ENV REPORT

RECORD OF DECISION:

Project: Navajo-Gallup

Date: 2009

RECLAMATION

Managing Water in the West

Record of Decision for the Navajo-Gallup Water Supply Project Planning Report and Final Environmental Impact Statement

Ken Salazar
Oct. 1, 2009

U.S. Department of the Interior
Bureau of Reclamation

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SUMMARY OF ACTION

The U.S. Bureau of Reclamation, Upper Colorado Region (Reclamation) has published a planning report/final environmental impact statement (PR/FEIS) for the Navajo-Gallup Water Supply Project (Project). Reclamation is lead agency for purposes of compliance with the National Environmental Policy Act of 1969 (NEPA), as amended for the development and implementation of the Project. Cooperating agencies for this EIS are the Navajo Nation, Jicarilla Apache Nation, Bureau of Indian Affairs, Indian Health Service, Navajo Tribal Utility Authority (NTUA), Northwest New Mexico Council of Governments, City of Gallup, and State of New Mexico.

Congress authorized Reclamation to complete feasibility studies for the Project to transport San Juan River water to the City of Gallup, New Mexico (P.L. 92-199, December 15, 1971). In 1975, NTUA requested that the investigations be expanded to include municipal/industrial (M&I) water supplies for various Navajo communities in the eastern part of the Navajo Reservation. A memorandum of understanding between Reclamation and NTUA to include Navajo Nation communities was executed on August 12, 1975.

The proposed action is to convey an M&I water supply to the eastern section of the Navajo Nation, the southwestern part of the Jicarilla Apache Nation, and the City of Gallup, New Mexico, via diversions from the San Juan River in northern New Mexico.

The PR/FEIS was prepared by Reclamation to address the need for a sustainable water supply to serve a future population of approximately 250,000 people by the year 2040. Existing groundwater supplies are dwindling, have limited capacity, and are of poor quality. More than 40 percent of Navajo households rely on water hauling to meet daily water needs. The City of Gallup's groundwater levels have dropped approximately 200 feet over the past 10 years, and the supply is not expected to meet current water demands within the decade. The Jicarilla Apache people are currently not able to live and work in areas of the Jicarilla Apache Reservation other than Dulce, New Mexico because of a lack of water supply. The final EIS was prepared by Reclamation to address these needs.

Before Reclamation finalized the PR/FEIS, Congress passed the Omnibus Public Land Management Act of 2009, Title X, Part III, (P.L. 111-11) which authorizes Reclamation, with delegated authority from the Secretary of the Interior, to: 1) construct, operate, and maintain the Project; 2) allocate the capacity of the Project among the Navajo Nation, Jicarilla Apache Nation, and the City of Gallup; and 3) enter into repayment contracts with the City of Gallup and the Jicarilla Apache Nation, subject to compliance with NEPA and other relevant laws.

The PR/FEIS and this record of decision (ROD) have been prepared in accordance with NEPA, the Council on Environmental Quality's NEPA regulations (40 CFR 1500-1508), and the Department of the Interior regulations for implementing NEPA (43 CFR 46). The decision made here is based on the PR/FEIS filed with the Environmental Protection

Agency (EPA) as FES 09-10 on July 6, 2009. A Notice of Availability was also published in the *Federal Register* on July 6, 2009 by Reclamation, and the EPA on July 17, 2009.

ALTERNATIVES CONSIDERED

The PR/FEIS includes the planning process that led to the selection of three alternatives evaluated in detail: No Action, the San Juan River-Public Service Company of New Mexico (SJRPNM) Alternative, and the Navajo Indian Irrigation Project-Amarillo (NIIP-Amarillo) Alternative. The SJRPNM is the preferred alternative and the environmentally preferable alternative, for reasons discussed in this document.

No Action Alternative

Under the No Action Alternative, M&I supplies and delivery systems would not be constructed on the eastern side of the Navajo Nation, for the City of Gallup, or for the southwestern area of the Jicarilla Apache Nation.

The No Action Alternative assumes that water development in the San Juan River Basin (Basin) will continue for projects with completed Endangered Species Act (ESA) Section 7 compliance. It also assumes that Reclamation will continue to operate Navajo Dam to attempt to meet ESA-related Flow Recommendations[1] to assist in conserving endangered fish in the San Juan River and to continue Basin water development. The No Action Alternative would not meet the conditions for settlement of the Navajo Nation water rights within the San Juan River Basin in New Mexico. Uncertainty regarding water rights and uses in the Basin would continue and potential adverse impacts to other water users could occur with litigation of the Navajo Nation's water rights.

SJRPNM Alternative

The SJRPNM Alternative is the preferred alternative in the PR/FEIS and consists of two separate lateral systems—the San Juan and Cutter laterals. The San Juan Lateral will divert water from the San Juan River downstream of Fruitland, New Mexico, and treat and deliver the water west along Navajo Nation Highway N36 and south along US Highway 491 to communities in the western portion of the Navajo Nation in New Mexico and the City of Gallup. This lateral also uses sub-laterals to service Window Rock, Arizona and Crownpoint, New Mexico areas.

The Cutter Lateral will obtain water from the Navajo Indian Irrigation Project (NIIP) system at the existing Cutter Reservoir and treat and deliver water south to

[1] *Flow Recommendations for the San Juan River, 1999.* The San Juan River Basin Recovery Implementation Program flow recommendations for the native fish community, including endangered Colorado pikeminnow and razorback sucker, in the San Juan River of New Mexico, Colorado and Utah.

communities in the eastern portion of the Navajo Nation in New Mexico and the Jicarilla Apache Nation.

This is the environmentally preferable alternative because it avoids significant adverse impacts except for cultural resources. The cultural resource impacts will be avoided where possible, and mitigated through archaeological data recovery under a Programmatic Agreement described in Appendix 3.

NIIP-Amarillo Alternative

The NIIP Amarillo Alternative would use the Cutter Lateral to provide water as described in the SJRPNM Alternative, but would use the NIIP Amarillo Canal to convey treated Project water to western portion of the Navajo Nation in New Mexico, the City of Gallup, New Mexico and Window Rock, Arizona. The Amarillo Canal would be winterized for year-round use and a 4,500 acre-foot lined storage pond would be constructed near the canal. The Amarillo Lateral runs west to Highway 491 and then shares a common alignment with the SJRPNM Alternative.

RECLAMATION'S DECISION AND RATIONALE

Reclamation's decision is to proceed with the SJRPNM Alternative, as identified in the PR/FEIS, subject to the Secretary of the Interior's execution of the Navajo Nation settlement agreement, repayment contracts, and the New Mexico cost-share agreement required by P.L. 111-11.

In selecting the SJRPNM and complying with P.L. 111-11, Reclamation will construct, operate, and maintain two lateral delivery systems. Project facilities include: 1 river intake and pumping plant, 2 water treatment plants, an estimated 19 forebay tanks, 24 pumping plants, 5 regulating tanks, 25 community storage tanks, and 266.4 miles of pipeline.

The San Juan Lateral will divert 33,118 acre-feet per year (afy) of water from the San Juan River above the existing Public Service Company of New Mexico (PNM) diversion dam and transport M&I water to the western New Mexico portion of the Navajo Nation, the City of Gallup, New Mexico, and the Window Rock community and surrounding Navajo chapters in Arizona.

The Cutter Lateral will be constructed below Cutter Reservoir and use existing NIIP facilities in Navajo Reservoir to deliver 4,645 afy of M&I water to the eastern Navajo Reservation, including 1,200 afy to the Jicarilla Apache Nation. Full development of the Project will result in a depletion of 35,893 afy from the San Juan River Basin, of which 5,271 afy is a new depletion. The Project incorporates a maximum Navajo Depletion Guarantee of 20,782 afy from reductions in use or changes in the operation of any of the Navajo Nation's existing projects that deplete water from the San Juan River.

