EXTRACTING THE MONKEY WRENCH FROM GLEN CANYON DAM: THE GRAND CANYON PROTECTION ACT — AN ATTEMPT AT BALANCE

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> Glen Canyon. Flowing through the bottom of the gorge is the tame and domesticated Colorado River, released from the bowels of the adjacent Glen Canyon Dam. Formerly a golden-red, as the name implies, the river now runs cold, clear and green, the color of glacier water.
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> Great river—greater dam . . . . A plug, a block, a fat wedge, the dam diverts through penstocks and turbines the force of the puzzled river.
>
> What was once a mighty river. Now a ghost.

— Edward Abbey[1]

> Because the hand of man now controls the flow of water through the . . . Grand Canyon, Congress, acting for the American people, has a responsibility to ensure that our hand is firmly guided by the ethics of stewardship . . . . We must conserve and protect those resources and values that caused Congress to designate the Grand Canyon as a national park and to make its special qualities available to the American people for all time.

— Stewart Udall[2]

I. INTRODUCTION

Glen Canyon Dam: viewed by some as an engineering marvel, and by others as a destructive intrusion into the natural environment. Whichever version one believes, the fact remains that the dam exists. And while it provides a number of benefits, including water storage, flood control, recreation, and hydroelectric power, it is also responsible for a significant

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1. EDWARD ABBEY, THE MONKEY WRENCH GANG 2 (1975).
2. 137 CONG. REC. S18,743 (daily ed. Nov. 27, 1991) (as quoted by Sen. McCain, R-Ariz.).

amount of destruction to one of the natural wonders of the world—the Grand Canyon. Glen Canyon Dam introduced the hand of man into the Grand Canyon, and forever altered its natural ecosystem. For thirty years, the Canyon has been adapting to the "new" Colorado River created by the Bureau of Reclamation when it sealed off the diversion tunnels and subdued another facet of the untamed West. Unfortunately, this adaptation has been anything but stable. Parties unconcerned with the Grand Canyon ecosystem have made decisions that severely affect the natural environment. Increasingly, however, many parties interested in and affected by Glen Canyon Dam have worked toward a goal of equilibrium, where dam operation would be "tuned in" with the environment down river. The culmination of these efforts is the Grand Canyon Protection Act (GCPA).[3]

The GCPA was signed into law on October 30, 1992 as part of the omnibus water bill passed at the end of the 102d Congress.[4] The Act's preamble states that widely fluctuating releases of water from Glen Canyon Dam severely damage the river corridor downstream by eroding beaches, destroying wildlife habitat, killing native endangered fish, and endangering archaeological sites.[5] To combat these problems, the GCPA mandates that the Secretary of the Interior "operate Glen Canyon Dam . . . in such a manner as to protect, mitigate adverse impacts to, and improve the values for which Grand Canyon National Park and Glen Canyon National Recreation Area were established."[6] Thus, the GCPA gives priority to protection of the Grand Canyon, and all other values must operate within this mandate.

As with most reform legislation, the passage of the GCPA is just the

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3. Grand Canyon Protection Act of 1992, Pub. L. No. 102-575, 106 Stat. 4600 (1992) [hereinafter GCPA].

4. David Hoye, *Canyon Protection Approved: San Carlos Apache Water Accord Also Included in Landmark Bill*, PHOENIX GAZETTE, Oct. 31, 1992, at A1.

5. ENVIRONMENTAL DEFENSE FUND, CONFLICT ON THE COLORADO RIVER 1 (1992) [hereinafter EDF]. *See also* 137 CONG. REC. S12,942 (daily ed. Sept. 13, 1991) (statement of Sen. McCain).

> Time is running out on the park's beaches—so many of which have been scoured away by the erratic release of water from Glen Canyon Dam. Time is running out for ancient Indian ruins and cultural sites. Time is running out for the disappearing riparian vegetation and the wildlife it supports. Time is running out for endangered fish species. And time is running out for us to do the right thing.

Id.

6. GCPA § 1802(a). Congress has identified the Grand Canyon as "an object of scientific interest, being the greatest eroded canyon within the United States" and warned unauthorized persons "not to appropriate, injure or destroy any feature" of the monument. BUREAU OF RECLAMATION, OPERATION OF GLEN CANYON DAM—DRAFT ENVIRONMENTAL IMPACT STATEMENT 5-6 (1994) [hereinafter EIS]. *See also* 16 U.S.C. §§ 221, 228a (1988). Glen Canyon Natural Recreation Area was established to "provide for public outdoor recreation use and enjoyment of Lake Powell and lands adjacent thereto . . . and to preserve scenic, scientific, and historic features contributing to public enjoyment of the area." 16 U.S.C. § 460dd.

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beginning. Protection of the Grand Canyon will occur only when real changes are made in the decision-making processes that control the operation of Glen Canyon Dam. This change requires disrupting the status quo, particularly the energy industry's traditional stranglehold on the dam's operation. The GCPA is an important first step, demonstrating that natural resource decisions in the West will no longer be driven solely by special interests.

This article will focus on the GCPA and its attempt to balance operations at Glen Canyon with environmental conditions at the Grand Canyon so that a maximum benefit may be extracted from both. In addition, the article evaluates the GCPA as a model for future legislation that will address the allocation of a limited natural resource with numerous competing demands on its use. Section II begins by looking at the history of the dam, and Section III reviews the impacts of its operation. Section IV examines the history and the text of the GCPA, and Section V evaluates its strengths and weaknesses. Finally, Section VI evaluates the future implications of the GCPA.

II. History of Glen Canyon Dam

Since the early twentieth century, a dam was destined to be built in Glen Canyon; the only question was when. As early as 1916, the chief hydrologist for the United States Geological Survey recommended a dam at Glen Canyon to contain the wild Colorado.[7] Political realities, however, dictated that no river development would take place until each state was assured a chance to acquire a fair share of the river water.[8] The Colorado River Compact of 1922 (Compact) apportioned the waters of the river between the upper basin states and the lower basin states.[9] The boundary between the two basins was set at Lees Ferry, a point downstream of Glen Canyon near the Utah-Arizona border.[10] By allocating the Colorado River's flow, the Compact provided some protection for the six upstream states against the explosive growth in California and thus the possible loss

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7. Russell Martin, A Story That Stands Like a Dam: Glen Canyon and the Struggle for the Soul of the West 20-21 (1989).

8. *See* Committee to Review the Glen Canyon Environmental Studies et al., Colorado River Ecology and Dam Management 13 (1991) [hereinafter GCES Committee].

9. *Id.* The upper basin states are Colorado, New Mexico, Utah, and Wyoming. The lower basin states are Arizona, California, and Nevada.

10. The Compact guarantees the lower basin states a flow of 75 million acre feet (maf) every ten years, or 7.5 maf annually. David H. Getches, *Competing Demands for the Colorado River*, 56 U. Colo. L. Rev. 413, 417 (1985). Additionally, a subsequent agreement with Mexico requires delivery of 1.5 maf to that country with the obligation allocated between the upper basin and lower basin. *See* Treaty with Mexico, T.S. No. 994, 59 Stat. 1219 (1944). The total amount of water that must therefore be delivered to the lower basin is approximately 8.25 maf annually. Getches, *supra* at 417-19.

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of water rights under the prior appropriation system.[11]

Once the Compact was in place, river development could be planned. A dam at Glen Canyon was immediately proposed, but its inaccessibility and location in the upper basin made the project a low priority.[12] An alternate proposal, supported by the California congressional delegation, became a reality when the Boulder Canyon Project Act[13] authorized Hoover Dam (originally Boulder Dam).[14] In 1935, Hoover Dam was completed and put into service.[15]

By the late 1940s, the upper basin states recognized the need to store Colorado River water upstream of Lees Ferry.[16] Such storage would allow the development of the upper river and its tributaries, but still enable the states to meet the delivery requirements of the 1922 Compact. A 1949 reclamation report identified three proposed reservoir sites: (1) Flaming Gorge on the Green River near the Wyoming-Utah border; (2) Echo Park on the Green River in Dinosaur National Monument near the Colorado-Utah border; and (3) Glen Canyon on the Colorado River.[17]

The dam at Glen Canyon was eventually authorized by the 1956 Colorado River Storage Project Act (CRSPA).[18] The CRSPA as passed, however, was markedly different from the legislation originally presented. The original CRSPA proposed two massive storage reservoirs and power-producing dams: one at Echo Park, the other in Glen Canyon.[19] The possibility of a dam at Echo Park infuriated and mobilized the fledgling environmental movement, which defeated the Echo Park proposal under the leadership of David Brower, then Executive Director of the Sierra Club.[20] The price of victory, however, was a larger Glen Canyon Dam.[21] On April 11, 1956 President Dwight D. Eisenhower signed the revised

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11. Getches, *supra* note 10, at 417-19. The prior appropriation system is the doctrine of law controlling water rights in the West. The concept is fairly simple, "first in time, first in right," meaning that anyone who puts water from a particular source to use has superior rights over anyone who later begins to use water from the same source. DAVID H. GETCHES, WATER LAW IN A NUTSHELL 6 (2d ed. 1990).

12. MARTIN, *supra* note 7, at 27-29.

13. 45 Stat. 1057 (1928) (codified at 43 U.S.C. § 617 (1988)) (signed into law by President Calvin Coolidge in December, 1928).

14. MARTIN, *supra* note 7, at 27-29.

15. *Id.* at 29, 40-41.

16. *Id.* at 49-50. Recognition of the need for upper basin storage was based on the accumulation of hydrologic evidence showing the annual flow of the Colorado at Lees Ferry to be only 14.2 maf per year, as opposed to the 16 maf assumed in the Colorado River Compact. This data made it clear that if the upper basin was to consume the 7.5 maf allocated to it by the compact, it would not meet the obligation to deliver the requisite amount to the lower basin. GCES COMMITTEE, *supra* note 8, at 16.

