



## Executive Summary

The Bureau of Reclamation (Reclamation) proposes to operate Navajo Dam and Reservoir to meet Endangered Species Act (ESA)-related flow recommendations for the San Juan River, or a reasonable alternative<sup>1</sup> to those recommendations, in a manner which enables both current and future<sup>2</sup> water depletions to proceed in compliance with the ESA.

This change in reservoir operation would assist in conserving endangered fish in the San Juan River downstream from Farmington, New Mexico, and enabling water development to proceed in the San Juan River Basin (Basin) in compliance with applicable laws, compacts, court decrees, and American Indian (Indian) trust responsibilities. To accomplish this action, Reclamation would continue to operate Navajo Dam to meet the authorized project purposes while modifying reservoir release patterns to meet flow recommendations designed, in concert with other authorized recovery actions, to maintain or improve habitat for the razorback sucker and Colorado pikeminnow.

The Navajo Reservoir Operations Final Environmental Impact Statement (FEIS) describes and analyzes potential environmental effects resulting from the proposed operational changes to Navajo Dam and Reservoir. The FEIS has been prepared according to provisions of the National Environmental Policy Act of 1969 (NEPA) and other laws and mandates.

## Purpose of and Need for the Proposed Action

The purpose of modifying the operations of Navajo Dam and Reservoir is to provide sufficient releases of water at times, quantities, and durations believed to be necessary to conserve, in concert with other recovery actions, the two endangered fish species and their designated critical habitat, as recommended in the San Juan River Basin Recovery Implementation Program (SJRBRIP)<sup>3</sup> *Flow Recommendations for the San Juan River* (Flow Recommendations) (Holden, 1999), and subject to consultation with the Fish and

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<sup>1</sup> A reasonable alternative may be determined through discussion with the U.S. Fish and Wildlife Service and the San Juan River Basin Recovery Implementation Program.

<sup>2</sup> Future water depletions include those which have or will obtain appropriate environmental compliance but are not yet implemented.

<sup>3</sup> The SJRBRIP is a major cooperative effort among entities interested in the goals of endangered fish recovery and in proceeding with water development in the Basin. In addition to Reclamation, participants include the U.S. Fish and Wildlife Service, Bureau of Indian Affairs, Bureau of Land Management, Southern Ute Indian and Ute Mountain Ute Tribes, Navajo and Jicarilla Apache Nations, water development interests, and the States of Colorado and New Mexico. The SJRBRIP consists of three committees dealing with coordination, biology, and hydrology.

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Wildlife Service (Service). Reclamation would maintain the authorized purposes of the Navajo Unit (Navajo Dam and Reservoir), which include enabling future water development to proceed in the Basin in compliance with applicable laws, compacts, decrees, and Indian trust responsibilities.

The need for a plan to modify operations has resulted from previous ESA consultations with the Service on other Basin projects that affect flows in the San Juan River. Reclamation is required to comply with the ESA for discretionary actions which affect listed species; this could include operation of the facilities of the Colorado River Storage Project (CRSP), which include Navajo Dam. The operation of Navajo Dam is a key element of the SJRBRIP.

## The Navajo Unit

After completion of the Navajo Unit in 1962, criteria governing releases of water from the dam focused primarily on meeting irrigation needs and providing flood control. However, native<sup>4</sup> fish populations and their habitat have been adversely affected or modified in part by the construction and subsequent operation of Navajo Dam. Also, Lake Powell's inundation of approximately 30 miles of the lower San Juan River has had significant impact on native fish habitat, as well. Some of the other factors adversely affecting these native fish include the introduction of non-native<sup>5</sup> fish, the past removal of native fish to create a more desirable recreational fishery, construction of diversion structures, and instream channel modifications. Operating the dam under its historical operating criteria would continue the adverse flow effects. However, over the last decade, the criteria and associated pattern for releasing water from the dam were modified to accommodate endangered fish research and recovery efforts in the San Juan River due to ESA consultations.<sup>6</sup>

After requesting consultation under the ESA on the operation of Navajo Dam, Reclamation committed to operate the dam in concert with ongoing research to determine hydrologic conditions beneficial to endangered fish and to operate the dam in a manner most consistent with endangered fish recovery for the life of the dam.<sup>7</sup> The Service concurred with Reclamation's request that the consultation process be initiated and the overall consultation period for the operation of the dam be extended while 7 years of planned research on the needs of the two listed endangered fishes in the San Juan River were conducted.<sup>8</sup>

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<sup>4</sup> Fish that are indigenous to the Colorado River Basin, of which the San Juan River Basin is a component.

<sup>5</sup> Fish that evolved outside of the Colorado River Basin but were purposely or accidentally introduced to this Basin.

