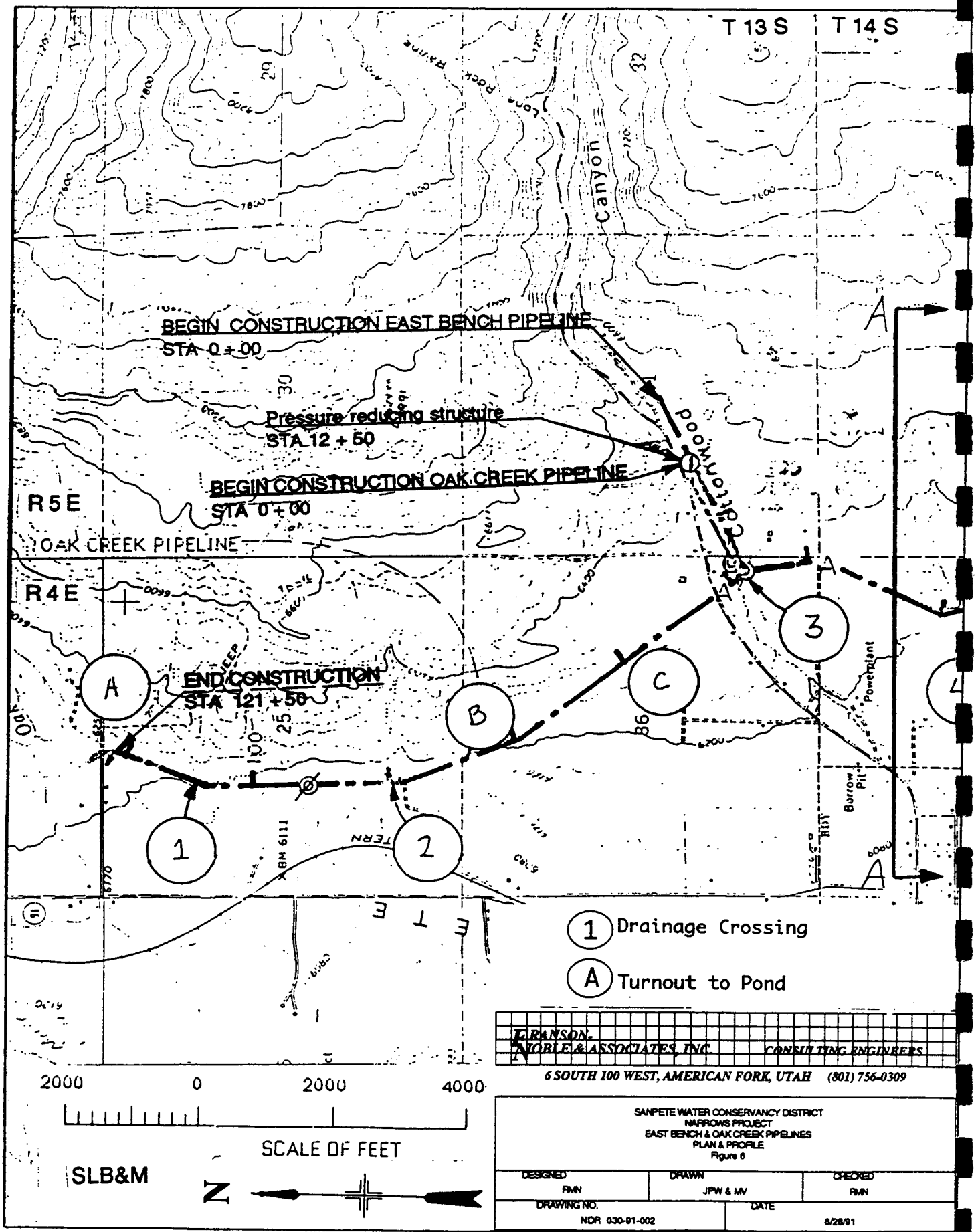
KRANSON, NOBLE & ASSOCIATES, INC. CONSULTING ENGINEERS
6 SOUTH 100 WEST, AMERICAN FORK, UTAH (801) 756-0309

SANPETE WATER CONSERVACY DISTRICT
NARROWS PROJECT

NARROWS RESERVOIR BASIN STUDY AREA

UPPER COTTONWOOD PIPELINE
Figure 5

DESIGNED	DRAWN	CHECKED
	DWW	RJC
DRAWING NO.	DATE	
	11/7/94	

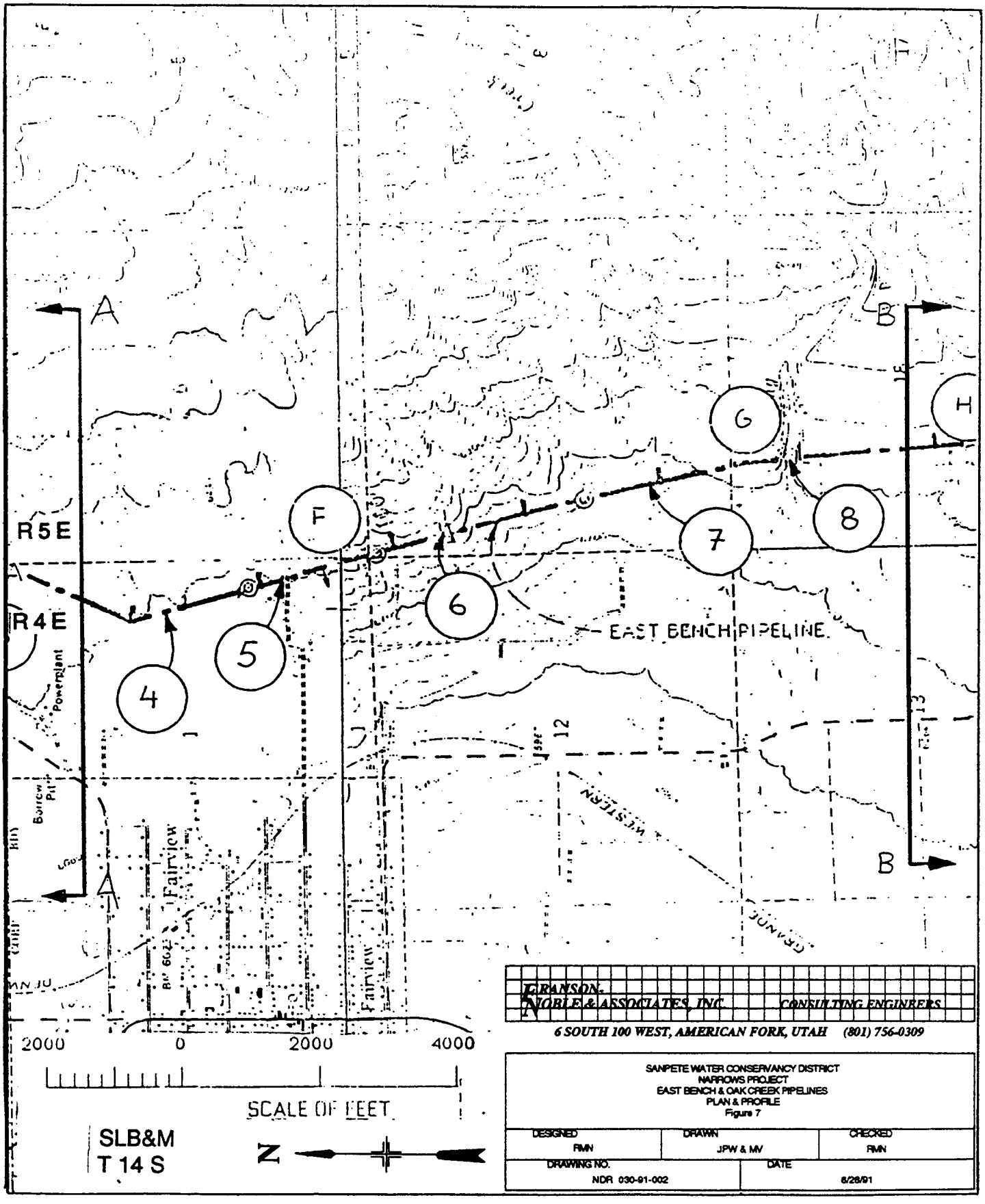


T. RANSON, NOBLE & ASSOCIATES, INC. CONSULTING ENGINEERS
6 SOUTH 100 WEST, AMERICAN FORK, UTAH (801) 756-0309

SANPETE WATER CONSERVANCY DISTRICT
NARROWS PROJECT
EAST BENCH & OAK CREEK PIPELINES
PLAN & PROFILE
Figure 6

DESIGNED	DRAWN	CHECKED
RMN	JPW & MV	RMN

DRAWING NO.	DATE
NDR 030-91-002	8/26/91



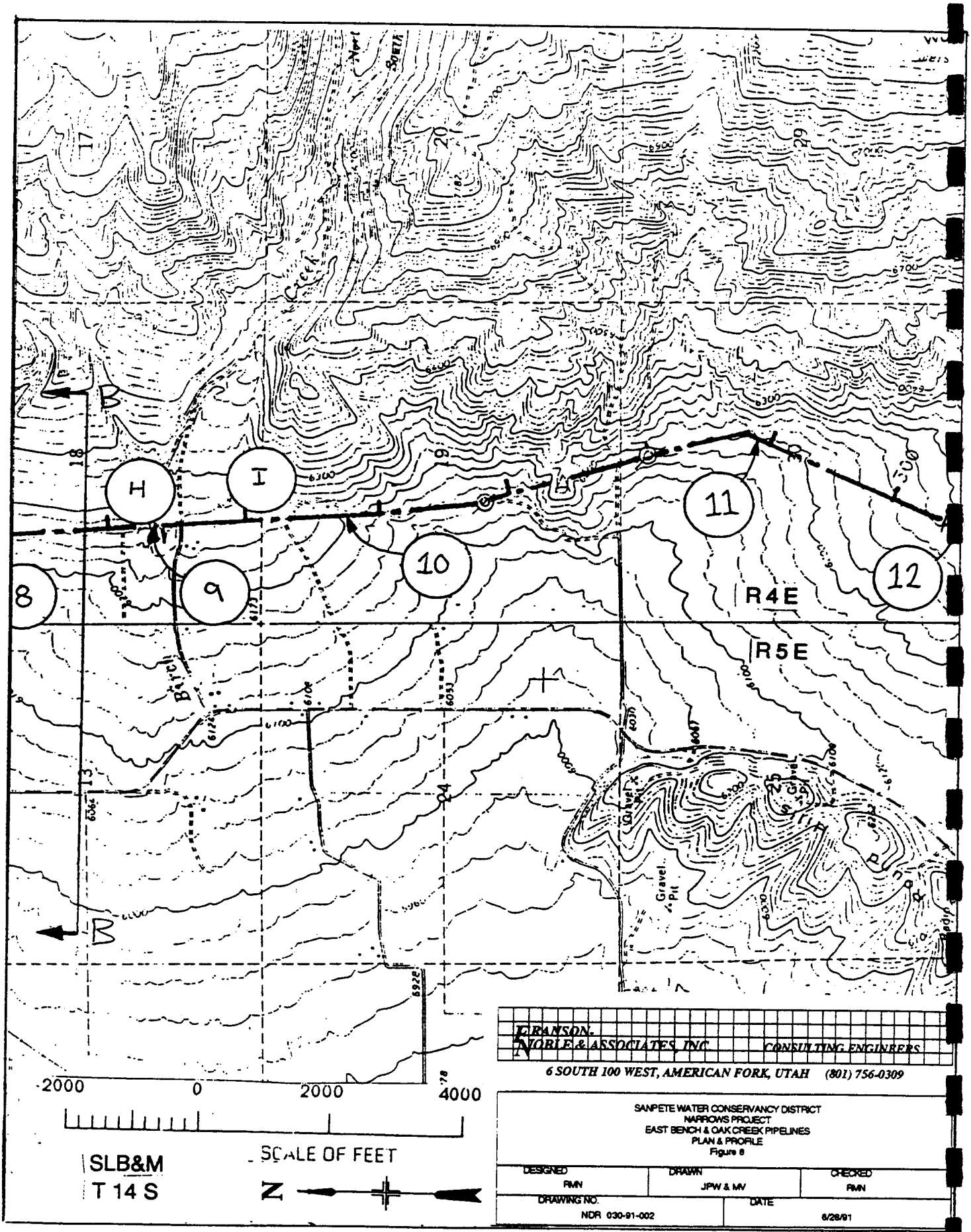
GRANSON, NOBLE & ASSOCIATES, INC. CONSULTING ENGINEERS

6 SOUTH 100 WEST, AMERICAN FORK, UTAH (801) 756-0309

SANPETE WATER CONSERVANCY DISTRICT
NARROWS PROJECT
EAST BENCH & OAK CREEK PIPELINES
PLAN & PROFILE
Figure 7

DESIGNED	DRAWN	CHECKED
RMN	JPW & MV	RMN

DRAWING NO.	DATE
NDR 030-91-002	6/26/91



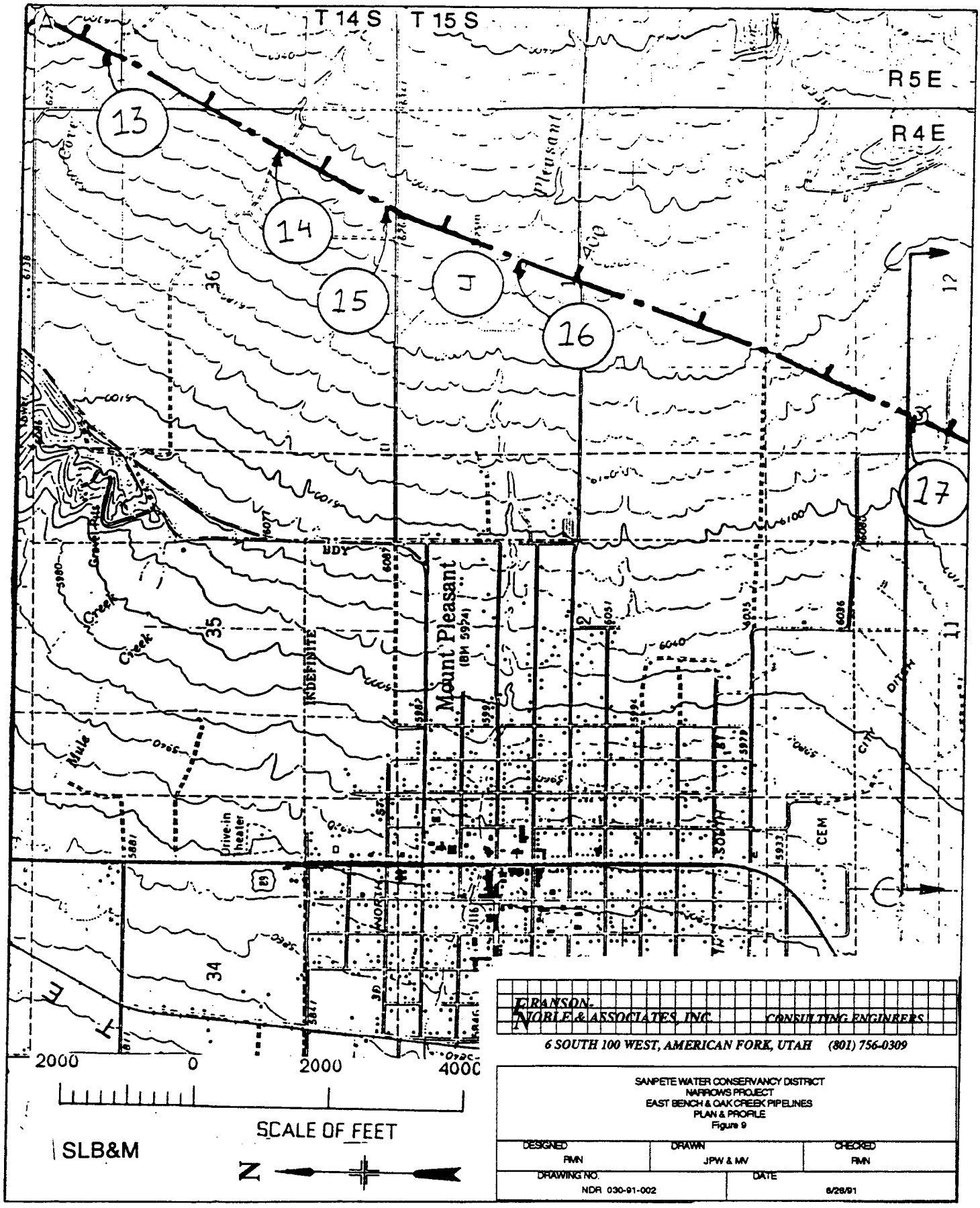
EVANSON, NOBLE & ASSOCIATES, INC. CONSULTING ENGINEERS

6 SOUTH 100 WEST, AMERICAN FORK, UTAH (801) 756-0309

SANPETE WATER CONSERVANCY DISTRICT
NARROWS PROJECT
EAST BENCH & OAK CREEK PIPELINES
PLAN & PROFILE
Figure 8

DESIGNED	DRAWN	CHECKED
RMN	JPW & MV	RMN

DRAWING NO.	DATE
NDR 030-91-002	6/28/91

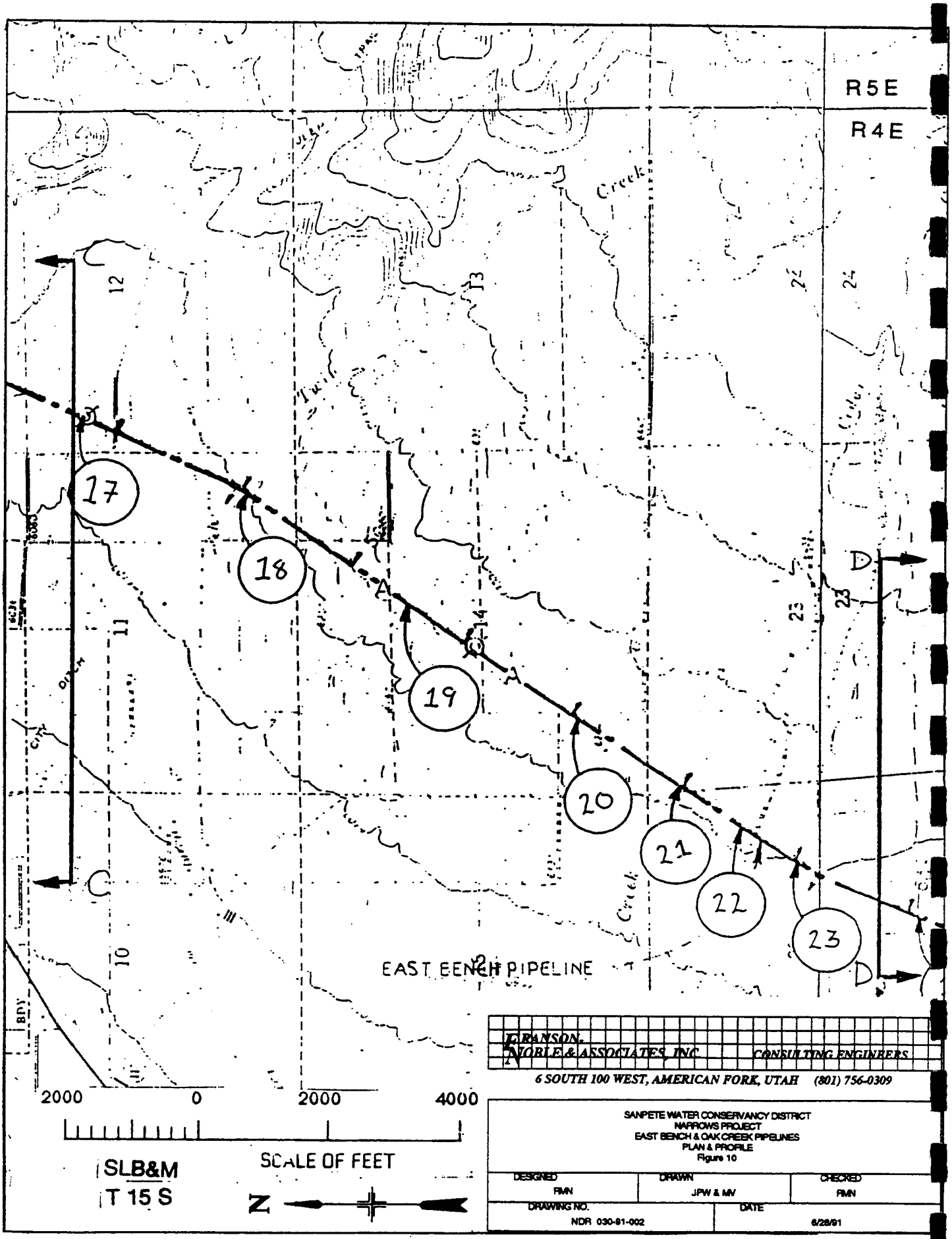


EVANSON, NOBLE & ASSOCIATES, INC. CONSULTING ENGINEERS

6 SOUTH 100 WEST, AMERICAN FORK, UTAH (801) 756-0309

SANPETE WATER CONSERVANCY DISTRICT
NARROWS PROJECT
EAST BENCH & OAK CREEK PIPELINES
PLAN & PROFILE
Figure 9

DESIGNED	DRAWN	CHECKED
RMN	JPW & MV	RMN
DRAWING NO.	DATE	
NDR 030-91-002	8/28/91	



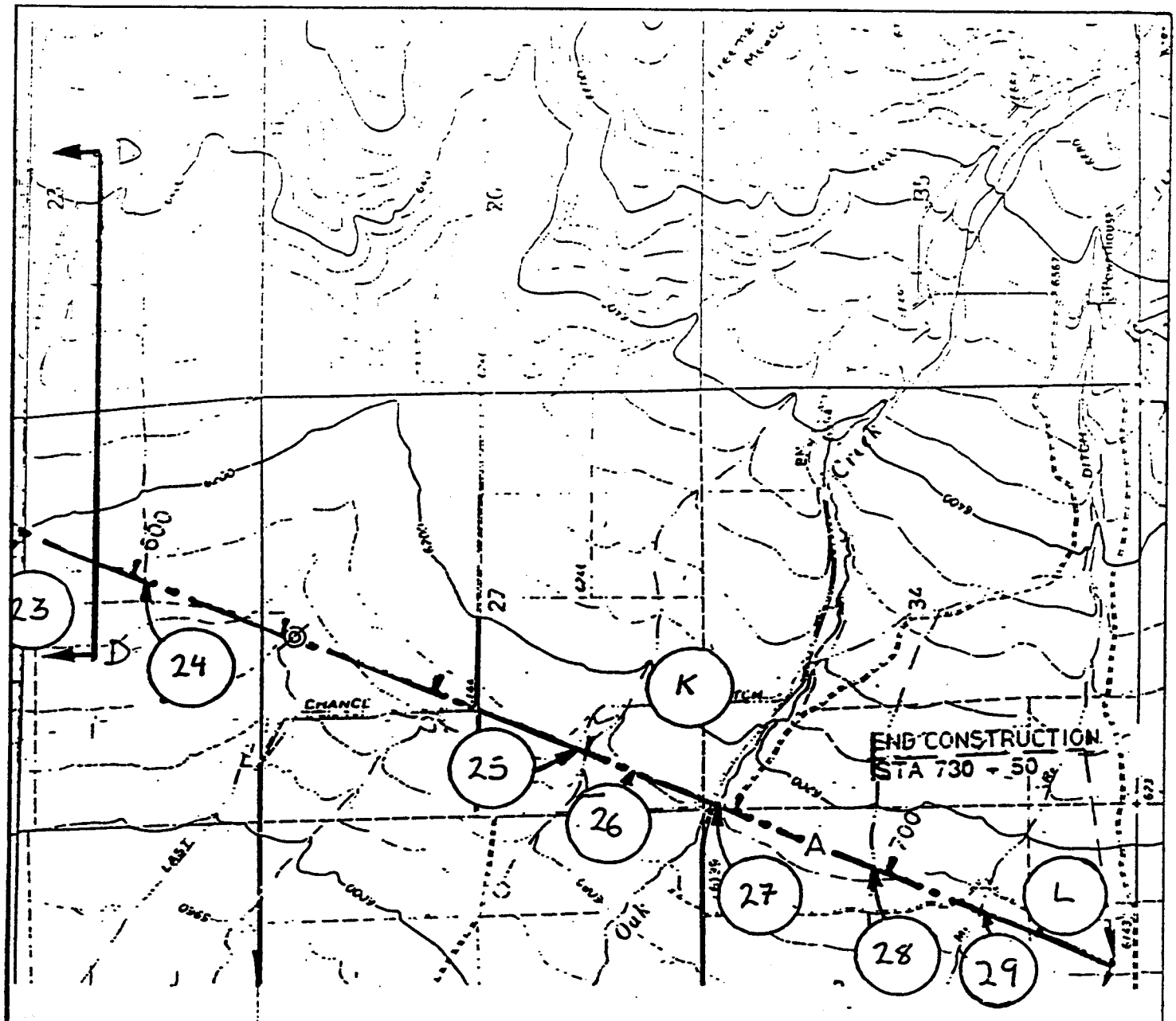
RANSON, NOBLE & ASSOCIATES, INC. CONSULTING ENGINEERS

6 SOUTH 100 WEST, AMERICAN FORK, UTAH (801) 756-0309

SANPETE WATER CONSERVANCY DISTRICT
NARROWS PROJECT
EAST BENCH & OAK CREEK PIPELINES
PLAN & PROFILE
Figure 10

DESIGNED	DRAWN	CHECKED
RMN	JPW & MV	RMN

DRAWING NO.	DATE
NDR 030-91-002	6/28/91



EVANSON-NOBLE & ASSOCIATES, INC. CONSULTING ENGINEERS

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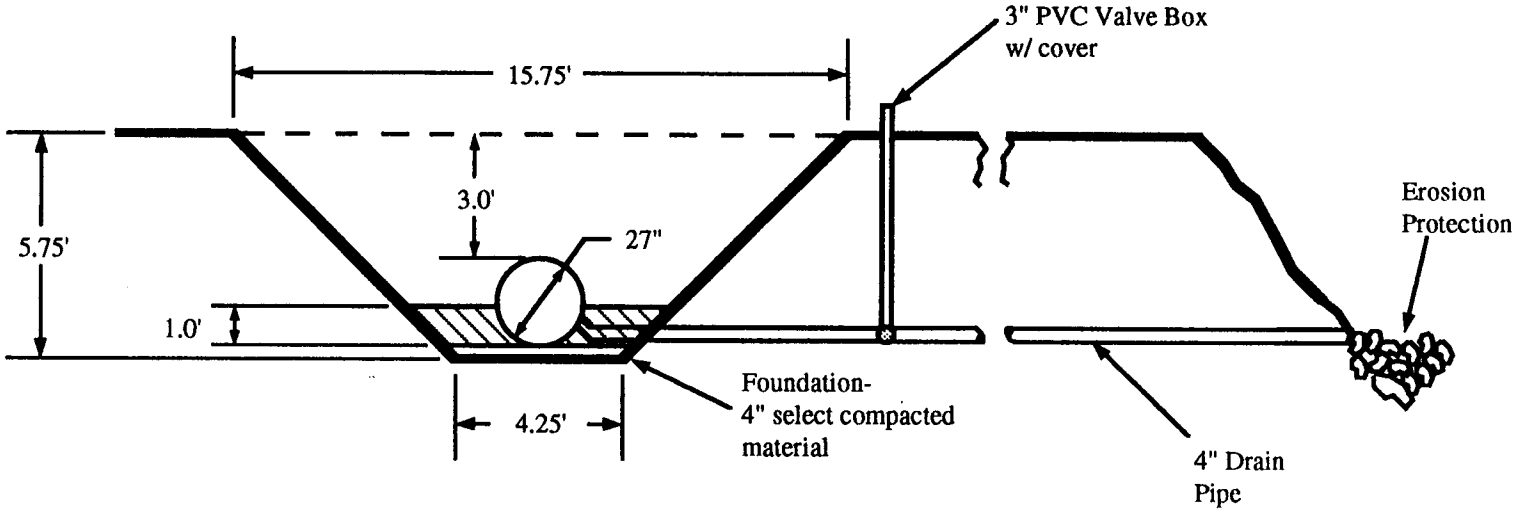
SANPETE WATER CONSERVANCY DISTRICT
NARROWS PROJECT
EAST BENCH & OAK CREEK PIPELINES
PLAN & PROFILE
Figure 11

DESIGNED	DRAWN	CHECKED
RMN	JPW & MV	RMN

DRAWING NO.	DATE
NDR 030-91-002	6/28/91



BRANSON, NOBLE & ASSOCIATES, INC. CONSULTING ENGINEERS

6 SOUTH 100 WEST, AMERICAN FORK, UTAH (801) 756-0309

Figure 12

TYPICAL TRENCH CROSS SECTION

SANPETE WATER CONSERVACY DISTRICT
NARROWS PROJECT

DESIGNED	DRAWN	CHECKED
	JRM	RJC
DRAWING	DATE	
	11/7/94	

PARCEL OWNERSHIP RETRIEVAL SANPETE COUNTY DATE: 07/11/94

SERIAL NUMBER	ACCOUNT	YEAR	ACREAGE	DIST	PARCEL ADDRESS
26604	0138253	1987	120.00	15	

OWNER: OLSEN ALICE ETAL JT
BRUNGER DIXIE L ETAL JT

TAX NOTICE MAILED TO: OLSEN ALICE ETAL JT
6298 COSMO DR
BOOK: 00265 PAGE: 00355 WEST JORDAN UT 84084
ENTRY NUMBER:

P A R C E L D E S C R I P T I O N :

N1/2 SE1/4,SW1/4 SE1/4,SEC 22-15-4E CONT 120 AC

PARCEL OWNERSHIP RETRIEVAL SANPETE COUNTY DATE: 07/11/94

SERIAL NUMBER	ACCOUNT	YEAR	ACREAGE	DIST	PARCEL ADDRESS
22460	0106953	1986	39.60	15	

OWNER: ANDERSON LAND & LIVESTOCK CO

TAX NOTICE MAILED TO: ANDERSON LAND & LIVESTOCK CO
PO BOX 95
BOOK: 00116 PAGE: 00164 FAIRVIEW UT 84629
ENTRY NUMBER:

P A R C E L D E S C R I P T I O N :

LOT 1 SEC 18 T14S R5E, SLM CONT 39.60AC

PARCEL OWNERSHIP RETRIEVAL SANPETE COUNTY DATE: 07/11/94

SERIAL NUMBER	ACCOUNT	YEAR	ACREAGE	DIST	PARCEL ADDRESS
22461X	0106979	1986	1.42	15	

OWNER: BIRCH CREEK IRRIGATION CO

TAX NOTICE MAILED TO: BIRCH CREEK IRRIGATION CO
PO BOX 455
BOOK: 00223 PAGE: 00302 FAIRVIEW UT 84629
ENTRY NUMBER:

P A R C E L D E S C R I P T I O N :

BEG S65*20'07"E 1710.34 FT W1/4 COR SEC 18-14-5E S0*23'59"E 355.26 FT,S88*39'42"
E 261.42 FT,N27*35'47"E 58.03 FT,N26*55'38"W 394.07 FT,S69*45'09"W 119.65 FT TO
BEG CONT 1.421 AC

PARCEL OWNERSHIP RETRIEVAL SANPETE COUNTY DATE: 07/11/94

SERIAL NUMBER	ACCOUNT	YEAR	ACREAGE	DIST	PARCEL ADDRESS
22480X	0107415	1986	1.43	15	

OWNER: BIRCH CREEK IRRIGATION CO

TAX NOTICE MAILED TO: BIRCH CREEK IRRIGATION CO
PO BOX 455
BOOK: 00225 PAGE: 00609 FAIRVIEW UT 84629
ENTRY NUMBER:

PARCEL DESCRIPTION:

BEG E 2074.40 FT,S 100.30 FT NW COR SEC 19-14-5E N0°15'05"E 250 FT,S89°44'55"E 250 FT,S0°15'05"W 250 FT,N89°44'55"W 250 FT TO BEG CONT 1.435 AC TOGETHER WITH R-O-W BK225 P6609

PARCEL OWNERSHIP RETRIEVAL SANPETE COUNTY DATE: 07/11/94

SERIAL NUMBER	ACCOUNT	YEAR	ACREAGE	DIST	PARCEL ADDRESS
22440	0104438	1987	39.27	15	

OWNER: PERRY CAROLYN B

TAX NOTICE MAILED TO: PERRY CAROLYN B
1130 EAST 965 NORTH
BOOK: 00270 PAGE: 00035 OREM UT 84057
ENTRY NUMBER:

PARCEL DESCRIPTION:

LOT 1 SEC 7-14-5E CONT 39.27 AC

PARCEL OWNERSHIP RETRIEVAL SANPETE COUNTY DATE: 07/11/94

SERIAL NUMBER	ACCOUNT	YEAR	ACREAGE	DIST	PARCEL ADDRESS
26647	0138907	1990	16.50	15	

OWNER: BECK CHAD D ETUX JT
BECK JACQUELYN T ETAL JT

TAX NOTICE MAILED TO: BECK CHAD D ETUX JT
PO BOX 328
BOOK: 00300 PAGE: 00845 SPRING CITY UT 84662
ENTRY NUMBER: 00007127

PARCEL DESCRIPTION:

BEG SE COR SW1/4,SEC 27-15-4E N 8.25 C,W 20 C,S 8.25 C,E 20 C TO BEG CONT 16.50AC BK293 P6758 FOR EASEMENT

PARCEL OWNERSHIP RETRIEVAL SANPETE COUNTY DATE: 07/11/94

SERIAL NUMBER	ACCOUNT YEAR	ACREAGE	DIST	PARCEL ADDRESS
22412	0103810 1989	80.00	15	

OWNER: MCKAY CHARLES A ETUX JT
MCKAY ELNA J ETAL JT

TAX NOTICE MAILED TO: MCKAY CHARLES A ETUX JT
310 W 600 S #52
BOOK: 00293 PAGE: 00101 MT PLEASANT UT 84647
ENTRY NUMBER: 00003424

P A R C E L D E S C R I P T I O N :

N1/2 SE1/4 SEC 36-14-4E CONT 80 AC

PARCEL OWNERSHIP RETRIEVAL SANPETE COUNTY DATE: 07/11/94

SERIAL NUMBER	ACCOUNT YEAR	ACREAGE	DIST	PARCEL ADDRESS
22417	0103885 1989	20.00	15	

OWNER: MCKAY CHARLES A ETUX JT
MCKAY ELNA J ETAL JT

TAX NOTICE MAILED TO: MCKAY CHARLES A ETUX JT
310 W 600 S #52
BOOK: 00293 PAGE: 00101 MT PLEASANT UT 84647
ENTRY NUMBER: 00003424

P A R C E L D E S C R I P T I O N :

E1/2 SW1/4 SE1/4 SEC 36-14-4E CONT 20 AC

PARCEL OWNERSHIP RETRIEVAL SANPETE COUNTY DATE: 07/11/94

SERIAL NUMBER	ACCOUNT YEAR	ACREAGE	DIST	PARCEL ADDRESS
21023	0085363 1992	88.00	15	

OWNER: ROBERTSON CARROLL BERT

TAX NOTICE MAILED TO: ROBERTSON CARROLL BERT
RR 1 BOX 190
BOOK: 00312 PAGE: 00453 FAIRVIEW UT 84629
ENTRY NUMBER: 00012477

P A R C E L D E S C R I P T I O N :

BEG 10 C S,1391.16 FT E NW COR SEC 36-13-4E E 1248.84 FT,N 10 C,E 18 C,S 20 C,W 11.40 C,S 9.25 C,N89*W 26.60 C,N 9 C,W 20 C,N 0.36 C,E 5.17 C,N 277.20 FT,E 1000 FT,N 15.29 FT,E 49.92 FT,N0*00'46"E 298.87 FT TO BEG CONT 88 AC

PARCEL OWNERSHIP RETRIEVAL SANPETE COUNTY DATE: 07/11/94

SERIAL NUMBER	ACCOUNT	YEAR	ACREAGE	DIST	PARCEL ADDRESS
21058	0005850	1991	11.05	15	

OWNER: COX FARMS INC

TAX NOTICE MAILED TO: COX FARMS INC
1997 S 1175 E
BOOK: 00316 PAGE: 00492 BOUNTIFUL UT 84010
ENTRY NUMBER: 00014267

PARCEL DESCRIPTION:

BEG SW COR LOT 7,SEC 36-13-4E N 8.80 C,S86*E 13.45 C,S17'W 6.38 C,S77*30'W 6.45 C,N85*45'W 7 C TO BEG CONT 11.05 AC SUB TO R-O-W

PARCEL OWNERSHIP RETRIEVAL SANPETE COUNTY DATE: 07/11/94

SERIAL NUMBER	ACCOUNT	YEAR	ACREAGE	DIST	PARCEL ADDRESS
25983	0130565	1986	80.12	15	

OWNER: PETERSON DAVID L ETUX JT
PETERSON MARY LYLE MENDENHALL

TAX NOTICE MAILED TO: PETERSON DAVID L ETUX JT
PO BOX 265
BOOK: 00264 PAGE: 00390 MT PLEASANT UT 84647
ENTRY NUMBER:

PARCEL DESCRIPTION:

LOT 2 & 3,SEC 1-15-4E CONT 80.12 AC

PARCEL OWNERSHIP RETRIEVAL SANPETE COUNTY DATE: 07/11/94

SERIAL NUMBER	ACCOUNT	YEAR	ACREAGE	DIST	PARCEL ADDRESS
25987	0130599	1993	35.42	15	

OWNER: PETERSON DAVID L ETUX JT
PETERSON MARY LYLE MENDENHALL

TAX NOTICE MAILED TO: PETERSON DAVID L ETUX JT
PO BOX 265
BOOK: 00326 PAGE: 00610 MT PLEASANT UT 84647
ENTRY NUMBER: 00018703

PARCEL DESCRIPTION:

BEG 200 FT E SW COR SE1/4 NE1/4 SEC 1-15-4E;N0*23'42"W 1000 FT,W 197.20 FT,N 320.01 FT,E 1320 FT,S 1320 FT,W 1120 FT TO BEG CONT 35.424 AC SUB TO R-O-W BK327 PG 373

PARCEL OWNERSHIP RETRIEVAL SANPETE COUNTY DATE: 07/11/94

SERIAL NUMBER	ACCOUNT YEAR	ACREAGE	DIST	PARCEL ADDRESS
20847	0083293 1994	39.78	15	

OWNER: ROYAL F F TRUSTEES
ROYAL MARIE TRUSTEES

TAX NOTICE MAILED TO: ROYAL F F TRUSTEES
3230 MONTECITO
BOOK: 00348 PAGE: 00401 LAS VEGAS NV 89120
ENTRY NUMBER: 00028612

PARCEL DESCRIPTION:

BEG 1016.40 FT N SE COR SW1/4 SE1/4 SEC 25-13-4E S 516.40 FT,W 51.60 C M-O-L TO E LINE ORGRR R-O-W,NE'LY ALONG E LINE RR R-O-W TO PT DUE W OF BEG,E 48 C M-O-L TO BEG CONT 39.78 AC

PARCEL OWNERSHIP RETRIEVAL SANPETE COUNTY DATE: 07/11/94

SERIAL NUMBER	ACCOUNT YEAR	ACREAGE	DIST	PARCEL ADDRESS
22510	0107993 1986	39.91	15	

OWNER: FRAMPTON PROPERTIES LTD

TAX NOTICE MAILED TO: FRAMPTON PROPERTIES LTD
540 EAST 7200 SOUTH
BOOK: 00231 PAGE: 00573 MIDVALE, UT 84047
ENTRY NUMBER:

PARCEL DESCRIPTION:

NW1/4 NW1/4 SEC 31-14-5E CONT 39.91 AC

PARCEL OWNERSHIP RETRIEVAL SANPETE COUNTY DATE: 07/11/94

SERIAL NUMBER	ACCOUNT YEAR	ACREAGE	DIST	PARCEL ADDRESS
22496	0107746 1992	70.00	15	

OWNER: FRAMPTON PROPERTIES LTD

TAX NOTICE MAILED TO: FRAMPTON PROPERTIES LTD
540 E 7200 S
BOOK: 00315 PAGE: 00511 MIDVALE UT 84047
ENTRY NUMBER: 00013923

PARCEL DESCRIPTION:

S 990 FT SE1/4 NE1/4;NE1/4 SE1/4 SEC 30-14-5E CONT 70 AC

PARCEL OWNERSHIP RETRIEVAL SANPETE COUNTY DATE: 07/11/94

SERIAL NUMBER	ACCOUNT YEAR	ACREAGE	DIST	PARCEL ADDRESS
26857	0141745 1986	80.00	15	

OWNER: BLACK FRANCIS T

TAX NOTICE MAILED TO: BLACK FRANCIS T
PO BOX 215
BOOK: 00141 PAGE: 00179 SPRING CITY UT 84662
ENTRY NUMBER:

PARCEL DESCRIPTION:

NE1/4 SE1/4,SE1/4 NE1/4,SEC 33-15-4E CONT 80 AC

PARCEL OWNERSHIP RETRIEVAL SANPETE COUNTY DATE: 07/11/94

SERIAL NUMBER	ACCOUNT YEAR	ACREAGE	DIST	PARCEL ADDRESS
26867	0141844 1986	40.75	15	

OWNER: BLACK FRANCIS T

TAX NOTICE MAILED TO: BLACK FRANCIS T
PO BOX 215
BOOK: 00141 PAGE: 00181 SPRING CITY UT 84662
ENTRY NUMBER:

PARCEL DESCRIPTION:

BEG SW COR NE1/4 SE1/4 SEC 33-15-4E W .50 C,N 12 C,E .50 C,S 12 C TO BEG ALSO SW 1/4 SE1/4 SEC 33-15-4E CONT 40.60 AC ALSO BEG 30 C S,39.75 C W,NE COR SEC 33-15-4E N 5 C,W .25 C,S 5 C,E .25 C TO BEG CONT .13 AC TOTAL 40.75 AC

PARCEL OWNERSHIP RETRIEVAL SANPETE COUNTY DATE: 07/11/94

SERIAL NUMBER	ACCOUNT YEAR	ACREAGE	DIST	PARCEL ADDRESS
26323	0134658 1986	120.00	15	

OWNER: MCMULLIN GARFF K

TAX NOTICE MAILED TO: MCMULLIN GARFF K
543 SO TOWERS DR BOX 186
BOOK: 00189 PAGE: 00664 SALEM UT 84653
ENTRY NUMBER:

PARCEL DESCRIPTION:

NE1/4 NW1/4,W1/2 NE1/4,SEC 14-15-4E CONT 120 AC

PARCEL OWNERSHIP RETRIEVAL SANPETE COUNTY DATE: 07/11/94

SERIAL NUMBER	ACCOUNT	YEAR	ACREAGE	DIST	PARCEL ADDRESS
20843	0003236	1986	47.32	15	

OWNER: SHELLEY IVAN J ETUX JT
SHELLEY DAWN M ETAL JT

TAX NOTICE MAILED TO: SHELLEY IVAN J ETUX JT
RR 1 BOX 126
BOOK: 00228 PAGE: 00524 FAIRVIEW UT 84629
ENTRY NUMBER:

PARCEL DESCRIPTION:

BEG 7.50 C W NE COR NW1/4 SEC 25-13-4E S 40 C,W 12.50 C,N 32.42 C,E 3.30 C,N 4.2
8 C,E .53 C,N 3.30 C,E 8.67 C TO BEG CONT 47.32 AC

PARCEL OWNERSHIP RETRIEVAL SANPETE COUNTY DATE: 07/11/94

SERIAL NUMBER	ACCOUNT	YEAR	ACREAGE	DIST	PARCEL ADDRESS
26601	0138220	1992	80.00	15	

OWNER: EDMUNDS JACK K TRUSTEES
EDMUNDS BERTHA R TRUSTEES

TAX NOTICE MAILED TO: EDMUNDS JACK K TRUSTEES
PO BOX 233
BOOK: 00328 PAGE: 00506 SPRING CITY UT 84662
ENTRY NUMBER: 00019475

PARCEL DESCRIPTION:

S1/2 NE1/4 SEC 22-15-4E CONT 80 AC

PARCEL OWNERSHIP RETRIEVAL SANPETE COUNTY DATE: 07/11/94

SERIAL NUMBER	ACCOUNT	YEAR	ACREAGE	DIST	PARCEL ADDRESS
21791	0095172	1988	58.89	15	

OWNER: LITTLE HOLLOW FARMS INC

TAX NOTICE MAILED TO: LITTLE HOLLOW FARMS INC
2632 E EL MORO
BOOK: 00282 PAGE: 00883 MESA AZ 85204
ENTRY NUMBER:

PARCEL DESCRIPTION:

BEG 22.27 CHS S NE COR SE1/4 SEC 1-14-4E W 10.40 CHS,S 0.75 CH, W 8.24 CHS, S 1.
25 CHS, W 2 CHS, N 89*15' W 18 CHS, S 31*30' E 9 CHS, S 12*15' E 8.10 CHS, E 31.
74 CHS, N 18 CHS TO BEG CONT 58.89 AC

PARCEL OWNERSHIP RETRIEVAL SANPETE COUNTY DATE: 07/11/94

SERIAL NUMBER	ACCOUNT	YEAR	ACREAGE	DIST	PARCEL ADDRESS
22436	0104362	1988	36.30	15	

OWNER: LITTLE HOLLOW FARMS INC

TAX NOTICE MAILED TO: LITTLE HOLLOW FARMS INC
2632 E EL MORO
BOOK: 00275 PAGE: 00302 MESA AZ 85204
ENTRY NUMBER:

P A R C E L D E S C R I P T I O N :

LOT 7, SEC 6-14-5E LESS FOLLOWING BEG 2.27 C S NW COR LOT 7 SEC 6-14-5E N 2.27 C ,E 15.75 C SW TO BEG CONT 36.30 AC

PARCEL OWNERSHIP RETRIEVAL SANPETE COUNTY DATE: 07/11/94

SERIAL NUMBER	ACCOUNT	YEAR	ACREAGE	DIST	PARCEL ADDRESS
22464	0106987	1994	5.00	15	

OWNER: TURPIN MAURICE W ETUX JT
TURPIN RODALEEN ETAL JT

TAX NOTICE MAILED TO: TURPIN MAURICE W ETUX JT
671 E 150 N
BOOK: 00351 PAGE: 00267 FAIRVIEW UT 84629
ENTRY NUMBER: 00030052

P A R C E L D E S C R I P T I O N :

BEG 17.94 C E,0.25 C N,SW COR LOT 3 SEC 18-14-5E N 8.75 C,E 5.72 C,S 8.75 C,W 5. 72 C TO BEG CONT 5 AC

PARCEL OWNERSHIP RETRIEVAL SANPETE COUNTY DATE: 07/11/94

SERIAL NUMBER	ACCOUNT	YEAR	ACREAGE	DIST	PARCEL ADDRESS
26305	0134450	1994	130.00	15	

OWNER: MEDICINE BEAR LAND & CATTLE LLC

TAX NOTICE MAILED TO: MEDICINE BEAR LAND & CATTLE LLC
188 W RIVER DR
BOOK: 00351 PAGE: 00655 PROVO UT 84604
ENTRY NUMBER: 00030237

P A R C E L D E S C R I P T I O N :

NE1/4 NW1/4,NW1/4 NE1/4,SW1/4 NW1/4,SW1/4 SE1/4 NW1/4 SEC 12-15-4E CONT 130 AC

PARCEL OWNERSHIP RETRIEVAL SANPETE COUNTY DATE: 07/11/94

SERIAL NUMBER	ACCOUNT YEAR	ACREAGE	DIST	PARCEL ADDRESS
22443	0104495 1986	33.00	15	

OWNER: CARLSTON MICHAEL R ETUX JT
CARLSTON LINDA J ETAL JT

TAX NOTICE MAILED TO: CARLSTON MICHAEL R ETUX JT
855 HARWOOD DRIVE
BOOK: 00183 PAGE: 00147 MURRAY UT 84107
ENTRY NUMBER:

PARCEL DESCRIPTION:

BEG NW COR LOT 2 SEC 7-14-5E S 48 1/2 RDS,W 79 RDS,S 21 1/4 RDS,E 159 RDS,N 21 1/4 RDS,W 40 RDS,N 48 1/2 RDS,W 40 RDS TO BEG CONT 33 AC

PARCEL OWNERSHIP RETRIEVAL SANPETE COUNTY DATE: 07/11/94

SERIAL NUMBER	ACCOUNT YEAR	ACREAGE	DIST	PARCEL ADDRESS
26881	0142073 1986	30.00	15	

OWNER: RASMUSSON PATRICIA DEON ETALJT
RASMUSSON RUSSELL ROGER ETALJT

TAX NOTICE MAILED TO: RASMUSSON PATRICIA DEON ETALJT
55 SOUTH MAIN
BOOK: 00262 PAGE: 00076 BEAVER UT 84713
ENTRY NUMBER:

PARCEL DESCRIPTION:

BEG NW COR SEC 34-15-4E E 20 C,S 15 C,W 20 C,N 15 C TO BEG CONT 30 AC

PARCEL OWNERSHIP RETRIEVAL SANPETE COUNTY DATE: 07/11/94

SERIAL NUMBER	ACCOUNT YEAR	ACREAGE	DIST	PARCEL ADDRESS
22499X	0107779 1986	15.00	15	

OWNER: HATCH RONALD LYLE ETUX JT
HATCH RIA E ETAL JT

TAX NOTICE MAILED TO: HATCH RONALD LYLE ETUX JT
137 PARK CIRCLE
BOOK: 00176 PAGE: 00340 ELK RIDGE UT 84651
ENTRY NUMBER:

PARCEL DESCRIPTION:

BEG NE COR SW1/4 SE1/4 SEC 30-14-5E S 20 C,W 2.50 C,N 20 C,E 2.50 C TO BEG CONT 5 AC BEG NW COR SE1/4 SW1/4 SEC 30-14-5E E 5 C,S 20 C,W 5 C,N 20 C TO BEG CONT 10 AC TOTAL 15 AC

PARCEL OWNERSHIP RETRIEVAL SANPETE COUNTY DATE: 07/11/94

SERIAL NUMBER	ACCOUNT YEAR	ACREAGE	DIST	PARCEL ADDRESS
20852	0003426 1986	100.02	15	

OWNER: MOWER RUEL L TRUSTEE

TAX NOTICE MAILED TO: MOWER RUEL L TRUSTEE
RR 1 BOX 126
BOOK: 00204 PAGE: 00437 FAIRVIEW UT 84629
ENTRY NUMBER:

PARCEL DESCRIPTION:

BEG NW COR NE1/4 SEC 25-13-4E E 15.01 C,S 20 C,E 4.99 C,S 20 C,W 27.50 C,N 40 C, E 7.50 C TO BEG CONT 100.02 AC

PARCEL OWNERSHIP RETRIEVAL SANPETE COUNTY DATE: 07/11/94

SERIAL NUMBER	ACCOUNT YEAR	ACREAGE	DIST	PARCEL ADDRESS
22459X	0106938 1986	3.20	15	

OWNER: SPRING CANYON IRRIGATION CO

TAX NOTICE MAILED TO: SPRING CANYON IRRIGATION CO
RR 1 BOX 244
BOOK: 00223 PAGE: 00726 FAIRVIEW UT 84629
ENTRY NUMBER:

PARCEL DESCRIPTION:

BEG N43*13'19"E 2832.96 FT FROM W1/4 COR SEC 18-14-5E N71*17'29"W 286.66 FT,N12* 07'27"E 447.18 FT,S77*57'19"E 315.87 FT,S15*49'40"W 481.49 FT TO BEG CONT3.204 A C M-O-L

PARCEL OWNERSHIP RETRIEVAL SANPETE COUNTY DATE: 07/11/94

SERIAL NUMBER	ACCOUNT YEAR	ACREAGE	DIST	PARCEL ADDRESS
26297X	0134328 1986	40.00	15	

OWNER: TWIN CREEK FARMS INC

TAX NOTICE MAILED TO: TWIN CREEK FARMS INC
15 N 300 W #3
BOOK: 00251 PAGE: 00940 MT PLEASANT UT 84647
ENTRY NUMBER:

PARCEL DESCRIPTION:

SE1/4 SE1/4 SEC 11-15-4E CONT 40 AC

PARCEL OWNERSHIP RETRIEVAL SANPETE COUNTY DATE: 07/11/94

SERIAL NUMBER	ACCOUNT	YEAR	ACREAGE	DIST	PARCEL ADDRESS
21021XS	2483210	1992	5.14	15	

OWNER: NORTON TED L ETUX JT
NORTON DONNA B ETAL JT

TAX NOTICE MAILED TO: NORTON TED L ETUX JT
1267 ALTA HEIGHTS DR
BOOK: 00316 PAGE: 00759 SANDY UT 84094
ENTRY NUMBER: 00014389

PARCEL DESCRIPTION:

BEG 477.84 FT N & 272.25 FT W SE COR LOT 26,SEC 36-13-4E;N 575.04 FT,W 389.63 FT ,S 575.04 FT,E 389.63 FT TO BEG CONT 5.14 AC

PARCEL OWNERSHIP RETRIEVAL SANPETE COUNTY DATE: 07/11/94

SERIAL NUMBER	ACCOUNT	YEAR	ACREAGE	DIST	PARCEL ADDRESS
22478	0107340	1987	60.00	15	

OWNER: COATES UTAHNA C ETAL
COATES DOYCE L ETAL 1/3
MADSEN CHERYLE C ETAL 1/3

TAX NOTICE MAILED TO: COATES UTAHNA C ETAL
151 N 400 W 860
BOOK: 00226 PAGE: 00447 MT PLEASANT UT 84647
ENTRY NUMBER:

PARCEL DESCRIPTION:

NW1/4 NE1/4, S1/2 NE1/4 NW1/4 SEC 19-14-5E CONT 60 AC

PARCEL OWNERSHIP RETRIEVAL SANPETE COUNTY DATE: 07/11/94

SERIAL NUMBER	ACCOUNT	YEAR	ACREAGE	DIST	PARCEL ADDRESS
26643	0138865	1994	103.50	15	

OWNER: LARSEN V BLAIN TRUSTEE ETAL
LARSEN NEVA TRUSTEE ETAL

TAX NOTICE MAILED TO: LARSEN V BLAIN TRUSTEE ETAL
107 NORTH 100 WEST 829
BOOK: 00347 PAGE: 00748 MT PLEASANT UT 84647
ENTRY NUMBER: 00028275

PARCEL DESCRIPTION:

BEG NW COR SW1/4,SEC 27-15-4E E 40 C,S 31.75 C,W 20 C,N 11.75 C,W 20 C,N 20 C TO BEG CONT 103.50 AC

PARCEL OWNERSHIP RETRIEVAL SANPETE COUNTY DATE: 07/11/94

SERIAL NUMBER	ACCOUNT YEAR	ACREAGE	DIST	PARCEL ADDRESS
26652	0138572 1994	40.00	15	

OWNER: LARSEN V BLAIN TRUSTEE ETAL
LARSEN NEVA TRUSTEE ETAL

TAX NOTICE MAILED TO: LARSEN V BLAIN TRUSTEE ETAL
107 NORTH 100 WEST #29
BOOK: 00347 PAGE: 00748 MT PLEASANT UT 84647
ENTRY NUMBER: 00028275
PARCEL DESCRIPTION:
SW1/4 SW1/4,SEC 27-15-4E CONT 40 AC

PARCEL OWNERSHIP RETRIEVAL SANPETE COUNTY DATE: 07/11/94

SERIAL NUMBER	ACCOUNT YEAR	ACREAGE	DIST	PARCEL ADDRESS
26325	0134674 1986	80.00	15	

OWNER: POULSEN WAYNE H ETUX JT
POULSEN COLLEEN ETAL JT

TAX NOTICE MAILED TO: POULSEN WAYNE H ETUX JT
263 E 100 N #88
BOOK: 00142 PAGE: 00359 MT PLEASANT UT 84647
ENTRY NUMBER:
PARCEL DESCRIPTION:
S1/2 SW1/4,SEC 14-15-4E CONT 80 AC

PARCEL OWNERSHIP RETRIEVAL SANPETE COUNTY DATE: 07/11/94

SERIAL NUMBER	ACCOUNT YEAR	ACREAGE	DIST	PARCEL ADDRESS
26612	0138345 1986	40.00	15	

OWNER: POULSEN WAYNE H ETUX JT
POULSEN COLLEEN ETAL JT

TAX NOTICE MAILED TO: POULSEN WAYNE H ETUX JT
263 E 100 N #88
BOOK: 00142 PAGE: 00359 MT PLEASANT UT 84647
ENTRY NUMBER:
PARCEL DESCRIPTION:
NW1/4 NW1/4 SEC 23-15-4E CONT 40 AC

PARCEL OWNERSHIP RETRIEVAL SANPETE COUNTY DATE: 07/11/94

SERIAL NUMBER	ACCOUNT YEAR	ACREAGE	DIST	PARCEL ADDRESS
22444	0104503 1990	64.12	15	

OWNER: DAVIS WENDEL A TRUSTEES
DAVIS NINA B TRUSTEES

TAX NOTICE MAILED TO: DAVIS WENDEL A TRUSTEES
1512 N SILVERTON
BOOK: 00297 PAGE: 00563 MESA AZ 85203
ENTRY NUMBER: 00005474
PARCEL DESCRIPTION:
BEG 6.94 C E,SW COR SEC 7-14-5E N5*30'E 20.06 C,E 30.88 C,S 20 C,W 32.88 C TO BE G CONT 64.12 AC

ATTACHMENT G - COMMENTS AND RESPONSES

1. LETTERS REQUIRING A RESPONSE
2. LETTERS NOT REQUIRING A RESPONSE

ATTACHMENT G - COMMENTS AND RESPONSES

This two-part attachment contains copies of all written comments received on the Narrows Project DEIS prepared for the Sponsor by Franson-Noble & Associates, Inc. Specific questions and comments requiring a response are found in Part 1 and have been numbered in the margin of the letter. The response to each of those comments, coded with the same number, is found following the letter. Part 2 includes comment letters not requiring a response.

ATTACHMENT G - COMMENTS AND RESPONSES

1. LETTERS REQUIRING A RESPONSE

United States
Department of
Agriculture

Forest
Service

Manti-La Sal
National Forest

599 West Price River Dr.
Price, Utah 84501

Reply to: 2530-5/1950

Date: April 25, 1994

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Prj GF
Cntr # 94014762
Fldr # 29165
Kywd
Date | Initials | To
4/28 | ZB | 7
75

Mr. Charles Calhoon
Bureau of Reclamation
125 South State Street
P.O. Box 11568
Salt Lake City, Utah 84147

Narrows EIS Comments

Dear Sir:

We have reviewed the Narrows Project, Draft Environmental Impact Statement, November 16, 1994. We believe this Draft Environmental Impact Statement (DEIS) does not meet the requirements of the National Environmental Policy Act. The description of the proposed project seems inadequate for the evaluation of the impacts. The cumulative effects are not fully described. The description of the existing environment and environmental impact omits important aspects. Portions of the Interdisciplinary, Interagency Committee reports appear to be taken out of context (i.e., fisheries). Several inconsistencies indicate corrections have not been carried to all relevant parts of the document.

As you are aware, the Forest Service has neither opposed nor endorsed the project. The Forest Service has participated in developing much of the scientific analysis of this project. By such participation we hope to minimize adverse impacts to the resources of the National Forest. However, this DEIS presents information not previously seen by this agency, and presents some of the findings of the studies in a manner that seems to obscure the findings.

1 Within the National Forest nearly all of the proposed project is within a Reclamation Withdrawal. The purposes of the withdrawal take precedence over the purposes of the National Forest. However, pending the authorization/construction of the project, the management of the area is directed by the Manti-La Sal National Forest Land and Resource Management Plan. If the project is constructed, an amendment to the Forest Plan would be necessary because the uses and management emphasis would change.

2 through 5 This project proposal would alter the nature and quality of the dispersed and developed recreation experience enjoyed by the current users. The benefits and losses of the development to recreation should be analyzed and displayed prior to the decision to develop the project. A recreation complex plan is needed to evaluate the effects of this project on the immediate and surrounding areas. This planning is required by the Federal Water Projects Recreation Act of 1965. This project may effect the recreation use from Miller's Flat to Lower Gooseberry and from Huntington Canyon to Scofield. The increased traffic may

effect the current use of the State Highway SR-264. The road relocation would affect the snowmobile parking area at the junction of Highways 264 and 31.

The project proposes to build a new recreation facility to provide for public use of the reservoir. The facility is to be administered by the Forest Service. In light of our current budgets, it seems unlikely that the Manti-La Sal would have the funds necessary to administer the campground. Funding for
6 operation and maintenance should be addressed not only for the new facilities but also for the impacts to adjacent existing facilities and dispersed use that will also be impacted from this proposal.

Although the Draft EIS stated that all proposed recreation facilities would be
7 constructed to Forest Service standards, it would be essential for us to participate in the details of design.

The project would change the character of the National Forest. The topography and resources would change. The attractiveness of the area would change. The uses and amount of use would change. The facilities would change. There is a potential for additional development of the private land. The stability of
8 Highway SR-31 may be impacted within Fairview Canyon. The Forest/development interface would occur sooner. Suburban development in the form of more roads, changes in land use and utility corridors could occur. The project proposes to attract many new recreationists to the Gooseberry Creek. The document should address the impacts of these new recreationists on the pollution of Lower Gooseberry Reservoir and Scofield Reservoir and associated watersheds and streams. To fully meet the requirements of NEPA the cumulative effects analysis must thoroughly address these impacts.

In the document, there are references to easements, rights-of-way, titles, and other ownership and management changes. We would need to develop a formalized
9 Memorandum of Understanding simultaneously with project approval that identifies respective agency and individual roles and responsibilities.

Federal Water Project Recreation Act of 1965 (P.L. 89-72) requires that all lands and easements acquired in conjunction with a reclamation project that are within the exterior boundaries of the National Forest shall become part of the National Forest. This includes areas acquired for mitigation of impacts. The requirements of this act should be reviewed with the sponsors and the Forest
10 Service to determine if the resulting land transfers would be acceptable to all parties. The proposal should also include possible acquisition of potentially developed private land as an alternative to added water quality impact it developed.

The cumulative effect of this project includes a net loss of fisheries. Trading habitat in one place for new access in another still results in a net loss of habitat. Replacing habitat on the National Forest with mitigations on land
11 owned by others diminishes the value of the National Forest and increases the value of the other lands. Not mitigating impacts to Lower Cottonwood Creek is a net loss. Fish habitat and fisherman access are different aspects of the fishing resource.

12 Many of the livestock operations in the Sanpete Valley are dependent upon the use of BLM and National Forest Rangelands. The extent of that dependancy should be described in this section. Some of the operations would be adversely affected by the proposed project and those impacts should be described.

13 A Benefit-Cost analysis is needed to totally disclose to the public the Benefits and Costs associated with the project. A discussion should be presented showing how much of the grants and mitigation funds supplied by the taxpayers, both Federal and State, would be used also as matching funds to help qualify for the loan from the Bureau of Reclamation to construct the dam.

14 The social and economic impacts to Carbon County should be described comparably to the discussion of the affects in Sanpete County. A discussion of the current state of the economy in Carbon County should be included relative to the need for a secure water supply and the need for additional water.

Enclosed find a memo from our ID Team Leader which displays in more detail some of the problems. This should also be included as a part of our official response. The final EIS should respond to this detailed review as well as this letter. If you have questions, please notify us.

Sincerely,

George A. Morris

GEORGE A. MORRIS
Forest Supervisor

United States Department of Agriculture | Forest Service | Manti-La Sal N.F.

Reply to: 2530-5/1950

Date: April 25, 1994

Subject: Gooseberry Narrows Dam DEIS Review

To: Forest Supervisor

This is a compilation of the ID Team's comments after reviewing the Narrows Project, Draft Environmental Impact Statement, November 16, 1994. We believe this Draft Environmental Impact Statement does not meet the requirements of the National Environmental Policy Act. The description of the project should be improved. The cumulative effects are not fully described. The description of the existing environment and environmental impact omits important aspects. Some of the committee reports seem to have been misrepresented. Several inconsistencies indicate corrections have not been carried to all relevant parts of the document.

I. Forest Plan

Within the National Forest nearly all of the proposed project is within a Reclamation Withdrawal. The purposes of the withdrawal take precedence over the purposes of the National Forest. However, pending the construction of the project, the management of the area is directed by the Land and Resource Management Plan for the Manti-La Sal National Forest (Forest Plan). If the project is constructed, an amendment to the Forest Plan would be necessary because the uses and management emphasis would change.

The Forest Plan gives the following guidance:

The emphasis in the project dam and reservoir area is for production of forage and cover for domestic livestock and wildlife (RNG) and for riparian area management (RPN).

The Plan Visual Quality Objectives (VQO) are Partial Retention with high sensitivity.

The desired future condition for developed recreation is to have additional developed recreation sites.

Desired future condition for fisheries is for improved habitat in streams and lakes or reservoirs.

The Gooseberry Narrows project would affect this guidance by:

The relocation of SR-264 may affect a Undeveloped Motorized (UDM) unit near the junction of SR-264 and SR-31. This project can be constructed within the standards and guidelines for these areas. This project would transfer the management emphasis from RNG to DRS and UDM which would require a Forest Plan amendment.

Visual Quality Objectives may not be met due to the changes in the character, resources, and topography of the project.

This project provides for new recreation sites but the Plan does not identify the Gooseberry Narrows as a location for these sites.

This project reduces fisheries habitat in Gooseberry Creek, Fish Creek, and Lower Gooseberry Reservoir, although it claims that the impacts will be mitigated.

II. The description of the proposed project seems inadequate for the evaluation of the impacts.

15 A. We were unable to find a description of the lands to be impacted by the construction of the pipeline nor of the need for rights-of-way for this construction and use. Specifics of the pipeline are lacking.

16 B. Much of what is recommended is described as things that will not be done in the other alternatives. The DEIS should be re-written and re-submitted for comments when the recommended plan describes what is to take place.

17 C. It should be clearly stated that the project is an additional diversion of water from the Colorado River Basin. This should be highlighted in the summary, in the description of the project, as well as in the description of the water resources of the 3rd chapter. The project would include a transbasin diversion of water from the Scofield Reservoir drainage of the Price - Green - Colorado River basins to the San Pitch - Sevier River of the Great Basin. The dam and diversion works would be located in the Gooseberry Valley tributary to Scofield Reservoir. The service area would be situated in the San Pitch River drainage.

18 D. It should be clearly stated that State Highways 264 and 31 are designated as State and National Scenic Byways. This should appear in the summary, in the description of the project, and in the description of the existing environment. The project includes the relocation a portion SR-264 and construction in SR-31.

III. The Cumulative Impacts to the National Forest are Inadequately Described:

A. Fisheries

19 The cumulative effect of this project would be a net loss of fisheries. Replacing habitat with access produces a loss of fish. Replacing habitat on the National Forest with mitigations on land owned by others diminishes the value of the National Forest and increases the value of the other lands. Not mitigating impacts to Lower Cottonwood Creek is a net loss. Fish habitat and fisherman access are different aspects of the fishing resource. Trading habitat in one place for new access in another results in a loss of habitat.

B. Multiple reservoirs

The effects of the project on Fairview Lakes, Beaver Dams Reservoir, and Lower Gooseberry Reservoir should be described under cumulative effects. How much of a change should be allowed in Gooseberry Creek and Fish Creek? Three dams, Fairview Lakes, Benches Pond and Lower Gooseberry, already modify the flows in the streams. A fourth dam, The Mammoth Dam, failed during construction, and washed away many of the habitat forming components of Gooseberry Creek. 20

C. Dewatering

The cumulative effects of diversion in the Gooseberry Creek - Fish Creek drainage should be addressed. The Gooseberry Creek - Fish Creek stream system has already been dewatered by the Indianola ditch, the Fairview Lakes ditch, and the Cabin Hollow Ditch. How much more water can be taken from the stream before the resource is damaged too much? The discussion indicates that one more would be too many for Gooseberry Creek. To what extent is it for the public benefit to further dewater Gooseberry Creek and Fish Creek? 21

D. Water Quality

The increase in the recreation population in the Gooseberry Valley would likely result in some unavoidable pollution of the streams and increasing the pollution loading downstream. On page 3-13 the effects of this project on water quality at Imperial Dam, on the border between Arizona and California, within a few miles of Mexico, are predicted to the nearest .01 mg/l. However, on page 3-17 it is not possible to predict the net effect on water quality in Lower Gooseberry and Scofield Reservoirs which are about 2 miles and 12 miles downstream respectively. Why? 22

E. Change in the Character of the Area

The project would change the character of the National Forest. The topography and resources would change. The attractiveness of the area would change. The uses and amount of use would change. The facilities would change. There is a potential for urbanization of the private land and the Forest Urban interface would become greater quicker. Suburban development in the form of more roads, changes in land use and utility corridors could occur. The DEIS should address these effects. 23

F. Recreation Complex Plan

A recreation complex plan is needed to evaluate the changes that this project would bring to the immediate and surrounding areas. This project may effect the recreation use from Millers Flat to Lower Gooseberry, in Huntington Canyon, and in Scofield. The traffic may effect the use of the State Highway SR-264 for coal hauling. This planning is also required by the Federal Water Projects Recreation Act of 1965. 24

G. New Recreation Facility Operations and Maintenance

25 The project proposes to build a new recreation facility to provide for public use of the reservoir. The facility is to be administered by the Forest Service. In light of our current budgets, it seems unlikely that the Manti-La Sal would have the funds necessary. Funding for operation and maintenance should be provided.

H. Land Acquisition

26 In the document, there are references to easements, rights-of-way, titles, and other ownership and management changes. Where these agreements are relative to actions or mitigation of impacts on National Forest Lands, we require that the agreements be secured simultaneously with project approval. If the loan is to be approved, it should be contingent upon the successful negotiations and acquisition of described easements, titles, rights-of-way, and agreements.

I. Mitigations

27 How long will it take for the proposed mitigation measures to restore and enhance the fish habitats in streams that have been partially dewatered since before the beginning of the 20th Century? Approval should be contingent upon more rigid mitigation requirements. The mitigations described in vague terms should be detailed specifically. Models should be used to assess the extent of mitigation achieved. Projections should be made estimating the likely success of the individual mitigation projects.

IV. Descriptions of the Affected Environment and Environmental Impacts should be Improved.

28 A. Landowners and permittees

To what extent have the landowners, affected permittees, users of the reservoir basin, the pipeline locations and mitigation areas agreed to this development? What is the likelihood that they will agree? What impact is any would there be to the private road access to the existing Wasatch Academy Environmental Education Center in Cottonwood Creek.

The development of this project and mitigations would alter the boundaries and capacities of 4 range allotments: Beaver Dams, Swens Canyon, Cottonwood-Gooseberry, and Fairview. The permittees who graze livestock on these allotments live in the Sanpete Valley. Some of the permittees are outside of the service area for the project. The economic effect on the permittees who graze livestock on these allotments is not disclosed.

B. Geology

29 1. Ground Water Leakage

The existing environment should include a discussion of the potential for leakage to the west along the dip of the bedrock into Cottonwood Canyon.

30 2. Landslide Hazards within the Gooseberry Valley

There should also be a description of the land stability within and adjacent to the Gooseberry Graben near the project. This discussion may identify hazards to potential developments that may occur as secondary effect of the project construction.

31 3. Slope Stability in Cottonwood Creek

The proposal is expected to widen Cottonwood Creek. From this widening, some de-stabilization of the slope may occur. This slope is National Forest land and is traversed by State Highway 31. The de-stabilization of this slope that occurred in 1983-84 rendered the highway impassable for hours and days at a time during these two years. The land instability added large quantities of sediment to the stream system. There was inconvenience and economic loss that resulted. To what extent would the anticipated de-stabilization of the slopes cause additional inconvenience and economic loss? Could the highway be damaged?

What effect would the slope instability have on recreation, wildlife, range, watershed conditions? Likely there would be a large amount of sediment in the creek since the instability would originate at the streambed.

C. Transportation Systems

32 1. SR-31 in Cottonwood Canyon

If Cottonwood Creek widens and the slope destabilizes as the EIS describes, then to what extent would the Scenic Byway (SR-31) in Cottonwood Canyon be impacted? What would be the impacts on commuter, commercial hauling, and recreation traffic?