17. MARTIN, *supra* note 7, at 49-50.

18. 43 U.S.C. § 620 (1988).

19. MARTIN, *supra* note 7, at 54.

20. *See id.* at 49-54.

21. *See generally id.* at 43-74.

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CRSPA into law, authorizing Wayne N. Aspinall Dam (formerly Curecanti Dam) on the Gunnison River, Flaming Gorge Dam on the Green River, Navajo Dam on the San Juan River, and Glen Canyon Dam on the Colorado River.[22]

Construction of Glen Canyon Dam began on October 1, 1956. The river was diverted from the dam site on February 11, 1959, and the final bucket of concrete was poured on September 13, 1963.[23] Power was first generated one year later.[24] The First Lady, Mrs. Lyndon Johnson, formally dedicated the dam on September 22, 1966.[25]

III. BACKGROUND—DAM OPERATIONS

The 1922 Compact, the CRSPA, and the 1968 Colorado River Basin Project Act (CRBPA) dictate operations at Glen Canyon Dam. The CRSPA stated that the authorized projects were:

> for the purposes, among others, of regulating the flow of the Colorado River, storing water for beneficial consumptive use, making it possible for the States of the Upper Basin to utilize, consistently with the provisions of the Colorado River Compact, the apportionments made to and among them in the Colorado River Compact and the Upper Colorado River Basin Compact, respectively, providing for the reclamation of arid and semiarid land, for the control of floods, *and for the generation of hydroelectric power, as an incident of the foregoing purposes.*[26]

The CRBPA added to this list of goals:

> This program is declared to be for the purposes, among others, of regulating the flow of the Colorado River; controlling floods; improving navigation; providing for the storage and delivery of the waters of the Colorado River for reclamation of lands, including supplemental water supplies, and for municipal, industrial, and other beneficial purposes; improving water quality; providing for basic public outdoor recreation facilities; improving conditions for fish and wildlife, *and the generation and sale of electrical power as an incident of the foregoing purposes.*[27]

The CRBPA's more specific mandate takes precedence over the broader

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22. 43 U.S.C. § 620.
23. STAN JONES, GLEN CANYON DAM AND STEEL-ARCH BRIDGE 23 (1984).
24. *Id.*
25. *Id.*
26. 43 U.S.C. § 620 (emphasis added).
27. 43 U.S.C. §§ 1501-1556 (1988) (emphasis added). The CRBPA authorized, among other things, the massive Central Arizona Water Project and created the Lower Colorado River Basin Development Fund.

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language of the CRSPA. The CRBPA identifies specific values that override power generation concerns in the event of conflict.[28] These identified values provide some legal basis for a number of groups, including irrigation districts, water conservation districts, fishing enthusiasts, river runners, environmentalists, and electric power districts, to influence operations at Glen Canyon Dam.[29] Nevertheless, power generation has evolved as the controlling factor in dam operations.[30] The two responsible authorities are the Bureau of Reclamation (BOR) and the Western Area Power Administration (Western).

A. *BOR and Hydropower*

The Department of the Interior (DOI) is charged with responsibility for overseeing dam operations under the CRSPA and the CRBPA. Within DOI, the BOR is the agency ultimately charged with meeting water delivery requirements and generating power.

Hydropower has developed into a significant source of electricity, providing 13% of all generating capacity in the United States.[31] In the West, hydropower supplies approximately 42% of all electricity, one-quarter of which is contributed by BOR power plants.[32] Hydropower offers a number of advantages over other sources of energy: it is a renewable resource; it is efficient; it conserves fossil fuels; and it creates no atmospheric pollutants.[33] The most significant advantage of hydropower, however, is its flexibility, which is the reason hydropower has become such an integral part of the power supply in the West.

The ability to meet peak power demand is critical.[34] The BOR estimates that only 50% of a power system needs to operate continuously.[35]

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28. GCES COMMITTEE, *supra* note 8, at 18. Such water delivery conflicts, although planned for, have not yet occurred so as to test the relationship between power generation and other uses of the river. *Id.* at 24.

29. *See* STEVEN W. CAROTHERS & BRYAN T. BROWN, THE COLORADO RIVER THROUGH GRAND CANYON 173-75 (1991).

30. The 1922 Compact specifies annual water delivery obligations to the lower basin and the Board of Reclamation (BOR) sets monthly releases to meet the annual target. Daily operation of the dam is therefore allowed to be flexible and has resulted in the emergence of power generation as the primary factor in daily releases. GCES COMMITTEE, *supra* note 8, at 24-25.

31. BUREAU OF RECLAMATION, HYDROPOWER 2002—RECLAMATION'S ENERGY INITIATIVE iv (1991) [hereinafter HYDROPOWER 2002]. The other significant contributors to United States electric generating capacity are fossil fuel steam plants (62%) and nuclear generating stations (14%). *Id.* at 6.

32. *Id.* at iv.

33. *Id.*

34. Peak periods are those resulting in the highest levels of demand in a utility's load or demand profile. Demand factors include time of day as well as seasonal requirements. WESTERN AREA POWER ADMINISTRATION, ELECTRIC POWER MARKETING EIS UPDATE FOR THE SALT LAKE CITY AREA INTEGRATED PROJECTS 9 (May 1, 1992).

35. HYDROPOWER 2002, *supra* note 31, at 7.

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As loads increase during peak periods, however, additional supply is needed instantaneously. Hydropower is best suited to meet this demand due to its ability to start quickly and adjust very rapidly to changes in load.[36] In fact, the most efficient way for a utility to operate is to use its fossil fuel (steam turbine) plants to meet baseloads and hydropower to meet peak demand.[37]

The BOR predicts that ever-increasing demand during peak periods may result in possible shortages in generating capacity, particularly in the West, where population growth is outpacing that of the rest of the country.[38] To satisfy this demand, additional hydropower development is being considered. The Federal Energy Regulatory Commission (FERC) has identified a potential 74,700 megawatts (MW) of additional hydropower development in the United States, 50,400 MW of which is located in 17 western states.[39] Obviously, the BOR considers hydropower critical to satisfy the insatiable demand for electricity.

B. *Western and Power Delivery*

Originally, the CRSPA authorized the BOR to sell hydropower generated at CRSPA dams directly.[40] In December 1977, the Department of Energy Organization Act transferred this authority to the newly created Western.[41] Western's mission is "to implement national energy policy by maintaining a viable marketing program for Federal power over an efficient and reliable transmission system while protecting the environment and encouraging conservation and the use of renewable resources."[42] Marketing federal power is paramount, however, and Western's mandate is to market federal hydroelectric resources "in such a manner as to encourage the most widespread use thereof at the lowest possible rates to consumers consistent with sound business principles."[43] Thus, Western's

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36. *Id.* Coal and nuclear plants, while excellent at providing baseload (near-constant) capacity, are not effective for meeting peak demands because their power output cannot be easily changed. WESTERN AREA POWER ADMINISTRATION, ENVIRONMENTAL IMPACT STATEMENT INFORMATION PACKET, POST-1989 POWER MARKETING CRITERIA 15 (Sept. 1990) [hereinafter INFORMATION PACKET]. For example, a coal-fired facility can take 24 hours to reach full generating capacity while the generators at Glen Canyon Dam take only minutes. CAROTHERS & BROWN, *supra* note 29, at 179.

37. HYDROPOWER 2002, *supra* note 31, at 7.

38. *Id.* at 4-5.

39. *Id.* at vii. As a point of reference, the generating capacity at Glen Canyon Dam is 1,288 MW, while at Hoover Dam it is 1,930 MW. *Id.*

40. 43 U.S.C. §§ 620, 620c, 620f.

41. 42 U.S.C. §§ 7101-7375 (1988). Western was specifically authorized by § 7152.

42. INFORMATION PACKET, *supra* note 36, at 1.

43. WESTERN AREA POWER ADMINISTRATION, 1989 ANNUAL REPORT 5 (1989) [hereinafter WESTERN REPORT]. This mandate is from section 5 of the Flood Control Act of 1944, Pub. L. No. 78-534, 58 Stat. 887 (1944) (codified at 16 U.S.C. § 825s (1988 & Supp. IV 1992), which is part of the federal reclamation laws that govern sales of CRSPA Power. *See* Salt Lake City v. Western Area

primary responsibility and focus is the sale of firm power and energy.[44] The basic statute governing power marketing is section 9(c) of the Reclamation Project Act of 1939.[45] Specifically, this section provides that in the sale of federal hydroelectric power, "preference shall be given to municipalities and other public corporations or agencies."[46] With respect to municipalities, Western has interpreted section 9(c) as giving preference only to those that operate their own utility systems.[47]

Pursuant to its authority, Western divided into five areas, each with marketing authority based roughly on one of the five major river basins from which federal power is generated.[48] The organization operates over 16,554 miles of transmission lines and 259 substations, serving over 600 wholesale power customers in 15 central and western states.[49] Western uses the revenues it collects to repay construction, maintenance, and operating costs of the power and irrigation projects authorized by CRSPA.[50] The total investment in these projects is approximately $1.5 billion.[51] Glen Canyon Dam is Western's primary money-maker, and as such is the centerpiece of its operations. This facility alone generates approximately 10% of Western's total kilowatt-hours, and more than 70% of all federal hydropower produced in the Rocky Mountain region.[52] As these numbers suggest, any disruption of hydroelectric operations at Glen Canyon Dam significantly affects Western's operations and obligations.

Power Admin., No. CIV.C86-1000G, 1988 WL 167244, at *7-9 (D. Utah Apr. 14, 1988), *aff'd*, 926 F.2d 974 (10th Cir. 1991).

44. WESTERN REPORT, *supra* note 43, at 3. Firm power is defined as "power which is guaranteed to be available at all times." *Western Area Power Admin.*, 926 F.2d at 979 n.4.

45. 43 U.S.C. § 485h(c) (1988); *see also Western Area Power Admin.*, 926 F.2d at 977.

46. 43 U.S.C. § 485h(c).