<sup>6</sup> Consultation under the ESA is required of Federal agencies for existing and new projects and programs to determine effects on endangered species.

<sup>7</sup> Memorandum to the Service, July 30, 1991.

<sup>8</sup> Memorandum to Reclamation, August 19, 1991.

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## San Juan River Basin Recovery Implementation Program

The SJRBRIP was initiated in 1992 with two goals:

- ❑ To conserve populations of Colorado pikeminnow and razorback sucker in the Basin, consistent with the recovery goals established under the ESA.
- ❑ To proceed with water development in the Basin in compliance with Federal and State laws, interstate compacts, court decrees, and Federal trust responsibilities to the Southern Ute Indian and Ute Mountain Ute Tribes and the Jicarilla Apache and Navajo Nations.

The SJRBRIP has identified factors limiting the recovery of endangered fish and is implementing actions to meet the physical and biological needs of the two endangered fish species. Ongoing and proposed activities recommended by the SJRBRIP include re-regulation of releases from Navajo Dam to better meet species needs through designated critical habitat, control of non-native fish, augmentation of endangered fish populations, and identification and removal of fish-passage barriers. These elements are designed to work together to help recover the endangered fish.

Under the direction of the SJRBRIP, Navajo Dam test releases were conducted and evaluated from 1992-1998. At the completion of the research period, the SJRBRIP completed the Flow Recommendations. The Flow Recommendations include suggested Navajo Dam operating rules for various hydrologic conditions and levels of water development in the Basin. Applying these rules would allow the Flow Recommendations to be met and water development to proceed consistent with the ESA and other applicable laws. Additional depletion in the Basin will increase above the level identified in the biological opinion for the Animas-La Plata Project (ALP Project) in southwest Colorado/northwest New Mexico.

The Flow Recommendations define conditions for mimicking a natural hydrograph in terms of magnitude, duration, and frequency of flows in the river downstream from Farmington. Such mimicry is designed to provide the river conditions believed to be required to develop and maintain favorable habitat for the endangered fish and to also provide the necessary hydrologic conditions for the various life stages of the endangered and other native fishes. For example, seasonal high spring flows create conditions for backwater formation while low flows help maintain backwaters which provide important nursery habitat. In addition, seasonal high flows clean cobble bars that are used for spawning (Holden, 1999). These are the recommendations that Reclamation is proposing to meet by modifying the operations of Navajo Dam.

The Flow Recommendations are based on the best information available as of 1998 and are subject to periodic review and modification through the SJRBRIP based on new information obtained by the program. It is possible that the Flow Recommendations will be modified in

the future based on new information, and that these modifications may further affect operation of Navajo Dam. Any re-operation outside of the release range of the alternative selected in this EIS process would be subject to further NEPA compliance, including public review and comment.

## Public Involvement Activities

Reclamation used several methods to obtain public input in developing the FEIS, including scoping meetings and dissemination of public information through project newsletters, news releases, paid advertisements, and a project Web site.

Reclamation announced its intent to prepare an EIS in a Notice of Intent (NOI) published in the *Federal Register* on October 1, 1999. A news release announcing the NOI was sent to approximately 300 parties, including Federal, Tribal, State, and local officials; agency representatives; conservation organizations; news media, and others.

The NOI also announced that a series of scoping meetings would be conducted in November 1999 to receive public input on issues to be addressed in the draft environmental impact statement (DEIS). The scoping meetings were held in November 1999 at Farmington and Albuquerque, New Mexico and Durango and Pagosa Springs, Colorado. In addition to the announcement contained in the *Federal Register*, each meeting was also advertised in local newspapers in advance of their scheduled dates.

In all, a total of approximately 100 people attended the Farmington, Durango, and Albuquerque meetings. No individuals (public or agency representatives) attended the Pagosa Springs meeting. Transcripts of the oral comments given at the meetings were made and are part of the public record for the Navajo Reservoir Operations EIS process. Interested or affected individuals, organizations, and agencies were also encouraged to submit written comments to Reclamation to be most effectively considered. Reclamation received eight letters during the comment period. The principal issues and concerns that were identified during public and internal scoping centered on: fish and wildlife resources, hydrology and water rights, water quality impacts, cultural resources, Indian Trust Assets, Environmental Justice, social and economic resources, and recreation resources.

On June 12, 2000, Reclamation held a public meeting to discuss agency plans to conduct a 5-day Summer Low Flow Test of 250 cfs in the San Juan River. The test, to have been conducted from Navajo Dam to the confluence of the Animas River, was to analyze potential low flow impacts to the river, recreation, and diversion structures. Approximately 80 people attended the meeting held in Farmington. Because of drought conditions, the low flows would not have left enough water in the system to meet Flow Recommendations for the endangered fishes' critical habitat, and the test was postponed until 2001.