33 2. Scenic Byways

The description of the transportation system should discuss the Scenic Byways. Two are affected by the project. However, in the Location and Climate section of the DEIS, which discusses highways, there is no mention of either. Full disclosure of the affected environment should describe for the public and the decision maker what these highways are. We suggest:

> The dam site is within two miles of the intersection of two state highways (31 and 264). Both highways have been designated as National and State Scenic Byways. State Highway 31 connects Fairview in the Sanpete Valley with Huntington in Emery County. State Highway 264 connects Scofield with State Highway 31 at Skyline Drive. These are major commuter routes for miners from the Sanpete valley working in the coal mines on the east side of the Wasatch Plateau. Highway 31 is a route for hauling livestock from the Sanpete Valley to the summer ranges. Both of these secondary highways have been designated as scenic byways and have been selected for grant funding by the Federal Highway Administration as authorized by the Intermodal Surface

Transportation Efficiency Act (ISTEA). This grant combined with money and services contributed by partners will total over 750,000 dollars. Enhancements associated with the Huntington and Eccles Canyons Scenic Byways are proposed to be in place near the end of 1995. These byways and other recreation opportunities on the Forest (including the proposed reservoir if the Narrows Project is implemented) will be advertised via an AM radio repeater located near the intersection of U-96 and US-6. To what extent would the construction of this project modify this Scenic Byway Enhancement Project?

34 3. Traffic Disruptions

There are several potentials to interrupt the traffic flow over these two important highways. Widening Cottonwood Creek and de-stabilizing the slopes in Fairview Canyon, installing a pipeline in the road shoulder of State Highway 31, and of moving State Highway 264 to cross the dam could all cause traffic disruptions. The effects on SR-264 are addressed but the effects on SR-31 are not. To what extent would recreationists, commuters, and commercial hauling be affected. To what extent would there be a change to the scenery and recreational quality of these Scenic Byways?

35 4. Reclamation of Surface Disturbances

Within the boundaries of the National Forest, the road cuts and fills and other disturbances and topographic changes should be reclaimed to the standards required by the Forest Service and the State Department of Environmental Quality for non-point source pollution control.

D. Recreation

1. The Quality of the Recreation Experience

The development of this project would alter the nature and quality of the recreation experience enjoyed by the current users. The benefits and losses of the development to the recreation community should be analyzed and displayed prior to the decision to developthe project.

36 2. Dispersed Recreation

The facilities available near the project area are described but the amount of dispersed, undeveloped recreation that occurs in the area is not. The day use not associated with the facilities is not described. The undeveloped recreation is already creating impacts to the resources of the National forest and diminishing the productivity of these lands for livestock and wildlife forage. The intense use of Fairview Lakes, Lower Gooseberry Reservoir and Gooseberry Campground contribute to the intense use of the Middle Gooseberry Creek and Upper Gooseberry Creek resources for hiking and fishing.

The EIS does not discuss dispersed recreation as an activity. The discussion includes developed sites but does not address the undeveloped camping across the plateau and through out the Gooseberry Valley nor the undeveloped camping along Fish Creek. The transition of this area to a highly developed recreation facility would change the quality of the recreation experience dramatically.

The reservoir may become an attraction for dispersed recreation. As mitigation for drawing all those people in the project should pay for hardening of dispersed recreation and day use sites. The project should assist the Forest in hardening the Lower Gooseberry Reservoir area. The project should pay for redeveloping the Gooseberry Campground.

37 3. Snowmobile Parking Facility

The DEIS does not address the snowmobile parking facility at the junction of SR-31 and SR-264. The relocation of Highway could require a relocation of this facility.

38 4. Facility Design

The DEIS estimated the recreation and fish and wildlife use rates by the equivalent reservoir method. Joe's Valley Reservoir was used as the equivalent reservoir. The recreation facilities proposed at the Narrows Project are proportionate to those at Joe's Valley based on the number of campsites, etc. per acres of water surface area. The data used to support the recreation plan assumes there are 107 campsites at Joe's Valley. In actuality Joe's Valley Reservoir has a total of 64 campsites. 46 of these sites are located in campground and 18 near the boat ramp. Initially there were 72 sites near the boat ramp; all but 18 were later eliminated and these are used primarily to park trailers. The total of 8 picnic sites however, is accurate as listed.

Our review projects that 60 campsites will still be needed, and the number of picnic sites should be increased from 6 to 10. Except for the addition of 4 picnic sites and a possible group site, we concur in general with the recreation plan as outlined.

The DEIS proposes to construct a public recreation facility on withdrawn lands to be operated and maintained by the Forest Service. The Forest Service Recreation specialists would need to participate in all aspects of the campground design to assure that a mixture of facilities are incorporated to provide for a variety of needs. The proposed projects could become a destination recreation facility and a larger facility may be needed. Although the Draft EIS stated that all proposed recreation facilities would be constructed to Forest Service standards, we feel it would be beneficial for us to participate in the details of design.

This proposed reservoir would be closer and more accessible to large population centers than Joe's Valley. Recreationists traveling the enhanced scenic byways and those enticed from US-6 would also increase the use. Given the reservoir's alpine setting and its proximity to various religious, educational and social

groups particularly in the Sanpete Valley; group use may be popular here and consequently a pavilion or similar facility may be appropriate.

39 5. Operation and maintenance funds program

To what extent would this recreation development and operation be a cost to the taxpayers? At this time there is no agreement about who will operate and maintain the recreation facilities?

Funds to operate and maintain the proposed recreation facilities are not readily available through the Forest Service budgets. Adding these new facilities may exacerbate the limited budget problems. Funds should be made available from the project to operate and maintain the facilities.

40 E. Noise

Dozens of summer homes are located in vicinity of the project. High levels of dispersed recreation use of this area is common and the noise associated with the project may be offensive to some.

41 F. Evaporation Water Losses

Everybody else has to pay for evaporation losses from reservoirs. Where does it say that their water right will partially be used for evaporation losses from the reservoir? 3-65. Does 5400 acre feet include evaporation right - is there a payment? Are depletion allowances for evaporation accounted for?

G. Water Quality

1. The project proposes to attract 46,400 new recreationists to the Gooseberry Creek. To what extent would these new recreationists add to the nutrient loading in Gooseberry Creek, Lower Gooseberry 42 Reservoir and Scofield Reservoir? To what extent would the more intensive use of the Gooseberry Valley add to the pollution of Gooseberry Creek and Fish Creek?

43 2. In the description of the existing environment, the discussion of phosphates should refer to the findings of Denton:

Denton, Richard L., Myron I. Cox. and LaVere B. Merritt. 1983. Scofield Reservoir Clean Lakes Study 1980-1982. Utah Department of Health, Division of Environmental Health, Bureau of Water Pollution Control. page 68.

"About 53% of the phosphorous loading to the (Scofield) Reservoir 44 enters from Fish Creek. Examination of the Fish Creek Watershed indicates that the source of most of the phosphorous is naturally-occurring, phosphorous-laden soils in the upper watershed."

H. Fisheries Resources

1. Utah Division of Wildlife Resources fish Stocking

45 The DEIS states that the reservoir would result in more reservoir habitat for cutthroat trout. It seems optimistic to assume that there would be sufficient reproducing cutthroat trout to supply the anticipated fishing pressure. What is the DWR's ability to supply sufficient fish of any size? What options are available if DWR cannot provide the fish needed?

2. Natural Reproduction

46 The Aquatic Mitigation proposes to add water to currently dry channels to provide spawning habitat for cutthroat trout. This plan optimistically assumes that the new reservoir will be managed for cutthroat trout and that the DWR will have fish to plant in this reservoir. Another assumption is that the cutthroat trout would be able to naturally reproduce in these channels that would receive water year-round. If they cannot then the losses to Lower Gooseberry Reservoir's naturally reproducing cutthroat trout population are unmitigated.

3. Error

47 The description of the existing environment for Middle Gooseberry Creek is in error. Cabin Hollow does not flow into Middle Gooseberry Creek. It flows into Lower Gooseberry Creek. This conveys the false impression of the amount of inflow to the Creek and indicates a more rapid inflow to Lower Gooseberry Reservoir.

4. Modeling

48 The fish habitat studies and models should be better explained. In any modeling there are limitations on the model and the interpretations of the results. The person who conducted those studies should describe the limitations of the work. The DEIS seems to present illogical conclusions from interpreting just the numbers from the studies. For instance, fish habitat will be improved with reduced flows. The conclusions need to be made cumulatively to the population not just by life stages.

The sponsor should commit to monitoring the results of the mitigations. If the results are not as good as hoped, then additional mitigations should be found and implemented at the sponsor's expense until adequate mitigation is attained.

The DEIS states that "losses to the trout are within the range of fluctuations that presently occur". By reducing the habitat by a given amount the population of trout would be reduced, the fluctuations of the population would remain the same with a lower average size of population. Reduction of habitat will not likely be compensated for by increased survival.

5. Reservoirs

49 On page 2-10 of the DEIS the sponsor proposes a multi-level outlet from the dam to regulate temperatures. What is the current temperature of the stream and how does it change throughout the year? What is the desired temperature? Who is going to monitor?

50 How fast would the conservation pool fill with sediment? How would this affect the life of the project and the ability of the Sponsor to pay back the loans?

51 The reduction of spawning habitat between Lower Gooseberry Reservoir and the Narrows Reservoir would adversely affect the cutthroat population in the Lower Gooseberry Reservoir. Many redds have been observed in this section. The spawning habitat appears to have been underestimated in the modeling. Gooseberry Reservoir is also a popular fishery.

52 I. Wetlands

1. The proposed project would purchase a wetland off Forest to mitigate for damages on the National Forest. Additionally, or in lieu of, the above the project would potentially create a new wetlands by pipeline irrigation between Fairview Lakes and the proposed reservoir. It may be difficult to acquire these lands.

2. The maintenance of these mitigations should be described.

53 J. Land Aquisition Policies:

In accordance with the requirements of the Federal Water Project Recreation Act of 1965 all lands and easements acquired in conjunction with a reclamation project that are within the exterior boundaries of the National Forest shall become part of the National Forest. This includes areas acquired for mitigation of impacts. We would like to see an analysis about whether or not this law applies in this instance.

K. Mitigations

54 1. The Forest Service policy is to mitigate mitigating in-kind, in-place and on National Forest land if possible. The location of many of the proposed mitigations are on private land. This replaces fish habitats diminished on National Forest Lands with mitigations to improve habitats on private lands. This is diminishes the quality of the resources of the National Forest. To what extent does this mitigate for the losses to the fish and to the public?

55 2. On page 2-4. Restoring streamflow in two small tributaries to Upper Gooseberry Creek may not be sufficient to provide habitat. Riparian vegetation and changes to the channel morphology may also be needed. To what extent does this replace the anticipated impacts to stream fish habitat? How much flow would be added to the channels?

56 3. On page 2-10 the proposed mitigations to stabilize stream banks along middle Gooseberry Creek may prove inadequate or ineffective. It is Forest Service policy in fish habitat management to maintain the natural characteristics of the surrounding area. In much of this stream segment large boulders are not a natural component of the aquatic system. The Forest Service would require a larger expenditure of effort to modify the channel and riparian conditions in this stream segment to

accommodate the remaining flows. Placement of a few structures would not be enough. Some realignment of the channel and associated riparian conditions and floodplains would be needed to provide for appropriate mitigation measures for fish habitat losses.

57 4. The project requires mitigation for the impacts that would occur. On the National Forest the management of the resources is a dynamic process. The development and timing of this project is uncertain. A list of specific projects would likely change before the project is ready to participate. In this situation, no project list has been developed. However, the impact analysis has been based on models of the changes to various wildlife, fish, and vegetation conditions. The sponsor should be required to provide support for projects until the analysis of the completed projects show a complete mitigation of the impacts. This is not determined by dollars or time but rather by habitat improvements.

58 5. Cottonwood Creek would be impacted by increased flows, downcutting, widening and sediment from slope instability. Not mitigating these impacts would cause degrade the water quality, clog the new pipelines, and damage the range and woodland resources of the National Forest. Some mitigation should be required.

59 6. The aquatic mitigation measures proposed do not appear adequate. By simply acquiring access to a stream that currently supports fish and placing fence around an area, does not adequately mitigate for the elimination of all life stages in one section of stream and its associated aesthetic values and reduction of habitat in a much larger area. The assumption that providing water into first order ephemeral tributaries of Upper Gooseberry Creek will make up for established fish habitat in second order sections of Gooseberry Creek that would be inundated is overly optimistic. Additional mitigation on the Forest for these stream fisheries where actual gains in fish habitat can be attained is needed. Table 3-12 should include impacts to naturally reproducing cutthroat trout in Lower Gooseberry Creek.

60 7. Our experience with flushing flows indicates that this mitigation is good to highly questionable. If the loan is to be approved, a detailed analysis of the water needs for a successful flushing flow with an estimate of the benefits to the fish habitat should be required prior to approval. What velocities and rates of flow (cfs) are needed to detach and transport sediments in this reach? What duration of flow is needed? How often will flushing flows be needed? How often will sufficient flows be available to conduct the flush?

61 8. The loss of fish habitat should also be related to changes in Recreation visitor days, impacts to fishermen and dollars. This should be done for Lower Gooseberry Reservoir, Scofield and the reaches of Gooseberry and Fish Creeks.

62 9. What impacts are there to Fishing day use and trout spawning?

63 10. Who is going to monitor the effectiveness of the mitigation measures. Who is going to maintain the mitigation measures?

L. Analysis of Impacts to the Human Environment:

64 1. The social and economic impacts to Carbon County are not mentioned. In a discussion of the current state of the economy in Carbon County should include the need and demand for a secure water supply and the need for additional water.

65 2. A Benefit-Cost analysis is needed. The net farm income does not seem adequate for a $16.1 million project.

66 3. Many of the livestock operations in the Sanpete Valley are dependent upon the use of BLM and National Forest Rangelands. The extent of that dependancy should be described in this section. Some of the operations would be adversely affected by the proposed project and that impact should be described.

V. Inconsistencies in the DEIS.

67 A. The judgements on the weighted usable areas for the stream sections is misleading. For example, cutthroat trout habitat in Upper Gooseberry Creek is deemed marginal for adults over the winter (8,000-9,000 WUA's). However in Middle Gooseberry Creek the adult cutthroat trout habitat over the winter is stated as being extremely limited (over 60,000 WUA's). What are your definitions for marginal and extremely limited and what value of WUA's applies to each.

68 B. The document Page 3-85 says that there would be no net change in the levels of resources in the Upper Colorado River. However, the purpose of the project is to remove 5,400 acre feet of water from the Upper Colorado River.

69 C. The DEIS on page 3-87 says "The Narrows Project would not affect minimum flows of the Price River." Immediately before that it states that the minimum flows are zero. Yes, the flows would not be less than zero. However, the period when zero flow occurs would be extended. On page 3-4 the changes in flow from Scofield Reservoir are described.

70 D. On page 3-17 one result of the proposed project would be "to reduce the amounts of nutrients flowing into Lower Gooseberry Reservoir and improve the water quality". This is misleading since the water quality of the reservoir is dependent upon the concentration of the nutrients in the flowing water. By reducing the flow of the water the amount of nutrients reaching the reservoir would be diminished; however, the quality of water is unchanged. In addition since the rate of flushing of the reservoir is greatly reduced by the reduction in flow, the water remains for longer periods of time. On page 3-38 the DEIS states that water quality may be affected and increased fish kills may result. The dissolved oxygen levels in the water are largely replenished by the aerated waters of the streams. With reduced streamflow, the water quality would decline. The result would be a reservoir that cannot support fish.

71

72 E. Contrary to what is stated on page 3-33 there would be direct effects to Fairview Lakes. Page 3-38 shows that the water levels would change and the schedule of releases would be changed.

73 F. 3-4 The Cottonwood stream channel could widen by 2 to 5 percent.
3-20 The recommended plan would have no impact on the stability of the Slopes in Fairview Canyon....
3-20 ...the channel width would increase by 74 percent ... and ...by 4 percent.
3-21 The remaining stream channel ... would widen by 23 percent... and by 4 percent.... This stream widening could potentially destabilize the banks causing a long-term erosion situation.

74 G. The duration and rate of release of the proposed flushing flow in middle Gooseberry Creek should be determined in consultation with the the Manti-La Sal National Forest, Utah Division of Wildlife Resources, the State Engineer's Office, and the downstream water users. It is stated in different ways in the DEIS.

75 H. It is inconsistent to quantify water quality impacts at Imperial Dam, hundreds of miles away and be unable to quantify water quality impacts within at a reservoir immediately below the proposed dam.

76 I. It is illogical to assume that there would be no water quality impacts from 46,400 additional recreation visitor days on small streams and reservoir.

77 J. The DEIS does not support the statement that there would be no Residual Impacts for water quality. The mitigation measures described mitigate impacts of the water quality on the stream fisheries not the reservoir fisheries. Impacts of water quality on the naturally reproducing cutthroat trout population in Lower Gooseberry Reservoir are not mitigated. There are some major assumptions that the new reservoir would be a good fishery, would have naturally reproducing trout, and that the DWR would have trout to put in this reservoir or if they want to manage this reservoir for cutthroat trout.

VI. Review of compliance with NEPA

78 A. Summary is too general and does not address impacts. It is description of project, not summary of document).

79 B. The assumptions used in the analysis of proposed reservoir and fishery potentials should be displayed for an evaluation of the analysis.

80 C. On page 3-13 the increase in the frequency of fish kills is deemed "insignificant". Perhaps this judgment should be based on an evaluation by the people who live near the reservoir and the fish that are killed and the DWR who stocks the reservoir rather than the proponents of a project creating this change.

81 D. Other alternative were dismissed without adequate evaluation. Perhaps Price River Water Users could buy the water rights. Perhaps the construction money could be used to buy alfalfa in another area.

82 E. No Landscape mitigation was provided i.e., remove or close old road

83 F. The impacts of the pipelines are not presented.

84 G. The Impacts of urbanization or development are not addressed and they are a logical expectation of project implementation.

85 H. In No-Action Alternative should address positive aspects of No Action i.e., a continuation of the stream fisheries in Gooseberry Creek, no potential impacts to Fairview Canyon.

86 I. The discussion of the history of the development of this project was necessarily brief. However, omissions of all documents that might have been construed as unfavorable to the project seems to be less than an a complete and open disclosure of relevant material. We suggest that the following excerpts be incorporated in the DEIS.

In December, 1964, the Bureau of Reclamation Department of Interior prepared a Basin Report for the Price and San Pitch River Basins.

The transmittal of this report on page iii states:

> "The University of Utah has estimated that if water can be made available at a reasonable cost, and additional 48,000 acre-feet annually will be utilized for municipal and industrial purposes in the next 55 years."

On page vii <u>concludes</u>:

> that both the Price and San Pitch River Basins need substantially more water than is now available within each basin to meet their existing and potential needs;

On page viii <u>recommends</u>:

> that the water supply features of the Gooseberry project, ... in combination with the development of equivalent water replacement ... for present uses in the Price River Basin be investigated... that such combined development proceed....

On page 22 states:

> "Insufficient water is the greatest limiting factor in the economic development of the (Price River) Basin."

On page 60 states:

> "More water for irrigation and improved regulation and control of the present supply are among the greatest needs of the San Pitch Basin"

So in summary, the Bureau of Reclamation's own report recommends that water should be taken out of the Price River Basin and transported to the San Pitch River Basin only if replacement water is available to the Price River. Without replacement water such a project will take water from one water short area and give it to another water short area at great expense. The cost benefit ratio

from the EAR and the Loan Application show that the taxpayers of the United States and the State of Utah will not receive full value for their grants to help qualify this project for a loan from the Bureau of Reclamation.

A new section should be added to the EIS:

In 1964 the Bureau of Reclamation compiled a river Basin Report for both the Price and San Pitch River Basins which assesses the water needs of both valleys. This report recommends that water should be taken out of the Price River Basin and transported to the San Pitch River Basin only if replacement water is available to the Price River. Without replacement water such a project will take water from one water short area and give it to another water short area at great expense.

G. Dennis Kelly

G. DENNIS KELLY
ID Team Leader

1. Amendment to Forest Plan

It is the responsibility of the FS to maintain the Forest Plan. The Narrows Project EIS contains sufficient information for the FS to address the stated concerns in amending its Forest Plan.

2. Effects on Dispersed Recreation

The Narrows Project plan does not include facilities that would attract increased dispersed recreation (trail heads, hiking trails, and snowmobile parking areas). The effect that the project is expected to have on recreation is the increased recreation activity adjacent to Narrows Reservoir. The Project Sponsor has included developed recreation facilities in the project plan to facilitate this increased recreation use. Therefore, there would be no impact to dispersed and developed recreation in other areas not immediately adjacent to the reservoir.

3 Federal Water Projects Recreation Act of 1965

The Narrows Project is not a Federal water project and is therefore not subject to the Federal Water Projects Recreation Act of 1965.

4. Increased Traffic

As stated in Chapter 3 of the EIS, the project's facilities would attract 46,400 additional visitor days per year of total recreation use. This use rate equates to an average traffic flow of 129 vehicles per day, assuming two persons average per vehicle. This increased traffic can be safely handled by the existing roads in the area would be able to safely accommodate the increase traffic.

5. Snowmobile Parking

The relocation of State Highway SR-264 would not affect the snowmobile parking area at the junction of SR-264 and SR-31. The existing parking area would be located immediately adjacent to the relocated highway and will have good access.

6. Recreation Facility Operation and Maintenance Funding

An agreement is needed between the Project Sponsor and the FS for management of the recreation area. If a suitable agreement between the two parties cannot be reached, the Sponsor would assume responsibility for management of the recreation area. Chapter 2 of the EIS has been revised to include the alternative management by the Sponsor.

7. Forest Service Involvement in Recreation Facility Design

Chapter 2 of the EIS has been revised to indicate that the FS would participate in the recreation facility design.

8. Cumulative Effect

Cumulative impacts are defined by the Council on Environmental Quality's (CEQ) regulations implementing NEPA as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonable foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such actions" (40 CFR 1508.7). The term "cumulative effects" has been misapplied in this context.

9. Memorandum of Understanding

A Memorandum of Understanding regarding easements, rights-of-way, titles, and other ownership and management changes would be prepared after the Record of Decision is signed.

10. Federal Water Project Recreation Act of 1965.

The Narrows Project is not a Federal water project and is therefore not subject to the Federal Water Projects Recreation Act of 1965.

11. Net Loss of Fisheries.

The fishery mitigation measures include habitat improvement measures in addition to securing rights-of-way and providing fencing to protect existing habitat. These measures would provide habitat that would offset habitat losses caused by the project. The EIS has been revised to include fishery mitigation measures for impact to lower Cottonwood Creek.

12. Livestock Operations

As indicated in Chapter 3 of the EIS, the project would affect portions of three sheep grazing allotments and four grazing permits. These permitees would experience a reduction of about 10 percent in the suitable grazing acreage. This reduction would create a need for the livestock operations to obtain about 240 AUM's of feed to replace the lost grazing acreage.

13. Benefit-Cost Analysis

CEQ regulations 1502.23 states:

> If a cost-benefit analysis relevant to the choice among environmentally different alternatives is being considered for the proposed action, it shall be incorporated by reference or appended to the statement as an aid in evaluating the environmental consequences. . . . For purposes of complying with the Act, **the weighing of merits and drawbacks of the various alternatives need not be displayed in a monetary cost-benefit analysis and should not be when there are important qualitative considerations**.

14. Social and Economic Impacts to Carbon County

Chapter 3 of the EIS has been revised to include additional information regarding social and economic impacts to Carbon County. However, the Sponsor believes that when the original Gooseberry Project Plan is considered in its entirety, Carbon County receives significant economic benefits from the project rather than an adverse impact. The Narrows Project clearly benefits both Carbon and Sanpete Counties because it is the last component part of the original Gooseberry Project Plan, a plan which included enlarging Scofield Reservoir by over 35,000 acre-feet, the contraction of a dam on Gooseberry Creek, and a transmountain tunnel to transport the Gooseberry Creek water to Sanpete County.

To view the "Narrows Project" without regard to its past is wrong because the enlargement of Scofield Reservoir from its original 30,000 acre-feet to its current 73,500 acre-feet was done as part of the Gooseberry Project Plan and for the express purpose of facilitating the transmountain diversion of water to Sanpete County. This is demonstrated by the simple fact that Sanpete County remains obligated to pay a portion of the Scofield Dam reconstruction costs upon completion of the remaining Gooseberry Project features. Clearly, if Carbon County had not agreed to the Gooseberry Project diversion plan, it would not have received the benefit of approximately 35,000 acre-feet of additional storage capacity that has been available to it for the past 50 years.

The only reason the "Narrows Project" is at all controversial with Carbon County is because it was not completed at the same time as the reconstruction effort on Scofield Dam. If it had, it would have been viewed by Carbon County as merely part of a plan by which Sanpete County was allowed to build a dam and tunnel on Gooseberry Creek in return for a new dam, more than 35,000 acre feet of new storage capacity, and the commitment of Sanpete County to pay a portion of the new dam's repayment costs. Just because the implementation of the entire plan was delayed, it should not change the way in which this project is viewed.

In 1944, when Scofield Reservoir was reconstructed, it was clearly recognized that the Narrows Dam and the transmountain tunnel would be completed at a later date. The operational agreement covering the reconstruction effort on Scofield Reservoir -- the Tripartite Agreement -- specifically recognized this and allowed the Carbon County interests to utilize the excess storage capacity being built into the reservoir until the remaining features of the Gooseberry Project Plan were completed. In this respect, Carbon County has already reaped a tremendous economic benefit from the Gooseberry Project -- it received and has placed to use up to 35,000 acre-feet of water annually that it would not otherwise have had. It began reaping the economic benefit of the Gooseberry Project Plan in 1944, when Scofield Reservoir was reconstructed. It did not have to wait -- as Sanpete County has -- for the completion of the other project features to realize its benefit. However, Carbon County is not entitled to <u>all</u> the economic benefit of the Gooseberry Project Plan. The plan anticipated benefits for both counties by providing additional water to both counties. The completion of the plan simply means that Scofield Reservoir will spill less often and Carbon County will no longer have the use of a small amount of water meant for Sanpete County. Carbon County still received a new dam, over 35,000

acre-feet of storage capacity it did not otherwise have and would not have otherwise received, and another party to help defray the repayment costs of its dam. The use of this storage capacity, both directly and by way of carry-over storage, represents a clear benefit to Carbon County.

It should also be noted that following the Scofield reconstruction effort, Sanpete County agreed to take even less water transmountain than was anticipated by the original Gooseberry Project Plan. By virtue of the Compromise Agreement of 1984, Sanpete County agreed to reduce its annual transmountain diversions by over two-thirds of what was originally contemplated -- the original water filings contemplated Sanpete County diverting up to 17,000 acre-feet of water annually. Carbon County is receiving even more water, and thus a greater economic benefit, than was originally anticipated when it negotiated for the reconstruction of Scofield Reservoir and agreed to the Gooseberry Project Plan.

Given the above, it appears clear that rather than suffering any adverse economic impacts by virtue of the Narrows Project, Carbon County has actually received a tremendous economic advantage by having signed agreements to the Gooseberry Project Plan. The benefits began immediately with the reconstruction of Scofield Dam and will continue after the project plan is fully implemented.

15. Inadequate Description of Pipeline

Descriptions of the Oak Creek, East Bench, and Upper Cottonwood Creek Pipelines are provided in Chapter 2 of the EIS. The acres of right-of-way for each of the pipeline are given in Table 2-3. Chapter 3 gives the acreage that would be disturbed by the pipeline construction and the types of vegetation that would be disturbed. Chapter 2 of the EIS has been revised to list specific widths and lengths of right-of-way required for the pipelines.

16. Inadequate Description of Alternatives

The Recommended Plan and the Smaller Reservoir Plan are quite similar in nature. Although the impacts of the Smaller Reservoir Plan and the No Action Plan are often expressed in relation to the impacts of the Recommended Plan, the absolute magnitude of the impacts is also given.

17. Colorado River Basin Diversion

This comment is accommodated in the Summary and in Chapters 2 and 3.

18. Scenic Byways

This comment has been accommodated in the Summary and Chapters 1 and 2 of the EIS.

19. Cumulative Impacts - Fisheries

Please refer to the responses to comments 8 and 11.

20. Cumulative impacts - Multiple Reservoirs

The stream flows given in Table 3-1 and the fish habitat information provided in Tables 3-7 through 3-11 include the cumulative impacts of all existing and proposed reservoirs in the project area. Because mitigation is provided, there is no net cumulative impact.

21. Cumulative Impacts - Dewatering

The stream flows given in Table 3-1 include the cumulative impacts of all existing and proposed projects that would remove water from streams in the project area.

22. Impact at Imperial and Local Impacts

The water quality section of Chapter 3 has been revised to include a more detailed analysis of Scofield Reservoir water quality based on TSI.

23. Cumulative Impacts - Change in the Character of the Area

Impacts on topography, scenery, and land use due to the project have been described in the EIS.

24. Cumulative Impacts - Recreation Complex Plan

Please refer to the responses to comments 2 and 3.

25. Cumulative Impacts - Recreation Facility Operations and Maintenance

Please refer to the response to comment 6.

26 Cumulative Impacts - Land Acquisition

Please refer to the response to comment 9.

27. Mitigation

Mitigation measures were developed with the assistance of an interagency team. The FS participated on this team. The project plan includes mitigation measures recommended by the FWS in the Fish and Wildlife Coordination Act Report. Integral to the mitigation measures is a monitoring process to ensure that mitigation measures are successful. The description of the mitigation plan in Chapter 3 of the EIS has been revised to included all recommendations contained in the Fish and Wildlife Coordination Act Report.

28. Landowners and Permitees

The Project Sponsor has secured right-of-way for all but 75 acres of the private land within the reservoir basin. Agreements with permitees are not required, as the public land has been withdrawn by Reclamation for the Gooseberry Project. No

rights-of-way have been acquired for the pipelines. A larger culvert might be required for the access into the Wasatch Academy Environmental Education Center. If so, it will be provided by the Sponsor in conjunction with the tunnel rehabilitation. As stated in the response to comment 12, about 240 AUM's of feed would be lost due to construction of the reservoir. This feed has an estimated value of $2,400 per year.

29. Reservoir Leakage Along Bedrock to Cottonwood Canyon

Although a previous geologic study does not specifically address the potential for reservoir leakage to Cottonwood Canyon, it does address reservoir leakage in general. This study report, dated 1986, Engineering Geology and Geotechnical Engineering Studies, Narrows Dam and Reservoir Project Sanpete County, Utah, describes the reservoir loss to be between 100 and 300 acre-feet per year for the entire reservoir. The "tight" soils in the reservoir area prevent high losses. Only a fraction of the estimated loss could potentially intercept the westerly dipping bedrock. The above report is identified in the bibliography of the EIS, however, because of the small magnitude of seepage, it is not addressed in the EIS as either a positive or negative environmental impact.

30. Landslide Hazards in Gooseberry Valley

It has been determined by a previously conducted geological study that the potential for reservoir-induced landslides within the reservoir basin is present, but comparatively low. There are no naturally occurring slides or slumps in the reservoir area. For this reason, landslides in Gooseberry Valley were not specifically addressed in the DEIS. Detailed information on the investigations that contained this conclusion is contained in the 1986 report, Engineering Geology and Geotechnical Engineering Studies, Narrows Dam and Reservoir Project Sanpete County, Utah. This report is referenced in the Bibliography of the EIS.

This concern has been addressed in Chapter 3 of the EIS.

31. Slope Stability in Cottonwood Creek

The EIS states in Chapter 3 that the landslide activity identified in Cottonwood Canyon is "not related to channel stability . . . but is caused by saturation from water sources on the hillsides." It is not reasonable to assume that widening of the channel would induce instability, particularly when all current landslide activity is not related to either channel stability or flows. There is no direct relationship between the channel width and flows to potential increases in landslide activity. In actuality, there is considerable information de-linking the stream from landslide activity. The comment is incorrect in stating that "instability would originate at the streambed."

32. SR-31 in Cottonwood Canyon

Please refer to the response to comment 31 above. The EIS does not describe any slope destabilization in Cottonwood Creek. It does refer to bank destabilization, meaning the stream bank described in Chapter 3, Slope and Channel Stability.

33. Scenic Byways

It is appropriate to identify SR-31 and SR-264 as Scenic Byways in the EIS. The suggested description of the State roads has been included in the Location and Climate section of Chapter 1 and in the Topography and Scenery section of Chapter 3 as appropriate. Those sentences relating to the Intermodal Surface Transportation Efficiency Act are not a description of the roads but a description of the Scenic Byway Enhancement Project and have therefore not been included. The last sentence in the comment is a question about how that project would be modified by the construction of the Narrows Project. Other than the relocation of SR-264, there will be no impacts to the Scenic Byway Enhancement Project.

34. Traffic Disruptions

Please refer to the response to comment 31 above as regards to slope stability in Cottonwood Canyon. There would likely be some increases in travel time associated with pipeline construction in Cottonwood Canyon. Delays would be minimal and subject to Utah State regulation of utility construction in or near State roads. Anticipated delays would not be significant, lasting less than 10 minutes per trip through Cottonwood Canyon.

Impacts on scenery and recreation are discussed in Chapter 3 of the EIS.

35. Reclamation of Surface Disturbances

Chapter 2 and Attachment A, Environmental Commitment List, contains a commitment to rehabilitate all disturbed landscape immediately after project construction.

36. Dispersed Recreation

The Recreation section in Chapter 3 of the EIS has been revised to describe impacts on dispersed recreation in addition to the developed recreation provided by the project.

Also, please refer to the response to comment 2.

37. Snowmobile Parking Facility

Please refer to the response to comment 2.

38. Recreation Facility Design

The description of the recreation area in Chapter 2 of the EIS has been revised to indicate that 10 picnic sites would be provided for day use. For issues related to the design of the recreation facility, please refer to the response to comment 7. At present, the Sponsor has no plans for a group-use recreation facility. However, this issue could be included in future discussions with the FS.

39. Recreation Operation and Maintenance Funds

Please refer to the response to comment 6.

40. Summer Homes

This comment was addressed in Chapter 3 of the EIS.

41. Reservoir Evaporation Losses

The reservoir evaporation has been included in the operation study and therefore is part of the determination of the amount of water available for the project. The evaporation is included in the depletion computations.

42. Recreational Impact on Water Quality

It is beyond the scope of the EIS to speculate and predict the behavior of individuals beyond the control of the project requirements and constraints. At the developed recreation area, adequate sanitation facilities would be provided as described in Chapter 2.

43. Discussion of Phosphorus Loading

According to the Denton study, about 53 percent of the phosphorus loading to Scofield Reservoir enters from Fish Creek. Indications are that the source of most of the phosphorus is naturally-occurring, phosphorus-laden soils in the upper watershed. This information has been added to Chapter 3, Water Quality of the EIS.

44. Discussion of Phosphates

The suggested quote from the Clean Lakes Study has been added to Chapter 3 and the study has been included in the Bibliography.

45. Fish Stocking

Although a detailed water management plan has not yet been developed for Narrows Reservoir, discussions with the UDWR indicate that the plan would include stocking Colorado Cutthroat Trout, possibly supplement with sterilized Rainbows. It is estimated that up to 60,000 fingerlings per year would be stocked under the Recommended Plan and up to 30,000 per year under the Smaller Reservoir Plan. The UDWR indicates that it would be able to meet these stocking quotas.

46. Natural Cutthroat Reproduction

The Fish and Wildlife Coordination Act Report for the Narrows Project states:

> "It is expected that UDWR will manage the reservoir for a cutthroat trout fishery, though sterile rainbows may also be stocked. Natural

cutthroat reproduction is expected under the proposed project alternative in the remaining segments of the three tributary streams, but this may need to be supplemented by stocking of fingerling cutthroats and rainbows."

47. Error

Chapter 3 of the EIS has been revised to delete the reference that Cabin Hollow flows into middle Gooseberry Creek.

48. Modeling

Fishery biologists from the FS, FWS, UDWR, Reclamation, and the Project Sponsor agreed that Instream Flow Incremental Methodology (IFIM) would be used to determine the effects that flow alterations would have on WUA of aquatic habitat. This procedure uses a series of computer models that combine stream hydraulic characteristics and species habitat utilization characteristics (Physical Habitat Simulation System [PHABSIM]) to predict changes in WUA with flow alterations. This information was provided in a technical fisheries report that was prepare in support of the EIS. A detailed description of the IFIM procedure may be found in an FWS paper entitled A Guide to Stream Habitat Analysis Using the Instream Flow Incremental Methodology, Instream Flow Information Paper No. 12 authored by Ken D. Bovee.

Based on the PHABSIM analysis, most fish species have an ideal flow that results in the optimum WUA for the species and flows greater than or less than this ideal flow results in a reduction in WUA. Therefore, if an existing flow is greater than the ideal flow, a flow reduction may actually result in an increase in WUA for a specific species.

The Sponsor agrees that it would be desirable to provide an analysis that provided for all life stages of a species within a single number, but is not aware of any model that has been developed that allows this to be done and is acceptable to the scientific community. The Sponsor has reviewed a few cases where such analysis has been attempted, but the procedures were not accepted by reviewing agencies. Therefore, information for each life stage is provided and potential effects for each life stage are discussed.

The FWS in their Fish and Wildlife Coordination Act Report for the project outlined mitigation that would be required by the project for fish and wildlife resources. It is expected that monitoring would be limited to activities needed to confirm that the proposed mitigation measures have been implemented.

The Sponsor agrees with your comments concerning range of fluctuations. The comparison to existing fluctuations was provided as an indication of the magnitude of change that would be expected. The amount of expected changes would be difficult to detect in a population that fluctuates as much as the fish populations in lower Gooseberry Creek. The statement has been deleted.

49. Multi-level Outlet

The Sponsor has no data on the temperature of middle Gooseberry Creek. However, by having a multi-level outlet, there would be opportunity to regulate the temperature of the water released to the stream. The multi-level outlet was included in the project plan because the State Engineer's 1985 Memorandum Decision requires it. The multi-level outlet was included in the water right agreement at the request of the UDWR. Following project construction, temperatures would be monitored by the Sponsor as part of the aquatic mitigation monitoring.

50. Reservoir Sedimentation

As stated in Chapter 2 of the EIS, less than 20 acre-feet of sediment would accumulate in the reservoir in a 100-year period. At that rate it would take over 12,500 years to fill the inactive pool with sediment. Sedimentation of the reservoir basin would have no effect on the ability of the Sponsor to repay loans.

51. Middle Gooseberry Creek Spawning Habitat

As stated in Chapter 2 of the EIS, the middle Gooseberry Creek channel would be narrowed and stabilized to provide spawning habitat for Lower Gooseberry Reservoir.

52. Wetland Mitigation

The Sponsor, with the assistance of the FS, has endeavored to identify wetland mitigation sites on National Forest System lands. However, representatives from the COE have expressed objections to the concept of mitigating on National Forest System lands because they believe that it is already the FS's responsibility to properly manage its lands. Both alternative mitigation measures are located on private land, one within the Forest boundaries and one outside. The Sponsor has discussed the wetland mitigation with the owner of one alternative mitigation site and believes that a suitable agreement can be reached. A description of the wetland mitigation area maintenance has been added to Chapter 2 of the EIS.

53 Land Acquisition Policies

The Narrows Project is not a Federal Reclamation project and therefore is not subject to the Federal Water Project Recreation Act of 1965.

54. Fishery Mitigation.

There are only limited opportunities to mitigate fishery impacts on National Forest System lands. Proposed mitigation sites within the Forest would be given first priority. After mitigation lands are acquired, they would be turned over to either the FS or the UDWR for management, depending on the location of the site. The public would have access to these mitigation sites.

55. Upper Gooseberry Creek Tributaries

In addition to providing streamflow, plantings and other habitat improvements would be provided as recommended in the Fish and Wildlife Coordination Act Report. A year-round average flow of about 1.3 cfs would be provided to each stream channel.

56. Middle Gooseberry Creek Channel Stabilization

The reference to placing boulders in the stream as a means of reducing the channel width has been deleted from the EIS. Instead, Chapter 2 has been revised to indicate that a detailed design of the stream channel modification would be performed by the Sponsor with coordination with the COE, FS, FWS, UDWR, and the Utah Division of Water Rights. This coordination would be essential in designing the modification because several of these agencies have conflicting views on how the channel modification should be accomplished.

57. Mitigation Monitoring

A commitment to monitor the effectiveness of mitigation measures is included in the environmental commitments. All mitigation measures would be monitored by the Sponsor to ensure that required mitigation habitat is achieved.

58. Cottonwood Creek Impact Mitigation

Mitigation measures for impacts to Cottonwood Creek have been added to the project plan as recommended in the Fish and Wildlife Coordination Act Report.

59. Adequacy of Aquatic Mitigation

Please refer to the response to comment 11.

60. Flushing Flows

As indicated in Chapter 2 of the EIS, the Sponsor in cooperation with the UDWR would determine the timing and quantity of water to be released for flushing sediments from the stream channel. Flushing flows would need to be monitored to determine their effectiveness and altered if necessary until the optimal flushing release were achieved.

61. Impact of Lost Fish Habitat on Recreation

Because mitigation is provided to offset project impacts to fisheries, there would be no net impact on recreation visitor days.

62. Fishing Day Use and Spawning

Please refer to the response to comment 61.

63. Mitigation Monitoring and Maintenance

The Project Sponsor would be responsible to monitor and maintain mitigation measures.

64. Social and Economic Impacts to Carbon County

Please refer to the response to comment 14.

65. Benefit-Cost Analysis

Please refer to the response to comment 13.

66. Impacts to Livestock Operations

Please refer to the responses to comments 12 and 28.

67. Judgments on Weighted Usable Areas

There was no set definition for "marginal" and "extremely limited" determinations based on WUA values. The WUA values are not exactly comparable because the overall value presented is directly influenced by the length of stream reach and the length of the two reaches are not the same. The state was intended to infer that there may not be adequate habitat available for adult cutthroat trout to survive the winter. In comparison, habitat is available for adult cutthroat trout to survive the winter but this type of habitat is quite limited. The word "marginal" has been removed from the description of habitat in upper Gooseberry Creek and replaced with "extremely limited."

68. Colorado River Depletion

Chapter 3, Cumulative Impacts of the EIS describes the cumulative impacts of depletions from the Colorado River system.

69. Extension of Zero Flow Periods below Scofield Dam

The Sponsor disagrees with this comment. The Narrows Project would have no effect on winter releases from Scofield Reservoir. As stated in Chapter 3, Water Resources, reductions in flow in the Price River would occur primarily as a result of decreased spills during the spring runoff period.

70 Misleading Statement About Nutrients

This statement is not misleading. The reduction in nutrient loadings to Scofield Reservoir would be a result of Narrows Reservoir trapping nutrients, transbasin diversion of nutrients and reduced sediment transportation below Narrows Dam. Measures to mitigate water quality effects of the Narrows Project on Lower

Gooseberry Reservoir have been included in the project plan and are described in Chapter 3 of the EIS.

71. Flushing Rate and Fish Kills in Scofield

The average flushing rate of Scofield Reservoir would actually increase slightly. Please refer to the response to comment 149.

72. Effects on Fairview Lakes

The statement in Chapter 3, Aquatic Ecology of the EIS states that Fairview Lakes would not be "directly affected" by the project. The changes in Fairview Lakes releases and storage are an indirect effect of the Narrows Project developing more water for the irrigators using Fairview Lakes. Irrigators are then able to maintain their storage supplies longer and as a result, the active capacity in Fairview Lakes would remain higher for a longer period each season. These indirect effects are described in Chapter 3 as being slightly beneficial to the overall quality of the fishery.

73. Cottonwood Stream Channel Widening

Please refer to the response to comments 31 and 32. The differences in values for percent of widening are related to the reach or cross section of the stream being discussed. The greatest widening (74 percent) would occur at the tunnel outfall. The 2 to 5 percent described in Chapter 3 refers to the reach below the confluence with Left Hand Fork. The 4 percent described in Chapter 3 refers to the mouth of the Cottonwood Canyon. The 23 percent described in Chapter 3 is a single cross section near the confluence with Left Hand Fork and the 4 percent is the same as that previously described.

74. Flushing Flows for Middle Gooseberry Creek

The EIS describes the plans for flushing flows below Narrows Dam in Chapter 2. The Project Sponsor would provide an average of 300 acre-feet per year for this purpose and would determine, in cooperation with UDWR, the timing and quantity of water to be released each year. It is the responsibility of UDWR to arrange for these flushing flows and to coordinate them with downstream users, the Manti-La Sal National Forest and the State Engineer's office.

75 Impacts at Imperial

Please refer to the response to comment 22.

76. Recreational Impacts

Please refer to the response to comment 42.

77. Residual Water Quality Impacts

The water quality section of Chapter 3 has been revised to include additional supporting data.

78. Summary

The Sponsor disagrees that the summary to too general. The impacts are summarized in Table S-2.

79. Analysis of Reservoir and Fishery Potentials

By necessity, the EIS does not contain all of the supporting data nor the details of all analyses. Instead, the EIS summarizes the results of the analyses. All supporting data is available from the Sponsor. The interagency team, which included representatives of the FS, has seen and reviewed the fishery analyses.

80. Fish Kills

The discussion in Chapter 3 on the potential for increased fish kills has been revised.

81. Other Alternatives

The alternatives described in this comment do not fit the purpose and need of the project as described in Chapter 1 of the EIS.

82. Landscape Mitigation

Landscape mitigation was not an issue raised during scoping nor by the interagency team. Therefore, the project contains no landscape mitigation provisions.

83. Impacts of Pipelines

Please refer to the response to comment 15.

84. Impacts of Urbanization

As stated in Chapter 3 of the EIS, major changes in urbanization due to the project are not expected.

85. No Action Alternative

Chapter 3 of the EIS states: "Under the No Action Plan, project induced changes to existing conditions would not occur."

86. Water needs of Carbon County

The Sponsor agrees that Carbon County also has a need to develop and manage its water resources. In fact the Sponsor supports and encourages Carbon County in doing so. The Narrows Project does not preclude Carbon County from developing its water resources. However, development of water resources for Carbon County is beyond the scope of the Narrows Project.

United States Department of Agriculture

Soil Conservation Service

P.O. Box 11350
Salt Lake City, Utah 84147

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Narrows EIS comments

Mr. Charles A. Calhoun
Acting Regional Director
Bureau of Reclamation
P.O. Box 11568
Salt Lake City, Utah 84147

Dear Mr. Calhoun:

Our planning staff has reviewed the Draft Environmental Impact Statement (EIS) on the Narrows Project (SCS Environmental Document No. 1617). We have the following comments on the document:

87 The General or Frontispiece Map scale appears to have about 25 percent error.

According to USGS Map MF 2085 there are many landslides in the area of the proposed dam site. USGS Map MF 1937 indicates that the North Horn formation is unstable and very landslide prone. No considerations are stated in the EIS for the impact of
88 reservoir seepage or naturally occurring wet cycles on landslides. In addition, no considerations are stated for landslide impacts on the safety of abutments and foundations. Reservoir and bank landslide potential has not been explored. Although previous landslides in the inventoried area of Cottonwood Creek appear to be "caused by saturation from water sources on the hillside," a detailed landslide map of the Cottonwood Creek and Gooseberry Creek areas should be done by a qualified geologist. These considerations could be significant for the town of Fairview.

There is little or no information on the proposed site for the Narrows Dam. As closely as we can determine, the proposed dam site appears to be located in the North Horn shale which represents a dam safety hazard of a severe category. The North Horn formation is a notoriously unstable rock unit and represents
89 a major source of landslides in Utah. Thistle landslide was generated in the North Horn formation. The native bedrock instability represents a high risk to the existence of any structure built in it. The abutments reservoir area and the downstream area will be subject to an increased and fairly constant saturation, a condition not experienced naturally. This could lead to stability problems that would at least result in expensive maintenance and at worst be a dam safety hazard.

Although a statement is made that less than 20 acre-feet of sediment would accumulate in a 100-year period, no information is
90 included on the size of the drainage area, sediment sources, sediment routing, erosion rates, sediment damages, or sediment impacts.

Seismic potential for the area is a 6.5R maximum credible earthquake from within the Colorado Plateau region and from the Sevier Valley. In 1988, there was a 5.4R approximately 47 miles from the proposed dam site about 17 miles east of Ferron, Utah. Joes Valley dam underwent considerable "g" forces during this event (in excess of .8g on the top of the dam, personal
91 communication, Bureau of Reclamation, and Utah Geological Survey).

In 1901, in Richfield there was a 6.5R, and in 1921 in Elsinore there were two 6.0R quakes. These historic earthquakes are within the area of concern that the Soil Conservation Service (SCS) would use for design criteria. The Richter level at which an earthquake can cause surface rupture is 6.5R. Any historic quake at 6.4R or less would not leave a surface trace. Therefore, historic quakes under the surface trace level may have occurred anywhere in the state. The SCS, Utah Geological Survey, and the Utah Seismological Center (University of Utah) recommend the use of a 6.5R as the design level earthquake.

We hope that these comments will help to more closely define the impacts of the proposed project.

Sincerely,

NORM PRIEST
Acting State Conservationist

cc: James B. Newman, Director, Ecological Sciences Division, SCS, NHQ, Washington, DC
Bill O'Donnell, District Conservationist, SCS, Richfield, UT

87. Frontispiece Map

The scale for the frontispiece map has been corrected.

88. Landslides in Reservoir and in Cottonwood Canyon

Landslides in Cottonwood Canyon were studied by qualified geologists. However, since the existing landslides are not caused by nor would they be affected by the project, USGS Map MF 2085 and USGS Map MF 1937 were not included in the EIS. Those maps are available for review at the offices of Franson-Noble & Associates, Inc. Also, please refer to the responses to comments 30 and 31. The study of landslides in Cottonwood Canyon is described in Chapter 3 of the EIS.

89. Stability of Proposed Damsite

Detailed engineering and geologic investigations have been performed by the Sponsor which indicate that a safe dam can be constructed at the proposed site. Documentation of these studies are available at the office of Franson-Noble & Associates, Inc.

90. Sediment

The issue of sediment is considered in Chapter 2 of the EIS. It states that the sediment would be contained in the dead and inactive pool. Sediment accumulation would be less than 20 acre-feet per 100 years. Dead and inactive storage is 2,500 acre-feet. It would take 12,500 years to use up all storage available for sediment containment. Therefore, no plans are necessary for sediment removal.

91. Seismic Potential and Recommendation for MCE

The EIS states in Chapter 3, Geology and Seismicity, Impacts, that "Preliminary studies indicate that the appropriate MCE would be of magnitude 5.5. Further review of the appropriate MCE would be performed prior to final design of the dam." In addition, State statutes and administrative rules for dam safety would have to be adhered to and final designs approved by the State. The significance of the Geology and Seismic section in Chapter 3 is to identify that no residual geologic nor seismic impacts to the environment would occur under the Recommended Plan, not to identify the final design criteria for the dam.

DEPARTMENT OF THE ARMY
U.S. ARMY ENGINEER DISTRICT, SACRAMENTO
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SACRAMENTO, CALIFORNIA 95814-2922

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May 12, 1994

Utah Regulatory Office (199250255)(IP)

Charles A. Calhoun
Bureau of Reclamation
Upper Colorado Office
P.O. Box 11568
Salt Lake City, Utah 84147

Narrows EIS Comments

Dear Mr. Calhoun:

We have completed our review of the Draft Environmental Impact Statement (DEIS) for the proposed Narrows Project. The following comments are provided for your consideration:

Page 2-7

92 The DEIS must address the long-term management of silt accumulation in the reservoir basin and how the silt accumulation will be handled when it begins to impact active storage of the reservoir.

Page 2-9

93 Fishery measures under the proposed project would provide releases from Fairview Lakes into two tributaries to Gooseberry Creek. Under the present operation of Fairview Lakes, these tributaries are de-watered much of the year. Given the fact that the proposed Narrows Reservoir would have an average annual drawdown of 12 feet, we question the merit of this measure. The drawdown, depending on the gradient of the slope, will leave an expanse of mudflat between the low pool elevation and the high pool elevation for the duration of the drawdown. It remains doubtful that fish will be able to negotiate the sections of stream in this exposed mudflat area.

Page 2-10

94 To compensate for reduced flows in the Middle-Gooseberry Creek, it is proposed to artificially reduce the channel width with boulders in order to provide a compatible width-depth ratio. We do not believe that this

technique holds much promise. We note that large rock, to begin with, is not a part of the Middle Gooseberry Creek channel morphology. The rock is likely to negatively affect the stream's hydraulic condition. Secondly, the disturbance necessary to gain access to this reach of the stream, the type of equipment needed to accomplish the work and the impact to the channel banks in placing the rock far outweighs any perceived benefit.

95 It is not stated whether or not the private land parcels targeted for acquisition in order to compensate for the lost stream fisheries are adjacent to public or private lands. The value of these stream segments, particularly the smaller ones, will be marginal if the streams do not tie into a larger, publicly managed context. In other words, if the segments exist as an inholding within a larger private land context, then we see only limited mitigation value. Additionally, long term maintenance of fences and policing of the enclosures for several small parcels will be inherently difficult and subject to a higher probability of failure.

Page 2-11

96 We do not understand how winter releases in Cottonwood Creek will mitigate for channel de-stabilization and widening. Please explain.

Page 2-14

97 The project sponsor is proposing to receive wildlife mitigation credit for participating in range improvements on the Manti-LaSal Forest. The federal land management agency is already charged with, and responsible for, making range improvements in areas that have suffered severe overgrazing in the past. We do not agree that mitigation credit should be given to the sponsor for range rehabilitation work the federal land management agency is already responsible for, with or without the Narrows Project.

Page 3-4

98 Piping the water from the tunnel mouth to the confluence of Left Hand Fork may avoid serious channel degradation on the upper section of Cottonwood Creek. However, what will the impacts be of installing the line to the riparian community and how will that be mitigated or reclaimed. Also, will the pipeline require a maintained access road for maintenance of the pipeline?

99 It is stated that flows in the Price River drainage would be depleted by 5,540 acre feet per year yet releases from Scofield Reservoir will be unaltered for most years. This seems inconsistent and we do not see how this is possible. Does this mean that Scofield Reservoir will undergo greater fluctuation in meeting downstream needs?

Page 3-59

100 The DEIS does not anticipate impacts to the riparian community downstream from the dam due to Gooseberry Creek being characterized as a gaining stream. While this may be true for established plants, we are concerned about the long-term propagation of woody riparian species. The seed biology of many such species depend on overbank flooding, silt deposition and subsequent increases in soil moisture for successful seed germination and seedling establishment. These critical components will be eliminated by the dam and there may be a chronic decline in woody species. Secondly, Gooseberry Creek is not the only stream to suffer reduced flows. The DEIS should analyze whether or not reduced flows in the rest of the Price River drainage will impact riparian communities, especially for losing reaches of streams.

Page 5-2

101 Mr. Michael Schwinn, of my staff, should not be listed as one of the preparers of the document. Mr. Schwinn should be listed as a member of a Technical Advisory Team.

We appreciate the opportunity to review and comment on the DEIS.

Sincerely,

Brooks Carter
Chief, Utah Regulatory Office

92. Sediment Accumulation in Narrows Reservoir

Please refer to the response to comment 90.

93. Restoration of Flows to Gooseberry Creek Tributaries

In spite of the concern over drawdown of the reservoir, the FWS and the UDWR have included this measure in their recommendations for fishery mitigation. Therefore the measure has been included in the project plan.

94. Middle Gooseberry Creek Channel Modification

Please refer to the response to comment 56.

95. Private Land Parcels

Private land parcels targeted for acquisition are adjacent to public lands and will be managed in conjunction with those public lands.

96. Winter Releases in Cottonwood Creek

Winter releases in Cottonwood Creek would allow fish to successfully over-winter in the upper reaches of the stream. At present the fish do not survive because of insufficient flows. Additional mitigation measures will also be provided to mitigate impacts to Cottonwood Creek as recommended in the Fish and Wildlife Coordination Act report.

97. Range Improvements on the Manti-La Sal National Forest

This measure was included in the recommendations contained in the Fish and Wildlife Coordination Act report. Impacts to upland game species would be mitigated primarily through the acquisition of 640 acres of private land. However, this land is not within the Forest boundary. The range improvements were included in the mitigation plan as a means of providing benefits to upland game species on National Forest System lands.

98. Upper Cottonwood Creek Pipeline

As stated in Chapter 2 of the EIS, the pipeline would be constructed in the shoulder of SR-31. This construction method would avoid impacts to the riparian zone. SR-31 would provide access for maintenance of the pipeline.

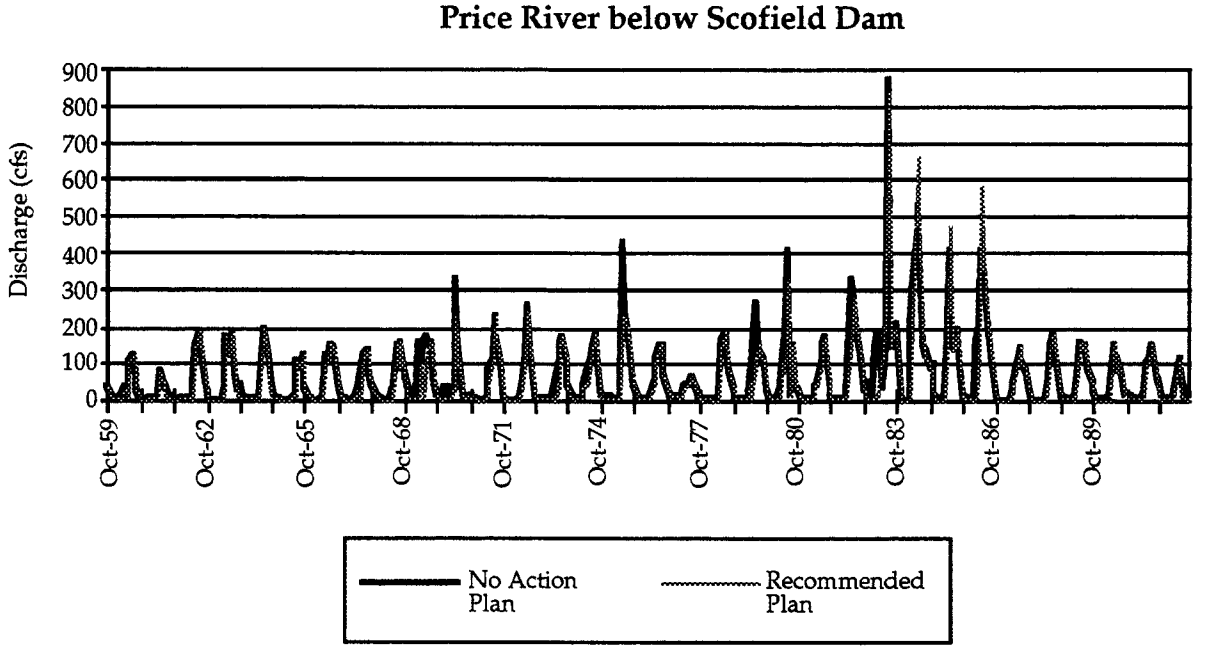
99. Scofield Reservoir Fluctuations

Scofield Reservoir would undergo greater fluctuations with implementation of the recommended plan. These fluctuations are illustrated in Figure 3-1 of the EIS.

100. Impacts on Riparian Vegetation

The Sponsor has committed to provide an average of 300 acre-feet of additional water for flushing and instream flows. In addition, Narrows Reservoir is expected to spill about once every 4 years on the average. These releases and spills could be used to flush sediments into the overbank areas to assist propagation of woody vegetation.

Effects on the riparian zone along the Price River below Scofield Dam were not evaluated because the interagency team, of which the COE was a part, agreed that the flow alteration effects of the project were minimal and consist primarily in a reduction in the magnitude of spills from Scofield Reservoir. The hydrograph provided below illustrates difference between future without project and project flows in the Price River below Scofield Dam.



101. List of Preparers

As requested, Mr. Michael Schwinn's name has been removed from our list of preparers. Agencies participating on the technical advisory team have been identified but individuals have not been named.

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DENVER, COLORADO 80202-2466

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APR 20 1994

Mr. Charles Calhoun
Regional Director
Bureau of Reclamation UC-750
P.O. Box 11568
Salt Lake City, Utah 84147

Narrows EIS Comments

Re: Draft - Environmental Impact Statement (DEIS) for the Narrows Project

000218

Dear Mr. Calhoun:

In accordance with our responsibilities under the National Environmental Policy Act (NEPA) and Section 309 of the Clean Air Act, the Region VIII Office of the Environmental Protection Agency (EPA) has reviewed the DEIS for the Narrows Project and offers the following concerns and comments for your consideration as you complete the final Environmental Impact Statement (FEIS). EPA's major concerns follow. The specifics of our concerns are in the attached detailed comments.

1. The ability of the Sanpete Conservation District to implement and maintain the proposed mitigation measures. We recommend that the FEIS address this concern by (1) developing more specifics mitigation plans, (2) funding and implementing the mitgation measures during project construction and (3) firmly establishing the sections of the dam operating plan which effect the environment or implement mitigation measures.

2. The environmental impacts and cost of the project seem to be much greater than the expected benefits of the project. The benefits or purposes of the project are to supply (1) supplement irrigation water for alfalfa and hay for cattle feed, (2) municipal irrigation and (3) to provide a flat water recreation area. These benefits may all be readily available from other sources in the area. We therefore recommend that the BOR consider another alternative based on obtaining the benefits from other sources, ie, hay from other farmers, water from the normal municipal water supplies, other lake recreation areas, etc.

3. The FEIS needs to more fully explain the impacts of the proposed project on water quality and aquatic life.

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Based on the procedures EPA uses to evaluate the potential effects of proposed actions and the adequacy of the information in the DEIS , the Preferred Alternative identified by the DEIS for the Narrows Project will be listed in the Federal Register in the category EC-2. This mean that the review has identified environmental impacts that should be avoided in order to fully protect the environment and that the DEIS does not contain sufficient information to fully assess environmental impacts that should be avoided in order to fully protect the environment. Attached is a summary of EPA's rating definitions.

The enclosed detailed comments are the basis upon which the EC-2 category was issued and are a part of our review. They should, therefore, be incorporated into your final document. We appreciate your interest in our comments. Please contact Dana Allen (303) 293-1587 if you have any questions about these comments.

Sincerely,

Robert R. DeSpain

Robert R. DeSpain, Chief
Environmental Assessment Branch

Enclosure

NOTICE: IF YOU DETACH
ENCLOSURES, PLEASE INSERT
DATE HERE.

EPA's Detailed Comments on the

NARROWS PROJECT

DRAFT ENVIRONMENTAL IMPACT STATEMENT

April 20, 1994

1. **404(r).** Title and Date page - The 4th paragraph indicates that this document will meet the requirements of Section 404(r) of the Clean Water Act. While this was probably included in error as part of the boilerplate, we need to point out that the document does not contain the necessary 404(b)(1) evaluation to meet the 404(r) requirements. 102

2. **ELIMINATED ALTERNATIVES.** Page S-2 - The project history discussion indicates that the BOR and DOJ have essentially eliminated all alternatives to the proposed project prior to the current NEPA analysis. We should point out that these prior agreements were major federal actions and the agreements have foreclosed a meaningful alternatives analysis at this time. 103

   The significance of these decisions was clearly stated in the May 1992 EA (page S-2): "Because of institutional constraints, only one alternative other than the no-action alternative was deemed environmentally and economically feasible. Conditions set forth in the 1984 Compromise Agreement dictate site location and storage capacity of the project reservoir." [emphasis added]. While this language was removed from the DEIS, the effect is still the same. The FEIS needs to more fully disclosed the effects of these agreements on the range of alternatives and operation of the dam. A section should be added listing all the agreements which limit or effect alternatives and operations (i.e., flow limits, timing of flow, demands on Narrows Reservoir water from the Price River Basin). The list should also explain the effect of the agreement on developing additional alternatives and the environmental impact of the agreements as implemented by the proposed project.

3. **WATER RIGHTS AGREEMENT.** Page 1-3 - The actual 1984 Compromise Agreement regarding three water rights for the proposed projects should be attached to the FEIS; as this agreement seems to have limited the available alternatives. In particular the reader needs to be able to understand the exceptions and conditions of the agreement. 104

4. **LIMITING ALTERNATIVES.** It should be noted that the various agreements discussed in 2 and 3 above could be construed as actions by the applicant to limit the availability of alternatives which conflicts with the NEPA requirements. 105

5. **ADDITIONAL WATER?** Page 1-8 - The discussion of the Scofield project indicates that there is 35,000 AF (acre-feet) of Gooseberry Creek water available in exchange for trans-
106 mountain diversions. However, the proposed project is only for 14,500 AF. From this it appears that there is 20,500 AF available for mitigation. Can this water be used for environmental improvements such as instream flows, wetland protection, etc. The FEIS should discuss the alternatives and feasibility of utilizing this water for mitigation or other environmental improvements.

6. **WATER SALES CONTRACTS.** The discussion of the water sales contracts on page 2-3 needs to indicate what "will" be required, not what "may" be required. As written now, any level of water efficiency improvement such as one percent
107 would allow the water user to receive project water. The reader, and in particular the water users, need to clearly understand what level of water efficiency will be necessary, so that the water users will be able to determine the actual project costs for their facility.

7. **WATER USE V. DEMAND.** Page 2-3 - The water supply discussion indicates the project demand is about 5,400 AF per year, while page 2-1 indicates the supplemental irrigation demand is about 12,300 AF. A better explanation of the varying values needs to be presented. It would be very useful to the reader to present the water demands as dry year demand
108 rather than averages. This will allow the reader to estimate "worse case" impacts. Page 2-7 indicates that the maximum project depletion under existing agreements is 5,400 AF per year. These agreements should be included in the FEIS with an explanation of the potential for these agreements to be changed. This information is necessary to insure the impact analysis is reasonable.

8. **MAX DRAW DOWN.** The final EIS needs to define the maximum acre-feet (AF) that the reservoir can be drawn down in any one year. The reservoir has an active capacity of 14,500
109 acre-feet. The maximum diversion to Cottonwood Creek is 5,400 acre feet. It is unclear from reviewing the DEIS if the remaining 9,100 acre feet can be withdrawn in one year for calls for water in the Gooseberry Creek drainage.

9. **ENVIRONMENTAL COMMITMENTS.** Page 2-9 indicates that various environmental commitments would be requirements of approval of loan. While this language is reassuring, the document
110 should include a discussion of what will happen if the project proponent does not comply with the environmental commitments. EPA's past experience with the small loan program has indicated that the Bureau has not always had the resources to monitor compliance with the conditions.

10. **ECONOMIC VIABILITY.** The DEIS proposes many environmental mitigation measures, however, the DEIS does not discuss who will be paying for the mitigation measures and the timing for implementing the measures in conjunction with construction of the dam. The FEIS must discuss in some detail how each of the measures will be implemented, timing and who pay for the mitigation. 111

11. **CUMULATIVE IMPACTS.** It appears that water from other projects will be transported through the Narrows Tunnel and Cottonwood Creek. On page 2-9, the DEIS states that calls for water by the Cottonwood-Gooseberry Irrigation Company would be released through the Narrows Tunnel and Cottonwood Creek. Depending on the flows, there may be significant cumulative effects in the Creek. The FEIS needs to address the effects of all flows through the Narrows Tunnel and Cottonwood Creek. 112

12. **LAND ACQUISITION.** The discussion of land acquisition on pages 2-10, and 11 should be expanded to indicate that the land acquisition must be completed prior to initiation of construction. This has been a problem in other BOR projects which needs to be resolved in the FEIS. 113

13. **MAINTAINING STREAM FLOW.** We are encouraged by the minimum in-stream flows proposed in the DEIS on pages 2-9, 2-11 and 3-4. However, we question the adequacy of the 1.5 cfs in Gooseberry Creek below the dam and the 2 cfs in Cottonwood Creek. Was any analysis conducted to determine the flows necessary to maintain trout fisheries? The minimum instream flows seem low given the amount of available, normally unused storage of the proposed action. An additional 1 cfs during the eight month low flow period would only result in 480 AF of further draw down. If the large reservoir is built, the additional instream flows should be provided whenever they are available to maintain a year-around fishery. The FEIS should fully discuss the minimum flows necessary to protect aquatic life in both creeks and the availability of water to maintain the minimum flows during wet, average and dry years. 114

14. **SEDIMENT DISCHARGE.** At some point in the future it may be necessary dredge or discharge sediment from the Narrows project for maintenance or to restore the reservoir's capacity. This type of maintenance activity needs to be conducted in an environmental manner. The FEIS and the dam operating plan need to incorporate treatment for sediment if dredging or sediment removal activities are conducted. In any case, the dam must not be allowed to be operated so that sediment coats the Gooseberry and Cottonwood Creeks stream beds. The FEIS should include this type of operational mitigation measures as part of the proposed alternatives. 115

15. **HEP MODELS.** Page 2-12 - The Specific Habitat Evaluation Procedures (HEP) models to be used need to be included in the FEIS so the reader can determine their applicability to the project area and resources of concern. 116

16. **WETLANDS MITIGATION.** Page 2-19 - The wetland mitigation section indicates that 220 acres of new wetlands would be created. This is different than the wetland discussion on page 2-12 which does not indicate what the final mitigation would be. Also, much of the wetland mitigation on page 2-12 does not appear to be creation of new wetlands but rather improvement of existing degraded wetlands. The FEIS needs to more clearly specify the wetlands mitigation measures. As a minimum, the 220 acres in Mud Creek should be restored along with specifying the number of acres of wetlands that will be created above the Narrows Reservoir. If the HEP models cannot identify an exact acreage, the FEIS should specify a range and explain how the HEP models will influence the final acreages. 117

17. **CARRY OVER STORAGE.** Page 2-20 - The water supply discussion needs to document how frequently carry over storage would not be available, e.g. 1 in 10 years, 1 in 20 years? 118

18. **OPERATIONAL STUDY.** Page 3-7 - The 3rd paragraph indicates that the State Engineer's office reviewed the operational study which compares the operation of Scofield Reservoir with and without the Narrows Project. The FEIS should discuss the result of this review. 119

19. **MINIMUM SETBACKS.** It is our understanding that about half of the land surrounding the proposed reservoir is privately owned, the other half is owned by the Forest Service. The final EIS needs to more fully explain how that land might be developed. In particular, there needs to be a minimum setback from the lake. Normally, such setbacks are 500 feet. 120

20. **SCOFIELD AND LOWER GOOSEBERRY RESERVOIRS.** The reservoir water quality analysis is confusing on pages 3-10 through 3-12. While all the discussion seems to indicate that the incidence of fish kills will increase, there is a one line conclusion that water quality will actually improve with project construction (3rd paragraph from bottom, page 3-13). The narrative does not provide a rationale for this conclusion. The Scofield Reservoir basin has received a great deal of effort and money to improve the water quality. At the time of the most recent project report, 1992, reservoir quality was continuing to deteriorate. The FEIS should clearly inform the public of the issues. Further, the text seems to indicate that the number of fish kills is 121

likely to increase as a result of project operation, however the DEIS found this insignificant? The final EIS should explain why the increased fish kills are insignificant.

122 It should be noted, that the use of the modeled phosphorus values reported in the DEIS exceeds the capability of the model as the level of precision used in the model is not measurable.

21. **SCOFIELD RESERVOIR.** The DEIS, on page 3-12, mentions several fish kills which have occurred in Scofield Reservoir and concluded that the new Narrows project would increase
123 the likelihood of future fish kills. The final EIS should investigate additional measures to reduce the likelihood of future fish kills. In particular, further measures to reduce phosphorus and sediment loadings may be appropriate.

22. **GROUND WATER.** There is no discussion on the impacts to the ground water resource as a result of this project. We can
124 safely assume that the regional ground water flow patterns will be altered as a result of this project. The FEIS should discuss the effects of the project on ground water dependant ecosystems (springs, wetlands etc.) in the area impacted by this large source of recharge?

23. **WATER QUALITY DATA.** An additional explanation of the water quality data portrayed in Table 3-2 is needed. The FEIS
125 should include an explanation of where and when the samples were taken, how many samples were taken, etc. The expanded water quality sampling table should include other parameters such as heavy metals.

24. **ANTI-DEGRADATION.** The discussion needs to indicate what water quality parameters will be adversely affected in the
126 antidegradation segments, where the segments are, and what would be the biological effects of such degradation. Explanation needs to be included as to why construction would cause such degradation and, presumably, not operation.

25. **PHOSPHORUS.** The water quality mitigation discussion on page 3-16 indicates that phosphorus will be diverted from
127 the Gooseberry drainage. However, the analysis does not indicate if this is a relatively high phosphorus source. The analysis needs to document the relative quality of the water being removed. If relatively clean water is being diverted, the downstream impacts will be negative not positive.

26. **NO INSTREAM TREATMENT.** At the top of page 3-17, the DEIS discusses diverting Mud Creek into the wetlands mitigation
128 site for treatment for sediment and nutrients. The use of natural wetlands for treatment is prohibited by the Clean Water Act regulations. If these wetlands are currently waters of the U.S. they cannot be used for water treatment.