47. 43 U.S.C. § 485h(c).

48. The five areas are Billings, Phoenix, Loveland, Sacramento, and Salt Lake City. Western's main headquarters is located in Golden, Colorado. WESTERN POWER ADMINISTRATION, ENERGY PLANNING AND MANAGEMENT UPDATE 1 (Mar. 1994).

49. WESTERN REPORT, *supra* note 43, at 3.

50. CAROTHERS & BROWN, *supra* note 29, at 178; 43 U.S.C. § 620d; 42 U.S.C. § 7152(1). The irrigation projects to be paid for by the power generation facilities include the Dolores Project in Southern Colorado, the San Juan-Chama Project in New Mexico, the Seedskadee Project in Wyoming, and the Central Utah Project. Jim Bishop, *A Water-based Electric Empire is Hit by a Flood of Criticism*, HIGH COUNTRY NEWS, July 13, 1992, at 10.

51. CAROTHERS & BROWN, *supra* note 29, at 183. Overall, the total federal investment in Western's power system is about $5 billion, of which approximately 42% had been repaid by 1989. WESTERN REPORT, *supra* note 43, at 6.

52. CAROTHERS & BROWN, *supra* note 29, at 180-81. As of March 25, 1993, Glen Canyon Dam had generated approximately $993 million in revenues since it was put into service. Author's tour of Glen Canyon Dam, Mar. 25, 1993.

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C. *Dam Operations and the Glen Canyon Environmental Studies*

1. *Basis for Operations at Glen Canyon Dam*

In theory, operations at Glen Canyon Dam are simple: the BOR determines the total amount of water to be released each month and year, and Western controls real-time releases subject to this plan.[53] In other words, the BOR is ultimately in charge. Its plan for dam operation has traditionally been governed by four criteria: (1) the annual release of approximately 8.23 maf of water as required by the 1922 Compact; (2) a monthly release schedule that satisfies the annual goal while still meeting water delivery commitments and avoiding spills (flows exceeding power-plant capacity); (3) the maximum amount of water that can be released at any given instant through the dam; and (4) an informal agreement with the National Park Service calling for specified minimum releases during the recreation and non-recreation seasons (3,000 and 1,000 cubic feet per second (cfs) respectively before 1991).[54] BOR enjoys tremendous flexibility in determining releases. Monthly releases are not strictly governed by seasonal irrigation patterns in the lower Colorado basin because the BOR uses Lake Mead to regulate these variations.[55]

Having wide leeway in how it dictates real-time releases, Western has utilized Glen Canyon Dam as a tool to meet peak power demands efficiently.[56] This means restricting flows at night and in the early morning and increasing them during the day (typically 8 a.m. to 5 p.m.). Western sells the electricity to its preferred customers at cost.[57] Excess peak-power that is not needed to satisfy firm customers is sold on the so-called "spot market" at true market prices.[58] This mode of operation results in huge daily fluctuations in the flow of water through Glen Canyon Dam, ranging from 1,000 cfs to 31,000 cfs.[59]

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53. GCES COMMITTEE, *supra* note 8, at 211. "Real time" releases are those made minute to minute based on actual demands placed on the power system.

54. CAROTHERS & BROWN, *supra* note 29, at 177-78. The monthly release schedule is also dependent on the BOR's goal of having water storage in Lake Powell at 22 maf on January 1 of each year and 27 maf (considered full) by July 1. *Id.* at 177.

55. GCES COMMITTEE, *supra* note 8, at 213.

56. *See supra* notes 34-37 and accompanying text.

57. WESTERN REPORT, *supra* note 43, at 5. Western contends that selling "firm power" at cost provides "significant economic benefits throughout our 15-state region." *Id.*

58. Bishop, *supra* note 50, at 10. Obtaining a premium price on excess peak power allows Western to keep prices about 60% below market for its 600 preferred customers. *Id.* The "spot market" is one where utilities connected to Western's power grid can purchase excess power on short notice as needed. *Id.*

59. Bishop, *supra* note 50, at 10.

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2. *Glen Canyon Environmental Studies and the Effect of Dam Operations*

Widely fluctuating flows from Glen Canyon Dam appear to harm the downriver environment in many ways. The first attempt to investigate this harm began in 1982 with the Glen Canyon Environmental Studies (GCES) program, initiated as an environmental assessment of the effects of uprating and rewinding the eight generators in place at the dam.[60] The broad objectives of the program were to (1) determine the impacts of dam operations on the natural and recreational resources of the Grand Canyon, and (2) decide whether there were ways, within the mandates of the CRSPA and the law of the river,[61] to adjust operations so as to minimize downstream impacts.[62]

To date, the program has identified a number of impacts. Records indicate that before Glen Canyon Dam was built, the average annual flow through the Grand Canyon varied from a maximum range of 85,000-95,000 cfs during spring runoff, to a minimum of about 4,000 cfs.[63] The dam eliminated these seasonal extremes, replacing them with daily extremes of 1,000 to 31,000 cfs. The dam also destroyed the seasonal temperature patterns of the river. Before the dam, temperatures ranged from a winter low of approximately 40 degrees Fahrenheit, to 60-70 degrees in the spring, and a high of 75-85 degrees in the summer.[64] Now the water released from Glen Canyon Dam comes from the bottom of Lake Powell, and its temperature stays nearly constant at about 48 degrees.[65]

The most significant result of the new flow regime is the alteration of sediment flow through the Grand Canyon. For millions of years, the Colorado River and its tributaries have deposited and removed sediment from the canyon in a complex pattern of erosion and deposition.[66] Glen Canyon Dam interrupted this pattern by trapping sediment in Lake Powell. The dam's effluent is now clear and free of sediment and thus has an enormous potential to erode (especially at high flows) but little ability to deposit.[67] Consequently, the only sediment available to replenish eroded

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60. GCES COMMITTEE, *supra* note 8, at 227.

61. The law of the river consists of the set of compacts, statutes, and court decisions allocating the flow of the Colorado River among states and between the United States and Mexico. Getches, *supra* note 10, at 414.

62. *Id.* at 229.

63. CAROTHERS & BROWN, *supra* note 29, at 22.

64. *Id.* at 67.

65. *Id.* All effects of the dam, however, dissipate downstream of the Glen Canyon due to additional flows from natural downstream tributaries. *Id.* at 71.

66. *Id.* at 47.

67. *Id.* at 52.

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deposits must come from tributaries within the Canyon.[68] The National Park Service is concerned with decreases in the size and number of sandbars since construction of the dam.[69] In fact, the National Park Service has designated preservation of sandbars as one of its highest priorities.[70] This priority is understandable, considering the importance of sandbars as habitat for riparian life[71] and as campsites.[72] If sandbars are to be maintained in the Grand Canyon, releases from the dam will have to be planned so that they build up the sandbars without causing a net loss of sand-size particles.[73]

In addition to the dam's impact on sediment flows, differences in the temperature and clarity of the water have had a tremendous effect on plant and animal life downstream of the dam. Sunlight—the most important source of energy for plant and animal growth—can now penetrate the clear water. This causes a tremendous increase in the growth of algae,[74] the basis of the river's food chain.[75] Thus, the Colorado River through the Grand Canyon is much more biologically active than it was in its pre-dam condition.

Probably the most controversial result of this change in biology has been the emergence of the Colorado River as a world-renowned trout fishery at the expense of native fish species. Glen Canyon Dam, although not solely responsible for this change, has certainly played a significant role in the process. Before the early 1900s, the dominant fish were squawfish, one of three chub species (humpback, bonytail, or roundtail), and

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68. *Id.* at 52-54.

69. GCES COMMITTEE, *supra* note 8, at 68. One investigator attributes the major cause of beach erosion to the great flood of 1983, which resulted in the opening of the spillways at Glen Canyon Dam and outflows exceeding 92,000 cfs. CAROTHERS & BROWN, *supra* note 29, at 28. This extremely high rate of flow, not carrying a significant amount of sediment, resulted in changed beach profiles. Since that time, the beaches within Grand Canyon have consistently eroded. *Id.* at 57-59. Of twenty beaches studied since the 1970s, four were gone by 1985, and eleven others had significantly decreased in size. Only three had actually gained sand. *Id.* at 58.

70. GCES COMMITTEE, *supra* note 8, at 68.

71. Notwithstanding the erosion of sandbars, riparian habitat has benefitted somewhat from the presence of the dam. Controlling the extremes of water flow through the Canyon has resulted in stability for some riparian areas and allowed for a greater abundance of food resources, resulting in an increase in numbers and species of animals along the river. CAROTHERS & BROWN, *supra* note 29, at 117-28, 148.

72. *Id.* at 59. Recreationists must also contend with the daily change in flows. River runners must sometimes choose between scheduling runs at low water stage, when they might be confronted with exposed rocks in the channel, or at a higher stage when larger, more dangerous waves are present. *Id.* at 37.

73. GCES COMMITTEE, *supra* note 8, at 68.

74. *Id.* at 65.

75. CAROTHERS & BROWN, *supra* note 29, at 64. Other physical and chemical factors affecting aquatic productivity are water temperature, nutrient levels, water fluctuations, bank and bottom conditions, substrate stability, and water velocity. Each of these factors has been affected by releases from Glen Canyon Dam. *Id.* at 65.

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flannelmouth and razorback suckers.[76] Even before Glen Canyon Dam was completed, non-native carp and catfish had largely replaced these species.[77] Now dam-induced changes in sections of the Colorado River have created an environment that fosters trout growth. Even so, the trout population is not completely self-sustaining, and stocking is necessary to keep up with the annual harvest.[78]

In the future, the native versus non-native species debate will continue to grow as an issue for resource managers. The Endangered Species Act (ESA) provides the U.S. Fish and Wildlife Service with the authority to suggest a reasonable and prudent alternative to any federal action which may jeopardize an endangered species.[79] The humpback chub, found in both the Colorado River and its tributary, the Little Colorado, has been listed as endangered since 1967. Thus, any future management decisions on the operation of Glen Canyon Dam will have to take into account possible effects on the humpback chub.[80]

Compiling evidence of the impacts of Glen Canyon Dam on the downstream environment provides a starting point for sound scientific inquiry. After reviewing the GCES report in 1987, DOI decided that additional data were needed on the relationships between the fluctuating flows and endangered species, the trout fishery, and sediment deposits.[81] In addition, the GCES program needed to look at potential economic impacts that would result from operational changes.[82]

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76. CAROTHERS & BROWN, *supra* note 29, at 83.