ALTERNATIVE EVALUATION PROCESS

The decision to select the SJRPNM Alternative was made after carefully weighing economic, social, and technical considerations, as well as the potentially significant environmental effects and after reviewing comments and concerns of agencies, tribes, states, public and private organizations, and individuals. Particular issues of concern were wetlands, endangered species, cultural resources, the Navajo Depletion Guarantee, the Department of the Interior's trust responsibility, and the Navajo Nation's water rights settlement as described in Public Law 111-11. The decision provides the best means to minimize or avoid environmental harm while meeting the Department of the Interior's trust responsibilities. Nonetheless, certain adverse environmental effects of the Project cannot be avoided. Areas of concern are discussed below.

Clean Water Act Compliance

Implementation of the Project is estimated to result in the permanent loss of up to 1.1 acres and temporarily impacts up to 3.6 acres of jurisdictional wetlands. Final designs will attempt to minimize these impacts as practical. Construction will create temporary turbidity and other water quality concerns, and Reclamation will obtain required permits under Section 404 of the Clean Water Act (CWA) for impacts associated with jurisdictional waters of the United States. Nationwide permits authorization under Nationwide Permits No. 12 (Utility Line Activities), No. 33. (Temporary Construction, Access and Dewatering), and No. 39 (Commercial and Institutional Developments) will be requested for temporary construction disturbances to perennial and intermittent stream pipeline crossings including the San Juan River as appropriate.

Permit conditions, including compensatory wetland mitigation requirements will be incorporated as environmental commitments. Permit requirements would include Best Management Practices to minimize and avoid impacts to water quality, wetlands and special aquatic sites.

Endangered Species

A primary goal of the San Juan River Basin Recovery Implementation Program (Recovery Program) is to protect and recover endangered fishes in the San Juan River basin, while water development proceeds in the Basin in compliance with Federal and State laws, interstate compacts, Supreme Court decrees, and Federal trust responsibilities to the Southern Ute Indian Tribe, Ute Mountain Ute Tribe, Jicarilla Apache Nation, and Navajo Nation. In 2001, the Recovery Program adopted principles for ESA section 7 consultations in the San Juan River Basin. These principles are used as a guide to define how the Recovery Program can be used to provide ESA compliance for impacts to listed fish species in the Basin from water development and water management activities.

Reclamation consulted with the Fish and Wildlife Service (Service) on the preferred alternative. In its Biological Opinion (BO), dated February 26, 2009 (Cons. # 2-22-01-F-532), the Service concurred with the findings contained in Reclamation's Biological Assessment and included conservation measures which Reclamation has adopted.

The BO concluded that the Project, as described in the Biological Assessment and in the PR/FEIS, is not likely to jeopardize the continued existence of the Colorado pikeminnow or razorback sucker and is not likely to adversely modify their designated critical habitat. The BO contains an incidental take statement for Colorado pikeminnow and razorback sucker that may become entrained as a result of diversions from the San Juan River. Reasonable and prudent measures and non-discretionary terms and conditions were included in the incidental take statement. Mesa Verde cactus also may be directly taken during the construction of Project features. The BO incorporates conservation measures to minimize impacts to the Colorado pikeminnow, razorback sucker, and Mesa Verde cactus. Conservation measures and reasonable and prudent measures are included as Appendix 1 to this ROD.

Navajo Depletion Guarantee

The BO incorporates a Navajo Depletion Guarantee, which limits new depletions associated with the Project to 5,271 afy at full development. The Navajo Depletion Guarantee is a commitment by the Navajo Nation that depletions for Navajo Nation uses under the Project will be offset by unused Navajo Nation depletions that are included in the San Juan River Basin. This includes forbearance of Navajo Nation uses on NIIP and/or Hogback and Fruitland Irrigation projects as necessary, if and when there is a need to keep the total depletions in the Basin from exceeding the depletion threshold of 752,127 afy[2].

The sum of the actual annual depletions of 35,893 afy will be made without requiring any forbearance of uses in excess of the 6,740 acre-feet in change of use baseline depletions shown in tables V-5 and VI-1 of the PR/FEIS (Appendix 2). The City of Gallup may subcontract with the Jicarilla Apache Nation, the Navajo Nation, or both in combination, for the diversion of up to 7,500 afy from the Navajo Reservoir supply for its Project uses.

When comparing actual depletions against the depletion threshold, depletions for San Juan-Chama Project and any other project added to the Basin's hydrologic baseline after February 26, 2009 (the date of the Project BO) are subtracted from the actual depletions at that point in time. Baseline depletions are shown in Table V-3 of the PR/FEIS (Appendix 2).

[2] The total includes 854,370 for all depletions in the hydrologic baseline, less 107,514 AFY average depletion by the San Juan –Chama Project, plus 5,271 AFY of new depletions included in the proposed project.

If the depletion threshold is reached in the future, the Navajo Nation will reduce its total depletion in the Basin so that its consumptive uses under the Project do not cause the total actual depletions in the Basin to exceed the depletion threshold. The Navajo Nation could accomplish the required reductions in use by changes in the operation of any of the Navajo Nation's projects that deplete water from the San Juan River. The maximum Navajo Depletion Guarantee requirement in any year is a reduction in Navajo Nation depletions of 20,782 afy.

When the depletion threshold condition is reached and the Navajo Depletion Guarantee must be implemented, the quantification of the threshold depletion amount will be recalculated using the baseline uses identified in the most recent San Juan Hydrology Model. Changes in either the Flow Recommendation for the San Juan River or the status of listed species may result in reduction or removal of the Navajo Depletion Guarantee based upon reconsultation.

No specific, detailed accounting of depletions will be required unless the sum of NIIP and Animas-LaPlata Project (ALP) depletions reaches 290,000 afy. This is because it is easier to track the depletions from these two projects than those of the entire Basin. Doing so will also limit monitoring requests in the Basin. If depletions reach 290,000 afy, then all the depletions listed in the baseline for the Project will be monitored and reported on a 5-year cycle to coincide with Reclamation's Consumptive Use and Loss report.

The BO, including the description of water supply scenarios in the San Juan River Basin and the Navajo Nation's depletion guarantee commitment, is not binding on the use of water by any person or entity other than the Navajo Nation and shall not affect the ability of any person or entity to fully develop and utilize their water rights. The fact that the total amount of baseline depletions in the Basin may not be used for some period of time in the future shall not be construed to diminish in any way the rights of persons or entities other than the Navajo Nation to develop their water uses in accordance with interstate compact apportionments, Federal law and state water rights.

Cultural Resources

The PR/FEIS identifies approximately 104 cultural resource sites within the area of potential effect of the Project and estimates that between 80 and 90 of these resources will require data recovery as a mitigating measure. Reclamation will implement a program to avoid or mitigate for losses of resources that are adversely affected by construction and operation, maintenance, and replacement of the Project.

It is likely that Native American human remains, funerary objects, or objects of cultural patrimony may be encountered during Project construction. Therefore, prior to issuing any approvals or permits for activities related to the Project, Reclamation will ensure full compliance with the relevant sections of NAGPRA and 43 CFR 10.3.

Department Trust Responsibility

The Project is a component necessary to implement the Navajo Settlement Agreement authorized by Congress in P.L. 111-11. The Project will also assist the Jicarilla Apache Nation in implementation of the Jicarilla Settlement Act (P.L. 102-114, 106 Stat. 2237).

There is a potential negative effect on other Indian trust assets in the San Juan Basin. Due to endangered species concerns and other complexities associated with the "Law of the Colorado River," the Project may limit the amount of water available for use by other tribes.

Section 10602 of P.L. 111-11 states that the Indian Self-Determination and Education Assistance Act (25 U.S.C. 450 et seq.) shall not apply to the design, construction, operation, maintenance, or replacement of the Project.