27. **OTHER DIVERSIONS.** In the first paragraph on page 3-24 - the DEIS mentions diverting other creeks to the Narrows Reservoir to maintain minimum flows. Where are the Creeks mentioned, Brooks Canyon and Cabin Hollow? How are these streams affected by the proposed project? The FEIS needs to evaluate the environmental impacts of diverting these Creeks and specify the conditions that will cause these creeks to be diverted, i.e. dry years, every year. 129

28. **NON-GAME FISH.** The sections on aquatic ecology do not discuss aquatic life other than game fish and threatened and endangered species. For example on page 3-23, does the San Pitch river support non-game fish species in the project area and downstream? If so what are the species? The final EIS should take a more holistic look at aquatic life. 130

29. **COTTONWOOD CREEK FISHERY.** There appears to be a conflict between the last paragraph on page 3-37 and the lower Cottonwood Creek entry in Table 3-12. On pages 3-37 and 3-38, the DEIS states: "Increased flows in lower Cottonwood Creek would not be expected to affect the excellent fishery that presently exists." However, the Table states that on Lower Cottonwood Creek there would be a loss of 4.9 miles of habitat for all life stages for various trout. These two statements conflict. The final EIS needs to resolved this apparent conflict. 131

30. **SEDIMENT COTTONWOOD CREEK.** The DEIS discusses the widening of Cottonwood Creek when water is diverted from the proposed project. However, the DEIS does not fully discuss the effect of this additional sediment loading on Cottonwood Creek. We expect Cottonwood Creek to be adversely effected. In fact the increased sediment loading appears to be one of the greatest aquatic impacts documented in the DEIS. However, the DEIS proposed no mitigation other than maintaining minimum flow and partial piping of the discharge. The final EIS needs to more fully explain the impacts of increased sediment in Cottonwood Creek including the impact of sediment deposition in downstream areas. 132

31. **WILDLIFE.** The section on endangered species limits its scope to those species which are on the threatened and endangered list. The final EIS should also evaluate candidate species and any species the State of Utah has identified as being in need of special management. 133

32. **SURFACE WATER QUALITY DATA.** The middle paragraph on page 3-51 indicates that water quality in the Sandpitch River is generally acceptable and refers to Table 3-17. However, the table does not include any data for pollutants of concern. The Table should be amended to include surface water quality data for selenium, arsenic, mercury, and boron. 134

33. **CUMULATIVE WETLANDS LOSSES.** Page 3-57 - The wetland
135 discussion should include a discussion of previous wetland losses in the basin.

34. **LOSS OF STREAM FISHERY.** Page 3-75 - Does the recreation visitor day mitigation include the losses of recreation due
136 to reduced stream fisheries and the Lower Gooseberry Reservoir fishery? The FEIS should take into account the loss of stream recreational areas.

35. **UT NPDES.** Pages 2-17 and 4-1 indicate that a 402 permit is needed from the State of Utah, however, it appears on
137 reviewing the DEIS that the only 402 permit necessary would be a storm water permit for construction. Are there any other proposed facilities that would need a permit, such as the campground. The final EIS should more clearly state the portions of the project that would require a 402 permit.

102. Title and Data Page

This page has been updated.

103. Eliminated Alternatives

A section has been added to Chapter 2 of the EIS which lists the agreements which limit or affect the range of alternatives and operation of the project.

104. 1984 Compromise Agreement

The agreement has been added as Attachment D to the EIS and a reference to its location in the document is found in Chapter 1.

105. Limiting Alternatives

It was not the Sponsor's intent to limit alternatives by the referenced agreements. Instead, these limitations were imposed by the other parties to the agreements, primarily the water users in Carbon County and the Utah State Engineer.

106. Additional Water

Chapter 1 of the EIS says that there is 35,000 acre-feet of [storage] capacity to support the transmountain diversion not that there is 35,000 acre-feet of Gooseberry Creek water available. This storage capacity is intended to provide long-term carryover storage to offset the impacts of the transmountain diversion on water users in Carbon County. The water users in Carbon County have the exclusive right to use this storage capacity in accordance with water right agreements. The Sponsor has no right to use water stored under this water right and cannot therefore use the water for mitigation or other environmental improvements.

107. Water Sales Contracts

The reference to water sales contracts in Chapter 2, Detailed Description of Alternatives, Recommended Plan, Water Supply and Use states that "Water sales contracts **would** require that the irrigators implement water conservation measures and improve the overall efficiency . . . ." The word "would" is used in this context to imply that it would occur if the project is constructed. If the word "may" had been used, it would have implied that if was optional.

Establishing a minimum percentage increase in irrigation efficiency as a condition for eligibility is not appropriate at this time. This would reward those who are presently very inefficient at the expense of those who practice good water management. Eligibility should be based on the "overall" efficiency within a water company. An individual farmer with a high present efficiency should not be required to do more than is technically feasible to qualify for project water.

108. Water Use vs. Demand

The purpose of describing the water demands in Chapter 2, General Discussions is to demonstrate that there is a significant need for supplemental water in north Sanpete County. As described in Chapter 2, the maximum of 5,400 acre-feet per year can be diverted through Narrows Tunnel. This is the "worst case" for an environmental assessment. The 5,400 acre-feet of project water is both an average and a maximum since this amount would be delivered each year. The EIS describes how this supplemental supply would simply reduce shortages from 30 percent to about 19 percent.

A copy of the 1984 Compromise Agreement has been attached to the EIS. (Please refer to the response to EPA-3). However, the position of the Sponsor is that those agreements described in Chapter 1 are the basis for the development of the Narrows Project. It is possible that any agreement could be changed or a new agreement negotiated. However, it would be unreasonable for the Project Sponsor to speculate on the "potential for these agreements to be changed." To do so would cast a cloud over the agreements that represent the project definition. The assumption of the EIS is that all the agreements described in Chapter 1 are legal and binding contracts and that unless some other agreement is made, these agreements must be adhered to in the project development and in the environmental analysis since they represent the reality of current legal conditions.

109. Maximum Drawdown

There are no project users owning Narrow Reservoir water below Narrows Dam in the Gooseberry Creek drainage. The EIS clearly states that all project lands are in Sanpete Valley (Chapter 1). There are no calls for Narrows storage water in the Gooseberry drainage. The only releases of storage water to Gooseberry Creek are for instream flow maintenance and flushing flows. Information in Chapter 2 describes the minimum pool (dead and inactive storage) to be 2,500 acre-feet. This is the maximum reservoir drawdown.

110. Environmental Commitments

Attachment A, the environmental commitment list has been revised to indicate that the mitigation measures would be concurrent with project construction. If the environmental commitments are not kept, project funding would be withheld by Reclamation. Additionally, the 404 Permit issued by the COE could restrict filling of the reservoir if environmental commitments are not met.

111. Economic Viability

The descriptions of mitigation measures in the EIS have been revised to include detail of how each mitigation measure would be implemented, timing, and who would pay for the mitigation.

112. Cumulative Impacts

Flows through the Narrows Tunnel and in Cottonwood Creek are considered part of pre-project conditions. The no-action alternative would continue to deliver these flows through the Narrows Tunnel. Therefore, it would be incorrect to describe impacts of the Narrows Project to include pre-project conditions.

113. Land Acquisition

This comment has been accommodated in Chapter 2.

114. Maintaining Stream Flow

The minimum instream flow below Narrows Dam is based on studies performed by the State Engineer. IFIM modeling was used to determine the 2 cfs winter release in Cottonwood Creek.

Data in the EIS indicates that 1.5 cfs in Gooseberry Creek is not adequate to maintain the existing trout fishery in the middle reach of Gooseberry Creek. Instead, this reach of stream would provide only spawning and rearing habitat. Lost habitat for other life stages would be provided in the mitigation measures described in Chapter 2.

Releasing additional water to Gooseberry Creek from Narrows Reservoir would correspondingly decrease the available water supply to the Sponsor because in would reduce the available carryover storage for dry years. Therefore, the Sponsor has identified other means of providing fishery mitigation.

The instream flows described in the EIS would be available in all years, wet or dry.

115. Sediment Discharge

Please refer to the response to comment 90.

116. HEP Models

The HEP models that would be used to evaluate the success of the wetland mitigation are described in Chapter 3 of the EIS.

117. Wetlands Mitigation

Chapter 2, Detailed Descriptions of the Alternative, Recommended Plan, Environmental Commitments and Measures, Affected Lands and Wetlands of the EIS has been revised to read: "The wetland mitigation measures would restore 220 acres of degraded wetlands or create about 100 acres of new wetlands, depending on the mitigation alternative selected." Chapter 2 of the EIS has also been revised to indicate that it is estimated that about 100 acres of new wetlands would be created adjacent to Narrows Reservoir.

118. Carryover Storage

This comment refers to the water supply for the Smaller Reservoir Plan. The smaller reservoir plan does not have long-term carryover storage. Each year the full 5,400 acre-feet of active storage would be used. The description in Chapter 2 of the smaller reservoir with an annual demand of 5,400 acre-feet and an active storage of 5,400 acre-feet explains that there is no carryover storage for the smaller reservoir.

119. Operational Study

Chapter 3 has been modified to accommodate this comment.

120. Minimum Setbacks

Chapter 2 of the EIS has been revised to indicate that the conservation easements would provide a setback of about 500 feet for any new development or construction on private land adjacent to the reservoir.

121. Conflict Between Increased Water Quality and Increased Fish Kills

The water quality section of Chapter 3 has been substantially revised to include findings of the Phase II Clean Lakes Study. Measures have been included in the project plan to mitigate the adverse effects on water quality in Scofield Reservoir. These mitigation measures are also described in Chapter 3.

122. Values Presented in the EIS for Phosphorus Exceed the Level of Precision of the Model

The model is only accurate to two significant figures since the data for phosphorus is only to two decimal places. Therefore, the EIS has been revised.

123. Additional Measures to Reduce Fish Kills in Scofield Reservoir

Measures have been included in the project plan to mitigate the adverse effects on water quality in Scofield Reservoir. These mitigation measures are also described in Chapter 3. These measures are expected to reduce the potential for increased fish kills in the reservoir.

124. Impacts on Ground Water

The new reservoir is expected to alter the ground-water flow patterns in the vicinity of the reservoir and downstream from the dam. However the direct contribution to the ground-water system in the reservoir basin is not expected to be significant due to the relative tight nature of the soils. Based on soil borings and explorations by Dames and Moore, the reservoir area is blanketed by a layer of sandy and silty clays and clayey sands with varying amounts of gravel, cobbles, and boulders. These soils are comparatively tight from the standpoint of seepage water losses. The water losses due to seepage from the reservoir basin were estimated to be about 300 acre-feet per year. The primary impact on the ground-water system could be the

formation of new springs or augmentation of existing springs and possibly enlarged wetland areas downstream from the dam.

125. Explanation of Water Quality Data in Table 3-2

Water quality data for Cottonwood Creek was taken from the EPA STORET data base and is based 4 to 5 on samples collected during the period January through May 1977, located 1.5 miles east of Fairview. The results of analysis of heavy metals samples has been added to the table. Gooseberry Creek quality data is based on two samples collected in June and October 1993, within the proposed reservoir basin at the crossing with SR-264. No heavy metals sampling was conducted at that time.

126. Discussion of Anti-degradation Segments

Anti-degradation segments are defined as those stream reaches located within the boundaries of the National Forest System lands. As the project is constructed, State BMP requirements would be implemented to prevent point source pollution and adequately control and treat discharges. Construction disturbances would be temporary in nature.

127. Phosphorus Removal

An analysis of the phosphorus in Narrows Reservoir indicates an estimated average concentration of 0.026 mg/L. This compares with a computed average concentration of 0.034 mg/L for Scofield Reservoir under present conditions.

128. No Instream Treatment

The water quality mitigation measures described in Chapter 3 of the EIS have been revised and use of the Mud Creek wetlands area for treatment for sediment and nutrients is no longer proposed.

129. Other Diversions

The State Engineer has stipulated that water from Brooks Canyon and Cabin Hollow Creeks may be used to provide minimum streamflows. However, the project plan does not include any such use of water from those streams.

130. Non-game Fish

Fish species within the study area are generally limited to game fish species. The reason fish species in the San Pitch River were not discussed was because downstream from the confluence of Cottonwood Creek the river is normally dewatered during the irrigation season and this prevents the stream from supporting a resident fishery. Since the project would not affect flows in the San Pitch River during this critical period, it was not included in the impact area that was included in the analysis. An occasional fish may enter this reach of the San Pitch River during the non-irrigation season when limited flows occur.

131. Cottonwood Creek Fishery

Chapter 3 of the EIS has been revised. Impacts are expected to occur in lower Cottonwood Creek and mitigation is provided in the project plan.

132. Increase Sediment Load on Cottonwood Creek

An analysis was made of the amount of material which might be eroded from the Cottonwood Creek channel under project conditions. This analysis indicates a maximum of about 10 acre-feet might be removed from the reach of channel from below the proposed pipeline to the mouth of the canyon (a distance of 6 miles). Due to the steep slope of the channel and resulting flow velocities most of this material would be carried into the San Pitch River. Some of this material over time might be deposited temporarily in the lower reaches of Cottonwood Creek, particularly between Fairview and the San Pitch River (a distance of about 1.1 miles) where the slope is flatter. Eventually the deposited material would also be flushed during higher flows into the San Pitch River. The material would eventually be deposited in Gunnison Reservoir. This amount of material is insignificant in relationship to the reservoir capacity of 18,200 acre-feet.

133. Wildlife

The biological assessment prepared by the Reclamation addressed impacts to the spotted frog and concluded that there would be no impacts. There are no candidate species nor other species identified by the State as being in need of special management within the project area.

134. Water Quality

Water quality data for selenium, arsenic, mercury, and boron has been obtained from the EPA STORET database and has been added to Table 3-17.

135. Cumulative Wetlands Losses

The EIS text has been revised as suggested to include previous wetlands losses within the reservoir basin.

136. Loss of Stream Fishery

The recreation visitor day mitigation in Chapter 3 does not include the losses of recreation due to reduced stream fisheries because the project plan includes mitigation that would offset losses to stream fisheries. Therefore, there would be no net loss to stream fisheries.

137. 402 Permits and 404 Permits

The only 402 Permit necessary would be a storm water permit for construction. The campground would not need a 402 permit because there would be no discharge

from the campground. All wastes from the restrooms would be collected in vaults and then pumped out and taken to an approved wastewater treatment site.

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Mountain-Prairie Region

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Memorandum

To: Regional Director, Bureau of Reclamation, Upper Colorado Regional Office, Salt Lake City, Utah
(Attention: Lee Swenson, Regional Environmental Office)

From: Assistant Regional Director, Ecological Services, Region 6 Larry Shanks

Subject: Draft Environmental Impact Statement for the Narrows Project, Sanpete County, Utah (EC 94/0023)

The Fish and Wildlife Service (Service) reviewed the above-referenced Draft Environmental Impact Statement prepared by the Sanpete Water Conservancy District for the Bureau of Reclamation (Reclamation) and has the following technical comments.

138 The discussion of "Endangered Species Impacts, Conservation Measures," page 3-67, references the biological opinion prepared by the Service in 1992. That biological opinion addressed a water depletion of 5,400 acre-feet, which was the depletion amount that Reclamation requested formal consultation on. The Draft Environmental Impact Statement states that the depletion will be 5,540 acre-feet. Therefore, the biological opinion will need to be modified to address the additional depletion. Also, on the same page, it states that the contribution for the depletion will be at a fee of $11.50 per acre-foot, which was the fee in effect in Fiscal Year 1992. It should be clarified that the fee will be the amount per acre-foot required <u>in the year in which the fee is paid</u>, multiplied by the amount of the depletion in acre-feet. For example, the depletion fee for FY 94 is $12.34 per acre-foot. The Service will prepare an amended biological Opinion at the time that the Final Environmental Impact Statement is released.

The Service, in conjunction with the Utah Division of Wildlife Resources, is preparing a Coordination Act Report for the proposed project. The Coordination Act Report will address the adequacy of the specific mitigation measures proposed in the Draft Environmental Impact Statement. A copy will be forwarded to Reclamation within the next few weeks.

Please contact Susan Linner in the Ecological Services Field Office, Salt Lake City, Utah, at (801) 524-5001 if there are questions.

138. Depletion Amount and Contribution Fee

The Fish & Wildlife Service is preparing an amended Biological Opinion which will show a water depletion of 5,557 acre-feet.

The discussion related to the contribution for the 5,557 acre-foot depletion has been updated in Chapter 3 of the EIS.

United States Department of the Interior

BUREAU OF LAND MANAGEMENT
Utah State Office
324 South State, Suite 301
Salt Lake City, Utah 84111-2303

IN REPLY REFER TO:
1792
(UT-934)

APR 2 5 1994

Narrows EIS comments

Memorandum

To: Regional Director, Bureau of Reclamation, 125 South State Street, P.O. Box 11568, Salt Lake City, Utah 84147

From: State Director, Bureau of Land Management

SUBJECT: Comment on Draft Environmental Impact Statement for the Narrows Project, Sanpete County, Utah

The United States owns the mineral rights to a portion of the lands underlying the proposed Narrows Dam and Reservoir. An application for an oil and gas lease for Sections 19, 30, and 31, Township 13 South, Range 6 East, was filed in 1990. The current U.S. Forest Service Forest Plan for the area designates these lands as open for leasing with standard stipulations.

139 The Final EIS should analyze mineral potential and possible effects on mineral resources from the proposed dam. Any changes to the leasing categories that could occur also should be analyzed.

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139. Mineral Potential and Effects on Mineral Resources

All lands within the reservoir area that are on National Forest System lands are Reclamation withdrawn lands. All applications for leases, including oil and gas leases, would require review by Reclamation. Typical stipulations limit leases to surface occupancy outside the reservoir and buffer area. Any leases being considered by either BLM or the FS must not interfere with Narrows Project purposes.

GOVERNOR'S OFFICE OF PLANNING AND BUDGET
Resource Development Coordinating Committee

Lynne N. Koga, CPA
Office Director
Brad T. Barber
State Planning Coordinator
Rod D. Millar
Committee Chairman
John A. Harja
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April 26, 1994

Charles Calhoun
DOI/Bureau of Reclamation
Upper Colorado Regional Office
125 South State
PO Box 11568
Salt Lake City, Utah 84147

Narrows EIS Comments

SUBJECT: Narrows Project - DEIS
State Identifier Number: UT940218-070

Dear Mr. Calhoun:

The Resource Development Coordinating Committee (RDCC), representing the State of Utah has reviewed this proposal. The Division of Wildlife Resources comments:

The Division has been involved with this project for a number of years. In that time several Division employees have worked on an interagency committee to identify wildlife impacts and mitigation for those impacts.

After our review of the DEIS, we feel there are a number of items included in the document that require more discussion. We have also included a few questions in our comments. We request that some consideration be given to answer them. There is a lot of redundancy throughout the DEIS. We have attempted to cross reference many of our comments; however, there will be some comments in one section that may affect comments in another that we have not cross referenced. We have also included suggested mitigation for some impacts not mitigated in this document.

Page S-1, Project Purpose and Need

The purpose of the project is to allow the Sanpete Water Conservancy District to "prove up" on their water right. They stand to lose 5,540 acre feet of water if the project is not completed. That amount of water is worth a lot of money when sold for irrigation or municipal use. Assuming that this is the main reason for the project, that should be so stated on the first page.

This paragraph should cite the report which indicates that existing recreation areas are overcrowded, and that there is need for additional facilities. Otherwise, it appears as speculation and is unsubstantiated. Does State Parks and Recreation consider Scofield overcrowded, and does the USFS consider the other flatwater fisheries overcrowded? It is true that the Utah State Comprehensive Outdoor Recreation Plan (SCORP) identifies a need for outdoor recreational facilities along the Wasatch Front, but there are better places to allocate funds for this purpose. Any project benefits would have to be viewed in terms of the tradeoffs with lost opportunities at Scofield Reservoir and along Lower Gooseberry Creek. A far better candidate for recreational development would be Little Dell. This reservoir, within 20 minutes of Salt Lake County, would provide far more recreation for Wasatch Front users than the Narrows. Taking these factors into account, perhaps more discussion should be added to this summary.

The Division has not made a determination that this would be an "excellent fishery." This again appears to be unsubstantiated, since there was no evaluation of the reservoir fishery from this perspective. We estimated angler use based on the use of other local reservoir fisheries.

Page S-4

The drawdown information is interesting. The smaller reservoir will likely have smaller mudflats even though the drawdown will be greater. Aesthetically, the smaller mudflats will be good.

A negative concerning smaller mudflats is related to productivity. We would suggest studying the basin profile to determine what the proposed reservoir operations will do to available littoral areas. We presume the smaller reservoir will have smaller mudflats and therefore smaller littoral area. With a limited littoral area, this reservoir's productivity would be extremely low. We do not have the information available to carry this argument any further. However, our experience with Electric Lake is that it is extremely unproductive when its littoral area is reduced by lake level drawdown.

Page S-5

The beneficial effects for the smaller reservoir in terms of angler days should be reconsidered depending on the productivity of this reservoir. This assessment presumes a linear relationship of angler days per surface acre, regardless of the surface acres (and regardless of the productive littoral zone available). This may not be appropriate.

Page S-6

The number of stream miles affected by the smaller reservoir is listed as 26.3. This is the same mileage as the larger reservoir. The EIS identified 2.3 miles of

mitigation for spawning/rearing habitat for the proposed plan, but not for the smaller reservoir alternative. Acknowledging that less of upper Gooseberry Creek will be inundated with the smaller reservoir, this should have been reflected in the identified total of 26.3 miles. Still, there will be some of upper Gooseberry Creek inundated which must be mitigated. The reason for not putting water in those headwater tributaries from Fairview Lakes seems to be because of lack of storage in the smaller reservoir to effect this "exchange." This **does not eliminate** the impact however, and mitigation for the 2.3 miles is still needed.

There are some positive elements to the smaller reservoir alternative, but the potential reservoir productivity could be less. Therefore, the flatwater fisheries benefits may be much less for the smaller reservoir alternative.

Page 1-4

Under **Need for the Project**, improving recreation and fishery opportunities is listed. Please see comment above for Page S-1. We support the idea of a multipurpose project as opposed to a single-purpose project. This EIS should include in its justification some documentation of the need of the reservoir for fishery and recreation purposes.

Page 1-6

The statement by the Division of Parks and Recreation about fishing being the most popular outdoor recreation activity should be referenced and should stand alone. The statement about the need for more fisheries is conjectural.

Page 2-3

Will the on-farm conservation measures which are required to receive "project water" be addressed in an Environmental Assessment or other forum? There could be impacts to wetlands, wildlife habitats, and other important areas by some irrigation efficiency projects.

Page 2-4

Specific fish and wildlife measures for restoring year-round flows in tributaries to Gooseberry Creek should quantify instream flow needs. We have recommended 2 to 3 cfs per channel.

Page 2-6

The statement concerning upland habitat mitigation is not strong enough. The statement "would be provided in one or a combination of the following ways:" implies not all of the following techniques would be used. We feel that all of these are necessary. The Appendix A, Page A-1, Item 6 specifically commits to do all of the measures.

Page 2-9

A monitoring program needs to be developed for the tributaries of Gooseberry Creek. We have identified some potential problems with this measure, e.g., questionable overwintering habitat, problems with mudflats and access by spawners. This feature should be evaluated after implementation, with a commitment to do additional work if needed to make this an effective mitigation feature.

Page 2-10

We are concerned that this mitigation feature is predicated on successfully narrowing the stream channel to provide spawning and fry habitat at the lower flows to be released from the dam. We are concerned about boulder placement as a means of accomplishing this objective. Boulders are not a part of the natural stream geomorphology in the area, not a big part of the landscape, and are probably not appropriate. Soil banks with heavy, woody, vegetative growth are preferred. We don't believe, however, that narrowing will occur naturally through soil deposition processes because the sediment supply to this reach will be cut off by the reservoir, and overbank flows sufficient to deposit the materials (if they were available) may not occur frequently enough to achieve this desired condition within a reasonable time frame. Another means of rehabilitating the channel should be developed.

Use of the 300 acre feet for flushing flows has not been decided upon as the best use of that water in all cases. We are concerned that low water exchange during the winter at Lower Gooseberry Reservoir may lead to fish kills, and the 300 acre feet might be better used as an instream flow supplement during the winter period.

Page 2-11

Table 2-2 identifies potential private lands to be acquired. Additional discussion with potential future land managers should be pursued. Operation and maintenance funding is an important consideration.

a) Mud Creek does not have a logical owner. If the Division were to obtain this, we would need substantial operation and maintenance funding to manage.

b) Fish Creek could go to Utah Parks or USFS. The property is sandwiched between Scofield and USFS.

c) The Division would be interested in managing the Price River property below Scofield (Lower Fish Creek) due to its proximity to existing UDWR property and the overall management goal for Lower Fish Creek. There are some exceptional wildlife values to this property.

d) The Division has low priority interest in managing the Coal Canyon property. It might tie in with USFS property, however.

e) This property may no longer be available.

Page 2-12

There needs to be a discussion of the types of wetlands (riparian fingers and associated wetlands) being displaced and how the mitigation sites will replace in-kind or out-of-kind. Perhaps it's appropriate to indicate the 404 application procedure and the fact that a mitigation plan will be submitted with the application.

Restoring wetlands along Mud Creek is an interesting idea. These wetlands are greatly impacted by cattle and the runoff from these lowlands and the streambank erosion likely contributes large amounts of sediments. This ties into the stream mitigation identified above; we still question the ownership and operation and maintenance responsibilities.

The open ditches are better than the "sprinkler" system but is it truly viable.

Page 2-14

Wildlife mitigation is a little stronger than what was previously presented and should be reflected in the Attachment A, Environmental Commitments. The monitoring plan presented is appropriate. **There should be similar commitments to monitor and adjust aquatic mitigation features.**

Page 3-61 indicates approximately 900 acres will be treated as part of a Forest-wide watershed and range improvement program. The sponsor's role in implementing these projects should be more clearly defined. Perhaps the sponsor should assume 100 percent of the responsibility for rehabilitating a certain amount of degraded rangeland. The specific areas to be treated by the sponsor should be identified. Plant community composition goals should be identified for these treated areas.

Paragraph 3 - Change "... additional mitigation could be required" to "...additional mitigation would be required."

Page 2-15

The discussion on this page referring to acquisition is confusing, and statements appear to be contradictory to plans presented in Table 2-3. Is a perpetual easement the first approach to all acquisitions? That impression is created by the narration, yet that is not what is said in Table 2-3 or in the narrative on Page 2-14. The Division recommends fee title acquisition for any/all properties acquired which may be managed for fish and wildlife purposes by the Division.

Paragraph 2 - Granted there will be no relocation of families and others, but acquisition of conservation easements could limit future development.

Page 2-18

See comments above about "Stream channel modifications." Until the channel becomes useful habitat, however long that will be, this mitigation does not contribute to the Lower Gooseberry Reservoir fisheries.

Flushing flows... We would rather see the term "channel maintenance" be changed to "habitat enhancement." This would leave the door open for more possible uses of the water than "flushing flows." Winter flows may be a better use of this water than the flushing flows. There may be other uses as well.

We need to make sure there is a bypass feature provided on the dam outlet works so that the instream flow can always be provided, even during times when inspections or maintenance are needed. At one time, we discussed a separate outlet structure in order to deliver the 1 cfs. It seems this bypass structure could help meet that need.

Small Reservoir Plan

Page 2-21 lists several negatives with the smaller reservoir.

Year-round flows would not be available for the tributaries of Gooseberry Creek. Mitigation for spawning habitat wasn't identified because they could not take the Fairview Lake flows into the Gooseberry tributaries. There is still a need to mitigate for lost habitat whether it is done at these sites or not.

Page 2-24, Last paragraph.

It states that environmental commitments and measures are the same for both action alternatives. This is not true. See comments above re: spawning habitat mitigation.

Page 3-2

Does the second paragraph under the heading "Smaller Reservoir Plan" conflict with Page 2-21 where it states that restoration of flows in the two small tributaries would not be considered for the smaller reservoir plan. If there is no restoration of flows there will be no "aesthetic benefits."

Page 3-4

Regulated releases from Scofield may also be affected while the larger reservoir is filling. The State Engineer's Memorandum of Decision restricts the amount of trans-basin diversion that can occur the first year. In subsequent years, could the entire 5,400 acre feet be diverted? If so, the reservoir could take many years to fill. What is the annual storage amount allowed for this project?

Paragraph 3 states that "the [Cottonwood Creek] stream channel could widen by 2 to 5 percent." This is inconsistent with the study results (see Page 3-21, and Table 3-6 which indicate increases in channel width of 4 to 23 percent would occur). Upstream reaches could be affected by up to 73 percent increase in width if not for the pipeline to the confluence of Left Hand Fork.

Page 3-7, Paragraph 2

What would be the impact of an additional 1,800 acre feet be on three miles of the fishery in the San Pitch River? Could it constitute an enhancement?

Page 3-13

Other agencies besides just UDWR "believes that there are other factors" that are causing problems in Scofield. All of the reports done by the Division of Water Quality have identified additional water quality problems.

Page 3-16 and Page 3-17

The stream channel morphology of middle Gooseberry Creek is once again a problem. See previous comments for page 2-18. Paragraph 7 - See comments for page 2-10. According to Rosgen, structures must be compatible with stream type to be effective. We question if an attempt
should be made to build structures until the results of several years of rest from grazing can be evaluated.

The diversions of the Mud Creek flows will help water quality but this is dependent on acquiring the wetlands. A different wetland area for purchase was identified. Originally it was suggested that the wetlands next to Scofield (south shore wetlands) be acquired. The south shore wetlands could have been used to develop this idea of diverting water and developing a natural filter. The proposal identified in this document will be a little more difficult. Fish migration will be an issue and design criteria.

The No Action Plan states that fish kills will continue 11 out of 33 years. However, the analyses for the Recommended Plan showed that "fish kill conditions" would occur 5 out of 33 years with the project, as opposed to 4 out of 33 years without. There is an apparent discrepancy here which should be clarified.

Page 3-21

Paragraph 3 - Bank destabilization in Cottonwood Creek should be monitored regularly. The sponsor should be required to rehabilitate badly eroded areas that can be attributed to the increased flows. Sufficient armoring below the outlet structure at the junction of Left Hand Fork could limit bank erosion.

Page 3-24

The discussion concerning water diversion from Brooks Canyon and Cabin Hollow Creeks is a surprise. We had the understanding that the Memorandum Decision precluded diversion of Brooks Canyon and Cabin Hollow Creeks. Doing such a thing for instream flow use on Gooseberry Creek is akin to "robbing Peter to pay Paul." There would be substantial wetland losses on both streams also if this is proposed.

Page 3-33

We conducted another creel survey for Lower Gooseberry. If you need a copy of the new data, give Ken Phippen a call at 637-3310 in Price.

Paragraph 5 - A water management plan should be developed for the Narrows Reservoir to identify the cost associated with the development of a fishery. Can a cutthroat trout fishery be maintained with the fishing pressure that is anticipated? Will there be significant natural reproduction in the two tributary streams? Will rainbows be planted, and if so, how many? The Division currently has difficulty meeting stocking quotas for many popular streams and reservoirs.

Page 3-37

The last statement in the last paragraph is not supportable by data. If we are at a position of providing professional opinion, it is the Division's opinion that there will be significant impacts from this project feature. Lack of mitigation for this impact (see Table 3-12) is not acceptable. We cannot support an unmitigated impact to this resource.

Page 3-38

It is likely that Lower Gooseberry Reservoir will be impacted greatly by this project. There was a winter kill there last year. This is why the Division would also consider using the 300 acre-feet for winter instream flow rather than flushing flows.

We assume the loss of angler days at Scofield was calculated on the loss of surface acres. A problem with this estimation method was proved last year. Angling pressure was down considerably due to fewer fish (post-treatment population, which could be compared to a post-fish kill), low water levels kept people away because of ramp conditions and bag limit reductions. We suggest that improvements in water quality for Scofield is the most promising way to reduce this impact. Hopefully the water quality mitigation for developing Mud Creek (if the Upper Fish Creek is purchased, the same type of program may be possible) will help Scofield and meet the mitigation needs.

We conducted an angler survey in 1992 at Scofield. Angling pressure was down to approximately 38,921 hours compared to 303,200 in 1986. This was due to all of those factors that were mentioned above as well as the fact that in low water situations it is difficult to fish the lake from shore. Large mudflats are difficult to traverse. This will be true of the Narrows as well.

Page 3-38, Paragraph 6

See comments for Page 33-3

Page 3-40

From Table 3-12, it appears all of the impacts for Middle Gooseberry, Lower Gooseberry and Fish Creek are supposed to be mitigated in the 4 miles of stream identified for the Upper Gooseberry. This seems like inadequate mitigation. We have a complete loss of 1 mile for Upper Gooseberry Creek, 72 percent loss for 3.0 miles Middle Gooseberry Creek (which may actually be more if the habitat enhancement doesn't work), some loss in Lower Gooseberry Creek and a loss of fish. This is less than 1:1 mitigation and does not replace habitat but enhances existing habitat. Mitigation of this type should be higher than 1:1.

Monitoring plans need to be developed for all of these proposed mitigation proposals, including monitoring and compliance commitments.

As mentioned in our comments on page 3-37, lack of mitigation for impacts (see Table 3-12) is not acceptable. We cannot support an unmitigated impact to the aquatic resources.

Our recommendation is that all the impacts to the aquatic and wetland resources be mitigated. Included here are some suggestions for mitigation.

Cottonwood Creek-This impact had previously been unmitigated in the draft EIS for the project. The Division recommends this impact be fully mitigated as a project commitment. We have prioritized several stream/riparian corridors slightly outside of the Narrows Project area, whose acquisition may partially

compensate for the 4.9 miles of trout fishery loss in Cottonwood Creek, a Class 3 quality stream. Acquisition of one or two longer contiguous reaches of stream corridor, by fee title or by conservation easement, would be preferable over to acquiring several isolated reaches from two or more of the identified streams. The following priorities are recommended:

1. Thistle Creek, from the confluence of Soldier Creek, upstream to the confluence of Nebo Creek, is a Class 3 quality stream. It supports a viable brown trout population. A short reach of the stream is currently stocked with catchable-size rainbow trout. There are also cutthroat trout in the stream, but they are lesser in abundance. Most of the stream is on private land (6.1 miles private). This stream presently has habitat and fish populations similar to Cottonwood Creek. Fee title ownership or a conservation easement along the riparian corridor at a ratio of 2:1 would allow public access to the stream, and ensure future maintenance of the stream and riparian habitat. (Location of area: Thistle Creek, from the confluence of Soldier Creek, upstream to the confluence of Nebo Creek, is located in the following sections: Sec. 32 of T9S, R4E; Sec. 5,7,8,25,26,35 of T10S, R4E; Sec. 13,24,25,26,35 of T10S, R3E; and Sec. 2 of T11S, R3E.)

2. Nebo Creek, from the Thistle Creek confluence, upstream to the Forest Service boundary (1.9 miles private ownership), is also a Class 3 quality stream, supporting brown trout, cutthroat trout and stocked rainbow trout. However, irrigation diversions and livestock grazing along the stream degrade the habitat available for fish on the private lands below the Forest Service boundary. This stream reach currently has the potential to support about half the fish biomass as Cottonwood Creek, but could be improved to about the same level. Fee title ownership or a conservation easement along this riparian corridor at a 2:1 ratio would permit public access to the stream and allow for improved riparian and stream habitat conditions. (Location of the area of Nebo Creek, from the Thistle Creek confluence, upstream to the Forest Service boundary, is located in the following sections: Sec. 2,10,11,15 of T11S, R3E.)

3. Thistle Creek, from the Nebo Creek confluence, to its headwaters up to the Utah-Sanpete County line (7.5 miles private) is a Class 4 water and is marginal habitat for brown trout. It does, however, support the sensitive species leatherside chub. It would be desirable for those reaches of the stream which are adjacent to Division property to be acquired in fee-title. A conservation easement to protect the wet meadow and riparian area for leatherside chub habitat would also be desirable. However, replacement for the loss of a Class 3 quality trout-producing stream by this reach of Class 4 quality stream would require a 3:1 ratio to be acceptable. (Location of the area of Thistle Creek, from the Nebo Creek

confluence, to its headwaters up to the Utah-Sanpete County line, is located in the following sections: Sec. 2,11,12,13,24 of T11S, R3E; Sec. 18,19,30,31,32 of T11S, R4E.)

Gooseberry Creek--The Division similarly recommends several stream reaches for consideration for acquisition of stream/riparian corridors for partial mitigation of the impacts to Gooseberry Creek. These stream sections should be considered in addition to the other sections mentioned in the document. We believe that a replacement ratio of 1:1 as proposed by the project sponsor in the draft EIS is not adequate. Because of the complete loss of stream habitat, we recommend that mitigation occur at a 3:1 ratio. This recommendation is based on the fact that any enhancement or protection strategy will still be a net loss of stream habitat. Potential strategies for mitigation include acquisition for protection, acquisition for enhancement, conservation easements for enhancement, conservation easements for protection, enhancement of USFS property and enhancement of DWR property. The Narrows mitigation will probably include several of these strategies.

The project should first attempt to achieve mitigation by attempting to block new acquisitions with existing Division or Forest Service properties, or with the wetlands mitigation proposal. To help mitigate impacts to Scofield Reservoir, we recommend consideration of mitigation options which would occur in the Scofield drainage.

1. Acquisition of segments of Mud Creek or Winter Quarters could complement the wetland mitigation proposal.

2. Lower Fish Creek acquisition would tie in with the state land section proposed for fish and wildlife mitigation and would tie in with the long range goals of managing Lower Fish Creek.

3. Pondtown Creek is a tributary to Scofield Reservoir. Acquisition and enhancement would help water quality for Scofield and provide spawning habitat for reservoir fish.

With each of these alternative acquisition projects, we recommend funds be provided for enhancement activities. These might include vegetation work, stream channel protection and possibly instream projects, with emphasis being on natural recovery of the areas. Fencing may be needed for these projects, with costs approximately $13,000 per mile for installed wire fence.

Page 3-41, Paragraph 3

As stated earlier, the damage caused by the trans-basin diversion should be monitored. Where possible, erosion control measures should be undertaken to minimize the damage to the drainage.

Page 3-42, Table 3-13

The Impacts to Reservoir fisheries under Narrows Reservoir is stated as resulting in mitigation commitment of 13,700 angler days use. On page 3-72, it states the smaller reservoir plan will include 8,200 days spent on fishing. Is this a discrepancy?

Page 3-48

It is estimated the sediment load in Gooseberry Creek downstream from the Reservoir would be reduced by 400 tons per year. Is this load going into the reservoir? What is the life of the reservoir? What kind of maintenance/disturbance will be necessary and how often?

Page 3-50

Table 3-13 shows toxicity data for selenium. The measured quantities at several stations were 0.2 ppm. This concentration converts to 200 ug/l. The National Academy of Science criteria cited in the table is 20 ug/l. This indicates there is in fact a potential selenium toxicity problem. We suggest this data be reviewed to see if it is accurate.

Page 3-54

In the first paragraph, cattle grazing should be included with the sheep grazing.

Page 3-58 and 3-59

This area is strictly deer summer range and has never been considered winter range. The document implies that this is poor mule deer habitat because it is poor winter range. This is not true. This is excellent summer range and areas surrounding the reservoir basin and aspen forest are critical in summer because of fawning. This is only a small piece of the herd's "habitat" and should not be expected to have all habitat needs or components. It was inappropriate to apply the model to such a small geographical area.

For the record, it should be noted that the technical team advised against using the HSI model for mule deer because it was generated for deer winter range. The site is used by deer during the summer and fall but never during the winter. Excessive snow depths force them to winter a couple of thousand feet lower in the piñon-juniper and mountain brush zone above the San Pitch Valley.

It should also be noted more strongly that the Brewer's sparrow was used because of the vegetative community it represented, not for the species. In conversations, it was felt that the Brewer's sparrow would reflect summer range needs for deer, elk and other species, as well as the sparrow.

Page 3-60

This is where it states that it would take two years to fill the reservoir. First paragraph of the Wildlife section states this. (See comments for page 3-4.)

There should be some mention of revegetating the areas temporarily disturbed by the placement of the diversion pipelines. There should be revegetation with a mixture that reflects the existing plant community -grasses, forbs, shrubs.

Page 3-63

We continue to question the watershed and range improvement project. Will there be a management plan for this area? What changes will be identified for grazing the area?

Before this is accepted as mitigation, a plan identifying expected results, locations, management and seeding prescriptions must be developed and reviewed.

Misspelling of deer as "dear."

The Lower Fish Creek acquisition will provide both summer and winter range. This depends on which side of the canyon they acquire. South facing slopes provide winter range in early winter and mild winters.

Paragraph 1 - How will conservation easements protect habitat around the reservoir? What rights are going to be purchased by the sponsor? What is meant by the sentence, "This measure would serve to protect wildlife values adjacent to the reservoir and prevent impacts that would occur if the land were developed." County zoning ordinances can change over time, so there is no guarantee that the 10 acre lot minimum will last forever. A conservation easement could permanently limit development to 10-acre lots, or preclude the possibility of any development. It could require that no fences are constructed, and no vegetation is destroyed. The restrictions that will be sought through the purchase of conservation easements need to be clarified.

Paragraph 2 - Should the proposals for upland wildlife mitigation be prioritized? What is the target date for achieving full mitigation? That becomes a critical date because no additional mitigation will be required prior to that date if monitoring shows that the standards are not achieved.

Page 3-64

Under the discussion on bald eagles, there should be mention of the importance of riparian areas and large roosting trees. These two elements may be more related to this project in the lower reaches than the state and federal properties statement.

Page 3-72

Paragraph 1 - Major changes in land use should be anticipated. Local realtors should be consulted to assess the likelihood of an increase in construction, given the proximity of the lots to a reservoir.

Paragraph 4 - To the contrary, land use impacts were to be mitigated through the purchase of conservation easements.

Page 3-73

If the shoreline of the reservoir is privately owned, how will the sponsor guarantee public access for fishing?

The visitor-day information for Scofield and Joe's Valley is questionable. Scofield is a higher use area than Joe's Valley. They are both high-use areas; we question why Joe's Valley is higher. Our fisheries biologist in the Southeastern Region guesses data from the post-treatment years was used for Scofield user days. This would characterize Scofield at a much lower use level than it really is. Note discussion for page 3-38 where the magnitude of difference that the creel surveys showed in 1986 compared to 1992 is discussed.

Page 3-74

Did we say the Narrows Reservoir would be an excellent fisheries? The success of the fishery will depend on a variety of factors. Productivity will be one big question and is addressed above.

We have already commented on the lost recreational days at Scofield. This is a more complex question than calculating losses due to reduced surface; social issues, management practices, access and other issues discussed have an impact on use levels.

The Small Reservoir may not be a great fishing reservoir due to low productivity, on the assumption of a small littoral area.

Page 3-79

Paragraph 4 - How often is a third crop harvested now? It's our understanding that the third crop is sometimes lost due to frost, in which case, additional water would do the farmer no good.

Page 5-2 and 5-3

We (John Fairchild, Ken Phippen, Mark Holden, Catherine Quinn) do not consider ourselves as preparers of this document. Franson-Noble & Associates and the BOR should be listed under "Preparers." We feel the rest of us should be listed as members of a technical advisory team.

Attachment A, Environmental Commitments

In several cases, the Environmental Commitments made in Attachment A lack specific numbers, such as amounts of instream flows in tributaries from Fairview Lakes to the proposed reservoir, lengths of stream/riparian corridor to be acquired, and others. Most of the specifics are listed in the text portions of the document. It is our belief that the Environmental Commitments section should be as specific as possible; in those cases where future planning must occur to define a mitigation feature more precisely, then lead agency and timetables for compliance should be identified. There should be no open-ended statements in this section of the EIS.

Division of Water Rights

In general we believe there are not any significant water right issues that remain unresolved with the project.

Specific comments:

Page 1-3, paragraph 4, line 3 - Delete the word "decree" and insert the word "Engineer" after the word "State."

Page 1-3, paragraph 4, lines 8 and 9 - The Price River Water Users' Association subordinated their water rights as a result or the 1984 agreement. This subordination does not affect all water users on the Price River; rather, just those parties who signed the 1984 agreement. The Price River Water Users' Association also received additional storage rights in Scofield Reservoir under the agreement.

Page 1-3, paragraph 4, line 11 - It is suggested that the words "as between the parties" be inserted after the word "Creek."

General comments:

1) One of the mitigation measures that is proposed is to release water from Fairview Lakes into the downstream tributaries of Gooseberry Creek on a year-round basis. The water right on Fairview Lakes for the Cottonwood-Gooseberry Irrigation Company is 3,020 acre-feet. Sixty-seven acre-feet of this water has been dedicated to the summer home development at Fairview Lakes. As a result, 2,953 acre-feet of water would be available for release and diversion through the tunnel.

To accomplish this, a change application on the Fairview Lakes water right would be required.

2) Because wetlands are part of the project, a Corps Permit should be used for all alteration sites. This would include the dam site, the work on the middle section of Gooseberry Creek and the flume installation below the dam. (Reference pages 2/4, 2-10, and 2-17).

3) Will additional water rights be required for the enlargement and replacement of wetlands adjacent to the Narrows Reservoir? If so, will it come from Fairview Lakes' right, or will it be part of the 5,400 acre-feet, or will another right be used? (Reference page 2-12). The proposed Scofield mitigation site will not require additional water rights. If the land is purchased, the water right should also be purchased.

4) A water right will need to be filed for the campground and any other associated uses. (Reference page 2-6).

If funding for the project is made available, we can assist the sponsor and their engineer in filing any necessary applications.

Division of Parks and Recreation

Inasmuch as **Scofield State Park** will be affected environmentally, functionally and financially, we wish to make the following comments.

1. Scofield SP receives annual visitation of about 56,000; annual revenues approach $30,000.

2. A new addition was made in the last three years at Madsen bay for parking, restrooms, boat ramp--extended boat ramp and other site provisions utilizing federal Wallop-Breaux boating funds and state appropriations (+$65,000).

3. A group day use area was developed in circa 1971 utilizing federal Land & Water Conservation Funds (Project No. 49-0060) for approximately $35,000. This site is protected 6F Conversion provisions of the federal Land & Water Conservation Fund Act. Wallop-Breaux projects are also protected by federal regulation--though not as specific as 6F provisions.

4. While one or both of the boat launching ramps have been extended during drought conditions, the removal of 30,000 acre feet may expose those ramps

and render ramp access impossible. The recent "Americans with Disability Act" has also been implemented at the park by the Division in the last year. If access has been effectively removed by lower water levels, then some consideration and mitigation will be required to restore reasonable access for the disabled to the reservoir for fishing and boating.

5. The 1992 Utah SCORP, or State Comprehensive Outdoor Recreation Plan affirms the need for access to waters of the state for fishing, boating and water play. The "Narrows Dam " would increase the state and regional inventory for this type of facility. Page 161 of the SCORP indicates that fishing is the number one "individual activity" in Sanpete County, followed by walking, golf and camping. For "family activities," the favored activities are sightseeing, developed camping, primitive camping and fishing among others. First choices for "new facilities" near communities are: picnicking, fishing, special event areas, ice skating and snowmobiling. Similar preferences are documented for Carbon County.

6. There appears to be no accommodation for legislatively-required handicapped or disabled access needs (as required under the federal ADA): for rest rooms, paved trails/access, signage, accessible parking, fishing piers, boat access, etc.

7. It is estimated at least 4500 fisherman days will be lost at Scofield (reduced surface area on reservoir). This could represent more than $5,000 in revenue loss to the state park, annually. More frequent fish kills and accelerated eutrophication will also denigrate the park. While the total inventory of the water-based recreation estate may be increased, some of this will be offset by a down-graded state park and instream fisheries. The high elevation Narrows Reservoir will have a shorter season of use at +9,000 feet amsl than at Scofield at about 7,600 feet amsl--probably with greater snow cover at 9,000 feet and less opportunity for year found fishing (ice) as compared to Scofield SP.

8. There may be some problem with relicting lands as Scofield water levels fall. BOR has metes and bounds problems on the park: inadequate buffer or perimeter lands were purchased and clearly surveyed when the reservoir was created in the 1940's (resulting in property line disputes). This may create some management problems--and perhaps opportunities as the lake recedes; i.e., providing legal public access to the receding shoreline(?), It seems some additional effort should be made to reduce phosphate levels from grazing animals in and around Scofield and the proposed Narrows--reducing AUMs, more fencing of stream channels; off creek watering for

stock are possibilities. Drainfields/septic tanks must be carefully and conveniently located to meet visitor needs. There may be needs for delineating fences between private and relicted public lands; and to keep stock from emerging riparian areas.

The Committee appreciates the opportunity to review this proposal. Please direct any other written questions regarding this proposal to the Utah State Clearinghouse at the above address or call Carolyn Wright at (801)538-1535 or John Harja at (801) 538-1559.

Sincerely,

for Brad T. Barber
State Planning Coordinator

BTB/ar

The Sponsor acknowledges the comment letter from the State Planning Coordinator of the Governor's Office of Planning and Budget. The letter includes all comments submitted by the Department of Environmental Quality, Divison of Water Quality; and the Department of Natural Resources, Division of Parks and Recreation, Division of Wildlife Resources, and Division of Water Rights. Response to each agency's specific comments follow each of their individual letters.

State of Utah

DEPARTMENT OF ENVIRONMENTAL QUALITY
DIVISION OF WATER QUALITY

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April 28, 1994

Mr. Charles A. Calhoun, Acting Regional Director
Bureau of Reclamation
Upper Colorado Regional Office
P.O. Box 11568
Salt Lake City, UT 84147

RE: Narrows Project Draft Environmental Impact Statement

Dear Mr. Calhoun,

We have received a copy of the Narrows Project EIS for review and comment. We appreciate the opportunity to provide input into the environmental review process. Enclosed is a copy of various water quality issues and concerns that we feel need to be addressed prior to the completion of the final report. We appreciate the opportunity to comment on these studies. If you have questions concerning these issues please contact me at 538-6146.

Sincerely,

Jay B. Pitkin

Jay B. Pitkin, P.E., Manager
Engineering & Water Quality Management

Enclosure

JBP:hlj
F:HJUDD\WP\NARROWS.EIS

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Narrows Project Environmental Impact Statement Water Quality Issues

Submitted by the Utah Division of Water Quality, April 26, 1994

140 There are several references in the document to the Department of Health and the Division of Health for jurisdictional activities within our agency. Proper terminology should refer to the Department of Environmental Quality and the Division of Water Quality.

141 Although conservation measures are alluded to in the body of the report and in general committed to in Attachment A, specific measures could be identified that would insure the implementation of conservation measures.

142 The management plans for operation of the reservoir under the recommended plan need to be identified. The reduction of water to Scofield Reservoir will impact the defined beneficial uses for the reservoir. Under the recommended plan it appears that water above the annual right will be stored in the Narrows Project reservoir for release during drought period. If this is correct, the impacts from this type of management plan need to be addressed.

143 The impact associated with the existing asphalt road within the boundaries of the proposed reservoir need to be addressed. Will these materials be stabilized or removed (including the gravel base under the asphalt) to protect water quality.

144 A multiple-level outlet structure (capacity 1.25 cfs) was described in the EIS to provide minimum stream flow requirements downstream from the reservoir that meet temperature requirements for the propagation of a cold water fishery. What structures will be available for the release of flushing flows and are mechanisms in place to assure that this water will have sufficient oxygen levels if hypolimnetic anoxic conditions develop in the future and low levels of suspended solids?

145 Mitigation measures are described below the proposed reservoir for the stream down to Lower Gooseberry Reservoir. To protect the stream and riparian zone, fencing with stock watering access points has been identified as one of the management practices. The feasibility of providing alternative off-stream watering sites should be evaluated. There are a number of practices that could be implemented that would provide water and provide for better protection of the stream corridor. In addition the placement of large boulders in the stream channel to

146 constrict flow and alter stream characteristics was mentioned for this section of stream. Any practice to alter the hydrology of the existing stream needs to be defined more specifically so that it can be evaluated from a hydrological viewpoint.

147 Specific best management practices (BMP's) need to be identified for all phases of construction, including instream work, that will be implemented to abate the movement of sediments into State waters. These types of activities will need to be identified and implemented before any variances from turbidity standards will be considered.

148 Water quality in Scofield Reservoir is impaired. Phosphorus loadings (internal and external) and flushing rates have a significant impact on reservoir water quality. It is our opinion that the diversion of water out of the Scofield watershed will only have an adverse impact on the

currently impaired water quality of Scofield Reservoir. Significant findings from previous water quality studies are not thoroughly documented in the EIS. In fact there is no reference to the Phase II Clean Lake Report, Scofield Reservoir Restoration Through Phosphorus Control, completed in 1992. Utah Division of Water Quality data cited in the Phase II report substantiates the fact that there is a decline in water quality as reservoir volume decreases. Although the EIS reports that the average inlake total phosphorus concentration was 34 ug/L for the period 1978-1989, concentrations for low water years of 1990 and 1991 were 64 and 53 ug/L respectively. To make the statement that the recommended plan would not have a detrimental effect on Scofield water quality but cause a slight improvement (page 3-13, para. 5) is undocumented. As a matter of fact the report states that the project would result in a higher potential of fish kills in Lower Gooseberry and Scofield Reservoirs. A presentation of credible data to substantiate these points needs to be incorporated into the EIS, if it exists.

149 It is difficult to review the interactions between Scofield Reservoir and the proposed reservoir through the information provided in the EIS. The data that was used to document future flush rates (Figure 3-3) needs to be put in the report for scrutiny. When reports exist that document that low reservoir capacities in addition to low flushing rates enhance the potential for fish kills it is difficult to see how the reduction of inflow to Scofield Reservoir can offset either of these two factors. In addition, fish kills have occurred in the reservoir when the reservoir shows a flushing rate ratio in excess of 0.85. The prime factor may be low reservoir capacity during the winter months and this phenomenon needs further investigation before it can be used solely to document the quality of water. Your report indicates that implementation of the recommended plan would increase the flushing rate in the reservoir but does not substantiate this fact with hard data. Given the fact that typically less water will be entering the reservoir while the same demand will exist for water downstream if not even greater, how then can the flushing rate increase? Does your model for computing these ratios take into account evaporation rates for Scofield Reservoir and the variation in storage water to be held in the proposed reservoir? Where in the EIS is addressed the additional water rights required to fill the reservoir beyond the allocated water right of 5,400 acre-feet per year?

140. Jurisdictional Terminology

Proper terminology for the Department of Environmental Quality and the Division of Water Quality has been accommodated throughout the document as requested.

141. Conservation Measures

The Sponsor believes that it is not appropriate at this time to provide a detailed description of specific conservation measures that would be implemented. However, the Sponsor has made a commitment to implement general types of conservation measures. A more specific plan for implementing conservation would be identified as part of the repayment contract negotiation with Reclamation. As part of that process, Reclamation would require the Sponsor to develop a comprehensive management plan, part of which would address water conservation issues. The plan would conform to current Reclamation policy and regulations.

142. Water Management Plan for Narrows Reservoir

The water rights associated with the Narrows Project are described in Chapter 3 of the EIS. The maximum annual amount of these water rights is 17,000 acre-feet. The water rights are equal to the total reservoir capacity in the recommended plan (refer to Table 2-5 of the EIS). The 1984 Compromise Agreement gives Narrows a higher water rights priority than Scofield in consideration for limiting transbasin diversion to a maximum of 5,400 acre-feet per year. The impacts to both the water quantity and water quality of Scofield Reservoir are addressed in the EIS in Chapters 1, 2, and 3. Also refer to the response to comment 119.

143. Asphalt Road Removal

The asphalt road surface and road base would be removed from the reservoir basin thus eliminating the potential for any adverse impacts.

144. Structures for Flushing Flows

A river level outlet works would provide sufficient capacity (305 cfs) for flushing flows. The gradient below the Narrows Dam is sufficient to provide adequate aeration within a short distance of the dam. Mixing of flows in the multiple-level outlet structure can also increase oxygen levels.

145. Off-stream Stockwatering

Chapter 2 of the EIS has been revised to indicate that in addition to stream access points, other alternative means of providing stockwater would be considered.

146. Stream Alterations

Stream alterations would require permitting by the UDWR and is described in Chapter 2.

The hydrology of the stream below Narrows Dam would be greatly modified with the operations of Narrows Reservoir. The stream alterations would be part of the mitigation for the impacts of reduced flows. Those reduced flows are described in Chapter 3. With flows reduced to 1 cfs, the impacts of boulders or other channel alterations on the "existing" stream will be negligible in comparison but should be beneficial to fishery habitat.

147. Best Management Practices

One of the requirements of the construction contract would be to implement the BMP's specified in the Nonpoint Source Water Pollution Control Plan for Hydrologic Modifications in Utah, which is an addendum to the Utah Nonpoint Source Management Plan. Specifically applicable sections such as Hydromod Planning Process, Measures to Control Construction Activities, and Impoundments in Appendix B would be implemented.

148. Decline in Water Quality of Scofield Reservoir

The studies referred to in Chapter 3 of the EIS are in fact the *Phase I Clean Lakes Report;* the *Scofield Reservoir Restoration Through Phosphorus Control , Phase II Clean Lakes Report;* the draft paper, *Nonpoint Source Pollution and Fisheries in Scofield Reservoir;* and a paper entitled *Why Scofield Reservoir is Eutrophic: Effects of Nonpoint Source Pollutants on a Water Supply Reservoir in Utah.* The EIS has been revised to reflect the findings of the Phase II report and to more clearly reference these documents. The documents have been included in the bibliography.

149. Flushing Data

The data used to develop the flushing rates in Figure 3-3 is contained in the Narrows Project Operation Study. The operation study is a detailed study that accounts for inflow, outflow, evaporation losses, spills, releases to direct flow rights, and other controlled releases. The study was conducting using 1960 through 1992 historical monthly hydrologic data. A copy of this study is available for perusal at the offices of Franson-Noble & Associates, Inc.

The flushing rate is simply the inflow divided by the outflow. Implementation of the Recommended Plan would have little effect on the average flushing rate for Scofield Reservoir. While the inflow to Scofield Reservoir would be decreased by the project, the outflow would also decrease. Historically, Scofield Reservoir has spilled in 17 of the 33 years included in the operation study. Under the recommended plan these spills, which are outflows, would be reduced. There would also be a reduction in other controlled releases from the reservoir as described in Chapter 3 of the EIS.

The storage water rights for the project are identified in Chapter 1 of the EIS and total 17,000 acre-feet per year. The 5,400 acre-feet number relates to the total allowed for transbasin diversion under the Compromise Agreement.

State of Utah
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF PARKS AND RECREATION

Michael O. Leavitt
Governor

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25 April 1994

U.S. Bureau of Reclamation
Attn: Mr. Charles A. Calhoun
Upper Colorado Regional Office
P.O. Box 11568
Salt Lake City, UT 84147

Narrows EIS Comments

C0044

Re: **Division comments regarding the Draft Environmental Impact Statement for the Narrows Project, Utah: potential negative impacts on Scofield State Park, and federal Land & Water Conservation Fund Project No. 49-0060**

Dear Mr. Calhoun:

We have reviewed the draft EIS: Narrows Project: Draft Environmental Impact Statement, prepared for the Sanpete Water Conservancy District by Franson-Noble & Associates, Inc. (November, 1993). We called and received a copy on or about 18 April 1994. We were told we were on the mailing list. Inasmuch as **Scofield State Park** will be affected environmentally, functionally and financially, we wish to make the following comments.

150 1. Scofield SP receives annual visitation of about 56,000; annual revenues approach $30,000.

2. A new addition was made in the last three years at Madsen bay for parking, restrooms, boat ramp--extended boat ramp and other site provisions utilizing federal Wallop-Breaux boating funds and state appropriations (+$65,000).

151 3. A group day use area was developed in circa 1971 utilizing federal Land & Water Conservation Funds (Project No. 49-0060) for approximately $35,000. This site is protected by 6F Conversion provisions of the federal Land & Water Conservation Fund Act. Wallop-Breaux projects are also protected by federal regulation--though not as specific as 6F provisions.

152 & 153 4. While one or both of the boat launching ramps have been extended during drought conditions, the removal of 30,000 acre feet may expose those ramps and render ramp access impossible. The recent "Americans With Disability Act" has also been implemented at the park by the Division in the last year. If access has been effectively removed by lower water levels, then some consideration and mitigation will be required to restore reasonable access for the disabled to the reservoir for fishing and boating.

154 5. The 1992 Utah SCORP, or State Comprehensive Outdoor Recreation Plan affirms the

need for access to waters of the state for fishing, boating and water play. The "Narrows Dam" would increase the state and regional inventory for this type of facility. Page 161 of the SCORP indicates that fishing is the number one "individual activity" in Sanpete County, followed by walking, golf and camping. For "family activities", the favored activities are sightseeing, developed camping, primitive camping and fishing among others. First choices for "new facilities" near communities are: picnicking, fishing, special event areas, ice skating and snowmobiling. Similar preferences are documented for Carbon County.

155 6. There appears to be no accommodation for legislatively-required handicapped or disabled access needs (as required under the federal ADA): for rest rooms, paved trails/access, signage, accessible parking, fishing piers, boat access, etc.).

156 through 158 7. It is estimated at least 4500 fisherman days will be lost at Scofield (reduced surface area on reservoir). This could represent more than $5,000 in revenue loss to the state park, annually. More frequent fish kills and accelerated eutrophication will also denigrate the park. While the total inventory of the water-based recreation estate may be increased, some of this will be offset by a down-graded state park and instream fisheries. The higher elevation Narrows Reservoir will have a shorter season of use at +9,000 feet amsl than at Scofield at about 7600 feet amsl--probably with greater snow cover at 9,000 feet and less opportunity for year round fishing (ice) as compared to Scofield SP.

159 8. There may be some problem with relicting lands as Scofield water levels fall. BOR has metes and bounds problems on the park: inadequate buffer or perimeter lands were purchased and clearly surveyed when the reservoir was created in the 1940's (resulting in property line disputes). This may create some management problems--and perhaps opportunities as the lake recedes; i.e., providing legal public access to the receding shoreline (?). It seems some additional effort should be made to reduce phosphate levels from grazing animals in and around Scofield and the proposed Narrows--reducing AUMs, more fencing of stream channels; off creek watering for stock are possibilities. Drainfields/septic tanks must be carefully and conveniently located to meet visitor needs. There may be needs for delineating fences between private and relicted public lands; and to keep stock from emerging riparian areas.

160

We appreciate this opportunity to comment on this important project. If you have questions, please contact us.

Respectfully Submitted,

Tharold E. Green, Jr., AICP
Planning Manager, UDPR

cc: Dave Morrow, Deputy Director UDPR
Franson-Noble & Associates, Inc.
Carolyn Wright, RDCC

150. Scofield State Park Visitor Days and Revenues

Chapter 3 of the EIS has been revised to include the information provided by this comment.

151. Impacts to State Park Facilities

In 1992 Scofield Reservoir was emptied or drawn down to the minimum pool level. Based on discussion with Division of Parks and Recreation personnel at Scofield State Park, the facilities at the State Park were all able to function at those drawn-down levels in 1992. The project would not cause a drawdown of Scofield Reservoir lower than that which occurred in 1992. Therefore, there would be no project impact to those facilities.

152. Removal of 30,000 acre-feet

The project would not remove 30,000 acre-feet from the reservoir. As stated in Chapter 3 of the EIS, the average contents of Scofield Reservoir is presently about 37,000 acre-feet. In Chapter 3, the average contents under the project would be decreased to about 30,200 acre-feet, or a 6,800 acre-foot decrease.

153. Americans with Disability Act Access

Please refer to the response to comment 151.

154. Recreation Preferences

Recreation preferences have been accommodated in Chapter 3 of the EIS.

155. Handicapped Access

Chapter 2 of the EIS has been revised to indicate that handicapped access would be provided at the recreation facilities.

156. Lost Fisherman Days

Chapter 3 of the EIS has been revised to indicate that the loss of 4,500 visitor days at Scofield Reservoir State Park would cause a loss of about $5,000 in revenue. Mitigation measures are included in the project plan to offset losses to stream fisheries.

157. Scofield Reservoir Water Quality Impacts

Please refer to the response to comment 148.

158. Ice Fishing

The EIS does not claim a benefit for ice fishing at Narrows Reservoir.

159. Relict Lands

The level of Scofield Reservoir would not drop any lower under the project than it has historically. However, the frequency of the lower levels would increase.

160. Reduced Phosphate Levels

The EIS has been revised to included more extensive measures that would reduce the external loading of phosphorus to Scofield Reservoir. These measures are described in Chapters 2 and 3 of the EIS.

State of Utah
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF WILDLIFE RESOURCES

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April 8, 1994

Ms. Carolyn Wright
Governor's Office of Planning and Budget
116 State Capitol
Salt Lake City, UT 84114

Subject: DOI/BOR/Sanpete County: Narrows Project DEIS Water Development Project (UT940218-070)

Dear Carolyn:

The Division has been involved with this project for a number of years. In that time several Division employees have worked on an interagency committee to identify wildlife impacts and mitigation for those impacts.

After our review of the DEIS, we feel there are a number of items included in the document that require more discussion. We have also included a few questions in our comments. We request that some consideration be given to answer them. There is a lot of redundancy throughout the DEIS. We have attempted to cross reference many of our comments; however, there will be some comments in one section that may affect comments in another that we have not cross referenced. We have also included suggested mitigation for some impacts not mitigated in this document.

Page S-1, Project Purpose and Need

161 The purpose of the project is to allow the Sanpete Water Conservancy District to "prove up" on their water right. They stand to lose 5,540 acre feet of water if the project is not completed. That amount of water is worth a lot of money when sold for irrigation or municipal use. Assuming that this is the main reason for the project, that should be so stated on the first page.

162 This paragraph should cite the report which indicates that existing recreation areas are overcrowded, and that there is need for additional facilities. Otherwise, it appears as speculation and is unsubstantiated. Does State Parks and Recreation consider Scofield overcrowded, and does the USFS

consider the other flatwater fisheries overcrowded? It is true that the Utah State Comprehensive Outdoor Recreation Plan (SCORP) identifies a need for outdoor recreational facilities along the Wasatch Front, but there are better places to allocate funds for this purpose. Any project benefits would have to be viewed in terms of the tradeoffs with lost opportunities at Scofield Reservoir and along Lower Gooseberry Creek. A far better candidate for recreational development would be Little Dell. This reservoir, within 20 minutes of Salt Lake County, would provide far more recreation for Wasatch Front users than the Narrows. Taking these factors into account, perhaps more discussion should be added to this summary.

163 The Division has not made a determination that this would be an "excellent fishery." This again appears to be unsubstantiated, since there was no evaluation of the reservoir fishery from this perspective. We estimated angler use based on the use of other local reservoir fisheries.

Page S-4

The drawdown information is interesting. The smaller reservoir will likely have smaller mudflats even though the drawdown will be greater. Aesthetically, the smaller mudflats will be good.

164 A negative concerning smaller mudflats is related to productivity. We would suggest studying the basin profile to determine what the proposed reservoir operations will do to available littoral areas. We presume the smaller reservoir will have smaller mudflats and therefore smaller littoral area. With a limited littoral area, this reservoir's productivity would be extremely low. We do not have the information available to carry this argument any further. However, our experience with Electric Lake is that it is extremely unproductive when its littoral area is reduced by lake level drawdown.

Page S-5

165 The beneficial effects for the smaller reservoir in terms of angler days should be reconsidered depending on the productivity of this reservoir. This assessment presumes a linear relationship of angler days per surface acre, regardless of the surface acres (and regardless of the productive littoral zone available). This may not be appropriate.

Page S-6

166 The number of stream miles affected by the smaller reservoir is listed as 26.3. This is the same mileage as the larger reservoir. The EIS identified 2.3 miles of mitigation for spawning/rearing habitat for the proposed plan, but not for the smaller reservoir alternative. Acknowledging that less of upper Gooseberry Creek will be inundated with the smaller reservoir, this should have been reflected in the identified total of 26.3 miles. Still, there will be some of upper Gooseberry Creek inundated which must be mitigated. The reason for not putting water in those headwater tributaries from Fairview Lakes seems to be because of lack of storage in the smaller reservoir to effect this "exchange." This **does not eliminate** the impact however, and mitigation for the 2.3 miles is still needed.

167 There are some positive elements to the smaller reservoir alternative, but the potential reservoir productivity could be less. Therefore, the flatwater fisheries benefits may be much less for the smaller reservoir alternative.

Page 1-4

168 Under **Need for the Project**, improving recreation and fishery opportunities is listed. Please see comment above for Page S-1. We support the idea of a multipurpose project as opposed to a single-purpose project. This EIS should include in its justification some documentation of the need of the reservoir for fishery and recreation purposes.

Page 1-6

169 The statement by the Division of Parks and Recreation about fishing being the most popular outdoor recreation activity should be referenced and should stand alone. The statement about the need for more fisheries is conjectural.

Page 2-3

170 Will the on-farm conservation measures which are required to receive "project water" be addressed in an Environmental Assessment or other forum? There could be impacts to wetlands, wildlife habitats, and other important areas by some irrigation efficiency projects.

Page 2-4

171 Specific fish and wildlife measures for restoring year-round flows in tributaries to Gooseberry Creek should quantify instream flow needs. We have recommended 2 to 3 cfs per channel.

Page 2-6

172 The statement concerning upland habitat mitigation is not strong enough. The statement "would be provided in one or a combination of the following ways:" implies not all of the following techniques would be used. We feel that all of these are necessary. The Appendix A, Page A-1, Item 6 specifically commits to do all of the measures.

Page 2-9

173 A monitoring program needs to be developed for the tributaries of Gooseberry Creek. We have identified some potential problems with this measure, e.g., questionable overwintering habitat, problems with mudflats and access by spawners. This feature should be evaluated after implementation, with a commitment to do additional work if needed to make this an effective mitigation feature.

Page 2-10

174 We are concerned that this mitigation feature is predicated on successfully narrowing the stream channel to provide spawning and fry habitat at the lower flows to be released from the dam. We are concerned about boulder placement as a means of accomplishing this objective. Boulders are not a part of the natural stream geomorphology in the area, not a big part of the landscape, and are probably not appropriate. Soil banks with heavy, woody, vegetative growth are preferred. We don't believe, however, that narrowing will occur naturally through soil deposition processes because the sediment supply to this reach will be cut off by the reservoir, and overbank flows sufficient to deposit the materials (if they were available) may not occur frequently enough to achieve this desired condition within a reasonable time frame. Another means of rehabilitating the channel should be developed.

175 Use of the 300 acre feet for flushing flows has not been decided upon as the best use of that water in all cases. We are concerned that low water exchange during the winter at Lower Gooseberry Reservoir may lead to fish kills, and the 300 acre feet might be better used as an instream flow supplement during the winter period.

Page 2-11

176 Table 2-2 identifies potential private lands to be acquired. Additional discussion with potential future land managers should be pursued. Operation and maintenance funding is an important consideration.

a) Mud Creek does not have a logical owner. If the Division were to obtain this, we would need substantial operation and maintenance funding to manage.

b) Fish Creek could go to Utah Parks or USFS. The property is sandwiched between Scofield and USFS.

c) The Division would be interested in managing the Price River property below Scofield (Lower Fish Creek) due to its proximity to existing UDWR property and the overall management goal for Lower Fish Creek. There are some exceptional wildlife values to this property.

d) The Division has low priority interest in managing the Coal Canyon property. It might tie in with USFS property, however.

e) This property may no longer be available.

Page 2-12

177 There needs to be a discussion of the types of wetlands (riparian fingers and associated wetlands) being displaced and how the mitigation sites will replace in-kind or out-of-kind. Perhaps it's appropriate to indicate the 404 application procedure and the fact that a mitigation plan will be submitted with the application.

Restoring wetlands along Mud Creek is an interesting idea. These wetlands are greatly impacted by cattle and the runoff from these lowlands and the streambank erosion likely contributes large amounts of sediments. This ties into the stream mitigation identified above; we still question the ownership and operation and maintenance responsibilities.

The open ditches are better than the "sprinkler" system but is it truly viable.

Page 2-14

178 Wildlife mitigation is a little stronger than what was previously presented and should be reflected in the Attachment A, Environmental Commitments. The monitoring plan presented is appropriate. **There should be similar commitments to monitor and adjust aquatic mitigation features.**

179 Page 3-61 indicates approximately 900 acres will be treated as part of a Forest-wide watershed and range improvement program. The sponsor's role in implementing these projects should be more clearly defined. Perhaps the sponsor should assume 100 percent of the responsibility for rehabilitating a certain amount of degraded rangeland. The specific areas to be treated by the sponsor should be identified. Plant community composition goals should be identified for these treated areas.

180 Paragraph 3 - Change "... additional mitigation could be required" to "...additional mitigation <u>would</u> be required."

Page 2-15

181 The discussion on this page referring to acquisition is confusing, and statements appear to be contradictory to plans presented in Table 2-3. Is a perpetual easement the first approach to <u>all</u> acquisitions? That impression is created by the narration, yet that is not what is said in Table 2-3 or in the narrative on Page 2-14. The Division recommends fee title acquisition for any/all properties acquired which may be managed for fish and wildlife purposes by the Division.

Paragraph 2 - Granted there will be no relocation of families and others, but acquisition of conservation easements could limit future development.

Page 2-18

182 See comments above about "Stream channel modifications." Until the channel becomes useful habitat, however long that will be, this mitigation does not contribute to the Lower Gooseberry Reservoir fisheries.