77. *Id.* The principal factors in the decline of native species in the Canyon are the introduction of non-native predators and revolutionary habitat changes that started with the construction of Hoover Dam. *Id.* at 81-82.

78. *Id.* at 90. Trout reproduction in the vicinity of the dam has generally been unsuccessful. Daily fluctuations in the level of the river negatively affect reproduction attempts because trout build their nests in gravel bars in shallow areas that become exposed when the river level falls in proportion to the decrease in power demand. *Id.* A recent report indicates, however, that natural spawning has been helped by the implementation of interim flows. GCES researchers and the Arizona Game and Fish Department have observed significant numbers of unstocked fry and fingerling fish in the Lees Ferry sampling area. Dave Wegner, *Status of Interim Flows*, COLO. RIVER STUDIES OFFICE NEWSLETTER (Bureau of Reclamation, Salt Lake City, Utah), Spring 1993, at 8.

79. 16 U.S.C. §§ 1536(a)(2), (b)(3)(A). *See also* Steven W. Carothers, *EIS Update—Draft Biological Opinion and Reasonable and Prudent Alternative*, COLO. RIVERS STUDIES OFFICE NEWSLETTER (Bureau of Reclamation, Salt Lake City, Utah), Fall 1993, at 3.

80. BUREAU OF RECLAMATION, SUMMARY: OPERATION OF GLEN CANYON DAM—DRAFT ENVIRONMENTAL IMPACT STATEMENT 12 (Jan. 6, 1994) [hereinafter SUMMARY DRAFT EIS]. In addition to the humpback chub, the razorback sucker is listed as endangered, but is rare in the area immediately affected by the dam. The flannelmouth sucker is a candidate for listing under the ESA but is relatively abundant and reproduces in several tributaries. *Id.* at 49.

81. GCES COMMITTEE, *supra* note 8, at 230-31.

82. *Id.*

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3. *GCES II and the Need for an Environmental Impact Statement*

Phase II of the GCES began in 1988 and was estimated to last five years. In July 1989, in the wake of public pressure, Secretary of the Interior Manuel Lujan directed that an environmental impact statement (EIS) on dam operations be completed.[83] The goal of the EIS is to assess alternative methods of operating (or not operating) the dam that may mitigate its adverse effects.[84] Unlike the GCES program, an EIS requires data beyond that strictly related to the ecosystem itself. In addition to new studies on fish and wildlife, especially endangered species, DOI is conducting studies of cultural and archeological resources.[85] This expanded approach requires extensive coordination with Native Americans.

In 1991, public concern over damage to the Grand Canyon again brought pressure on Secretary Lujan, who responded by ordering operating criteria that would protect downriver resources until completion of the EIS. The criteria were implemented on November 1, 1991 and provided the following guidelines: (1) releases through the dam are to be limited to 20,000 cfs unless increases are necessary to avoid anticipated spills; (2) minimum flows are to be 8,000 cfs between the hours of 7 a.m. and 7 p.m. and 5,000 cfs at night; (3) daily fluctuations are limited to 5,000, 6,000, or 8,000 cfs, depending on monthly release volumes; and (4) ascending and descending ramping rates are to be limited to 2,500 and 1,500 cfs per hour respectively.[86]

These restrictions caused an uproar from power interests in the West. Western, claiming that cutbacks in its peak power-producing capability would force it to pay a premium to private utilities to replace the lost capacity, convinced DOI to issue "exception criteria," which modify the interim flow requirements.[87] The criteria allow Western to exceed the specified maximum flows to respond to power system disturbances, to regulate the power system, and to avoid the expense of purchasing replacement power if capacity is available from Glen Canyon (a maximum of twenty-two hours during any one month).[88] The exceptions provided a window through which Western can use the hydroelectric plant as it always has and shows the strength of utility interests in influencing operations at

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83. EIS, *supra* note 6, at 231. In his 1989 news release announcing the EIS, Secretary Lujan stated: "It is time to gather the facts about this issue, to give all interested parties a chance to explain their positions and to do so in full view of the American people." *Id.* at 2.

84. GCES COMMITTEE, *supra* note 8, at 231.

85. *Id.*

86. *Interim Operating Criteria Implemented*, COLO. RIVER STUDIES OFFICE NEWSLETTER (Bureau of Reclamation, Salt Lake City, Utah), Jan. 1992, at 1 [hereinafter *Criteria Implemented*].

87. Interagency Agreement Between the Bureau of Reclamation and the Western Area Power Administration (Oct. 21, 1991) (on file with author).

88. *Criteria Implemented*, *supra* note 86, at 3.

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the dam.[89]

Plainly, the limits imposed on the power plant will affect consumers. An analysis of those impacts is warranted, and is part of the EIS being prepared.[90] In the short run, due to a surplus of generating capacity in the West, most government projections estimate a total cost to Western of $6-8 million per year.[91] Based on the $8 million figure, this cost would result in a 10-cent increase to the typical residential customer's monthly bill.[92] Obviously, the impact would be proportionately higher to business and agricultural entities that use more electricity. Other estimates of short-term costs to Western, however, are as low as $3 million per year.[93] Irrespective of the actual costs, Western raised its wholesale power rate from $1.45 per kilowatt-hour (Kwh) to $1.78 per Kwh, a 23% increase.[94] Even at this price, the rate is substantially less than the open market price of $4.50 per Kwh.[95] Completion of the Glen Canyon Dam EIS—a draft of which was released on January 6, 1994—should provide more data on the long-term costs associated with changes in dam operations (i.e., those incurred when surplus capacity is diminished).[96]

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89. In a one-year review of interim operations, exception criteria were invoked sporadically due to transmission and generating system emergencies. None of the deviations lasted longer than one hour. The EIS team is assessing environmental impacts. Wegner, *supra* note 78, at 7.

90. Western is also developing a separate EIS entitled the Salt Lake City Area/Integrated Projects (SLCA/IP) Electric Power Marketing EIS. The scope of the EIS is to assess the impacts of current and alternative electric power marketing programs (seven in all), particularly those impacts on the human and natural environment downstream from all applicable SLCA/IP hydropower generation facilities. This EIS is independent of the Glen Canyon Dam EIS but will incorporate those studies and their results as part of Western's review. WESTERN AREA POWER ADMINISTRATION, ELECTRIC POWER MARKETING EIS UPDATE FOR THE SALT LAKE CITY AREA INTEGRATED PROJECTS 2-3 (Apr. 22, 1991). The primary facilities in the SLCA/IP include Glen Canyon Dam, Flaming Gorge Dam in Wyoming, and the Aspinall Unit in western Colorado. *Id.* at 6-7 (May 1, 1992). Western's draft EIS is due out in early 1994, with the final EIS and Record of Decision due out by early 1995. *Id.* at 1 (July 8, 1993).

91. EDF, *supra* note 5, at 1.

92. *Id.*

93. Bishop, *supra* note 50, at 12.

94. *Power Cuts at Glen Canyon Dam Hits as Burec Tests Water-Flow Impacts*, ELECTRIC UTILITY WEEK, Aug. 12, 1991, at 17.

95. EDF, *supra* note 5, at 8; Bishop, *supra* note 50, at 12.

96. The draft EIS recommends a modified low fluctuating flow (MLFF) as the preferred alternative for operations at Glen Canyon Dam. This alternative is essentially identical to the interim flow criteria presently being used except for the addition of habitat maintenance flows, endangered fish research, and other elements common to all the alternatives that were added to provide additional resource protection. SUMMARY DRAFT EIS, *supra* note 80, at 21. These common elements include an adaptive management program, monitoring, and protection of cultural resources, flood frequency reduction measures, beach/habitat building flows, introduction of a new population of humpback chub, further study of selective withdrawal (water intake into the powerplant), and the continuation of emergency exception criteria. *Id.* at 8-13. The draft EIS also indicates that the effect of restrictions imposed on dam operations by any of the alternatives likely to be chosen in the final EIS will be a reduction in the flexibility of power operations and an increase in power marketing costs and rates.

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After all the studies, administrative orders, and agreements regarding the operation of Glen Canyon Dam, questions still remained: What had been accomplished in the way of long-term protection for the Grand Canyon? More fundamentally, should preservation of the Grand Canyon be the driving force behind all decision-making related to operations at the dam? The BOR still had no overall goal for operating the dam, other than meeting water delivery requirements, and thus, Western was able to dictate daily releases. In response to growing concern, Congress ultimately established new guidelines for operations at Glen Canyon Dam which were intended to make protection of the Grand Canyon a priority.

IV. THE GRAND CANYON PROTECTION ACT

A. *Overview of Legislative History*

The GCPA was the product of a long, drawn-out process. Arizona Senator John McCain's efforts were instrumental in the Act being signed into law on October 30, 1992. Senator McCain first introduced the GCPA in 1990. It was immediately recognized that operations at Glen Canyon Dam affected a number of diverse interests, and any legislation modifying its operation would be controversial. However, there was substantial agreement that protection of the Grand Canyon was paramount.[97] Politics and gridlock prevented the GCPA from passing when it was first introduced. The GCPA was either tied to other, more controversial pieces of legislation (an omnibus reclamation package), or "improperly" attached to an appropriations bill and thus defeated on procedural grounds.[98] Even in its final form, the GCPA was tied to an omnibus water bill which was passed in the waning hours of the 102d Congress and signed by President Bush one day before it would have died.[99]

The stated purpose of the GCPA is protection of the Grand Canyon and other resources downstream of Glen Canyon Dam.[100] These resources include aquatic and riparian ecosystems, recreation, and numerous cultural sites.[101] The fact that the Secretary of the Interior had already taken steps in this direction did not diminish the need for the GCPA, but actually

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Quantifying the increases, the BOR estimates that those households being served by a small utility will see an increase in electricity costs of anywhere from $6 to $40 per year (0.9% to 6.4% increase) if the MLFF is ultimately implemented. *Id.* at 57.