Navajo Settlement

The Project will allow the United States to resolve the Navajo Nation's water rights claims within the San Juan River Basin in New Mexico consistent with P.L. 111-11. P.L. 111-11 authorizes the Secretary, acting through the Commissioner of Reclamation, to design, construct, operate, and maintain the Project in substantial accordance with the preferred alternative in the draft EIS.

Sec. 10602 (d) of P.L. 111-11 conditions Project construction and states that the Secretary shall not commence construction of the facilities authorized until such time as:

a) the Secretary executes the Navajo Settlement Agreement and the Settlement Contract with the Navajo Nation (no later than December 31, 2010);
b) repayment contracts are executed with the City of Gallup, and Jicarilla Apache Nation; and
c) the Secretary has entered into an agreement with the State of New Mexico under which the State of New Mexico will provide a share of the construction costs of the Project of not less than $50,000,000, except that the State of New Mexico shall receive credit for funds the State has contributed to construct water conveyance facilities to the Project Participants to the extent that the facilities reduce the cost of the Project as estimated in the "Draft Impact Statement".

P.L. 111-11 also provides an exception if the Jicarilla Apache Nation elects not to enter into a Project contract. The Secretary, after consulting with the Navajo Nation, the City of Gallup, and the State of New Mexico acting through the Interstate Stream Commission, may make appropriate modifications to the scope of the Project and

proceed with Project construction if all other conditions for construction have been satisfied.

Sec. 10701 (d) provides nullification of the Navajo Settlement Agreement if the construction of all Project features is completed after December 31, 2024. This section also provides for an extension if the Navajo Nation, the Secretary, and the New Mexico Interstate Stream Commission agree that an extension is reasonably necessary.

Sec. 10603 (c) requires that Project water shall not be delivered for use by any community of the Navajo Nation located in the State of Arizona until:

a) The Nation and the State of Arizona have entered into a water rights settlement agreement approved by an Act of Congress that settles and waives the Nation's claims to water in the Lower Basin and the Little Colorado River Basin in the State of Arizona, including those of the United States on the Navajo Nation's behalf; and
b) The Secretary and the Navajo Nation have entered into a Navajo Reservoir water supply delivery contract for the physical delivery and diversion of water via the Project from the San Juan River system to supply uses in the State of Arizona.

SUMMARY OF COMMENTS ON PR/DEIS

Reclamation received 26 comment letters on the Planning Report/Draft Environmental Impact Statement (PR/DEIS) and held five public hearings during the public comment period. Reclamation identified 280 specific comments from the letters and public hearings, including 98 comments from tribes and tribal nations (73 of those were Navajo Nation), 90 comments from State and locals governments, 36 comments from power and water interests, 10 comments from other organizations, and 45 comments from individuals. Comments on the PR/DEIS and Reclamation's responses are included as Volume III of the PR/FEIS.

IMPLEMENTING THE DECISION AND ENVIRONMENTAL COMMITMENTS

The decision shall be implemented no sooner than 30 days after publication of the notice of availability in the *Federal Register*. The following mitigation, monitoring, enforcement commitments, and legal requirements will be implemented as integral parts of the decision as a means of avoiding or minimizing adverse effects.

Navajo Settlement Agreement (P.L. 111-11)

Subject to Public Law 111-11 as previously described, Reclamation will not commence construction of Project facilities authorized until such time as:

a) The Secretary executes the Navajo Settlement Agreement and the Settlement Contract with the Navajo Nation;
b) Repayment contracts are executed with the City of Gallup and Jicarilla Apache Nation; and
c) The Secretary has entered into an agreement with the State of New Mexico under which the State of New Mexico will provide a share of the construction costs of the Project of not less than $50,000,000, except that the State of New Mexico shall receive credit for funds the State has contributed to construct water conveyance facilities to the Project participants to the extent that the facilities reduce the cost of the Project as estimated in the Draft Impact Statement.

Project Construction Committee

Sec. 10604 (g) of P.L. 111-11) requires the Secretary to facilitate the formation of a project construction committee with Project participants and the State of New Mexico to:

a) Review cost factors and budgets for construction and operation and maintenance activities;
b) Improve construction management through enhanced communication; and
c) Seek additional ways to reduce overall Project costs.

Environmental Commitments

Reclamation has used all practical means to avoid impacts or minimize environmental harm that could occur due to implementation of the preferred alternative. The mitigation measures are discussed in Chapter V of the PR/FEIS. In addition to the conservation and reasonable and prudent measures in Appendix 1, environmental commitments are included as Appendix 3.

APPROVED:

Ken Salazar — Oct. 1, 2009

Ken Salazar
Secretary of the Interior

Date

APPENDIX 1
February 26, 2009 Final Biological Opinion

Conservation Measures

Conservation measures are actions that Reclamation agrees to implement to further the recovery of the species under review. The beneficial effects of conservation measures were taken into consideration for determining both jeopardy and incidental take analyses and all hydrology analyses considered in the Biological Opinion assume implementation of these conservation measures, including the implementation of the San Juan River Basin Recovery Implementation Program. Reclamation agrees that failure to implement the conservation measures will be grounds for reinitiation of consultation.

The following are the conservation measures incorporated in the Biological Opinion. More expanded descriptions can be found in the Biological Opinion in Volume 2 of the PR/FEIS.

Mesa Verde Cactus

1) Prior to completion of final design, Reclamation will complete an inventory of known populations and suitable Mesa Verde cacti habitat within 500 feet of the proposed pipeline alignment, pumping plant, and construction footprint.
2) Based on the inventory, Reclamation will develop a Mesa Verde Cactus Construction Plan to avoid and minimize disturbance to cacti and suitable habitat. The Plan will be submitted to the Service and Navajo Nation for review. Specific locations of cacti will be kept confidential.
3) Construction areas will be located in coordination with Project engineers and Reclamation resource specialists to avoid individual cactus and habitat identified during inventories. To the extent practicable, impacts to Mesa Verde cacti and/or suitable habitat will be minimized. Existing roads and previously disturbed areas will be utilized where possible, to minimize impacts. If temporary construction roads are needed that are closer than 50 feet from known cacti, these plants will be monitored during road use and the edges of the access road flagged in the field.
4) Temporary access roads and staging areas within suitable Mesa Verde habitat will be closed and hand-raked to remove tire tracks. No post-construction reseeding will be implemented in these areas.
5) Pre-construction surveys for Mesa Verde cacti will be conducted in the spring of the year preceding the initiation of construction activities to identify new cacti. Locations of any additional cacti identified in the pre-construction surveys will be incorporated into the Construction Plan and appropriate mitigation measures developed in consultation with the Service and Navajo Nation.
6) Reclamation will develop an education program for Reclamation field staff and all appropriate contractor employees regarding identification and conservation of the Mesa Verde cactus.

7) All sites where Mesa Verde cacti are present will be fenced or flagged as detailed in the Construction Plan and monitored daily. Fencing will extend 200 feet in both directions along access roads where cacti are present. Where possible, fencing will include a 50-buffer around any known cacti during construction. Any disturbed cacti will be reported immediately to Reclamation. A written account, including a map, extent of disturbance, the number of cacti, and the circumstances surrounding the disturbance, will be submitted to the Service and Navajo Nation within 48 hours.
8) To reduce the likelihood of noxious plants, cleaning of construction equipment will be required before entry into occupied or suitable Mesa Verde cactus habitat.
9) Additional surveys for Mesa Verde cacti in suitable habitat will be required prior to any ground-disturbing activity for maintenance. Survey results will be valid for 3 years.
10) Where features cannot be re-routed or moved to avoid impacts to an individual Mesa Verde cactus, the cactus will be transplanted in suitable habitat in cooperation with the Service and the Navajo Nation as described in the Construction Plan. Transplanted cacti will be monitored for a minimum of five years. Applicable permits from the Service and Navajo Nation will be obtained prior to transplanting Mesa Verde cactus.
11) Noxious weeds will be continually controlled within disturbed areas.