183 Flushing flows... We would rather see the term "channel maintenance" be changed to "habitat enhancement." This would leave the door open for more possible uses of the water than "flushing flows." Winter flows may be a better use of this water than the flushing flows. There may be other uses as well.

184 We need to make sure there is a bypass feature provided on the dam outlet works so that the instream flow can always be provided, even during times when inspections or maintenance are needed. At one time, we discussed a separate outlet structure in order to deliver the 1 cfs. It seems this bypass structure could help meet that need.

Small Reservoir Plan

Page 2-21 lists several negatives with the smaller reservoir.
185 Year-round flows would not be available for the tributaries of Gooseberry Creek. Mitigation for spawning habitat wasn't identified because they could not take the Fairview Lake flows into the Gooseberry tributaries. There is still a need to mitigate for lost habitat whether it is done at these sites or not.

Page 2-24, Last paragraph.
186 It states that environmental commitments and measures are the same for both action alternatives. This is not true. See comments above re: spawning habitat mitigation.

Page 3-2
187 Does the second paragraph under the heading "Smaller Reservoir Plan" conflict with Page 2-21 where it states that restoration of flows in the two small tributaries would not be considered for the smaller reservoir plan. If there is no restoration of flows there will be no "aesthetic benefits."

Page 3-4
188 Regulated releases from Scofield may also be affected while the larger reservoir is filling. The State Engineer's Memorandum of Decision restricts the amount of trans-basin diversion that can occur the first year. In subsequent years, could the entire 5,400 acre feet be diverted? If so, the reservoir could take many years to fill. What is the annual storage amount allowed for this project?

189 Paragraph 3 states that "the [Cottonwood Creek] stream channel could widen by 2 to 5 percent." This is inconsistent with the study results (see Page 3-21, and Table 3-6 which indicate increases in channel width of 4 to 23 percent would occur). Upstream reaches could be affected by up to 73 percent increase in width if not for the pipeline to the confluence of Left Hand Fork.

Page 3-7, Paragraph 2
190 What would be the impact of an additional 1,800 acre feet be on three miles of the fishery in the San Pitch River? Could it constitute an enhancement?

Page 3-13

191 Other agencies besides just UDWR "believes that there are other factors" that are causing problems in Scofield. All of the reports done by the Division of Water Quality have identified additional water quality problems.

Page 3-16 and Page 3-17

192 The stream channel morphology of middle Gooseberry Creek is once again a problem. See previous comments for page 2-18. Paragraph 7 - See comments for page 2-10. According to Rosgen, structures must be compatible with stream type to be effective. We question if an attempt should be made to build structures until the results of several years of rest from grazing can be evaluated.

193 The diversions of the Mud Creek flows will help water quality but this is dependent on acquiring the wetlands. A different wetland area for purchase was identified. Originally it was suggested that the wetlands next to Scofield (south shore wetlands) be acquired. The south shore wetlands could have been used to develop this idea of diverting water and developing a natural filter. The proposal identified in this document will be a little more difficult. Fish migration will be an issue and design criteria.

194 The No Action Plan states that fish kills will continue 11 out of 33 years. However, the analyses for the Recommended Plan showed that "fish kill conditions" would occur 5 out of 33 years with the project, as opposed to 4 out of 33 years without. There is an apparent discrepancy here which should be clarified.

Page 3-21

195 Paragraph 3 - Bank destabilization in Cottonwood Creek should be monitored regularly. The sponsor should be required to rehabilitate badly eroded areas that can be attributed to the increased flows. Sufficient armoring below the outlet structure at the junction of Left Hand Fork could limit bank erosion.

Page 3-24

196 The discussion concerning water diversion from Brooks Canyon and Cabin Hollow Creeks is a surprise. We had the understanding that the Memorandum Decision precluded

diversion of Brooks Canyon and Cabin Hollow Creeks. Doing such a thing for instream flow use on Gooseberry Creek is akin to "robbing Peter to pay Paul." There would be substantial wetland losses on both streams also if this is proposed.

Page 3-33

197 We conducted another creel survey for Lower Gooseberry. If you need a copy of the new data, give Ken Phippen a call at 637-3310 in Price.

198 Paragraph 5 - A water management plan should be developed for the Narrows Reservoir to identify the cost associated with the development of a fishery. Can a cutthroat trout fishery be maintained with the fishing pressure that is anticipated? Will there be significant natural reproduction in the two tributary streams? Will rainbows be planted, and if so, how many? The Division currently has difficulty meeting stocking quotas for many popular streams and reservoirs.

Page 3-37

199 The last statement in the last paragraph is not supportable by data. If we are at a position of providing professional opinion, it is the Division's opinion that there will be significant impacts from this project feature. Lack of mitigation for this impact (see Table 3-12) is not acceptable. We cannot support an unmitigated impact to this resource.

Page 3-38

200 It is likely that Lower Gooseberry Reservoir will be impacted greatly by this project. There was a winter kill there last year. This is why the Division would also consider using the 300 acre-feet for winter instream flow rather than flushing flows.

201 We assume the loss of angler days at Scofield was calculated on the loss of surface acres. A problem with this estimation method was proved last year. Angling pressure was down considerably due to fewer fish (post-treatment population, which could be compared to a post-fish kill), low water levels kept people away because of ramp conditions and bag limit reductions. We suggest that improvements in water quality for Scofield is the most promising way to

reduce this impact. Hopefully the water quality mitigation for developing Mud Creek (if the Upper Fish Creek is purchased, the same type of program may be possible) will help Scofield and meet the mitigation needs.

202 We conducted an angler survey in 1992 at Scofield. Angling pressure was down to approximately 38,921 hours compared to 303,200 in 1986. This was due to all of those factors that were mentioned above as well as the fact that in low water situations it is difficult to fish the lake from shore. Large mudflats are difficult to traverse. This will be true of the Narrows as well.

Page 3-38, Paragraph 6

203 See comments for Page 33-3

Page 3-40

204 & 205 From Table 3-12, it appears all of the impacts for Middle Gooseberry, Lower Gooseberry and Fish Creek are supposed to be mitigated in the 4 miles of stream identified for the Upper Gooseberry. This seems like inadequate mitigation. We have a complete loss of 1 mile for Upper Gooseberry Creek, 72 percent loss for 3.0 miles Middle Gooseberry Creek (which may actually be more if the habitat enhancement doesn't work), some loss in Lower Gooseberry Creek and a loss of fish. This is less than 1:1 mitigation and does not replace habitat but enhances existing habitat. Mitigation of this type should be higher than 1:1.

Monitoring plans need to be developed for all of these proposed mitigation proposals, including monitoring and compliance commitments.

As mentioned in our comments on page 3-37, lack of mitigation for impacts (see Table 3-12) is not acceptable. We cannot support an unmitigated impact to the aquatic resources.

Our recommendation is that all the impacts to the aquatic and wetland resources be mitigated. Included here are some suggestions for mitigation.

Cottonwood Creek-This impact had previously been unmitigated in the draft EIS for the project. The Division recommends this impact be fully mitigated as a project commitment. We

have prioritized several stream/riparian corridors slightly outside of the Narrows Project area, whose acquisition may partially compensate for the 4.9 miles of trout fishery loss in Cottonwood Creek, a Class 3 quality stream. Acquisition of one or two longer contiguous reaches of stream corridor, by fee title or by conservation easement, would be preferable over to acquiring several isolated reaches from two or more of the identified streams. The following priorities are recommended:

1. Thistle Creek, from the confluence of Soldier Creek, upstream to the confluence of Nebo Creek, is a Class 3 quality stream. It supports a viable brown trout population. A short reach of the stream is currently stocked with catchable-size rainbow trout. There are also cutthroat trout in the stream, but they are lesser in abundance. Most of the stream is on private land (6.1 miles private). This stream presently has habitat and fish populations similar to Cottonwood Creek. Fee title ownership or a conservation easement along the riparian corridor at a ratio of 2:1 would allow public access to the stream, and ensure future maintenance of the stream and riparian habitat. (Location of area: Thistle Creek, from the confluence of Soldier Creek, upstream to the confluence of Nebo Creek, is located in the following sections: Sec. 32 of T9S, R4E; Sec. 5,7,8,25,26,35 of T10S, R4E; Sec. 13,24,25,26,35 of T10S, R3E; and Sec. 2 of T11S, R3E.)

2. Nebo Creek, from the Thistle Creek confluence, upstream to the Forest Service boundary (1.9 miles private ownership), is also a Class 3 quality stream, supporting brown trout, cutthroat trout and stocked rainbow trout. However, irrigation diversions and livestock grazing along the stream degrade the habitat available for fish on the private lands below the Forest Service boundary. This stream reach currently has the potential to support about half the fish biomass as Cottonwood Creek, but could be improved to about the same level. Fee title ownership or a conservation easement along this riparian corridor at a 2:1 ratio would permit public access to the stream and allow for improved riparian and stream habitat conditions. (Location of the area of Nebo Creek, from the Thistle Creek confluence, upstream to the Forest Service boundary, is located in the following sections: Sec. 2,10,11,15 of T11S, R3E.)

3. Thistle Creek, from the Nebo Creek confluence, to its headwaters up to the Utah-Sanpete County line (7.5 miles private) is a Class 4 water and is marginal habitat for brown trout. It does, however, support the sensitive species leatherside chub. It would be desirable for those reaches of the stream which are adjacent to Division property to be acquired in fee-title. A conservation easement to protect the wet meadow and riparian area for leatherside chub habitat would also be desirable. However, replacement for the loss of a Class 3 quality trout-producing stream by this reach of Class 4 quality stream would require a 3:1 ratio to be acceptable. (Location of the area of Thistle Creek, from the Nebo Creek confluence, to its headwaters up to the Utah-Sanpete County line, is located in the following sections: Sec. 2,11,12,13,24 of T11S, R3E; Sec. 18,19,30,31,32 of T11S, R4E.)

Gooseberry Creek--The Division similarly recommends several stream reaches for consideration for acquisition of stream/riparian corridors for partial mitigation of the impacts to Gooseberry Creek. These stream sections should be considered in addition to the other sections mentioned in the document. We believe that a replacement ratio of 1:1 as proposed by the project sponsor in the draft EIS is not adequate. Because of the complete loss of stream habitat, we recommend that mitigation occur at a 3:1 ratio. This recommendation is based on the fact that any enhancement or protection strategy will still be a net loss of stream habitat. Potential strategies for mitigation include acquisition for protection, acquisition for enhancement, conservation easements for enhancement, conservation easements for protection, enhancement of USFS property and enhancement of DWR property. The Narrows mitigation will probably include several of these strategies.

The project should first attempt to achieve mitigation by attempting to block new acquisitions with existing Division or Forest Service properties, or with the wetlands mitigation proposal. To help mitigate impacts to Scofield Reservoir, we recommend consideration of mitigation options which would occur in the Scofield drainage.

1. Acquisition of segments of Mud Creek or Winter Quarters could complement the wetland mitigation proposal.

2. Lower Fish Creek acquisition would tie in with the state land section proposed for fish and wildlife mitigation and would tie in with the long range goals of managing Lower Fish Creek.

3. Pondtown Creek is a tributary to Scofield Reservoir. Acquisition and enhancement would help water quality for Scofield and provide spawning habitat for reservoir fish.

With each of these alternative acquisition projects, we recommend funds be provided for enhancement activities. These might include vegetation work, stream channel protection and possibly instream projects, with emphasis being on natural recovery of the areas. Fencing may be needed for these projects, with costs approximately $13,000 per mile for installed wire fence.

Page 3-41, Paragraph 3

206 As stated earlier, the damage caused by the trans-basin diversion should be monitored. Where possible, erosion control measures should be undertaken to minimize the damage to the drainage.

Page 3-42, Table 3-13

207 The Impacts to Reservoir fisheries under Narrows Reservoir is stated as resulting in mitigation commitment of 13,700 angler days use. On page 3-72, it states the smaller reservoir plan will include 8,200 days spent on fishing. Is this a discrepancy?

Page 3-48

208 It is estimated the sediment load in Gooseberry Creek downstream from the Reservoir would be reduced by 400 tons per year. Is this load going into the reservoir? What is the life of the reservoir? What kind of maintenance/disturbance will be necessary and how often?

Page 3-50

209 Table 3-13 shows toxicity data for selenium. The measured quantities at several stations were 0.2 ppm. This concentration converts to 200 ug/l. The National Academy of Science criteria cited in the table is 20 ug/l. This indicates there is in fact a potential selenium toxicity problem. We suggest this data be reviewed to see if it is accurate.

Page 3-54

210 In the first paragraph, cattle grazing should be included with the sheep grazing.

Page 3-58 and 3-59

211 This area is strictly deer summer range and has never been considered winter range. The document implies that this is poor mule deer habitat because it is poor winter range. This is not true. This is excellent summer range and areas surrounding the reservoir basin and aspen forest are critical in summer because of fawning. This is only a small piece of the herd's "habitat" and should not be expected to have all habitat needs or components. It was inappropriate to apply the model to such a small geographical area.

For the record, it should be noted that the technical team advised against using the HSI model for mule deer because it was generated for deer winter range. The site is used by deer during the summer and fall but never during the winter. Excessive snow depths force them to winter a couple of thousand feet lower in the pinyon-juniper and mountain brush zone above the San Pitch Valley.

212 It should also be noted more strongly that the Brewer's sparrow was used because of the vegetative community it represented, not for the species. In conversations, it was felt that the Brewer's sparrow would reflect summer range needs for deer, elk and other species, as well as the sparrow.

Page 3-60

213 This is where it states that it would take two years to fill the reservoir. First paragraph of the Wildlife section states this. (See comments for page 3-4.)

214 There should be some mention of revegetating the areas temporarily disturbed by the placement of the diversion pipelines. There should be revegetation with a mixture that reflects the existing plant community -grasses, forbs, shrubs.

Page 3-63

215 We continue to question the watershed and range improvement project. Will there be a management plan for this area? What changes will be identified for grazing the area?

Before this is accepted as mitigation, a plan identifying expected results, locations, management and seeding prescriptions must be developed and reviewed.

Misspelling of deer as "dear."

216 The Lower Fish Creek acquisition will provide both summer and winter range. This depends on which side of the canyon they acquire. South facing slopes provide winter range in early winter and mild winters.

217 Paragraph 1 - How will conservation easements protect habitat around the reservoir? What rights are going to be purchased by the sponsor? What is meant by the sentence, "This measure would serve to protect wildlife values adjacent to the reservoir and prevent impacts that would occur if the land were developed." County zoning ordinances can change over time, so there is no guarantee that the 10 acre lot minimum will last forever. A conservation easement could permanently limit development to 10-acre lots, or preclude the possibility of any development. It could require that no fences are constructed, and no vegetation is destroyed. The restrictions that will be sought through the purchase of conservation easements need to be clarified.

218 Paragraph 2 - Should the proposals for upland wildlife mitigation be prioritized? What is the target date for achieving full mitigation? That becomes a critical date because no additional mitigation will be required prior to that date if monitoring shows that the standards are not achieved.

Page 3-64

219 Under the discussion on bald eagles, there should be mention of the importance of riparian areas and large roosting trees. These two elements may be more related to this project in the lower reaches than the state and federal properties statement.

Page 3-72

220 Paragraph 1 - Major changes in land use should be anticipated. Local realtors should be consulted to assess the likelihood of an increase in construction, given the proximity of the lots to a reservoir.

221 Paragraph 4 - To the contrary, land use impacts were to be mitigated through the purchase of conservation easements.

Page 3-73

222 If the shoreline of the reservoir is privately owned, how will the sponsor guarantee public access for fishing?

223 The visitor-day information for Scofield and Joe's Valley is questionable. Scofield is a higher use area than Joe's Valley. They are both high-use areas; we question why Joe's Valley is higher. Our fisheries biologist in the Southeastern Region guesses data from the post-treatment years was used for Scofield user days. This would characterize Scofield at a much lower use level than it really is. Note discussion for page 3-38 where the magnitude of difference that the creel surveys showed in 1986 compared to 1992 is discussed.

Page 3-74

224 Did we say the Narrows Reservoir would be an excellent fisheries? The success of the fishery will depend on a variety of factors. Productivity will be one big question and is addressed above.

We have already commented on the lost recreational days at Scofield. This is a more complex question than calculating losses due to reduced surface; social issues, management practices, access and other issues discussed have an impact on use levels.

225 The Small Reservoir may not be a great fishing reservoir due to low productivity, based on the assumption of a small littoral area.

Page 3-79

226 Paragraph 4 - How often is a third crop harvested now? It's our understanding that the third crop is sometimes lost due to frost, in which case, additional water would do the farmer no good.

Page 5-2 and 5-3

227 We (John Fairchild, Ken Phippen, Mark Holden, Catherine Quinn) do not consider ourselves as preparers of this document. Franson-Noble & Associates and the BOR should be listed under "Preparers." We feel the rest of us should be listed as members of a technical advisory team.

Attachment A, Environmental Commitments

228 In several cases, the Environmental Commitments made in Attachment A lack specific numbers, such as amounts of instream flows in tributaries from Fairview Lakes to the proposed reservoir, lengths of stream/riparian corridor to be acquired, and others. Most of the specifics are listed in the text portions of the document. It is our belief that the Environmental Commitments section should be as specific as possible; in those cases where future planning must occur to define a mitigation feature more precisely, then lead agency and timetables for compliance should be identified. There should be no open-ended statements in this section of the EIS.

We appreciate the opportunity to comment on this draft EIS.

Sincerely,

Robert G. Valentine
Director

RDCC\APR94\20

161. Project Purpose and Need

The Sponsor disagrees with the comment that the purpose of the project is to "prove up" on a water right. The water right is merely a means of accomplishing the true purpose and need as stated in Chapter 1 of the EIS.

162. Recreation Needs

The requested information has been added to the Project Needs, Recreation Opportunities section of Chapter 1 rather than on page S-1 which contains only summary information.

163. Quality of Fishery in Narrows Reservoir

The EIS has been revised to delete the term "excellent fishery."

164. Littoral Area

The concern seems to be that the smaller reservoir would have a smaller littoral area. The recommended plan is the larger reservoir and as such would have a larger littoral area than the smaller reservoir alternative. No change to the EIS is planned as a result of this comment.

165. Smaller Reservoir Angler Days

As discussed in Chapter 3 of the EIS, annual angler day benefits were assumed to be 30 trips per surface acre which is the fishing pressure Scofield Reservoir had in 1986. We believe that this is a conservative estimate as other lakes in the region have been report to support as many as 75 trips per surface acre per year. We believe that both the larger and smaller Narrows Reservoirs would be able to support at lease 30 angler trips per acre per year. However, when checking the expected annual angler trips shown on Table S-2 and Table 2-5 with the number discussed in the text, the number of angler trips that are expected to be created with the smaller reservoir is 7,200 not 8,200 as reported. This typo has been corrected.

Normally larger reservoirs are less productive than smaller reservoirs because the littoral zone of the larger reservoir usually represents a smaller percentage of the total surface area. In response to the comment, the Sponsor compared the ratio of littoral area (area with water depth of 10 feet or less) to surface area for both the large and small reservoirs. For the larger reservoir there is 3.9 surface acres for each acre within the littoral zone, whereas for the smaller reservoir there is 2.7 surface acres for each acre within the littoral zone. This comparison suggests that on a per acre basis the smaller reservoir would be more productive than the larger reservoir. Therefore, the Sponsor believes the analysis and conclusions presented in the EIS are a correct and conservative presentation of expected benefits that would be realized with the smaller reservoir.

166. Stream Miles Affected by Smaller Reservoir

The number of stream miles affected by the smaller reservoir shown in Table S-2 was in error. The number has been revised to 25.8 miles. The EIS has been revised to include mitigation for spawning/rearing habitat in the Smaller Reservoir Plan.

167. Smaller Reservoir Productivity

The Sponsor disagrees with this comment and as discussed in the previous response, it is expected that the smaller reservoir would be as productive on a per acre basis as the larger reservoir and possibly even more productive.

168. Need for Recreation and Fishery

Please refer to the response to comment 162.

169. Need for Fishing

Please refer to the response to comment 162.

170. Conservation Measures

No on-farm conservation measures would be implemented under the Narrows Project. Therefore, there are no project impacts to address. The conservation measures described in Chapter 2 of the EIS have already been implemented independently of the project and are part of the future without project condition.

171. Fish and Wildlife Measures

An average annual water supply of about 1,850 acre-feet per year is available from Fairview Lakes. This amounts to an average flow of 1.3 cfs per channel. No other water is available to increase these flows. Chapter 2 of the EIS has been revised to include this flow level.

172. Upland Habitat Mitigation

Chapter 2 of the EIS has been revised to read "Mitigation and enhancement of upland habitat . . . would be provided in the following ways:"

173. Monitoring Program

Chapter 2 of the EIS has been revised to indicate that a monitoring and maintenance program would be established to ensure the effectiveness of fishery mitigation measures.

174. Middle Gooseberry Creek Channel Modification

Chapter 2 of the EIS has been revised to delete references to placement of boulders as a means of narrowing the stream channel. The text now indicates that stream

channel modifications would be developed by the Sponsor with coordination with the FS, the FWS, the COE, the UDWR, and the Utah Division of Water Rights.

175. Additional Releases to Gooseberry Creek

Chapter 2 of the EIS has been revised to indicate that an average of 300 acre-feet of additional water would be made available for release to Gooseberry Creek. This water could be used for fish habitat or flushing flows. The Sponsor in cooperation with the UDWR would determine the timing and quantity of water to be released each year.

176. Management of Mitigation Areas

Table 2-2 of the EIS has been revised to reflect the recommendations contained in the Fish and Wildlife Coordination Act Report. The table now shows proposed managing agencies for each mitigation area. A discussion of funding of operation and maintenance has also been added to the text.

177. Wetland Mitigation

Chapter 3, Vegetation of the EIS has been revised to indicate that the affected wetlands in the reservoir basin occur in a dendritic pattern in the riparian zones along small drainages. Chapter 3, Wetlands has been revised to indicate that the proposed wetland mitigation areas are in-kind and that a detailed mitigation plan would be developed in conjunction with the Section 404 permitting process.

178. Wildlife Mitigation and Monitoring

The wildlife mitigation measures described in Chapter 2 are reflected in Attachment A, Environmental Commitments. Commitments by the Sponsor to monitor aquatic mitigation features have been added to Chapter 2 and Attachment A. Attachment A has been revised to reflect the recommendation of the Fish and Wildlife Coordination Act Report..

179. Range Improvements

Chapter 3, Upland Wildlife Habitat of the EIS indicates that the Sponsor would supplement "the FS's seed mixture with other species to provide biodiversity and to improve habitat for impacted species. Seeds that could be added to the mixture included big sagebrush and a variety of forbs."

180. Additional Mitigation

Chapter 2 of the EIS has been revised as suggested.

181. Acquisition of Mitigation Lands

Chapter 2 of the EIS has been revised to read: "The acquisition of private lands required for fish and wildlife mitigation would be primarily by fee title. The

conservation area adjacent to the reservoir would be created through conservation easements. These lands would be administered . . . ."

182. Stream Channel Modifications

Chapter 2 of the EIS has been revised to indicate that it may take 1 or 2 years for useful habitat to develop within the modified channel.

183. Flushing Flows

Please refer to the response to comment 175.

184. Bypass Feature

Preliminary designs for the dam call for separate low flow outlets at three different levels within the reservoir. These outlets would have their own gates and would be able to deliver up to a 10 cfs release even when the main outlet is being inspected or maintained. Chapter 2 of the EIS has been revised to describe this feature.

185. Spawning Habitat Mitigation for Smaller Reservoir

Chapter 2 of the EIS has been revised to include additional fishery mitigation for lost spawning habitat under the Smaller Reservoir Plan.

186. Environmental Commitments

Chapter 2 of the EIS has been revised to reflect the differences in mitigation measures.

187. Restoration of Flows - Smaller Reservoir Plan

Yes, the second paragraph was in conflict and has been deleted.

188. Larger Reservoir Filling

The larger reservoir is intended to provide long-term carryover storage. The reservoir could take as little as 2 years to fill completely during very wet years such as occurred in 1983 and 1984. It could take several years to fill during a drier period. In either case, under the water rights, up to 17,000 acre-feet could be stored in the reservoir in a single year. However, this amount would almost certainly be affected by the snowpack and the possibility of that much water being stored in a single year is very remote. During the 1960 through 1992 period of study, the largest inflow to the reservoir in a single year was 17,160 acre-feet, which occurred in 1983.

189. Cottonwood Creek Stream Channel Widening

Paragraph 3, Water Resources of the EIS has been revised to indicated that the channel could widen by 4 to 23 percent.

190. Possible Enhancement in San Pitch River

To date, the UDWR has not offered any enhancement credit for the increased flow in the San Pitch River. This credit is not identified in the Fish and Wildlife Coordination Act Report. However, the Sponsor would be happy to accept credit for enhancement of the San Pitch River.

191. Other Agencies Believe That There are Other Factors

This section of the EIS has been revised to remove reference to UDWR.

192. Middle Gooseberry Creek Stream Channel Morphology

Please refer to the response to comment 174.

193. Mud Creek Diversions

Chapters 2 and 3 of the EIS have been revised to describe additional measures to mitigate potential water quality impacts in Scofield Reservoir. This water quality mitigation would occur in conjunction with fishery mitigation.

194. Fish Kills

The reference in Chapter 3 to the No Action Plan refers to 11 years out of 33 that historically experienced fish kills. The Recommended Plan description refers to a condition when the flushing rate is less than 0.85. This condition would occur 5 out of 33 years instead of 4 out of 33 years without the project.

195. Continuous Monitoring of Cottonwood Creek Stability

The Project Sponsor is mitigating for increased flows in Cottonwood Creek. All anticipated problems are being mitigated. At this time, no problems associated with minimal widening of the channel have been identified.

196. Diversions from Brooks Canyon and Cabin Hollow Creeks

The Memorandum of Decision provides for diversions from Brooks Canyon and Cabin Hollow Creeks for fish and wildlife measures. However, no such diversions are included in any of the alternative plans.

197. Lower Gooseberry Creel Survey

The fisheries section of Chapter 3 of the EIS has been revised to include the creel survey provided by the UDWR.

198. Narrows Reservoir Management Plan

Please refer to the response to comment 45.

199. Lower Cottonwood Creek Fishery Impacts

The EIS has been revised to delete the statement in question. The fishery mitigation plan has been revised to include mitigation for impacts on lower Cottonwood Creek.

200. Winter Release to Lower Gooseberry Reservoir

If the UDWR believes that this is the best use of the 300 acre-feet, the Sponsor is supportive of using it for winter instream flow. The potential for using the water for this purpose has been described in the EIS.

201. Scofield Reservoir Lost Angler Days

As indicated in the comment, there are many factors attributable to the reduction in angler days in 1992. The Sponsor anticipates that the proposed mitigation measures would help solve fish kill problems in Scofield Reservoir.

202. Scofield Reservoir Lost Angler Days.

Please refer to the response to comment 201.

203. Lower Gooseberry Reservoir Creel Survey and Narrows Reservoir Management Plan

Please refer to the response to comment 198.

204. Fishery Mitigation Measures

Fishery mitigation measures have been revised according to the recommendations contained in the Fish and Wildlife Coordination Act Report.

205. Suggested Mitigation Measures for Cottonwood Creek Impacts

Please refer to the response to comment 204.

206. Damage to the Cottonwood Drainage

The comment assumes that minimal widening associated with increase channel flows would result in damage to the drainage. Equating widening with damage is inaccurate. All "possible" measures are being taken to mitigate excessive flows that might cause significant damage. The principal measure would be the construction of the Upper Cottonwood Pipeline.

207. Table 3-13

The text in Chapter 3 of the EIS now indicates that the Smaller Reservoir Plan would provide only 7,200 angler-days at Narrows Reservoir.

208. Sediment Load into Narrows Reservoir

Please refer to the response to comment 90.

209. Table 3-14, Toxicity Data for Selenium

The National Academy of Science criteria for selenium is a water quality standard and therefore does not apply to the results of the soil samples analysis. The footnotes on the trace elements table (Table 3-14) have been revised to show the mean concentrations and common range for these trace elements in western soils. The arsenic, mercury, and selenium measured within the project area are well within the common range for the western soils. An analysis of the water quality data in this same section indicates the same trace elements are present in low concentrations which should not be a concern.

210. Cattle Grazing

This paragraph has been modified to include cattle grazing.

211. Deer Summer Range

Chapter 3 of the EIS has been revised as suggested.

212. Brewer's Sparrow

Chapter 3 of the EIS has been revised as suggested.

213. Initial Reservoir Filling

As indicated in the response to comment 188, the 2-year filling would only occur if there were 2 successive very wet years. The period of 2 years was used to describe the worst-case situation of how long it would take to develop the full project impact due to inundation.

214. Revegetation of Pipeline Alignments

Chapter 3 of the EIS has been revised to describe revegetation of the pipeline alignments. Revegetation would be accomplished with a mixture of grasses, forbs, and shrubs that reflects the existing plant community.

215. Watershed and Range Improvement Project

This measure was included in the project plan to provide some wildlife mitigation within the National Forest. Other than providing additional seeds for the revegetation, the Sponsor commits to no other monitoring or management associated with this measure. Acquisition of the property on lower Fish Creek is intended to provide mitigation for terrestrial wildlife.

216. Lower Fish Creek Acquisition

The suggested revisions have been made to Chapter 3 of the EIS.

217. Conservation Easements

Chapter 2 of the EIS describes in more detail the proposed conservation easements. The exact language of the easements would be coordinated with the UDWR and the FS before they are acquired.

218. Upland Wildlife Mitigation

As indicated in the response to comment 172, all of these mitigation measures would be implemented. Therefore, no prioritization is needed.

219. Bald Eagles

Chapter 3 of the EIS has been revised to mention the importance of riparian areas and large roosting trees for the bald eagle.

220. Major Changes in Land Use

The Sponsor does not anticipate major changes in land use. The county would want to maintain the zoning restriction of one dwelling per 10 acres in order to protect the water quality in the reservoir.

221. Land Use Impacts

The purpose of the conservation easements adjacent to the reservoir is to avoid impacts to wildlife and not to mitigate changes in land use.

222. Access for Fishing

Over half of the reservoir shoreline is on National Forest System land.

223. Recreation Use at Joes Valley and Scofield Reservoirs

As indicated in the footnote for Table 3-26, the recreation use data is based on Reclamation recreation use reports for 1982 through 1990. Joes Valley Reservoir has better public access than Scofield, which is surrounded mostly by private land. The data is not related to the treatment of Scofield Reservoir.

224. Narrows Reservoir Fishery

Please refer to the response to comment 163.

225. Smaller Reservoir Fishery

The Sponsor disagrees with this statement as the smaller reservoir would have a higher portion of littoral zone to surface area than the larger reservoir. Therefore, the productivity of the smaller reservoir should be as good, if not better, than the larger reservoir. Please refer to the response to comment 165.

226. Third Crop of Alfalfa

According to the Agriculture Stabilization and Conservation Service (ASCS) Manti Office, a third crop of alfalfa is harvested approximately 1 out of every 5 years. During most years the majority of the project water supply would be delivered from July through September which would increase the yield of the second crop of alfalfa and allow in many years a third crop. These increased crop yield would occur prior to killing frosts.

227. List of Preparers

The names of John Fairchild, Ken Phippen, Mark Holden, and Catherine Quinn have been removed from our list of preparers. Agencies participating on the technical advisory team have been identified but individuals have not been named.

228. Environmental Commitments

The environmental commitments have been revised to describe in more detail the mitigation and other environmental measures.

State of Utah
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF WATER RIGHTS

Michael O. Leavitt
Governor
Ted Stewart
Executive Director
Robert L. Morgan
State Engineer

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April 26, 1994

Charles A. Calhoun, Regional Director
Bureau of Reclamation
Upper Colorado River Regional Office
PO Box 11568
Salt Lake City, Utah 84147

Dear Mr. Calhoun:

We have reviewed the draft Environmental Impact Statement for the Narrows Project, Utah, and offer the following comments. In general, we believe there are not any significant water right issues that remain unresolved with the project.

SPECIFIC COMMENTS:

229 Page 1-3, paragraph 4, line 3 - Delete the word "decree" and insert the word "Engineer" after the word "State".

Page 1-3, paragraph 4, lines 8 and 9 - The Price River Water Users' Association subordinated their water rights as a result of the 1984 agreement. This subordination does not affect all water users on the Price River; rather, just those parties who signed the 1984 agreement. The Price River Water Users' Association also received additional storage rights in Scofield Reservoir under the agreement.

Page 1-3, paragraph 4, line 11 - It is suggested that the words "as between the parties" be inserted after the word "Creek".

GENERAL COMMENTS:

230 1) One of the mitigation measures that is proposed is to release water from Fairview Lakes into the downstream tributaries of Gooseberry Creek on a year-round basis. The water right on Fairview Lakes for the Cottonwood-Gooseberry Irrigation Company is 3,020 acre-feet. Sixty-seven acre-feet of this water has been dedicated to the summer home development at Fairview Lakes. As a result, 2,953 acre-feet of water would be available for release and diversion through the tunnel. To accomplish this, a change application on the Fairview Lakes water right would be required.

231 2) Because wetlands are part of the project, a Corps Permit should be used for all alteration sites. This would include the dam site, the work on the middle section of Gooseberry Creek and the flume installation below the dam. (Reference pages 2/4, 2-10, and 2-17).

3) Will additional water rights be required for the enlargement and replacement of wetlands adjacent to the Narrows Reservoir? If so, will it come from Fairview Lakes' right, or will it be part of the 5,400 acre-feet, or will another right be used? (Reference page 2-12). The proposed Scofield mitigation site will not require additional water rights. If the land is purchased, the water right should also be purchased.

232

4) A water right will need to abe filed for the campground and any other associated uses. (Reference page 2-6).

233

If funding for the project is made available, we can assist the sponsor and their engineer in filing any necessary applications. We appreciate the opportunity to review and comment on the draft EIS. Should you have any questions concerning these comments, please contact me.

Sincerely,

Robert L. Morgan

Robert L. Morgan, P.E.
State Engineer

RLM:nj

pc: Mark Page
Kirk Forbush
Howard Rigtrup
GOPB

229. Editorial Comments

Suggestions under Comment 1 have been accommodated in Chapter 1 of the EIS.

230. Year-round Release of Fairview Lakes Water

It is recognized that there may need to be some water rights considerations for storing Fairview Lakes water in Narrows Reservoir. However, the State has been inconsistent in enforcing or requiring change applications for releases of stored water when it relates to the coordinated operations of multiple reservoirs. When the EIS is finalized and approved, the issues related to possible new water rights would be addressed and discussed with the State.

231. Corps Permits

The Sponsor recognizes that 404 Permits would be required before construction and is prepared to file applications for those permits. Some would be filed before approval of the EIS and some following its approval. These permits are described in Chapter 2 of the EIS. The Sponsor appreciates the State pointing out the possible need for permitting for stream habitat improvement work on Middle Gooseberry Creek.

232. Wetlands Water Rights near Narrows Reservoir

If the chosen wetlands mitigation measure includes creation of new wetlands adjacent to Narrows Reservoir, water rights provisions may be necessary. However, since these wetlands are in replacement of naturally occurring wetlands within the reservoir site, the consumptive use should approximate that of the natural wetlands, which have no associated water rights. For this reason, the need for and magnitude of water rights dedicated for these wetlands would need to be negotiated with the State once the EIS receives approval.

Irrigation water associated with the lands for the Scofield mitigation site would be purchased with the land.

233. Water Rights for the Campground

The Sponsor would acquire a water right for municipal water supplies for the campground.

ORIGINAL

LOU COLOSIMO
Mayor
NICK SAMPINOS
City Attorney
VERNON W. JONES
Administrative Assistant
JOANNE LESSAR
City Recorder
PAT LARSEN
Finance Director
KATHRYN M. BURNHAM
City Treasurer

PRICE MUNICIPAL CORPORATION

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CITY COUNCIL
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THERESSA FRANDSEN
JANET OLIVETO
ROY A. NIKAS

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March 31, 1994

REGIONAL DIRECTOR
Bureau of Reclamation
125 South State Street
P.O. Box 11568
Salt Lake City, Utah 84147

Narrows EIS Comment

RE: Public Hearing Comments
PROPOSED NARROWS PROJECT
Draft Environmental Impact Statement
November 1993

Dear Sirs,

I am following up to the Public Hearing held on Wednesday, March 30, 1994, Carbon County Court House, Price, Utah. My name is Gary Sonntag. I am the Price City Engineer, Price, Utah.

Past history has shown that there have been many wet and dry cycles across the state. These cycles have certainly affected Price City and the Price River drainage.

I came to the Price area in 1978 near the end of a dry cycle. In recent years I experienced another dry cycle, approximately 1989 to 1992. I participated in an inter-agency group to cope with the water shortages. This group met often over the space of four years to review water levels, reduced delivery rates and restricted outside watering. The dry cycle seemed to peak in 1992. The reservoir dropped to a critically low point in late summer of 1992. I was asked by the Carbon Water Conservancy District to review the lake elevation at the Old Dam breach and reservoir outlet where the water flow was becoming constricted.

We surveyed a profile from a point west of the Old Dam and went east to the reservoir outlet. A distance of approximately 1000 feet. The Old Dam and reservoir outlet were completely exposed. Attached is a topographical sketch, Exhibit 'A', that illustrates the Old Dam and present Scofield Dam and outlet.

P.O. BOX 893 / PRICE, UTAH 84501-0893 / PHONE (801) 637-5010

Many years ago after the present Scofield Dam was built the Old Dam was breached to allow water to flow through to the new outlet. Our survey determined that the channel though the Old Dam breach was allowing only 14 1/2 inches of water to pass. The channel bottom elevation was 7586.42. The water surface elevation was 7587.62.

The elevation at the bottom of the reservoir outlet grate is 7586. The depth of water above the bottom of the outlet grate was 1 foot 7 5/8 inches deep.

The lowest water surface elevation for the 1992 year was 7587.0. The reservoir at this time held 1102 acre feet of water.

Two major concerns developed at this time. Would the water drop lower? If it did would it clear the Old Dam breach and would it clear the outlet structure grate. For every tenth of a foot the water was dropping at this time, the reservoir was being reduced by approximately 118 acre feet.

Secondly, the outside temperature was dropping below 32° F.. Ice was beginning to form on the lake. The question was, would there be enough clearance beneath the ice for the water to past over the Old Dam breach to the outlet.

It was decided to excavate a larger channel through the Old Dam breach. After securing the necessary permits through the Army Corp of Engineers a channel was created to a depth of approximately 6 feet.

After this the next effort was to prevent the lake water from freezing around the outlet structure. This would cause damage from the ice lifting up the structure. An effort was made to install an electrical system and run electrical conduit and wiring down to the outlet. Heat tape was wrapped around the outside of the outlet and grates.

With those two improvements in place we hoped that the lake water level would not drop below the bottom of the outlet grate.

In the event the reservoir level dropped lower three additional measures were set in place and put on stand-by:

1. Install ridged pipe in the Old Dam breach in order to keep the channel open and 2. Large submersible pumps were secured that could be put into the lake and then pump water into the outlet and 3. Plans were being designed for a siphon to draw water up and into the outlet.

With tight restrictions put on reservoir releases, no outside watering allowed, irrigation water cut backs and a close watch on

water tank levels, we were able to pass through the crisis. We came perilously close to a real emergency.

The Narrows Project proposes to have a capacity of 17,000 acre feet (14,500 acre feet active capacity, 2,500 acre feet of dead storage). 5,400 acre feet would be diverted through the Narrows tunnel. 300 acre feet would be diverted back into Gooseberry Creek that flows into Scofield Reservoir.

If the Narrows had been in place in the summer of 1992, the Scofield Lake level would have dropped below the Outlet grate. It
234 would have been necessary to pump from the dead pool. The proposed Narrows project would cause significant fluctuations in the reservoir level and would only aggravate the already difficult affects of the dry cycles.

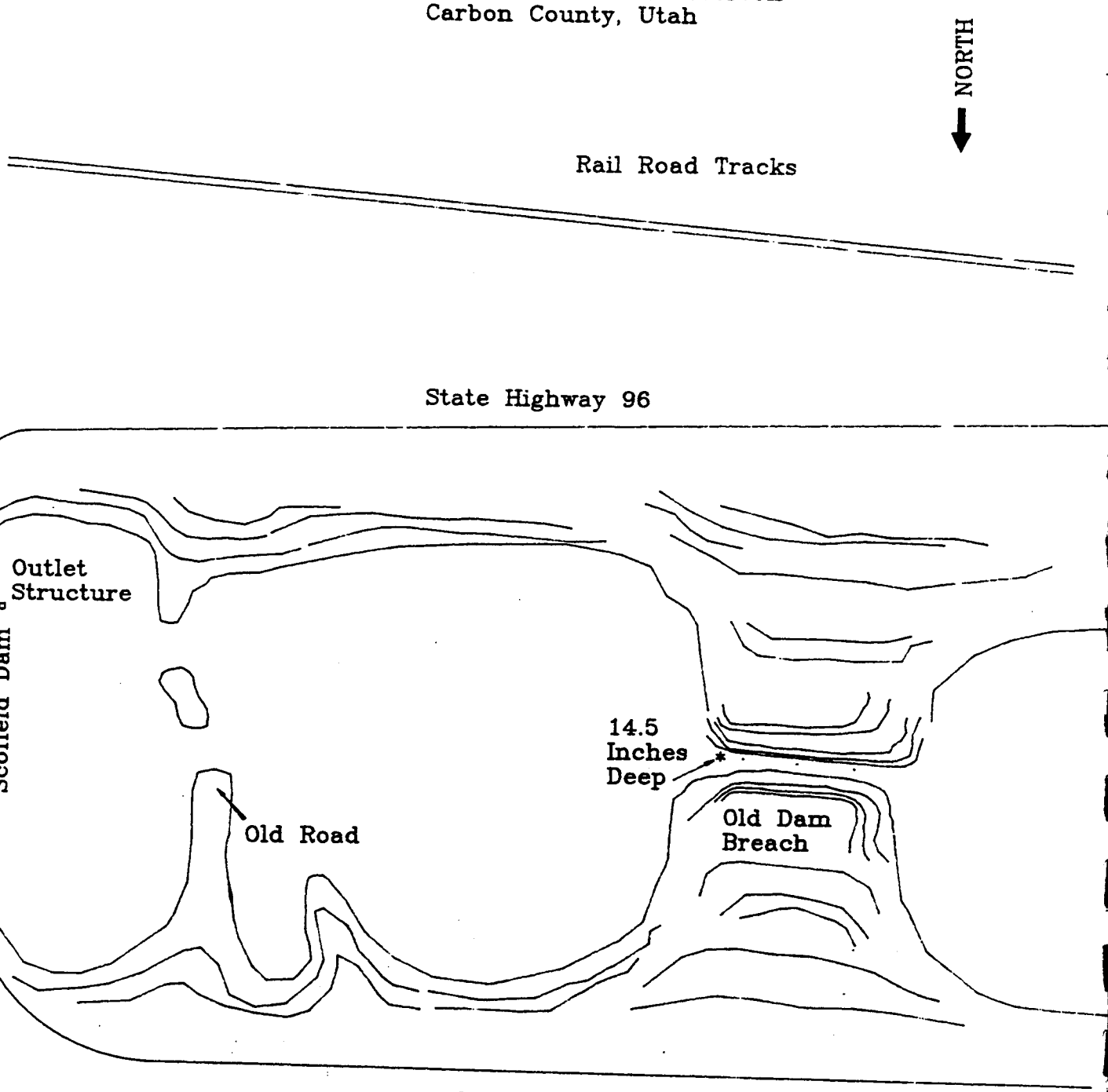
Thank you for the opportunity to make comments on this project.

Sincerely,
Price City Engineering Department

Gary D. Sonntag, P.E.
City Engineer

REGISTERED PROFESSIONAL ENGINEER
NO. 6510
GARY D.
SONNTAG
STATE OF UTAH

Scofield Dam and Reservoir
Carbon County, Utah



Note: The water level was low enough that these features could be clearly seen.

Topographical survey and sketch October 26, 1992	SITE PLAN Exhibit 'A'	Scofield Reservoir and Dam Section 10, T12S, R7E Carbon County, Utah

234. Pumping Below Outlet Grate

It is the Project Sponsor's understanding that there is a dedicated conservation pool of about 7,800 acre-feet in Scofield Reservoir for fish habitat. The UDWR owns the right to maintain that conservation pool. Therefore the water users would need to obtain permission from the UDWR before pumping from the conservation pool. It seems that the water users would want to implement a management plan for Scofield Reservoir so that in extreme drought years, such as 1992, releases from the reservoir would be prioritized. High priority uses, such as municipal and industrial water, could be given the highest priority. As the reservoir contents drop below a predetermined level, releases to lower priority uses could be cut back to ensure that there is enough water for the higher priority uses. This is standard procedure in many reservoirs throughout the State.

CARBON WATER COMMITTEE

P.O. Box 509
Helper, UT 84526

MEMBERS

Carbon Water Conservancy District

Price River Water Improvement District

Price City

Helper City

Wellington City

Carbon County Commission

Price River Distribution System

Carbon Canal Company

Utah Power

April 25, 1994

Regional Environmental Officer
Bureau of Reclamation
125 South State Street
P.O. Box 11568
Salt Lake City, UT 84147

RE: Written Comments on the Draft Environmental Impact Statement for the Gooseberry Narrows Project.

Dear Sir:

The following comments concerning the Draft Environmental Impact Statement (DEIS) for the Narrows Project are submitted on behalf of the Carbon Water Committee. We appreciate the opportunity to comment on the DEIS and hope that our comments are carefully considered.

The Carbon Water Committee is composed of the Carbon Water Conservancy District, the Price River Water Improvement District, Price City, Helper City, Wellington City, the Carbon County Commission, the Price River Distribution System, the Carbon Canal Company, and Utah Power & Light Company. We represent a broad spectrum of agricultural, municipal, and industrial interests and have several concerns about the potential environmental and socioeconomic impacts of the Narrows Project.

After careful review of the DEIS, we believe the DEIS is fundamentally flawed and does not comply with the goals and requirements of the National Environmental Policy Act or current Bureau of Reclamation policy. Even with the inadequacies described in our comments, however, it is apparent from the DEIS that the fiscal, environmental and socioeconomic costs of the proposed Narrows Project cannot be justified. The proposed Narrows Project would spend more than $16 million of public funds, significantly alter the natural flow and habitat of Gooseberry and Cottonwood Creeks and diminish the water available to established water users in the Price River system to provide only supplemental irrigation to produce a third crop of alfalfa in another watershed. Irretrievably committing significant financial and environmental resources to achieve such a limited objective would be

irresponsible. For these reasons, as more completely described in our comments, the Carbon Water Committee urges the Bureau of Reclamation to abandon further investment in the proposed Narrows Project.

The Carbon Water Committee's comments on the DEIS are presented in two sections. In the first section, the comments identify general regulatory and policy requirements that the DEIS fails to satisfy. The second section includes comments that address particular substantive inadequacies of or errors in the DEIS.

REGULATORY AND POLICY ISSUES

1. The DEIS fails to analyze reasonable alternatives to the Project. It fails to analyze the effects of water conservation measures as a reasonable alternative, and it inadequately discusses the alternatives it purports to have studied.

The goal of the National Environmental Policy Act (NEPA) is to ensure that federal agencies make informed decisions concerning proposed projects with significant impacts on the natural and human environment. Numerous federal decisions involving NEPA state that before an agency can make an informed decision concerning a proposed project, the agency must first take a hard look at the project. A crucial aspect of this hard look is the analysis of reasonable alternatives. This requirement is also emphasized by the federal regulations that implement NEPA. For example, 40 C.F.R. § 1502.14 states that the analysis of reasonable alternatives "is the heart of the environmental impact statement," and that agencies must "[r]igorously explore and objectively evaluate all reasonable alternatives" to a proposed project. See § 1502.14(a). The purpose of NEPA's requirement that agencies consider alternatives "is not merely to force the agency to reconsider its proposed action, but, more broadly, to inform Congress, other agencies, and the public about the environmental consequences of a certain action in order to spur all interested parties to rethink the wisdom of the action". Natural Resources Defense Council, Inc. v. Hodel, 865 F.2d 288 (D.C. Cir. 1988).

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The DEIS twice violates this fundamental requirement that a range of reasonable alternatives be considered. First, it fails to analyze the effect of water conservation measures as a reasonable alternative. Second, the DEIS inadequately discusses the alternatives it purports to analyze. These are serious flaws. They demonstrate that the agency has not taken a "hard look" at the Project, thus preventing the informed decision making required by NEPA.

Failure to analyze conservation measures.

The DEIS states that conservation measures were not studied as a reasonable alternative "because conservation would be an integral part of any project plan." DEIS 2-1. This explanation makes no sense, particularly in light of the present emphasis by the Bureau of Reclamation (the "Bureau") on the importance of water conservation in every water management program. For example, in its Strategic Plan dated June 1992, the Bureau states that conservation is a guiding principle in managing and developing water resources: "Water conservation is a key element in improving the use and management of the Nation's water resources to more effectively meet present and future needs." See Reclamation's Strategic Plan 5 (June 1992). Further, the Blueprint for Reform: The Commissioner's Plan for Reinventing Reclamation (November 1, 1993), states that the Bureau will emphasize "conservation and improvements in the efficiency of use of already developed water" and that "promoting conservation will be given priority in our program activities." See Blueprint 1, 2.

In light of these policies, the failure to study water conservation measures as a reasonable alternative in the DEIS is a critical flaw. In fact, the Council on Environmental Quality (the "CEQ"), which promulgated the regulations implementing NEPA, has indicated that this is the type of omission that warrants preparation of a supplemental EIS. In its guidance document on the NEPA regulations, the CEQ discusses different ways that an agency must respond to a comment on a draft EIS that raises a new alternative not previously considered in the draft EIS. Concerning this, the CEQ states in part:

> A fourth possibility is that a commentor points out an alternative which is not a variation of the proposal or of any alternative discussed in the draft impact statement, and is a reasonable alternative that warrants serious agency response. In such a case, the agency must issue a supplement to the draft EIS that discusses this new alternative. For example, a commentor on a draft EIS on a nuclear power plant might suggest that a reasonable alternative for meeting the projected need for power would be through peak load management and energy conservation programs. If the permitting agency has failed to consider that approach in the Draft EIS, and the approach cannot be dismissed by the agency as unreasonable, a supplement to the Draft EIS, which discusses that alternative, must be prepared.

(Emphasis added). See Council on Environmental Quality, Questions and Answers about the NEPA Regulations No. 29b (March 16, 1981). In this case, conservation measures clearly are not an unreasonable alternative. The DEIS states that conservation measures could reduce supplemental irrigation demand by 10,700 acre feet per year. DEIS at 2-1.

Thus, conservation measures alone would reduce supplemental irrigation demand by more than twice the annual quantity of supplemental irrigation water projected to be supplied by the proposed Narrows Project. The CEQ regulations discussed above clearly require the preparation of a supplement to the DEIS that describes and analyzes the use of water conservation measures as a reasonable alternative to the proposed Narrows Project.

Inadequate analysis of alternatives.

The DEIS states that 8 alternatives are presented in the DEIS, but acknowledges that only 3 of the 8 alternatives were studied in any detail. Five "non-viable alternatives were studied in less detail." DEIS at S-3. One of the 3 alternatives supposedly studied in detail is the "no action" alternative. Consequently, the DEIS actually examines only 2 alternatives, and the only difference between these alternatives involves the size of the reservoir that would be constructed.

The DEIS suggests that a reason why these two alternatives were the only ones analyzed in any detail is that there are no water rights designated for use under any of the five "non-viable" alternatives. For example, in discussing the Alternative Damsite Plan, the DEIS indicated that the alternative damsite would have been located upstream from the proposed Narrows Damsite, but that:

> conditions set forth in the 1984 Compromise Agreement dictate site location and storage capacity of the project reservoir. If those conditions are not met, a breach of contract would result and the water rights agreement would be null and void. . . . Because of these institutional constraints, there are no water rights for the Alternative Damsite Plan.

DEIS at S-7 to -8. See also DEIS at 2-25 ("if those conditions [in the 1984 Agreement] are not met, a breach of contract would result and water-rights relative to the project would be forfeited.").

However, the existence of a contract concerning water rights or between persons that may be affected by a project has no bearing on the plain legal requirement that reasonable alternatives must be studied in an EIS. The CEQ has emphasized that "reasonable alternatives include those that are practical or feasible from the technical and economic standpoint and using common sense, rather than simply desirable from the standpoint of the applicant." In addition, reasonable alternatives that are outside the legal jurisdiction of the lead agency must still be analyzed in an EIS. See Council on Environmental Quality, Questions and Answers about the NEPA Regulations No. 2b (March 16, 1981). See also § 1502.14(c) (the EIS must "include reasonable alternatives not within the jurisdiction of the

lead agency."). Consequently, the existence of the 1984 Agreement does not excuse the failure to study reasonable alternatives to the Project. The "non-viable" alternatives
237 dismissed at the onset of the DEIS should have been discussed in more than a conclusory manner.

As noted above, the range of alternatives to be identified and analyzed depends on the nature of the proposal. See Council on Environmental Quality, Questions and Answers about the NEPA Regulations No. 1b (March 16, 1981). The primary purpose of the Project is "to provide a supplemental irrigation water supply for presently irrigated lands in north Sanpete County." DEIS at 1-1. Thus, the DEIS should have identified and analyzed
238 alternatives that would satisfy that purpose. For example, the DEIS should have analyzed whether existing and presently undeveloped ground water in Sanpete County can be developed to supply the need for supplemental irrigation water. According to a USGS study, Sanpete County has ample undeveloped ground water supplies. See Ground-Water Hydrology of the San Pitch River Drainage Basin, Sanpete County, Utah (Geological survey Water-Supply Paper 1896). Consequently, this alternative to the proposed Narrows Project should have been fully considered. However, the DEIS dismisses this possibility even though it acknowledges that there is a large amount of available ground water in Sanpete County. It states that coefficients of transmissibility for the aquifer are quite low and that the Utah State Engineer considers the ground water in north Sanpete County to be fully appropriated. DEIS at S-9 and 2-27 to 2-28. However, only minimal discussion concerning coefficients of transmissibility is provided. Although transmissibility may significantly vary in different formations and areas, the DEIS assumes an average transmissibility for the entire area. Consequently, it fails to consider the possibility that areas of higher
239 transmissibility might provide viable sources of additional water. The DEIS also fails to
240 refer to documentation concerning the State Engineer's policy, or adequate discussion of what specific areas are covered by that policy.

The DEIS similarly fails to analyze the alternative of year-round releases from a dam that could be constructed in Sanpete County. It indicates that the main impact of such dam at the Milburn Damsite would be the complete or partial dewatering of approximately 40 miles of the San Pitch River below the dam. This alternative is summarily dismissed due to the potential dewatering, other environmental impacts, and related construction costs. However, these impacts and costs, and measures that could be taken to mitigate such impacts were not discussed. DEIS at S-8 and 2-26 to 2-27.

Another alternative considered "non-viable" in the DEIS was the use of water from the Central Utah Project ("CUP") to supply the needs of Sanpete County. Although CUP water will be used in the southern part of Sanpete County, the DEIS dismisses the use of CUP in northern part of County as too costly. However, it does not specify the costs of this

alternative. It also states that exchange agreements would not work but does not adequately discuss why not.

In summary, each of the "non-viable" alternatives is dismissed based on conclusory statements that afford the reader and the Bureau no substantive information on which to compare the alternative with the proposed action. The result is a DEIS that fails to heed the mandate that all practical and feasible alternatives be rigorously considered.

The proposed Narrows Project is estimated to cost approximately $ 16.1 million, and will not result in any new land being placed in production. Further, it is a transbasin diversion that will have widespread environmental and socioeconomic impacts. Z41 Consequently, the failure to adequately identify and analyze these or other reasonable alternatives to the Project is a critical flaw in the DEIS.

2. The DEIS does not adequately describe a need for the Narrows Project.

The CEQ regulations require that each EIS briefly specify the need for the proposed project and reasonable alternatives that the agency is analyzing. See 40 C.F.R. § 1502.13. Concerning this requirement, the Bureau's own handbook on implementing NEPA states in part:

> This section [of the EIS] should briefly describe why the action is needed and what the action is designed to accomplish. It should provide a brief history leading to current conditions and anticipated future conditions. . . . Care must be taken to ensure an objective presentation and not a justification.

See United States Department of Interior, Bureau of Reclamation, National Environmental Policy Act Handbook § 4-9 (October 1990). The DEIS fails to comply with this requirement. It does not provide an "objective presentation" of the need for the Narrows Project. Instead, the DEIS merely recites a list of undocumented reasons why the Narrows Project should proceed.

In an introductory section entitled "Project Purpose and Need," the DEIS states that the Narrows Project is a multiple purpose water project intended to satisfy the need for supplemental irrigation water and municipal water in Sanpete County, and general needs for outdoor recreation facilities. Rather than identifying alternative actions that might satisfy these needs, the DEIS focuses exclusively on construction of a big dam or alternatively a small dam. Contrary to the direction of the CEQ regulations and the

Bureau's own guidance, the summary of the purpose and need is not an objective presentation, but rather a justification for construction of the Narrows Dam.

242 This situation is demonstrated by the failure of the DEIS to document the package of needs identified. The need for municipal water is supported only by statements that irrigation shortages cause persons in small towns in Sanpete County to water their lawns with municipal water supplies. Similarly, the recreation needs claimed to be satisfied by the Narrows Project are not adequately documented or discussed.

For example, the DEIS states that there is a shortage of outdoor recreation facilities near the project area and along the Wasatch Front. Further, the existing recreation facilities, "including campgrounds, boat ramps, and reservoirs are overcrowded and inadequate" and that the recreation facilities created by the Narrows Project" are expected to draw heavy use from not only Sanpete, Carbon, and Emery Counties, but also from the
243 Provo/Orem and metropolitan Salt Lake City areas." DEIS at S-1. However, the DEIS does not refer to any data to support these conclusions.

244 Moreover, the DEIS fails to identify and consider a multitude of alternative projects that may serve the recreational needs of this extensive geographical area. For example, construction of the Jordanelle Dam will provide significant water-based recreational facilities that are much more convenient to Wasatch Front communities than the proposed Narrows Project. If a recreational need exists, the DEIS should examine a range of reasonable alternatives that would satisfy this need. As drafted, the DEIS simply tries to make the case for the proposed Narrows Project by asserting that it will provide recreational opportunities.

Other statements in the DEIS concerning recreational needs in the area are equally unsupported. The DEIS indicates that: (1) the demand for recreation is increasing rapidly in the area where the proposed project is located; (2) there are not enough flatwater boating and boat launching lanes presently available in Sanpete and Carbon Counties for local users; and (3) because many high mountain reservoirs do not have a minimum pool to maintain fisheries, fishing is overcrowded and additional flatwater fishing areas are needed. DEIS at 1-6. No supporting data for these conclusions is referenced. Consequently, the DEIS's discussion of the recreation needs to be met by the Narrows Project appears to be a justification and not an objective presentation.

The reason for the DEIS's recitation of the municipal water and recreational facilities needs that will be satisfied by the Narrows Project is suggested by language in a three sentence section elsewhere in the DEIS concerning costs and financing concerning the "Recommended Plan." This is the only section in the DEIS that discusses the estimated costs of the Narrows Project. It indicates that the Narrows Project is estimated to cost

approximately $16.1 million, and that 65% ($ 10,465,000) of this would be financed under the Small Reclamation Projects Act of 1956, and the remaining 35% ($ 5,635,000) would be financed through funding from the state of Utah. DEIS at 2-18. The State of Utah rarely has the financial resources to provide funding for irrigation components of Bureau projects. However, state funds might be available to provide funding for other water uses, including water developed in conjunction with recreational facilities and for municipal purposes. Consequently, the municipal water and recreational facilities components of the Narrows Project appear to be added to the Project more for the purpose of acquiring funding than for fulfilling actual needs.

3. The DEIS relies on a model based on incomplete data to estimate certain of the Project's environmental impacts. Consequently, the DEIS reaches incorrect conclusions regarding these impacts.

The heart of the DEIS is a water model used to estimate the impacts of the Narrows Project on streamflows, water quality, and fisheries, in lower Gooseberry and Scofield Reservoirs, and impacts to the Price River drainage. The model is a simulated reservoir operations study based on streamflow data collected from Gooseberry Creek near Fairview and near Scofield Reservoir for the years 1960 to 1992. The study estimates Project impacts by deducting the 5,400 acre-feet per year that would be removed from Gooseberry Creek by the transbasin diversion to Sanpete County. However, because the model is based on less accurate methods and significantly less than the total available data record, the conclusions based on the model are incorrect.

Robert J. Murdock, P.E., has performed a reservoir operations study based on data for the time period from October 1, 1946 to September 30, 1993. The data is from records published by the United States Geological Service and it includes stream gauge records of flows in the Fairview Ditch and Tunnel, Gooseberry Creek near Scofield Reservoir, the Price River below Scofield Reservoir, and historic storage amounts in Scofield Reservoir. This data was supplemented with information from the Price River Commissioner Reports filed with the State Engineer's Office in the Utah Division of Water Rights. In his study, Murdock assumed that the Narrows Reservoir was constructed and full as of 1946 to estimate its downstream impacts. Further, the Narrows Reservoir was assumed to have two different capacities -- 14,500 acre feet (as in the Preferred Plan in the DEIS), and 5,400 acre-feet (the smaller plan). Murdock's data and conclusions are summarized on 9 tables showing the historic storage in Scofield Reservoir, how this storage would be affected by a Narrows reservoir with active capacities of either 14,500 and 5,400 acre feet, the reductions in releases from Scofield that would be caused by the two different sized Narrows Reservoirs, and the effects of the different sized reservoirs on water releases to Cottonwood

Canyon. The two documents summarizing Murdock's study, dated March 18, 1994, and April 5, 1994, respectively, are attached as Exhibit A to these comments. Further, a graph comparing Murdock's conclusions with those in the DEIS concerning storage amounts in Scofield Reservoir is attached as Exhibit B to these comments.

Because it is based on more data collected over a longer period of time, Murdock's study is able to present a more accurate picture of the hydrology of the area and how it will be impacted by the Narrows Project. Murdock's study reaches significantly different conclusions than the DEIS. For example, the DEIS estimates that a Narrows Reservoir with an active capacity of 14,500 acre-feet will cause an average reduction in historical water releases from Scofield Reservoir of 685 acre-feet per year. In contrast, Murdock's study concludes that the average annual reduction in historical releases will be 1,627 acre-feet per year, a significant difference.

The DEIS estimates that operation of the Narrows Reservoir would cause reductions in the amount of irrigation water released from Scofield Reservoir in 5 of the 33 years simulated. In contrast, Murdock concludes that reductions would occur in 14 of the 48 years studied, approximately 30% of the time. Further, in several of these 14 years, the water shortages would have prevented a large portion of the actual releases from occurring. For example, in 1960, 15,714 acre-feet of water was released from Scofield -- under Murdock's study, shortages would have prevented 7,134 acre-feet of this amount from being released. In 1961, 4,794 acre-feet was released from Scofield -- under Murdock's study, shortages would have prevented 2,452 acre-feet of this amount from being released. In 1977, 12,857 acre-feet was released from Scofield -- under Murdock's study, shortages would have prevented 10,866 acre-feet of this amount from being released. Finally, in 1992, 9,850 acre-feet was released from Scofield -- under Murdock's study, shortages would have prevented 7,087 acre-feet of this amount from being released.

Murdock also points out that the DEIS underestimates the impacts of the Narrows Reservoir in assuming that it would be full starting in 1960, the first year in the DEIS model, since the Reservoir would not instantly fill with water. Consequently, those amounts of water "removed" from the drainage following construction of the Narrows Reservoir are not reflected in the estimated impacts.

As Murdock's study reveals, by ignoring readily available hydrological records concerning streamflows and reservoir storage, and focusing instead on less data for a limited
245 period of time, the DEIS significantly underestimates the impacts of the Narrows Project on the quantity of water stored in and subsequently released from Scofield Reservoir. This is a critical error in the DEIS, and it is exacerbated by the fact that the Price River below Scofield is fully appropriated. The historic releases from Scofield into the Price River are

already are barely adequate to provide the water required for current agricultural, municipal, and industrial uses. Consequently, any reduction in the flows into or from the Scofield Reservoir will significantly and adversely impact these uses. Therefore, the nature of these impacts must be accurately determined before an informed decision concerning the Narrows Project can be made as required by NEPA.

4. The DEIS fails to adequately describe and analyze the social and economic costs of the Narrows Project.

The Narrows Project is a transbasin diversion under which 5,400 acre-feet per year of water currently used in the Price River drainage, in Carbon County, will be diverted to the San Pitch River drainage, in Sanpete County. The affected water will not be used to irrigate any new lands, but will affect the amounts of water currently used each year in Carbon County for a variety of agricultural, municipal, and industrial uses. Upon diversion to Sanpete County, almost all of the 5,400 acre-feet will be used for the supplemental irrigation of lands that are already under production. More specifically, 4,920 acre-feet will be used for the supplemental irrigation of 15,420 acres. The remaining 480 acre-feet will be used for municipal uses, apparently lawn watering, in four small towns.

246 The DEIS does not discuss the economic benefits of the 480 acre-feet of Project water that will be used for municipal use. However, it estimates that approximately 248 families will use the supplemental irrigation water to harvest a third alfalfa crop each year for a net income increase of $1,300 per family. This is estimated to increase annual net farm income in Sanpete County, in turn, by approximately $325,000 per year. DEIS at 3-7.

247 The DEIS does not estimate what the cost of the water will be to these 248 families. Nor does the DEIS discuss the costs associated with the conservation measures it assumes will be implemented by these water users as a condition of receiving Project water. Consequently, the estimated annual benefits of the supplemental irrigation water are understated and inaccurate.

A rough estimate of the cost of this water, by itself, assuming that the $ 16.1 million Project costs would be repaid at 0% interest over 50 years, is approximately $ 60 per acre-foot, which is much higher than what most irrigators in Carbon County or Sanpete County currently pay, and can afford to pay, for water. The costs of the assumed conservation measures will further increase the actual cost of the water. Although a draft loan application concerning the proposed Narrows Project has been submitted to the Bureau pursuant to the Small Reclamation Projects Act of 1956, neither the financial data used in the application, nor the application has been provided to the public. This financial information is essential if an informed decision on the Project is to be made.

248 The DEIS also fails to estimate the costs of transferring water from its present agricultural, municipal, and industrial uses in Carbon County. Indeed, the DEIS fails to even acknowledge that there will be such costs. These costs will be quite significant, since water supplies in Carbon County are limited and fully appropriated. Any water shortage in releases from Scofield Reservoir will significantly impact agricultural water users. Primary crops that would have been previously irrigated will not be grown, causing losses in net income. Shortages would also impact municipal water use, restrict growth, and thwart fire protection in Price City, Helper City, and Wellington City. Finally, shortages will significantly impact industrial uses of water in Carbon County. At the public hearing on the DEIS in Price, Utah on March 30, 1994, a representative of Utah Power & Light stated that its Carbon Plant relies in part on water releases from Scofield Reservoir to operate and generate electricity, and if water shortages forced the plant to shut down, the cost of replacement power would be approximately $125,000 per day, or over $ 3 million per month. Plant shutdowns are a real possibility, and almost occurred in 1992. In that year, releases from Scofield were insufficient to meet the needs of the Carbon Plant and UP&L was able to keep the Plant operating only by leasing 1800 acre-feet of water from local irrigators who agreed to not irrigate their fields.

249 The DEIS presents an incomplete and inaccurate picture of Project benefits. It purports to project net immediate benefits to approximately 248 families in Sanpete County without determining the actual cost of the water to these water users. In addition, the DEIS
250 completely ignores the obvious and adverse impacts to existing water users and others in the Price River system from transferring water out of the basin. The failure to thoroughly identify and analyze these impacts is a major flaw that further undermines the DEIS.

5. The DEIS fails to analyze the impacts of the Project on Carbon County.

Federal regulations implementing NEPA are quite clear that an EIS must analyze both the direct (primary) and the indirect (secondary) effects of the proposed action. 40 C.F.R. § 1502.16. The Bureau of Reclamation also emphasizes this requirement in its guidance document, which states in part:

> Secondary impacts are frequently difficult to identify and measure; however, the secondary impacts that can reasonably expected to occur, should Reclamation proceed with its proposal, would need to be addressed. For example, the impacts associated with the construction of a reservoir and the delivery of water may have some of the primary and secondary effects:
>
> . . .

> The secondary impacts generally are associated with the intended use of the water and include such things as economic and human population growth inducement, changes in land use (including associated fish and wildlife habitat changes), and potential industrial development. These impacts must be addressed to provide the decisionmaker with a clear understanding of the potential range of impacts associated with the proposal.

See United States Department of Interior Bureau of Reclamation, National Environmental Policy Act Handbook § 4-10.E (October 1990) (emphasis added). There is no such analysis in the DEIS even though it is obvious that the Project will have several significant impacts on Carbon County. In fact, the DEIS suggests that the transbasin diversion of water from Carbon County to Sanpete County will not have any significant effects in Carbon County.

The failure to perform such analysis is particularly egregious since the benefits of the Project to Sanpete County are so modest. Even though it is estimated to cost approximately $16 million, the Narrows Project will only provide supplemental irrigation water. Further, it is estimated that the Project will only supply the equivalent of an extra 4" each year to 15,000 acres for a net gain of about $1,300 each year for 248 families in the Project area.

Balanced against these modest benefits are the several significant environmental and socioeconomic impacts in Carbon County that the DEIS acknowledges, but analyzes as if each impact is totally separate from the others. As previously discussed, these impacts include taking land out of agricultural production, restricting growth and interfering with municipal water use in Price City, Helper City, and Wellington City, and impacting operations of the Carbon Plant. However, these are not separate impacts. The failure of the DEIS to analyze the cumulative effect of these and other impacts on streamflows, water quality, wetlands, fisheries, recreation, water availability, and agricultural, municipal, and industrial water use in Carbon County is a major flaw that requires further analysis.

6. The DEIS fails to reconcile the obvious conflict between the Narrows Project and the new policies of the Bureau of Reclamation concerning new water projects.

In its Blueprint for Reform: The Commissioner's Plan for Reinventing Reclamation (November 1, 1993), the Commissioner of the Bureau of Reclamation adopted general principles, including the following:

- We will facilitate changes from current to new uses of water in accordance with state law when such changes increase benefits to society and the environment.

- We will encourage conservation and improvements in the efficiency of use of already developed water and hydroelectric supplies.

- We will promote the sustainable use of the water and associated land resources in an environmentally sensitive manner throughout the 17 Western States.

- We will facilitate integrated water resources management on a watershed basis, stressing interagency cooperation, public participation, and local implementation.

In addition, the Commissioner's Plan states that "promoting conservation will be given priority in our program activities," and that "[f]ederally-funded irrigation water supply projects will not be initiated in the future."

251 As outlined in the DEIS, the Narrows Project clearly violates these guidelines. The Project's benefits to society are questionable, particularly since its impacts have not been identified and adequately analyzed. It is a transbasin diversion that does not provide new water or result in new lands being placed into production. Instead, it removes water from existing high-value beneficial uses and moves it to supplemental irrigation, a low-value use. The Project is environmentally destructive. Further, it does not facilitate integrated water
252 resources management on a watershed basis. Nor does it promote conservation. In fact, the DEIS fails to discuss in any meaningful way the role of conservation in its analysis of the Project.

The failure of the DEIS to address the Bureau's policy favoring conservation measures is contrary to the requirement of the CEQ regulations that an EIS discuss "possible conflicts between the proposed action and the objectives of Federal, regional, State, and local . . . policies." 40 C.F.R. § 1502.16(c). Current Bureau policy clearly favors conservation over development of costly new storage and delivery projects. The DEIS must acknowledge the Bureau's policy and the conflict that exists between the proposed action and that policy. The Carbon Water Committee believes that the sensible and efficient way to resolve this conflict is to not build the Project.

ANALYSIS OF PROJECT IMPACTS AND RELATED MITIGATION MEASURES

1. The DEIS acknowledges that the Project will adversely impact water quality in Gooseberry Creek, lower Gooseberry Reservoir, and Scofield Reservoir. It proposes two measures to mitigate these effects and concludes that the Project will have no residual impact on water quality. This conclusion is not supported by the available data.

The DEIS acknowledges that construction and operation of the Narrows Reservoir will result in decreased flows in Gooseberry Creek, and these decreased flows will adversely impact water quality in Gooseberry Creek, lower Gooseberry Reservoir, and Scofield Reservoir. However, the DEIS states that implementation of two mitigation measures will alleviate these impacts so that there will be no residual impact on water quality. DEIS at 3-17. The mitigation measures would involve: (1) stabilizing the channel in Gooseberry Creek between the Narrows Dam and the Gooseberry Reservoir; and (2) removing sediment from Mud Creek.