97. 137 CONG. REC. S18,743 (daily ed. Nov. 27, 1991) (statements of Sen. McCain).

98. *Id.*; *see also* 137 CONG. REC. S12,942-50 (daily ed. Sept. 13, 1991) (statements of Sen. McCain).

99. Hoye, *supra* note 4. The bill, entitled the Reclamation Projects Authorization and Adjustment Act of 1992, Pub. L. No. 102-575, 106 Stat. 4600 (1992), contained 30 pieces of legislation affecting Western states. *Id.*

100. GCPA § 1802(a).

101. *See* SUMMARY DRAFT EIS, *supra* note 80, at 6.

enhanced it. As Senator McCain stated:

> Enactment of the Grand Canyon Protection Act . . . is critical because it will provide vital guidance and legal support to the Secretary in his efforts. Congress has an obligation to permanently and clearly codify our standards in statute and leave no doubt now and in the future, about our national responsibility to protect the Grand Canyon.[102]

B. *Provisions of the GCPA*

Overall, the legislative goals of the GCPA are to (1) ensure that operations at Glen Canyon Dam stop damaging downstream resources in both the Glen Canyon National Recreation Area and Grand Canyon National Park, (2) ratify Secretary Lujan's order implementing interim flows while the EIS is being completed, (3) provide all members of the public who use the Colorado River in both the Recreation Area and the National Park with an opportunity to be part of the decision-making process, (4) require the DOI to develop and implement a long-term monitoring program to continually acquire information on the impacts of dam operations, and (5) ensure that the GCPA does not affect the institutional arrangements and laws in place for apportioning the waters of the Colorado River.[103]

The first legislative goal is embodied in section 1802 of the GCPA. This section requires protection of all values for which Grand Canyon National Park and Glen Canyon National Recreation Area were established, "including, but not limited to natural and cultural resources and visitor use."[104] Section 1802 also fulfills the fifth goal by specifying that the Secretary of the Interior shall carry out its directive in compliance with the law of the river.[105]

Section 1803 of the GCPA ratifies interim operations (until EIS completion), and thus implements the second legislative goal. It is one of four major provisions in the GCPA requiring specific actions of the Secretary, although most have already been completed.[106] The section continues the interim operations, including the exception criteria agreed upon between the BOR and Western.[107] Additionally, in order to comply

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102. 137 CONG. REC. S12,942 (daily ed. Sept. 13, 1991).

103. 138 CONG. REC. S17,831 (daily ed. Oct. 8, 1992).

104. GCPA § 1802(a).

105. GCPA § 1802(b).

106. *See also* GCPA § 1804 (requiring completion of EIS); GCPA § 1805 (requiring implementation of a long-term monitoring program); and GCPA § 1809 (requiring identification of replacement power).

107. GCPA § 1803(a). Additional bases for deviation from the interim operations are given in

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with the third goal, public participation in decision-making, the Secretary is to consult with various groups concerning interim operations, including (1) all appropriate agencies of the DOI; (2) the Secretary of Energy; (3) the governors of the Compact states; (4) Indian tribes; and (5) the general public, including representatives from academic and scientific communities, environmental organizations, the recreation industry, and contractors for the purchase of federal power.[108]

The EIS is the key to determining long-term operations, and section 1804—the second action-forcing provision—requires completion of the EIS by November 1994.[109] At that time, the Comptroller General will perform an audit and report to the Secretary, who will then adopt long-term operating criteria that will protect the resources listed in section 1802.[110] The Secretary is to prepare the new plan in consultation with the governors of the Compact states and the general public as defined in section 1803.[111]

The Secretary's responsibilities do not end with the adoption of long-term criteria. The fourth legislative goal, long-term monitoring, is addressed by section 1805, and provides for a program to determine the effect of the new operating criteria, including all necessary research and studies.[112] The monitoring program will be conducted in consultation with the Secretary of Energy, the governors of the Compact states, Indian tribes and the general public as defined under section 1803.[113]

The final provision requiring the Secretary to take affirmative steps is section 1809, which concerns replacement power. This section states that the Secretary of Energy, in consultation with the Secretary of Interior, the Compact states, representatives of Colorado River Storage Project power customers, and environmental organizations, "shall identify economically and technically feasible methods of replacing any power generation that is lost through adoption of long-term operational criteria for Glen Canyon Dam."[114] The language specifically mentions Hoover Dam as a possible source of replacement energy. In doing so, the GCPA contemplates that additions to the power transmission system in the West may be required.[115]

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section 1803(c).

108. GCPA § 1803(b).

109. GCPA § 1804(a). A draft EIS was released on January 7, 1994. *See supra* note 96 and accompanying text. The final EIS is due in October 1994, and a Record of Decision is scheduled to be released two months later. *Key Dates in the GCDEIS Process*, COLO. RIVER STUDIES OFFICE NEWSLETTER (Bureau of Reclamation, Salt Lake City, Utah), Fall 1993, at 6-7.

110. GCPA §§ 1804(b)-(c).

111. GCPA § 1804(c)(3).

112. GCPA §§ 1805(a)-(b).

113. GCPA § 1805(c).

114. GCPA § 1809.

115. GCPA § 1809.

A final issue results from the significant costs of the comprehensive activities that are to take place under the GCPA. Section 1807 grants the Secretary the authority to use funds received from the sale of electric power to prepare the EIS and to conduct the long-term monitoring program. These costs are "nonreimbursable" and will be added to the outstanding amount due under the CRSPA, meaning federal taxpayers will ultimately pay the costs involved.[116]

The GCPA is a congressional attempt to protect the natural and cultural environment downstream of Glen Canyon by defining the priorities under which DOI must operate the dam. The law of the river is still paramount in dictating releases, but now the protection of downstream resources takes priority over all other values. In fact, the legislative history indicates that the GCPA specifically rejects the notion that power generation has any priority over protection of downstream environmental, recreational, or cultural values.[117] This reordering of priorities, recognizing traditionally overlooked values, is by itself enough to make the GCPA a significant piece of legislation. What remains to be seen is whether the GCPA is a model to be used in settling other controversies concerning the use of natural resources in this country.

V. Strengths and Weaknesses of the GCPA

This Section evaluates the strengths and weaknesses of the GCPA by analyzing how the legislation deals with certain questions common to natural resource issues. First, does the Act establish an overall goal and set of priorities that can be used to guide activities that are undertaken pursuant to its provisions? Second, are scientific data used, as appropriate, to direct the planning? Third, is the decision-making process open to all parties who are affected by the issue at hand? Finally, does the legislation promote overall efficiency in the use of natural resources? As a means of comparison, the analysis will use the Pacific Northwest Electric Power Planning and Conservation Act (Northwest Power Act)[118] as an example of natural resource reform legislation that addresses the above questions.

The Northwest Power Act was signed into law on December 5, 1980 for the purpose of developing, in tandem, a region-wide energy plan and a comprehensive program to protect and enhance fish and wildlife resources.[119] The Northwest Power Act is similar to the GCPA in that it is

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116. GCPA § 1807.

117. 138 Cong. Rec. S17,832 (daily ed. Oct. 8, 1992) (questions and statements by Sen. McCain & Sen. Bill Bradley).

118. 16 U.S.C. § 839 (1988 & Supp. IV 1992).

119. Michael C. Blumm & Brad L. Johnson, *Promising A Process for Parity: The Pacific Northwest Electric Power Planning and Conservation Act and Anadromous Fish Protection*, 11

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reform legislation, enacted in part to arrest the deterioration of fish runs in the Upper Columbia River Basin. [120] Also, similar to the situation at Glen Canyon Dam, a diverse number of interest groups use the Columbia River and therefore are very concerned with any changes in the status quo. These interest groups include utilities, recreationists, commercial fishing interests, and Native Americans.[121] Due to similarity with the issues involved at Glen Canyon, the Northwest Power Act serves as a standard for reform-type legislation. Although it is still too early to determine the overall success of the Northwest Power Act,[122] it has had a significant effect on reordering priorities in the Northwest[123] and therefore appears to be an appropriate standard to follow.

A. *Goal Setting & Reordering of Priorities*

Legislation affecting the use of natural resources should, and usually does, specify an overall goal or objective.[124] This provides a reference point by which all activities under a program can be measured. Even more important than a broad objective is a strong statement as to what values should take precedence when competing uses come into conflict.

The Northwest Power Act lists a number of goals in its mission statement. These goals include assuring an efficient, economical power supply while encouraging conservation, protection, and enhancement of the fish and wildlife resource of the Columbia River and its tributaries.[125] Most significant is a provision that elevates anadromous fish to the status of a co-equal partner with energy production.[126] Although the Northwest Power Act does not specifically establish a hierarchy of priorities, it gives the Northwest Power Planning Council (Council) a defined mission and a set of equal obligations to which it must adhere.[127]

ENVTL. L. 497, 499 (1981).

120. *Id.* at 501.

121. *See generally id.* at 549-55.

122. Salmon runs are far from fully recovered. *See* Paul Koberstein, *The Decline and Fall of Salmon*, HIGH COUNTRY NEWS, Nov. 15, 1993, at 1.

123. CHARLES F. WILKINSON, CROSSING THE NEXT MERIDIAN: LAND, WATER, AND THE FUTURE OF THE WEST 210-16 (1992) (setting out changes in operation of the Columbia River dams made pursuant to the Act that benefit salmon at the expense of hydropower production.)