San Juan River and Other Water Crossings

12) Silt curtains, cofferdams, dikes, straw bales, or other suitable erosion control measures will be used to prevent erosion from entering water bodies during construction.
13) Water quality parameters will be monitored before, during and after construction to ensure compliance with Navajo Nation Water Quality Standards. In-water work will stop if Navajo Nation Water Quality Standards are exceeded at or below the worksite due to construction activities.
14) Construction of the cofferdam will be scheduled during minimal flows to avoid and minimize direct and indirect effects to fish species. River flows upstream and downstream of construction areas will be maintained and fish passage around dewatered construction areas will be maintained at all times.
15) A fish net barrier will be installed upstream and downstream of the construction site during construction to exclude fish from the work area during periods of in-water work.
16) Reclamation will coordinate with the Service to have a biologist(s) onsite to rescue any fish species stranded as a result of construction activities.

Reasonable and Prudent Measures

The following Reasonable and Prudent Measures (RPMs) were included in the incidental take statement of the Biological Opinion for the Project dated February 26, 2009 (Cons. # 2-22-01-F-532).

1) Reclamation will continue to support and participate in the implementation of the San Juan River Basin Recovery Implementation Program (Recovery Program).
2) Through the Recovery Program, Reclamation shall implement measures to create and maintain habitat complexity and to minimize loss and long-term degradation of habitat for the endangered fishes within the San Juan River.
3) To protect future flow regimes in the San Juan River through the Recovery Program, Reclamation will be responsible for the maintenance and application of the San Juan Hydrology Model to evaluate proposed projects on the San Juan River.

Non-discretionary Terms and Conditions described in Biological Opinion are as follows:

1) Reclamation will continue to seek and provide funding, as authorized, for the implementation of the Recovery Program.
2) To create and maintain complex habitat, Reclamation, through the Recovery Program, will:
    a) Investigate the use of habitat manipulation such as non-native vegetation removal, mechanically opening the mouths of secondary channels, or reconnecting the river within the floodplain in appropriate sites to augment the function of high flows. Any resulting appropriate options should be implemented and funded through the Recovery Program.
    b) Continue to monitor habitat response to the San Juan River Flow Recommendations.
    c) Monitor the response of actions taken to increase habitat complexity.
3) To track potential climate changes and how these changes may affect the Colorado pikeminnow and razorback sucker and their designated critical habitats, Reclamation, in cooperation with the Recovery Program, will begin monitoring to:
    a) Determine changes in the timing of runoff.
    b) Determine if average annual runoff is decreasing and a timeframe in which a change may affect the ability of the Flow Recommendations to be met.
    c) If, from monitoring activities listed above, it is determined that climate change is affecting water availability in the San Juan River, this would be considered new information that may affect listed species or designated critical habitat. Reclamation would reinitiate consultation consistent with Section 7.0 D (2) of the "Principles for Conducting Endangered Species Act Section 7 Consultations on Water Development and Water Management Activities Affecting Endangered Fish Species in the San Juan River Basin". Reclamation, in consultation with the Service, would evaluate the changes in water availability and determine if the changes would have an adverse effect on listed species and if the Recovery Program is sufficient to serve as the Reasonable and Prudent Alternative or RPM.

4. To ensure the integrity, consistency, and scientific rigor in regards to water project depletions, Reclamation, working through the Recovery Program, will:
    a) Continue maintenance and upgrades of the San Juan Hydrology Model using the best available science.
    b) Conduct project analysis for water depletion projects on the San Juan River as needed.

APPENDIX 2
Selected Tables from the Navajo-Gallup Water Supply Project PR/FEIS

Table V-3—Baseline and current depletion summary in the Basin[1]

Depletion category	RiverWare baseline (acre-feet)	Estimated current (acre-feet)	Presently[2] unused (acre-feet)
New Mexico depletions			
Navajo lands irrigation depletion			
NIIP	[3]280,600	160,330	120,270
Hogback	12,100	9,535	2,565
Fruitland	7,898	6,147	1,751
Cudei[4]	900	715	185
Subtotal	**301,498**	**176,727**	**124,771**
Non-Navajo lands irrigation depletion			
Above Navajo Dam - private	738	575	163
Above Navajo Dam - Jicarilla	[5]2,190	350	1,840
Animas River	36,711	24,878	11,833
La Plata River	9,808	8,470	1,338
Upper San Juan	9,137	6,680	2,457
Hammond Area	10,268	7,507	2,761
Farmers Mutual Ditch	9,532	7,457	2,075
Jewett Valley	3,088	2,379	709
Westwater	110	110	0
Subtotal	**81,582**	**58,406**	**23,176**
Total New Mexico irrigation depletion	**383,080**	**235,133**	**147,949**
Non-irrigation depletions			
Navajo Reservoir evaporation	27,350	29,235	-1,885
Utah International[6]	39,000	31,388	7,612
San Juan Powerplant	16,200	16,200	0
Industrial diversions near Bloomfield	2,500	2,500	0
Municipal and industrial uses	8,453	7,443	1,010
Scattered rural domestic uses	[7]1,400	1,400	0
Scattered stock ponds and livestock uses	2,200	2,200	0
Fish and wildlife	1,400	1,400	0
Total New Mexico non-irrigation depletion	**98,503**	**91,766**	**6,735**
San Juan-Chama Project exportation	107,514	107,514	0
Unspecified minor depletions	[8]4,500	2,500	2,000
Jicarilla Apache Nation Navajo River Water Supply Project	[9]6,570	0	6,570
Total New Mexico depletions (excluding ALP)	**600,168**	**436,914**	**163,254**

Table V-3—Baseline and current depletion summary in the Basin[1] (continued)

Depletion category	RiverWare baseline (acre-feet)	Estimated current (acre-feet)	Presently[2] unused (acre-feet)
Colorado depletions – upstream of Navajo			
Upper San Juan	10,858	9,270	1,588
Navajo-Blanco	7,865	6,972	893
Piedra	8,098	6,892	1,206
Pine River	71,671	69,775	1,886
Subtotal	**98,492**	**92,909**	**5,583**
Colorado depletions – downstream of Navajo			
Florida	28,607	27,749	858
Animas	25,119	24,099	1,020
La Plata	13,245	13,049	196
Long Hollow	1,339	0	1,339
Mancos	19,532	15,516	4,016
Subtotal	**87,842**	**80,413**	**7,429**
Total Colorado depletions (excluding ALP)	**186,334**	**173,322**	**13,012**
Total Colorado and New Mexico combined depletions	**786,502**	**610,236**	**176,266**
ALP	[10]57,133	1,620	55,513
Subtotal	**843,635**	**611,856**	**231,779**
McElmo Basin imports	-11,769	-11,769	0
Utah depletions	[11]9,140	9,140	0
Arizona depletions	[7]10,010	10,010	0
Net New Mexico, Colorado, Utah, and Arizona depletions	**851,016**	**619,237**	**231,779**
New Mexico off-river depletions			
Chaco River	[7]2,832	2,832	0
Whiskey Creek	[7]523	523	0
GRAND TOTAL	**854,371**	**622,592**	**231,779**

[1] Baseline depletion values are from the Generation 2 San Juan River Basin Hydrology Model operated by the SJRBRIP and may change with new versions of the model or new basin hydrology. They are provided here as a reference point and would naturally be adjusted to match changes approved by the SJRBRIP.

[2] "Presently Unused" is water allocated to a specific project that is not currently developed but that is included in the baseline. Transfers of water rights within New Mexico under water subcontracts or leases are subject to State Engineer approval.