253 Under the first mitigation measure, the channel in middle Gooseberry Creek would be narrowed. This is intended to improve water quality by reducing the amount of sediment and nutrient flow into Lower Gooseberry Reservoir. The DEIS indicates that the reduced flows in middle Gooseberry would cause this condition to eventually occur naturally, but that this process would be expedited by placing large boulders in strategic locations in the stream to constrict its flow and cause the depth of flow to increase. In addition, the stream banks would be stabilized by transplanting sedges and other plants from the reservoir basin. However, the DEIS fails to cite any data that would support its theory that this mitigation measure will accomplish its purpose. Large boulders are not part of the natural stream geomorphology in the area, and their placement might only increase erosion along the sides of the creek. Consequently, there is no reason to assume that this measure will mitigate any of the Project's adverse effects on water quality. Further, a narrower channel in middle Gooseberry Creek will be susceptible to flooding or sediment loading during the spring in the occasional years of large snow-melt.

254 Under the second mitigation measure, sediment would be removed from Mud Creek, which flows into Scofield Reservoir. However, the DEIS provides no details concerning what types and quantities of sediments would be prevented from reaching the reservoir. Instead, it simply states that "a portion of the Mud Creek flows would be diverted and dispersed over the wetlands mitigation site." DEIS at 3-17. The DEIS does not identify the
255 "wetlands mitigation site" referenced in the discussion. However, this is likely the approximately 220 acres of land adjacent to Mud Creek and south of the town of Scofield that the DEIS indicates would be purchased to mitigate the impacts to wetlands caused by
256 the Narrows Project. DEIS at 2-12. At the time of the public hearing on the DEIS in Price, Utah, on March 30, 1994, the owner of this property had not even been contacted

257 concerning the purchase of his land as a mitigation measure. Consequently, it is unclear whether this measure would even be implemented.

This uncertainty highlights a problem that occurs throughout all discussions of mitigation measures in the DEIS, since it is frequently unclear whether the specific measure discussed will actually be implemented or is merely being discussed to appear to comply with NEPA. This is particularly the case when property is proposed to be purchased, or other actions outside the jurisdiction of the Bureau are proposed. The CEQ's guidance on the federal regulations implementing NEPA indicates that the EIS must discuss the probability that proposed mitigation measures will be implemented:

> All relevant, reasonable mitigation measures that could improve the project are to be identified, even if they are outside the jurisdiction of the lead agency . . . . to ensure that environmental effects of a proposed action are fairly assessed, the probability of the mitigation measures being implemented must also be discussed. Thus, the EIS and the Record of Decision should indicate the likelihood that such measures will be adopted or enforced by the responsible agencies.

See Council on Environmental Quality, Questions and Answers about the NEPA Regulations No. 19b (March 16, 1981). Consequently, the failure of the DEIS to indicate the probability of whether the land referenced above may be purchased for wetlands or water quality mitigation violates these requirements. The failure to address this issue also undermines the DEIS's conclusion that the known adverse water quality impacts of the Narrows Project will be mitigated by the proposed mitigation measures.

258 Similarly, the DEIS's conclusion concerning water quality are not supported by the data. The water quality conclusions are based on table 3-2, which shows phosphorous concentrations in Scofield from 1978 to 1989, a period of relatively wet years, and ignores the drier years of 1990 to 1992. DEIS at Figure 3-2. Consequently, even if phosphorous is a good indicator of water quality, it is improper to use a short time period of known wet years to opine on the Project's long-term effects on water quality.

Finally, the DEIS assumes that the water quality impacts of the Narrows Project will be caused solely by reduced streamflows below the Narrows Dam. However, water quality also will be affected by other factors. For example, since the Narrows Project will cause reduced streamflows and a reduced quantity of water in Scofield Reservoir, it is likely that the temperature of the reservoir water will increase, particularly in the summer months.
259 Higher water temperatures, in turn, will likely affect the quality of the stored water. However, the DEIS fails to analyze this possibility. Further, construction of the Narrows

Dam, relocation of SR-264, and the anticipated recreational use of the Narrows Reservoir will likely have significant impacts on water quality. These potential impacts should have
260 been identified and analyzed in the DEIS. See 40 C.F.R. § 1502.16 (requiring both direct and indirect effects to be analyzed).

2. The DEIS fails to explain how the significant loss of spawning habitat for cutthroat and rainbow trout will be mitigated.

The DEIS acknowledges that the Project will destroy: (1) 100% of the spawning habitat in the 1 mile of Gooseberry Creek and the 4.3 miles of the headwater tributaries that join to form Gooseberry Creek; (2) 94% of the spawning habitat in the 3 miles of Middle Gooseberry Creek; (3) 100% of the spawning habitat in the 7 miles of Lower Gooseberry Creek; (4) 25% of the spawning habitat in Fish Creek; and (5) 100% of spawning habitat in 4.9 miles of Lower Cottonwood Creek. DEIS at Table 3-12.

These streams are classified by the Utah Department of Wildlife Resources as Class 2, 3, and 3B waters, all of which are extremely important fisheries. The loss of extensive spawning habitat would likely destroy the self-reproducing populations of cutthroat and rainbow trout that presently inhabit these streams. This would be an irretrievable loss that cannot be mitigated by planting hatchery fish or attempting to improve habitat off site. Consequently, the Narrows Project will have a permanent adverse impact on the stream fisheries contrary to express state policy favoring the preservation of such unique resources.

The DEIS briefly discusses nine measures that might be implemented to mitigate the Project's impact on stream fisheries. DEIS at 2-9 to 2-12. However, the discussion of these
261 measures is too general and does not specify how the measures will compensate for the Project's destruction of the spawning habitat. In fact, only four of the nine referenced mitigation measures discuss spawning habitat. The first measure involves year-round releases of 3.0 cfs from the Fairview Lakes, which are intended to create approximately 2.3 miles of spawning habitat for cutthroat trout. The second measure involves stabilizing the stream banks along middle Gooseberry Creek. As discussed above in the criticism of the water quality mitigation measures, this stabilization is supposed to occur by placement of large boulders in middle Gooseberry Creek. However, no data supports this action as an effective measure to create spawning habitat. The third measure involves year-round releases from the Narrows Reservoir to provide flushing flows below the Dam. Finally, the fourth measure involves purchasing 50 acres of private land that contains approximately 4 miles of live fishery streams.

These brief references to measures intended to mitigate impacts to spawning habitat are too vague to give any real indication of whether they could mitigate impacts to spawning habitat and, if so, the long-term effects of these measures, including the types and numbers of fish resulting from these measures. Nor does the discussion of these mitigation measures assess the likelihood that they can or will be implemented as required by the CEQ
262 regulations. Another flaw with these measures is that if successful, they would constitute less than 1:1 mitigation. Further, the mitigation only enhances existing habitat and does not replace habitat that would be destroyed by the proposed project. In addition, the DEIS fails
263 to outline any monitoring plans and compliance proposals for these measures.

The mitigation measures mentioned above are intended to mitigate the adverse impacts to trout habitat in Gooseberry Creek and Fish Creek. However, no mitigation is proposed for the habitat in 4.9 miles of Lower Cottonwood Creek that will be destroyed by increased flows (average flow increase: 162%; average summer flow increase: 300%). This is unacceptable and violates the clear requirement in the NEPA regulations that mitigation measures be analyzed for all adverse impacts. See 40 C.F.R. §§ 1502.14(f); 1502.16(h).

Finally, the DEIS's statement that 4.9 miles of trout habitat in Lower Cottonwood Creek will be destroyed conflicts with its statement that: "Increased flows in Lower Cottonwood Creek would not be expected to affect the excellent fishery that presently exists." DEIS at 3-38. This statement also conflicts with the DEIS statement that the increased flows in Cottonwood Creek are expected to widen the stream channel by up to 24 percent, cause long-term instability in the channel and banks, and adversely affect the fishery in 4.9 miles of Cottonwood Creek. DEIS at 3-41.

3. The DEIS acknowledges impacts to fisheries and recreational use in Scofield Reservoir, but fails to discuss measures to mitigate these impacts.

As previously discussed, the DEIS acknowledges that the reduced streamflows caused
264 by the Narrows Dam will decrease water quality and increase the potential for fish kills in Scofield Reservoir. The DEIS fails to state how many fish will be killed as a result. Nor does the DEIS propose any mitigation measures with respect to this impact, which violates the federal regulations implementing NEPA. See 40 C.F.R. §§ 1502.14(f); 1502.16(h). Instead, the DEIS simply indicates that reduced flows will cause the Reservoir to operate at a lower level and with a decreased surface area, which will result in the loss of approximately 4,500 angler days per year. DEIS at 3-38. However, no data or methodology is provided to support this figure. Therefore, it is impossible to determine whether a hard look has been taken with respect to this impact of the Project.

In his reservoir operations study discussed in item 3 of the first section of our comments, Robert J. Murdock concludes that the surface area of Scofield Reservoir will be reduced by an average of approximately 302 acres, and that 9,060, not 4,500, angler days per year will be lost at the Reservoir.

The DEIS also states that the Utah Department of Wildlife Resources (the "UDWR") would manage the Narrows Reservoir as a cutthroat trout fishery. It also claims that the Narrows Reservoir will receive approximately 13,700 angler days per year.
265 However, there is no discussion of the water management plan that would be necessary to identify the costs associated with development of the fishery, whether the fishery could be maintained under the anticipated fishing pressure, and how many fish would be planted under the plan. Nor does the DEIS indicate whether the UDWR has been consulted about or approves this proposed use of the Narrows Reservoir.

The DEIS acknowledges that the decreased surface area of Scofield Reservoir may
266 affect on the value of lakeside property. DEIS at 3-7. However, it does not analyze this possible adverse impact. Nor does the DEIS discuss potential impacts of the decreased surface area on the recreational activities other than fishing (e.g. boating, camping, hiking, birdwatching) that occur on or in the vicinity of the reservoir. Finally, the DEIS fails to
267 describe or analyze the effect of these changes in Scofield Reservoir on businesses that depend on the Reservoir (e.g. tourism, fishing, agriculture, industry, municipal).

4. The DEIS does not adequately discuss impacts to wetlands or the measures that may be taken to mitigate these impacts.

The DEIS states that 100 acres of wetlands will be inundated by the Narrows Reservoir. However, it fails to identify the type or types of wetlands that compose these 100 acres. DEIS at 3-62. Further, more wetland areas will likely be affected by the Project than only in the area flooded by the Reservoir. For example, riparian areas adjacent to Gooseberry Creek will be adversely impacted by the reduced flows (i.e. flows in the middle 3 miles of Gooseberry Creek will be reduced by about 90%). DEIS at 3-4. In addition, increased flows of 162% in Cottonwood Creek, which are expected to widen the stream channel by up to 24% and also erode the stream banks, will adversely impact jurisdictional wetlands. However, these potential impacts on wetlands, among others, are not mentioned
268 in the DEIS. Therefore, it appears that the DEIS fails to adequately analyze and discuss the Project's potential impacts on wetlands.

The DEIS proposes two measures to mitigate impacts to the 100 acres of wetlands flooded by the Narrows Reservoir. Under one of the proposed mitigation measures,

approximately 220 acres of private land adjacent to Mud Creek would be purchased. DEIS at 2-12. The DEIS describes this as a former wetland that has been severely damage by cattle grazing. Following purchase, the cattle would be removed, thus restoring the existing wetland. The DEIS does not estimate the cost of purchasing this land, whether the land is
269 available for purchase, and the probability that this measure would be implemented. Nor does it indicate whether seepage from Mud Creek would be an adequate water supply for these lands, whether other water would be needed and, if so, whether that water would be available to be so used. The DEIS fails to describe the type of wetlands that would be restored through this purchase. Nor does it propose monitoring plans to ensure that the wetlands restoration would be completed. As mentioned earlier, as recently as the public hearing on the DEIS in Price, Utah, on March 30, 1994, the owner of this property had not been contacted concerning the purchase of his land as a mitigation measure. Consequently, it is unclear whether this mitigation measure could ever be implemented.

The second mitigation measure would involve water releases from Fairview Lakes and the Narrows Reservoir to enlarge existing and create new wetland areas. The DEIS indicates that this would be accomplished by distributing water throughout this area by a system of open ditches. However, the DEIS fails to quantify the amount of water that will
270 be needed to create and maintain these wetlands, or whether water rights are available for this purpose. Further, since evaporation from wetlands areas can sometimes be greater than that from open surfaces of water, this mitigation measure might require large amounts of water, thereby creating an additional impact on the Price River system not addressed in the DEIS. Finally, the DEIS fails to discuss what specific types of existing wetlands would be enlarged, and what types would be created, and whether these wetlands could effectively function as the wetlands flooded by the Narrows Reservoir. Since the flooded wetlands likely smoothed high flows and improved water quality in Gooseberry Creek, it is unlikely that the enhanced wetlands would provide a similar function. Consequently, it is doubtful whether this measure could ever accomplish its purpose.

5. The DEIS fails to indicate whether the water used for various proposed mitigation measures will be deducted from the amounts of Project water to be used in Sanpete County or the remaining water for the Price River drainage.

The DEIS describes various measures that might be implemented to mitigate the Narrows Project's adverse impacts on streamflows, fisheries, water quality in Scofield Reservoir, and wetlands. However, it does not describe whether the affected water is to be deducted from the supplies intended for Sanpete County, or from the Price River drainage.

Under one of the nine mitigation measures concerning impacts on the trout fishery, year-round releases averaging 3.0 cfs will be made from Fairview Lakes. DEIS at 2-9. This is approximately 2193 acre-feet per year. Another mitigation measure involves winter releases (October to March) of 2 cfs to Cottonwood Creek. DEIS at 2-12. This is approximately 731 acre-feet per year. Further, under one of the wetlands mitigation measures, water would be released from Fairview Lakes and spread over adjacent land to create additional wetlands. The amount of water required to create and maintain these wetlands is not quantified. Finally, an average of 300 acre-feet per year would be released from the Gooseberry Narrows Reservoir for channel maintenance each year. DEIS at 2-18.

271 The DEIS should have stated whether the water used in these mitigation measures will be deducted from the Narrows Project water supplies destined for Sanpete County. If so, the amount of water actually available for supplemental irrigation will be less than projected in the DEIS and the costs of this water will be even greater than currently estimated. The water users that will have to pay these costs should know about this in order to make an informed decision whether they really want the water. On the other hand, if the water used in these mitigation measures will be deducted from the remaining water supplies for the Price River drainage, the Project's negative impact on water use in Carbon County will be even greater.

6. The DEIS fails to identify or address potential earthquake hazards, or provide any information to indicate that a dam can be safely built upon the proposed site.

The DEIS concludes that "from a geoseismic standpoint, the recommended Narrows
272 Damsite is suitable for construction." DEIS 3-46. However, this conclusion ignores the fact that three faults, the West Gooseberry Fault, the Fairview Lakes Fault, and the East Gooseberry Fault, have been mapped in the vicinity of the Damsite. The DEIS concludes that these faults are not active, but provides no supporting data. It also ignores the possibility of an earthquake with a magnitude of 7.5 originating along the Wasatch Fault, less than 50 kilometers from the Narrows damsite.

273 Further, the DEIS fails to include any hard data that would indicate that a hard look has been taken concerning the actual construction of the Narrows Dam, or that adequate materials exist within reasonable haul distances to build the dam. There are no drill logs, no test pit logs, no water tests of drill holes, no soil tests, and no water table data for the damsite or reservoir basin. Further, the DEIS fails to indicate whether a detailed surface
274 geology study of the damsite has even been made. The DEIS does state that the proposed damsite is located on the North Horn formation. DEIS 3-43. This is the same formation on which 104 landslides in nearby Cottonwood Canyon have occurred. DEIS 3-18.

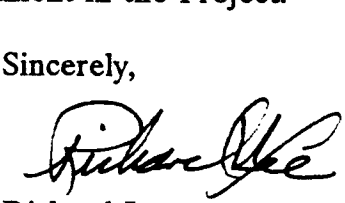
According to Robert Murdock, the North Horn formation is well-recognized as being involved in landslides and instability throughout the Wasatch Plateau. However, the DEIS never discusses this, nor does it provide any information to indicate that a dam can be safely built upon the proposed damsite.

SUMMARY

The DEIS is fundamentally flawed and does not comply with the goals and requirements of the National Environmental Policy Act or current Bureau of Reclamation
275 policy. It fails to identify and analyze a range of reasonable alternatives to the Project, including the most obvious reasonable alternative of water conservation. This is reason enough to require preparation of a supplemental DEIS. The DEIS also fails to adequately
276 identify and analyze potential impacts of the Project. Because it relies on incomplete data, the DEIS inaccurately estimates Project impacts on streamflows, water quality, aquatic and reservoir fisheries, and agricultural, municipal, and industrial water use in the Price River system. Further, it purports to determine the financial benefits of using Project water in Sanpete County without identifying the actual costs of the water to these persons, or the adverse impacts caused by transferring this water out of the Price River system. In addition, it proposes questionable mitigation measures, in probability of occurrence and effectiveness.
277 Finally, the DEIS ignores the obvious conflict between the Project and the Bureau's policies that emphasize water conservation, protection of the environment, and integrated resource management on a watershed basis.

In simple terms, the Project makes no sense. It is estimated to cost $16.1 million of public funds, but it will not result in any new land being put into production. Instead, it will provide only supplemental irrigation water to reduce annual irrigation water shortages by approximately 11% in the Project area and allow some persons to harvest a third crop of alfalfa each year. In addition, Project is a transbasin diversion that will move water from existing high-value beneficial uses to a low-value use. The Project would be environmentally destructive and would adversely impact agricultural, municipal, and industrial water users in the Price River system. Because the fiscal, environmental, and socio-economic costs of the Project are both significant and unjustified, the Bureau of Reclamation should abandon further consideration of and investment in the Project.

Sincerely,



Richard Lee
Chairman, Carbon Water Committee

EXHIBIT "A"

Robert J. Murdock, P.E.
2964 East 3135 South
Salt Lake City, Utah 84109

Phone (801) 487-0258
April 5, 1994

Regional Director
Bureau of Reclamation
125 South State St.
Salt Lake City, Utah 84111

Re: Draft EIS Narrows Project - Comments

Dear Sir,

At the hearing on the Narrows Project Draft EIS held in Price March 30, 1994 I made a statement and submitted written notes associated with the statement. These comments and information are in addition to that presented March 30, 1994.

At the hearing March 30 I referred to an operation study of the Narrows Project and Scofield Reservoir that I have performed. Several others that had access to my study also referred to it. I feel it proper to include the result of my study to support the comments that have been made that refer to it. Attached are tables that are the result of the study.

My study is a monthly operation study showing end of month figures in 9 tables. Some months on Table 1 list the annual high or low that occurred during the month but not at its end. Table 1 lists the historic active storage contents of Scofield Reservoir. The 0s in 1946 and 1993 are beyond the period of record used and figures on other tables for similar months should be disregarded.

Tables 2 & 3 are also the active storage contents of Scofield Reservoir assuming the Narrows Reservoir at the indicated capacity was operating concurrently with Scofield Reservoir. The same historic bypass of prior rights and storage releases were made from Scofield Reservoir. Flood releases and spills from Scofield Reservoir were retained to the extent there was capacity to hold them.

On Tables 2 & 3 the months showing 0 are months when the active storage pool of Scofield Reservoir was empty at the end of the month and the historic active storage release was not fully satisfied. Tables 4 & 5 show the amounts of water that was historically released from Scofield Reservoir that would not have been available for release if the Narrows Project were in operation. These figures are not the historic water shortages of the Price River below Scofield Reservoir. The amounts shown on Tables 4 & 5 should be added to the historic water supply shortages of the Price River indicated by several at the hearing.

Tables 6 thru 9 show the operation result at the Narrows Reservoir. Two significant things to note. One, the larger reservoir has almost no shortage to Sanpete, but the size of the reservoir used for the study greatly exceeds (about 4,500 acre-feet) the water right approval for the reservoir. Second, there are significant shortages to Sanpete with the smaller reservoir. The shortage exceed 11 percent.

The historic active storage contents record of Scofield Reservoir begins several years before 1946. I started with 1946 because it was the year Scofield was enlarged to its present capacity. The starting contents I used for Scofield Reservoir was from the historic record. I assumed the Narrows Reservoir to be full at the start of the study the same as was done for the DEIS. Assuming it less than full at start would show less benefit to Sanpete and a greater negative impact upon Scofield Reservoir and the Price River.

COMMENTS:

1. The reduction of historic active storage releases shown on Tables 4 & 5 are significant reductions of water supply. During many of these years there was already great shortage with water going to more essential uses such as the municipal treatment plant and the power plant. During many years the Narrows induced shortages to Scofield Reservoir will directly impact water supply for drinking water, fire protection and generation of electricity at Castle Gate. The DEIS did not adequately evaluate these negative impacts.

2. The DEIS is in error in many of the points it analyses because it fails to use the full available hydrologic record that is available. It uses a shorter period of data that give different results than if the longer period were used. The operation study starts with Scofield Reservoir about 6,000 acre-feet higher than it would have been October 1959 if the full record were used. The DEIS operation study starts with the Narrows Reservoir full. It is in error because it fails to show the impacts of filling the Narrows Reservoir. These two errors impact Scofield Reservoir about 23,000 acre-feet.

3. The DEIS fails to adequately address negative impacts to the flat water fishery of Scofield Reservoir. My operation study indicate the average surface area of Scofield Reservoir will be reduced 302 acres or 253 acres with Narrows Reservoir at 14,500 and 5,400 acre-feet active storage respectfully. With the Recommended Plan 2/3 of what is gained at the Narrows site is lost at Scofield. As per DEIS page 3-38,9 the loss would be 9,060 angler days per year not 4,500. With the Small Reservoir Plan 450 angler days per year more are lost at Scofield than gained at the Narrows.

Tables 6 thru 9 show the operation result at the Narrows Reservoir. Two significant things to note. One, the larger reservoir has almost no shortage to Sanpete, but the size of the reservoir used for the study greatly exceeds (about 4,500 acre-feet) the water right approval for the reservoir. Second, there are significant shortages to Sanpete with the smaller reservoir. The shortage exceed 11 percent.

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COMMENTS:

1. The reduction of historic active storage releases shown on Tables 4 & 5 are significant reductions of water supply. During many of these years there was already great shortage with water going to more essential uses such as the municipal treatment plant and the power plant. During many years the Narrows induced shortages to Scofield Reservoir will directly impact water supply for drinking water, fire protection and generation of electricity at Castle Gate. The DEIS did not adequately evaluate these negative impacts.

2. The DEIS is in error in many of the points it analyses because it fails to use the full available hydrologic record that is available. It uses a shorter period of data that give different results than if the longer period were used. The operation study starts with Scofield Reservoir about 6,000 acre-feet higher than it would have been October 1959 if the full record were used. The DEIS operation study starts with the Narrows Reservoir full. It is in error because it fails to show the impacts of filling the Narrows Reservoir. These two errors impact Scofield Reservoir about 23,000 acre-feet.

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4. Winter releases to Cottonwood Creek amount to 720 acre-feet per year. When Wales Reservoir can not store this water its benefits are lost to the project area. An operation study of the Wales Reservoir in conjunction with the winter releases from the Narrows Reservoir is needed to evaluate the lost benefits to either irrigation or the fishery of Cottonwood Creek.

5. The HEP studies should be done before the DEIS is prepared to properly evaluate and present the affects to impact and mitigation lands.

6. There is no information in the DEIS to indicate that a safe dam can be built upon the proposed site, or to indicate that adequate materials exist within reasonable haul distances to build the dam. There are no drill logs, no test pit logs, no water pressure tests of drill holes, no soil tests, no water table data for dam site or reservoir basin, no detail surface geology study of the dam site, no profiles, nothing. The DEIS does say the dam site is on the North Horn formation. This is the same formation that is the cause of 104 landslides in nearby Cottonwood Canyon as recorded in the DEIS page 3-18. The North Horn formation is notorious for landslides and instability throughout the Wasatch Plateau. Is the dam site the result of a landslide? The DEIS is wholly inadequate in providing assurance that a safe dam can be built at the proposed site.

7. The DEIS proposes to narrow the channel of Gooseberry Creek below the dam site. This is a bad idea. The size of the channel is the result of infrequent large snow melt floods. Most snow melt runoff will be retained in the Narrows Reservoir. However, the big snow melt floods will fill the reservoir and spill for days at nearly the same flow rate as they have historically run in the channel. A smaller channel will be gutted, Lower Gooseberry Reservoir will get an unnecessary load of sediment and the stream channel fishery benefits will be lost. Who is going to remove the sediment from Lower Gooseberry Reservoir and rebuild the smaller channel each time it happens?

The proposed project has not been planned well. It proposes many features that have no water rights approved for the use and improperly sizes the proposed reservoir with respect to the approver water rights. The past fights of this project have revolved around water rights and I would think the planners would be sensitive to get those aspects of the plan right this time, but they have not.

It is planned for very expensive supplemental irrigation ONLY in Sanpete County, and will cause water shortages for irrigation, culinary, fire protection, and power plant use in Carbon County. It will damage existing fisheries. The DEIS does not adequately address the negative impacts.

The proposed project ignores extensive resources of water in Sanpitch Valley that are being very very poorly used while at the same time seeks to take part of a short supply of water away from Carbon County that is making good and critical use of it. There has got to be a better plan whereby the small increase of water supply can be developed with added storage, and the project structured in such a way that it will not negatively impact the water supply of either county but give them both some improvement and added stability of water supply. It can be done.

Sincerely,

Robert J. Murdock, P.E.

cc: Richard Lee

EXHIBIT "A"

Robert J. Murdock, P.E.
2964 East 3135 South
Salt Lake City, Utah 84109

Phone 487-0258
March 18, 1994

Richard N. Lee, President
Carbon Water Conservancy District
P.O. Box 509
Helper, Utah 84526

Re: Studies related to the proposed Narrows Project

Dear Richard,

Enclosed is a copy of the results of an operation study I have performed that shows the affects of the Narrows Reservoir upon the storage water supply available from Scofield Reservoir. The calculations assume BOTH Scofield Reservoir and the Narrows Reservoir were constructed when Scofield Dam was enlarged in 1946 and that both reservoirs operated during the full 47 year period since then. The study was performed for two different sizes of the Narrows Reservoir. These were 14,500 and 5,400 acre-feet active storage, plus 2,500 acre-feet dead storage, which are the Recommended Plan and Smaller Reservoir Alternate Plan discussed in the Narrow Project DRAFT EIS.

The water releases from the Narrows Reservoir are those proposed for the Narrow Project in the DRAFT EIS. The historic storage record of Scofield Reservoir was adjusted based upon the amount of water retained in the Narrows Reservoir. Evaporation from the Narrows Reservoir and the change in evaporation losses from Scofield Reservoir due to its smaller size were part of the calculations.

The study covers the period from October 1, 1946 through September 30, 1993. The study uses historic storage amounts in Scofield Reservoir, the stream gauge records of the Price River below Scofield Reservoir, Gooseberry Creek near Scofield and near Fairview, and the Fairview Ditch and Tunnel all as published by the U.S.G.S. I supplemented this data with information from the Price River Commissioner Reports in the State Engineers office.

The Gooseberry Creek flows were adjusted to get the water supply at the proposed Narrows Dam site. All water released from Scofield Reservoir to make room for flood storage was added to Scofield Reservoir storage. Spills from Scofield Reservoir were evaluated based upon how much of the spill flow was likely used to satisfy the demands for irrigation and other uses.

Storage in Scofield Reservoir less than 72,100 acre-feet was assumed to be used for irrigation etc if the flow rates were typical of rates released for usage. If the flow rates

were higher than typical use rates, part of the flow was assumed retained in storage and part was assumed released for usage. Calculated storage greater than 72,100 acre-feet was assumed spilled and lost.

Tables 1, 2 and 3 show monthly water storage amounts in Scofield Reservoir. Table 1 shows the historic data. It shows that Scofield Reservoir has been managed to never be without some active storage water available for use. Tables 2, 3, 4 and 5 show that with either size of the Narrows Reservoir, Scofield Reservoir could not have supplied the same amount of water as the historic uses. Tables 2 and 3 show the active storage pool in Scofield Reservoir would have been empty many times. Tables 4 and 5 show the amounts of shortage of the historic releases from storage in Scofield Reservoir. This is the amount of water that would not have been available if the Narrows Reservoir had been operating.

Based upon the Price River Commissioner Reports the average annual supply form Scofield Reservoir storage has been 21,924 acre-feet per year. Tables 4 and 5 show the total loss of historic storage supply from Scofield Reservoir is 76,471 or 62,829 acre-feet depending upon the size of the Narrow Reservoir. These losses average 1,627 or 1,337 acre-feet per year or 7.4 or 6.1 percent of what has been available.

Tables 6 and 7 show what the active storage contents of the Narrow Reservoirs would have been. Tables 8 and 9 show what the diversions of water and shortages to Sanpete uses would have been from the Narrow Reservoirs of different sizes. The total releases to Sanpete would have been 256,479 or 230,252 acre-feet depending upon the reservoir size. These diversions average 5,343 or 4,797 acre-feet per year. The shortages would have been 2,721 or 28,948 acre-feet or average 57 or 603 acre-feet per year depending upon the reservoir size. The shortages are 1.1 or 11.2 percent of the proposed diversion amount.

Calculations show the surface area of Scofield Reservoir (available for flat water fishery) is reduced an average of 302 or 253 acres depending upon the size of the Narrows Reservoir. The surface area losses at Scofield are 67 percent of the area gained by the larger Narrows Reservoir, and greater by 15 acres than the area gained by the smaller Narrows Reservoir.

COMMENTS:

1. The Narrows Reservoir causes losses to the useable stored supply in Scofield Reservoir. These losses would require frequent alteration of historic use patterns.

2. Only the months of March and April would not at some time require changes in the historic use patterns. The greatest and most frequent changes would be required during the late summer months.

3. The negative impacts of the loss of Scofield Reservoir water for municipal, industrial etc uses should be evaluated and included in the DRAFT EIS.

4. The June 8, 1984 Agreement and the State Engineer's January 7, 1985 MEMORANDUM DECISION only allow 10,000 acre-feet active storage for transmountain diversion. Up to an additional 4,500 acre-feet active storage is allowed only as needed to provide for the minimum streamflow of Gooseberry Creek below the Narrows Dam. Brooks Canyon Creek was approved to be diverted to provide for the minimum streamflow below the dam. The minimum streamflow is 1.0 to 1.25 cfs or about 730 acre-feet per year.

   The proposed plans outlined in the DRAFT EIS do not include a diversion from Brooks Canyon Creek so Gooseberry Creek water must be used for the minimum streamflow. Using Gooseberry Creek which has a minimum flow of 0.6 cfs for 2 to 3 months would require only about 60 to 75 acre-feet of active storage to provide the minimum streamflow. The Recommended Plan of the Narrows Project with 4,500 acre-feet active storage for minimum streamflow and 14,500 acre-feet total active storage does NOT comply with the approved water rights for the project.

5. The Small Reservoir Alternate for the Narrows Project has an average annual shortage of 11.2 percent which is a significant loss of benefits and would affect the economic feasibility of the project.

6. The Narrow Reservoir causes a reduction of the flat water fishery value of Scofield Reservoir. There is a water surface area reduction that closely offsets the area gained at the Narrows Reservoir. The decrease in water stored in Scofield Reservoir would cause the reservoir to be warmer in the summer and have less winter carry over capacity. These negative impacts should be addressed and included in the DRAFT EIS.

7. Adding storage at the Narrows Dam Site increases the total average useable stored supply from the Price River drainage by 3,716 or 3,460 acre-feet per year. I doubt that this amount of water for supplemental irrigation is worth the estimated costs.

These comments relate to the operation study. If you have questions please contact me. I intend to list other comments that relate to the DRAFT EIS.

Sincerely,

Robert J. Murdock, P.E.

cc: James Lee
Marvin Allen
E.J. Skeen

TABLE 1.

SCOFIELD RESERVOIR HISTORIC STORAGE - ACRE FEET

DATE 03-18-1994 TIME 11:20:25

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1946	0.	0.	0.	0.	0.	0.	0.	0.	1,450.	1,740.	3,450.	4,830.
1947	5,760.	6,490.	8,340.	15,800.	35,900.	34,100.	23,000.	18,700.	12,800.	9,640.	10,700.	11,500.
1948	13,000.	13,900.	15,400.	19,900.	28,000.	20,300.	9,150.	2,160.	771.	441.	1,920.	2,780.
1949	3,950.	5,050.	6,490.	14,100.	39,300.	46,000.	35,700.	24,600.	18,900.	18,300.	19,700.	21,300.
1950	23,200.	24,200.	25,700.	32,900.	51,900.	51,100.	43,700.	31,800.	26,900.	25,000.	26,500.	27,400.
1951	29,300.	30,900.	32,200.	37,100.	53,800.	51,400.	39,000.	34,300.	26,500.	25,300.	26,300.	27,600.
1952	30,200.	31,600.	33,800.	43,500.	76,500.	66,600.	57,500.	52,200.	47,300.	43,500.	43,900.	43,900.
1953	46,100.	48,300.	50,900.	54,000.	58,300.	57,500.	46,700.	39,500.	31,100.	28,500.	30,000.	30,400.
1954	32,000.	32,700.	34,800.	37,100.	33,600.	23,600.	16,300.	9,310.	7,250.	6,640.	7,090.	7,710.
1955	8,990.	10,200.	11,500.	14,800.	26,100.	22,300.	13,000.	9,150.	3,680.	2,160.	2,910.	4,360.
1956	5,900.	6,940.	8,660.	14,300.	29,100.	23,600.	13,500.	6,640.	2,040.	1,100.	1,450.	2,410.
1957	3,680.	4,630.	6,050.	9,310.	26,500.	53,000.	44,700.	41,700.	37,800.	35,200.	36,600.	37,600.
1958	38,800.	40,000.	41,700.	40,000.	71,200.	64,900.	50,600.	39,300.	34,800.	31,800.	32,200.	32,000.
1959	32,900.	34,500.	35,900.	34,300.	34,500.	27,800.	18,700.	13,300.	8,180.	6,640.	6,050.	5,470.
1960	5,760.	6,640.	8,020.	10,800.	19,300.	14,100.	5,760.	2,160.	1,560.	2,040.	2,160.	1,920.
1961	2,160.	2,290.	3,680.	5,900.	6,050.	3,420.	1,330.	661.	551.	882.	992.	1,330.
1962	1,560.	2,530.	3,420.	13,700.	39,300.	40,300.	30,900.	21,700.	16,700.	17,100.	17,100.	16,700.
1963	16,500.	18,100.	20,100.	21,900.	30,000.	27,800.	17,100.	13,700.	12,600.	9,640.	9,980.	9,640.
1964	9,980.	10,300.	11,500.	15,200.	35,000.	38,100.	26,900.	17,500.	11,700.	9,640.	10,200.	10,800.
1965	13,000.	13,900.	15,200.	19,500.	42,200.	61,600.	59,100.	56,200.	51,400.	49,300.	49,800.	50,900.
1966	51,900.	53,200.	55,100.	63,000.	67,800.	61,300.	50,100.	39,500.	35,000.	33,800.	34,100.	33,800.
1967	36,600.	37,800.	39,800.	42,000.	60,500.	70,600.	61,900.	51,900.	46,700.	43,700.	44,200.	44,500.
1968	45,700.	46,700.	48,500.	51,600.	72,300.	69,500.	59,100.	55,100.	44,200.	42,200.	42,700.	43,700.
1969	45,200.	46,700.	39,000.	44,000.	72,300.	68,900.	59,100.	50,600.	45,700.	47,000.	47,500.	48,300.
1970	49,600.	51,400.	52,400.	52,700.	69,200.	67,500.	57,500.	46,000.	38,800.	38,500.	39,000.	39,800.
1971	41,200.	43,500.	45,700.	52,700.	69,500.	66,100.	53,500.	43,000.	37,300.	37,100.	37,800.	38,500.
1972	40,700.	41,500.	44,500.	49,000.	53,000.	48,300.	33,400.	24,000.	19,100.	20,900.	21,300.	21,700.
1973	22,300.	23,200.	24,600.	26,700.	64,400.	68,300.	59,700.	49,300.	42,200.	40,000.	40,700.	41,500.
1974	43,500.	44,000.	45,500.	48,000.	66,900.	59,400.	48,500.	37,300.	32,200.	31,500.	32,000.	31,500.
1975	32,200.	32,900.	34,500.	35,900.	51,900.	69,200.	63,300.	51,100.	43,700.	41,000.	42,500.	43,200.
1976	43,700.	44,500.	45,500.	49,000.	61,600.	55,100.	43,200.	34,300.	31,100.	30,000.	29,800.	29,300.
1977	28,400.	29,100.	30,200.	30,700.	27,200.	24,600.	20,900.	19,100.	17,700.	17,300.	17,300.	17,300.
1978	17,300.	17,300.	19,700.	26,100.	50,300.	62,200.	51,600.	42,500.	37,300.	35,900.	37,300.	38,500.
1979	40,000.	41,000.	42,500.	40,700.	65,200.	66,600.	56,700.	49,300.	41,500.	39,800.	40,700.	41,500.
1980	43,200.	44,500.	44,500.	43,500.	71,200.	68,300.	60,000.	50,100.	47,500.	46,200.	47,500.	48,500.
1981	49,300.	50,300.	51,600.	55,100.	55,600.	49,800.	39,500.	31,500.	29,100.	30,400.	31,500.	32,500.
1982	34,300.	35,700.	37,300.	43,200.	73,800.	68,900.	61,300.	53,000.	47,500.	49,800.	52,400.	53,200.
1983	52,700.	46,700.	38,500.	36,400.	61,900.	72,900.	67,200.	60,200.	50,300.	40,700.	43,000.	46,200.
1984	48,500.	50,100.	39,000.	27,600.	60,000.	70,900.	64,400.	58,900.	51,600.	47,800.	43,500.	47,000.
1985	49,000.	51,100.	53,200.	57,000.	70,300.	64,900.	56,400.	44,500.	40,200.	41,500.	43,500.	45,000.
1986	46,700.	49,300.	43,700.	45,700.	73,800.	68,600.	60,500.	50,100.	44,200.	45,700.	47,000.	48,800.
1987	50,900.	52,700.	55,100.	60,500.	61,600.	55,600.	47,500.	40,700.	35,900.	34,300.	35,900.	37,600.
1988	39,500.	40,700.	42,700.	47,800.	57,000.	50,900.	39,800.	31,300.	27,200.	26,700.	27,200.	28,700.
1989	30,000.	31,500.	34,300.	37,100.	35,200.	29,100.	19,300.	14,400.	11,500.	9,980.	10,660.	11,180.
1990	11,700.	12,420.	13,510.	20,500.	21,930.	19,500.	12,240.	8,500.	7,400.	7,090.	7,250.	7,250.
1991	7,710.	8,340.	9,810.	12,960.	23,580.	28,450.	19,300.	12,600.	9,310.	6,640.	7,560.	8,180.
1992	8,990.	9,640.	11,530.	13,320.	9,480.	4,220.	2,530.	1,450.	980.	1,460.	2,170.	2,790.
1993	3,690.	4,770.	6,800.	12,600.	47,510.	55,100.	44,970.	37,360.	31,780.	0.	0.	0.

TABLE 2.

SCOFIELD RESERVOIR STORAGE WITH NARROWS RESERVOIR - ACRE FEET DATE 03-18-1994 TIME 10:38:19

NARROWS RESERVOIR ACTIVE CAPACITY IS 14,500. AC.FT.

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1946	0.	0.	0.	0.	0.	0.	0.	0.	1,450.	1,632.	3,274.	4,603.
1947	5,509.	6,224.	8,016.	15,003.	35,069.	33,119.	21,677.	17,169.	11,178.	7,932.	8,915.	9,664.
1948	11,141.	12,029.	13,510.	17,735.	23,303.	14,937.	3,614.	0.	0.	0.	1,435.	2,252.
1949	3,386.	4,459.	5,834.	12,284.	33,014.	38,244.	27,619.	16,424.	10,725.	10,094.	11,461.	13,047.
1950	14,941.	15,941.	17,400.	24,051.	40,067.	38,077.	30,405.	18,442.	13,502.	11,594.	12,953.	13,803.
1951	15,681.	17,268.	18,519.	22,681.	36,199.	32,595.	19,939.	15,130.	7,380.	6,151.	7,069.	8,310.
1952	10,871.	12,238.	14,376.	23,479.	69,893.	72,100.	63,272.	57,541.	52,425.	48,499.	48,797.	48,745.
1953	50,919.	53,103.	55,649.	58,477.	60,529.	57,934.	46,685.	39,226.	30,702.	28,014.	29,414.	29,732.
1954	31,260.	31,885.	33,886.	35,323.	30,142.	19,728.	12,263.	5,265.	3,195.	2,554.	2,945.	3,535.
1955	4,792.	5,987.	7,236.	10,309.	19,154.	14,498.	5,053.	1,170.	0.	0.	740.	2,181.
1956	3,714.	4,755.	6,427.	11,242.	22,974.	16,757.	6,486.	0.	0.	0.	314.	1,261.
1957	2,518.	3,448.	4,803.	7,835.	22,516.	43,850.	34,876.	31,649.	27,671.	24,954.	26,232.	27,176.
1958	28,337.	29,501.	31,119.	34,540.	63,721.	62,536.	47,868.	36,367.	31,816.	28,775.	29,124.	28,888.
1959	29,757.	31,342.	32,705.	30,890.	29,320.	21,976.	12,687.	7,294.	2,228.	695.	71.	0.
1960	304.	1,200.	2,527.	5,015.	10,983.	5,121.	0.	0.	0.	449.	520.	239.
1961	466.	590.	1,955.	3,902.	2,909.	343.	0.	0.	0.	282.	329.	628.
1962	819.	1,710.	2,510.	11,912.	32,750.	31,718.	21,797.	12,394.	7,330.	7,701.	7,641.	7,223.
1963	7,036.	8,636.	10,626.	12,361.	17,475.	14,308.	3,480.	77.	0.	0.	306.	0.
1964	301.	587.	1,748.	5,328.	22,142.	23,455.	11,901.	2,444.	0.	0.	526.	1,051.
1965	3,170.	4,012.	5,256.	9,298.	29,022.	45,499.	42,424.	39,102.	33,975.	31,660.	31,999.	32,999.
1966	33,916.	35,138.	36,881.	43,703.	46,292.	39,430.	28,216.	17,558.	13,113.	11,853.	12,101.	11,752.
1967	14,529.	15,714.	17,675.	19,753.	35,242.	42,930.	33,888.	23,812.	18,629.	15,631.	16,070.	16,304.
1968	17,432.	18,368.	20,088.	23,008.	41,778.	50,109.	39,442.	35,261.	24,299.	22,220.	22,633.	23,580.
1969	25,043.	26,714.	28,027.	38,769.	64,328.	61,117.	50,907.	42,254.	37,248.	38,399.	38,774.	39,471.
1970	40,672.	42,408.	43,304.	43,429.	56,359.	53,443.	43,122.	31,557.	24,324.	23,946.	24,340.	24,984.
1971	26,198.	28,449.	30,572.	37,231.	51,283.	46,788.	33,995.	23,474.	17,783.	17,535.	18,147.	18,742.
1972	20,824.	21,530.	24,239.	28,028.	30,104.	24,989.	10,158.	970.	0.	1,828.	2,139.	2,474.
1973	3,018.	3,873.	5,191.	7,085.	40,938.	43,143.	34,301.	23,900.	16,817.	14,605.	15,230.	15,950.
1974	17,851.	18,287.	19,715.	22,004.	37,307.	29,227.	18,342.	7,309.	2,430.	1,828.	2,280.	1,752.
1975	2,412.	3,082.	4,643.	5,997.	20,356.	33,107.	26,637.	14,412.	7,122.	4,427.	5,817.	6,409.
1976	6,804.	7,517.	8,446.	11,729.	21,618.	14,762.	3,065.	0.	0.	0.	0.	0.
1977	0.	689.	1,763.	1,977.	0.	0.	0.	0.	0.	0.	0.	0.
1978	0.	0.	2,357.	8,264.	29,058.	37,215.	26,329.	17,144.	12,011.	10,735.	12,054.	13,221.
1979	14,688.	15,664.	17,131.	15,136.	36,339.	36,276.	26,280.	18,931.	11,247.	9,583.	10,434.	11,178.
1980	12,822.	14,073.	15,417.	20,518.	50,023.	60,773.	52,002.	41,963.	39,267.	37,877.	39,085.	40,017.
1981	40,755.	41,704.	42,893.	45,638.	44,236.	37,690.	27,292.	19,304.	16,922.	18,139.	19,162.	20,122.
1982	21,906.	23,300.	24,860.	30,194.	62,137.	72,100.	63,948.	55,424.	49,708.	51,616.	53,903.	54,873.
1983	56,462.	58,470.	60,085.	63,559.	72,100.	72,100.	67,867.	60,461.	50,297.	40,420.	42,499.	45,461.
1984	47,562.	48,993.	47,722.	55,243.	72,100.	72,100.	64,857.	59,063.	51,586.	47,543.	43,056.	46,365.
1985	48,188.	50,165.	52,128.	60,762.	72,100.	66,540.	57,600.	45,521.	41,108.	42,257.	44,112.	45,485.
1986	47,057.	49,524.	52,156.	62,201.	72,100.	72,100.	63,560.	52,961.	46,916.	48,229.	49,374.	51,088.
1987	53,167.	54,959.	57,320.	61,840.	61,299.	54,866.	46,582.	39,707.	34,861.	33,208.	34,764.	36,433.
1988	38,291.	39,456.	41,396.	46,067.	52,538.	45,870.	34,634.	26,086.	21,969.	21,420.	21,829.	23,256.
1989	24,485.	25,945.	28,633.	30,316.	26,834.	20,338.	10,459.	5,619.	2,781.	1,299.	1,810.	2,299.
1990	2,790.	3,482.	4,525.	10,665.	10,494.	7,631.	399.	0.	0.	0.	158.	122.
1991	545.	1,142.	2,566.	5,603.	13,392.	16,496.	7,184.	526.	0.	0.	835.	1,391.
1992	2,169.	2,805.	4,596.	5,670.	1,125.	0.	0.	0.	0.	417.	1,102.	1,704.
1993	2,563.	3,590.	5,491.	10,864.	40,499.	46,197.	35,755.	28,053.	22,450.	0.	0.	0.

TABLE 3.

SCOFIELD RESERVOIR STORAGE WITH NARROWS RESERVOIR - ACRE FEET DATE 03-18-1994 TIME 10:45:20

NARROWS RESERVOIR ACTIVE CAPACITY IS 5,400. AC.FT.

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1946	0.	0.	0.	0.	0.	0.	0.	0.	1,450.	1,632.	3,274.	4,603.
1947	5,509.	6,224.	8,016.	15,029.	35,107.	33,214.	21,771.	17,262.	11,271.	8,023.	9,007.	9,755.
1948	11,232.	12,121.	13,602.	17,827.	23,395.	15,028.	3,703.	0.	0.	0.	1,435.	2,252.
1949	3,386.	4,459.	5,834.	12,284.	33,238.	39,870.	29,234.	18,026.	12,313.	11,673.	13,040.	14,626.
1950	16,520.	17,520.	18,979.	25,630.	41,644.	39,646.	31,963.	19,989.	15,037.	13,121.	14,480.	15,330.
1951	17,208.	18,795.	20,046.	24,208.	37,724.	34,317.	21,646.	16,822.	9,051.	7,807.	8,725.	9,966.
1952	12,527.	13,894.	16,032.	25,135.	72,100.	72,100.	63,272.	57,541.	52,425.	48,499.	48,797.	48,745.
1953	50,919.	53,103.	55,649.	58,477.	60,529.	58,232.	46,982.	39,521.	30,996.	28,307.	29,707.	30,026.
1954	31,553.	32,178.	34,179.	35,616.	30,435.	20,019.	12,550.	5,547.	3,472.	2,830.	3,220.	3,810.
1955	5,067.	6,262.	7,511.	10,584.	19,429.	14,770.	5,320.	1,431.	0.	0.	740.	2,181.
1956	3,714.	4,755.	6,427.	11,242.	22,974.	16,757.	6,486.	0.	0.	0.	314.	1,261.
1957	2,518.	3,448.	4,803.	7,835.	22,516.	46,301.	37,313.	34,072.	30,082.	27,359.	28,637.	29,580.
1958	30,741.	31,906.	33,523.	36,944.	67,514.	67,088.	52,397.	40,875.	36,304.	33,252.	33,601.	33,365.
1959	34,234.	35,819.	37,182.	35,367.	33,791.	26,418.	17,081.	11,628.	6,498.	4,926.	4,303.	3,723.
1960	4,026.	4,923.	6,250.	8,737.	14,691.	8,770.	270.	0.	0.	449.	520.	239.
1961	466.	590.	1,955.	3,902.	2,909.	343.	0.	0.	0.	282.	329.	628.
1962	819.	1,710.	2,510.	11,912.	32,985.	33,921.	23,982.	14,558.	9,466.	9,818.	9,758.	9,340.
1963	9,153.	10,753.	12,743.	14,478.	19,587.	16,400.	5,533.	2,087.	1,012.	0.	306.	0.
1964	301.	587.	1,748.	5,328.	22,142.	23,455.	11,901.	2,444.	0.	0.	526.	1,051.
1965	3,170.	4,012.	5,256.	9,298.	29,022.	46,671.	43,589.	40,262.	35,129.	32,811.	33,151.	34,151.
1966	35,068.	36,290.	38,033.	44,854.	47,442.	40,908.	29,684.	19,015.	14,558.	13,291.	13,538.	13,190.
1967	15,967.	17,152.	19,112.	21,191.	36,677.	45,001.	35,946.	25,857.	20,661.	17,655.	18,094.	18,328.
1968	19,457.	20,392.	22,112.	25,032.	43,799.	53,319.	42,635.	38,437.	27,459.	25,370.	25,784.	26,730.
1969	28,193.	29,864.	31,177.	41,919.	70,081.	68,088.	57,846.	49,164.	44,131.	45,268.	45,642.	46,340.
1970	47,541.	49,276.	50,173.	50,297.	63,221.	60,953.	50,593.	38,991.	31,721.	31,323.	31,717.	32,360.
1971	33,575.	35,826.	37,948.	44,607.	58,651.	54,127.	41,291.	30,727.	24,992.	24,720.	25,332.	25,926.
1972	28,008.	28,714.	31,423.	35,211.	37,278.	32,121.	17,212.	7,911.	3,111.	4,912.	5,223.	5,557.
1973	6,101.	6,956.	8,274.	10,167.	44,012.	46,583.	37,720.	27,297.	20,193.	17,967.	18,592.	19,313.
1974	21,213.	21,650.	23,077.	25,365.	40,664.	32,565.	21,651.	10,575.	5,646.	5,015.	5,467.	4,939.
1975	5,599.	6,269.	7,830.	9,184.	23,532.	37,364.	30,863.	18,603.	11,269.	8,540.	9,931.	10,523.
1976	10,917.	11,630.	12,559.	15,842.	25,721.	18,832.	7,060.	0.	0.	0.	0.	0.
1977	0.	689.	1,763.	1,977.	0.	0.	0.	0.	0.	0.	0.	0.
1978	0.	0.	2,357.	8,264.	29,058.	39,493.	28,591.	19,388.	14,237.	12,949.	14,268.	15,435.
1979	16,902.	17,878.	19,345.	17,350.	38,549.	38,731.	28,717.	21,350.	13,646.	11,970.	12,821.	13,565.
1980	15,209.	16,460.	17,804.	22,905.	52,407.	66,261.	57,464.	47,402.	44,685.	43,284.	44,491.	45,423.
1981	46,161.	47,111.	48,299.	51,044.	49,637.	43,066.	32,631.	24,605.	22,188.	23,386.	24,409.	25,369.
1982	27,153.	28,547.	30,107.	35,441.	67,378.	72,100.	63,948.	55,424.	49,708.	51,616.	53,903.	54,873.
1983	56,462.	58,470.	60,085.	63,559.	72,100.	72,100.	67,867.	60,461.	50,297.	40,420.	42,499.	45,461.
1984	47,562.	48,993.	47,722.	55,243.	72,100.	72,100.	64,857.	59,063.	51,586.	47,543.	43,056.	46,365.
1985	48,188.	50,165.	52,128.	60,762.	72,100.	66,596.	57,656.	45,577.	41,163.	42,313.	44,168.	45,540.
1986	47,113.	49,580.	52,212.	62,256.	72,100.	72,100.	63,560.	52,961.	46,916.	48,229.	49,374.	51,088.
1987	53,167.	54,959.	57,320.	61,840.	61,299.	54,866.	46,582.	39,707.	34,861.	33,208.	34,764.	36,433.
1988	38,291.	39,456.	41,396.	46,067.	52,538.	45,870.	34,634.	26,086.	21,969.	21,420.	21,829.	23,256.
1989	24,485.	25,945.	28,633.	30,316.	26,834.	20,338.	10,459.	5,619.	2,781.	1,299.	1,810.	2,299.
1990	2,790.	3,482.	4,525.	10,665.	10,494.	7,631.	399.	0.	0.	0.	158.	122.
1991	545.	1,142.	2,566.	5,603.	13,392.	16,496.	7,184.	526.	0.	0.	835.	1,391.
1992	2,169.	2,805.	4,596.	5,670.	1,125.	0.	0.	0.	0.	417.	1,102.	1,704.
1993	2,563.	3,590.	5,491.	10,864.	40,802.	48,323.	37,869.	30,155.	24,540.	0.	0.	0.

TABLE 4.

SCOFIELD RESERVOIR SHORTAGES WITH NARROWS RESERVOIR - ACRE FEET DATE 03-18-1994 TIME 10:39:24

NARROWS RESERVOIR ACTIVE CAPACITY IS 14,500. AC.FT.

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL SHORTAGE
1946	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1947	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1948	0.	0.	0.	0.	0.	0.	0.	3,292.	1,362.	323.	0.	0.	4,978.
1949	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1950	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1951	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1952	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1953	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1954	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1955	0.	0.	0.	0.	0.	0.	0.	0.	4,200.	1,492.	0.	0.	5,692.
1956	0.	0.	0.	0.	0.	0.	0.	246.	4,525.	925.	0.	0.	5,695.
1957	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1958	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1959	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	509.	509.
1960	0.	0.	0.	0.	0.	0.	3,054.	3,514.	566.	0.	0.	0.	7,134.
1961	0.	0.	0.	0.	0.	19.	1,688.	645.	100.	0.	0.	0.	2,452.
1962	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1963	0.	0.	0.	0.	0.	0.	0.	0.	827.	2,864.	0.	34.	3,725.
1964	0.	0.	0.	0.	0.	0.	0.	0.	3,169.	1,967.	0.	0.	5,135.
1965	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1966	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1967	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1968	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1969	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1970	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1971	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1972	0.	0.	0.	0.	0.	0.	0.	0.	3,678.	0.	0.	0.	3,678.
1973	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1974	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1975	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1976	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1977	900.	0.	0.	0.	1,442.	2,250.	3,295.	1,487.	1,161.	275.	27.	29.	10,866.
1978	23.	19.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	43.
1979	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1980	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1981	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1982	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1983	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1984	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1985	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1986	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1987	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1988	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1989	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1990	0.	0.	0.	0.	0.	0.	0.	3,136.	964.	243.	0.	0.	4,344.
1991	0.	0.	0.	0.	0.	0.	0.	0.	2,593.	2,597.	0.	0.	5,190.
1992	0.	0.	0.	0.	0.	4,004.	1,601.	1,035.	447.	0.	0.	0.	7,087.
1993	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

GRAND TOTAL 76,471.

TABLE 5.

SCOFIELD RESERVOIR SHORTAGES WITH NARROWS RESERVOIR - ACRE FEET DATE 03-18-1994 TIME 10:51:05

NARROWS RESERVOIR ACTIVE CAPACITY IS 5,400. AC.FT.

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL SHORTAGE
1946	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1947	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1948	0.	0.	0.	0.	0.	0.	0.	3,204.	1,362.	323.	0.	0.	4,890.
1949	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1950	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1951	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1952	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1953	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1954	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1955	0.	0.	0.	0.	0.	0.	0.	0.	3,941.	1,492.	0.	0.	5,433.
1956	0.	0.	0.	0.	0.	0.	0.	246.	4,525.	925.	0.	0.	5,695.
1957	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1958	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1959	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1960	0.	0.	0.	0.	0.	0.	0.	3,246.	566.	0.	0.	0.	3,813.
1961	0.	0.	0.	0.	0.	19.	1,688.	645.	100.	0.	0.	0.	2,452.
1962	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1963	0.	0.	0.	0.	0.	0.	0.	0.	0.	1,857.	0.	34.	1,891.
1964	0.	0.	0.	0.	0.	0.	0.	0.	3,169.	1,967.	0.	0.	5,135.
1965	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1966	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1967	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1968	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1969	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1970	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1971	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1972	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1973	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1974	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1975	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1976	0.	0.	0.	0.	0.	0.	0.	1,479.	2,879.	933.	200.	500.	5,990.
1977	900.	0.	0.	0.	1,442.	2,250.	3,295.	1,487.	1,161.	275.	27.	29.	10,866.
1978	23.	19.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	43.
1979	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1980	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1981	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1982	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1983	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1984	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1985	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1986	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1987	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1988	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1989	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1990	0.	0.	0.	0.	0.	0.	0.	3,136.	964.	243.	0.	0.	4,344.
1991	0.	0.	0.	0.	0.	0.	0.	0.	2,593.	2,597.	0.	0.	5,190.
1992	0.	0.	0.	0.	0.	4,004.	1,601.	1,035.	447.	0.	0.	0.	7,087.
1993	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

GRAND TOTAL 62,829.

TABLE 6.

NARROWS RESERVOIR ACTIVE STORAGE - ACRE FEET DATE 03-18-1994 TIME 10:37:12

NARROWS RESERVOIR ACTIVE CAPACITY IS 14,500. AC.FT.

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1946	0.	0.	0.	0.	0.	0.	0.	0.	14,500.	14,417.	14,365.	14,293.
1947	14,192.	14,094.	14,029.	14,500.	14,500.	14,500.	12,866.	11,042.	10,066.	9,984.	9,940.	9,868.
1948	9,767.	9,665.	9,560.	9,834.	12,340.	12,903.	11,202.	9,168.	8,097.	7,922.	7,846.	7,765.
1949	7,677.	7,591.	7,532.	8,691.	13,136.	14,491.	12,882.	10,992.	9,973.	9,862.	9,775.	9,665.
1950	9,547.	9,434.	9,351.	9,899.	12,864.	13,962.	12,332.	10,438.	9,486.	9,367.	9,388.	9,313.
1951	9,211.	9,111.	9,036.	9,774.	12,944.	14,085.	12,489.	10,689.	9,700.	9,641.	9,603.	9,537.
1952	9,453.	9,373.	9,311.	9,908.	14,500.	14,500.	13,316.	11,678.	10,793.	10,727.	10,709.	10,636.
1953	10,538.	10,442.	10,371.	10,642.	12,855.	14,500.	12,961.	11,176.	10,221.	10,129.	10,108.	10,066.
1954	10,015.	9,977.	9,951.	10,813.	12,465.	12,761.	10,998.	9,038.	8,047.	7,938.	7,877.	7,783.
1955	7,683.	7,585.	7,511.	7,738.	10,177.	10,961.	9,269.	7,432.	6,372.	6,201.	6,091.	5,976.
1956	5,859.	5,745.	5,669.	6,494.	9,544.	10,182.	8,499.	6,483.	5,428.	5,261.	5,177.	5,066.
1957	4,955.	4,861.	4,802.	5,031.	7,522.	12,593.	11,346.	9,590.	8,642.	8,607.	8,609.	8,541.
1958	8,457.	8,379.	8,337.	8,796.	13,780.	14,500.	12,895.	11,065.	10,049.	9,917.	9,847.	9,759.
1959	9,667.	9,569.	9,481.	9,695.	11,440.	11,980.	10,264.	8,306.	7,272.	7,146.	7,060.	6,936.
1960	6,798.	6,669.	6,598.	6,890.	9,417.	10,066.	8,112.	6,099.	5,047.	4,926.	4,855.	4,772.
1961	4,661.	4,554.	4,455.	4,728.	5,860.	5,759.	3,844.	1,868.	850.	757.	700.	615.
1962	530.	497.	462.	1,341.	6,090.	8,053.	6,702.	4,978.	4,083.	4,004.	3,944.	3,838.
1963	3,701.	3,587.	3,474.	3,539.	6,524.	7,483.	5,873.	4,109.	3,071.	2,913.	2,827.	2,703.
1964	2,618.	2,539.	2,454.	2,575.	5,568.	7,335.	5,894.	4,140.	3,102.	2,943.	2,857.	2,809.
1965	2,765.	2,711.	2,643.	2,902.	5,877.	8,757.	7,469.	5,955.	5,294.	5,380.	5,420.	5,397.
1966	5,356.	5,320.	5,353.	6,432.	8,635.	8,962.	7,158.	5,340.	4,365.	4,336.	4,269.	4,193.
1967	4,092.	3,994.	3,910.	4,032.	7,049.	9,451.	7,986.	6,189.	5,249.	5,158.	5,099.	5,041.
1968	4,988.	4,940.	4,896.	5,076.	7,714.	10,484.	8,889.	7,140.	6,226.	6,186.	6,153.	6,082.
1969	5,995.	5,912.	5,855.	6,512.	12,929.	14,119.	12,581.	10,726.	9,786.	9,772.	9,777.	9,756.
1970	9,731.	9,682.	9,662.	9,837.	13,384.	14,500.	12,904.	10,993.	10,013.	9,947.	9,933.	9,965.
1971	10,026.	9,962.	9,916.	10,256.	12,989.	14,005.	12,318.	10,402.	9,417.	9,342.	9,310.	9,292.
1972	9,286.	9,267.	9,434.	10,145.	12,062.	12,454.	10,612.	8,630.	7,563.	7,485.	7,454.	7,396.
1973	7,328.	7,260.	7,218.	7,425.	11,278.	12,929.	11,327.	9,422.	8,457.	8,366.	8,322.	8,277.
1974	8,252.	8,203.	8,152.	8,363.	11,961.	12,531.	10,742.	8,773.	7,730.	7,607.	7,535.	7,440.
1975	7,355.	7,273.	7,188.	7,235.	8,903.	13,481.	12,271.	10,461.	9,490.	9,447.	9,437.	9,421.
1976	9,403.	9,376.	9,324.	9,541.	12,275.	12,708.	10,916.	8,883.	7,815.	7,640.	7,520.	7,396.
1977	7,272.	7,170.	7,071.	7,360.	7,334.	7,222.	5,292.	3,302.	2,270.	2,116.	1,996.	1,872.
1978	1,748.	1,635.	1,554.	2,049.	5,470.	9,207.	7,693.	5,916.	4,943.	4,739.	4,700.	4,610.
1979	4,518.	4,430.	4,339.	4,535.	7,842.	9,308.	7,629.	5,735.	4,733.	4,632.	4,560.	4,492.
1980	4,424.	4,360.	4,292.	4,742.	8,238.	12,259.	10,794.	8,936.	7,993.	7,925.	7,897.	7,841.
1981	7,779.	7,717.	7,704.	8,458.	10,340.	11,005.	9,219.	7,266.	6,261.	6,213.	6,171.	6,087.
1982	5,978.	5,872.	5,788.	6,353.	10,996.	13,224.	11,785.	9,961.	9,095.	9,305.	9,498.	9,584.
1983	9,630.	9,659.	9,740.	10,024.	12,378.	14,500.	14,043.	12,396.	11,573.	11,665.	11,766.	11,880.
1984	11,955.	12,011.	12,058.	12,355.	14,500.	14,500.	13,252.	11,498.	10,593.	10,653.	10,720.	10,787.
1985	10,840.	10,850.	10,864.	12,428.	14,500.	14,500.	12,947.	11,077.	10,106.	10,073.	10,098.	10,102.
1986	10,106.	10,125.	10,229.	11,183.	14,500.	14,500.	12,940.	11,082.	10,137.	10,138.	10,173.	10,135.
1987	10,032.	9,927.	9,842.	10,720.	12,329.	12,620.	10,836.	8,884.	7,865.	7,746.	7,670.	7,577.
1988	7,494.	7,416.	7,352.	7,781.	10,484.	10,938.	9,143.	7,201.	6,188.	6,083.	6,053.	6,003.
1989	5,949.	5,876.	5,864.	6,980.	8,546.	8,877.	7,108.	5,159.	4,172.	4,046.	4,095.	4,003.
1990	3,908.	3,823.	3,746.	4,597.	6,200.	6,655.	4,925.	2,938.	1,909.	1,757.	1,639.	1,551.
1991	1,464.	1,384.	1,306.	1,420.	4,259.	6,020.	4,413.	2,579.	1,554.	1,403.	1,368.	1,309.
1992	1,216.	1,117.	1,092.	1,809.	2,534.	2,462.	589.	0.	0.	0.	0.	0.
1993	0.	0.	5.	433.	5,697.	7,517.	5,946.	4,091.	3,124.	0.	0.	0.

TABLE 7.

NARROWS RESERVOIR ACTIVE STORAGE - ACRE FEET DATE 03-18-1994 TIME 10:44:16

NARROWS RESERVOIR ACTIVE CAPACITY IS 5,400. AC.FT.

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1946	0.	0.	0.	0.	0.	0.	0.	0.	5,400.	5,342.	5,290.	5,218.
1947	5,117.	5,019.	4,954.	5,400.	5,400.	5,400.	3,840.	2,082.	1,165.	1,116.	1,072.	1,000.
1948	899.	797.	692.	967.	3,489.	4,112.	2,488.	528.	0.	0.	0.	0.
1949	0.	0.	0.	1,160.	5,400.	5,400.	3,864.	2,041.	1,082.	1,004.	917.	806.
1950	689.	576.	492.	1,042.	4,022.	5,178.	3,620.	1,792.	899.	813.	834.	759.
1951	657.	557.	483.	1,221.	4,406.	5,400.	3,874.	2,139.	1,207.	1,179.	1,141.	1,076.
1952	991.	912.	849.	1,448.	5,400.	5,400.	4,288.	2,715.	1,885.	1,850.	1,832.	1,759.
1953	1,661.	1,565.	1,494.	1,765.	3,994.	5,400.	3,934.	2,215.	1,318.	1,259.	1,238.	1,196.
1954	1,145.	1,107.	1,081.	1,944.	3,611.	3,966.	2,282.	397.	0.	0.	0.	0.
1955	0.	0.	0.	227.	2,681.	3,521.	1,900.	132.	0.	0.	0.	0.
1956	0.	0.	0.	825.	3,887.	4,565.	2,934.	969.	0.	0.	0.	0.
1957	0.	0.	0.	229.	2,732.	5,400.	4,213.	2,511.	1,610.	1,602.	1,604.	1,536.
1958	1,452.	1,374.	1,332.	1,791.	5,400.	5,400.	3,868.	2,104.	1,148.	1,049.	979.	891.
1959	799.	701.	613.	828.	2,589.	3,194.	1,560.	0.	0.	0.	0.	0.
1960	0.	0.	0.	293.	2,833.	3,532.	1,913.	0.	0.	0.	0.	0.
1961	0.	0.	0.	274.	1,417.	1,359.	0.	0.	0.	0.	0.	0.
1962	0.	0.	0.	879.	5,400.	5,400.	4,074.	2,374.	1,500.	1,432.	1,373.	1,266.
1963	1,129.	1,016.	903.	968.	3,959.	4,938.	3,353.	1,614.	741.	596.	510.	386.
1964	301.	221.	137.	258.	3,257.	5,043.	3,624.	1,892.	873.	727.	641.	592.
1965	549.	494.	426.	685.	3,667.	5,400.	4,143.	2,657.	2,021.	2,121.	2,161.	2,138.
1966	2,097.	2,062.	2,095.	3,173.	5,383.	5,400.	3,629.	1,843.	897.	885.	817.	742.
1967	641.	543.	459.	581.	3,606.	5,400.	3,972.	2,209.	1,300.	1,226.	1,167.	1,109.
1968	1,057.	1,008.	964.	1,145.	3,791.	5,400.	3,850.	2,143.	1,267.	1,248.	1,215.	1,144.
1969	1,057.	973.	916.	1,574.	5,400.	5,400.	3,933.	2,142.	1,259.	1,277.	1,282.	1,261.
1970	1,236.	1,187.	1,167.	1,342.	4,904.	5,400.	3,877.	2,034.	1,112.	1,079.	1,065.	1,098.
1971	1,159.	1,095.	1,049.	1,390.	4,137.	5,211.	3,596.	1,747.	821.	780.	748.	730.
1972	723.	705.	872.	1,583.	3,516.	3,966.	2,201.	293.	0.	0.	0.	0.
1973	0.	0.	0.	208.	4,075.	5,400.	3,860.	2,013.	1,100.	1,038.	994.	949.
1974	924.	875.	824.	1,036.	4,647.	5,265.	3,539.	1,627.	637.	544.	472.	376.
1975	292.	209.	124.	172.	1,855.	5,400.	4,256.	2,505.	1,587.	1,572.	1,562.	1,546.
1976	1,528.	1,502.	1,449.	1,667.	4,414.	4,899.	3,174.	1,205.	195.	53.	0.	0.
1977	0.	0.	0.	290.	280.	238.	0.	0.	0.	0.	0.	0.
1978	0.	0.	0.	496.	3,920.	5,400.	3,920.	2,176.	1,233.	1,046.	1,007.	916.
1979	825.	736.	645.	842.	4,157.	5,400.	3,756.	1,897.	926.	843.	771.	703.
1980	636.	571.	503.	954.	4,457.	5,400.	3,993.	2,187.	1,292.	1,250.	1,222.	1,166.
1981	1,104.	1,042.	1,029.	1,784.	3,678.	4,390.	2,666.	771.	0.	0.	0.	0.
1982	0.	0.	0.	566.	5,220.	5,400.	4,025.	2,260.	1,446.	1,684.	1,877.	1,963.
1983	2,010.	2,039.	2,120.	2,404.	4,771.	5,400.	5,014.	3,429.	2,658.	2,779.	2,880.	2,994.
1984	3,069.	3,125.	3,172.	3,469.	5,400.	5,400.	4,224.	2,535.	1,687.	1,778.	1,845.	1,912.
1985	1,966.	1,975.	1,989.	3,553.	5,400.	5,400.	3,920.	2,116.	1,205.	1,204.	1,230.	1,233.
1986	1,237.	1,257.	1,360.	2,315.	5,400.	5,400.	3,913.	2,122.	1,236.	1,269.	1,304.	1,266.
1987	1,163.	1,058.	973.	1,852.	3,476.	3,827.	2,122.	247.	0.	0.	0.	0.
1988	0.	0.	0.	429.	3,147.	3,654.	1,929.	55.	0.	0.	0.	0.
1989	0.	0.	0.	1,117.	2,694.	3,072.	1,364.	0.	0.	0.	49.	0.
1990	0.	0.	0.	852.	2,463.	2,950.	1,264.	0.	0.	0.	0.	0.
1991	0.	0.	0.	115.	2,957.	4,730.	3,136.	1,316.	304.	162.	127.	67.
1992	0.	0.	0.	717.	1,444.	1,385.	0.	0.	0.	0.	0.	0.
1993	0.	0.	5.	433.	5,400.	5,400.	3,850.	2,015.	1,066.	0.	0.	0.

TABLE 8.

NARROWS RESERVOIR RELEASES TO COTTONWOOD CANYON - ACRE FEET DATE 03-18-1994 TIME 10:35:35

NARROWS RESERVOIR ACTIVE CAPACITY IS 14,500. AC.FT.

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL	SHORTAGE
1946	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1947	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1948	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1949	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1950	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1951	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1952	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1953	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1954	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1955	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1956	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1957	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1958	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1959	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1960	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1961	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1962	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1963	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1964	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1965	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1966	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1967	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1968	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1969	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1970	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1971	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1972	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1973	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1974	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1975	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1976	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1977	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1978	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1979	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1980	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1981	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1982	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1983	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1984	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1985	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1986	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1987	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1988	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1989	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1990	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1991	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1992	124	113	124	0	0	0	1800	562	0	56	25	18	2,822.	2,578.
1993	40	53	124	0	0	0	1800	1900	971	124	120	124	5,257.	143.
GRAND TOTALS													256,479.	2,721.

TABLE 9.

NARROWS RESERVOIR RELEASES TO COTTONWOOD CANYON - ACRE FEET DATE 03-18-1994 TIME 10:43:10

NARROWS RESERVOIR ACTIVE CAPACITY IS 5,400. AC.FT.