124. For example, the Clean Water Act set out the goal of fishable and swimmable waters. *See* 33 U.S.C. § 1251 (1988 & Supp. IV 1992).

125. 16 U.S.C. § 839.

126. 16 U.S.C. 839b(h)(11)(A)(i). *See also* WILKINSON, *supra* note 123, at 210.

127. The Council was created under the Northwest Power Act and charged with managing the hydropower resource in the Pacific Northwest. Specifically, its responsibilities include: (1) developing a program to help fish and wildlife, in particular salmon and steelhead runs affected by hydroelectric dams in the Columbia River Basin; (2) preparing a plan to meet energy demands of the Pacific Northwest; and (3) encouraging broad public participation in developing both the fish & wildlife program and the power plan. John M. Volkman & Kai N. Lee, *Within the Hundredth Meridian:*

The GCPA focuses on a more specific problem than the Northwest Power Act, yet it defines both a goal and set of priorities which the BOR must use in managing operations at Glen Canyon Dam. The GCPA's goal is included in the mandate to operate the dam so as to not only protect downstream resources, but also "improve the values for which Grand Canyon National Park and Glen Canyon National Recreation Area were established."[128] This directive is subject only to the requirements of the law of the river.[129] The legislative history emphasizes that all other values, including power generation, are subservient to the goal of protecting the natural and cultural downstream resources.[130] The main strength of the GCPA legislation is that it indeed sets these goals and priorities.

B. *Use of Scientific Data*

When evaluating the effects of development on natural resources, one must consider a large number of variables. Ecosystem science is especially important because the interdependence of each element in the system requires an interdisciplinary approach to any type of cause and effect analysis.[131] A lesson to be learned from our past use of natural resources[132] is that single-minded management and planning, implemented without the benefit of adequate scientific inquiry, will most likely cause more harm than good. This is the case with operations at Glen Canyon Dam, where wholesale deference to power generation created a number of imbalances in the ecosystem that now need to be corrected if the many values of the Grand Canyon are to be preserved. This reactive approach, which results in part from a lack of scientific investigation, is inefficient. Such an approach can be avoided by incorporating scientific analysis into resource decisions.[133]

Under the Northwest Power Act—the result of years of destruction of salmon habitat in the Columbia River watershed—the Council has responsibility for conducting the scientific investigations necessary to

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Western States and Their River Basins in a Time of Transition, 59 U. COLO. L. REV. 551, 562-63 (1988).

128. GCPA § 1802(a); *see also supra* note 6.

129. *See supra* note 11.

130. See 138 CONG. REC. S17,832 (daily ed. Oct. 8, 1992) where Sen. Bill Bradley, D-N.J., rejects the notion that in operation of Glen Canyon Dam, power generation has complete priority over all other uses and values in operating Glen Canyon Dam.

131. *See* GCES COMMITTEE, *supra* note 8, at 34-35.

132. Referred to by some as the "great barbecue." *See* STEWART UDALL, THE QUIET CRISIS AND THE NEXT GENERATION 54-68, 84 (1988) (quoting Vernon Parrington).

133. The National Environmental Policy Act (NEPA), 42 U.S.C. §§ 4321-4370d (1988 & Supp. IV 1992) recognized the value of scientific inquiry and incorporated it into the EIS process. A large number of the natural resource issues currently being dealt with, however, are due to activities undertaken prior to the implementation of NEPA.

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create a plan under which energy production, fish, and wildlife can coexist.[134] For example, the Council conducted an extensive study of energy conservation measures while carrying out a comprehensive review of the biological and economic effects of increasing stream flows for fish.[135] As a result of the research, the fish and wildlife program now requires water to be spilled over dams or flushed through reservoirs for the benefit of anadromous fish. This activity causes the loss of hundreds of megawatts of power each year.[136] The loss is partially offset, however, by the conservation measures which the Act mandates.

The GCPA, even more specifically than the Northwest Power Act, also provides for scientific study of resources. In fact, the entire decision-making process is centered around the EIS and the long-term monitoring program.[137] Such a direct integration of science and management recognizes that the environment is a dynamic system and allows for continual "fine-tuning" of the resource plan. A mandate for integration, however, is not enough.

Scientists have a duty to present their data in a manner that will be of practical use to resource managers, in this case the BOR. Additionally, these managers have a duty to try to understand the science, and consequently to understand the potential impacts of the decisions they implement.[138] Good policy choices must take scientific realities into account. In the GCPA, Congress has provided for the creation of the scientific database necessary to allow those good choices to be made.

Just as important as the legislation itself is the process to implement its provisions. The BOR has chosen to use "adaptive management," a concept based on the "need for operational flexibility to respond to future monitoring and research findings and variable biological and physical conditions."[139] In addition to being adaptive, incorporating a comprehensive environmental database into daily decisions concerning the operation of a developed resource seems to reflect what is meant by the term "ecosystem management."[140] The GCPA provides the basis for such a

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134. Volkman & Lee, *supra* note 127, at 562-65.

135. 1 NORTHWEST POWER PLANNING COUNCIL, 1991 NORTHWEST CONSERVATION AND ELECTRIC POWER PLAN 9, 14 (1991) [hereinafter POWER PLAN].

136. *Id.* at 8.

137. *See* GCPA §§ 1804-05.

138. *See* Luna B. Leopold, *Closing Remarks*, *in* GCES COMMITTEE, *supra* note 8, at 256.

139. SUMMARY DRAFT EIS, *supra* note 80, at 8.

140. The movement toward adaptive management and the related, but larger, concept of ecosystem management has been enhanced by the creation of the National Biological Survey (NBS) within the Department of the Interior. The NBS was created in September 1993 by order of the Secretary of the Interior and Congress made an appropriation for the new agency in the fiscal year 1994 budget. United States Department of Interior, Secretarial Order No. 3173, "Establishment of the National Biological Survey" (Sept. 29, 1993); 1994 Appropriations Act for the Department of the

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management strategy, and the BOR appears to be striving to implement that mandate.

C. *Public Participation in Decision-Making*

The controversy generated by Glen Canyon Dam illustrates the competing demands placed on the Colorado River. To satisfy these multiple demands, the views of all interested parties must be heard. Only by integrating these views into the decision-making process can the potential impacts be thoroughly evaluated and addressed by the final plan. Legislation encouraging the integration of interested parties should lead to increased satisfaction with the end result, allowing for more resources to be dedicated to problem-solving activity and fewer to litigation.[141]

One of the strengths of the Northwest Power Act is its promotion of public participation. To start with, it created the Northwest Power Planning Council. As alluded to earlier, the Council is a new kind of administrative entity, a regional consortium given the herculean task of dealing with the complex problems created by energy production in the Pacific Northwest.[142] Additionally, the Council is directed to encourage public involvement in both the power plan and the fish and wildlife program.[143] The broad public participation provisions of the Northwest Power Act were a response to the limited involvement previously available in decisions regarding the region's power system.[144] The public is now considered a major player in developing and implementing the Council's plans.[145]

The GCPA also contains specific provisions requiring broad participation in the creation of an operations plan for Glen Canyon Dam. The Act calls for consultation with the "general public," which includes (1) representatives of academic and scientific communities; (2) environmental

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Interior and Related Agencies, Pub. L. No. 103-138, 107 Stat. 1379, 1384 (1993). The NBS has responsibility for acquiring and adding to the scientific data on biology. The data will expedite future decision-making on the use of natural resources by optimizing the analysis of impacts from such decisions.

141. This process of inclusion is starting to be used in other areas as a basis for changing previously single-minded policies. For example, in developing proposals for rangeland reform, Secretary of the Interior Bruce Babbitt is considering giving local residents more say over grazing rules. One possibility is the creation of Resource Advisory Councils, made up of ranchers, environmental groups, hunters, and biologists, who would make key decisions regarding use of the public range. *See* 59 Fed. Reg. 14317-321, 14328 (1994) (describing Resource Advisory Councils in proposed grazing regulations).

142. WILKINSON, *supra* note 123, at 210.

143. 16 U.S.C. §§ 839(3)(A) & (B), 839b(g). *See also* Blumm & Johnson, *supra* note 119, at 549-53.

144. Volkman & Lee, *supra* note 127, at 563-64.

145. *See* POWER PLAN, *supra* note 135, at 5.

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organizations; (3) the recreation industry; and (4) contractors for purchase of federal power produced at Glen Canyon Dam.[146] In addition, sections 1803 and 1805, which address interim operations and long-term monitoring, call for consultation with Indian tribes.[147]

The inclusion of Native Americans in the decision-making process is another significant aspect of the GCPA. Historically, most tribes have not been empowered to influence natural resource policy. The Glen Canyon EIS process is proving to be remarkably different in this regard.[148] Six Native American groups are participating in the GCES and the EIS to determine (1) the effects that the dam has had on traditional cultural properties and lifestyles, and (2) alternatives that exist to better protect traditional use and long-term Native American concerns.[149] Hopefully, such recognition of Native American heritage and cultural resources reflects a growing awareness of the need for preservation of this integral part of the history of the West and the United States as a whole.

One possible criticism of the GCPA is that it did not create any new institutional processes that will ensure public participation. The Northwest Power Act created a new entity charged with guaranteeing accessibility.[150] The GCPA, however, left this responsibility to the BOR and, with respect to replacement power, to Western.[151] Therefore, these agencies must effectively reform themselves by relinquishing some of their traditional control over dam operations. Because the GCPA provides for participation in processes beyond the EIS—e.g., interim operations and long-term monitoring—the agencies must accommodate numerous interested parties and incorporate the needs of these groups in its policy choices. This much Congress has required.

The BOR has responded to this mandate through its Adaptive Management Program.[152] The program includes an Adaptive Management Work Group comprised of representatives from each of the EIS cooperating agencies, Basin states, federal power purchasers, recreationists, and environmental organizations; a technical work group comprised of technical representatives from Federal, State, and Tribal governments; and an independent scientific review panel comprised of scientific experts

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146. GCPA §§ 1803(b), 1804(c)(3), 1805(c).