[3] Includes 10,600 acre-feet of annual groundwater storage. At equilibrium this drops to 270,000 acre-feet, based on irrigation of the full 110,630 acres every year. The proposed schedule of anticipated depletions prepared by the NMISC to reflect the Navajo Settlement Agreement includes an equilibrium depletion for NIIP of 256,500 acre-feet based on an average fallow acreage of 5 percent. While including fallow land in the depletion calculation is reasonable, the larger number is used here to be consistent with the NIIP section 7 consultation and the full capacity of the project.

[4] The Cudei diversion from the San Juan River has been removed and the Cudei area now receives water from the Hogback Project diversion.

[5] The Jicarilla Apache Nation recognizes this historic depletion as 2,195 acre-feet, but it was modeled as 2,190 acre-feet on average.

[6] The Utah International diversion/depletion is currently owned by BPH-Navajo Coal Company

[7] Indicates offstream depletion accounted for in calculated natural gains.

[8] 1,500 acre-feet of depletion from minor depletions approved of SJRBRIP in 1992. 3,000 acre-feet from 1999 intra-service consultation, a portion of which may be in Colorado.

[9] Biological opinion lists this depletion as 6,654 acre-feet, but model configuration shows 6,570. Model configuration used.

[10] Actual approved depletion is 57,100 acre-feet. Small changes in reservoir evaporation between runs results in small variation from actual project depletion. Exact match would require multiple iterations because of model limitations. The breakdown of the total project depletions between the States of Colorado and New Mexico is preliminary and approximate pending a final allocation of Nighthorse Reservoir evaporation to the States.

[11] 1,705 San Juan River depletion; 7,435 off-stream depletion.

Table V-5.—Summary of major existing and future Tribal uses of Basin water

Description	Diversion (AFY)	Depletion (AFY)	Included in environmental baseline[1] for recent ESA consultations
Existing uses – Navajo Nation[2]			
NIIP (Blocks 1–8)[3]		160,330	Yes
Hogback Project		12,100	Yes
Cudei Irrigation Project[4]		900	Yes
Fruitland		7,898	Yes
Existing uses – Navajo Nation (New Mexico State water rights)			
Shiprock Helium Plant (permit 2472)[5]		1,400	Yes
Kerr McGee (uranium processing) (permit 2875)[5]		700	Yes
Kerr McGee (permit 2807)[5]		500	Yes
Navajo Methodist School (Navajo Academy)		139.5	Yes
Existing uses – Jicarilla Apache Nation			
Decreed for historic and existing uses, 1880 priority date	5,683	2,195	Yes
Small third-party water service contracts	770	[6]770	Yes
PNM third-party water service contract (pursuant to the 1992 Jicarilla Settlement Act)	16,200	16,200	Yes
Evaporation – stock ponds and reservoirs		2,187	Yes
Existing uses – Ute Mountain Ute Tribe			
Dolores Project	25,100		N/A[7]
Existing uses – Southern Ute Indian Tribe			
Water allocated to the Tribe from the Florida Project	2,000		Yes
Pine River 181.7 cfs and 1/6 interest in Vallecito Reservoir			Yes
San Juan River, 5.64 cfs direct diversion rights, 1868 priority date	1,014		Yes
Piedra River, 2.0 cfs direct diversion, 1868 priority date	600		Yes

Table V-5.—Summary of major existing and future Tribal uses of Basin water (continued)

Description	Diversion (AFY)	Depletion (AFY)	Included in environmental baseline[1] for recent ESA Consultations
Future Uses – Navajo Nation[1]			
Navajo Nation Municipal Pipeline (ALP Project)	4,680	2,340	Yes
NIIP (Blocks 9–11)		120,270	Yes
Navajo-Gallup Water Supply Project (includes 7,500 AFY for the city of Gallup)	37,764	[2]27,193	No
Hogback Project restoration		16,420	No
Future Uses – Jicarilla Apache Nation		1,875	No
Jicarilla Settlement Act of 1992 (from San Juan-Chama Project)	6,500	6,500	Yes
Jicarilla Apache Nation Navajo River Water Supply Project (Navajo Gallup)	[8]12,000	6,654	Yes
Jicarilla Settlement Act of 1992 (Remaining from Navajo Reservoir or Navajo River) (Navajo Gallup)	[8]4,530	1,876	No
Future Uses – Ute Mountain Ute Tribe (see table I-1, ALP FSEIS for details on Colorado Ute Settlement)			
ALP Project		16,525	Yes
San Juan River, 10 cfs direct diversion rights, 1868 priority date	1,600		No
Mancos River direct diversion rights for 7,200 acres, priority date subordinated to 1985	21,000		No
Navajo Wash, 15 cfs direct diversion rights, priority date subordinated to 1985	4,800		No
Tributary groundwater, domestic and livestock wells		1,850	No

Table V-5.—Summary of major existing and future Tribal uses of Basin water (continued)

Description	Diversion (AFY)	Depletion (AFY)	Included in environmental baseline[1] for recent ESA consultations
Future uses – Southern Ute Indian Tribe (see table I-1, ALP FSEIS, p. 1-6 for details on Colorado Ute Settlement)			
ALP Project		16,525	Yes
Florida River, direct diversion rights, priority date subordinated to 1976	1,090		No
Florida River, Project water	563		Yes
Stollsteimer Creek, 1,850 AFY Pargin Reservoir storage, 5.5 cfs with 1868 priority and refill right with 1986 priority date	1,850+		Yes[9]
Piedra River, 8.9 cfs direct diversion, 1868 priority date	1,595		No
Devil Creek, direct flow right, 1868 priority date subordinated to 1976	183		No
San Juan River, direct diversion rights, 1868 priority date	516		No
Round Meadow Creek, direct diversion rights, 1868 priority date	975		No
Cat Creek, direct diversion, 1868 priority date	1,372		No
Tributary groundwater, domestic and livestock wells	2,000		No

Note: Blank spaces indicate information not readily available.

[1] The Service's biological opinions contain a baseline of depletions that are considered in recent ESA consultations. This table is not the same as the depletion table derived for this planning report and final environmental impact statement (table V-3).

[2] The Navajo Nation has existing unquantified uses in the Basin that are not listed in the table, including municipal water uses, irrigation on San Juan River tributaries, livestock uses, evaporation from reservoirs, and stock ponds, etc. These uses are included in the baseline table (table V-3).

[3] Includes 16,420 AFY from Hogback and Hogback extension.

[4] The Cudei diversion from the San Juan River has been removed and the Cudei area now receives water from the Hogback Project diversion

[5] Once the San Juan River Basin in New Mexico Navajo Nation Water Rights Settlement Agreement has been executed, and upon completion of the Joint Hydrographic Report and subsequent applicable paragraphs in the Supplemental Partial Final Judgment and Decree, the permits and licenses for the diversion and use of water pursuant to New Mexico State Engineer File Nos. 2472, 2807 and 2875 for uses of water at the Shiprock Helium Plant and Shiprock Mill shall be cancelled, and no water rights shall be adjudicated for said permits and licenses.

[6] This 770 acre-foot depletion is allowed under the 3,000 acre-foot minor depletion account allowed for through ESA (section 7) consultation under the SJRBRIP.

[7] This 25,100 acre-feet is imported from the Dolores River Basin and consumed in the Basin.

[8] The proposed diversion is a variable amount up to 12,000 AFY. The maximum new diversion will depend on the available water in that year. The Nation, as a member of the Hydrology Committee, will introduce for the Hydrology Committee's consideration, a method to calculate available water. The sum of this diversion and the remaining water Jicarilla Settlement Act water supply will not exceed 16,530 AFY.

[9] 530.6 acre-feet of the storage right and the 2 cfs and the 3.5 cfs are included in the environmental baseline for recent ESA consultations.

