

**EFFECTS OF INTERIM FLOWS FROM GLEN CANYON DAM ON THE
AQUATIC RESOURCES OF THE LOWER COLORADO RIVER FROM
DIAMOND CREEK TO LAKE MEAD**

INTERIM FLOW MONITORING

Submitted to

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INTRODUCTION

This document proposes to extend the Aquatic Resources Study for the Hualapai Indian Tribe from Diamond Creek (RM 226) upstream to National Canyon (RM 166) in 1995. The Hualapai Wildlife Management Department, with technical assistance from BIO/WEST, initiated an investigation of the aquatic resources of the Colorado River from Diamond Creek to Pearce Ferry (RM 280) in May, 1992. Extending the investigation to National Canyon would provide a complete characterization of aquatic resources for the Colorado River and tributaries throughout the northern boundary of the Hualapai Indian Reservation (RM 166-274). Sampling methods under this proposal will be conducted in the manner described in the 1992 Annual Report, 1993 Annual Report, and the 1994 Work Plan.

Data on aquatic resources from National Canyon to Diamond Creek were collected as part of the Glen Canyon Environmental Studies by BIO/WEST from October, 1990 to November, 1993 (Valdez et al. 1992, Valdez and Hugentobler 1993, Valdez 1994). Ongoing investigations in this region of Grand Canyon are important to provide an ongoing assessment of occurrence and abundance of fishes, particularly native species, by area and season. Past investigations of this region have revealed numerous shoreline springs and local small aggregations of humpback chub. This lower region of Grand Canyon may be very important to future recovery of this and other native species because its distance from Glen Canyon Dam ameliorates effects of cold hypolimnetic releases and fluctuating flows.

Investigations of aquatic resources in this area are also important to determine downstream effects of the high beach building flow proposed for March, 1995. The first trip

of this investigation would be conducted prior to the high release, and subsequent trips would be conducted to evaluate downstream effects. Also, modifications to interim flows, resulting from the record of decision for the Glen Canyon Dam EIS, will be assessed, such as higher hourly upramp rates of 4,000 cfs instead of 2,500.

APPROACH

Four field trips proposed for the Hualapai Aquatic Resources Study in 1995 would each be 20 days long. This would extend the existing 13-day trips by 7 days to sample from National Canyon to Diamond Creek. Support boats (one 33-foot S-rig and 2 Achilles research boats) would be launched at Lees Ferry to pick up a team hiking in at Havasu Creek. The team would consist of 3 BIO/WEST biologists and 2-4 Hualapai biologists. The team would sample to Diamond Creek, and be replaced by a second team that would spend 13 days sampling from Diamond Creek to Pearce Ferry, under the same sampling protocol as identified in the 1994 Study Plan.

The following trip dates are proposed:

<u>Trip</u>	<u>1994 Trip Dates</u>	<u>Proposed 1995 Trip Dates</u>
1	March 30 - April 12	March 15 - April 3
2	May 26 - June 7	May 19 - June 7
3	Sept 26 - Oct 8	Sept 19 - Oct 8
4	December 6-18	Nov 29 - Dec 18

Purpose and Objectives

The purpose of the investigation will be the same as the existing Hualapai Aquatic Resources Study--to determine the effects of interim flows from Glen Canyon Dam on fish,

macroinvertebrates, algae, and water quality in the Colorado River from National Canyon (RM 166) to Pearce Ferry (RM 286) at Lake Mead.

The objectives of this proposed extension will also be the same as those of the existing program. The objectives of the 1995 Study Plan are to assess the effects of interim flows from Glen Canyon Dam on:

1. Distribution, abundance, and behavior of native and non-native adult fish.
2. Distribution, abundance, and behavior of larval and juvenile stages of native fishes.
3. Reproduction, food habits, and patterns of habitat use of piscivorous non-native fishes that may prey on native fishes.
4. Environmental conditions of tributary mouths and shallow shoreline habitat, including water quality and degradation and/or aggradation of sediments.
5. Food base including productivity and algal standing crops.
6. Fish communities in key tributaries.

Sampling Methods

Fish in the mainstem and tributary inflows will be sampled with seven primary gear types, including electrofishing, gill nets, trammel nets, hoop nets, minnow traps, seines, and angling. Larval light traps and lighted dip nets will also be used to capture larval native and endangered fishes in areas that are difficult to seine. Macroinvertebrates will be sampled with Hess and Surber samplers, as well as drift nets. Plankton will be sampled with fine mesh plankton nets and from filtered water samples, and water quality will be recorded with Hydrolab Datasondes and Surveyor II's to supplement U.S. Geological Survey (USGS) gage information. River stage changes will be measured with temporary staff gages referenced

to temporary bench marks that will be surveyed later for true elevation. Also, depth profiles will be developed for key tributary inflows (e.g., Spencer Creek, Surprise Creek), using the "Super-Hydro" hydrographic system, to assess fish access from the mainstem.

Proposed Analyses

Fish distribution, abundance, and behavior will continue to be monitored in the mainstem Colorado River to assess effects of interim flows from Glen Canyon Dam, as described in the 1992 Annual Report (Valdez 1993) and 1993 Annual Report (Valdez et al. 1994). Data from past investigations, including the BIO/WEST studies, will be integrated into the findings of the 1992-93 Hualapai Aquatic Resources Study to provide a complete assessment for the Colorado River and its tributaries along the Hualapai Indian Reservation.

The analyses will continue to examine relationships between stage height/change and fish habitat, particularly at tributary inflows and along shorelines. Additionally, the effects of varying elevations of Lake Mead will be assessed on fish habitat, as well as on fish species composition. Seasonal changes in species composition will be documented to determine use and importance of this region of Grand Canyon. Seasonal use of tributaries will also be documented, by fish species and size, to assess the potential predator load to the system and its effects on locally produced native species. This investigation will continue to evaluate drift material by season and river flow to evaluate bioenergetic potential in the area. Also, fish stomach contents will continue to be collected from various species to identify predator links and evaluate food availability with use.

Deliverables

Trip reports will be submitted within 10 days from the completion of each trip. A 1995 Annual Report will be prepared by March 1, 1996. This report will continue to evaluate effects of interim flows on mainstem fish communities and habitats, and will integrate information from tributaries in the study area.