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The Summer Low Flow Test was conducted from July 9 through July 15, 2001. Reclamation representatives attended meetings of various organizations and held two public meetings to discuss the Summer Low Flow Test. Approximately 65 people attended the public meetings held on April 4, 2001, in Farmington, New Mexico, and April 5 in Bluff, Utah. Reclamation received 35 written comments.

## Document Review

In September 2002, the DEIS was available to interested parties, including the agencies, organizations, and individuals in Reclamation's distribution list, and copies of the technical appendices referenced in the DEIS were available from Reclamation upon request. The DEIS was also available at Reclamation offices and area public libraries.

The public comment period lasted for 90 days following publication of the Notice of Availability in the *Federal Register*. Public hearings on the DEIS were held on October 1, 2, and 3, 2002, to provide an opportunity for interested parties and agencies to present oral and written comments on this document and the proposed Navajo Reservoir operations. The majority of the comments received expressed concern with adverse impacts of the Preferred Alternative on resources such as the trout fishery, recreation, water quality, and hydropower. Other commentators indicated that the Preferred Alternative was the only reasonable way to meet ESA obligations and protect water development.

Comments, including Reclamation's responses to comments, are published in volume III of this FEIS. Where appropriate, changes have been made in the text of the FEIS.

## Consultation and Coordination

As the lead agency responsible for preparation of this EIS and subsequent documents, Reclamation invited Federal agencies and local, State, and Tribal governments with appropriate expertise or jurisdiction in the project area to participate in the NEPA process as cooperating agencies.<sup>9</sup> These agencies included:

### *Federal agencies*

Bureau of Indian Affairs  
Bureau of Land Management  
Corps of Engineers  
Environmental Protection Agency

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<sup>9</sup> Status as a cooperating agency does not necessarily imply concurrence with all the conclusions presented in this document.

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Federal Energy Regulatory Commission  
U.S. Fish and Wildlife Service  
National Park Service, Glen Canyon National Recreation Area

*Indian Tribes/Nations*

Jicarilla Apache Nation  
Southern Ute Indian Tribe  
The Navajo Nation  
Ute Mountain Ute Tribe

*State of Colorado agencies*

Colorado Water Conservation Board

*State of New Mexico agencies*

New Mexico Department of Game and Fish  
New Mexico Interstate Stream Commission  
New Mexico Environment Department

*Local agencies*

City of Farmington, New Mexico  
San Juan Water Commission  
Southwestern Water Conservation District

Reclamation coordinated and consulted with these cooperating agencies concurrently with the development of alternatives and preparation of the EIS. Activities with the cooperating agencies included regularly meeting with them, providing status reports concerning progress, convening project planning meetings, arranging conference calls, and facilitating regular interaction among the parties.

Reclamation and the Service have conferenced/consulted, both formally and informally, regarding potential impacts to protected species which may occur as a result of implementation of the Preferred Alternative. A list of the major actions and correspondence between the agencies, in accordance with the ESA, is included in the biological assessment included in volume II of this EIS. A Fish and Wildlife Coordination Act report and a final biological opinion are included in volume II.

Under the Native American Graves Protection and Repatriation Act (NAGPRA), Reclamation has consulted with interested and concerned Indian Tribes and Nations as part of normal Navajo Reservoir operations. Tribal representatives include elected officials,

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recognized traditional and religious leaders, Tribal representatives and historians, and cultural committees. In addition, as part of Reclamation's resource management planning, Reclamation will develop and implement a cultural resource management plan for the Navajo Reservoir area.

## EIS Evaluation Process

This EIS evaluated seven alternatives. Most of the alternatives formulated for evaluation are described in terms of flow rates representing minimum and maximum limits in cfs in the range of release rates from Navajo Dam. For example, the 250/5000 Alternative has a minimum release of 250 cfs and a maximum release of 5,000 cfs. The alternatives formulated are shown in table S-1.

Table S-1.—List of Navajo Reservoir operations  
EIS alternatives

Title
No Action Alternative (Historical Operation) (1973 – 91)
250/5000 Alternative
500/5000 Alternative
250 Variable/5000 Alternative
250/6000 Alternative
500/6000 Alternative
Decommission/Breach Navajo Dam Alternative

The range of alternatives developed for this EIS was initially formulated and subsequently evaluated using hydrologic modeling and each alternative's ability to:

- Maintain authorized purposes of the Navajo Unit
- Meet the goals of the SJRBRIP
- Meet the *Flow Recommendations for the San Juan River* (Holden, 1999)
- Reflect public scoping meetings and informal public contacts