Table VI-1.—Summary depletions for full proposed project development

Water provider	Change in use of baseline depletion (changed used) (acre-feet)	New depletions (approved in excess of baseline) (acre-feet)	Met within total threshold depletion for Navajo Depletion Guarantee (acre-feet)	Total (acre-feet)
Scenario 1 – City of Gallup subcontract with the Jicarilla Apache Nation				
Jicarilla Apache Nation	[1]6,740	[2]1,960	0	8,700
Navajo Nation	0	6,411	20,782	27,193
Proposed Project total	6,740	8,371	20,782	35,893
Total reduced for 3,100 acre-feet NIIP returns		[3]5,271		
Scenario 2 – City of Gallup subcontract with the Navajo Nation				
Jicarilla Apache Nation	[4]1,200	0	0	1,200
Navajo Nation	[5]5,540	8,371	20,782	34,693
Proposed Project total	6,740	8,371	20,782	35,893
Total reduced for 3,100 acre-feet NIIP returns		[3]5,271		

[1] Includes forbearance by the Jicarilla Apache Nation of 6,750 AFY of consumptive use on the Jicarilla Apache Nation Navajo River Water Supply Project (JANNRWSP) and 170 acre-feet of consumptive use under Jicarilla water rights for historic uses.

[2] The Final Biological Opinion for the Navajo-Gallup Water Supply Project does not establish any right in the Jicarilla Apache Nation to retain approval for 1,960 AFY of new depletions in excess of the baseline depletions listed in table V-3 should this amount of Jicarilla water rights, over and above the change in use of 6,750 acre-feet of baseline depletion, not be required for the proposed Project due to the City of Gallup subcontracting with the Navajo Nation, as shown in scenario 2.

[3] By the time the Navajo Nation's water demands under the proposed Project reach the full 27,193 acre-feet of depletion, the return flows from the NIIP to the San Juan River are anticipated to have increased by approximately 3,100 AFY, on average, over and above the current rate of return flow from the NIIP. This increase in return flows from the NIIP offsets an equivalent amount of new depletion by the proposed Project and reduces the net new depletion from the river in the proposed Project's biological opinion from 8,371 AFY to 5,271 AFY.

[4] Includes a forbearance by the Jicarilla Apache Nation of 1,200 AFY of consumptive use on the JANNRWSP.

[5] Includes forbearance by the Navajo Nation of 5,540 AFY of consumptive use on the NIIP or other Navajo projects for which depletions are in the baseline.

APPENDIX 3
ENVIRONMENTAL COMMITMENTS

Record of Decision
Navajo-Gallup Water Supply Project

This appendix summarizes the environmental commitments that have been made by Reclamation during the development of the Preferred (SJRPNM) Alternative. Reclamation will have responsibility for implementing measures that will avoid or reduce potential environmental impacts of the Navajo-Gallup Water Supply Project.

Commitments for pre-construction activities will generally be completed by Reclamation or by contractors during the final design process and prior to construction activities. Wildlife, wetland, cultural resources and other mitigation will be completed by Reclamation as described in the following paragraphs. Some commitments, such as monitoring or additional studies, would continue beyond completion of construction of Project facilities.

General Commitments

1. Reclamation will prepare and implement an Environmental Commitment Plan for the Project to document and track the completion of the environmental commitments.

Water Uses and Resources Commitments

1. Until depletions in the San Juan River Basin reach the baseline depletion (Table V-3 in Volume I of Navajo-Gallup Water Supply PR/FEIS, Appendix 2 of this ROD) plus 5,270 afy added to the baseline for this Project, no specific, detailed accounting of depletions will be required.
2. If the depletion threshold of 752,127 afy of depletions is reached in the future, the Navajo Nation will reduce its total depletions in the Basin so that its consumptive uses under the Project do not cause the total depletions in the Basin to exceed the threshold depletions. The Navajo Nation could accomplish the required reductions in use by changes in the operation of any of the Navajo Nation's projects that deplete water from the San Juan River. The maximum Navajo Depletion Guarantee requirement in any year is a reduction in Navajo Nation depletions of 20,782 acre-feet.
3. Reclamation will identify the point at which ALP and NIIP annual depletions reach 290,000 afy.
4. If that target depletion is reached, Reclamation will initiate reporting of depletions for the categories listed in the hydrologic baseline for the Project (Table V-5 in the PR/FEIS) on a five-year cycle as part of the consumptive use and loss reporting procedure.

5. As a result of monitoring, Reclamation will identify the point at which the sum of actual depletions reach the depletion threshold, Reclamation will limit deliveries to Navajo projects, as directed by the Navajo Nation, to levels required by implementation of the Navajo Depletion Guarantee.
6. The Navajo Nation will limit uses as specified in the Navajo Depletion Guarantee if the conditions stated above are reached and provide to the Recovery Program and Reclamation the projects it wishes limited to reduce depletions.

Indian Trust Assets Commitments

1. There is no mitigation measure proposed for Indian Trust Assets. However, one of the goals of the Recovery Program is to "...proceed with water development in the Basin in compliance with federal and state water law, interstate compacts, Supreme Court decrees, and federal trust responsibilities to the Southern Utes, Ute Mountain Utes, Jicarillas, and the Navajos".

Water Quality Commitments

1. Reclamation will develop and implement a program to reduce, minimize, or eliminate temporary, short-term increase in suspended sediment loading or other water quality constituents potentially caused by Project construction through the incorporation of permits, best management practices (BMPs), and sediment control structures.

Vegetation Commitments

1. Reclamation will ensure that Project construction contractors limit ground disturbance to the smallest feasible areas and that they implement BMPs along with planting or reseeding of areas disturbed by the Project using native plants to assist in the re-establishment of native vegetation.
2. Reclamation will use accepted erosion control measures during Project construction, supplement grass seeding with native shrub seed in upland areas where shrub cover is diminished due to pipeline disturbance, monitor planting to ensure establishment, and control noxious weeds in areas disturbed by the Project.
3. Reclamation will comply with Section 404 of the Clean Water Act and request and obtain authorizations for discharge of dredge and fill for the Project prior to construction.
4. Reclamation will develop and implement a plan to replace riparian and wetland habitat. The plan will include acre-per-acre replacement or enhancement of 3 acres for each acre lost. It is anticipated that compensatory mitigation will require the revegetation of 17 acres of non-native riparian (Russian olive and tamarisk), and 3.6 acres of wetlands temporarily removed during pipeline construction. Approximately 0.9 acres of non-native riparian and 1.1 acres of wetlands will be permanently removed for Project features.

Wildlife Commitments

1. Reclamation will minimize disturbance to raptors by restricting major construction activities along the Nutria and Defiance Monoclines, Cutter Canyon, Blanco Canyon, and the corridor from Cutter to Largo Canyons during the nesting season (January 15 to August 15). If that is not possible, extensive nest searches will be made up to three-quarters of a mile from the proposed activities immediately prior to construction and active nests avoided.
2. Reclamation will conduct extensive nest searches within one-quarter mile of the proposed activities immediately prior to construction and avoid active nests if construction activities could not be scheduled outside the January 15 to July 15 timeframe.
3. Reclamation will incorporate raptor perch guards or raptor safe configurations on all new transmission structures.
4. Reclamation will avoid removal of riparian and wetland vegetation between March 15 and August 15 to avoid potential impacts to migratory bird nesting.
5. Reclamation will trench and bury pipeline concurrently to minimize trapping of small wildlife to the extent possible. Reclamation will construct escape ramps for trenches left open overnight.

Aquatic Resources Commitments

1. The Navajo Depletion Guarantee will be implemented as previously described under Water Uses and Resources Commitments.
2. Reclamation will incorporate BMPs in construction contracts as previously described in the Water Quality Commitments.