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL	SHORTAGE
1946	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1947	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1948	124	113	124	0	0	0	1800	1900	498	0	44	43	4,646.	754.
1949	36	27	65	0	0	0	1800	1900	971	124	120	124	5,167.	233.
1950	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1951	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1952	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1953	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1954	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1955	23	15	51	0	0	0	1800	1900	446	50	59	30	4,647.	753.
1956	6	0	49	0	0	0	1800	1900	108	0	10	10	3,916.	1,484.
1957	13	20	65	0	0	0	1800	1900	932	0	36	13	4,736.	664.
1958	124	113	124	0	0	0	1800	1900	971	124	120	124	5,137.	263.
1959	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1960	0	0	53	0	0	0	1800	1583	10	31	33	0	3,819.	1,581.
1961	13	6	25	0	0	0	1800	1861	0	29	49	42	3,833.	1,567.
1962	39	79	90	0	0	0	1306	0	0	37	63	39	1,489.	3,911.
1963	124	113	124	0	0	0	1800	1900	971	124	120	124	5,247.	153.
1964	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1965	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1966	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1967	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1968	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1969	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1970	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1971	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1972	124	113	124	0	0	0	1800	1900	331	80	89	66	4,627.	773.
1973	56	45	82	0	0	0	1800	1900	971	124	120	124	5,222.	178.
1974	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1975	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1976	124	113	124	0	0	0	1800	1900	971	124	53	0	5,209.	191.
1977	0	11	25	0	0	0	215	0	0	0	0	0	251.	5,149.
1978	0	0	43	0	0	0	1800	1900	971	124	120	124	5,082.	318.
1979	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1980	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1981	124	113	124	0	0	0	1800	1900	791	106	78	40	5,075.	325.
1982	16	6	40	0	0	0	1800	1900	971	124	120	124	5,101.	299.
1983	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1984	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1985	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1986	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1987	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1988	42	35	60	0	0	0	1800	1900	270	39	44	31	4,445.	955.
1989	70	40	112	0	0	0	1800	1378	78	48	90	74	4,127.	1,273.
1990	29	28	47	0	0	0	1800	1223	37	20	120	81	3,658.	1,742.
1991	37	33	46	0	0	0	1800	1900	0	0	2	36	3,164.	2,236.
1992	98	15	99	0	0	0	1800	1900	971	124	120	124	5,155.	245.
1993	40	53	124	0	0	0	1332	0	0	56	25	18	1,642.	3,758.
1994	124	113	124	0	0	0	1800	1900	971	124	120	124	5,257.	143.
GRAND TOTALS													230,252.	28,948.

Scofield Reservoir Storage with Larger Narrows Option
Comparison of Murdock Simulation to DEIS Simulation

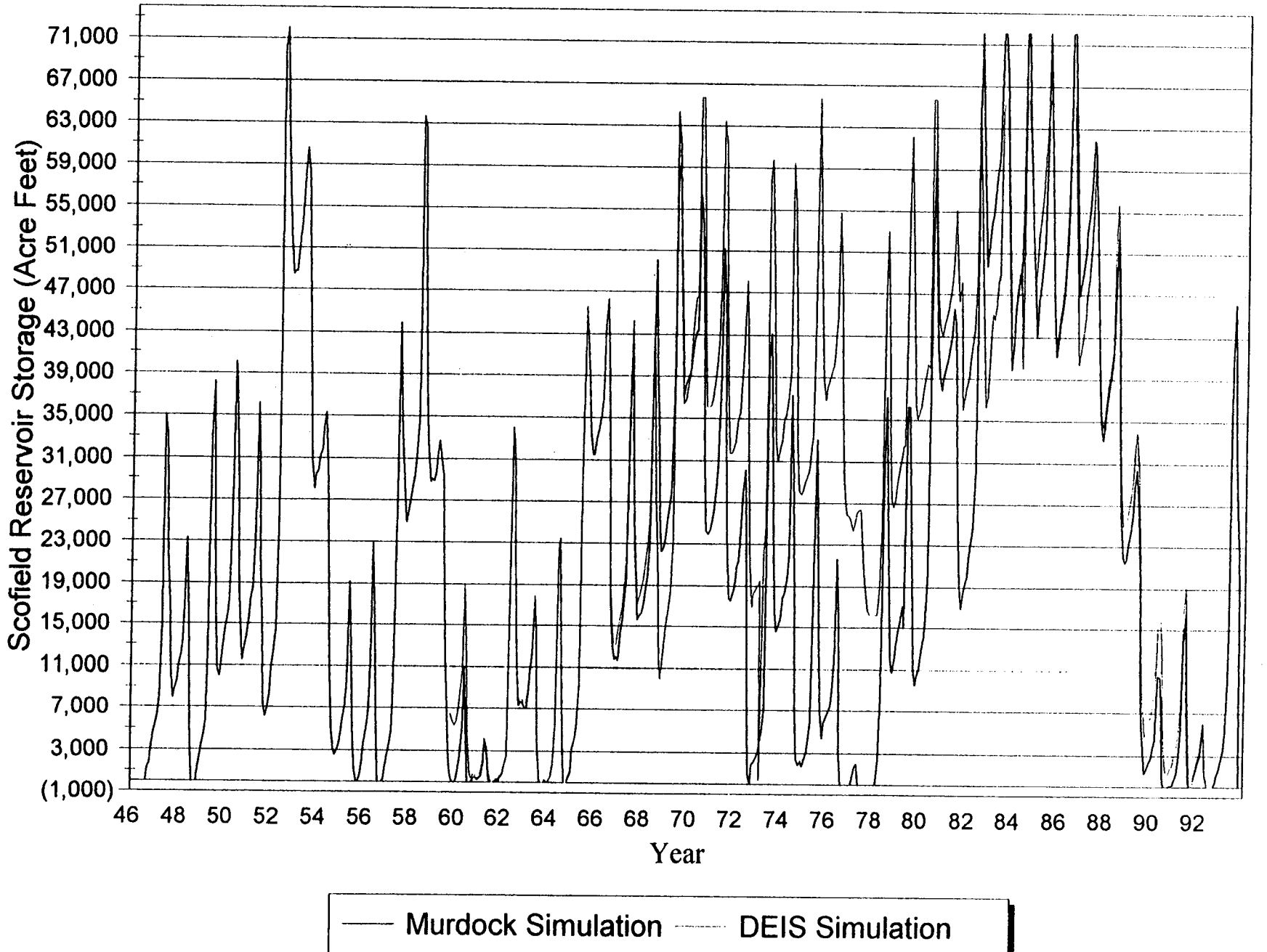

EXHIBIT "B"

235. Water Conservation as an Alternative

An expanded discussion of water conservation as an alternative to the project has been added to Chapter 2 of the EIS.

236. Inadequate Analysis of Alternatives

The Sponsor believes that the alternatives were analyzed and discussed in sufficient detail. Three alternatives were evaluated in detail in the EIS, the Recommended Plan, the Smaller Reservoir Plan, and the No Action Plan. As stated in the final EIS, six other alternatives were considered but were determined to be nonviable. The reasons that these alternatives were determined to be nonviable are also described in Chapter 2 of the EIS.

237. Inadequate Discussion of Non-viable Alternatives

Because the alternatives in question are not viable, a detailed analysis of the impacts of these alternatives is not required nor appropriate.

238. Alternatives to Provide Supplemental Water

Alternative methods of providing a supplemental water supply for north Sanpete County are described in Chapter 3. Unfortunately, including the No Action Plan, only three of those alternatives are viable. The Sponsor has been unable to identify any other reasonable alternatives to the project.

239. Areas of Higher Transmissibility

In addition to the discussion on transmissibility, the EIS also provides a description of the specific capacities of existing wells within the project area as described in the USGS Water-Supply Paper 1896. The specific capacity is a function of transmissibility. As stated in the EIS,

> Specific capacities of existing wells range from 2 gpm/ft to 42 gpm/ft, with most being in the lower range. The locations of the few wells with higher specific capacities are quite random and there are only four wells in the area with specific capacities in the 40 gpm/ft range.

These numbers do not reflect the numerous dry wells that have been drilled. In order to keep well drawdown within present levels, a total of 23 new 1,200 gpm wells would need to be drilled. The specific capacity of these wells would need to be at least 40 gpm/ft. As stated previously, there are only four wells within the project area with specific capacities near 40 gpm. Therefore it is highly doubtful that 23 new wells could be successfully developed. In addition, the impact of these new wells on existing wells needs to be considered. A discussion of those impacts is included in Chapter 2 of the EIS.

240. State Engineer's Policy

The EIS has been revised to quote the State Engineer's policy for additional ground water development in the Sanpete Valley.

241. Critical Flaw

The Sponsor does not believe that there is a critical flaw in the EIS. Please refer to the responses to comments 235 through 240.

242. Need for the Project

References have been added to Chapter 1 of the EIS to document and support the statements of need for the project. Also, please refer to the response to comment DWR-2. Please refer to letter from Mt. Pleasant City Corporation dated March 30, 1994, in Attachment F of the EIS.

243. Data to Support Statements of Need

Please refer to the response to comment 242.

244. Alternatives for Recreation at Other Sites Outside the Project Area

Providing recreation facilities at Jordanelle Reservoir or at other sites outside the project area does not satisfy the purpose of the project and is beyond the scope of the EIS. The Sponsor has documented the need for additional recreation facilities within the Manti-La Sal National Forest.

245. Underestimation of Impacts on Water Stored in Scofield Reservoir

The Sponsor believes that its analysis of the impacts on the quantity of water stored in and released from Scofield Reservoir is correct and adequate. The Sponsor's studies were reviewed by the Utah Division of Water Rights and the methodology and assumptions used in the studies were determined to be conservative. The Sponsor believes that the 33-year-period used in its analyses is more than adequate to identify impacts of the project.

246. Social and Economic Costs

A discussion of the economic benefits of the municipal water developed by the project has been included in Chapter 3 of the EIS.

247. Cost of Conservation Measures

As described in Chapter 2 of the EIS, the majority of irrigators in the project area have already implemented conservation measures. Many others currently are working on plans to implement conservation measures such as installation of pipelines and sprinkler systems. Implementation of these project measures is part of the future without project condition and not a project cost.

248. Costs of Transferring Water in Carbon County

A discussion on the cost of transferring water from its present agricultural, municipal, and industrial uses in Carbon County has been added to Chapter 3 of the EIS.

249. Incomplete and Inaccurate Picture of Project Benefits

A statement of the estimated direct cost of project water to water users has been added to Chapter 3 of the EIS.

250. Impacts on Carbon County

Please refer to the response to comment 14.

251. Conflict Between Narrows Project and New Reclamation Policies

The Narrows Project is not a traditional Reclamation project and is therefore not subject to the "new Bureau of Reclamation policies." The Sanpete Water Conservancy District is the Project Sponsor. The Sponsor has applied for loans and grants from reclamation under the provisions of the SRPA (PL 84-984). Reclamation's loan program guidelines state:

> Key provisions of the small project legislation are simplified planning, review, and authorizing procedures; and provisions whereby the local sponsor would be in charge, and with their consultant, make the key decisions within broad Federal guidelines."

In planning the Narrows Project, the Sponsor has followed Reclamation's guidelines.

252. Integrated Water Resources Management

The Sponsor endeavored at length to formulate the project plan on the basis of integrated water resources management. In addition to developing a project in accordance with long-standing agreements, the Sponsor has included other purposes in the project such as a municipal water supply, and measures for fish and wildlife, water quality, wetlands, and recreation. Conservation measures have been considered and are included in the project plan.

253. Stabilization of Middle Gooseberry Creek

This mitigation measure has been included in the project plan at the recommendation of the FWS and the UDWR. The EIS has been revised to indicate that final designs for middle Gooseberry Creek would be developed by the Sponsor in coordination with several resource management agencies. However, it is proper to assume that lower flows and controlled releases from the proposed Narrows Dam would reduce the potential for erosion. The current condition of Middle Gooseberry includes unfenced streams with open cut banks. Stream stabilization is

an accepted practice and numerous stream improvement projects have been constructed throughout the United States that have resulted in reduced sediment transportation. Stream improvement was also identified as a practical water quality improvement measure in the Phase II Clean Lakes report for Scofield Reservoir.

The description of water quality mitigation measures in the EIS has been revised to include improvements on other streams in addition to Mud Creek. The proposed mitigation plan described in Chapter 3 is expansion and continuation of the work performed under the Phase II Clean Lakes program. In the report entitled *"Scofield Reservoir Restoration Through Phosphorus Control"* the Utah Department of Environmental Quality concluded: *"the most pragmatic and effective means to control the further eutrophication of Scofield Reservoir, or possibly to effect a moderate reversal of the eutrophication process, appears to be a reduction of the phosphorus load to the lake."*

254. Types and Quantities of Sediments to be Prevented From Entering Scofield Reservoir

The water quality section of Chapter 3 has been revised. In evaluating the effectiveness of its Phase II Clean Lakes measures, the Utah Department of Environmental Quality states:

> *"Although insufficient water quality data exists to determine annual average concentrations, from a review of the total phosphorus concentrations during recent years and the fact that flow rates to the reservoir have decline[d] in recent years, there is an indication that the external loading to the reservoir has declined."*

In other words, the Utah Department of Environmental Quality believes that the stream stabilization is effective in reducing phosphorus loading to the reservoir, but there is insufficient data to quantify the exact amount of the phosphorus reduction.

255. Identification of Wetlands Mitigation Site

The water quality section of Chapter 3 has been revised.

256. Contact With Landowners

Negotiations with the land owners for purchase would not begin until NEPA compliance is completed and the Record of Decision has been signed.

257. Discussion of Probability of Implementing Mitigation

This comment fails to recognize that purchase of property for a project is not required prior to the final EIS. All that is required from the Sponsor is a commitment to do so. The Sponsor has committed to provide mitigation concurrent with project construction. If the Sponsor is not successful in acquiring the described mitigation site, other equivalent mitigation at an alternative site would be provided.

258. Period of Study Inadequate

It is believed that the comment refers to Figure 3-2 and not to Table 3-2. The water quality section of Chapter 3 has been revised to include additional data found in the Utah Department of Environmental Quality's Phase II Clean Lakes report. This analysis covers a longer period of study.

259. Effects of Temperature on Water Quality

The Sponsor believes that the revised water quality analysis presented in Chapter 3 takes into consideration the effects of temperature on water quality. The analysis correlates TSI with the annual minimum reservoir content. As indicated in the comment, the temperature profile of the reservoir is affected by the reservoir content and is therefore taken into account.

260. Construction and Recreation Impacts on Scofield Water Quality

BMP's would be developed to control water quality impacts during construction. (Please refer to the response to comment 147.) In addition, adequate sanitation facilities are included as part of the recreation area to prevent water quality impacts from the recreation area.

261. Description of Mitigation for Lost Spawning Habitat Too General

The Fish and Wildlife Coordination Act Report which was prepared by the FWS with concurrence by the UDWR makes recommendations for mitigating the impacts to fisheries. A copy of the Coordination Act Report is included as an attachment to the EIS. The EIS has been revised to include the recommended mitigation measures.

262. Less Than 1:1 Mitigation

The fishery mitigation described in the EIS has been revised to include the recommendations contained in the Fish and Wildlife Coordination Act report and provide greater than 1:1 mitigation.

263. Monitoring Plans

The EIS has also been revised to discuss monitoring of fishery mitigation measures.

264. Number of Fish Killed in Scofield Reservoir

It is not possible to accurately predict the number of fish that might be killed in Scofield Reservoir. The Sponsor did obtain copies of records from the UDWR which document historical fish kills. Many of these reports did not quantify the number of dead fish and simply stated that numerous dead fish were observed. Other reports provided specific numbers of dead fish found. These ranged from 7 to 25 dead fish at any given time. It is doubtful, however, that this represents the total number of fish killed. The EIS does describe project measures which are

expected to help improve water quality in Scofield Reservoir and reduce the potential for increased fish kills.

265. Water Management Plan for Narrows Reservoir

Although a detailed water management plan has not yet been developed for Narrows Reservoir, discussion with the UDWR indicate that the plan would include stocking Colorado Cutthroat Trout, possibly supplemented with sterilized Rainbows. It is estimated that up to 60,000 fingerlings per year would be stocked under the Recommended Plan and up to 30,000 per year under the Smaller Reservoir Plan. The UDWR indicates that it would be able to meet these stocking quotas.

266. Possible Adverse Impacts on the Value of Lakeside Property

It is not possible to determine whether or not the project would have an adverse impact on the value of lakeside property. There are too many external variables such as supply and demand and local, regional, and national economic conditions.

267. Effects on Businesses

The EIS has been revised to describe effects of the projects on businesses adjacent to Scofield Reservoir.

268. Impacts to wetlands

Descriptions of types of wetland communities impacted by the project are in Chapter 3 of the EIS.

With respect to wetland impacts along middle Gooseberry Creek, Chapter 3, Wildlife, Impacts of the EIS indicates:

> Because the depth of flow in the stream would not be significantly reduced under the project, the depth of the groundwater table adjacent to the stream should not be decreased. Therefore, the riparian vegetation should not be adversely affected by the project.

With respect to wetland impacts along Cottonwood Creek, Chapter 3, Impacts, Recommended Plan, Vegetation of the EIS indicates:

> A total of 1.5 acres of riparian vegetation, mostly willows, would be lost due to an average 2.5-foot channel widening over 4.9 miles of stream.

Mitigation for this impact would be provided by the alternative wetland mitigation measures described in Chapter 2 of the EIS.

269. Cost of Implementing Wetland Mitigation and Water Requirements

The cost of implementing the wetland mitigation is included in the total project cost listed in Table 2-5 of the EIS. The Sponsor believes that there is sufficient water associated with this property to perform the wetland mitigation. Chapters 2 and 3 of the EIS indicate that monitoring of wetland mitigation measures would be provided to ensure that wetland values achieved by the mitigation is at least equal to the value of the wetlands lost. The FWS's HEP would be used to determine the value of the wetlands.

270. Water for Wetland Mitigation

There is sufficient water associated with the proposed Mud Creek wetland mitigation area to accomplish the wetland mitigation. It is estimated that the wetland mitigation adjacent to Narrows Reservoir would consumptively use an additional 100 acre-feet of water above that used by the present vegetation. This water would be taken from the Sponsor's present water rights and would therefore not increase the impact to the Price River system beyond that described in the EIS.

As indicated previously, monitoring would be provided to ensure that wetland values provided through mitigation are at least equal to wetland values lost. The proposed reservoir would provide the function of smoothing high flows in Gooseberry Creek.

271. Water Supply for Mitigation Measures

Most of the supplies for the mitigation measures are clearly described in the EIS. The release from Fairview Lakes is described in Chapter 2 of the EIS as a change in operations. The total annual amount of release from Fairview Lakes would "not change" but would be spread over the entire year. It describes this water as belonging to Cottonwood-Gooseberry Irrigation Company and that it would be captured during the non-irrigation season in Narrows Reservoir for subsequent release when called upon by the Cottonwood-Gooseberry Irrigation Company.

Water released to Cottonwood Creek to maintain 2 cfs in the winter would be a part of the project water supply of 5,540 acre-feet. The water released for this instream flow maintenance is described in Chapter 2 as being stored in Wales Reservoir.

Water for the wetlands mitigation measures would be acquired as needed following negotiation with the State. Please refer to the response to comment 232.

Water released from Narrows Reservoir for channel maintenance would be available for downstream storage. It would be released from the carryover storage of the reservoir. Therefore, this 300 acre-feet per year would not reduce the amount that could be diverted to Sanpete County. Chapter 2 of the EIS has been modified to accommodate this comment.

272. Faults

The purpose of the EIS is to identify environmental concerns related to the proposed project. It is not intended to be a detailed geology nor design report on the dam construction. It is unreasonable to require complete final designs before environmental compliance approvals are obtained. Please refer to the responses to comment 91. For additional information on geotechnical information about the dam, refer to the studies identified in the Bibliography of the EIS.

273. Construction Data

Please refer to the response to comment 272.

274. Detailed Surface Geology Study

Please refer to the response to comment 272.

275. Range of Alternatives

Please refer to the responses to comments 235 through 241.

276. Failure to Adequately Identify and Analyze Project Impacts

Please refer to the responses to comments 245 through 250, 253 through 260, and 268 through 274.

277. Bureau of Reclamation Policies

Please refer to the responses to comments 251 and 252.

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March 31, 1994

Narrows Comments

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Regional Environmental Officer
Bureau of Reclamation
125 South State Street
P.O. Box 11568
Salt Lake City, UT 84147

RE: Statement at Public Hearing on March 31, 1994, in Price, Utah, concerning the Draft Environmental Impact Statement for the Gooseberry Narrows Project.

Dear Sir:

Attached to this letter is a copy of the statement I made on behalf of the Carbon Water Committee at the Public Hearing on March 31, 1994, in Price, Utah, concerning the Draft Environmental Impact Statement for the Gooseberry Narrows Project.

I am forwarding this statement to you because Mr. Scott Lovelace, the hearing officer, indicated that all persons making oral statements at the hearing were required to file a copy of such statement with the Bureau of Reclamation by April 5, 1994 in order for their statements to be considered by the Bureau. I question whether this requirement is justified since each word spoken at the hearing was recorded and is presumably already part of the record. I understand that written comments on the DEIS are due April 26, 1994, and reserve the right to supplement these comments by that time.

I appreciate your careful consideration of my comments and the issues that they raise.

Sincerely,

Richard Lee

Richard Lee, Chairman
Carbon Water Committee

NOTICE. IF YOU DETACH
ENCLOSURES, PLEASE INSERT
CODE NO. _____

COMMENTS ON GOOSEBERRY NARROWS PROJECT DRAFT ENVIRONMENTAL IMPACT STATEMENT

By
Richard Lee, Chairman
Carbon Water Committee

278 **1. The Draft Environmental Impact Statement (DEIS) does not adequately discuss alternatives to the Gooseberry Narrows Project.**

The DEIS states that 8 alternative projects were analyzed. However, the DEIS only briefly discusses 5 out of the 8 alternatives before dismissing those 5 alternatives as infeasible. Since 1 of the remaining 3 alternatives discussed in the DEIS was the "no action" alternative, the result is that the DEIS actually examined only 2 alternatives. In light of the fact that the Project will cost $16 million and will clearly have several significant environmental and socioeconomic impacts, the other alternatives should have been more thoroughly analyzed and discussed in the DEIS.

The DEIS failed to analyze the alternative of ground water development in Sanpete County. According to the USGS study No. 1896 (Ground water hydrology of the San Pitch water basin) (1971), Sanpete County has ample ground water supplies that could be developed.

The DEIS failed to analyze the alternative of year-round releases from a dam that could be constructed in Sanpete County. It stated that the main impact of such dam (at the Milburn Damsite) would be the complete or partial dewatering of 40 miles of the San Pitch River below the dam. It stated that the potential dewatering, other environmental impacts, and related construction costs prevented this alternative from being further considered. However, the impacts and costs were not discussed, nor were measures that could be taken to mitigate such impacts.

The DEIS failed to analyze the alternative of use of CUP water. Although CUP water will be used in the southern part of Sanpete County, the DEIS dismisses the use of CUP in northern part of County as too costly but does not discuss these costs. The DEIS also states that exchange agreements would not work but does not discuss why not.

279 **2. The DEIS dismissed one of the alternatives to the Project, a different damsite and reservoir location, as "non-viable" because the water users in Sanpete County would not be able to pay the costs of that alternative. The same test should have applied to the Project, and the results of the test should have been discussed.**

280 **3. The DEIS fails to analyze whether and to what extent conservation measures would reduce the average annual water shortages in Sanpete County.**

The DEIS states that the Project is needed to reduce the average annual water shortages in Sanpete County from 30% to 19%. It also states that it did not include a conservation plan "because conservation would be an integral part of any project plan." In light of the Project's cost to water users in Sanpete County, its widespread environmental impacts, its depletion to the Price River drainage and negative impacts on water users in Carbon County, and the Bureau of Reclamation's new goals of being a water conservation agency, the failure of the DEIS to analyze possible effects of water conservation measures is a significant omission.

The DEIS states that the Sanpete Water Conservancy District has adopted policies requiring all recipients to implement conservation practices in order to be eligible for project water, and that numerous conservation measures have already been implemented. However, the specific policy and conservation practices are never described, what their effect might be, how much they might cost, and whether the water users in Sanpete County can afford these costs.

281 **4. The DEIS fails to discuss the actual cost of the Project water to water users in Sanpete County and whether these water users can afford to pay for this water.**

The DEIS states that the Project will cost approximately $16.1 million, and will supply 4,920 acre-feet of water each year for the supplemental irrigation of 15,420 acres. A rough estimate of the cost of this water is $ 60 per acre-foot, which is considerably higher than what most persons pay or can afford for water.

The DEIS indicates that the Project will supply supplemental irrigation water to approximately 248 families, who will be able to harvest a third alfalfa crop each year for a net income increase of $1,300. However, the DEIS should have discussed whether these families can afford to pay (1) the costs of the conservation measures the Sanpete Water Conservancy District states it will require of all users of Project water and (2) the high cost of the water itself.

282 **5. The DEIS should have clearly discussed where and how the Project water will be used.**

The DEIS is too general in discussing where the Project water will be used. It simply states that 66% of the Project water will be used along the east bench area of the Sanpete

Valley, and the remaining 1,800 acre-feet will flow into the San Pitch River and be diverted within 3 miles of its confluence with Cottonwood Creek. This makes it impossible to determine how much "wet water" will actually be used, or evaluate the actual affects and impacts, good and bad, of the Project on Sanpete County water users.

Further, the DEIS fails to discuss how the 480 acre-feet per year of municipal water would be apportioned among Fairview, Mount Pleasant, Spring City, and Moroni, the costs of this water to these towns, and any impacts of that water use.

283 **6. The DEIS describes various measures that will be implemented in an attempt to mitigate the Project's significant impacts on streamflows, fisheries, water quality in Scofield Reservoir, and wetlands. However, the DEIS fails to indicate whether the water used in these mitigation measures will be deducted from the amounts of Project water to be used in Sanpete County or the remaining water for the Price River drainage. Either way, each county is going to take a loss, and these losses should have been discussed.**

If the water used in these mitigation measures will be deducted from the Project water supplies destined for Sanpete County, the costs of the water actual received and used will be even greater than currently estimated. The water users that will have to pay these costs should know about this in order to make an informed decision whether they really want this water.

If the water used in these mitigation measures will be deducted from the remaining water supplies for the Price River drainage, the Project's negative impact on water use in Carbon County will be even greater.

284 **7. The DEIS also fails to describe how much water will be used for the various mitigation measures. It appears that a significant amount of water may be used for wetlands mitigation. This should have been discussed.**

The Project will destroy approximately 100 acres of wetlands. The DEIS proposes 2 alternative mitigation measures. Under one measure, water would spread over land adjacent to the Narrows Reservoir to create new wetlands. However, the DEIS fails to quantify the amount of water that will be needed to create and maintain these wetlands. Since evaporation from wetlands areas can sometimes be greater than that from open surfaces of water, this mitigation measure might require large amounts of water. Under one mitigation measure, the Sanpete Water Conservancy District would purchase approximately 220 acres of land adjacent to Mud Creek. The cost of purchasing this land, and the water needed for these wetlands is not described.

285 **8. The DEIS's conclusions concerning the Project's impact on water flows in the Price River are inaccurate because the DEIS relies on a water model that is based a limited time period in which annual precipitation was higher than average.**

The DEIS concludes that the Project will reduce water flows in the Price River by an average of 685 acre-feet each year. However, this conclusion is derived from records concerning a limited time period that included years of high precipitation. When data for the period from October 1, 1946 to September 30, 1993 is used, the reduction in Price River water flows increases to between 1,337 and 1,627 acre-feet each year.

286 **9. The DEIS does not adequately discuss the Project's impacts on water storage, water quality, the fishery, or recreation uses on and adjacent to Scofield Reservoir.**

The DEIS states that the average contents of Scofield Reservoir will be reduced to about 30,200 acre-feet. It acknowledges that this will likely reduce water quality, increase the possibility for fish kills, result in a loss of 4,500 angler days each year, and affect the value of lakeside property. These are all very significant impacts, yet the DEIS fails to adequately analyze these impacts and discuss how they could be mitigated.

287 **10. The DEIS acknowledges that the Project will adversely impact water quality in Gooseberry Creek, lower Gooseberry Reservoir, and Scofield Reservoir. It proposes 2 measures to mitigate these effects and concludes that the Project will have no residual impact on water quality. The data used to support this conclusion is either missing or incomplete.**

The DEIS proposes to: (1) stabilize the channel in Gooseberry Creek between the Narrows Dam and the Gooseberry Reservoir; and (2) remove sediment from Mud Creek. The purpose of these measures would be to improve water quality by reducing the amount of sediments and nutrient flow into Lower Gooseberry Reservoir.

The channel in Gooseberry Creek would be stabilized by placing large boulders in strategic locations to narrow and deepen the channel. However, there is no data to show that this method would accomplish its purpose. Large boulders are not part of the natural stream environment in that area and might only increase erosion along the sides of the Creek.

Concerning removing sediment from Mud Creek, the DEIS does not discuss what types and quantities of sediments would be prevented from reaching the 2 reservoirs. Consequently, it is impossible to determine what effect this would have on water quality.

It appears the DEIS's conclusion concerning water quality are based on table 3-2, which shows phosphorous in Scofield from 1978 to 1989, and not the drier years of 1990 to

1992. This is quite a limited time frame that includes several wet years. Consequently, it makes no sense to reach a conclusion of the long-term effects of the Project from such a short-term data base.

The DEIS also fails to discuss the impacts on water quality resulting from construction of the Narrows Dam, relocation of SR-264, or the anticipated recreational use of the Narrows Reservoir or Scofield Reservoir.

288 **11. The DEIS fails to explain how the significant loss of spawning habitat for cutthroat and rainbow trout will be mitigated.**

The DEIS acknowledges that the Project will destroy: (1) 100% of the spawning habitat in the 1 mile of Gooseberry Creek and the 4.3 miles of the headwater tributaries that join to form Gooseberry Creek; (2) 94% of the spawning habitat in the 3 miles of Middle Gooseberry Creek; (3) 100% of the spawning habitat in the 7 miles of Lower Gooseberry Creek; and (4) 25% of the spawning habitat in Fish Creek.

The DEIS fails to specifically describe the impact of this spawning habitat will have on stream fisheries. Consequently, the actual effect of the Narrows Project will be on the stream fisheries is unknown.

The DEIS briefly discusses 9 measures that might be implemented to mitigate the Project's impact on stream fisheries. However, the discussion of these measures is too general and does not specify how the each measures will compensate for the Project's destruction of the spawning habitat.

289 **12. The DEIS does not adequately discuss impacts on the fishery in Scofield Reservoir.**

The DEIS states that the lower water levels in Scofield will likely result in poorer water quality and increased fish kills. In addition, the reduced surface area would result in the loss of approximately 4,500 angler days per year. However, no data is provided to support this figure, or the figure that the Narrows Reservoir would receive approximately 13,700 angler days per year.

Further, the DEIS concludes that any adverse impact to the cutthroat fisheries in Lower Gooseberry or Scofield Reservoir will be compensated by the trout habitat that will be created in the Narrows Reservoir. It seems to base this conclusion on the assumption that the Utah Division of Wildlife Resources will manage the Narrows Reservoir as a cutthroat trout fishery. It provides no support for this statement. Even if true, the DEIS needs to describe the nature and result of this management.

The DEIS does not quantify how large the fish kill at Scofield may be or how many new fish could be expected in the Narrows Reservoir.

290 **13. The DEIS fails to analyze the cumulative impacts from the Project on Carbon County.**

The National Environmental Policy Act (NEPA) and the federal regulations that implement NEPA require that the cumulative impacts of a project be analyzed. There is no such analysis in the DEIS even though it is obvious that the Project will have several significant impacts on Carbon County.

The failure to perform such analysis is particularly egregious since the benefits of the Project to Sanpete County are so modest. Even though it will cost an estimated $16 million, the Project will only provide supplemental irrigation water. Further, it only supply the equivalent of an extra 4" each year to 15,000 acres for a net gain of about $1,300 each year for 248 families in the Project area.

Balanced against these modest benefits are the several significant environmental and socioeconomic impacts in Carbon County that the DEIS acknowledges, but analyzes as if each impact is totally separate from the others. However, these are not separate impacts. The failure of the DEIS to analyze the cumulative affect of these separate impacts on streamflows, water quality, wetlands, fisheries, recreation, water availability, and agricultural and urban water use in Carbon County is a major flaw that justifies sending the DEIS back to its drafters to do it right.

278. Alternatives to the Gooseberry Narrows Project

Please refer to the response to comment 236.

279. Project Costs and Benefits

Please refer to the response to comment 13.

280. Conservation Measures

Please refer to the response to comment 235.

281. Economic Cost

Please refer to the response to comments 246 through 249.

282. Location of Use of Project Water

The comment is not specific on the level of detail believed to be necessary. It is inappropriate for the Project Sponsor to identify every acre that would receive water. Once the project has received environmental approval, water sales contracts can start to be negotiated, which will clarify more specifically the location of project water deliveries. Until that time, planning-level identification of project lands is most appropriate.

283. Water for Mitigation

The only mitigation measure that would create an additional consumptive use of water would be the wetland mitigation area adjacent to Narrows Reservoir. It is estimated that consumptive use would be increased by about 105 acre-feet. This water would need to come from the Sponsor's existing water rights. The wetland mitigation measure adjacent to Mud Creek would be accomplished with existing water rights associated with the land. Chapter 2 of the EIS has been revised to describe the amount of water required for wetland mitigation.

284. Water for Mitigation

Please refer to the responses to comment 14 and 283.

285. Water Operation Model

Please refer to the response to comment 245.

286. Impacts on Scofield Reservoir

These impacts are identified in the EIS and mitigation is described in Chapter 3.

287. Mitigation for Water Quality Impact to Scofield Reservoir

Please refer to the response to comment 253.

288. Loss of Spawning Habitat

Chapter 3 of the EIS provides descriptions of the impacts on fisheries and the associated mitigation measures. The proposed mitigation measures have been revised to comply with the recommendations of the FWS and the UDWR as contained in the Fish and Wildlife Coordination Act report for the project.

289. Impacts on the Fishery in Scofield Reservoir

Please refer to the responses to comments 286 and 288.

290. Cumulative Impacts on Carbon County

Please refer to the response to comment 14.

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Robert J. Murdock, P.E.
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April 5, 1994

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Regional Director
Bureau of Reclamation
125 South State St.
Salt Lake City, Utah 84111

Narrows EIS Comments

Re: Draft EIS Narrows Project - Comments

Dear Sir,

At the hearing on the Narrows Project Draft EIS held in Price March 30, 1994 I made a statement and submitted written notes associated with the statement. These comments and information are in addition to that presented March 30, 1994.

At the hearing March 30 I referred to an operation study of the Narrows Project and Scofield Reservoir that I have performed. Several others that had access to my study also referred to it. I feel it proper to include the result of my study to support the comments that have been made that refer to it. Attached are tables that are the result of the study.

My study is a monthly operation study showing end of month figures in 9 tables. Some months on Table 1 list the annual high or low that occurred during the month but not at its end. Table 1 lists the historic active storage contents of Scofield Reservoir. The 0s in 1946 and 1993 are beyond the period of record used and figures on other tables for similar months should be disregarded.

Tables 2 & 3 are also the active storage contents of Scofield Reservoir assuming the Narrows Reservoir at the indicated capacity was operating concurrently with Scofield Reservoir. The same historic bypass of prior rights and storage releases were made from Scofield Reservoir. Flood releases and spills from Scofield Reservoir were retained to the extent there was capacity to hold them.

On Tables 2 & 3 the months showing 0 are months when the active storage pool of Scofield Reservoir was empty at the end of the month and the historic active storage release was not fully satisfied. Tables 4 & 5 show the amounts of water that was historically released from Scofield Reservoir that would not have been available for release if the Narrows Project were in operation. These figures are not the historic water shortages of the Price River below Scofield Reservoir. The amounts shown on Tables 4 & 5 should be added to the historic water supply shortages of the Price River indicated by several at the hearing.

291 Tables 6 thru 9 show the operation result at the Narrows Reservoir. Two significant things to note. One, the larger reservoir has almost no shortage to Sanpete, but the size of the reservoir used for the study greatly exceeds (about 4,500 acre-feet) the water right approval for the reservoir. Second, there are significant shortages to Sanpete with the smaller reservoir. The shortage exceed 11 percent.

The historic active storage contents record of Scofield Reservoir begins several years before 1946. I started with 1946 because it was the year Scofield was enlarged to its present capacity. The starting contents I used for Scofield Reservoir was from the historic record. I assumed the Narrows Reservoir to be full at the start of the study the same as was done for the DEIS. Assuming it less than full at start would show less benefit to Sanpete and a greater negative impact upon Scofield Reservoir and the Price River.

COMMENTS:

292 1. The reduction of historic active storage releases shown on Tables 4 & 5 are significant reductions of water supply. During many of these years there was already great shortage with water going to more essential uses such as the municipal treatment plant and the power plant. During many years the Narrows induced shortages to Scofield Reservoir will directly impact water supply for drinking water, fire protection and generation of electricity at Castle Gate. The DEIS did not adequately evaluate these negative impacts.

293 2. The DEIS is in error in many of the points it analyses because it fails to use the full available hydrologic record that is available. It uses a shorter period of data that give different results than if the longer period were used. The operation study starts with Scofield Reservoir about 6,000 acre-feet higher than it would have been October 1959 if the full record were used. The DEIS operation study starts with the Narrows Reservoir full. It is in error because it fails to show the impacts of filling the Narrows Reservoir. These two errors impact Scofield Reservoir about 23,000 acre-feet.

294 3. The DEIS fails to adequately address negative impacts to the flat water fishery of Scofield Reservoir. My operation study indicate the average surface area of Scofield Reservoir will be reduced 302 acres or 253 acres with Narrows Reservoir at 14,500 and 5,400 acre-feet active storage respectfully. With the Recommended Plan 2/3 of what is gained at the Narrows site is lost at Scofield. As per DEIS page 3-38,9 the loss would be 9,060 angler days per year not 4,500. With the Small Reservoir Plan 450 angler days per year more are lost at Scofield than gained at the Narrows.

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COMMENTS:

1. The reduction of historic active storage releases shown on Tables 4 & 5 are significant reductions of water supply. During many of these years there was already great shortage with water going to more essential uses such as the municipal treatment plant and the power plant. During many years the Narrows induced shortages to Scofield Reservoir will directly impact water supply for drinking water, fire protection and generation of electricity at Castle Gate. The DEIS did not adequately evaluate these negative impacts.

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4. Winter releases to Cottonwood Creek amount to 720 acre-feet per year. When
295 Wales Reservoir can not store this water its benefits are lost to the project area. An operation study of the Wales Reservoir in conjunction with the winter releases from the Narrows Reservoir is needed to evaluate the lost benefits to either irrigation or the fishery of Cottonwood Creek.

5. The HEP studies should be done before the DEIS is prepared to properly
296 evaluate and present the affects to impact and mitigation lands.

6. There is no information in the DEIS to indicate that a safe dam can be built upon
297 the proposed site, or to indicate that adequate materials exist within reasonable haul distances to build the dam. There are no drill logs, no test pit logs, no water pressure tests of drill holes, no soil tests, no water table data for dam site or reservoir basin, no detail surface geology study of the dam site, no profiles, nothing. The DEIS does say the dam site is on the North Horn formation. This is the same formation that is the cause of 104 landslides in nearby Cottonwood Canyon as recorded in the DEIS page 3-18. The North Horn formation is notorious for landslides and instability throughout the Wasatch Plateau. Is the dam site the result of a landslide? The DEIS is wholly inadequate in providing assurance that a safe dam can be built at the proposed site.

7. The DEIS proposes to narrow the channel of Gooseberry Creek below the dam
298 site. This is a bad idea. The size of the channel is the result of infrequent large snow melt floods. Most snow melt runoff will be retained in the Narrows Reservoir. However, the big snow melt floods will fill the reservoir and spill for days at nearly the same flow rate as they have historically run in the channel. A smaller channel will be gutted, Lower Gooseberry Reservoir will get an unnecessary load of sediment and the stream channel fishery benefits will be lost. Who is going to remove the sediment from Lower Gooseberry Reservoir and rebuild the smaller channel each time it happens?

299 The proposed project has not been planned well. It proposes many features that have no water rights approved for the use and improperly sizes the proposed reservoir with respect to the approver water rights. The past fights of this project have revolved around water rights and I would think the planners would be sensitive to get those aspects of the plan right this time, but they have not.

300 It is planned for very expensive supplemental irrigation ONLY in Sanpete County, and will cause water shortages for irrigation, culinary, fire protection, and power plant use in Carbon County. It will damage existing fisheries. The DEIS does not adequately address the negative impacts.

301 The proposed project ignores extensive resources of water in Sanpitch Valley that are being very very poorly used while at the same time seeks to take part of a short supply of water away from Carbon County that is making good and critical use of it. There has got to be a better plan whereby the small increase of water supply can be developed with added storage, and the project structured in such a way that it will not negatively impact the water supply of either county but give them both some improvement and added stability of water supply. It can be done.

Sincerely,

Robert J. Murdock, P.E.

cc: Richard Lee

NOTICE. IF YOU DETACH
ENCLOSURES, PLEASE INSERT
CODE NO. _____

TABLE 1.

SCOFIELD RESERVOIR HISTORIC STORAGE - ACRE FEET DATE 03-18-1994 TIME 11:20:25

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1946	0.	0.	0.	0.	0.	0.	0.	0.	1,450.	1,740.	3,450.	4,830.
1947	5,760.	6,490.	8,340.	15,800.	35,900.	34,100.	23,000.	18,700.	12,800.	9,640.	10,700.	11,500.
1948	13,000.	13,900.	15,400.	19,900.	28,000.	20,300.	9,150.	2,160.	771.	441.	1,920.	2,780.
1949	3,950.	5,050.	6,490.	14,100.	39,300.	46,000.	35,700.	24,600.	18,900.	18,300.	19,700.	21,300.
1950	23,200.	24,200.	25,700.	32,900.	51,900.	51,100.	43,700.	31,800.	26,900.	25,000.	26,500.	27,400.
1951	29,300.	30,900.	32,200.	37,100.	53,800.	51,400.	39,000.	34,300.	26,500.	25,300.	26,300.	27,600.
1952	30,200.	31,600.	33,800.	43,500.	76,500.	66,600.	57,500.	52,200.	47,300.	43,500.	43,900.	43,900.
1953	46,100.	48,300.	50,900.	54,000.	58,300.	57,500.	46,700.	39,500.	31,100.	28,500.	30,000.	30,400.
1954	32,000.	32,700.	34,800.	37,100.	33,600.	23,600.	16,300.	9,310.	7,250.	6,640.	7,090.	7,710.
1955	8,990.	10,200.	11,500.	14,800.	26,100.	22,300.	13,000.	9,150.	3,680.	2,160.	2,910.	4,360.
1956	5,900.	6,940.	8,660.	14,300.	29,100.	23,600.	13,500.	6,640.	2,040.	1,100.	1,450.	2,410.
1957	3,680.	4,630.	6,050.	9,310.	26,500.	53,000.	44,700.	41,700.	37,800.	35,200.	36,600.	37,600.
1958	38,800.	40,000.	41,700.	40,000.	71,200.	64,900.	50,600.	39,300.	34,800.	31,800.	32,200.	32,000.
1959	32,900.	34,500.	35,900.	34,300.	34,500.	27,800.	18,700.	13,300.	8,180.	6,640.	6,050.	5,470.
1960	5,760.	6,640.	8,020.	10,800.	19,300.	14,100.	5,760.	2,160.	1,560.	2,040.	2,160.	1,920.
1961	2,160.	2,290.	3,680.	5,900.	6,050.	3,420.	1,330.	661.	551.	882.	992.	1,330.
1962	1,560.	2,530.	3,420.	13,700.	39,300.	40,300.	30,900.	21,700.	16,700.	17,100.	17,100.	16,700.
1963	16,500.	18,100.	20,100.	21,900.	30,000.	27,800.	17,100.	13,700.	12,600.	9,640.	9,980.	9,640.
1964	9,980.	10,300.	11,500.	15,200.	35,000.	38,100.	26,900.	17,500.	11,700.	9,640.	10,200.	10,800.
1965	13,000.	13,900.	15,200.	19,500.	42,200.	61,600.	59,100.	56,200.	51,400.	49,300.	49,800.	50,900.
1966	51,900.	53,200.	55,100.	63,000.	67,800.	61,300.	50,100.	39,500.	35,000.	33,800.	34,100.	33,800.
1967	36,600.	37,800.	39,800.	42,000.	60,500.	70,600.	61,900.	51,900.	46,700.	43,700.	44,200.	44,500.
1968	45,700.	46,700.	48,500.	51,600.	72,300.	69,500.	59,100.	55,100.	44,200.	42,200.	42,700.	43,700.
1969	45,200.	46,700.	39,000.	44,000.	72,300.	68,900.	59,100.	50,600.	45,700.	47,000.	47,500.	48,300.
1970	49,600.	51,400.	52,400.	52,700.	69,200.	67,500.	57,500.	46,000.	38,800.	38,500.	39,000.	39,800.
1971	41,200.	43,500.	45,700.	52,700.	69,500.	66,100.	53,500.	43,000.	37,300.	37,100.	37,800.	38,500.
1972	40,700.	41,500.	44,500.	49,000.	53,000.	48,300.	33,400.	24,000.	19,100.	20,900.	21,300.	21,700.
1973	22,300.	23,200.	24,600.	26,700.	64,400.	68,300.	59,700.	49,300.	42,200.	40,000.	40,700.	41,500.
1974	43,500.	44,000.	45,500.	48,000.	66,900.	59,400.	48,500.	37,300.	32,200.	31,500.	32,000.	31,500.
1975	32,200.	32,900.	34,500.	35,900.	51,900.	69,200.	63,300.	51,100.	43,700.	41,000.	42,500.	43,200.
1976	43,700.	44,500.	45,500.	49,000.	61,600.	55,100.	43,200.	34,300.	31,100.	30,000.	29,800.	29,300.
1977	28,400.	29,100.	30,200.	30,700.	27,200.	24,600.	20,900.	19,100.	17,700.	17,300.	17,300.	17,300.
1978	17,300.	17,300.	19,700.	26,100.	50,300.	62,200.	51,600.	42,500.	37,300.	35,900.	37,300.	38,500.
1979	40,000.	41,000.	42,500.	40,700.	65,200.	66,600.	56,700.	49,300.	41,500.	39,800.	40,700.	41,500.
1980	43,200.	44,500.	44,500.	43,500.	71,200.	68,300.	60,000.	50,100.	47,500.	46,200.	47,500.	48,500.
1981	49,300.	50,300.	51,600.	55,100.	55,600.	49,800.	39,500.	31,500.	29,100.	30,400.	31,500.	32,500.
1982	34,300.	35,700.	37,300.	43,200.	73,800.	68,900.	61,300.	53,000.	47,500.	49,800.	52,400.	53,200.
1983	52,700.	46,700.	38,500.	36,400.	61,900.	72,900.	67,200.	60,200.	50,300.	40,700.	43,000.	46,200.
1984	48,500.	50,100.	39,000.	27,600.	60,000.	70,900.	64,400.	58,900.	51,600.	47,800.	43,500.	47,000.
1985	49,000.	51,100.	53,200.	57,000.	70,300.	64,900.	56,400.	44,500.	40,200.	41,500.	43,500.	45,000.
1986	46,700.	49,300.	43,700.	45,700.	73,800.	68,600.	60,500.	50,100.	44,200.	45,700.	47,000.	48,800.
1987	50,900.	52,700.	55,100.	60,500.	61,600.	55,600.	47,500.	40,700.	35,900.	34,300.	35,900.	37,600.
1988	39,500.	40,700.	42,700.	47,800.	57,000.	50,900.	39,800.	31,300.	27,200.	26,700.	27,200.	28,700.
1989	30,000.	31,500.	34,300.	37,100.	35,200.	29,100.	19,300.	14,400.	11,500.	9,980.	10,660.	11,180.
1990	11,700.	12,420.	13,510.	20,500.	21,930.	19,500.	12,240.	8,500.	7,400.	7,090.	7,250.	7,250.
1991	7,710.	8,340.	9,810.	12,960.	23,580.	28,450.	19,300.	12,600.	9,310.	6,640.	7,560.	8,180.
1992	8,990.	9,640.	11,530.	13,320.	9,480.	4,220.	2,530.	1,450.	980.	1,460.	2,170.	2,790.
1993	3,690.	4,770.	6,800.	12,600.	47,510.	55,100.	44,970.	37,360.	31,780.	0.	0.	0.

TABLE 2.

SCOFIELD RESERVOIR STORAGE WITH NARROWS RESERVOIR - ACRE FEET DATE 03-18-1994 TIME 10:38:19

NARROWS RESERVOIR ACTIVE CAPACITY IS 14,500. AC.FT.

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1946	0.	0.	0.	0.	0.	0.	0.	0.	1,450.	1,632.	3,274.	4,603.
1947	5,509.	6,224.	8,016.	15,003.	35,069.	33,119.	21,677.	17,169.	11,178.	7,932.	8,915.	9,664.
1948	11,141.	12,029.	13,510.	17,735.	23,303.	14,937.	3,614.	0.	0.	0.	1,435.	2,252.
1949	3,386.	4,459.	5,834.	12,284.	33,014.	38,244.	27,619.	16,424.	10,725.	10,094.	11,461.	13,047.
1950	14,941.	15,941.	17,400.	24,051.	40,067.	38,077.	30,405.	18,442.	13,502.	11,594.	12,953.	13,803.
1951	15,681.	17,268.	18,519.	22,681.	36,199.	32,595.	19,939.	15,130.	7,380.	6,151.	7,069.	8,310.
1952	10,871.	12,238.	14,376.	23,479.	69,893.	72,100.	63,272.	57,541.	52,425.	48,499.	48,797.	48,745.
1953	50,919.	53,103.	55,649.	58,477.	60,529.	57,934.	46,685.	39,226.	30,702.	28,014.	29,414.	29,732.
1954	31,260.	31,885.	33,886.	35,323.	30,142.	19,728.	12,263.	5,265.	3,195.	2,554.	2,945.	3,535.
1955	4,792.	5,987.	7,236.	10,309.	19,154.	14,498.	5,053.	1,170.	0.	0.	740.	2,181.
1956	3,714.	4,755.	6,427.	11,242.	22,974.	16,757.	6,486.	0.	0.	0.	314.	1,261.
1957	2,518.	3,448.	4,803.	7,835.	22,516.	43,850.	34,876.	31,649.	27,671.	24,954.	26,232.	27,176.
1958	28,337.	29,501.	31,119.	34,540.	63,721.	62,536.	47,868.	36,367.	31,816.	28,775.	29,124.	28,888.
1959	29,757.	31,342.	32,705.	30,890.	29,320.	21,976.	12,687.	7,294.	2,228.	695.	71.	0.
1960	304.	1,200.	2,527.	5,015.	10,983.	5,121.	0.	0.	0.	449.	520.	239.
1961	466.	590.	1,955.	3,902.	2,909.	343.	0.	0.	0.	282.	329.	628.
1962	819.	1,710.	2,510.	11,912.	32,750.	31,718.	21,797.	12,394.	7,330.	7,701.	7,641.	7,223.
1963	7,036.	8,636.	10,626.	12,361.	17,475.	14,308.	3,480.	77.	0.	0.	306.	0.
1964	301.	587.	1,748.	5,328.	22,142.	23,455.	11,901.	2,444.	0.	0.	526.	1,051.
1965	3,170.	4,012.	5,256.	9,298.	29,022.	45,499.	42,424.	39,102.	33,975.	31,660.	31,999.	32,999.
1966	33,916.	35,138.	36,881.	43,703.	46,292.	39,430.	28,216.	17,558.	13,113.	11,853.	12,101.	11,752.
1967	14,529.	15,714.	17,675.	19,753.	35,242.	42,930.	33,888.	23,812.	18,629.	15,631.	16,070.	16,304.
1968	17,432.	18,368.	20,088.	23,008.	41,778.	50,109.	39,442.	35,261.	24,299.	22,220.	22,633.	23,580.
1969	25,043.	26,714.	28,027.	38,769.	64,328.	61,117.	50,907.	42,254.	37,248.	38,399.	38,774.	39,471.
1970	40,672.	42,408.	43,304.	43,429.	56,359.	53,443.	43,122.	31,557.	24,324.	23,946.	24,340.	24,984.
1971	26,198.	28,449.	30,572.	37,231.	51,283.	46,788.	33,995.	23,474.	17,783.	17,535.	18,147.	18,742.
1972	20,824.	21,530.	24,239.	28,028.	30,104.	24,989.	10,158.	970.	0.	1,828.	2,139.	2,474.
1973	3,018.	3,873.	5,191.	7,085.	40,938.	43,143.	34,301.	23,900.	16,817.	14,605.	15,230.	15,950.
1974	17,851.	18,287.	19,715.	22,004.	37,307.	29,227.	18,342.	7,309.	2,430.	1,828.	2,280.	1,752.
1975	2,412.	3,082.	4,643.	5,997.	20,356.	33,107.	26,637.	14,412.	7,122.	4,427.	5,817.	6,409.
1976	6,804.	7,517.	8,446.	11,729.	21,618.	14,762.	3,065.	0.	0.	0.	0.	0.
1977	0.	689.	1,763.	1,977.	0.	0.	0.	0.	0.	0.	0.	0.
1978	0.	0.	2,357.	8,264.	29,058.	37,215.	26,329.	17,144.	12,011.	10,735.	12,054.	13,221.
1979	14,688.	15,664.	17,131.	15,136.	36,339.	36,276.	26,280.	18,931.	11,247.	9,583.	10,434.	11,178.
1980	12,822.	14,073.	15,417.	20,518.	50,023.	60,773.	52,002.	41,963.	39,267.	37,877.	39,085.	40,017.
1981	40,755.	41,704.	42,893.	45,638.	44,236.	37,690.	27,292.	19,304.	16,922.	18,139.	19,162.	20,122.
1982	21,906.	23,300.	24,860.	30,194.	62,137.	72,100.	63,948.	55,424.	49,708.	51,616.	53,903.	54,873.
1983	56,462.	58,470.	60,085.	63,559.	72,100.	72,100.	67,867.	60,461.	50,297.	40,420.	42,499.	45,461.
1984	47,562.	48,993.	47,722.	55,243.	72,100.	72,100.	64,857.	59,063.	51,586.	47,543.	43,056.	46,365.
1985	48,188.	50,165.	52,128.	60,762.	72,100.	66,540.	57,600.	45,521.	41,108.	42,257.	44,112.	45,485.
1986	47,057.	49,524.	52,156.	62,201.	72,100.	72,100.	63,560.	52,961.	46,916.	48,229.	49,374.	51,088.
1987	53,167.	54,959.	57,320.	61,840.	61,299.	54,866.	46,582.	39,707.	34,861.	33,208.	34,764.	36,433.
1988	38,291.	39,456.	41,396.	46,067.	52,538.	45,870.	34,634.	26,086.	21,969.	21,420.	21,829.	23,256.
1989	24,485.	25,945.	28,633.	30,316.	26,834.	20,338.	10,459.	5,619.	2,781.	1,299.	1,810.	2,299.
1990	2,790.	3,482.	4,525.	10,665.	10,494.	7,631.	399.	0.	0.	0.	158.	122.
1991	545.	1,142.	2,566.	5,603.	13,392.	16,496.	7,184.	526.	0.	0.	835.	1,391.
1992	2,169.	2,805.	4,596.	5,670.	1,125.	0.	0.	0.	0.	417.	1,102.	1,704.
1993	2,563.	3,590.	5,491.	10,864.	40,499.	46,197.	35,755.	28,053.	22,450.	0.	0.	0.

TABLE 3.

SCOFIELD RESERVOIR STORAGE WITH NARROWS RESERVOIR - ACRE FEET DATE 03-18-1994 TIME 10:45:20

NARROWS RESERVOIR ACTIVE CAPACITY IS 5,400. AC.FT.

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1946	0.	0.	0.	0.	0.	0.	0.	0.	1,450.	1,632.	3,274.	4,603.
1947	5,509.	6,224.	8,016.	15,029.	35,107.	33,214.	21,771.	17,262.	11,271.	8,023.	9,007.	9,755.
1948	11,232.	12,121.	13,602.	17,827.	23,395.	15,028.	3,703.	0.	0.	0.	1,435.	2,252.
1949	3,386.	4,459.	5,834.	12,284.	33,238.	39,870.	29,234.	18,026.	12,313.	11,673.	13,040.	14,626.
1950	16,520.	17,520.	18,979.	25,630.	41,644.	39,646.	31,963.	19,989.	15,037.	13,121.	14,480.	15,330.
1951	17,208.	18,795.	20,046.	24,208.	37,724.	34,317.	21,646.	16,822.	9,051.	7,807.	8,725.	9,966.
1952	12,527.	13,894.	16,032.	25,135.	72,100.	72,100.	63,272.	57,541.	52,425.	48,499.	48,797.	48,745.
1953	50,919.	53,103.	55,649.	58,477.	60,529.	58,232.	46,982.	39,521.	30,996.	28,307.	29,707.	30,026.
1954	31,553.	32,178.	34,179.	35,616.	30,435.	20,019.	12,550.	5,547.	3,472.	2,830.	3,220.	3,810.
1955	5,067.	6,262.	7,511.	10,584.	19,429.	14,770.	5,320.	1,431.	0.	0.	740.	2,181.
1956	3,714.	4,755.	6,427.	11,242.	22,974.	16,757.	6,486.	0.	0.	0.	314.	1,261.
1957	2,518.	3,448.	4,803.	7,835.	22,516.	46,301.	37,313.	34,072.	30,082.	27,359.	28,637.	29,580.
1958	30,741.	31,906.	33,523.	36,944.	67,514.	67,088.	52,397.	40,875.	36,304.	33,252.	33,601.	33,365.
1959	34,234.	35,819.	37,182.	35,367.	33,791.	26,418.	17,081.	11,628.	6,498.	4,926.	4,303.	3,723.
1960	4,026.	4,923.	6,250.	8,737.	14,691.	8,770.	270.	0.	0.	449.	520.	239.
1961	466.	590.	1,955.	3,902.	2,909.	343.	0.	0.	0.	282.	329.	628.
1962	819.	1,710.	2,510.	11,912.	32,985.	33,921.	23,982.	14,558.	9,466.	9,818.	9,758.	9,340.
1963	9,153.	10,753.	12,743.	14,478.	19,587.	16,400.	5,533.	2,087.	1,012.	0.	306.	0.
1964	301.	587.	1,748.	5,328.	22,142.	23,455.	11,901.	2,444.	0.	0.	526.	1,051.
1965	3,170.	4,012.	5,256.	9,298.	29,022.	46,671.	43,589.	40,262.	35,129.	32,811.	33,151.	34,151.
1966	35,068.	36,290.	38,033.	44,854.	47,442.	40,908.	29,684.	19,015.	14,558.	13,291.	13,538.	13,190.
1967	15,967.	17,152.	19,112.	21,191.	36,677.	45,001.	35,946.	25,857.	20,661.	17,655.	18,094.	18,328.
1968	19,457.	20,392.	22,112.	25,032.	43,799.	53,319.	42,635.	38,437.	27,459.	25,370.	25,784.	26,730.
1969	28,193.	29,864.	31,177.	41,919.	70,081.	68,088.	57,846.	49,164.	44,131.	45,268.	45,642.	46,340.
1970	47,541.	49,276.	50,173.	50,297.	63,221.	60,953.	50,593.	38,991.	31,721.	31,323.	31,717.	32,360.
1971	33,575.	35,826.	37,948.	44,607.	58,651.	54,127.	41,291.	30,727.	24,992.	24,720.	25,332.	25,926.
1972	28,008.	28,714.	31,423.	35,211.	37,278.	32,121.	17,212.	7,911.	3,111.	4,912.	5,223.	5,557.
1973	6,101.	6,956.	8,274.	10,167.	44,012.	46,583.	37,720.	27,297.	20,193.	17,967.	18,592.	19,313.
1974	21,213.	21,650.	23,077.	25,365.	40,664.	32,565.	21,651.	10,575.	5,646.	5,015.	5,467.	4,939.
1975	5,599.	6,269.	7,830.	9,184.	23,532.	37,364.	30,863.	18,603.	11,269.	8,540.	9,931.	10,523.
1976	10,917.	11,630.	12,559.	15,842.	25,721.	18,832.	7,060.	0.	0.	0.	0.	0.
1977	0.	689.	1,763.	1,977.	0.	0.	0.	0.	0.	0.	0.	0.
1978	0.	0.	2,357.	8,264.	29,058.	39,493.	28,591.	19,388.	14,237.	12,949.	14,268.	15,435.
1979	16,902.	17,878.	19,345.	17,350.	38,549.	38,731.	28,717.	21,350.	13,646.	11,970.	12,821.	13,565.
1980	15,209.	16,460.	17,804.	22,905.	52,407.	66,261.	57,464.	47,402.	44,685.	43,284.	44,491.	45,423.
1981	46,161.	47,111.	48,299.	51,044.	49,637.	43,066.	32,631.	24,605.	22,188.	23,386.	24,409.	25,369.
1982	27,153.	28,547.	30,107.	35,441.	67,378.	72,100.	63,948.	55,424.	49,708.	51,616.	53,903.	54,873.
1983	56,462.	58,470.	60,085.	63,559.	72,100.	72,100.	67,867.	60,461.	50,297.	40,420.	42,499.	45,461.
1984	47,562.	48,993.	47,722.	55,243.	72,100.	72,100.	64,857.	59,063.	51,586.	47,543.	43,056.	46,365.
1985	48,188.	50,165.	52,128.	60,762.	72,100.	66,596.	57,656.	45,577.	41,163.	42,313.	44,168.	45,540.
1986	47,113.	49,580.	52,212.	62,256.	72,100.	72,100.	63,560.	52,961.	46,916.	48,229.	49,374.	51,088.
1987	53,167.	54,959.	57,320.	61,840.	61,299.	54,866.	46,582.	39,707.	34,861.	33,208.	34,764.	36,433.
1988	38,291.	39,456.	41,396.	46,067.	52,538.	45,870.	34,634.	26,086.	21,969.	21,420.	21,829.	23,256.
1989	24,485.	25,945.	28,633.	30,316.	26,834.	20,338.	10,459.	5,619.	2,781.	1,299.	1,810.	2,299.
1990	2,790.	3,482.	4,525.	10,665.	10,494.	7,631.	399.	0.	0.	0.	158.	122.
1991	545.	1,142.	2,566.	5,603.	13,392.	16,496.	7,184.	526.	0.	0.	835.	1,391.
1992	2,169.	2,805.	4,596.	5,670.	1,125.	0.	0.	0.	0.	417.	1,102.	1,704.
1993	2,563.	3,590.	5,491.	10,864.	40,802.	48,323.	37,869.	30,155.	24,540.	0.	0.	0.

TABLE 4.

SCOFIELD RESERVOIR SHORTAGES WITH NARROWS RESERVOIR - ACRE FEET DATE 03-18-1994 TIME 10:39:24

NARROWS RESERVOIR ACTIVE CAPACITY IS 14,500. AC.FT.

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL SHORTAGE
1946	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1947	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1948	0.	0.	0.	0.	0.	0.	0.	3,292.	1,362.	323.	0.	0.	4,978.
1949	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1950	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1951	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1952	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1953	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1954	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1955	0.	0.	0.	0.	0.	0.	0.	0.	4,200.	1,492.	0.	0.	5,692.
1956	0.	0.	0.	0.	0.	0.	0.	246.	4,525.	925.	0.	0.	5,695.
1957	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1958	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1959	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	509.	509.
1960	0.	0.	0.	0.	0.	0.	3,054.	3,514.	566.	0.	0.	0.	7,134.
1961	0.	0.	0.	0.	0.	19.	1,688.	645.	100.	0.	0.	0.	2,452.
1962	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1963	0.	0.	0.	0.	0.	0.	0.	0.	827.	2,864.	0.	34.	3,725.
1964	0.	0.	0.	0.	0.	0.	0.	0.	3,169.	1,967.	0.	0.	5,135.
1965	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1966	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1967	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1968	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1969	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1970	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1971	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1972	0.	0.	0.	0.	0.	0.	0.	0.	3,678.	0.	0.	0.	3,678.
1973	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1974	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1975	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1976	0.	0.	0.	0.	0.	0.	0.	5,432.	2,879.	933.	200.	500.	9,944.
1977	900.	0.	0.	0.	1,442.	2,250.	3,295.	1,487.	1,161.	275.	27.	29.	10,866.
1978	23.	19.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	43.
1979	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1980	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1981	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1982	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1983	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1984	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1985	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1986	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1987	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1988	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1989	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1990	0.	0.	0.	0.	0.	0.	0.	3,136.	964.	243.	0.	0.	4,344.
1991	0.	0.	0.	0.	0.	0.	0.	0.	2,593.	2,597.	0.	0.	5,190.
1992	0.	0.	0.	0.	0.	4,004.	1,601.	1,035.	447.	0.	0.	0.	7,087.
1993	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
GRAND TOTAL													76,471.

TABLE 5.

SCOFIELD RESERVOIR SHORTAGES WITH NARROWS RESERVOIR - ACRE FEET DATE 03-18-1994 TIME 10:51:05

NARROWS RESERVOIR ACTIVE CAPACITY IS 5,400. AC.FT.

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL SHORTAGE
1946	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1947	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1948	0.	0.	0.	0.	0.	0.	0.	3,204.	1,362.	323.	0.	0.	4,890.
1949	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1950	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1951	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1952	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1953	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1954	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1955	0.	0.	0.	0.	0.	0.	0.	0.	3,941.	1,492.	0.	0.	5,433.
1956	0.	0.	0.	0.	0.	0.	0.	246.	4,525.	925.	0.	0.	5,695.
1957	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1958	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1959	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1960	0.	0.	0.	0.	0.	0.	0.	3,246.	566.	0.	0.	0.	3,813.
1961	0.	0.	0.	0.	0.	19.	1,688.	645.	100.	0.	0.	0.	2,452.
1962	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1963	0.	0.	0.	0.	0.	0.	0.	0.	0.	1,857.	0.	34.	1,891.
1964	0.	0.	0.	0.	0.	0.	0.	0.	3,169.	1,967.	0.	0.	5,135.
1965	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1966	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1967	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1968	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1969	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1970	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1971	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1972	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1973	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1974	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1975	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1976	0.	0.	0.	0.	0.	0.	0.	1,479.	2,879.	933.	200.	500.	5,990.
1977	900.	0.	0.	0.	1,442.	2,250.	3,295.	1,487.	1,161.	275.	27.	29.	10,866.
1978	23.	19.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	43.
1979	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1980	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1981	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1982	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1983	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1984	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1985	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1986	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1987	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1988	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1989	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1990	0.	0.	0.	0.	0.	0.	0.	3,136.	964.	243.	0.	0.	4,344.
1991	0.	0.	0.	0.	0.	0.	0.	0.	2,593.	2,597.	0.	0.	5,190.
1992	0.	0.	0.	0.	0.	4,004.	1,601.	1,035.	447.	0.	0.	0.	7,087.
1993	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
GRAND TOTAL													62,829.

TABLE 6.

NARROWS RESERVOIR ACTIVE STORAGE - ACRE FEET DATE 03-18-1994 TIME 10:37:12

NARROWS RESERVOIR ACTIVE CAPACITY IS 14,500. AC.FT.

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1946	0.	0.	0.	0.	0.	0.	0.	0.	14,500.	14,417.	14,365.	14,293.
1947	14,192.	14,094.	14,029.	14,500.	14,500.	14,500.	12,866.	11,042.	10,066.	9,984.	9,940.	9,868.
1948	9,767.	9,665.	9,560.	9,834.	12,340.	12,903.	11,202.	9,168.	8,097.	7,922.	7,846.	7,765.
1949	7,677.	7,591.	7,532.	8,691.	13,136.	14,491.	12,882.	10,992.	9,973.	9,862.	9,775.	9,665.
1950	9,547.	9,434.	9,351.	9,899.	12,864.	13,962.	12,332.	10,438.	9,486.	9,367.	9,388.	9,313.
1951	9,211.	9,111.	9,036.	9,774.	12,944.	14,085.	12,489.	10,689.	9,700.	9,641.	9,603.	9,537.
1952	9,453.	9,373.	9,311.	9,908.	14,500.	14,500.	13,316.	11,678.	10,793.	10,727.	10,709.	10,636.
1953	10,538.	10,442.	10,371.	10,642.	12,855.	14,500.	12,961.	11,176.	10,221.	10,129.	10,108.	10,066.
1954	10,015.	9,977.	9,951.	10,813.	12,465.	12,761.	10,998.	9,038.	8,047.	7,938.	7,877.	7,783.
1955	7,683.	7,585.	7,511.	7,738.	10,177.	10,961.	9,269.	7,432.	6,372.	6,201.	6,091.	5,976.
1956	5,859.	5,745.	5,669.	6,494.	9,544.	10,182.	8,499.	6,483.	5,428.	5,261.	5,177.	5,066.
1957	4,955.	4,861.	4,802.	5,031.	7,522.	12,593.	11,346.	9,590.	8,642.	8,607.	8,609.	8,541.
1958	8,457.	8,379.	8,337.	8,796.	13,780.	14,500.	12,895.	11,065.	10,049.	9,917.	9,847.	9,759.
1959	9,667.	9,569.	9,481.	9,695.	11,440.	11,980.	10,264.	8,306.	7,272.	7,146.	7,060.	6,936.
1960	6,798.	6,669.	6,598.	6,890.	9,417.	10,066.	8,112.	6,099.	5,047.	4,926.	4,855.	4,772.
1961	4,661.	4,554.	4,455.	4,728.	5,860.	5,759.	3,844.	1,868.	850.	757.	700.	615.
1962	530.	497.	462.	1,341.	6,090.	8,053.	6,702.	4,978.	4,083.	4,004.	3,944.	3,838.
1963	3,701.	3,587.	3,474.	3,539.	6,524.	7,483.	5,873.	4,109.	3,071.	2,913.	2,827.	2,703.
1964	2,618.	2,539.	2,454.	2,575.	5,568.	7,335.	5,894.	4,140.	3,102.	2,943.	2,857.	2,809.
1965	2,765.	2,711.	2,643.	2,902.	5,877.	8,757.	7,469.	5,955.	5,294.	5,380.	5,420.	5,397.
1966	5,356.	5,320.	5,353.	6,432.	8,635.	8,962.	7,158.	5,340.	4,365.	4,336.	4,269.	4,193.
1967	4,092.	3,994.	3,910.	4,032.	7,049.	9,451.	7,986.	6,189.	5,249.	5,158.	5,099.	5,041.
1968	4,988.	4,940.	4,896.	5,076.	7,714.	10,484.	8,889.	7,140.	6,226.	6,186.	6,153.	6,082.
1969	5,995.	5,912.	5,855.	6,512.	12,929.	14,119.	12,581.	10,726.	9,786.	9,772.	9,777.	9,756.
1970	9,731.	9,682.	9,662.	9,837.	13,384.	14,500.	12,904.	10,993.	10,013.	9,947.	9,933.	9,965.
1971	10,026.	9,962.	9,916.	10,256.	12,989.	14,005.	12,318.	10,402.	9,417.	9,342.	9,310.	9,292.
1972	9,286.	9,267.	9,434.	10,145.	12,062.	12,454.	10,612.	8,630.	7,563.	7,485.	7,454.	7,396.
1973	7,328.	7,260.	7,218.	7,425.	11,278.	12,929.	11,327.	9,422.	8,457.	8,366.	8,322.	8,277.
1974	8,252.	8,203.	8,152.	8,363.	11,961.	12,531.	10,742.	8,773.	7,730.	7,607.	7,535.	7,440.
1975	7,355.	7,273.	7,188.	7,235.	8,903.	13,481.	12,271.	10,461.	9,490.	9,447.	9,437.	9,421.
1976	9,403.	9,376.	9,324.	9,541.	12,275.	12,708.	10,916.	8,883.	7,815.	7,640.	7,520.	7,396.
1977	7,272.	7,170.	7,071.	7,360.	7,334.	7,222.	5,292.	3,302.	2,270.	2,116.	1,996.	1,872.
1978	1,748.	1,635.	1,554.	2,049.	5,470.	9,207.	7,693.	5,916.	4,943.	4,739.	4,700.	4,610.
1979	4,518.	4,430.	4,339.	4,535.	7,842.	9,308.	7,629.	5,735.	4,733.	4,632.	4,560.	4,492.
1980	4,424.	4,360.	4,292.	4,742.	8,238.	12,259.	10,794.	8,936.	7,993.	7,925.	7,897.	7,841.
1981	7,779.	7,717.	7,704.	8,458.	10,340.	11,005.	9,219.	7,266.	6,261.	6,213.	6,171.	6,087.
1982	5,978.	5,872.	5,788.	6,353.	10,996.	13,224.	11,785.	9,961.	9,095.	9,305.	9,498.	9,584.
1983	9,630.	9,659.	9,740.	10,024.	12,378.	14,500.	14,043.	12,396.	11,573.	11,665.	11,766.	11,880.
1984	11,955.	12,011.	12,058.	12,355.	14,500.	14,500.	13,252.	11,498.	10,593.	10,653.	10,720.	10,787.
1985	10,840.	10,850.	10,864.	12,428.	14,500.	14,500.	12,947.	11,077.	10,106.	10,073.	10,098.	10,102.
1986	10,106.	10,125.	10,229.	11,183.	14,500.	14,500.	12,940.	11,082.	10,137.	10,138.	10,173.	10,135.
1987	10,032.	9,927.	9,842.	10,720.	12,329.	12,620.	10,836.	8,884.	7,865.	7,746.	7,670.	7,577.
1988	7,494.	7,416.	7,352.	7,781.	10,484.	10,938.	9,143.	7,201.	6,188.	6,083.	6,053.	6,003.
1989	5,949.	5,876.	5,864.	6,980.	8,546.	8,877.	7,108.	5,159.	4,172.	4,046.	4,095.	4,003.
1990	3,908.	3,823.	3,746.	4,597.	6,200.	6,655.	4,925.	2,938.	1,909.	1,757.	1,639.	1,551.
1991	1,464.	1,384.	1,306.	1,420.	4,259.	6,020.	4,413.	2,579.	1,554.	1,403.	1,368.	1,309.
1992	1,216.	1,117.	1,092.	1,809.	2,534.	2,462.	589.	0.	0.	0.	0.	0.
1993	0.	0.	5.	433.	5,697.	7,517.	5,946.	4,091.	3,124.	0.	0.	0.