- Reflect coordination with cooperating agencies and interagency consultations
- Meet flood control procedures for Navajo Dam, as revised and established by the Corps to provide flood protection for areas along the San Juan River from the dam to Farmington, New Mexico<sup>10</sup>
- Fulfill authorized and potential American Indian (Indian) and non-Indian water uses, including those pursuant to Indian water rights and Federal trust and interstate compact responsibilities to Tribes and Tribal nations, water contracts with the Secretary of the Interior for delivery of the Navajo Reservoir water supply, and compact apportionments
- Fulfill applicable water rights, laws, treaties, interstate compacts, court decrees, Indian trust responsibilities, and various rules, regulations, policies, and directives

Also taken into account in formulating the alternatives were such issues as water user concerns that high releases could wash out existing water diversion structures, while low releases could make it difficult to divert water. Other concerns centered on water quality, erosion, and minimizing adverse impacts of alternative dam operations on fish and wildlife, recreation, and hydropower generation benefits.

## Alternatives Considered but Eliminated

During the alternatives formulation and evaluation process, some of the alternatives were found to have serious flaws either in meeting the project purpose and need or in technical/physical constraints. Accordingly, they were eliminated from further consideration and were not carried over for full evaluation.

### **250 Variable/5000 Alternative**

The 250 Variable/5000 Alternative would allow the minimum release from Navajo Dam to vary between 250 and 500 cfs, depending on weather conditions and needs of various resources. It would also allow a 5,000 cfs maximum release in the spring. It was developed with the intent to minimize potential impacts on downstream water users' ability to take

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<sup>10</sup> The previously approved river channel capacity as defined in the Report on Reservoir Regulation is 16,000 cfs from below the dam to the Animas River confluence in Farmington. The Corps has determined and advised Reclamation (letter of December 5, 2001) that the channel capacity for this reach is now 5,000 cfs as proposed in the draft Water Control Manual (WCM). Upon completion of the Navajo Reservoir Operations EIS, the Corps intends to gain approval of the draft WCM to reflect current river conditions below the dam.

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their water right at their diversion structures. In addition, it would attempt to minimize impacts to downstream recreation users (trout fishing and rafting) by maintaining higher minimum releases during certain critical times of the year than does the 250/5000 Alternative. However, it would result in insufficient reservoir storage to provide releases to meet spring peak flow criteria.

Under the "Proposed Federal Action" section of the NOI, Reclamation stated the following:

Reclamation proposes to prepare a DEIS which will describe the effects of operating the Unit to implement the Flow Recommendations, or reasonable alternatives, as contained in the recommendation from the Program's Biological Committee resulting from consultation under the ESA.

To further this effort, Reclamation met with the Service on August 8, 2001, in Albuquerque. The meeting focused on discussing the possibility of implementing the 250 Variable/5000 Alternative as a reasonable alternative to operating Navajo Dam to meet the Flow Recommendations. During the course of this discussion, it was determined that the Flow Recommendations contain flexibility, at least in the short term, that might allow for operations similar to those proposed in the 250 Variable/5000 Alternative; therefore, it was determined there was no need for a separate alternative that incorporated variability. This alternative was eliminated because it did not meet the Flow Recommendations in the long term.

### **250/6000 Alternative**

Under this alternative, the minimum release from Navajo Dam would be 250 cfs, and the maximum release would increase to 6,000 cfs in the spring. This alternative was considered because it was modeled and discussed in the Flow Recommendations. However, studies completed by the Corps and Reclamation during the summer of 1998 demonstrated that a maximum release of 6,000 cfs is not feasible without performing major structural modifications to the dam's outlet works and to channel and diversion improvements between the dam and the Animas River confluence.

As noted earlier, the Corps has determined that the current safe river channel capacity for this reach is 5,000 cfs. The Corps intends to gain approval of the draft WCM to revise the river channel capacity below Navajo Dam to the confluence of the Animas River from the approved flow of 16,000 cfs to 5,000 cfs to reflect current river operations. Further, alternatives with the 6,000-cfs maximum release reduce the active storage of the reservoir to a point where, during extended droughts, the water level would fall below the Navajo Indian Irrigation Project (NIIP) intake, preventing releases to any Navajo Dam contractors.

## **500/6000 Alternative**

This alternative was considered as a way to reduce potential impacts on downstream water users' ability to take water at their diversion structures by providing a higher minimum flow release of 500 cfs.

In addition, it attempts to minimize impacts to downstream recreation (trout fishery and rafting) by maintaining higher minimum releases during certain critical times of the year than does the 250/5000 Alternative. However, it has the same limitations as the 250/6000 Alternative and also does not fully meet the Flow Recommendations. The 6,000-cfs release also exceeds the channel capacity, as discussed under the 250/6000 Alternative.