Special Status Species Commitments

1. Reclamation will conduct surveys for ferruginous hawk and bald eagle in Project construction areas one year in advance of construction for pipeline routes and construction sites not adjacent to highways, well-traveled roads, or areas of regular human activity.
2. Reclamation will implement appropriate protective measures to avoid or minimize nest disturbance if active nests are found.
3. Reclamation will conduct surveys for Southwestern willow flycatcher in riparian and wetland habitat prior to construction within one-quarter mile of disturbed areas and avoid construction activities during the nesting season (March 15 to August 15) if active nesting is found.
4. Reclamation will delineate and avoid beautiful gila plants where possible.
5. Reclamation will implement Conservation Measures and Reasonable and Prudent Measures (RPMs) as described in Appendix 1.

Recreation Commitments

There are no environmental commitments for recreation resources.

Land Use Commitments

1. Reclamation will ensure that revegetated areas are fenced to prevent grazing activities until disturbed areas become re-established.
2. Reclamation will work with the Navajo Nation to provide temporary relocation assistance to affected livestock owners along the pipeline corridor.
3. Reclamation will provide relocation assistance to affected residences displaced by construction of the San Juan water treatment facility.

Hazardous Materials Commitments

1. Reclamation will contact pipeline and gas well companies prior to construction activities to identify and avoid existing and new hazards. Pipeline alignments will be adjusted, as needed to avoid impacts to other pipelines and wells.

Soil Commitments

1. Reclamation will mandate that construction contractors use and implement measures contained in erosion control guidelines and BMPs to control soil erosion from Project construction areas.

Geology Commitments

There are no environmental commitments for geological resources.

Paleontological Commitments

1. During Project construction activities, Reclamation will monitor areas with exposed geological units or settings that indicate a high likelihood of yielding vertebrate fossils or noteworthy occurrences of invertebrate or plant fossils. In the event of discovery, Reclamation will evaluate the significance before construction activities in the affected area could continue.
2. Reclamation will manage, on a case-by-case basis, Project construction activities adjacent to the Lynbrook and Bentonnie Tsosie Fossil areas. Reclamation will conduct paleontological clearances prior to any surface-disturbing activities along the pipeline corridor in the Lynbrook and Betonnie Tsosie Fossil areas.

Air Quality and Noise Commitments

1. Reclamation will require Project construction contractors to implement measures to control fugitive dust during construction.
2. There are no environmental commitments for noise abatement.

Socioeconomic Commitments

1. Reclamation will implement Land Use Commitments previously described to reduce socioeconomic impacts to displaced residence and livestock operators.

Environmental Justice Commitments

There are no environmental commitments for environmental justice.

Cultural Resources Commitments

1. Reclamation will implement a program to compensate for losses of archaeological sites that will occur as a result of construction, operation and maintenance of the Project.
2. Reclamation will coordinate the program with the New Mexico State Historic Preservation Officer, Navajo Nation Tribal Historic Preservation Officer, Jicarilla Apache Nation, Hopi Cultural Preservation Office, Bureau of Land Management, Bureau of Indian Affairs, City of Gallup, and the Advisory Council on Historic Preservation.
3. Reclamation will ensure compliance with mitigation measures developed in accordance with the Native American Graves Protection and Repatriation Act and Executive Order 13007.

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Adaptive Control

An Adaptive Management Strategy For Nonnative Fish Control

Background

Experiments to control the population of non-native fish, primarily trout, in the Little Colorado River (LCR) reach of the main-stem Colorado River were initiated in the winter of 2003 and ran for 3 years. Two experiments were conducted: 1) mechanical removal of rainbow trout and brown trout, and 2) nonnative fish suppression flows from Glen Canyon Dam.

The mechanical removal experiments were considered successful in reducing trout numbers in the LCR reach. However, there were many complicating factors such as declining basin-wide abundance of trout and relatively high yet declining immigration rates. It is unknown whether the reduction in trout numbers was a factor in the increasing trend of humpback chub. We do know that trout do have an immediate effect on native fish. Rainbow trout consume about 4 humpback chub per year in the LCR reach, while brown trout consume about 80 humpback chub per year (Yard et al. in review). Further, recent modeling results by Dr. Carl Walters (USGS Senior Ecologist) suggest a potential for severe food restrictions in the LCR reach which might exacerbate competitive interactions between trout and humpback chub. Although mechanical removal has been shown to be effective as a mechanism for removing trout, it is still unclear if it is effective at maintaining low abundances of trout due to immigration rates and whether those removals (either short or long-term) are effective in having a population-level response in humpback chub. Thus, many questions remain unanswered and should be evaluated in an adaptive-management framework.

The nonnative fish suppression flows may have also had some degree of success in reducing the productivity of the trout stock in Lees Ferry. However, it is not clear to what extent targeted flows can have in controlling the trout population in Grand Canyon, especially the emigration rates from Lees Ferry downstream to the LCR reach. We do know that severe fluctuations (i.e., pre-rod flows) can substantially reduce recruitment of trout to the extent that stocking was needed to support a sport-fishery. Further, recent evidence suggests that a combination of flows at specific times related to the life-history of trout in Lees Ferry could have a cumulative impact on the recruitment of rainbow trout. The extent of the impacts is unknown especially when being considered in tandem to each other.

A series of flow and mechanical mechanisms was discussed in depth and proposed in Valdez et al. (2010) and was provided to Reclamation. This has generally been talked about as the Kitchen Sink approach, utilizing a series of activities, both flow and non-flow, to achieve the desired management of trout in Grand Canyon and Glen Canyon.

Key Assumptions

- Rainbow trout represent a substantial threat to the recovery of humpback chub due to competition for limited food resources and predation in the LCR reach of the main-stem.
- Mechanical removal of trout at the LCR reach is likely to be successful if the number of removal trips (effort) is commensurate with the number of rainbow trout and the immigration rates to the LCR reach. High flow experiments are expected to substantially enhance the emigration rates from Lees Ferry and thus the immigration rates to the LCR reach. It is unclear if mechanical removal on its own could be effective under these conditions (high immigration rates) and would certainly be expensive as well as disruptive to tribal concerns in Grand Canyon. However, mechanical removal in coordination with other activities may provide the needed assurances that we can mitigate the impacts of trout on humpback chub in the LCR reach.
- The implementation of mechanical removal in the LCR reach could be implemented under specific triggers (see below), providing the assurance that as other mechanisms are tested that we can insure that trout do not have a population-level impact on humpback chub.
- In order to implement mechanical removal in the LCR reach culturally sensitive options for the taking of trout and their beneficial use would need to be used, including the option for live removal.
- Actions considered in Valdez et al. (2010), and further considered as the "Kitchen Sink II" during the SDM workshops would utilize a variety of flow and non-flow actions upstream of the LCR reach in order to avoid the need for mechanical removal downstream. This approach utilized three key mechanisms: (1) primary control of trout using mechanical removal in the Paria to Badger Rapid reach as well as the removal of brown trout at Bright Angel creek, (2) secondary control of trout at the LCR reach only when triggered, and (3) further experimentation with flows to affect trout in the Lees Ferry reach in order to reduce the emigration rates to an acceptable level.

Removal Curtain in the Paria to Badger Rapid (PBR) Reach

Modeling results during the SDM workshop suggest that intensive removals in the PBR reach could substantially reduce the amount of trout emigrating downstream to the LCR reach. Substantial uncertainty exists with the potential effects of repeated high flow events. Thus, more or less effort in the PBR might be needed. If proven to be successful, it is intended for efforts in the PBR reach to become the primary control effort in this adaptive management scenario. This is due in part to the logistical benefits of working near Lees Ferry and the potential for live removals and beneficial use of the trout. By moving closer to the primary source of the trout we are hoping to have a more robust effect on the suitability of the main-stem habitat in the LCR reach by maintaining a year-round reduction in trout numbers by intercepting fish closer to the source. This approach also substantially reduces the disturbance effect in the LCR reach and likely would result in less take of humpack chub (e.g., less handling of fish). Some level of mechanical removal may be necessary in the LCR reach during the first few years of the program to remove existing trout (depending on triggers), and on occasion afterwards to remove fish that emigrated past the PBR curtain. Substantial uncertainty exists around any of these proposals and robust monitoring would be needed as well as experimentation with gear types and effort, etc, including the potential for enhancing sport fishing take of trout.