147. GCPA §§ 1803(b)(4), 1805(c)(3).

148. Jean Ann Mercer, *Native American Perspectives on the Grand Canyon: The Ethnohistorical Component of GCES*, COLORADO RIVER STUDIES OFFICE NEWSLETTER (Bureau of Reclamation, Salt Lake City, Utah), Spring/Summer 1992, at 1 [hereinafter *Native American Perspectives*]. The author of the cited article is a member of the Hopi Tribe.

149. *Id.* The six groups are the Havasupai, Hopi, Hualapai, Navajo, Southern Paiute, and Zuni. *Id.*

150. *See supra* notes 142-45 and accompanying text.

151. GCPA §§ 1804(c)(3), 1805(c), & 1809.

152. *See supra* notes 139-40 and accompanying text.

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not otherwise participating in the long-term monitoring and research studies.[153] Although the program will not be completely defined until the final EIS is released, the BOR is finally beginning to accept its role as a facilitator in the use of natural resources as opposed to a sole proprietor of dams and reservoirs.

With respect to power production, another model for diverse participation is also being developed. A "Colorado Plateau Collaborative Decision Process" is in progress, the brainchild of Jim Ruch, Executive Vice President of the Grand Canyon Trust, and Ken Maxey, Assistant Administrator of Western.[154] Although the two entities have been at odds in the past, the goal of this particular effort is to build a process for open discussion before the next crisis arises.[155] Originally, the collaborative process was designed to develop recommendations for the Secretary of Energy in response to section 1809 of the GCPA, which requires identification of "economically and technically feasible methods of replacing any power generation that is lost" from Glen Canyon Dam.[156] The focus of the collaborative process changed, however, when some of the local power interests refused to participate in any further meetings.[157] Western, the Grand Canyon Trust, and other stakeholders in Glen Canyon Dam power are now looking at a different concept for public involvement in the search for replacement power. One idea is the creation of expert teams, available on an as-requested basis, to consult with communities affected by increases in energy costs due to the provisions of the GCPA.[158] The goal of such consultations would depend on the needs of each locality, but would most likely entail implementation of some type of demand-side management program. Whatever form the collaborative process takes, the BOR and Western may use it as a liaison for fulfilling the consultation mandates found in the GCPA.

D. *Promoting Efficient Uses of Natural Resources*

The history of resource use in the United States is a chronicle of

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153. SUMMARY DRAFT EIS, *supra* note 80, at 8-9.

154. Colorado Plateau Collaborative Decision Process, Draft Concept Paper 1 (Jan. 18, 1993) (unpublished manuscript, on file with author) [hereinafter Collaborative Process]. The Grand Canyon Trust is a non-profit regional organization that advocates responsible conservation of the natural and cultural resources of the Colorado Plateau. *Id.* at 2. The group was indispensable in the conception, development, and passage of the Grand Canyon Protection Act. 138 CONG. REC. S17,666-67 (daily ed. Oct. 8, 1992) (statement of Sen. McCain).

155. Collaborative Process, *supra* note 154, at 1.

156. GCPA § 1809.

157. Telephone Interview with Roger Clark, Vice President for Conservation, Grand Canyon Trust (Aug. 30, 1993).

158. *Id.*

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waste.[159] Fortunately, however, sustainable development is a guiding principle for the 1990s and beyond, though implementation of the principle is far in the future.[160] Sustainability is a dynamic concept and incorporates many different principles, but at its core is the idea that wasting or destroying a natural resource is not conducive to maintaining an acceptable quality of life for future generations. Sustainability therefore will require real efficiency gains in the use of natural resources.[161] In this country that means substantial changes. Sustainability does not exclude development, but modifies how development should occur. Efficiency as the core idea should be promoted through both legislation and administrative policy. This can be done by requiring conservation techniques and by confronting and eliminating externalities.[162]

The Northwest Power Act serves as a model for legislation that promotes efficiency. In developing a regional energy plan, "cost effective" resources are to be considered first and foremost.[163] Specifically, the Council is directed to give first priority to conservation, second priority to renewable resources, third priority to generating resources using waste heat or high efficiency resources, and fourth priority to "all other resources," e.g., coal and nuclear power plants.[164] During the last ten years, conservation has added, on average, 300 MW of capacity to the energy supply of the Bonneville Power Administration (BPA), an amount equal to almost 25% of the output of Glen Canyon Dam generators.[165] The present goal of the Council is to secure conservation of least 1,500 MW in homes, farms, businesses, industries, and improvements in its own power system,

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159. *See* UDALL, *supra* note 132, at 54-68.

160. This concept was adopted as part of the Rio Declaration on Environment and Development, U.N. Doc. A/CONF.151/5/Rev.1 (1992), *reprinted in* 31 I.L.M. 874. For a discussion on the concept of "sustainable development" as contemplated in the United Nations Conference on Environment and Development (UNCED), see Mukul Sanwal, *Sustainable Development, the Rio Declaration and Multilateral Cooperation*, 4 COLO. J. INT'L ENVTL. L. & POL'Y 45 (1993).

161. Although sustainability involves cultural, as well as natural and economic factors, resource use is at the core of the issue as it touches all the named factors. Development processes must therefore be addressed and a program of sustainability ought to include the knowledge, technology, and planning needed to increase the productivity of the land. *See* WILKINSON, *supra* note 123, at 298-300.

162. The term "externalities" refers to the costs (whether they be economic, social, or environmental) imposed on others as a result of actions taken by a particular person or group. Due to a failure in the marketplace, the person or group responsible is not held accountable and therefore has no incentive to curtail such actions. Mark Sagoff, *Economic Theory and Environmental Law*, 79 MICH. L. REV. 1393, 1404-05 n.51 (1981).

163. "Cost-effectiveness" requires a determination that a resource will be reliable and available within the time needed and have the lowest economic and environmental cost compared to other possible resources. 16 U.S.C. § 839a(4)(A) (1988 & Supp. IV 1992).

164. 16 U.S.C. § 839(e)(1); Blumm & Johnson, *supra* note 119, at 512-13.

165. HYDROPOWER 2002, *supra* note 31, at 17. Bonneville is Western's larger counterpart in the Columbia River Basin, marketing federal power throughout the Pacific Northwest. Volkman & Lee, *supra* note 127, at 559-60.

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by the year 2000.[166] The Council's 1991 power plan also addresses the other energy resources that are prioritized by statute, with an overall goal of acquiring the least-costly, most environmentally responsible resources first.[167]

The Northwest Power Act also promotes efficiency by providing that BPA customers will pay all the necessary costs (including those related to fish and wildlife conservation) to produce, transmit, and conserve resources to meet the region's power requirements.[168] Funding for the Northwest Power Planning Council comes from BPA's receipts and, therefore, the costs of protecting and restoring the Northwest salmon fishery are treated as a cost of doing business—internalized to the consumers of hydroelectric power.[169] Because BPA's customers are not insulated from the cost of the program, an incentive is created to conserve electricity.

Unfortunately, the GCPA does not go as far as the Northwest Power Act in promoting efficiency. First, section 1807[170] provides that the cost of EIS preparation, scientific research, and long-term monitoring are nonreimbursable, and will therefore be borne by federal taxpayers rather than the project beneficiaries, i.e., Western's customers who benefit from obtaining low-cost electricity.[171] This provision is controversial because it violates federal policy that requires project beneficiaries to pay environmental study costs.[172] The Grand Canyon Trust has promised to reexamine the issue to amend the legislation so that project beneficiaries bear the cost of environmental protection.[173] The controversy stems from the view that Western's rates already encourage energy consumption rather than conservation and that section 1807 is just another in a long line of subsidies.[174]

A second failing of the Act exists in the replacement power provision of section 1809. This section calls for the Secretary of Energy, in consultation with others, to identify economically and technically feasible methods of replacing lost power generation at Glen Canyon Dam. However, no priority is given to demand-side management, i.e., controlling the level of electricity demand, as a means to replace lost capacity. In fact, the only option mentioned is an investigation into the feasibility of

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166. POWER PLAN, *supra* note 135, at 2.

167. *See id.* at 31-47.

168. 16 U.S.C. § 839(4).

169. WILKINSON, *supra* note 123, at 210.

170. *See supra* note 116 and accompanying text.

171. 138 CONG. REC. S17,666 (daily ed. Oct. 8, 1992) (statement of Sen. McCain).

172. *Id.*

173. *Congress Passes Grand Canyon Protection Act*, COLORADO PLATEAU ADVOCATE (Grand Canyon Trust, Flagstaff, Ariz.), Fall 1992, at 4.

174. *Id.*

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modifying the transmission system in the West so that Hoover Dam may be used to supply lost generating capacity.[175] A mandate for a review of conservation technologies would certainly not have been without precedent considering the provisions of the Northwest Power Act a decade earlier.

Demand-side management programs[176] are being implemented throughout the United States with about 50% of the nation's largest utilities now engaging in such activities.[177] Integrating demand-side alternatives with traditional supply-side strategies enables utilities to offer energy services that simultaneously maximize customer service while allowing for efficient and profitable utility operations.[178] Demand-side management measures are of three types: (1) energy conservation activities, (2) load management, and (3) fuel switching.[179] Energy conservation measures can provide peak resources through the use of more efficient equipment typically used during the peak period, e.g., air conditioners.[180] Load management can also provide peak capacity by shifting demand from one time period to another.[181] This technique can flatten out the energy demand (load) curve, thus reducing the need for peak hydropower and allowing more demand to be met by baseload coal-fired generators. Fuel switching, the last of the three demand-side management measures listed, can directly reduce the need for generated electricity through the substitution of other energy resources such as natural gas or solar energy.[182]

Only time will tell, but there is a distinct possibility that demand-side

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175. GCPA § 1809.