## **Decommission and Breach Navajo Dam**

This alternative largely meets the conditions of a natural hydrograph, and removal of the dam would provide the endangered fish with access to the portion of the San Juan River now inundated by Navajo Reservoir, as long as fish passage is provided throughout the river. Although large spring peaks would be provided most years, low flows during the irrigation season would still occur downstream of diversions, resulting in low flows substantially below 500 cfs within designated critical habitat downstream of Farmington. Therefore, this alternative does not meet the Flow Recommendations.

This alternative is considered unreasonable and impractical because it does not meet all the elements of the purpose and need for the proposed action and would not support maintaining the authorized purposes of the Navajo Unit. It would result in loss of reservoir storage needed to allow contract water deliveries to the San Juan-Chama Project, the NIIP, and other contractors, and would make it extraordinarily difficult, if not impossible, for the States of New Mexico and Colorado to fully utilize their consumptive use apportionments under the Upper Colorado River Basin Compact. It also could precipitate expensive litigation of Indian versus non-Indian water rights in both States. In addition, this alternative would result in the loss of the following benefits provided by Navajo Dam and Reservoir: downstream flood control, reservoir and tailwater fisheries, reservoir and downstream recreation, and hydropower generation. The concept of decommissioning or removing the dam is not further considered in this EIS because it does not meet the purpose of and need for the proposed action.

## **Alternatives Retained for Further Consideration**

The alternatives described below were retained for further analysis:

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- No Action Alternative (Historical Operation – from 1973 to 1991)
- 250/5000 Alternative (minimum release 250 cfs; maximum release 5,000 cfs)
- 500/5000 Alternative (minimum release 500 cfs; maximum release 5,000 cfs)

## **No Action Alternative**

Because it does not address the Flow Recommendations, it is likely that implementing the No Action Alternative would adversely affect downstream endangered fish habitat and existing and future water development. However, this alternative would help maintain or enhance the downstream trout fishery and river rafting by moderating flow fluctuations.

If no action is taken by Reclamation to operate Navajo Dam and Reservoir to meet the Flow Recommendations criteria, future Indian water development in the Basin would probably not proceed as planned, and several existing or proposed projects could be affected as well. ESA consultations could be re-initiated on several projects such as the ALP Project, NIIP Blocks 7 through 11, Jicarilla Apache Nation third-party contracts, the Navajo-Gallup Water Supply Project (NGWSP), and the Jicarilla Apache Nation Navajo River Water Supply Project (JANNRWSP). It is uncertain whether the Service would issue favorable biological opinions on these projects or any other Indian water development projects in the Basin. If the water supply available from Navajo Reservoir is insufficient to meet additional future water uses pursuant to Indian water rights, this could result in negative impacts to Tribal water development projects and Tribal water uses.

Also at possible risk are existing Federal projects in New Mexico that have not yet undergone ESA consultation, including the San Juan-Chama Project. The Jicarilla Apache Nation and the San Juan Pueblo have contract allocations for water from the San Juan-Chama Project.

## **250/5000 Alternative**

Operations under this alternative would best meet the purpose of and need for the proposed action. It would support water projects that have completed ESA consultations and NEPA compliance—including NIIP completion, the ALP Project, the Jicarilla Apache contract with PNM, the JANNRWSP, and 3,000 acre-feet for minor unspecified depletions—to proceed, and would meet the Flow Recommendations. Since this alternative meets Flow Recommendations, it also reduces the risk of impact to the other water uses listed under the No Action Alternative.

Reclamation would modify Navajo Dam operations to provide sufficient releases of water at times, quantities, and durations necessary to assist in conserving endangered fish and their designated critical habitat. Reclamation would maintain the authorized purposes of the Navajo Unit, enabling water development with ESA compliance to occur in compliance with applicable laws, compacts, decrees, and Indian trust responsibilities.

Under this alternative, releases would range from 250 cfs to 5,000 cfs. Minimum releases would not fall below 250 cfs.<sup>11</sup> The spring peak release would meet the Flow Recommendations criteria. Non-spring peak releases as low as 250 cfs are intended to meet the Flow Recommendations downstream of Farmington and to provide water storage in Navajo Reservoir. These releases would also help maintain a minimum 500 cfs flow downstream of Farmington, benefitting river rafting in dry years.<sup>12</sup> All releases would be made within the operational limitations/constraints of Navajo Dam.

Some flexibility in reservoir releases exists because water committed for present or future development is not currently fully used. In the long term, flexibility will diminish; in certain drought years, flexibility to go above 250 cfs may not exist at all. Because of this, this FEIS

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<sup>11</sup> Except possibly under extreme multi-year drought conditions, see chapter II of the FEIS, "Extreme Hydrological Conditions."