TABLE 7.

NARROWS RESERVOIR ACTIVE STORAGE - ACRE FEET DATE 03-18-1994 TIME 10:44:16

NARROWS RESERVOIR ACTIVE CAPACITY IS 5,400. AC.FT.

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1946	0.	0.	0.	0.	0.	0.	0.	0.	5,400.	5,342.	5,290.	5,218.
1947	5,117.	5,019.	4,954.	5,400.	5,400.	5,400.	3,840.	2,082.	1,165.	1,116.	1,072.	1,000.
1948	899.	797.	692.	967.	3,489.	4,112.	2,488.	528.	0.	0.	0.	0.
1949	0.	0.	0.	1,160.	5,400.	5,400.	3,864.	2,041.	1,082.	1,004.	917.	806.
1950	689.	576.	492.	1,042.	4,022.	5,178.	3,620.	1,792.	899.	813.	834.	759.
1951	657.	557.	483.	1,221.	4,406.	5,400.	3,874.	2,139.	1,207.	1,179.	1,141.	1,076.
1952	991.	912.	849.	1,448.	5,400.	5,400.	4,288.	2,715.	1,885.	1,850.	1,832.	1,759.
1953	1,661.	1,565.	1,494.	1,765.	3,994.	5,400.	3,934.	2,215.	1,318.	1,259.	1,238.	1,196.
1954	1,145.	1,107.	1,081.	1,944.	3,611.	3,966.	2,282.	397.	0.	0.	0.	0.
1955	0.	0.	0.	227.	2,681.	3,521.	1,900.	132.	0.	0.	0.	0.
1956	0.	0.	0.	825.	3,887.	4,565.	2,934.	969.	0.	0.	0.	0.
1957	0.	0.	0.	229.	2,732.	5,400.	4,213.	2,511.	1,610.	1,602.	1,604.	1,536.
1958	1,452.	1,374.	1,332.	1,791.	5,400.	5,400.	3,868.	2,104.	1,148.	1,049.	979.	891.
1959	799.	701.	613.	828.	2,589.	3,194.	1,560.	0.	0.	0.	0.	0.
1960	0.	0.	0.	293.	2,833.	3,532.	1,913.	0.	0.	0.	0.	0.
1961	0.	0.	0.	274.	1,417.	1,359.	0.	0.	0.	0.	0.	0.
1962	0.	0.	0.	879.	5,400.	5,400.	4,074.	2,374.	1,500.	1,432.	1,373.	1,266.
1963	1,129.	1,016.	903.	968.	3,959.	4,938.	3,353.	1,614.	741.	596.	510.	386.
1964	301.	221.	137.	258.	3,257.	5,043.	3,624.	1,892.	873.	727.	641.	592.
1965	549.	494.	426.	685.	3,667.	5,400.	4,143.	2,657.	2,021.	2,121.	2,161.	2,138.
1966	2,097.	2,062.	2,095.	3,173.	5,383.	5,400.	3,629.	1,843.	897.	885.	817.	742.
1967	641.	543.	459.	581.	3,606.	5,400.	3,972.	2,209.	1,300.	1,226.	1,167.	1,109.
1968	1,057.	1,008.	964.	1,145.	3,791.	5,400.	3,850.	2,143.	1,267.	1,248.	1,215.	1,144.
1969	1,057.	973.	916.	1,574.	5,400.	5,400.	3,933.	2,142.	1,259.	1,277.	1,282.	1,261.
1970	1,236.	1,187.	1,167.	1,342.	4,904.	5,400.	3,877.	2,034.	1,112.	1,079.	1,065.	1,098.
1971	1,159.	1,095.	1,049.	1,390.	4,137.	5,211.	3,596.	1,747.	821.	780.	748.	730.
1972	723.	705.	872.	1,583.	3,516.	3,966.	2,201.	293.	0.	0.	0.	0.
1973	0.	0.	0.	208.	4,075.	5,400.	3,860.	2,013.	1,100.	1,038.	994.	949.
1974	924.	875.	824.	1,036.	4,647.	5,265.	3,539.	1,627.	637.	544.	472.	376.
1975	292.	209.	124.	172.	1,855.	5,400.	4,256.	2,505.	1,587.	1,572.	1,562.	1,546.
1976	1,528.	1,502.	1,449.	1,667.	4,414.	4,899.	3,174.	1,205.	195.	53.	0.	0.
1977	0.	0.	0.	290.	280.	238.	0.	0.	0.	0.	0.	0.
1978	0.	0.	0.	496.	3,920.	5,400.	3,920.	2,176.	1,233.	1,046.	1,007.	916.
1979	825.	736.	645.	842.	4,157.	5,400.	3,756.	1,897.	926.	843.	771.	703.
1980	636.	571.	503.	954.	4,457.	5,400.	3,993.	2,187.	1,292.	1,250.	1,222.	1,166.
1981	1,104.	1,042.	1,029.	1,784.	3,678.	4,390.	2,666.	771.	0.	0.	0.	0.
1982	0.	0.	0.	566.	5,220.	5,400.	4,025.	2,260.	1,446.	1,684.	1,877.	1,963.
1983	2,010.	2,039.	2,120.	2,404.	4,771.	5,400.	5,014.	3,429.	2,658.	2,779.	2,880.	2,994.
1984	3,069.	3,125.	3,172.	3,469.	5,400.	5,400.	4,224.	2,535.	1,687.	1,778.	1,845.	1,912.
1985	1,966.	1,975.	1,989.	3,553.	5,400.	5,400.	3,920.	2,116.	1,205.	1,204.	1,230.	1,233.
1986	1,237.	1,257.	1,360.	2,315.	5,400.	5,400.	3,913.	2,122.	1,236.	1,269.	1,304.	1,266.
1987	1,163.	1,058.	973.	1,852.	3,476.	3,827.	2,122.	247.	0.	0.	0.	0.
1988	0.	0.	0.	429.	3,147.	3,654.	1,929.	55.	0.	0.	0.	0.
1989	0.	0.	0.	1,117.	2,694.	3,072.	1,364.	0.	0.	0.	49.	0.
1990	0.	0.	0.	852.	2,463.	2,950.	1,264.	0.	0.	0.	0.	0.
1991	0.	0.	0.	115.	2,957.	4,730.	3,136.	1,316.	304.	162.	127.	67.
1992	0.	0.	0.	717.	1,444.	1,385.	0.	0.	0.	0.	0.	0.
1993	0.	0.	5.	433.	5,400.	5,400.	3,850.	2,015.	1,066.	0.	0.	0.

TABLE 8.

NARROWS RESERVOIR RELEASES TO COTTONWOOD CANYON - ACRE FEET DATE 03-18-1994 TIME 10:35:35

NARROWS RESERVOIR ACTIVE CAPACITY IS 14,500. AC.FT.

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL	SHORTAGE
1946	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1947	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1948	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1949	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1950	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1951	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1952	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1953	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1954	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1955	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1956	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1957	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1958	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1959	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1960	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1961	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1962	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1963	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1964	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1965	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1966	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1967	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1968	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1969	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1970	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1971	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1972	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1973	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1974	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1975	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1976	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1977	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1978	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1979	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1980	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1981	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1982	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1983	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1984	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1985	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1986	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1987	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1988	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1989	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1990	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1991	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1992	124	113	124	0	0	0	1800	562	0	56	25	18	2,822.	2,578.
1993	40	53	124	0	0	0	1800	1900	971	124	120	124	5,257.	143.
GRAND TOTALS													256,479.	2,721.

TABLE 9.

NARROWS RESERVOIR RELEASES TO COTTONWOOD CANYON - ACRE FEET DATE 03-18-1994 TIME 10:43:10

NARROWS RESERVOIR ACTIVE CAPACITY IS 5,400. AC.FT.

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL	SHORTAGE
1946	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1947	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1948	124	113	124	0	0	0	1800	1900	498	0	44	43	4,646.	754.
1949	36	27	65	0	0	0	1800	1900	971	124	120	124	5,167.	233.
1950	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1951	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1952	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1953	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1954	124	113	124	0	0	0	1800	1900	446	50	59	30	4,647.	753.
1955	23	15	51	0	0	0	1800	1900	108	0	10	10	3,916.	1,484.
1956	6	0	49	0	0	0	1800	1900	932	0	36	13	4,736.	664.
1957	13	20	65	0	0	0	1800	1900	971	124	120	124	5,137.	263.
1958	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1959	124	113	124	0	0	0	1800	1583	10	31	33	0	3,819.	1,581.
1960	0	0	53	0	0	0	1800	1861	0	29	49	42	3,833.	1,567.
1961	13	6	25	0	0	0	1306	0	0	37	63	39	1,489.	3,911.
1962	39	79	90	0	0	0	1800	1900	971	124	120	124	5,247.	153.
1963	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1964	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1965	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1966	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1967	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1968	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1969	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1970	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1971	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1972	124	113	124	0	0	0	1800	1900	331	80	89	66	4,627.	773.
1973	56	45	82	0	0	0	1800	1900	971	124	120	124	5,222.	178.
1974	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1975	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1976	124	113	124	0	0	0	1800	1900	971	124	53	0	5,209.	191.
1977	0	11	25	0	0	0	215	0	0	0	0	0	251.	5,149.
1978	0	0	43	0	0	0	1800	1900	971	124	120	124	5,082.	318.
1979	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1980	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1981	124	113	124	0	0	0	1800	1900	791	106	78	40	5,075.	325.
1982	16	6	40	0	0	0	1800	1900	971	124	120	124	5,101.	299.
1983	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1984	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1985	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1986	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1987	124	113	124	0	0	0	1800	1900	270	39	44	31	4,445.	955.
1988	42	35	60	0	0	0	1800	1900	78	48	90	74	4,127.	1,273.
1989	70	40	112	0	0	0	1800	1378	37	20	120	81	3,658.	1,742.
1990	29	28	47	0	0	0	1800	1223	0	0	2	36	3,164.	2,236.
1991	37	33	46	0	0	0	1800	1900	971	124	120	124	5,155.	245.
1992	98	15	99	0	0	0	1332	0	0	56	25	18	1,642.	3,758.
1993	40	53	124	0	0	0	1800	1900	971	124	120	124	5,257.	143.
GRAND TOTALS													230,252.	28,948.

PRICE RIVER WATER
IMPROVEMENT DISTRICT
P.O. Box 903
265 South Fairgrounds Road
Price, Utah 84501
Telephone (801) 637-6350
FAX (801) 637-6374

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April 25, 1994

Regional Environmental Officer
Bureau of Reclamation
125 South State Street
P.O. Box 11568
Salt Lake City, Utah 84147

Narrows

RE: Narrows Project
Draft Environmental Impact Statement
Sanpete Water Conservancy District
November, 1993

This letter is a formal protest to the construction of the Narrows Project.

The Price River Water Improvement District is an agency created and organized to treat wastewater and particularly in this case, to provide culinary water to the residents of Carbon County.

Of the approximate 21,000 residents in Carbon County, the District supplies water on a full-time basis to about 8,400 residents. The District also has the ability to provide supplemental and emergency water to the cities of Price and Helper. 100% of the District's water supply comes from Scofield Reservoir.

302 In the last 5 to 6 years of drought, the volume of water in Scofield Reservoir has been depleted to the point that in 1992 we received 35% delivery on our reservoir water. In addition to this minimal deliver, in excess of $100,000 was spent to meet winter operational requirements. This included the lease of additional water and costs associated with the breaching of the old dam site. The draft Environmental Impact Statement (EIS) for the Narrows Project does not adequately address the operational problems that could occur in Scofield Reservoir in the Narrows Project was completed. In addition, the draft EIS does not address the
303 negative impact that could occur in the Scofield Reservoir due to an excess concentration of pollutants because of lower volumes of water in the reservoir.

We hereby request that the final EIS on the Narrows Project reflect the condition of the Scofield Reservoir, including pollution concentrations and decreased volumes if the Narrows Project had been constructed and in service for the past 10 years, and also evaluate the future impact it will have for the next 10 to 15 years for municipal, industrial and agricultural demands.

CLEAN WATER

The draft EIS applied very little effort in investigation of all water supply alternatives. Most of the effort was made in describing the "preferred alternative." Receiving water from the Central Utah Project (CUP) as an alternative was given one very small paragraph in the draft EIS. We believe that the CUP may well be a viable alternative. It would obviously be less of a environmental impact that the "preferred alternative".

304 We hereby request that the CUP and all other options outlining alternative water sources be investigated thoroughly as part of the Environmental Impact process.

Page 3-80 of the draft EIS contains information on the "No Action Plan" under the "Social and Economic Conditions" section, and states:

> "Without the Narrows Project, north Sanpete County would remain as stable in the next decade as it has in the past. There would be no residual social impacts from the No Action Plan".

305 Page 3-81 of the draft EIS contains information dealing with the "Existing Environment" under the section on "Cultural Resources". It states that "Surveys have not been performed for the Upper Cottonwood Creek, Oak Creek and East Bench Pipeline alignments. A literature search and survey would be conducted prior to design of these facilities." Now is the time, not sometime in the future, to study these creeks to determine if the Narrows Project would produce any adverse affects.

306 Enclosed is a copy of an article which appeared in "The Salt Lake Tribune" on April 1, 1994, entitled "River of Dreams: Babbitt's Next Idea: Damn the Dams to Save the Fish." The article clearly points out that Interior Secretary Babbitt is "out to restore the ecological balance that existed before the Bureau of Reclamation began its nearly 100 years of dam building." In light of the direction Interior Secretary Babbitt is heading, we hereby demand that a copy of the draft EIS and all information and materials pertaining to the Narrows Project, including the information presented at the hearing on March 30, 1994 in Price, Utah, and the hearing on March 31, 1994 in Sanpete County, be sent to Mr. Babbitt for his review, and comment.

In view of the information contained in the draft EIS and the protests which were submitted at the March 30, 1994 meeting and those protests now being filed, the Price River Water Improvement District cannot conceive of any possible reason why the Bureau of Reclamation would even consider funding the Narrows Project where clearly there is no justification or need.

Phillip P. Palmer, District Manager
PRWID

The Salt Lake Tribune

FRIDAY
APRIL 1, 1994

RIVER OF DREAMS

Babbitt's Next Idea: Damn the Dams To Save the Fish

By Melissa Healy
LOS ANGELES TIMES

OLYMPIC PARK, Wash. — Interior Secretary Bruce Babbitt has a dream.

He wants to stand in the shadow of a massive dam and push a dynamite plunger. The blast would collapse the imposing structure with a thunderous roar. The long-trapped river behind it would flow freely again. And neither the West nor the Interior Department would be same again.

It is an ambitious dream — as ambitious as the engineering feats that dammed this region and made crops and cities sprout from the desert during the past century.

Like many past interior secretaries, Babbitt wants to transform the West. But he has something different in mind: He wants to restore, if in small measure, the ecological balance that existed before the Bureau of Reclamation began its nearly 100 years of dam building.

He also wants to transform the Bureau of Reclamation from an empire builder with little environmental concern into an agency dedicated to preserving and protecting America's inland waters.

□□□

Troubled Waters: Now that he is interior secretary, Babbitt could make his dream a reality. He, in fact, has raised the possibility in the department's 1995 budget.

The first dam Babbitt wants to dismantle is the 210-foot high Glines Canyon Dam on the Elwha River, which tumbles for 48 miles through Olympic National Park into the Strait of Juan de Fuca. The Elwha Dam, which lies 20 miles down a plunging, spectacular run of the steel-gray river, would be the second to go.

At stake is the restoration of some of the nation's most important and most endangered fisheries. Salmon, trout and sturgeon once spawned by the millions in the West's rivers. And the pristine Elwha River was one of the most fecund — a "fish pump" that spewed hundred-pound salmon into the Pacific Ocean.

Babbitt said removal of the dams on the Elwha would illustrate "the search for the highest and best mix of uses" for scarce water in the West.

Before construction of the Elwha Dam in 1913 and the Glines in 1927, the Elwha River was home to six species of salmon. Today, the salmon are at about a fourth of their pre-dam strength and some, like the sockeye and the pink salmon, virtually are gone because dams have disrupted their migratory routes. The most precipitous decline has come in the past decade.

To the paper mills, aluminum manufacturers, miners and hydroelectric producers of Washington's Olympic Peninsula, Babbitt's dream is more like a nightmare. The dams he wants to demolish produce almost 40 percent of the electricity used by one of nearby Port Angeles' two remaining mills, the Daishowa America pulp and paper mill. And Daishowa employs 320 people in a region rich in natural beauty but poor in job opportunities.

□□□

Ripple Effect: To be sure, Babbitt's dream faces several obstacles, not the least of which is that the dams — like thousands of others across the country — were built privately and are owned privately. But federal licensing of the dams is in jeopardy because they do not comply with environmental standards. And the dams' owner is trying to negotiate their sale to the government.

The Interior Department's 1995 budget includes funds to study the demolition and sale of the dams. But Congress still would have to appropriate the needed funds — an estimated $155 million to $815 million. A battle over allocating the money probably would result.

The proposed destruction of the Glines Canyon and Elwha dams is sending waves of worry beyond the Olympic Peninsula. From the Mississippi River to the Pacific Ocean, farmers, manufacturers, ranchers, miners and loggers have come to count on the dam-building Bureau of Reclamation to provide plentiful water and cheap hydroelectric power regardless of the toll on the environment or the taxpayer. If the Glines Canyon and Elwha dams can be ripped down in the interests of a few salmon, critics ask, where would it stop? And how many jobs in industries long dependent on the dams would be sacrificed?

Many residents already feel threatened by a feared expansion of the spectacular Olympic National Park and besieged by what they see as the insatiable demands of the environmental movement. And those who oppose removal of the dams see in the proposal a federal environmental agenda on the march: To them destruction of the dams is just the first step in pushing residents off the peninsula and turning it into a sanctuary for vacationing urbanites.

Babbitt is quick to observe that the rest of the nation's dams will not fall like dominoes in the wake of the Elwha and Glines dams. Both dams offer a unique opportunity for river restoration, he said. Alternative sources of electricity are available and the dams' owner is willing to sell if the price is right. And since one of the dams and virtually the entire river lie in the protected Olympic National Park, the prospects for the return of fish and the restoration of natural habitat is seen as good.

Babbitt said that his proposal to destroy the dams is the most dramatic evidence of his determination to take actions that mitigate, wherever possible, damage done to rivers by reckless human intervention. And some of those actions, he has acknowledged, could be costly.

In recent months, for instance, Babbitt has proposed changes in the operations of hydroelectric and irrigation dams along the Colorado and North Platte rivers that would prove costly to farmers and electric utilities but improve the environmental health of those rivers and boost recreational opportunities on them as well.

"We didn't think much about wildlife values and salmon and the environment in the process" of making initial decisions to dam the nation's rivers, Babbitt said. "We now have to go back and see if we can find the equilibrium that we didn't talk about" when the dams were built.

302. Effects of 1986-1992 Drought on Scofield Reservoir

The effects of the 1986 through 1992 drought on Scofield Reservoir are illustrated in Figure 3-1 of the EIS. As indicated in Chapter 3, the 1960 through 1992 hydrologic period was used to identify project impacts. This period of study included the 1986 through 1992 drought period. A description of the operational problems that occurred during 1992 has been included in Chapter 3 of the EIS.

303. Increased Concentration of Pollutants

As indicated in Chapter 3 of the EIS, the average concentration of phosphorus (the limiting pollutant for algae growth) would remain about the same under the project.

304. Alternative Water Sources

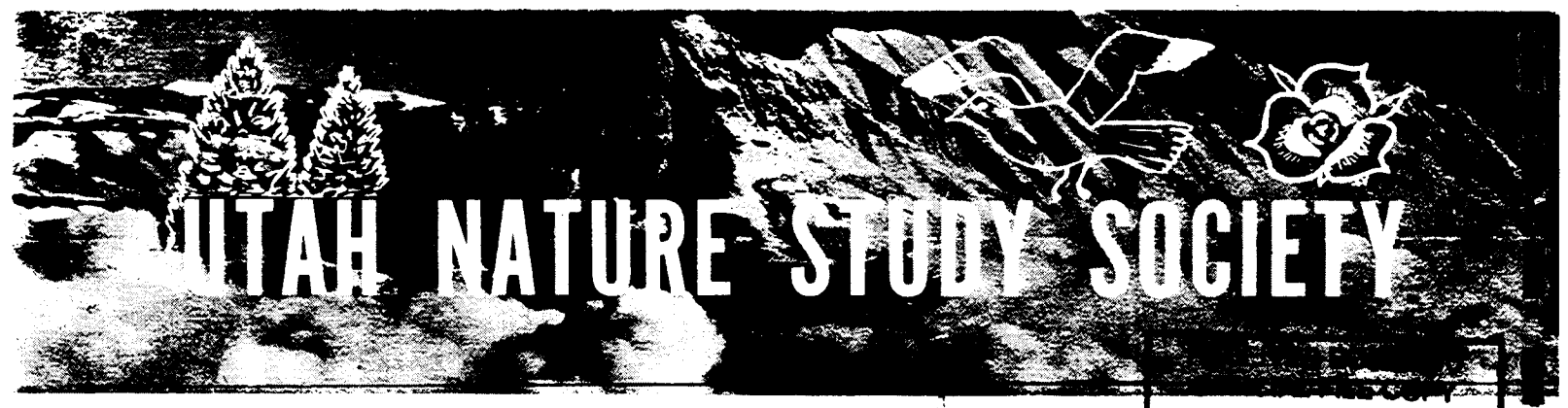
A discussion of CUP water as a project alternative is found in Chapter 2 of the EIS. Other alternatives are also described in Chapter 2. These alternatives have all been determined to be non-viable. Since the draft EIS was published, developments with respect to CUP planning indicate that CUP water will not be available to Sanpete County. With Millard County withdrawing from the CUWCD, the CUWCD has dropped from further consideration all plans to deliver CUP water to the Sevier River basin and hence, to Sanpete County.

305. Cultural Resource Surveys

In a letter dated March 2, 1994 (copy attached to EIS), the Utah State Historical Society expresses its concurrence with the information provided in the EIS and the proposed mitigation.

306. Copy of EIS to Secretary of the Interior

The Department of the Interior is on the distribution list and has received copies of the draft EIS. The Department will also receive copies of the final EIS which will include the comments made by the Price River Water Improvement District.



UTAH NATURE STUDY SOCIETY

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April 4, 1994

Regional Director
Bureau of Reclamation
125 South State Street
P.O. Box 11568
Salt Lake City, Utah 84147

Narrows EIS Comments

X Endangered Species / X Wetlands

Dear Regional Director:

Concerning the Draft Environmental Impact Statement for the Narrows Project:

I was a little dismayed upon reading the Draft EIS with respect to spotted frogs, a prime candidate species for the threatened and endangered species list. On page 3-66 this frog is mentioned twice and in conjunction with the bald eagle with the biological assessment concluding that "there would be no impacts" to either species.

I would suggest quite the contrary. The spotted frog populations have collapsed because of agricultural and livestock degradation of wetlands and because of urbanization. These uses are the
307 stated benefits to the San Pitch region. With the stated economic benefits of this project to the project sponsors, the two locations (north and south of Fairview) used by spotted frogs will be degraded by more intensive agricultural use of adjacent lands and more urbanization which such use will generate.

As is typical of water project planning, there is no study of the impacts of new water on the land which receives this water, the increased pollution of San Pitch River from agricultural runoffs, and the affects of urban populations on wetlands and riparian habitats. This contrasts sharply with the affects of the projects on very distant Colorado River native fishes and salinity.

Sincerely,

Peter Hovingh

Peter Hovingh, Chairman
Issues Committee
Utah Nature Study Society

307. Spotted Frog

The biological assessment prepared by the Reclamation concluded that there would be no impacts to the spotted frog because there were no frog populations found within the project area. True, populations were found north and south of Fairview, but these areas are outside the project. The project would not cause an increase in the intensity of agriculture nor in urbanization. All lands to receive project water are presently irrigated.

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April 7, 1994

TO: Bureau of Reclamation
RE: Narrows Project

Narrows EIS Comments

Dear Sirs,

000121

We are writing this letter concerning the proposed Narrows Project as citizens and owners and managers of the Snack and Pack convenience store and the Lazy Anchor Campground in Scofield, Utah. We feel that the dam, if built, would damage the environment, recreation, economy and drinking water of the area.

Many different types of wildlife rely on the streams and Scofield Resevoir for survival. We had hoped that society and government had finally gained some wisdom about disturbing mother nature.

Scofield Resevior boasts some excellent recreational possibilities. It is known to be one of the best fisheries in the entire state, and many people from throughout the state come here to spend time and money. Hunters, boaters, lake, stream and ice fishermen, hikers, campers, sightseers all come and depend heavily on the resevoir to create the habitat they enjoy.

308 We will concede that the proposed diversion of water would insure Sanpete County's growth, but it would kill all growth in Carbon County. We cannot see any advantage in spending 16 million dollars to grow an extra crop of hay for approximately 250 families. The State Parks and Recreation and the Forest Service have spent, are spending and are planning to spend more money in the Scofield area. The State has also allocated an additional 2 million dollars for the state parks in the Scofield area. We are appalled at the idea of the CIB giving funds to a project that would kill, instead of support, one of the areas most impacted by mining. It would not make any sense at all to spend more taxpayers money making the taxpayers money already spent in this area obselete. That could definitely be termed poor money management.

Carbon County has very few options concerning drinking water, beause of the alkali content in the soil prevents the development of potable wells. Sanpete County, on the other hand, has many streams flowing into the valley. Perhaps they could find a more suitable site for their dam. One which would not jeopardize the environment, recreation, drinking water and economy of Carbon County.

The Scofield area supports a wide range of wildlife, which in turn, attracts a very large amount of people, who in turn, spend a good deal of money in this immediate area and in the entire state. It would not seem wise to kill off this area, jeopardize the future of an entire county all because of the changing of the natural course of a drainage.

Thank you for your time and consideration.

Sincerely,

Jim Levanger

Jim Levanger, Councilmember and Chairman of Planning and Zoning

Carol Levanger

Carol Levanger, Scofield Town Clerk

Scofield Star Rt 80
Helper UT 84526

308. Economic impacts on Carbon County

Please refer to the response to comment 14.

ORIGINAL

SOUTHERN UTAH WILDERNESS ALLIANCE

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Jacque Murphy
Bureau of Reclamation
125 So State St
PO Box 11568
Salt Lake City, Utah 84147

April 13, 1994

Narrows EIS Comments

00012

Dear Ms. Murphy

Thank you for the chance to respond to the Draft Environmental Impact Statement for the Narrows Project on Gooseberry Creek.

I consider the proposed Narrows Dam and Reservoir project to be a terrible and pathetic attempt to waste huge sums of taxpayer money for a ridiculous and unjustified cause. With an estimated cost of 16.1 million dollars of state and federal money, the proposed alternative will reduce agricultural water shortages by a meager 11%. The so called shortages are actually only water transfers that I believe could be eliminated through water conservation measures. This project represents a giant state and federal subsidy for the benefit of a very few people at the expense of outstanding fish and wildlife species, and priceless aesthetic values.

309 The DEIS does not even consider investing in conservation measures to solve agricultural water shortages. If 16 million dollars were spent on water conservation measures there would be no water "shortages". The irrigation water is to be used on crops known for their high water consumption. One is left to question the wisdom of spending huge amounts of money to feed water intensive crops like alfalfa and grass hay. This project is just another short-sighted subsidy for the desert farmer.

The impact to the four Colorado River Endangered fish was not quantified in the DEIS, even though the project would reduce water flows into the Price by 5,540 acre-feet. The only contribution the Sponsors would make to offset this uncertain impact is a meager contribution of $63,710. The Sponsor's seem to assert that any damage to the endangered species in the Colorado River will be offset by their participation in the Recovery Implementation Program for Endangered Species in the Upper Colorado River. I for one will forgo their participation in the RIP in favor of maintaining the 5,540 acre-feet that presently flow into the Colorado River.

310 In discussing the impact of destroying 100 acres of wetlands, the DEIS asserts that the new wetland sites will be "monitored to ensure that the value of the mitigation sites is at least equal to the value of the wetlands lost." This monitoring will entail comparing HEP habitat values. There is no reason whatsoever to believe that these values will ever be close to the values that

X endangered species
X wetlands
X costs

Metro office: 1471 South 1100 East • Salt Lake City, Utah 84105-2423 • (801)486-3161
Moab office: Box 758 • Moab Utah, 84532-0758 • (801) 259-5440
Washington, D.C. office: 415 C Street, NE • Washington, D.C. 20002 • (202) 546-2215

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exist presently on the 100 acres of wetlands. A wetland is a complex interaction between aquatic and terrestrial ecosystems that can not be duplicated by the mere mingling of ground and water. Not one hour of professional research has been devoted to assessing the viability of creating a healthy wetland ecosystem in the areas identified in the DEIS.

Finally, the onslaught of impacts to the aquatic and terrestrial ecosystems caused by the Narrows project are not at all compensated for by the mitigation measures. The loss of over 20 stream miles of invaluable fish habitat for all life stages of Rainbow, Cutthroat, and Brown Trout on Gooseberry Creek, Fish Creek, and Lower Cottonwood Creek is supposedly compensated by the Sponsor's acquiring a mere 4 miles of private land with a fishery stream. This is an utterly maddening and ludicrous mitigation project that will obviously not offset the irretrievable losses to the healthy fisheries present on Gooseberry Creek and it's tributaries.

For these reasons, the Southern Utah Wilderness Alliance adamantly opposes the Narrows Project Dam and Reservoir under any circumstance. The huge impacts to healthy fish and wildlife species can not be offset by the pitiful mitigation projects proposed. Neither can the public afford to carry such a huge burden of costs for a project that will benefit such a small minority of people.

Sincerely

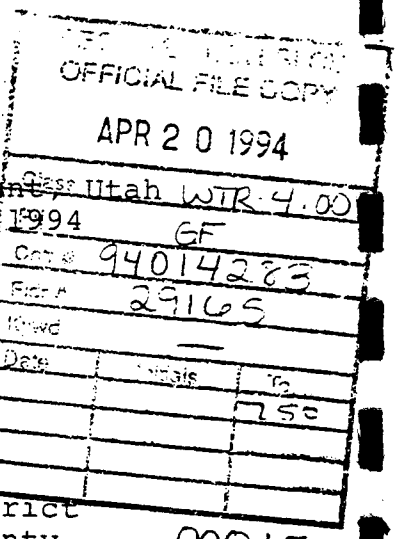
Zachary Frankel
Rivers Coordinator

309. Conservation Measures

Please refer to response to comment 235.

310. Wetland Mitigation

The Sponsor strongly disagrees with this comment. The Mud Creek wetland mitigation site is a natural wetland that has been severely damaged but can be restored and properly managed to return it to its former state. The Sponsor also believes that wetland mitigation can be accomplished at the mitigation site between Fairview Lakes and the proposed Narrows Reservoir. The topography, soils, and proximity to other natural wetlands have been carefully evaluated in an attempt to identify an on-site wetland mitigation alternative. However, the Sponsor does believe that the mitigation would be more efficiently accomplished at the Mud Creek site. In developing the mitigation alternatives there was extensive consultation with the FWS, FS, COE, Reclamation, and the UDWR.



Narrows EIS comment

Mt. Pleasant, Utah
April 20, 1994

Regional Director
Bureau of Reclamation
125 South State Street
Salt Lake City, Utah 84147

Re: Narrows Project
Sanpete Water Conservancy District
Cottonwood Canyon, Sanpete County
EIS Comment Period to April 26, 1994

Gentlemen:

We appreciate the opportunity to review and comment on the Draft Environmental Impact Statement (EIS) for the Narrows Project in Sanpete County, Utah. We support the Narrows Project in concept and general planning, and we hope that it will be completed for the benefit of Sanpete County and the State of Utah.

However, there are several issues associated with this project which specifically impact our property and livestock operation to the degree that we are compelled to raise them in response to the EIS. We understand that the conservancy district has obtained a perpetual easement to flood the basin. But the project impacts us in additional ways which we now call to your attenetion.

311 GRAZING: The EIS estimates that 10% of the suitable grazing area will be taken. If that 10% is the accessible forest grazing permit area, then injury to our grazing permit ought to be addressed and mitigated. Further, if conservation easements or restrictions to protect wildlife are created, our grazing capacity will be additionally impacted. Additionally, if new wetlands are created, our grazing capacity is impacted even more.

312 RECREATION: The EIS recognizes that public recreation will be greatly increased in the area: fishing, boating, camping, picnicking, summer home use, horseback riding, snowmobiling, hunting and related facilities such as boat ramps, slips and day use areas. Please be advised that public use for recreation on our adjacent private land has not been negotiated or acquired. The EIS presumes that these uses are only a matter of course without hint of mitigation or compensation. The inevitable public use ought not to become our individual and private burden.

313 CONSTRUCTION: The EIS presumes that fill material for the dam will be taken from the reservoir basin. Also, construction will be disruptive to our property and operation. To the extent material is borrowed from private property or some private area is used for a construction site, there ought to be compensation. otherwise, we are individually required to bear a burden more properly born by the public. The EIS contains no plan to mitigate this burden.

/

314 DOWNSTREAM FLOW: The EIS indicates that stream flow in cottonwood Canyon will increase to 300% at times and that the channel will be widened. The clear implication is that increased flow will create downstream problems, impair riparian areas, destabilize streambanks, and possibly create dangerous situations and severe erosion. The EIS contains no suggestion as to how this impairment will be mitigated downstream from Left hand Fork. Our particular problem is that increased stream flow will likely impact on our access, roads, culverts and stream bnaks on private property in the Hy's Fork area where the stream makes a sharp bend. The EIS lacks any discussion of this problem, and any suggestion of mitigation is totally absent. We have done a lot of repair work to the roads and stream banks since the floods of '82 and 83, and we don't want to have to do it all over again when it appears to be preventable in the first place. Damage which can be prevented ought to be prevented rather than repaired.

In conclusion, while we support the Narrows Project, it will result in a particularly significant impact on our property and livestock operation. The EIS fails to address these issues which impact us mostand how they are to be mitigated. We sincerely hope you will give serious consideration to our problems an comments.

Sincerely,

Jack McAllister

Jack McAllister, President
Fairview Land and Livestock
140 West 400 North #44
Mt. Pleasant, Utah 84647

CC: David Peterson
John Anderson

311. Grazing

The project impacts on grazing are described in Chapter 3 of the EIS. These impacts include the effects of conservation easements adjacent to the reservoir. If the alternative wetlands mitigation area adjacent to Narrows Reservoir is used, the area would be within the conservation easements or on land owned by the Fairview Lakes development. Therefore, there would be no additional impact to grazing. Compensation for impacts to grazing on private lands would come in the form of payments that have or would be made for the acquisition of easements. There is no mitigation proposed for impacts to grazing on National Forest System lands since these lands are under Reclamation withdrawal for the Gooseberry Project.

312. Recreation

Over half of the reservoir shore line is on National Forest System land. Public access would be acquired for most of the remainder of the shore line under the conservation easements. The project plan includes a developed recreation facility to accommodate the recreation that would occur on the reservoir.

313. Construction Materials

The Sponsor would provide compensation for any construction materials obtained from private lands.

314. Cottonwood Canyon Impacts

Please refer to the responses to comments 29, 30, and 41. The major mitigation measure for Cottonwood Canyon includes construction of a pipeline to handle high flows in the reach between the Narrows Tunnel and Left Hand Fork.

SIERRA CLUB

Utah Chapter
2273 South Highland Drive Suite 2D • Salt Lake City, UT 84106-2832
801•467•9297 Fax 801•467•9296

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April 22, 1994

Regional Director
US Bureau of Reclamation
P.O. Box 11568
Salt Lake City, UT

Narrows EIS Comments

Dear Sir:

I wish to comment on the EIS concerning the Gooseberry Narrows Project. The project would have a number of adverse environmental impacts and would satisfy only a third of the farm irrigation shortfall in the region.

This project is partly justified in the EIS on the basis that it is the third and final leg of an ongoing development. The project was, however, designed in 1933 and completing it would ignore the advances made and knowledge gained in the past 61 years. The fact is that USDA data shows that simple measures
315 such as converting all irrigation to sprinklers with the sprinklers facing down would conserve more water than required to meet the entire shortfall. Furthermore, conversion of some of the farming to lower water use crops would result in there being an irrigation water surplus in the area. You are certainly aware of this and so are many others. Thus, the project is unnecessary. The pressure irrigation systems could be paid for with money intended for the dam, through the CUP, and through the Soil Conservation Service. The total cost of meeting the farmers' needs in this manner would be significantly less than the cost of the dam.

Since the dam and reservoir would flood wetland, reduce Gooseberry Creek to a trickle, probably block restoration of part of the Price River, and have other negative impacts, whereas sprinkler systems would be environmentally benign and better meet irrigation needs, this project is categorically unjustified.

316 That the project is a poor one is, in fact, tacitly acknowledged in the EIS by attempts to justify the project by claiming need for more flatwater recreation and fishing opportunities. Neither of these is or ever has been a permitted justification for a BOR water project. In the past, these have been offsetting benefits. The BOR has no mandate to alter the environment for imaginary, assumed, or projected recreational desires.

In sum, this is an out-of-date project inconsistent with the current thrust of the BOR, an unnecessary project that is also inadequate to meet the needs of the farmers, an environmentally unsound project, and an egregious waste of taxpayers' money. It should be allowed to sink gracefully out of sight.

Sincerely,

James A. Wechsler

Recycled Paper

James A. Wechsler, Ph.D.

315. Simple Conservation Measures

The Soil Conservation Service Conservationist in Manti, Utah, was consulted regarding conservation measures being adequate to meet entire shortfall. He stated the majority of the county is already under sprinkler irrigation. Irrigating with the sprinkler heads facing down is not possible in all applications. This type of system would normally require a pivot type sprinkler and most of the fields are 40 acres or less which do not justify a pivot system. However, if it were possible to use this type of system the savings in water use might only approach a maximum of 10 percent. The real problem in this area is lack of storage to provide late season water supply. By the middle of June only about 50 percent of the needed water supply is available. With good management some flood systems are almost as efficient as sprinkler systems. The farmers are presently trying to improve management practices and systems to conserve in this water short area. They are also converting to crops that require less water.

Please refer to the response to comment 235.

316. Multiple Purpose Project

The Narrows Project plan was developed in accordance with Reclamation's published loan program guidelines for the SRPA. According to Reclamation's guidelines:

> A small Reclamation project may be solely for irrigation or drainage of irrigable land. The project may also be for multipurpose water resource development authorized or eligible for authorization under Reclamation law . . . . Other purposes may include development of municipal and industrial (M&I) water supply and treatment, hydroelectric power, flood control, fish and wildlife (F&W) enhancement, or outdoor recreation.

The majority of Reclamation projects have been multiple purpose in nature and have served purposes such as flood control, fish and wildlife enhancement, highway improvement, and outdoor recreation in addition to water supply functions.

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April 23, 1994

To: Regional Director, Bureau of Reclamation
Upper Colorado Regional Office

From: A. Laurelle Hughes
Box 263
Alamo, NV 89001

Narrows [illegible]
Comments

Subject: DEIS, Narrows Project

I have a membership in the Fairview Lakes association. This membership includes the right to use a specific lot to park a trailer or construct a cabin. There are approximately 200 memberships in the association. These lots are located in the area north and east of Fairview Lakes (south of the proposed project area) in accordance with a lease between the Association and the private landowner.

I have the following concerns and comments regarding the DEIS:

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Narrows EC Comments

Pg 3-69: "The area adjacent to the proposed Narrows Reservoir is zoned Forest Watershed 1-10 (1 dwelling per 10 acres). The primary areas now under development include the area approximately 2 miles east of Gooseberry Reservoir and the area on the north side of privately owned Fairview Lakes."

pg 3-72: "construction of summer homes might be accelerated but would be limited by zoning restrictions of one dwelling per 10 acres."

317

The DEIS does not appear to reflect the use of the area on the north side of Fairview Lakes. This area has been developed with lots being 1± acre each. Though there are several common areas where no development will take place, the "1-10" development ratio apparently doesn't apply to this area. Approximately 150-200 memberships to Fairview Lakes Association have been sold which includes the right to build a cabin [illegible] specific lot.

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Narrows DIS Comments

At least 50 cabins have been constructed to date, most over the last 5 years. The cabins are subject to year-round use since the general area is a popular cross-country skiing and snow-mobiling area. Many of the other lots have 1 to 3 trailers parked on them for the summer season (June through September). Also, the private landowners allow their members to use some of the area ~~north~~ south and east of Fairview Lakes for recreation use, i.e., parking recreational trailers, although I am not familiar with the specifics of this use.

My specific comments regarding the DEIS:

1. The DEIS should more accurately reflect this more intensive use of the area south of the Narrows Project. 318

2. Will the water quality in the Narrows Reservoir (either alternative) be adversely affected by future as well as current use by this summer/winter home and trailer use? 319

Conversely, will the proposed project affect the current practices by those users?

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3. What is the high water line in relation to the lands under lease to the association? Will any existing cabins be affected by the impounded waters? 320

I appreciate your consideration of my comments.

Laurelle Hughes

Narrows S.C. Comments

317. Present Land Use Conditions

Chapter 3 of the EIS has been revised to more accurately describe the Fairview Lakes development and other subdivisions in the project area.

318. Present Land Use Conditions

Please refer to the response to comment 317.

319. Water Quality in Narrows Reservoir

The county and State health department's requirements for waste disposal would be implemented to protect the reservoir water quality. Zoning requirements which control the density of developments would also be followed.

320. Relationship of Reservoir High Water Line to Existing Cabins

The high water line of the proposed Narrows Reservoir would be well below any existing cabins. Therefore, there would be no impacts to those dwellings.

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Jan Ellen Burton
1340 Gilmer Dr.
SLC. UT. 84105

Narrows EIS Comments

Regional Director
US Bureau of Reclamation
PO Box 11568
Salt Lake City, UT. 84147

April 22. 1994

Dear Sir:

I urge you to stop the Narrows Project on the upper Price watershed. This project will destroy a potentially excellent fishing area and possibly result in major problems for the people in the Price area.

I have land in the mountains above Price, and recall only two years ago the water situation in Central Utah was critical. Diverting more water from this area could have devastating effects in future dry years. The thought of implementing a
321 transbasin diversion for more irrigation when the populace served by the existing waterways and natural streambeds will suffer, is unconscionable.

I am a member of the Stonefly Society of the Wasatch and Trout Unlimited. With adequate instream flow protection, the Price River can become an excellent trout stream. With the implementation of the Narrows Project, Scofield Reservoir will
322 inevitably be drained in dry years, and the spawning areas above Lower Gooseberry will be destroyed. --I refer you to recent past issues of the Trout Unlimited magazines, if you are not fully aware of increasing problems due to dependence on stocking rather than enhancement of natural fisheries.

Sincerely,
Jan Ellen Burton, Ph.D
Jan Ellen Burton

321. Impacts to Carbon County

Please refer to the response to comment 14.

322. Impacts to Stream and Reservoir

Chapter 3 of the EIS identifies the impacts to stream and reservoir fisheries. However, Chapters 2 and 3 of the EIS also identify mitigation measures, which are an integral part of the project plan, to offset these impacts.

334 West 200 North, Apt. 309
Provo, Utah 84601
25 April 1994

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Jacqueline Murphy, UC 751
Bureau of Reclamation
125 South State Street
P.O. Box 11568
Salt Lake City, UT 84147

Dear Ms Murphy:

Thank you for the opportunity to comment on the Draft Environmental Impact Statement for the Narrows Project. I shall group my observations under three headings: recreation, trace elements and salinity and threatened and endangered vegetation species.

00041

Recreation

323 In the analysis of the recreational benefits of the Narrows Project, the sponsor claims a net increase of 41,900 visitor days in the project area; the data in this document are insufficient to support that conclusion.

324 Your document does not state the number of acres by which the project will diminish the average surface area of Scofield Reservoir. However, you have hypothesized a reduction in angler days of 4,500. If this number derives from the assumption that each acre of lake surface will attract 30 angler days per year, then presumably Scofield Reservoir will on average be 150 acres smaller after the completion of the Narrows Project. Nowhere does your analysis consider that types of recreation other than fishing might also be reduced by the smaller size of Scofield Reservoir. At some density boaters, for example, will probably be driven away. If density does not affect other recreational uses of the lake, you should state this and the literature to support the assertion.

325 The analysis of the project impact on Lower Gooseberry Reservoir includes the following statement from p. 3-38, "At the present time, Gooseberry Reservoir frequently experiences fish kills due to low dissolved oxygen levels. If the problem becomes severe, it would be an adverse effect attributable to the project." The DEIS adds on p. 3-39, "However, the creation of the reservoir fishery would compensate for adverse effects that may occur on Gooseberry Reservoir and Scofield Reservoir." At least in the case of Scofield Reservoir, some quantification--however faulty--is provided. Here we get none.

326 On p. 3-74, the DEIS states, "Gooseberry Creek in the immediate project area is utilized to a lesser degree by fisherman. [sic]" This reference appears to be the sole mention of stream anglers in the entire document. Such a cavalier treatment is unacceptable for two reasons. First, without quantification of the stream-based recreation in the area the net gain in recreation days from the project is meaningless. Second, you do not even treat the

question of whether the two types of recreation--stream angling and flat-water fishing--are perfectly substitutable. Almost certainly they are not. You are creating certain recreational opportunities while destroying others, and you have not even established the level of the recreation you are destroying.

327 In the analysis of the effect of increased project flows through Upper Cottonwood Creek, the DEIS states on p. 3-37, "The increased flows, however, would make fishing much more difficult." Nowhere in the analysis of recreational impacts do you estimate the change this increased flow will have on fishing days on Cottonwood Creek.

328 Finally, as far as I can tell, nowhere does the DEIS deal with the displacement of hiking and other solitary-use recreation that will be displaced by the dam.

329 This document has not dealt with the **full impact of the reduced size of Scofield Reservoir, quantified the damage to recreation at Lower Gooseberry Reservoir, the loss of stream-based fishing at the reservoir site and on Cottonwood Creek,** and **the loss of other forms of solitary-use recreation at the reservoir site.** In conclusion, until these gaps in the recreational analysis are filled, from this DEIS one can make no conclusion about whether the project increases or diminishes recreational opportunities in the project area.

Trace Elements and Salinity

In the discussion of the causes of eutrophication at Scofield Reservoir on p. 3-12, the DEIS states, "The principal pollutants are nutrients, trace metals, and sediments associated with nonpoint sources, such as construction of roads and mine portals, domestic waste disposal, animal grazing, and **natural deposits of rock containing phosphate."** (emphasis added)

330 One would assume the sponsor would be interested in phosphate levels at the reservoir site; nevertheless, in the trace element analysis, it is impossible to determine if phosphate levels were tested at the reservoir site. In fact it is difficult to learn much at all from this discussion. On p. 3-49 the DEIS states, "A total of 11 soil samples were collected in 1990 and were analyzed by the USGS. The results are shown in Table 3-14 for arsenic, mercury, and selenium and are from three representative sites in the project area."

After reading this, I had several questions. Was any of the three representative sites at the reservoir? Where were they? Were arsenic, mercury and selenium the only chemicals tested at these sites? One cannot tell from this text.

The DEIS also refers to data from the National Geochemical Data Base, "Fifty-nine soil sampling sites from this data base were located in the vicinity of the survey area. Almost all sites were in Quaternary alluvium." Again questions present themselves. Where were these sites? What were the trace elements tested? Would even one of these sites be inundated by the reservoir?

331 On p. 3-13 the DEIS projects increased salinity levels of 0.55 mg/L in the Colorado River at Imperial Dam. The DEIS does not explain whether this addition violates or meets the standards of the Colorado River Salinity Control Program. How does the sponsor know if this estimate is accurate without testing the inundation site for sodium? If sodium is found in the soil at the reservoir site in considerable quantities, how long would it take to flush this compound from the reservoir site and what would the effects be?

Threatened and Endangered Vegetation Species

332 The DEIS disposes of this issue in one sentence on p. 3-64, "No plant species currently receiving protection under the Endangered Species Act are known to exist in the project area." This fatuous generalization is inadmissible. If a detailed inventory has been performed, a summary of the methodology and results should be included in a revised EIS. If you have not performed such an inventory, one must be completed before this analysis will be complete.

333 Apparently the Narrows DEIS team has discussed threatened and endangered plant species with neither the Utah Natural Heritage Program nor with the plant specialist at the Manti-La Sal National Forest. Officials at both organizations stated to me in recent conversations that current records indicate you had not called or written them despite the fact that both organizations have valuable information about this area.

334 The reservoir site, grazed--according to the DEIS--by more than one livestock allotment, contains enough wetland to provide important habitat. Early-season grazing in the past might have obscured the presence of certain flowering plants. Any inventory must be conducted under circumstances allowing accurate identification. Furthermore, potential habitat for *Penstemon tidestromii* could exist in the area proposed for the distribution pipelines. *Penstemon tidestromii* is a federal category 2 candidate for listing. This plant is found below 8200 feet in open, level areas and has been suggested to exist on western slopes of Cottonwood Ridge.

I look forward to seeing any further documents and analysis completed on this project.

Very truly yours,

Mark A. Clemens

Mark A. Clemens, chair
Utah Valley Group, Sierra Club

cc: Doug Walton, conservation chair, Utah Chapter, Sierra Club

323. Recreation User Day Estimates

The equivalent reservoir method was used to develop estimates of recreation use of Narrows Reservoir. Chapter 3 of the EIS indicates that Joes Valley and Scofield Reservoirs were used in the comparison. Page 10 of the FS letter comments on the use of the equivalent reservoir method and the FS expresses its concurrence with the recreation use estimates.

324. Average Surface Area of Scofield Reservoir and Impacts to Recreation Use Other than Fishing

According to reservoir operation studies conducted for the project, the average surface area of Scofield Reservoir would be 2,193 acres under the No Action Plan. Under the Recommended Plan, the reservoir would operate at a somewhat lower level and would have an average surface area of 2,041 acres. The average surface area of Scofield Reservoir under the Smaller Reservoir Plan would be 2,058 acres. However, it should be pointed out that if Sanpete County had not agreed to pay the cost of enlarging Scofield Reservoir, the average surface area of the reservoir would be only 1,331 acres. Therefore, Carbon County has enjoyed a benefit over the last 50 years at Sanpete County's expense. The net effect on recreation is that Scofield Reservoir would have been smaller if the Gooseberry Project Plan had never been conceived.

325. Impact on Lower Gooseberry Reservoir

The fish kills that have occurred historically in Lower Gooseberry Reservoir are the result of low DO during the winter. The UDWR has expressed a desire to use the majority of the 300 acre-feet of additional flow water described in Chapter 2 of the EIS to provide additional winter inflow to Lower Gooseberry Reservoir. This measure is intended to increase the amount of oxygenated water flowing into the reservoir and reduce winter fish kills. This measure is expected to actually provide improved conditions in Lower Gooseberry Reservoir. Chapter 3 of the EIS have been revised to reflect this revised mitigation measure.

326. Lost Stream Fishing Opportunities

The project plan includes mitigation measures which are intended to offset losses to stream fisheries. These measures were developed by the FWS and UDWR in the Fish and Wildlife Coordination Act report. Because mitigation is provided to offset the impacts, there would be no net loss to stream fishing opportunities.

327. Impact on Fishing Days on Cottonwood Creek

In developing mitigation measures for impacts to Cottonwood Creek, it was assumed the all fisherman days below the Upper Cottonwood Creek Pipeline would be lost. Although the Sponsor believes that this assumption is overly conservative, the mitigation proposed for Cottonwood Creek is intended to fully replace the lost fisherman days.

328. Solitary-use Recreation

The proposed reservoir basin is a large open meadow, mostly private land and used primarily for sheep grazing. A State highway also passes through the reservoir basin. There is little or no solitary-use recreation that occurs within the reservoir basin.

329. Impacts on Scofield Reservoir, Lower Gooseberry Reservoir, Stream Fisheries, and Solitary-use Recreation

Please refer to the responses to comments 323 through 329.

330. Trace Elements Analysis

In Chapter 3 of the EIS it states that the purpose of the trace element analysis was to "identify where concentrations of potentially toxic elements such as selenium, arsenic, and mercury would be likely to occur in **irrigation return flows** under project conditions." (emphasis added)

Since the purpose was to determine impacts on **irrigation return flows**, none of the soil samples were taken in the reservoir basin nor in the vicinity of the dam. Rather, the samples were taken in the service area around the communities of Fairview and Mount Pleasant. These areas are not located near the dam and therefore would not affect water quality in the reservoir.

Arsenic, mercury, and selenium were not the only trace elements tested at this sites. A total of 44 chemicals were tested at each site. Accumulations of these three particular elements have proven to be harmful to humans and wildlife and were therefore emphasized in the EIS.

The results of this trace element analysis, along with identification of the exact locations of these test sites, are located in the office of Franson-Noble & Associates, Inc., for review.

331. Water Quality at Narrows Reservoir

The estimate of salinity impact at Imperial Dam (0.55 mg/L) is based on the concentration effect of the project depletion to the Colorado River and a small reduction in salt loading due to the transbasin diversion. PL 93-320 authorized salinity control measures which would allow development of water projects in the upper basin while maintaining the salinity levels within the criteria set by Colorado River Basin Salinity Control Forum. The Colorado River salinity is treated as a basin-wide problem and the impacts are analyzed in a cumulative manner. In the Cumulative Impacts section of Chapter 3 of the EIS, the potential impacts of the project are shown with respect to other basin developments. These developments include both water development and salinity control projects. The analysis has shown that the normal wet and dry periods in the Colorado River basin can cause the salinity to vary by as much as 200 mg/L which can mask the impacts of both development and salinity control projects.

332. Threatened and Endangered Vegetation Species

A team of biologists met on a regular basis to address the biological impacts of the Narrows project. The team included representatives from the Reclamation, FWS, FS (Manti-La Sal National Forest), COE, and UDWR. In a team meeting on February 13, 1991, the possibility of the presence of Threatened and Endangered plant species was discussed. The plant, *Spiranthes diluvialis* Shev. was addressed. Its existence in the study was considered low probability based on the current known range for this species. The question as to the possibility of other Threatened and Endangered plants known to exist in the area was directed to Bob Thompson (FS, Manti-La Sal). Mr. Thompson's response was that he did not know of or expect any other Threatened and Endangered species in the study area.

Additionally, a written response was requested from the FWS as to the potential for the existence of Threatened and Endangered plant or animal species. A response dated January 30, 1992, was later received. An "Informal Endangered Species Act consultation on the Narrows Project" dated march 28, 1991, was supplied at that time. In an attached memo, The Service stated that the list in this document is "still valid" -- with a few exceptions concerning the wildlife species and their status.

Detailed on-the-ground surveys were conducted as part of the HEP analysis that was used to identify impacts to vegetation and wildlife. No Threatened and Endangered plants were observed in those surveys.

333. Coordination with Utah Natural Heritage Program and Manti-La Sal National Forest

Please refer to the response to comment 332..

334. Presence of Flowering Plants

Please refer to the response to comment 332.

STONEFLY SOCIETY OF THE WASATCH

Member Club, Federation of Fly Fishers and Trout Unlimited

482 12th Avenue
Salt Lake City, Utah
84103-3225

April 26, 1994

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Mr. Charles A. Calhoun
Acting Regional Director
Upper Colorado Region
Bureau of Reclamation
125 South State
P. O. Box 11568
Salt Lake City, Utah 84147
Telephone: 524-3304 or 524-5580

Narrows EIS Comments

Re: Comments on Narrows Project
Draft Environmental Impact Statement

Dear Mr. Calhoun:

This letter sets forth the comments of the Stonefly Society of Chapter of Trout Unlimited and the Federation of Fly Fishers and the Utah Council of Trout Unlimited. The comments are directed toward the Draft Environmental Impact Statement ("DEIS") of the Gooseberry Narrows Project ("Project") dated November, 1993. Pursuant to your letter dated February 1, 1994 and the second page of the DEIS, comments are timely if received by you on April 26, 1994.

As groups who advocate the interests of fly fishers, fishers and others who enjoy the experience found in our national forests, we are keenly interested in the proposed Narrows project. We are especially interested in the new mission of the Bureau of Reclamation (BOR), that has been publicized by its director and others, to promote conservation and the environment. We have signed letters of partnership with the Bureau of Reclamation to try to promote goals such as expressed in the new mission statement of the Bureau.

We and our national affiliates view this project as a bellwether of this new mission.

On November the first, 1993, Dan Beard, the new Commissioner of the Bureau of Reclamation announced his "Blue Print for Reform". Also, in November 1993, the Narrows DEIS was presented to the Bureau. Among the general guidelines for the US Bureau of Reclamation are the following:

> "We will facilitate changes from current to new uses of water in accordance with state water law when such changes increase benefits to society and the environment."
>
> "We will promote the sustainable use of the water and associated land resources in an environmentally sensitive manner throughout the 17 western state."
>
> "We will facilitate integrated water resources management on watershed basis, stressing interagency cooperation, public participation, and local implementation."
>
> "Federally funded irrigation water supply projects will not be initiated in the future."

It is difficult to image a water project which violates these guidelines to a greater extent than the Project.

--- It does not benefit society as a whole.

--- It is destructive to the environment.

--- It violates watershed planning.

--- It is not a cooperative project. The US Forest Service, the Utah Division of Wildlife Resources, Carbon water users, and all citizen groups have been ignored in project planning and are not project participants.

--- It is an irrigation adding to the nation's supply of alfalfa hay.

As indicated in these comments, we are greatly concerned and disappointed that the environmental consequences of this project are not adequately addressed in the DEIS. Apparently the DEIS purpose is submitted only to further the one chosen alternative of the Sanpete Water Conservancy District. Accordingly, we would request that this Project be halted until a sufficient draft environmental impact study is prepared and distributed.

Our comments in addition to those presented orally at the public hearing, are as follows:

DEIS STANDARDS

The DEIS does not meet numerous legal requirements for an DEIS. See generally 42 U.S.C. § 4332(c) and 40 C.F.R. 1502. Specifically an DEIS must (1) "rigorously explore and objectively evaluate all reasonable alternatives; (2) if employing cost benefit analysis provide an adequate cost benefit analysis; and (3) discuss means to "mitigate adverse environmental impacts." As discussed below, the DEIS for the project fails to meet any of these basic legal requirements.

DISCUSSION OF ALTERNATIVES

Both 42 U.S.C. § 4332(c)(iii) and the CFR specifically require that alternatives to the proposed project be carefully considered. According to 40 C.F.R. 1502.14, the portion of the DEIS devoted to a discussion of alternatives is "the heart of the [DEIS]" which should "sharply defin{e} the issues and provid[e] a clear basis for choice among options. . . ." See 40 C.F.R. § 1502,14,

Specifically, the DEIS alternatives section is required to:

(a) rigorously explore and objectively evaluate all reasonable alternatives . . .

(b) devote substantial treatment to each alternative considered in detail including the proposed action so that reviewers may evaluate their comparisons,

(c) include reasonable alternatives not within the jurisdiction of the lead agency,

(d) include the alternative of no action. . . . 40 C.F.R. 1502.14.

335 1. The DEIS does not adequately discuss alternatives to the preferred alternative of the Project.

DEIS references 8 alternatives; however, 5 of the 8 are not discussed in any detail and summarily dismissed at the outset.

One of the 5 alternatives given no real consideration, was use of CUP water. While CUP water might not be available to Sanpete County, there are a number of elements of the Central Utah Project Completion Act which apply to Sanpete County. These include the alternative projects funds, water conservation funds, mitigation funds, and rebate funds from the Central Utah Water Conservancy District. DEIS ignor this water development option. It is impossible to evaluate the reasonableness of decision without more information.

Another of the 5 summarily dismissed alternatives involves an alternative dam site and location for the Narrows Reservoir. This was considered non-viable and eliminated from further study because a financial analysis showed that the water users would not be able to pay the cost of this alternative. However, the financial analysis is not

included in the DEIS. It is unclear whether a similar financial study was performed for the recommended alternative? If so, where are the results? If a similar study was not performed, why not? Again, without this information, the reasonableness of this alternative cannot be evaluated.

Another of the 5 alternatives not given serious consideration involves year-round releases -- with a dam in Sanpete County. The main impact of constructing a dam at the Milburn Damsite appears to be the complete or partial dewatering of 40 miles of the San Pitch River below the dam. This and other environmental impacts, plus associated construction costs is given as the reason this alternative was not considered further. Again, these impacts and costs should have been discussed, and again this alternative is improperly not given consideration.

Another variation of the year-round release alternative is based on a groundwater exchange option. The DEIS states that there is a large amount of groundwater beneath the Sanpete Valley. However, it states that coefficients of transmissivity, specific capacities of existing well, and draw downs/interference from project wells render this alternative infeasible. The DEIS did not discuss costs of this option, but did state that the State Engineer considers the ground water aquifer in north Sanpete County to be fully appropriated. This would likely preclude development there, but would not necessarily preclude well development in the southern part of the county. These factors must be more fully discussed to determine whether this is.

Most importantly, the DEIS fails to even mention several reasonable

alternatives. For example, there is no discussion of a water conservation alternative. The purpose of the Project is to provide additional irrigation water, particularly during late summer months, to northern San Pete County. Water conservation measures including lining of irrigation ditches and canals, more efficient irrigation methods, i.e., sprinkling rather than flood irrigation, use of tail and waste water, could achieve the desired by allowing current water systems and supplies to meet this perceived need. This is certainly a reasonable alternative and it must, under the laws and regulations cited above, be given serious consideration. Failure to include or discuss this reasonable alternative makes the DEIS fatally defective.

Cost Benefit Analysis

336 As discussed above, while a cost benefit analysis has been employed to summarily dismiss the "Alternative Damsite Plans" alternative, a cost benefit analysis for the preferred alternative is not found in the DEIS. This omission violates federal law and regulation. 40 CFR §1502.23 requires that an analysis of unqualified environmental impacts, values and amenities.

Mitigation of Adverse Impacts

The DEIS for the project is woefully inadequate in its discussion of mitigation of adverse impacts. The DEIS fails to recognize the full scope of adverse impacts on the entire Price River drainage. It also fails to provide sufficient mitigation proposals on the adverse impacts it does recognize. Specific inadequacies are as follows:

1) Total Impacts in the Price River System

337 Since the initial planning of this project, the Price River and its associated tributaries, wetlands, and reservoirs have become an increasingly valuable

recreational and natural area. This project threatens these resources now and also limits their future enhancement. The Project will impact the entire Price River drainage ecosystem.

Recently, a number of groups have made significant investments in this Price River. The Utah Division of Wildlife Resources (DWR) has acquired large amounts of property along the Price River below Scofield Reservoir. The DWR has also paid to have Scofield Reservoir chemically treated to remove undesirable fish species. The United States Forest Service has reconstructed the dam at Lower Gooseberry Reservoir. The Stonefly Society of Trout Unlimited and the Federation of Fly Fishers have worked very hard over the last several years to acquire water to provide a winter instream flow for the Price River below Scofield Reservoir. As part of the Central Utah Project mitigation work, the CUP Statewide Stream Workgroup ranked the Price River as the highest priority cold water fishery in the state of Utah. The city of Helper has established an urban river parkway along the lower Price River. The most important element in making this area productive is water. Using the water resources of this basin wisely and combining this with additional investment will result in even greater benefits for the state of Utah.

This area is a largely intact aquatic ecosystem, one of the very few in the state of Utah and must be viewed as an intact ecosystem. The entire area below the proposed project will be adversely impacted by the reduction of water.

2) Endangered Species Concerns:

338

Reduced flows in the Price River will have a cumulative impact on flows in the Green River. The area near the confluence of the Price River is currently

occupied by federally endangered Colorado squawfish (Ptychocheilus lucius), humpback chub (Gila cypha), and possibly bonytail (Gila elegans), as well as the proposed razorback sucker (Xyrauchen texanus). The Green River immediately downstream of the Price River is a major nursery area for young Colorado squawfish. These young fish use backwater habitats which are susceptible to desiccation and inundation with small changes in flow. The Price River and Green River are also used by the federally endangered bald eagle (Haliaeetus leucocephalus).

339 **3) Need for a Mitigation Trust Fund**

The proposed mitigation measures call for fencing several areas, watershed work and efforts to restore spawning areas. These efforts demand ongoing monitoring, continued upkeep and modifications. The efforts to restore fishery habitat and wetlands above and below Narrows will clearly require this type of ongoing expense. Land acquired for mitigation will require ongoing funds for management. It would appear that the Sanpete Water Conservancy District intends to be responsible for this activity. We do not feel that this is acceptable.

Another agency needs to be responsible for these activities. In addition, to the initial capital required, planning must include ongoing operation and maintenance expenses, as well as funds for later assessments to insure that the mitigation efforts have been successful. Funds must be provided for these needs. It should not be a matter of ongoing dispute and controversy. Initially, a long-term budget needs to be developed. We feel that the funds should be placed in a trust fund. The size of the trust fund should be determined by the amount of money required each year. In event, the fund is too small, there should be a mechanism for enlarging the fund without resort

to litigation. This aspect of mitigation has not been addressed in the DEIS.

340 **4) Inadequate Mitigation of Stream Losses**

The DEIS notes that 4.3 miles of Gooseberry tributaries will be inundated, 1 mile of Upper Gooseberry Creek will be dewatered, 3 miles of Middle Gooseberry will be reduced in flow by 72%, 7.1 miles of Lower Gooseberry will be reduced in flow by 47%, and there will be a 17% reduction in flow on 6 miles of Fish Creek. There is also an impact on 4.9 miles of Cottonwood Creek.

To mitigate these losses, there are 3 proposals (2-9):

1) Restore a flow of 1.5 cfs in each of 2 small tributaries for a total of 2.3 miles between Fairview lakes and Narrows Reservoir.

2) Stabilize stream banks below Narrows

3) Acquire 4 miles of private land containing a stream whose banks and riparian areas can be restored

We feel that losses in stream flow should be mitigated by provision of replacement stream flows. In Utah, water is the limiting factor, not land. Acquisition of land is a simple matter compared to acquisition of water.

Thirty percent of the trout caught in Lower Gooseberry Reservoir are naturally produced cutthroat trout. This leads to the conclusion that the amount of spawning habitat that your model has predicted for the Middle Gooseberry segment is too low. This needs to be reassessed, perhaps by actual redd counts. Mitigation should entail providing a spawning area for a lake or reservoir fishery.

The release of a small amount of water into several small dewatered

tributaries between Fairview Lakes and Narrows is an uncertain investment. There is no indication that spawning habitat will be produced. Nor is there any other documentation provided of the type of habitat which will be produced. We are very uncertain with this as a mitigation effort.

We also have questions regarding the effectiveness of the channel work planned for below the Narrows. This will be a very different environment after the project is constructed and we are extremely skeptical about the ability of simple stream improvement structures to produce long term environmental benefits.

We are also concerned that the modeling done by project planners has not been successful. Perhaps, they are operating in an area which cannot be satisfactorily assessed by modeling techniques. The prediction that spawning habitat will actually increase in certain stream sections at certain times of the year requires additional documentation, such as qualified expert opinion. It would be reasonable to have both the impacts and the mitigation plan reviewed by an independent outside consultant. Such a consultant should be selected jointly by the organizations in Price, the Sanpete District, and other interested parties.

5) Inadequate Wetland Mitigation

341

We regard the mitigation plans being proposed as inadequate, particularly the area above Narrows. Flooding sage brush areas above Narrows is not an acceptable wetland mitigation plan. It has a speculative quality. It might provide a minimal amount of flooded soils, but it does not produce a wetland with hydrologic impacts such as smoothing high flows and improving water quality. It will also demand long-term management and operation expenses.

There needs to be defined goals to be met by this action and a plan for an alternative wetland mitigation project if this plan is not successful. We feel that alternative sites are available which need to be explored such as the other suggested wetland mitigation area.

6) Stress on Cottonwood Creek

342 The stresses the project would place on Cottonwood Creek have not been adequately addressed. The DEIS acknowledges that the channel will double in size as a consequence of dumping the additional water into Cottonwood Creek. To mitigate this loss, the DEIS state that a 2 cfs instream flow will be released during the winter. This is nonsense. There is no information provided to document the loss suffered nor the gain produced.

7) Need for a No Net Loss of Wetland Alternative

343 We feel that it is mandatory that an alternative be prepared which uses improved water management and conservation with no losses to wetlands. The DEIS simply dismisses this alternative without any real documentation.

On page 2-1, the DEIS states that a conservation plan does not need to be developed because it would be an integral part of any project plan and on page 2-3 it is stated that conservation would be required prior to allowing project water to be sold. This assumes that the entire conservation effort would be an "on farm" investment. A reasonable conservation plan would involve both on farm investments and off farm investments such as canal lining, retirement of low productivity farm areas, and conjunctive use of surface and groundwater supplies. Such a plan should include on farm conservation efforts, system wide elements, interior water use conservation, and residential outside watering.

It is mandatory that such an alternative be developed in a reasonable manner and subjected to outside review. Evidently, project planners would like to build the project first, then impose water conservation at a later date. It should be the other way around.

8) Need for an Explicit Water Conservation Plan

344 As noted above, project planners say that they will implement a water conservation plan as part of the project operation. As a consequence of this decision, a separate water conservation alternative does not need to be developed. We disagree with this position. However, if the project sponsors say that this is what they are going to do, they need to do it.

There is no discussion regarding the details of this conservation plan nor how it would be implemented. It does not indicate whether this plan will function strictly on farm or whether it will be also required as part of project participation by the irrigation companies involved. Nor is there any requirement for binding contracts with conservation mandates as part of them. Nor is there any even brief discussion of conservation programs in municipal water use.

There needs to be an explicit plan adopted and in place prior to completion of a formal EIS.

9) Need for a Sanpete County Alternative

345 I feel that a plan needs to be developed that uses dam sites in Sanpete County. According to the DEIS, the main water problem in Sanpete County is the lack of late season water supplies. Are there alternative dam sites

available which would allow water re-distribution from early season use to use later in the water year? In the DEIS there is mention made of a Milburn damsite and the possibility of enlarging Wales Reservoir. As part of the Central Utah Project Completion act there are funds available to Sanpete County to develop a water conservation program and for the construction of small reservoirs up to 5000 acre feet in size. We as an organization feel very strongly that if the Narrows is canceled, Sanpete County should have the highest priority for these funds from the Central Utah Project.

10) Amount of Water Depletion Occurring in the Price River as a Consequence of the Narrows Project

346

We have reviewed hydrologic data supplied by project consultants, Franson-Noble. These data do not provide a consistent assessment of the pre-project and post-project conditions. For instance, the data provided seem to indicate that there will be more water after the Project than before. This is absurd. The following are the long-term average water amounts at specific locations in the Narrows area.

Pre-Narrows Water Budget	Water (af)
Amount of water diverted to Cottonwood Creek as part of the Fairview Lakes	1795
Historic Flow Gooseberry Creek near Fairview	7171
Historic Water Gains above Gooseberry Creek	6293
sum	15259
Post-Narrows Water Budget	
Amount of water diverted to Cottonwood Creek as part of the Fairview Lakes	1795
New Sanpete Diversion	5312
Narrows Evaporative Losses	1061
Narrows Releases	1978
Historic Water Gains above Gooseberry Creek	5565
sum	15711

These figures seem to show that there will be an additional 452 acre feet per

year of water available in this area after the project is constructed as opposed to before the project. Three critical factors have not been included in the water budget:

(1) Changes in evaporative water losses at the Fairview Lakes caused by maintaining these lakes at a greater capacity for the entire summer.

(2) Inundation of wetland areas by the Narrows Reservoir.

(3) Water use by the proposed wetlands mitigation area above the Narrows Reservoir.