176. Demand-side management programs are those that enable a utility to reliably affect the level or pattern of demand for energy services. Bruce Driver & Chris Shaver, Environmental Defense Fund, Status Report on Alternative Energy Strategy 2 (April 5, 1993) (unpublished manuscript, on file with author). Such programs are but one facet of an alternative energy strategy that endeavors to move away from traditional supply-side planning which only takes into account coal and nuclear resources. Another aspect of alternative energy strategy is an evaluation of renewable resources, which include geothermal, wind, solar, and biomass possibilities. Because of concerns over reliability, these resources, at present, are limited in their ability to be used as baseload capacity. Renewable resources may, however, prove to be useful in meeting peak power demands and thus alleviate the pressure to use hydropower facilities solely as peak power producers. The key to this transition is a showing that overall costs, including externalities, of using such renewable resources to meet peak demand are less than those costs associated with the use of hydropower units. *See generally id.*

177. WESTERN AREA POWER ADMINISTRATION, THE ENERGY SERVICES APPROACH TO UTILITY PLANNING: A GUIDE TO POLICYMAKERS (Jan. 1989) [hereinafter GUIDE FOR POLICYMAKERS]. Utilities in New England, New York, and the Pacific Northwest plan to meet at least 20% of their future energy demand through demand-side management programs. Additionally, California expects to use efficiency standards, government programs, and utility demand-side management programs to meet 75% of planned electricity resource additions during the 1990s. Driver & Shaver, *supra* note 176, at 8.

178. GUIDE FOR POLICYMAKERS, *supra* note 177, at 3.

179. Driver & Shaver, *supra* note 176, at 3.

180. *Id.*

181. *Id.*

182. *Id.*

management will end up being a focal point of section 1809 review, despite the lack of a firm mandate. If some aspect of the collaborative decision process is successfully implemented, conservation techniques may play a substantial role in providing additional capacity in the Southwest.[183]

Additionally, Western is attempting to increase capacity through improvements in customer efficiency. The agency is establishing an Energy Planning and Management Program with two primary objectives.[184] The first objective is to "provide greater stability in planning for future resources through extension of a major portion of existing hydropower commitments."[185] The second objective is to "encourage customers to use electrical energy efficiently; and, promote full and open consideration . . . of [demand-side management] alternatives and supply-side alternatives including renewable resources."[186] Because of the significant environmental and economic issues involved, Western is preparing an EIS for the program, a draft of which was made available in March 1994.[187] The preferred alternative for the program would extend commitments of federal energy resources by anywhere from ten to thirty-five years, but would also require integrated resource planning by all customers.[188] The program was validated by the Energy Policy Act of 1992,[189] which requires a number of items already in Western's program, including integrated resource planning by the agency's customers.[190] The Energy Planning and Management Program not only stands on its own, but is touted as an integral part of the Salt Lake City Area/Integrated Projects Electric Power Marketing EIS.[191]

Finally, as would be expected, advances in technology may further power system efficiency and assist in minimizing the impact of changed

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183. *See supra* notes 154-58 and accompanying text.

184. WESTERN AREA POWER ADMINISTRATION, PROPOSED ENERGY PLANNING MANAGEMENT PROGRAM 3 (May 1991) [hereinafter PROPOSED ENERGY PLANNING PROGRAM]. The program is the latest element in a process to influence energy use among Western's customers. In the early 1980's, Western implemented a contract article requiring long-term firm power customers to develop a conservation and renewable energy program. Legislation reinforcing the program was enacted in Title II of the Hoover Power Plant Act of 1984, Pub. L. No. 98-381, 98 Stat. 1333, 1340-42 (1984) (codified as amended in scattered sections of 43 U.S.C.).

185. PROPOSED ENERGY PLANNING PROGRAM, *supra* note 184, at 3.

186. *Id.*

187. WESTERN AREA POWER ADMINISTRATION, ENERGY PLANNING AND MANAGEMENT UPDATE (Mar. 1994).

188. *Id.* "Integrated Resource Planning is a process where supply and demand side resource options are evaluated together to determine how to serve the electricity needs of consumers at the lowest reasonable cost." PROPOSED ENERGY PLANNING PROGRAM, *supra* note 184, at 8.

189. Energy Policy Act, Pub. L. No. 102-486, § 114, 106 Stat. 2776 (1992).

190. Id. § 114, *amended by* 42 U.S.C. § 7276 (Supp. 1993). *See also* WESTERN AREA POWER ADMINISTRATION, ENERGY PLANNING AND MANAGEMENT UPDATE (Nov. 1992).

191. *See supra* note 90.

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operations at Glen Canyon Dam. Western hopes to provide technical assistance and technology transfer services to utilities as part of its Conservation and Renewable Energy Program.[192] Apparently the agency has had some success, as Western and Siemens Energy and Automation Inc. of Germany recently unveiled new computer technology that can increase the capacity of high-voltage power lines by up to one-third.[193] The ultimate result could be more flexibility in reallocating power flows, thus reducing the need for more power plants by allowing electric power to be swapped among distant regions.[194]

Although the GCPA does not follow the model legislative criteria for promoting efficiency, its reprioritization of values may be enough to further such a goal. An express mandate for demand-side management consideration may have been preferred, but it may be enough just to provide for broad-based participation in the decision-making process for replacement power. The resulting policies implemented in the GCPA's wake will indicate whether the notion of efficiency in natural resource use is an accepted theory.

VI. CONCLUSION

The implications of the Grand Canyon Protection Act are two-fold. First and foremost is the preservation of the Grand Canyon, one of the crown jewels in the National Park System. Second is a continued movement toward efficiency in resource use and development. The overall goal is to restore an equilibrium between humans and nature. Too often, such restoration is attempted only after the balance has long been lost.

In preserving the Grand Canyon, it is important to realize that the ecosystem has been forever altered by the construction of Glen Canyon Dam. A "new" river was created by the dam, one with cold, clear water and a new capacity for biological productivity.[195] Not all of the changes have been bad,[196] and it is impossible for resource managers to try and recreate the pre-dam environment.[197] Doing so would seem to be a gross over-

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192. PROPOSED ENERGY PLANNING PROGRAM, *supra* note 184, at 10. *See also* 42 U.S.C.A. § 7276a (1988 & Supp. IV 1992).

193. Steve Hinchman, *Power: A New Electric Power Technology Could Help Grand Canyon, Salmon*, HIGH COUNTRY NEWS, Oct. 19, 1992, at 1.

194. *Id.*

195. CAROTHERS & BROWN, *supra* note 29, at 10-11.

196. One example of positive change is the creation of a highly prized trout fishery which would not have been possible before the dam was in place. CAROTHERS & BROWN, *supra* note 29, at 10-11.

197. One proposal that has been discussed, however, is the possibility of taking the heated effluent from nearby Navajo Generating Station, and discharging it into the Colorado River below Glen Canyon Dam to compensate for the cold water discharge which presently occurs. Presumably, this may assist the restoration of native fish species. Meeting with L.D. Shakespeare & Mike Outlaw, Salt River Project, Navajo Generating Station (Mar. 25, 1993).

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manipulation of the natural environment. The objective now in managing Glen Canyon Dam should be to "keep the manager's hand as unobtrusive as possible."[198] Obviously, the ability to do this and still protect the Grand Canyon ecosystem will be addressed by the EIS, the long-term monitoring process, and more importantly, the policy choices made after taking into account scientific data and the values of the interested parties. As stated by Secretary of the Interior Bruce Babbitt, "We must relentlessly search for a level and a method of human activity that is compatible with the ecosystem. In most cases, if we try hard enough, we can find that balance. It won't satisfy everybody, but it'll be vastly better than what's going on now."[199]

Future balance between humans and the natural environment depends somewhat on the principles of goal-setting, use of scientific data, public participation, and the promotion of efficiency in natural resource decision-making. Public participation may be the most important aspect, as this facet will most likely drive the choices made. Thus, a diversity of viewpoints is necessary so that decisions are not made in a vacuum. Indeed, the demands of local and national interest groups, both conservative and liberal, require future natural resource decision-making to be a consensus-building process, one that takes into account the human and community impacts of proposed actions.

Fortunately, aided by legislation and responding to the dynamics of the public process, the BOR and Western seem to be on the brink of truly reforming their traditional practices. Nothing shows this more than the press conference held by Dan Beard, Commissioner of the Bureau of Reclamation, to release the Glen Canyon Dam Draft EIS. The Commissioner stated:

> Many conflicting interests have come together and produced this plan to protect the magnificent Grand Canyon. In the old days, these documents were developed behind closed doors with water lawyers, engineers, and irrigation district representatives. Now we are throwing the doors wide open and including community leaders, Native Americans, the recreation industry, environmentalists, and many others.[200]

In conclusion, the Grand Canyon Protection Act illustrates, at least with respect to a national treasure, that the industrialized world can and

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198. *Where Do We Go From Here?*, GRAND CANYON RIVER GUIDES, Fall 1992, at 4 (on file with author).

199. Frances Wilkinson, *The Rolling Stone Interview with the Secretary of the Interior Bruce Babbitt: Is He Tough Enough to Save the Environment?* ROLLING STONE, July 8-22, 1993, at 52.

200. *Reclamation Releases Draft Glen Canyon Dam EIS Changes to Protect Grand Canyon*, DEP'T OF INTERIOR NEWS RELEASE, Jan. 6, 1994, at 1.

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will take a back seat to the natural environment. The long-term issue of overall sustainability of the earth's resources is still far from resolved, primarily because sustainability means different things to different people. The Grand Canyon Protection Act, however, is the result of an agreement by a majority of parties on what needs to be sustained. The legislation demonstrates the perception that protection of this resource could be accomplished in a manner that does not unduly infringe on existing expectations and dependence on the Glen Canyon Dam Power System.

Legislation such as the Northwest Power Act and the GCPA shows that both managing and affected parties can find common ground on at least a case by case basis. As we move into an era that will have to deal with sustainability on a global scale, the lesson learned at places like the Grand Canyon will serve as a model for future global solutions.

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