<sup>12</sup> The target base flow is calculated as the weekly average of gaged flows throughout the critical habitat area; therefore, daily flows of less than 500 cfs may occur at some gages. The goal of the Flow Recommendations is to maintain San Juan River base flows downstream from the Animas River confluence at Farmington between 500 and 1,000 cfs. Because of variable inflows from the Animas River, occasional high inflow from intermittent tributaries, diversions, and return flow, and water travel time from Navajo Dam, this goal is difficult to consistently meet.

The Flow Recommendations call for using a 7-day moving average of two of the four downstream gages to monitor whether flows are kept between 500 and 1,000 cfs. This monitoring plan was presented in the DEIS. There can be significant variability in these gage readings and the selective use of any two gages could give results above or below the intent of the Flow Recommendations. Because of this, in 2002 the SJRBRIP suggested that flows be monitored by the following: "Use the lesser of the average of Bluff, Four Corners, and Shiprock (gages) and the average of Farmington, Shiprock, and Four Corners (gages). . . extreme conditions (low or high flows) identified by. . . Reclamation will be handled on a case-by-case basis with recommendations of the Biology Committee." The Service has provided written support of this approach to monitoring.

Reclamation's intent, documented in the FEIS, will be to maintain the recommended base flows in the critical habitat reaches by using the best available gage information. In practice, Reclamation and the Service will discuss flows routinely during the irrigation season and (as needed) the remainder of the year to determine the operations needed to meet the base flows. Reclamation, in consultation with the Service, will use the lesser of the weekly moving average of the Bluff, Four Corners, and Shiprock gages and the average of the Farmington, Shiprock, and Four Corners gages as the guide in meeting this intent. In periods of severe drought, Reclamation will work with the Service to arrive at operating criteria to respond to these conditions. For example, in 2002, Reclamation and the Service agreed to reduce target base flows in the critical habitat reaches to 350 cfs due to the extreme drought conditions.

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addresses long-term impacts as if flexibility were not available. Currently, however, there may be a significant amount of water available in many, but not all, years, particularly when the reservoir is full or during high runoff conditions. Water anticipated to be available for this flexibility will be identified and quantified to the extent possible during the Navajo Reservoir Operations meetings and the scheduling of releases will be discussed. Based on recommendations from resource experts, options will be presented for the use of this water and comments will be solicited from the public. Reclamation will use these comments to make decisions on the release of water from Navajo Dam.

These decisions will reflect a priority desire to augment a 250 cfs minimum release during the irrigation season, maintaining irrigation-season releases above 350 cfs while assuring a spring release as described in the Flow Recommendations and assuring recommended minimum flows within critical habitat can be met. Such a release would benefit recreation, hydropower, water quality, fish and wildlife, and other resources. In response to information gained from monitoring, water release flexibility could also be used to conduct experiments guided by the SJRBRIP.

Under this alternative, unusually high inflows (other than those associated with spring runoff) resulting in very high reservoir elevations would be released as a spike flow, if necessary, to avoid an uncontrolled spill.

### **500/5000 Alternative**

During the public scoping process, many people and interests requested that minimum releases not be reduced below 500 cfs. This alternative was included to reduce potential impacts on downstream water users' ability to take water at their diversion structures and to downstream recreation users (trout fishery and rafting) by maintaining higher minimum releases than those under the 250/5000 Alternative.

Because Flow Recommendations are not fully met by this alternative, reconsultation under ESA on the ALP Project, NIIP completion, various water contracts, and 3,000 acre-feet of minor unspecified depletions would be required. These depletions and other potential uses face an uncertain future. In addition, Navajo Reservoir would infrequently (less than 1 percent of the years) be drawn down below the NIIP inlet works, thus interfering with irrigation deliveries to the NIIP. Further, maintaining the minimum release at 500 cfs limits the ability to develop water and results in spring peak releases of lesser duration and frequency. A minimum release of 500 cfs also limits the ability to meet Flow Recommendations below Farmington because it leaves less water available to meet spring peaks.

Even though this alternative would not fully meet the Flow Recommendations, the purpose and need outlined in this EIS, or diversion demands from the Navajo Reservoir water supply, it was retained for analysis because of substantial public interest and concern.

## Comparison of Alternative Impacts

Table S-2 provides a summary of the impacts of the Preferred Alternative and the 500/5000 Alternative as compared to the No Action Alternative.