These figures are extremely important in determining both project impacts and project benefits. The DEIS does not include specific water budget data. It should be accurate and it needs to be included. The DEIS does not contain accurate figures on the exact depletion occurring on the Price including evaporative water losses. This needs to be included in the DEIS.

The figures dealing with water losses occurring on the Price River are not consistent. These figures are listed in the following table:

Post-Narrows Water Budget	Water (acre feet)
New Sanpete Diversion	5312
Narrows Evaporative Losses	1061
sum	6373
Historic Flow Fish Creek Above Scofield	36940
Post Project Flow in Same Location	31019
difference	5921

This figure does not match the figures for water flow changes occurring downstream in the area of Fish Creek above Scofield. Here the depletion may be calculated by subtraction and is 5921 acre feet. Again, there appears to be

452 acre feet more water in the river than there was based on the depletion figures. On page 3-4 of the DEIS, the depletion is stated to be 5540 acre feet. There needs to be an explanation of exactly how this figure was produced.

The DEIS on page 3-4 states that there would be no effect upon direct flow rights on the Price River and that historical releases from Scofield would only be reduced by an average of 642 acre per year. This would be accomplished by taking most of the extra water out of the spills occurring on some years. These analyses are not provided in the DEIS and they appear to demand very specific knowledge of the behavior of water users in the Price area. They also imply that much greater use would be made of the storage capacity of Scofield.

A much more accurate assessment is to examine the reduction of water available for use at Scofield on a year by year basis. One cannot predict exactly how Scofield and its water will be used, but one can say how much water will be available each year for their use.

This is calculated by using the analysis provided by Franson-Noble. The flow reduction occurring each year is subtracted from the historic inflow to Scofield and then divided by the historic Scofield inflow from the same year. We have used the Franson-Noble flow reduction figure even though we believe that this figure is too low. This data was then divided by the type of water year, low, average or high based on whether Scofield spilled water. The critical years are the Low Spill or No Spill years. On these critical years, Scofield will experience a 18% or 16% reduction in available water. This loss could be compensated for by use of storage in Scofield, but it would place a

stress on this reservoir system.

	Number of Years	Percent Inflow Reduction
High Spill Years	10	11%
Low Spill Years	7	18%
No Spill Years	16	16%

However, this analysis is not accurate enough. In addition, to placing the Scofield water rights behind the Narrows water rights. The Scofield water rights are also secondary to the direct flow water rights on the Price River. This calculation should be repeated with the direct flow water rights excluded from the calculation.

Percent Reduction in Available Water for use at Scofield Reservoir Excluding Direct Flow Bypasses		
	Number of Years	Percent Inflow Reduction
High Spill Years	10	15%
Low Spill Years	7	22%
No Spill Years	16	29%

On the critical Low Spill and No Spill years the reduction in water available for the operation of Scofield is magnified 2 fold by the loss of water at Narrows combined with the obligation to release water to protect the direct flow water rights on the Price. The decline in water available would be 22% and 29% respectively. These represent very significant figures which have not been dealt with in the Draft DEIS.

11) Impacts to Scofield Reservoir & Gooseberry Reservoirs

347

Both Scofield and Lower Gooseberry are very valuable fisheries. Scofield is one of the most important fisheries in the state of Utah. With many Utah reservoirs such as Flaming Gorge, Bear Lake, and Fish Lake developing more

specialized fisheries, Scofield stands out as the most significant family type-rainbow trout fishery in the state of Utah. At present Strawberry helps fill this need. With the Utah chub returning to Strawberry, its role will change. Strawberry will probably become a more limited fishery in the future. With this decline, Scofield will become even more important as a family fishery. We do not feel that the impacts to Scofield have been adequately documented.

First, from a hydrologic point of view. The reservoir will fluctuate to a greater extent. This will lead to a lower surface area. It will also impact the highly productive littoral areas of the reservoir. Overall the biological productivity will be reduced. This has not been addressed in the DEIS.

	Historic Condition without Narrows Project	Historic Modified Condition with Narrows Project in Operation
Number of Years with Capacity below 25% over the Last 33 Years	7	12
Average Water Capacity at the End of the Water Year	31,368 acre feet 48%	23,774 acre feet 36%

In addition, there will be a greater chance of fish kills. Again, using the Franson-Noble figures, Scofield will be at a low hold over water level much more frequently.

This has been partially assessed in the DEIS. On page 3-12, reference is made to studies of fishkills on Scofield. Studies have shown that when the flushing rate is less than .85, the probability of a fishkill is 80 percent. On page 3-13, it is stated that this condition one additional year in 33. We feel that this underestimates the problem. We feel that fishkills might also be related to the volume of water remaining in the reservoir at the end of the water year.

Lower Gooseberry is particularly valuable because is has a consistent water level with significant biological productivity. The spawning that occurs above it on Upper Gooseberry Creek make it a unique Utah fishery. With special regulations and some habitat work, it could probably maintain a fishery without stocking. Spawning will be impacted at both reservoirs, but will be particularly devastated at Lower Gooseberry. During the winter, Lower Gooseberry already experiences fishkills. The trout congregate at the inflow areas. With reduced inflow and lower turnover, this problem will increase. This has not been addressed in the DEIS.

12) Multi-level outlets

348 There are multiple references in the DEIS to the requirement that the Project will have multi-level outlets. At no place in the document is there any discussion of how this will work. Exactly how many outlets will be needed to insure that water can in fact be selectively withdrawn. This may seem trivial, but Soldier Creek was designed with 2 outlet levels and most of the time both outlets are at a sub-thermocline level.

CONCLUSION

While the DEIS was prepared by a consultant to the Applicant, San Pete Water Conservancy District, it is the BOR's responsibility to see that the final DEIS complies with federal law, regulation and BOR policy. Each of the inadequacies of the DEIS set forth in this letter has led to successful Court challenges of the adequacy of a DEIS. See Natural Resources Defense Council, Inc. v. Stamm, 4 E.L.R. 20463 (E.D. Cal. 1974), Texas Comm. on Nat. Resources v. Alexander, 12 E.R.C. 1677 (E.D. Tex 1978) and Oregon Nat. Resources Council

v. Marsh, 832 F.2d 489 (1987).

It is hoped that the BOR will take its legal responsibilities and new role seriously and require the applicant and its consultant to prepare a DEIS that meets all legal requirements.

Yours truly,

Fred Reimherr, on behalf of
Stonefly Society, Trout Unlimited
and Federation of Fly Fishers

335. Adequacy of Alternatives

Please refer to the responses to comments 235 and 236.

336. Cost-benefit Analysis

Chapter 2 of the EIS indicates that the 1984 Compromise Agreement dictates the location of the proposed dam. There are no water rights for the Alternative Damsite Plan and a dam could not be built at the site. Therefore, this alternative is not viable. This is an important qualitative consideration which would preclude the need for a cost-benefit analysis.

Please refer to the response to comment 13.

337. Total Impacts in the Price River System

Please refer to the response to comment 100.

338. Endangered Species

An assessment of impacts to the named endangered species is provided in Chapter 3 of the EIS.

339. Mitigation Trust Fund

After the Record of Decision is signed, the Sponsor would enter into an MOA with the UDWR regarding fish and wildlife mitigation. The MOA would address issues relating to fish and wildlife mitigation and would identify the responsibilities and commitments of all parties to the agreements. The need for a mitigation trust fund would be addressed as the MOA is drafted.

340. Inadequate Mitigation of Stream Losses

The stream fishery mitigation measures have been revised to incorporate the recommendations of the FWS and the UDWR as contained in the Fish and Wildlife Coordination Act Report for the project. A copy of the Fish and Wildlife Coordinate Act Report is attached to the EIS for reference.

341. Inadequate Wetland Mitigation

Based on the writer's last sentence in this paragraph of his letter, it appears that the writer believes that the alternative wetland mitigation measure adjacent to Mud Creek has merit. The alternative wetland mitigation adjacent to Narrows Reservoir was included to provide on-site mitigation. The Sponsor recognizes that, from a technical standpoint, the on-site mitigation would be more difficult to accomplish. Alternative mitigation measures were proposed so that the trade-offs between on-site and off-site mitigation could be evaluated. Although one alternative may be more difficult from a technical standpoint, the Sponsor believes that either

mitigation measure is viable and adequate. Mitigation monitoring would be provided for either alternative to ensure that full mitigation is achieved.

342. Stress on Cottonwood Creek

The Cottonwood Creek channel would not double in size as a result of the project. As indicated in Chapter 3 of the EIS, impacts to the upper portion of Cottonwood Creek would be avoided by constructing the Upper Cottonwood Creek Pipeline. The remainder of the stream channel would widen by 23 to 4 percent, with the impact lessening near the mouth of the canyon. Mitigation measures for impacts to Cottonwood Creek have been added to the plan in the final EIS.

343. No Net Loss of Wetlands Alternative

A no net loss of wetlands alternative has been presented in the EIS. The No Action Plan would result in no net loss to wetlands. Chapter 2 of the EIS has been revised to indicate that water conservation is part of the No Action Plan and the future without project condition.

344. Need for Water Conservation Plan

Under present policy, Reclamation will require the Sponsor to prepare and submit a comprehensive water management plan before any construction funds would be advanced to the Sponsor. This water management plan would include specific water conservation measures such as those described in Chapter 2 of the EIS. Both Reclamation and the Sponsor believe that it is premature to attempt to develop the specifics of such a plan until there is a decision to proceed with the project.

345. Sanpete County Alternative

As presently configured, the major project features, including Narrows Dam and Reservoir, are all located in Sanpete County. The letter writer refers to re-distribution of early season water for use later in the water year. Unfortunately, this high water belongs to other downstream users. This high water is caught and stored in reservoirs such as Gunnison and Sevier Bridge Reservoirs. Therefore, such an alternative would not be viable.

346. Amount of Water Depletion in the Price River

With one exception, the Sponsor believes that the project operation studies are correct. When the water budgets were checked, an incorrect entry was discovered for the flow at Gooseberry Creek near Fairview. In the preproject operation study the previously entered value for June 1961 was 107 acre-feet. The entry should have been 558 acre-feet which was the actual measured value at the gauge. This error caused a 14-acre-foot difference in the average flow at Gooseberry Creek near Fairview. The operation studies and the flow data in Chapter 3 of the EIS have been revised to reflect this correction.

347. Impacts to Scofield and Lower Gooseberry Reservoirs

The impacts to fisheries in Scofield and Lower Gooseberry Reservoir as well as impacts to spawning habitat have been described in Chapter 3 of the EIS. Mitigation measures to offset these impacts have been recommended by the FWS and the UDWR. These mitigation measures are described in Chapters 2 and 3 of the EIS. One of the mitigation measures is to provide increased releases to Lower Gooseberry Reservoir to provide increased winter flushing and aeration to reduce fish kills that have occurred historically.

348. Multi-level Outlets

Final design of the multi-level outlets for Narrows reservoir has not yet occurred. Preliminary designs call for outlets at three different levels in addition to the river-level outlet. Because the reservoir would have a maximum drawdown of 45 feet, the outlets would be spaced at about 15-foot intervals. This spacing could change as additional studies are performed during the final design process.

Utah Wilderness Association

455 East 400 South #306/Salt Lake City, UT 84111/(801)359-1337

April 22, 1994

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Regional Director
Bureau of Reclamation
125 South State St.
P.O. Box 11568
Salt Lake City, UT 84147

Narrows EIS Comments

RE: "Narrows Project", Draft Environmental Impact Statement
Dam on Gooseberry Creek, Manti-LaSal National Forest

Dear Director:

We are submitting these comments on the DEIS for the Narrows Project on the Manti-LaSal National Forest. We find the DEIS woefully inadequate in addressing the environmental and socioeconomic concerns raised by the proposed dam on Gooseberry Creek.

349 The DEIS has failed to consider a meaningful range of alternatives. The only alternatives are "big dam" or "small dam". However, there are numerous other options that should have been analyzed. One alternative should have considered the potential to meet the project's goals through conservation of existing water supplies. This could include pressurized irrigation systems, lining canals, using pipelines instead of open irrigation ditches, retiring the least productive irrigated lands, and other opportunities for conservation that would have become evident had the alternative been considered. Though the EIS mentions conservation, there is simply no serious analysis that describes the qualitative or quantitative benefits to be gained.

One alternative should have considered the potential of Carbon County (existing downstream water users) purchasing water rights held by the project's proponents. This alternative eliminates the negative socioeconomic and environmental impacts of the proposed project. The project's sponsors could use the revenue gained from the sale to address the perceived water shortages in the Sanpete Valley through many of the measure described above in the conservation alternative.

A "non-dam" diversion alternative should also have been analyzed. The "threat" of a law suit (EIS S-9) does not release the EIS from meeting NEPA's requirements for consideration of viable alternatives.

The No Action alternative receives very little discussion in the DEIS, thus it appears it was not seriously considered. In conjunction with many of the conservation and other measures discussed above the No Action (no dam on Gooseberry Creek) option could provide many of the benefits anticipated from the proposed dam.

350 Cumulative impacts from constructing the dam and reservoir are ignored in the DEIS. If the DEIS is correct and visitation to this area increases by over 40,000 visitors per year, significant impacts will occur to wildlife, soils, vegetation, private property and recreationists who currently use the surrounding lands. Yet, none of these related impacts are discussed in the DEIS.

There is no discussion of the impacts to wildlife when thousands of additional recreationists spread into the backcountry surrounding the reservoir. Hunting and fishing pressure, harassment from off-road vehicle (ORV) use, and overall increased human presence will degrade the quality and quantity of wildlife habitat for nearly all species.

Off-road vehicles will destroy vegetation and compact soils. Even with travel plan restrictions, land managers have been unable to prevent unauthorized use when large numbers of users are attracted to an area.

There are numerous private cabins in the area. Vandalism will undoubtedly increase if thousands of people are drawn to the new reservoir and surrounding lands.

The dam will reduce the amount of water flowing through the Fish Creek SPR area, an area set aside in the Manti-LaSal National Forest Land and Resource Management Plan (Forest Plan) for its unique natural values. The area is highly sought after for its relatively wild character and solitude in what is otherwise a highly roaded and developed national forest. Not only will the dam impact upper Fish Creek's ecological values, it will bring thousands of new users into the area which will dramatically alter the solitude sought after by existing users.

The dam will also reduce the amount of water available in the entire Price River drainage. The
351 Price River has become a popular, early season river running adventure where it flows through the Desolation Canyon Wilderness Study Area. Depleting the amount of water in the Price River will

impact the ecological and recreational values of the Desolation Canyon WSA. Those impacts, like the impacts to the Fish Creek SPR area, are ignored in the DEIS.

352 There is no analysis in the DEIS of the socioeconomic impacts to existing downstream water users. The water that would be diverted by the project is currently used in Carbon County for municipal, agricultural and industrial purposes. There is no discussion whether the amount of water diverted by the Narrows Project could be replaced, or at what cost. Of course there would likely be significant environmental impacts associated with any new development built to replace existing supplies.

There is no economic analysis of the impacts from reducing the fisheries values in the lower Price River and Scofield Reservoir.

353 The Manti-LaSal Forest Plan did not anticipate the "Narrows Project", nor the impacts associated with it. In order to approve the project, the Forest Service would be required to approve a significant amendment to its Forest Plan. This legal requirement was not even considered in the DEIS.

354 The DEIS did not consider a water right reserved to the federal government with the creation of the national forest. Leaving enough water in the stream to meet the needs and purposes of the national forest would significantly reduce the amount of water available to the project sponsors. It will alter the cost-benefit analysis for the project. Yet, meeting these requirements for national forest-related instream flows was not considered in the DEIS.

355 A complete cultural resource survey must be conducted and the information made available to the public prior to any decision being rendered on the DEIS.

The DEIS substantially fails to provide mitigation for the impacts that will result from the dam and reservoir. Though the document mentions many mitigation measures that will be implemented, there is no discussion of their effectiveness. There is no mitigation proposed for the loss of wildland character in places like upper Fish Creek.

The DEIS is severely flawed. Important public and legal issues were ignored. Viable, meaningful alternatives were not considered. Cumulative impacts were barely analyzed. The DEIS should be corrected for these deficiencies and be reissued in draft form. The project poses serious threats to the local environment, which requires a far more substantive analysis than presented thus far. It is

clearly not in keeping with the Bureau's pronouncements of a new, environmentally sensitive agency.

Please be sure to add our name to the mailing list to receive all future information on this project.

Sincerely,

George Nickas

George Nickas
Assistant Coordinator

349. Range of Alternatives

Please refer to the responses to comments 235 and 236.

With respect to Carbon County purchasing Sanpete County's water rights, this alternative would not meet the purpose and need of the project as described in Chapter 1 of the EIS.

350. Impacts to Adjacent Areas

Please refer to the responses to comments 4, 8, and 359.

351. Impacts on River Running on the Price River

Please refer to the response to comment 100.

352. Socioeconomic Impacts on Carbon County

Please refer to the response to comment 14.

353. Impacts on Forest Plan

Please refer to the response to comment 1.

354. Federal Reserved Water Rights

The issue of Federal reserved water rights was not addressed in the EIS since none of the lands adjacent to Gooseberry Creek downstream from Narrows Dam is on Federal land.

Chapter 1 of the EIS describes the agreement made between the Sponsor and the United States regarding reserved water rights. In that agreement, the United States subordinated its reserved water right claim to the Sponsor's water rights.

355. Cultural Resource Survey

As stated in Attachment A, Environmental Commitment List of the EIS:

> Prior to initiation of final design and construction, detailed cultural resource surveys would be performed along the proposed alignments of the Upper Cottonwood Creek, Oak Creek, and East Bench Pipelines. If cultural resource sites are found, the pipelines would be re-routed where possible to avoid the impact. If the pipeline cannot be re-routed, appropriate mitigation would be developed through coordination with the SHPO.

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April 25, 1994

Charles A. Calhoun
Acting Regional Director
US Department of the Interior
Bureau of Reclamation
Upper Colorado Office
P.O. Box 11568
Salt Lake City, Utah 84147

Narrows [illegible]

Dear Sir:

I am writing to comment on your Draft Environmental Impact Statement for the proposed Narrows Project in the Upper Gooseberry Creek on the Price River drainage.

I am also including a copy of previous comments I made to Utah Governor Michael O. Leavitt on February 8, 1993, which I would like to make a part of my comments today.

I do not wish to comment on the legal aspects of the water rights involved other than to say that I have heard comments from local residents to the effect that the water rights that were signed over to Sanpete County and subsequently affirmed by the Utah Supreme Court were not owned by the peoplewho signed them over. I remain opposed to this project for the following reasons, and ask that these items be answered in your final EIS:

356 1. In the May 27, 1992 edition ofthe Mt. Pleasant Pyramid it was stated that the project was for irrigation water. In the Salt Lake Tribune of March 30, 1994, the Mayor of Mount Pleasant, Chesley Christensen stated "The growth were experiencing is starting to put demand on our culinary water supplies". Is this an irrigation or culinary water project?

357 2. I have spoken to Mr. Bob Radokovich, owner of the lands in Section 5 and 8 of Township 13 South, Range 7 East, South of Scofield Town being considered for Wetlands restoration on Mud Creek. He has not been contacted concerning this project. This seems odd to me and of little or no value in balancing out the effects of the project.

358 3. The Utah Division of Wildlife Resources believes that this project would increase the frequency of fish kills in Scofield Reservoir. Considering the fact that the State spent approximately $250,000.00 poisoning and restocking Scofield in 1991, and that anglers are now catching 22" fish at this 2rd most popular fishing area of the State, which provided 81,200 days of angler use in 1986 with an estimated economic value of $2,452,240.00. Carbon County and Scofield Town would lose a major economic base if this project caused a fish kill in Scofield Reservior.

359 4. The flow alteration effects to Upper Fish Creek from this proposed project would reduce trout spawning by 16 percent. The US Forest Service is currently proposing to upgrade the campground in this area to encourage more use of Upper Fish Creek. This seems to me to be a contradiction in efforts.

360 5. The loss of 4,500 angler days per year at Scofield Reservoir, and the effect on future development in Carbon County will have a social and economic impact that cannot be ignored, and that should be addressed in your final report.

361 6. Finally, the effect on bald eagles in the Upper and Lower Fish Creek areas was not addressed beyond a generic statement that eagles do not nest in the area. Many local residents and workers in the area have observed eagles feeding close to the proposed site.

Sincerely,

David W. Levanger

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Spring Glen, Utah
February 8, 1993

The Honorable Michael O. Leavitt
Governor of Utah
210 State Capital
Salt Lake City, Utah 84114

Dear Governor Leavitt:

I enjoyed the opportunity to see you on January 12th at the Carbon County Chamber of Commerce Banquet. It was good to visit with you and see one of our generation from Southern Utah in the Governor's Office.

I am writing today to register my concern regarding the proposed Gooseberry Narrows Dam to be located in Sanpete County. I have written to the engineers for the project, Franson and Noble in American Fork, to convey my apprehension over the project and it's negative impact on Scofield Reservoir and Carbon County. As you may know, the Price River Drainage supplies culinary and irrigation water stored in Scofield to Helper, Price, Wellington, and most valley locations. This area is perhaps unique in Utah in that we do not have a potable water aquifer in the valley. Virtually all culinary water in Carbon County is supplied from the Price River drainage from the west or the Grassy Trail drainage from the east. I am sure that you are aware that our area, especially Scofield Reservoir, has experienced extreme drought over the last 6 or 7 years. Scofield reached a low storage volume of 1,280 acre feet on November 25, 1992. The proposed Gooseberry project would permanently divert 5,400 acre feet from Scofield. The effect of this diversion on the people of Carbon County is obvious. We would run out of drinking water on drought years.

362

I do not believe that the Draft Environmental Assessment prepared by Franson and Noble properly addressed the following points:

363

1. I disagree with their statement that there is a shortage of recreational facilities in the project area. Scofield Reservoir is recently re-habilitated and re-stocked with fish. Ice fishermen are currently catching 18 inch fish. The Utah Parks system just completed a new campground and restrooms at the north end of the lake in addition to the existing camp facility. My family is currently constructing a new R.V. Campground in Scofield Town. I am opposed to the Narrows Project and it's associated camp facilities to be managed by the U.S. Forest Service competing with existing State and private camping facilities.

364 2. The disturbance to the meadows and the reduced streamflow to Upper Fish Creek will have an impact on the native and planted trout. Reduced water flows will lower the fish population in this popular fishery.

365 3. All of the environmental mitigation plans that I reviewed in the Draft Environmental Assessment were aimed at Sanpete County and the Gooseberry drainage. The draft did not address damage to Fish Creek, Scofield Reservoir, or the Price River drainage.

366 4. The economic impacts to Carbon County, especially Scofield Town, were not addressed. The statement was made in the Draft that this project will not affect Scofield.

In summary I do not believe that the Gooseberry Narrows Project offers the best use of the water resource on the Upper Fish Creek and Price River drainage. I am a strong supporter of agriculture and I recognize that there are legal and other considerations in this matter but the devastation to our fishery, drinking water supply, and future development should outweigh any agricultural benefit to Sanpete County.

367 Finally, I object to the possibility of millions of dollars of Community Impact funds being spent on this project. It is my understanding that Mineral Lease Funds are intended to mitigate impacts from mineral development.

Thank you for your consideration of this matter. I have enclosed photocopies of recent press clippings concerning this issue, and I am supplying copies of this letter to the Carbon County Commission, Senator Mike Dmitrich, Representative Tom Matthews, and the Permanent Community Impact Board, in the hope that this project can be stopped.

Sincerely, and with best regards,

Dave Levanger
1440 West 3500 North
Spring Glen
Helper, Utah 84526
(801) 472-5632

356. Project Purposes

As explained in Chapter 1 of the EIS, a primary purpose of the Narrows Project is to develop additional municipal water and a supplemental water supply for presently irrigated lands in north Sanpete County, Utah.

357. Proposed Wetland Mitigation area on Mud Creek

The proposed wetland mitigation area on Mud Creek is a natural wetland area that has been severely degraded because of past and present land management practices. By acquiring this property, performing restoration work, and then managing it for wildlife habitat, it would provide similar wetland values as the wetlands that would be adversely impacted by the project.

358. Increased Fish Kills in Scofield Reservoir

The EIS has been revised to include additional mitigation measures which are expected to have a beneficial effect on the water quality of Scofield Reservoir. These measures are expected to decrease the possibility of increased fish kills in Scofield Reservoir and hence, decrease the likelihood of and adverse economic impact.

359. Impacts on Fish Creek

The impacts on the fishery in Fish Creek are summarized in Chapter 3 of the EIS. As shown in Tables 3-10, 3-11, and 3-12, the impacts in this reach of stream are minimal. The Narrows Project is not expected to affect the viability of a campground in this area.

360. Social and Economic Impacts on Carbon County

Please refer to the response to comment 14.

361. Impacts on Bald Eagles

Please refer to the response to comment 219.

362. Effect on Carbon County

Please refer to the response to comment 14.

363. Need for Recreation Facilities

Please see the response to comment 162.

364. Fishery Impacts

The impacts to reservoir and stream fisheries are described in Chapter 3 of the EIS. It should be noted that mitigation is included in the project plan to offset fishery impacts.

365. Mitigation Measures

Chapters 2 and 3 of the EIS show that the majority of the mitigation measures are in the Price River drainage.

366. Economic Impacts to Carbon County

Please refer to the response to comment 14.

367. Use of Community Impact Funds

It has not been determined whether Community Impact funds would be used on the Narrows Project. That decision would be determined by the board of directors of the Permanent Community Impact Fund.

Darrell H. Mensel
P.O. Box 625
Midway, Utah 84049

April 25, 1994

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Mr. Roland Robison
Regional Director, Bureau of Reclamation
125 South State
P. O. Box 11568
Salt Lake City, Utah 84147

Narrows EIS Comment

Dear Mr. Robison,

I am writing to express my concern with a dubious water project in central Utah known as the "Narrows Project."

368 This project strikes me as a throwback to some former era, where water management for the sake of agriculture or industry was viewed as the highest and best use of the resource. But, as we both know, the citizenry as well as the Bureau itself are now committed to a broader, more holistic approach.

The Narrows Project threatens a wide array of recreational resources in the Price River drainage. Scofield and Gooseberry Reservoirs, both excellent flat-water fisheries, will have diminished quantities of water which will decrease the numbers of fish in general, increase the potential for winter kill, and lessen natural reproduction. The stream fisheries below the Narrows Project will suffer as well. The Price River below Scofield is potentially an excellent fishery and wildlife area, and has been the object of considerable attention by the Stonefly Society, a Trout Unlimited chapter along the Wasatch Front. All of their efforts will be for naught if the Narrows Project is put in place.

Utah's quality fisheries are desperately overcrowded. The Price River, Fish and Gooseberry Creeks, and the reservoirs in the area are important recreational resources that need to be protected and enhanced. The Narrows Project will permanently impair them.

369 Vice President Al Gore's National Performance Review called for the Bureau to "redefine its mission toward new environmental priorities and clarify its role in water management." I do not see how the Narrows Project is compatible with this "new" thinking. I would ask that this Project be discontinued or put on hold until a broader spectrum of people and ideas is applied to it.

Thanks sincerely for your consideration.

Sincerely,

Darrell H. Mensel

Darrell H. Mensel

368. Holistic Approach to Water Resource Planning

The Sponsor disagrees with the letter writer's view that maintaining water resources for the sole benefit of fish and wildlife is a holistic approach to water resource planning and management. The Narrows Project plan is based on multiple purpose water use and management. The plan not only provides for an irrigation and municipal water supply, but also provides fish and wildlife and recreation benefits as well. The Sponsor believes that this multi-purpose approach is more holistic.

369. Redefined Mission for Bureau of Reclamation

Please refer to the response to comment 251.

Narrows [illegible]

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4/25/94

Regional Director
US Bureau of Reclamation
PO Box 11568
Salt Lake City, Utah 84147

00040

Regional Director,

370 I'm writing to express my concerns over the Upper Narrows project on the upper Price River drainage. I'm a flyfisherman. I've fished Manti Mountain for going on ten years now. I'm extremely worried about the impact the Upper Narrows project on the fisheries of Manti Mountain. The Upper Narrows project will negatively affect the following fisheries:

1) Increased flow down Cottonwood Creek (Fairview Canyon).
2) Loss of natural reproduction in Lower Gooseberry Reservoir.
3) Reduced flow into Gooseberry Creek.
4) Reduced flow into Upper Fish Creek.
5) Reduced flow into Scofield Reservoir.
6) Reduced flow into the Price River.
7) Increased fishing pressure on the remaining unaffected Manti Mountain fisheries.

371 Let me offer some perspective that the loss or reduction of these waters would cause. Cottonwood Creek would be turned into an irrigation ditch as opposed to a trout stream. Lower Gooseberry Reservoir is one the more popular fishing spots on Manti Mountain. 30% of fish caught at Gooseberry Reservoir are provided by natural reproduction. This forces

Gooseberry to rely on low-quality, costly stocked trout. Lowering the flow to Gooseberry Creek and Upper Fish Creek would hurt wonderful cutthroat trout fisheries. Both streams have put out trophy trout in the past. This is a drainage that doesn't have a whole lot of water to spare.

372 The impact on Scofield Reservoir would be the most widespread. Scofield is one of Utah's most popular trout lakes. Scofield is also a somewhat shallow lake that has problems with water quality. If flows are reduced those water quality problems will only increase. The Utah DWR has stated that Scofield is touch and go for trout in low water years. The reduction of inflow caused by the Upper Narrows would multiple Scofield Reservoir's problems. The Price River would be adversely affected by lowered inflow into Scofield. The Price River could be one of Utah's prime trophy trout fisheries. It isn't due to lack of water in the winter. It winter kills. The larger trout are frozen or suffocated by the lack of flow.

373 Reduced water into Scofield will make it even harder for local fishery advocates to buy the water needed to maintain adequate winter flows.

374 Fishing pressure would be greatly increased on other Manti Mountain waters:

1) Electric Lake
2) Huntington Creek
3) Cleveland, Miller's Flat, Boulger, Beaver Dam and Huntington Reservoirs.

With the lost or reduction of the fisheries adversely affected by the Upper Narrows project displaced fishing pressure will negatively affect the

above waters. Electric lake had to be changed to catch and release regulations to protect the cutthroat trout population when the Scofield Reservoir fishery was destroyed by trash fish. If Scofield had perennial problems with water amounts and quality, Electric Lake would bear the brunt of Scofield's fishing pressure.

375 Finally, there are economic concerns involved in this. One, fishing is a big business in Utah, and it's growing. Notice all those Catch and Release bumper stickers on cars in Utah, the crowds in sporting goods stores and the hordes of fisherman at Scofield and Gooseberry Reservoirs. The loss of these fisheries will adversely affect the fishing business in Utah. It's silly to think that larger Gooseberry and Fairview Lakes Reservoir in any way mitigates the loss to other fisheries, particularly the loss of the streams. Trout streams are a very finite resource. Two, why does it makes sense to harm the economy of Carbon county to benefit Sanpete county? Please consider these factors and cancel the Upper Narrows Project. Thanks for your interest.

Sincerely,

Reed LeCheminant
61 E. Casa Loma Dr.
Centerville, Utah 84014
295-2705

370. Impacts on Fisheries

Impacts on fisheries are described in Chapter 3. This Chapter also describes project measures which mitigate the impacts to those fisheries, resulting in no net impact.

371. Impacts on Fisheries

Please refer to the response to comment 370 above.

372. Economic Impacts on Fishing

Please refer to the response to comment 370 above. Because mitigation is provided, there is no net economic impact to fishing and related businesses.

373. Purchase of Water for Winter Flows

The project would not change the availability of water rights for purchase.

374. Fishing Pressure

As stated in Chapter 3 of the EIS, implementation of the recommended plan would result in the loss of about 4,500 angler days per year at Scofield Reservoir. However, the proposed Narrows Reservoir is expected to support about 13,700 angler days per year. This new fishery would more than offset the fishery losses at Scofield.

375. Economic Concerns

Please refer to the responses to comment 372 above.

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Danny T. Potts
Vice President/Salt Lake County
Fish & Game Association
415 South 1000 West
Salt Lake City, UT 84104
April 26, 1994

Regional Director BOR
125 South State
P.O. Box 11568
Salt Lake City, UT 84147

Narrows EIS Comments

Dear Sir,

I am writing this letter as a representative for the fishermen of Utah and as a student of fish ecology with a Master's Degree to discuss my disapproval of the proposed Narrows Reservoir. I do not wish to involve myself in the political and controversial issues surrounding this project, but only the ecological issues as they relate to the economical impacts of the resources.

376 The primary concern is the effect this project is likely to have on Utah's second most important fishery—Scofield Reservoir. In the upcoming years it is predicted that Scofield will probably be Utah's best family rainbow trout resource. Even Strawberry Reservoir will probably be too specialized to fit this bill. With only approximately one out of every four years supplying adequate downstream bypass water to Scofield, the Narrows project will substantially rob Scofield of its ability to weather dry spells and provide Utahns with an ongoing fishing experience to which they are very accustomed. Only slightly lower lake levels will adversely affect the trout fishery in even 'normal' precipitation years, not to mention the apparently more frequent 'dry' ones.

377 The second concern is the subsequent endangerment of the Price River below Scofield Reservoir. There is much interest in the rehabilitation of this beautiful trout stream. This stream is potentially one of the best in the State if, and only if, it has adequate flow year round.

378 The third concern is of the loss of the natural reproduction of trout in Lower Gooseberry Reservoir. Thirty percent of the trout in the reservoir come from natural reproduction, which displaces a real cost to fishermen in replacing this recruitment with subquality hatchery raised fish. Plus, isn't it quite possible that the whole fishery could be lost in a dry season with waters being diverted elsewhere?

All three of these impacts would add up to a significant economic impact that would easily outweigh the economic benefits of diverting water through the narrows project.

It is also of interest that an addition of approximately two miles of road would be needed to circumvent the newly formed lake to be rerouted over the new dam.

379 This ecologist has major concerns about this project as it needs to take into account all economic considerations that relate to the costs and benefits to Utah and its people, not just to a few local people with selfish motives. Thank you for your consideration.

Sincerely,

Dan Potts

Dan Potts
Vice President, SLCF&GA

DP/kp

376. Effect on Scofield Reservoir Fishery

The impacts to the fishery in Scofield Reservoir are described in Chapter 3 of the EIS. There is no direct correlation between the level of the reservoir and the fish kills that have occurred historically. Fish kills have occurred when the reservoir is full, nearly empty, and at intermediate stages.

377. Endangerment of Price River Fishery below Scofield

The Narrows Project would not endanger the fishery in the Price River below Scofield Dam. In fact, the project plan includes several measures that would enhance and increase the fish habitat in that portion of the river.

378. Natural Reproduction of Trout in Lower Gooseberry Reservoir

As indicated in Chapters 2 and 3 of the EIS, one of the project's fishery measures is to narrow the stream channel of middle Gooseberry Creek between Narrows Dam and Lower Gooseberry Reservoir. This measure would provide 3 miles of spawning habitat to support the fishery in Lower Gooseberry Reservoir. The minimum fishery bypass of 1 cfs would be maintained at all times in wet or dry years. This measure could actually be an improvement over natural conditions during dry years.

379. Need to Take into Account All Economic Considerations

Please refer to the response to comment 368.

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Regional Director
Bureau of Reclamation
Upper Colorado Regional Office
P. O. Box [illegible]
Salt Lake City, Utah 84147

Dear Sirs:

00059

This letter is in response to the Draft Environmental Impact Statement prepared in regards to the proposed Narrows Project located in San Pete County.

I am currently the President of Fairview Lakes Association which is the recreational development located to the south of the proposed project between Fairview Lake and the proposed Narrows Reservoir.

380 One aspect of the DEIS that is somewhat misleading is in regards to the recreational land use presently underway in the Fairview Lakes Association. There are currently 199 separate parcels approximately one acre in size in the development. Under a long term lease from the water users association and variance from the County, approximately 30 cabins have been built and many other county approved septic tanks have been installed for use with trailers during the summer months. The trailers are temporary as cabins are proposed. Though it is very unlikely that all lots will ever have cabins built on them, it is expected that more cabins will be built in future years.

The Fairview Lakes Association has followed the progress of the Narrows Project over the past years and is in favor of the project. We see no adverse effects to the project from the Association and would be in favor of seeing the dam and reservoir constructed.

We appreciate the opportunity of being able to respond to the DEIS and would appreciate being involved with the project as it progresses.

Sincerely,

Ronald W. Jibson, P.E.
President, Fairview Lakes Association
1236 East 2050 South
Bountiful, Utah 84010

380. Fairview Lakes Development

Please refer to the response to comment 317.

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00047

Narrows [illegible] Comment

April 21, 1994
Regional Director
Bureau of Reclamation
125 South State St
P.O. Box 11568
Salt Lake City, Utah 84147

Dear Director:

I'm opposed to the Narrows project. All it does is divert much needed water from one county to another. In the meantime, it ruins
381 several creeks and lakes I like to fish in. Why can't the water users that want the dam built be taught how to more carefully use the water they have? I'm sure that if the same amount of money that would be used to build this dam were used to help them conserve, that the net affect will be better for all.

Stop this project NOW!

Sincerely

Timothy Christensen
2254 Rustic Roads Drive
South Jordan Utah 84095

381. Conservation

Chapter 2 describes conservation measures already implemented and those that would be an integral part of any project plan.

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Narrows EIS
Comment

April 21, 1994
Regional Director
Bureau of Reclamation
125 South State St
P.O. Box 11568
Salt Lake City, Utah 84147

Dear Sir:

Please accept this letter as comment on the proposed Gooseberry Narrows project. I'm very much opposed to this project. My opposition is for two major reasons:

382 1- The costs are excessive; the money could be used to conserve water by improving irrigation practices. This would improve conditions for landowners and benefit wildlife.

2- Damming upper Gooseberry creek would essentially dry up Scofield during times of drought and would dewater lower Fish Creek, harming or destroying a valuable existing fishery. Naturally sustained populations of Cutthroat trout in Gooseberry reservoir would also be eliminated because 4.3 miles of spawning habitat would be eliminated.

Please stop this project before its too late.

Jean Waters

Jean Waters
805 Birch Street
Clearfield,Utah
84015

382. Economics and Conservation

This subject is discussed in the response to comment 381 and in Chapter 2 of the EIS.

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April 23, 1994
Regional Director
Bureau of Reclamation
125 South State St
P.O. Box 11568
Salt Lake City, Utah 84147

Dear Sir:

383 By constructing the Narrow project in both Price and Sanpete counties will be hurt. Water users in these areas must come to terms with the fact that water must be conserved. Currently, these users practice archaic methods for irrigating and water management. Narrows, it only delays the inevitable.

384 In the mean time, naturally sustained populations of trout will be eliminated from the Gooseberry Reservoir tributaries, the existing trout fishery of Scofield reservoir will be compromised, if not destroyed in low water years. As a result an estimated 4500 fishing days will be lost. Lower Gooseberry Creek will see a 73% reduction in flows for three miles downstream. Finally Lower Fish Creek will be dewatered in the fall/winter, destroying a potential blue ribbon Brown Trout stream.

There is no justification for considering completing the Narrows dam if proper consideration is given to the real costs of this project.

Gene Webb

Gene Webb
6318 South 2135 West
West Jordan, Utah

383. Conservation

Conservation methods are discussed in the response to comment 381 and Chapter 2 of the EIS.

384. Impacts on Fisheries

The project impacts on fisheries are described in Chapter 3 of the EIS. The project would not adversely impact fall and winter flows in lower Fish Creek. In fact, the project would provide additional fall and winter flows as a project measure.

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April 19, 1994
Regional Director
Bureau of Reclamation
125 South State St
P.O. Box 11568
Salt Lake City, Utah 84147

Narrows [illegible]
Comments

Dear Sir:

I'm writing in response to the proposed new reservoir on Gooseberry Creek in Sanpete County, Utah. In my opinion, this project
385 contradicts everything I've been reading about the Bureau's new management plan for Western water resources. If it is constructed, this project simply "robs Peter to pay Paul", and creates a net loss for wildlife habitat in the process. Further more, investing
386 the same moneys in water conservation efforts as are proposed for dam building will yield greater benefits to both communities, than by redirecting water that is critical to the Price River watershed.

I strongly urge you to stop this project and help focus community attention on water conservation instead of short sighted wildlife habitat destruction.

Sincerely,

Steve

Steve Davis

No address

000 48

385. Bureau of Reclamation's New Policies

Please refer to the response to comment 251.

386. Conservation in Lieu of Project Development

Please refer to the response to comment 235.

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April 21, 1994
Regional Director
Bureau of Reclamation
125 South State St
P.O. Box 11568
Salt Lake City, Utah 84147

To whom it may concern:

Please accept my comments on the proposed dam construction on upper Gooseberry Narrows.

This project should be stopped before any more money or water are squandered. If this dam is built, Scofield Reservoir will be damaged and lose an estimated 4,500 angling days. This affects my favorite place to take my family fishing. I understand that it will also hurt Gooseberry Reservoir and the feeder creeks that trout spawn in.

387 If the money to build the dam were put into efforts to help farmers line ditches and practice better irrigation techniques, they would have more water than this project would provide them. Please consider doing that with the money instead of ruining Scofield.

Yours Truly:

Ray DeMie

Ray DeMie
2625 Alida Drive
South Jordan, Utah
84084

387. Conservation in Lieu of Project Development

Please refer to the response to comment 235.

MAX G. MORGAN, M.D.
590 EAST 1ST NORTH, #5
PRICE, UTAH 84501
TELEPHONE (801) 637-2300

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June 21, 1994

Bureau of Reclamation
Regional Environmental Office
125 South State Street
P.O.Box 11568
Salt Lake City, UT 84147

00060

RE: Gooseberry Project

Dear Sirs:

It is my understanding that an EIS is being prepared for the Gooseberry Project. I was unable to attend the local hearing on the comment date and I feel that I have comments and information that are crucial to full consideration of project impacts which will be unavailable without consideration of my letter.

I would like to take this opportunity to address the water issue of long standing concern existing between Carbon County and Sanpete County residents. The issue specifically involves the Gooseberry Water drainage into Upper Fish Creek and ultimately into Scofield Reservoir.

Before going any further, I would like to apologize for not attending the public hearing in Price concerning this issue. As a physician, my intention was to present some information from a medical perspective, but needless to say a medical emergency called me away.

As you are aware, the residents of Carbon County obtain their irrigation and culinary water from the Scofield Reservoir and from some mountain springs. However in 1992, during the midst of the drought, while on water rationing since April , most of the culinary water came from the bottom of the very low Scofield Reservoir. The reservoir was so low that later that fall, it was necessary to dredge a channel from the residual reservoir water to the outlet of the dam in order to allow more water out to supply the residents of Carbon County.

This highly concentrated bottom water is therefore the source of concern to this Carbon County Physician of twenty two years. My practice in 1992 can be characterized as a year where patients presented to the office with a high incidence of gastroenteritis, symptoms of abdominal cramping, nausea, vomiting and bloody diarrhea. Along with this, there appeared to be an increase in the number of patients with hepatitis.

Other physicians in Carbon County both in private practice setting and in the emergency room have voiced these same concerns during the 1992 drought year. A concentrated effort is in

place to document the statistical numbers of hospital admissions related to gastrointestinal disorders during that year in comparison to non drought years. The number of patient office visits related to gastrointestinal disorders will be much more difficult to document.

My conclusions would be that the increased number of cases of intestinal disorders were related to the consumption of this highly concentrated bottom water. Whether there were residual bacterial coloforms present in the treated water or whether it was necessary to superchlorinate the water to render it safe is unknown. There were numerous complaints of cloudy drinking water, "swamp-smelling" bathing and drinking water and at times water from the tap that tasted like Chlorox. Never the less, the quality of this water was affected by the drought conditions.

388 There does seem to be a correlation between low reservoir water levels and drought conditions and between low water levels and gastrointestinal disease in Carbon County. Diverting water away from Carbon County in the future will adversely impact the critical water levels we now have and can adversely impact the health of the residents of Carbon County. This is especially true in future drought years.

Thank you.

Sincerely,

Max G. Morgan M.D.

M.G. Morgan, M.D.

MGM/bk

388. Correlation Between Reservoir Water Levels and Gastrointestinal Disease

Based on available information it is not possible to identify the specific cause of the increase in gastrointestinal disorders. If the cause is bacterial choloforms, adequate water treatment and disinfection should remedy the problem.

ORIGINAL

Department of Community & Economic Development
Division of State History
Utah State Historical Society

Michael O. Leavitt
Governor
Max J. Evans
Director

300 Rio Grande
Salt Lake City, Utah 84101-1182
(801) 533-3500
FAX: (801) 533-3503

March 2, 1994

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Charles A. Calhoun
Acting Regional Director
Bureau of Reclamation
Upper Colorado Regional Office
P. O. Box 11568
Salt Lake City, Utah 84147

RE: Draft EIS for the Narrows Project, Utah

In Reply Please Refer to Case No. 92-0594

Dear Mr. Calhoun:

The Utah State Historic Preservation Office received the above referenced Draft EIS on February 23, 1994. After review of the Cultural Resource material; pg 3-81-83, the Utah Preservation concurs with the information provided and the proposed mitigation measures. Before any excavation is undertaken, the Utah Preservation Office requests a research design be developed as outline by Secretary of Interior Standards and submitted to our office for review.

This information is provided on request to assist the Bureau of Reclamation with its Section 106 responsibilities as specified in 36CFR800. If you have questions, please contact me at (801) 533-3555.

Sincerely,

James L. Dykmann
Compliance Archaeologist

JLD:92-0594 BOR

Board of State History: Marilyn C. Barker • Dale L. Berge • Boyd A. Blackner • Peter L. Goss
David D. Hansen • Carol C. Madsen • Dean L. May • Christie Needham • Thomas E. Sawyer • Penny Sampinos • Jerry Wylie

00001

HOUSE OF REPRESENTATIVES
STATE OF UTAH

REP. MICHAEL R. STYLER
68TH DISTRICT
(MILLARD AND SANPETE COUNTIES)
1755 WEST 5500 SOUTH
DELTA, UTAH 84624
RES. 864-3077 / BUS. 864-3891

COMMITTEES: ENERGY, NATURAL RESOURCES AND AGRICULTURE; HUMAN SERVICES; NATURAL RESOURCES AND ENERGY APPROPRIATIONS SUBCOMMITTEE

To: Regional Director
Bureau of Reclamation

I would like to comment on the Sanpete Water Conservancy District proposed Narrows Project. This project has been in the planning for over forty years. Water rights for this project were secured long ago and the only way to deliver that water is through the construction of the Narrows Project.

I support the Reclamation's plan to deliver 4,920 acre-feet of supplimental irrigation water for 15,420 acres of irrigated farmland and 480 acre-feet for municipal use. This water would provide extensive economic value with returns easily exceeding 1 Million dollars per year to Sanpete County agriculture. The multipler-effect of this will substantially enhance the Sanpete County economy.

The construction of the Narrows Project will enhance recreation opportunities in Sanpete County. Fishing, ice fishing, boating and camping will all be enhanced. Wildlife should be helped by stabilizing high water flows and leveling out of late summer stream flows.

This is a project where all interests come our winners and I would heartily endorse the construction of the Narrows Project.

Sincerely,

Michael R. Styler
Utah State Representative
District #68

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Narrows EIS Comments

ATTACHMENT G - COMMENTS AND RESPONSES

2. LETTERS NOT REQUIRING A RESPONSE

ORIGINAL

Cottonwood Gooseberry Irrigation Company

P.O. Box 425, Fairview, Utah 84629

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April 1, 1994

Mr. Charles A. Calhoun
Regional Director
Bureau of Reclamation
125 South State Street
P.O. Box 11568
Salt Lake City, UT 84147

Re: Narrows Project Environmental Impact Statement

Narrows [illegible]

Dear Mr. Calhoun:

I am writing in regards to the meeting held in Mt. Pleasant, Utah on the evening of March 31, 1994, where the Narrows Project Environmental Statement (EIS) was discussed. Due to other commitments, I arrived at the meeting late and didn't feel comfortable in expressing my views at that time. As president of the Cottonwood Gooseberry Irrigation Company, I would like to express our company's position and feelings regarding this matter.

Cottonwood Gooseberry is in favor of the project as outlined in the EIS and feel that by cooperating with the Sanpete County Water Conservancy District, the wetlands inundated by the reservoir can be adequately mitigated. The rehabilitation of the Narrows Tunnel will also require the cooperation of both parties. We are looking forward to working with the Conservancy District to formulate agreements which will be mutually beneficial and expedite the construction of the project.

During the meeting I was upset with the position taken by the spokesman from Utah Power when he expressed his concern about possible restrictions at the power plant in Castle Dale due to water shortages. Surely, a multi-million dollar company such as Utah Power would not be so short-sighted as to build a power plant in a location where they had to depend upon using someone else's water for day to day operations. I'm sure that Sanpete County hasn't been reimbursed for any of the water used in the past by Utah Power. The point here is that the water right issue has already been resolved and should not be opened again for discussion.

Another issue raised by a Carbon County Commissioner was that Sanpete should make further mitigation to Carbon County. May I point out that Carbon County has had the benefit of using Sanpete's water for more than 60 years and has forced the expenditure of millions of dollars in litigation costs. Sanpete's water right has already been reduced to a third of the original amount. I feel that Sanpete has already paid far too much to even consider additional mitigation of any impact to Carbon County.

Cottonwood Gooseberry's position is that the Narrows Project as presented in the EIS is a viable and important project. It will play an important role in the future growth of Sanpete County. The economic benefits are far reaching and are essential if Sanpete County is to meet even its current needs.

I hope you will consider these concerns and comments as you progress through your analysis of the Narrows Project.

Sincerely,

I. Branch Cox

I. Branch Cox
President

ORIGINAL

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6 April 1994 Narrows EIS comments

Regional Director,
Bureau of Reclamation
125 South State St.
P.O. Box 11568
Salt Lake City, Utah 84147

Dear Sir:

Help! Help! Sanpete county needs water. The "Gooseberry Narrows Water Project" needs to be started and completed. It can be a benefit to Carbon and Emery Counties as well as Sanpete county.

Sincerely,

Reed K. Miller
70 South 400 West #8
Mt. Pleasant, Utah 84647

ORIGINAL

Economic Development District

Sevier County Courthouse • P.O. Box 820 • Richfield, Utah 84701 • Phone (801) 896-9222 FAX (801) 896-9226

March 28, 1994
ID: 940328L-1.EDD

Regional Director
Bureau of Reclamation
125 South State Street
P.O. Box 11568
Salt Lake City, UT 84147

WARROWS EIS COMMENTS

Dear Regional Director,

The Six County Economic Development District comprising commissioners, mayors, and special interest representation from Juab, Millard, Piute, Sanpete, Sevier, and Wayne Counties are most supportive of the development of the Gooseberry Narrows Project. We feel this endeavor is most beneficial to not only the citizens of Sanpete County but all residents of Utah.

The project will provide the much needed infrastructure necessary to store water for agriculture and industrial purposes in Sanpete County. Additionally, recreation for Utah citizens and outside visitors will be enhanced through providing additional fishing, boating, camping, and other opportunities. The project will most certainly provide another pristine destination for all to enjoy.

The economic benefits this project will provide to local farmers and retailers in Sanpete County must not be overlooked. More water means better crop yields for existing farms and the opportunity to place additional land into production. The recreational aspect of the project will mean a significant increase in retail sales and the establishment of support services for fishermen, campers, and other sporting endeavors. This means more jobs and will help to diversify Sanpete County's economy.

We appreciate the administration of the Bureau. If there is anything our organization can do to help bring this project to fruition don't hesitate to contact our office.

Sincerely yours,

Keith Gillins

Mayor Keith Gillins
Chairman of the Board

CC: Sanpete County Commissioners
Commissioner J. Keller Christenson, Chair

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Commissioners:

Robert D. Bessey, *Chairman*
J. Keller Christenson
Eddie L. Cox

Sanpete County

Center of Utah's scenic beauty

Courthouse Building
Manti, Utah 84642

Assessor: Yvonne A. Howell
Attorney: Ross C. Blackham
Auditor: Jay D. Alder
Clerk: Kristine F. Christiansen
Recorder: Reed D. Hatch
Sheriff: Wallace S. Buchanan
Treasurer: Earl D. Clark

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April 5, 1994

Narrows EIS Comments

Regional Director
Bureau of Reclamation
125 South State Street
P. O. Box 1156878
Salt Lake City, Utah 84147

Dear Sir:

At the April 5, 1994 Commission meeting the Sanpete County Commissioners unanimously supported, in form of a motion, the construction and completion of the Gooseberry Narrows project.

Previous court cases have determined Sanpete County's water right and the construction will not only allow for the timely use of the water, but will provide a beautiful recreational area that will benefit the public and wild life resources.

Thank you for allowing us to make public comment.

The Sanpete County Commission,

Robert D. Bessey

J. Keller Christenson

Eddie L. Cox

U.S. Department of Transportation
Office of the Secretary of Transportation

400 Seventh St., S.W.
Washington, D.C. 20590

APR 13 1994

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Lee Swenson
Regional Environmental Office
Upper Colorado Regional Office
PO Box 11568
Salt Lake City UT

Narrows EIS Comments

Dear Lee Swenson:

This office has reviewed the draft environmental impact statement on the Narrows Project, Utah, proposed by the Sanpete Water Conservancy District. We have no comments to offer.

Thank you for the opportunity to review the draft EIS.

00016

Sincerely,

Eugene L. Lehr

Eugene L. Lehr
Chief, Environmental Division

Council Members
W. Grant Peel Steve Rosenlund
Dan Simons Shauna Brotherson
David Blackham

Officers
William W. Way, City Administrator
Dixie Brunger, Recorder
Karen Larsen, Treasurer
Kay P. Larsen, Chief of Police

Mt. Pleasant City Corporation

115 West Main, Mt. Pleasant, Utah 84647
Telephone (801) 462-2456
Chesley R. Christensen, Mayor

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March 30, 1994

Narrows EIS Comments

Regional Director
Bureau of Reclamation
125 South State Street
P.O. Box 11568
Salt Lake City, UT 84147

Dear Sirs:

We, the Mt. Pleasant Main Street board, voted at this mornings meeting to enthusiastically endorse the Gooseberry Narrows Water Project.

The project is one of the most important projects to come to the north end of Sanpete County. It will bring the much needed water our agri-business and industry are so dependent upon. The benefit of the water to them will spill over into our entire community by enhancing the economic development of our area. It will also provide additional recreational facilities and infrastructure for tourism in Sanpete County. The Gooseberry Narrows Project is vital to Sanpete County's future.

Thank your for your consideration.

Mt. Pleasant Main Street Board

Gordon Farmer
Laurel Christensen
Allen Shelley
Dae Thompson
Deane Jorgensen
W. Grant Peel
Dennis A. Mower
Steve Haskell
Vernon R. Fuster
Christy Thompson King
Mark Allan Beck

Remembering the past, preparing for the future.

April 19, 1994
Regional Director
Bureau of Reclamation
125 South State St
P.O. Box 11568
Salt Lake City, Utah 84147

Dear Sir:

I'm writing to submit my opinion on the proposed Narrows project up Fairview canyon. This dam and the subsequent diversion of waters poses an unacceptable threat to existing downstream fisheries including natural self sustaining population of Cutthroat trout in Gooseberry reservoir and Creek, and the Scofield reservoir fishery.

The BOR's efforts should be refocus landowners favoring dam construction from antiquated irrigation practices to modern ones that will improve range an farmland production while conserving water and topsoil for future generations. Its time these people are held accountable for wise stewardship of resources before taxpayers dollars are invested to further destroy whats left of the West.

Please stop the narrows project from happening.

Thank you for your consideration,

Allan Ryther

Allan Ryther
431 East Center Street
Centerville, Utah 84014

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April 20, 1994

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Regional Director
Bureau of Reclamation
125 South State
P. O. Box 11568
Salt Lake City, UT 84147

NARROWS EIS COMMENTS

To Whom It May Concern:

I am strongly opposed to the building of the Narrows project. This dam would destroy some existing fisheries and damage others. It will eliminate a vigorous population of naturally reproducing Cutthroat trout that inhabit Lower Gooseberry Reservoir, eliminate 4.3 miles of critical spawning streams for the trout, reduce water that fills Scofield Reservoir, eliminating an estimated 4500 fishing days, and dewater Fish Creek during low water years.

The diverted water would only augment water users capacity to continue resisting conservation practices which if funds were invested in, would cost less than the diversion and yield greater benefits.

The Narrows project is a relic of old policy to dam without considering long term implications. It should dry up, not the creeks it wants to feed off of!

Sincerely,

Lorrie Ryther

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April 19, 1994
Regional Director
Bureau of Reclamation
125 South State St
P.O. Box 11568
Salt Lake City, Utah 84147

Narrows EIS Comments

00018

Dear Sir:

As an avid fisherman and concerned conservationist, I'm wish to strongly express my opposition to the proposed dam construction on upper Gooseberry creek. This project would destroy a flourishing wild fishery in Gooseberry Reservoir, where a significant percentage of the population sustains itself naturally. It would also nearly dry up Scofield Reservoir and lower Fish creek in low water years. This would seriously compromise a much needed family fishery.

I strongly feel that if dam construction money were put into efforts to conserve water in Sanpete County, both Carbon and Sanpete county ranchers would benefit much more than they would if this dam is constructed. This time, lets have our cake and eat it too. Stop the dam construction and push ahead with water conservation. If we don't we'll destroy our Western heritage and the outdoors we love.

Sincerely,

Bradley

Bradley Ryther
2624 West Alida Drive
West Jordan, Utah
84084

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April 19, 1994
Regional Director
Bureau of Reclamation
125 South State St
P.O. Box 11568
Salt Lake City, Utah 84147

Narrows

00021

Dear Sir:

I am strongly opposed to the so called Narrows project being proposed for construction in central Utah. Construction of this project would result in a serious compromise of critical habitat for fish on upper Gooseberry Creek, and compromise critical sport fisheries at Gooseberry and Scofield Reservoirs. By emphasizing sound water use planning and investing monies in water conservation instead of new dams, communities in Sanpete county and those along the Price River will benefit. Its time to stop building dams and focusing attention on proper water management.

Sincerely,

Dr. Taki Skedros
1588 Vineyard Drive
Bountiful Utah

April 20, 1994
Regional Director
Bureau of Reclamation
125 South State St
P.O. Box 11568
Salt Lake City, Utah 84147

To Whom it may concern:

I'm writing this letter to protest what I consider to be another waste of taxpayers money; the construction of the proposed Gooseberry Narrows project. This attempt to grab water and divert it from Carbon County to Sanpete is just another power play by a few individuals who don't manage the water they have now. Efforts should be made to if necessary force these people to practice water conservation instead of augment poor practices with what precious little water is left. I'm sure that investing monies this way will benefit both counties people and help improve productivity of the farms and ranches it affects.

Ruth Perkins

Ruth Perkins
1649 W. 9775 So.
So. Jordan, Ut.
84095

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April 20, 1994
Regional Director
Bureau of Reclamation
125 South State St
P.O. Box 11568
Salt Lake City, Utah 84147

Narrows EIS Comments

To whom it may concern:

I am writing to comment on the proposed reservoir construction on upper Gooseberry creek. I'm very much against this project. If it is completed, it will be another senseless dam being built at the expense of some of the best fishing water this state has to offer. It will also take away potential development from Carbon county and give the water to ranches who don't practice water conservation, and use a disproportionate share of water to irrigate because they refuse to use current technology. Why should my tax money go to support poor practices and ruin my fishing too?

Andy

Andrew Christensen
2254 Rustic Roads Drive
South Jordan, Utah
84095

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April 18, 1994
Regional Director
Bureau of Reclamation
125 South State St
P.O. Box 11568
Salt Lake City, Utah 84147

Narrows EIS Comments

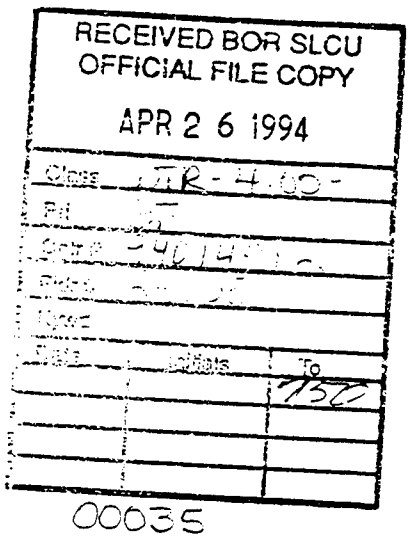
Dear Sir:

I'm concerned about the proposal to dam upper Gooseberry creek and divert water to Sanpete county ranchers. If this is done, it will irreparably damage fishing from Gooseberry reservoir, downstream to Scofield and lower Fish Creek. These are some of the best places to fish in Utah. When I talked with the fish and game ranger, he told me that Scofield is considered the second most important fishery in the state. I know that I take my family there regularly and I'm never alone.

Why can't the ranchers practice water conservation instead of asking for more federal handouts that only postpone what they must eventually do anyway? Please stop this senseless project.

Sincerely,

Rodney Rose
12295 So. 1367 W.
Riverton, Utah 84065



April 25, 1994

Regional Director
Bureau of Reclamation
125 South State Street
P.O. Box 11568
Salt Lake City, Utah 84147

Re: Gooseberry Narrows Project

Dear Sir:

I want to comment in support of the Gooseberry Narrows Project. As an interested party, as an owner of the property in Fairview, Utah, I feel there are several points that I want to comment on that reflect on the effects of the completion of this project.

There is no dispute about the right Sanpete County has regarding the right to the water, this having been resolved in various legal decisions. The dispute now seems to be whether the hardship on Carbon and Emery Counties would be adversely affected to the point that any advantages to Sanpete County should be dismissed. This argument seems to have totally missed the point. An analogy of the situation will help to demonstrate my point.

The citizens of Carbon and Emery Counties purchased a fleet of 100 used cars to set up a taxi service. They determined they didn't have enough mechanics to get the fleet into service so they contracted with the mechanics of Sanpete County to help. The agreed price was fifteen of the cars to be sent to Sanpete County to help set up their own taxi service. When the project was completed all of the cars were put into service in Carbon and Emery Counties. When the Sanpete County people came to collect their cars they were told the price they had agreed upon was too high and that the taxi service would be adversely affected by payment of the full price.

After much discussion and several law suits, Sanpete County agreed to reduce the amount of cars they would take as payment in order to get their taxi service going. The lack of this service was adversely affecting the development of the Sanpete economy and they recognized that a compromise to expedite the payment would be to their benefit. However, when Sanpete County residents came to collect the five cars agreed upon, they were told that even the reduction of their fleet by five cars would be disastrous because Carbon and Emery Counties had come to depend on the full fleet.

Carbon and Emery Counties have benefited from the 1933 agreement for 50 years using not only the water they should have received but also the water that should have been reserved for Sanpete County. This extra water that was temporarily available to Carbon and Emery Counties made it possible for their economies to grow. They now have a year-round supply of water sufficient to support much industry and giving them a more varied economy that can provide an

acceptable living for the residents of their counties.

This needs to be compared to the limited water resources Sanpete County is forced to deal with. Sanpete County residents can only count on water through mid-July in most years and early-August on a good year. The only water storage facility available to Sanpete County is Fairview Lake. This gives Fairview the ability to spread the snowpack melt to provide water through mid-summer. Without this facility, life in Sanpete County would be difficult at best.

Sanpete County has had to implement the most extreme water conservation measures in order to progress to their current position. They have instituted the much more efficient sprinkler irrigation systems and have been limited in the growth of industries in the County to those that don't require any additional water. Many cities will soon be at a point of limiting new residential construction because of the lack of culinary water.

Much has been made of the cost of "growing another crop of alfalfa". The issue here is not just agricultural, but the economic future of Sanpete County. Almost no additional growth can be accommodated without the additional water resources to support such growth. Since I can remember, the major export of Sanpete County has been the children of the local families. With no possibility of growth, the best that could be hoped for was to keep enough of the young people to sustain the communities at their current levels.

Without the support of the counties below, Sanpete can't take advantage of any additional water rights through the Central Utah Project. Therefore, Sanpete has no other option regarding additional water resources. They must develop the Gooseberry Narrows project in order to make a future for the county.

Carbon and Emery Counties should have been planning for the reduced amount of water. For them to develop planning on this water is foolish at best. As recently as 1983 they agreed to allow Sanpete to take a reduced amount of water that would mitigate the damage to their economy. However, it seems that as long as the water is still running downstream in their direction, they will fight and obstruct Sanpete County in taking their rightful share of water. Any additional delay they can cause is in their benefit.

I would ask that you approve without any additional delay the funding of this project. Any delay in completion of the project will increase Carbon and Emery Counties dependance on Sanpete County's water and delay the future growth of Sanpete County.

Sincerely,

C. Kurt Cox
1885 N. 400 E.
Orem, Utah 84057

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April 26, 1994

Narrows EIS
Comments

Regional Director
Bureau of Reclamation
125 S State St
SLC UT 84147

Dear Regional Director,

Please accept this letter as a protest against the Narrows Project.

As a 22-year resident of Carbon County I can tell you that we need all of the water we have. Our water comes from *so few* sources and is often *so limited* that we cannot possible give up any.

I am the daughter of a Delta farmer I know how valuable water is and I know how "sacred" water law is in many areas of this state; but I can honestly say that Carbon County deserves to have this water. There have been many summers over the past decade when we have rationed water religiously just to keep our trees alive. We use our grey water during the summer to water our lawns and vegetable gardens. We honestly try to conserve water whenever and wherever possible. Please understand that there can be no comparing our need for this water to that of a few Sanpete County farmer's need for one more irrigation. Two years ago we would have run out of drinking and bathing water if a portion of our water had been diverted.

Please don't allow this injustice to happen. We are living in a desert and we need our water.

Thank you.

Jane Johnson

778 Molyneux
Price UT 84501

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April 26, 1994

Regional Director
Bureau of Reclamation
125 S State St
SLC UT 84147

Narrows - comment

Dear Regional Director,

I am writing this letter to register my opposition to the Narrows Water Project. I realize that political boundaries rarely reflect physical boundaries, but, we must begin to recognize that working against nature and tampering with natural water sheds can bring nothing but disaster.

Not only will we be dealing with obvious problems such as altered fisheries, but how can we be sure that taking water from the natural water shed won't do irreparable damage to the local flora. That whole area has been under distress because of the continuing draught condition over the past five years. Couple that with the proposed water removal and who knows what damage may occur.

I don't know what the plans are for construction but doubtless, with pipe laying there will be considerable damage done to the natural ground cover. This area is also very susceptible to erosion. I am certain that this is one of the most likely problems to occur because of this project.

Additionally, I believe that this project will destroy the fishery that has been developed in that area.

Sincerely,

Bradley L. King
635 N 500 E
Price UT 84501

SIX COUNTY ASSOCIATION OF GOVERNMENTS

Sevier County Courthouse, P.O. Box 820
Richfield,Utah 84701
Phone: (801) 896-9222
FAX: (801) 896-6951

Office of the Executive Director

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May 26, 1994
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Narrows EIS Comments

Regional Director
Bureau of Reclamation
125 South State Street
P O Box 11568
Salt Lake City, UT 84147

Dear Regional Director,

The Six County Association Of Governments, comprising commissioners and mayors from Juab, Millard, Piute, Sanpete, Sevier and Wayne counties, are most supportive of the development of the Gooseberry Narrows Project. We feel this endeavor is most beneficial to not only the citizens of Sanpete County but all residents of Utah.

The project will provide the much needed infrastructure necessary to store water for agriculture and industrial purposes in Sanpete County. Additionally, recreation for Utah citizens and outside visitors will be enhanced through providing additional fishing, boating, camping, and other opportunities. The project will most certainly provide another pristine destination for all to enjoy.

The economic benefits this project will provide to local farmers and retailers in Sanpete County must not be overlooked. More water means better crop yields for existing farms and the opportunity to place additional land into production. The recreational aspect of the establishment of support services for fishermen, campers, and other sporting endeavors. This means more jobs and will help to diversify Sanpete County's economy.

We appreciate the administration of the Bureau. If there is anything our organization can do to help bring this project to fruition don't hesitate to contact our office.

Sincerely yours,

Carl V. Madsen, for

J. Keller Christenson,
Chairman

cc: Sanpete County Commissioners
Mary Maughn, Senator Bennett

JKC:jh

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Regional Director
U.S. Bureau of Reclamation
P.O. Box 11568
Salt Lake City, UT 84147
April 22, 1994

Narrows

0006)

To whom it may concern,

I would like to state my opposition to the Narrows Project proposal to build a dam in the Upper Gooseberry/Price River Watershed. During the summers of 1990 and 1991 I had the opportunity to fish along the Price river (lower Fish Creek) below Scofield reservoir. I recall that this stretch of stream was one of my favorite fishing spots during those two summers. The fish I caught (and released) were some of the healthiest Brown trout I have ever caught. During my only visit to the stream in spring 1992, the fish seem to have adversely suffered from the previous falls poisoning of Scofield Reservoir. In fact, I caught none. Then, in summer of 1992, the stream flow was shut down completely, due to the drought conditions, undoubtedly causing further decline in what could be one of Utah's premier trout streams. During the last 7 years, there have been numerous such incidents throughout the state of Utah, underscoring a general lack of regard for wetlands, Riparian habitats, and wild-life habitat in general.

I believe that much of this disregard is actually counter to the economic welfare of this state, and that proper concern for recreation and alternate use of watersheds provides economic benefits. In the specific case of the Gooseberry/Price watershed, I think that the benefits gained from the dam are far outweighed by the detrimental effects to the water uses of the Price river valley and the negative impact on the habitat and recreational potential of the Price River Watershed. From my own personal experiences, I can state that the Price river does have the potential to be one of Utah's premier trout streams, perhaps surpassing even the Provo River (particularly since the Provo will undoubtedly suffer at the hands of the D.O.T.). In fact, I have supported the Stonefly Societies efforts to acquire in stream flow water rights for the stretch below Scofield, to help it attain that potential. Streams such as the Price translate to income for many Utahns in the recreational and sporting goods industries, and further "erosion" of in-stream flows to ill-advised and poorly thought-out irrigation diversions, such as the Narrows project, may benefit a few, while having adverse impacts on many. I ask that you seriously re-think this proposal, its cost, and its impacts on Utah as a whole.

Sincerely,

David L. Gard, Ph.D.
Asst. Professor of Biology
University of Utah

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1 May 1994

Narrows Sls Comments

Regional Director
US Bureau of Reclamation
P.O. Box 11568
Salt Lake City UT 84147

Subj: Proposed Narrows Project on the Upper Price Watershed

Dear Sir:

I am writing to you to express my opposition to the proposed Narrows Project on the upper Price watershed. As a Utahn and a fisherman who values the waters of this state, I am very concerned that the proposed project will cause irreversible damage to the Price River, Scofield Reservoir, Fish Creek, Gooseberry Creek, and Lower Gooseberry Reservoir.

I urge you to reconsider, and withdraw your support for the project.

Very truly yours,

James F. Smith
1444 East Sherman Ave,
Salt Lake City UT 84105

Doug DeVries
280 E 1100 S
Bountiful, UT 84010
May 11, 1994

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Regional Director
US Bureau of Reclamation
P. O. Box 11568
Salt Lake City, UT 84147

Narrows CIS
Comments

Dear Regional Director:

The proposed Gooseberry Narrows project on the Upper Price watershed threatens the Scofield Reservoir and the Price River below Scofield as well as other waterways and storage in the watershed.

These waterways and water storage areas are important to wildlife and the many people who hunt, fish, camp and otherwise enjoy the area.

Opportunities for outdoor recreation are at a premium and increasing population and dwindling resources are facts of life.

I urge the Bureau of Reclamation to abandon the Gooseberry Narrows project as one whose benefits do not justify the costs.

Sincerely yours,

Doug DeVries

United States Department of the Interior

BUREAU OF RECLAMATION
Upper Colorado Regional Office
125 South State Street, Room 6107
Salt Lake City, Utah 84138-1102

GLEN CANYON ENVIRONMENTAL STUDIES OFFICE
MAR 1 1996
RECEIVED
FLAGSTAFF, AZ

JAN 18 1995

IN REPLY REFER TO:

UC-750
ENV-6.00

To: Interested Agencies, Organizations, and Individuals

Subject: Distribution of the Final Environmental Impact Statement for the Narrows Project, Utah

Enclosed is a copy of the Final Environmental Impact Statement for the Narrows Project, Utah.

The Sanpete Water Conservancy District, the project sponsor, is proposing to build a multiple purpose water development project that would provide water for irrigation and municipal use. In addition to providing a water supply, the project would include fish and wildlife mitigation and recreation and enhancement measures. Water from the project would come from a transmountain diversion from upper Gooseberry Creek and its tributaries which are located in the Price River drainage. The water would be used in north Sanpete County.

This EIS analyzes the impacts of three alternatives: The Recommended Plan, the Smaller Reservoir Plan, and the No Action Plan.

Sincerely,

Larry Walkoviak

Acting for Charles A. Calhoun
Regional Director

Enclosure