LCR Reach Mechanical Removal

The potential to use mechanical removal in the LCR reach provides an assurance that the effect of trout on humpback chub can be reduced if needed, or triggered. The threat of competition and predation from trout on humpback chub is likely more severe when humpback chub numbers are low and rainbow trout numbers are high. The degree to which mechanical removal is necessary is thus a function of two variables: humpback chub and trout population numbers and trends (see discussion of triggers below).

Glen Canyon Dam Flow Experimentation

Once the primary control mechanisms for trout (PBR reach removals) are proven effective and PBR removals move from the experimental to management actions, flow and non-flow experiments focused on the Lees Ferry reach will be conducted in order to evaluate their ability to reduce the emigration of trout. Prior to flow experimentation at Lees Ferry, we would first seek certainty that removal efforts in the PBR reach is effective. We propose that an experimental protocol be developed to logically test the various flow mechanisms described in Valdez et al. (2010). The goal is to appreciably reduce emigration rates from Lees Ferry while maintaining adequate catch rates to support a robust recreational fishery. The development of an experimental protocol to test flow actsions would be accomplished through a public process that would include meetings with interested stake holders.

There are many potential benefits of using flows to reduce trout emigration rates. First, flow actions might be cheaper or more effective over the long-term at mitigating the effects of trout on humpback chub. Second, it might also be found that the goals cannot be achieved without using flows to reduce the productivity of the Lees Ferry trout population. Thus, we propose using an adaptive management framework to experiment with a variety of options and to pick the ones that best meet our objectives of developing a long-term management strategy that is culturally sensitive, cost effective, and benefits native fish.

Proposed Triggers for Mechanical Removal in the LCR Reach

Given that humpback chub are a long-lived species while rainbow trout are relatively short-lived species, any attempt at a species-specific trigger must account for time lags in population level responses. Thus we are proposing a tired trigger that accounts for both trout and humpback chub population size. The reconsultation trigger of 6,000 adult humpback chub in the 2009 Biological Opinion and 2010 revised Incidental Take Statement provides the lower-bound for humpback chub population size. If the starting point for the humpback chub population is 8,000 adults (current estimates used in the SDM workshop) and if the population declined at about a 5% rate (similar to the 1990s), it would take about 6 years for the humpback chub population to fall below the 6,000 adult reconsultation trigger. However, any impact of reducing trout numbers would not likely have a population level effect (on age 4+) for 4 years. Conversely, if we do see an effect such as a declining humpback chub population it could very well be that due to the lag in time between the effect (predation, competition due to high trout numbers) the trout population might have decline drastically due to the difference in life histories between the two species. Considering these complications, a reasonable trigger could be established: if humpback chub are fewer than 4 years away from reaching 6,000 adults (using the decline rate) and rainbow trout are above 1,200 in the LCR reach then implement removals. If humpback remain above 7,220 (the population number that is 4 years above the 6,000 adult boundary), a sufficient buffer might exist and no LCR mechanical removal should be necessary (given primary control efforts in the PBR reach are operating and effective) unless a much higher rainbow trout population is reached, and this should be unlikely if the PBR efforts are effective. If humpback chub are fewer than 7,220 adults but rainbow trout in the LCR reach are below 1,200 then no action in the LCR reach is necessary.

Flow Chart

The following figure illustrates the control approach described above. The effectiveness of mechanical removal at the LCR has been demonstrated (ability to remove trout). We have a high degree of certainty that with enough removal trips trout numbers can be substantially reduced in the LCR reach. LCR removal trips would only occur when the trout and humpback chub triggers are met. Mechanical removal in the LCR reach would be expensive and is generally not culturally sensitive, despite the possibility that beneficial use may be made of the trout removed.

If trout productivity is affected anywhere near the extent as the 2008 and 2009 levels observed from the latest HFE, then the program is going to need a more effective method for mitigating impacts of trout on humpback chub. As discussed at the SDM workshop, mechanical removal in the PBR reach offers many benefits over similar activities in the LCR reach. However, substantial uncertainty exists on how trout will use the habitat in the PBR reach and whether efforts can be appropriately timed to coincide with emigration periods from Lees Ferry. The intent is to experiment with PBR mechanical removals using those tools necessary to provide the same assurances (or better) that we would have if we just implemented LCR reach mechanical removal efforts. As we learn more about the movement patterns of trout we may be able to create triggers for implementing PBR removal efforts.

There is little doubt that mechanical removal efforts in the PBR reach and LCR reach would be expensive and very labor intensive. It is possible that flows could be used in conjunction with or in lieu of mechanic removal efforts to control the emigration of trout from Lees Ferry. The program should develop a plan to experiment with flows at Glen Canyon Dam and with other actions at Lees Ferry thus expanding our tools to manage trout. The dual goals of reducing emigration of trout and enhancing the Lees Ferry recreational fishery must be emphasized here. A successful combination of management actions and flows could allow an assurance to resource managers that trout movement downstream can be controlled. The strategic use of combined trout-humpback chub triggers is a critical component in this proposal.

ADAPTIVE CONTROL APPROACH

≈ 10-year Phased Implementation

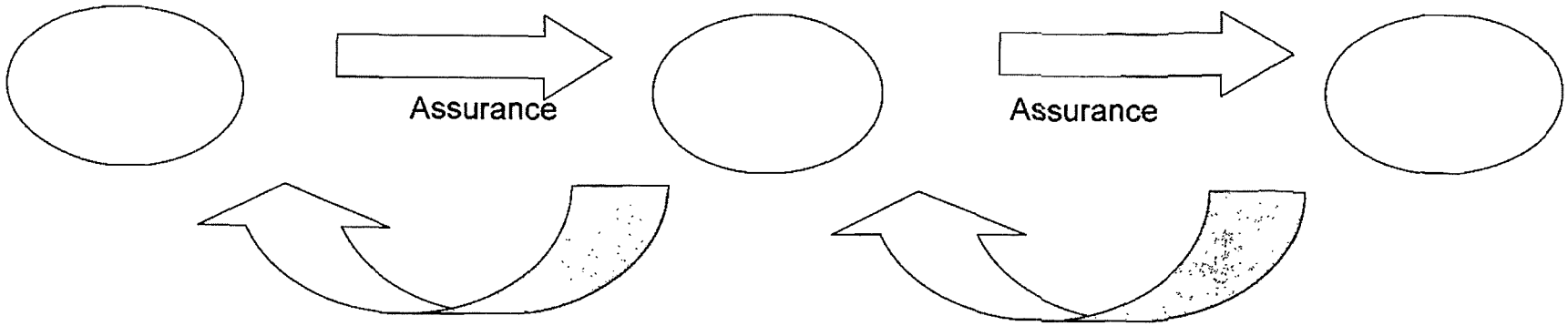
↓ Cultural Sensitivity
↓ Efficacy and Efficiency
↑ Costs
↑ Uncertainty

SECONDARY CONTROL
.CR
Mechanical Removal

PRIMARY CONTROL
PARIA-BADGER
Removal Curtain

↑ Cultural Sensitivity
↑ Efficacy and Efficiency
↓ Costs
↓ Uncertainty

EXPERIMENTATION
LEES FERRY
Targeted Flows



This approach strives to move to a sustainable, cost effective and increasingly culturally sensitive long-term program. It strives to find the combinations of management actions and locations that effectively manages the fishery resources by reducing competition between native and non native fish while improving the cold water fishery resources in the Glen Canyon National Recreation Area.

As management efficacy increases and uncertainty decreases with each treatment through effective research design and study, it allows for increased experimentation with the subsequent treatment in an adaptive approach.

Implementation of an effective research design will allow for continued refinement of management techniques through the adaptive management process