Table S-2—Summary comparison of alternatives retained for further analysis<sup>1,2</sup>

Resource	No Action Alternative	250/5000 Alternative	500/5000 Alternative
Navajo Reservoir operations and content	Reservoir operated for flood control and existing uses; average July content 1.52 million acre-feet.	Reservoir operated for flood control, endangered fish, full NIIP water supply; average July content 1.35 million acre-feet.	Reservoir operated for flood control and endangered fish, potential shortage to NIIP water supply; average July content 1.3 million acre-feet.
San Juan River monthly flows at Archuleta (near dam)	Minimum flow 500 cfs; average annual flow of 1,015 cfs; average July flow 1,050 cfs; average January flow 880 cfs.	Minimum flow 250 cfs; average annual flow of 775 cfs; average July flow 385 cfs; average January flow 300 cfs	Minimum flow 500 cfs; average annual flow of 780 cfs; average July flow 540 cfs; average January flow 500 cfs.
Lower San Juan River monthly flows	Minimum flow 65 cfs; average annual flow of 1,900 cfs; average June flow 4,250 cfs; average August flow 1,570 cfs.	Minimum flow 500 cfs; <sup>3</sup> average annual flow of 1,670 cfs; average June flow 4,680 cfs; average August flow 1,110 cfs.	Minimum flow <100 cfs when reservoir storage exhausted; <sup>4</sup> average annual flow of 1,670 cfs; average June flow 4,110 cfs; average August flow 1,170 cfs.
Water uses and resources	Water supply adequate to meet existing uses; future water uses including NIIP completion and ALP Project is uncertain.	Water supply adequate to meet existing uses; completion of NIIP and ALP Project would occur. Best opportunity to accomplish future water development.	Water supply adequate to meet existing uses with possible shortages in dry years; completion of NIIP and ALP Project included with possible shortages.
Indian Trust Assets	Two types of ITAs potentially affected—water uses and cultural resources on trust lands. Uncertain opportunity for development of water uses. Employment opportunities adversely affected.	Two types of ITAs potentially affected—water uses and cultural resources on trust lands. Positive impacts to all Tribes by protecting water development that has ESA and NEPA compliance—allows best possibility for future water development.	Two types of ITAs potentially affected—water uses and cultural resources on trust lands. Shortages to water projects would occur and better chance for future water development than No Action. Employment opportunities adversely affected.
Environmental Justice	Uncertain opportunity for development of water resources. Hinders Tribal economic development.	Provides best opportunity for future water development.	Flow Recommendations not fully met and additional ESA consultation would be required. Hinders Tribal economic development.

Table S-2—Summary comparison of alternatives retained for further analysis (continued)

Resource	No Action Alternative	250/5000 Alternative	500/5000 Alternative
Trout fishery	Maintains better downstream trout fishery than action alternatives.	Habitat reduced average of 34 percent in special regulation waters when flows drop from 500 to 250 cfs. Physical habitat and water quality problems projected to be significant downstream from Citizens Ditch.	Maintenance of 500 cfs maintains existing trout fishery, although in shortage years minimum releases may drop, with noticeable impact.
Trout fishery recreation	Provides more recreation opportunities than action alternatives.	Reduction in trout fishery results in lower quantity and quality of recreation associated with trout fishing.	Recreation maintained, very infrequent water-short years have adverse effects on quantity and quality.
Native fisheries (e.g., roundtail chub, flannelmouth and bluehead suckers, etc.)	Has greater adverse impact on native fishes than action alternatives.	Reduced habitat in the river reach between the Hammond Diversion and Farmington; habitat improvement downstream from Farmington due to more natural hydrograph.	Some habitat improvement downstream from Farmington due to more natural hydrograph.
Rafting recreation downstream from Farmington	Overall flow regime beneficial; however, periods of flow below 500 cfs adversely affect rafting.	Overall volume of flow for rafting declines; however, attempt to maintain minimum rafting flows near 500 cfs. <sup>3</sup>	Overall volume of flow for rafting declines; however, attempt to maintain minimum rafting flows near 500 cfs. <sup>3</sup>
Reservoir recreation	Less impact than action alternatives.	Generally recreation use levels maintained; reservoir drawdown adversely affects quality of recreation in dry periods.	Generally recreation use levels maintained; reservoir drawdown adversely affects quality of recreation in dry periods.
Reservoir fishery	Less impact to reservoir fishery than action alternatives.	Minor adverse effects to reservoir fishery due to increased reservoir drawdowns.	Moderate adverse effects to reservoir fishery due to increased reservoir drawdowns.
Hydropower	Existing hydropower operations by city of Farmington at Navajo Dam would continue.	Reduced annual energy production. Annual hydropower replacement cost up to \$7 million.	Reduced annual energy production. Annual hydropower replacement cost up to \$3.2 million.



Table S-2—Summary comparison of alternatives retained for further analysis (continued)

Resource	No Action Alternative	250/5000 Alternative	500/5000 Alternative
Diversion structures	Existing diversions protected by flood control operations and 500 cfs minimum releases from dam.	Some existing diversions need additional operation and maintenance to handle high spring releases and lower summer minimums.	Some existing diversions need additional operation and maintenance to handle high spring releases.
River water quality	Existing conditions continue or improve due to water treatment and erosion control advances.	Dilution of pollutants reduced when minimum releases occurring; additional dilution during high releases. Improved channel maintenance.	Similar to existing conditions although dry year shortages may lead to increased water quality issues. Improved channel maintenance.
Reservoir water quality	Existing conditions continue.	Existing conditions continue.	Existing conditions continue.
Socioeconomics	Adverse impacts could occur as water development, including completion of the NIIP and ALP Project, is uncertain. Employment opportunities adversely affected, but recreation-based economy maintained.	Adverse impacts on trout fishery economy and hydropower; economic benefits associated with water development will occur.	Economic benefits associated with water development occur, although reduced due to water shortages. Employment opportunities adversely affected, but recreation-based economy maintained.
Special status species	Few Flow Recommendations to conserve endangered fish met; no significant effect on other endangered species.	All Flow Recommendations to conserve endangered fish met; no significant effect on other endangered species.	Some Flow Recommendations to conserve endangered fish partially met; no significant effect on other endangered species.
River vegetation and wildlife downstream from dam	Few adverse impacts to wildlife. No adverse impacts to wetland riparian vegetation.	No major loss of riparian habitat, though long-term reduction in vegetation vigor may occur. This could reduce riparian habitat for some wildlife species.	Inconsequential effects on existing riparian vegetation and associated wildlife habitat.
Reservoir vegetation and wildlife	Less impact to existing wetland and riparian vegetation and associated wildlife habitat as compared to action alternatives.	Minimal additional impacts to wetland and riparian vegetation and associated wildlife habitat associated with greater reservoir fluctuations.	Moderate additional impacts to wetland and riparian vegetation and related wildlife habitat associated with greater reservoir fluctuations.

Table S-2—Summary comparison of alternatives retained for further analysis (continued)

Resource	No Action Alternative	250/5000 Alternative	500/5000 Alternative
Land use	Current land uses not affected by reservoir operations. Possibly no future production of Blocks 7 and 8 (10,500 acres). Possibly no development of Blocks 9 - 11 (45,630 acres) of NIIP lands.	Blocks 9 - 11 (45,630 acres) of additional irrigation land developed under NIIP. Blocks 7 and 8 (10,500 acres) would continue under production.	Possible reduction of full NIIP development.
Cultural resources	Reservoir fluctuations continue to impact cultural resources in reservoir basin.	Reservoir fluctuations impact cultural resources; impact less than No Action and 500/5000 Alternatives.	Reservoir fluctuations impact cultural resources; impact less than that of No Action but greater than that of 250/5000 Alternative.
Flood control and erosion	Flood control operations of Navajo Dam met; maximum releases limited to 5,000 cfs.	Flood control operations of Navajo Dam met; maximum releases limited to 5,000 cfs; increased frequency of releases of 5,000 cfs would cause bank erosion until river stabilized itself or banks stabilized.	Flood control operations of Navajo Dam met; maximum releases limited to 5,000 cfs; increased frequency of releases of 5,000 cfs would cause bank erosion until river stabilized itself or banks stabilized.
Operation, maintenance, and safety of dams	Operations would be within designed capability of Navajo Dam.	Operations would be within designed capability of Navajo Dam. Increased monitoring of gaging stations and more frequent release changes required.	Operations would be within designed capability of Navajo Dam. Increased monitoring of gaging stations and more frequent release changes required.
Hazardous materials	No impacts.	No impacts.	No Impacts.
Geology and soils	No impacts.	No impacts.	No impacts.
Air quality and noise	No impacts.	Increased dust due to lower reservoir levels exposing more land.	Increased dust due to lower reservoir levels exposing more land.

<sup>1</sup> The table presents long-term impacts. Until further water development occurs in the Basin, additional water would be available to reduce impacts to various resources including irrigation, trout fishery, and recreation; this interim water would diminish as development occurs.

<sup>2</sup> Flows have been rounded to the nearest 5 cfs.

<sup>3</sup> Measured as a weekly average.

<sup>4</sup> Model analysis does not allow releases from Navajo Dam when water surface elevations drop below 5990 feet, so 15 months of the 65 years of analysis are predicted as zero. Actual operation would implement shortage-sharing for Navajo Reservoir contractors and some flows less than 500 cfs would occur.

## EIS Conclusions and Recommendations

After conclusion of a detailed analysis, Reclamation has selected the 250/5000 Alternative as the Preferred Alternative. This alternative best meets the purpose of and need for the Federal action. Potential measures to mitigate adverse impacts to fish and wildlife and other resources with statutory requirements to consider mitigation are presented in the EIS.

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