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Navajo Sett
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Navajo Re

MEMORANDUM
May 31, 2005

To: John D'Antonio, State Engineer
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John Stomp, Water Resources Division Manager, City of Albuquerque

Copy: Estevan Lopez, Interstate Stream Engineer
Jim Dunlap, Chairman, Interstate Stream Commission
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Erik Webb, Staff, Office of Senator Pete Domenici
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From: John Whipple, Staff, Interstate Stream Commission

Subject: Institutional Processes and Computational Procedures for Implementing
Section 11 of the Act of June 13, 1962, Public Law 87-483

BACKGROUND

Representatives of the Office of the State Engineer, the Navajo Nation, the City of Albuquerque and New Mexico's Congressional delegation met on March 29, 2005, to discuss the City of Albuquerque's concerns regarding possible impacts of the San Juan River Basin in New Mexico Navajo Nation Water Rights Settlement Agreement on the availability of water for the San Juan-Chama Project. As part of the discussion, the City proposed that a working group be established to develop institutional processes and computational procedures for implementing the water allocation formula of section 11 of the Act of June 13, 1962, Public Law 87-483, during years of shortage (see John Stomp's March 28, 2005, Inter-Office Correspondence to Congressional staff on Hydrologic Impacts and Recommendations for the Navajo Nation Water Rights Settlement Agreement, at page 4). Existing processes and procedures, and additional direction and guidance to the Secretary of the Interior that is proposed by the Settlement Agreement, are as follows.

WATER ALLOCATION FORMULA OF SECTION 11 OF PUBLIC LAW 87-483

Section 11 of Public Law 87-483 provides, in pertinent part:

- (a) No person shall have or be entitled to have the use for any purpose, including uses under the Navajo Indian irrigation project and the San Juan-Chama project authorized by sections 2 and 8 of this Act, of water stored in Navajo Reservoir or of any other waters of the San Juan River and its tributaries originating above Navajo Reservoir to the use of which the United States is entitled under these projects except under contract satisfactory to the Secretary [of the Interior] and conforming to the provisions of this Act. Such contracts, which, in the case of water for Indian

uses, shall be executed with the Navajo Tribe, shall make provision, in any year in which the Secretary anticipates a shortage, taking into account both prospective runoff originating above Navajo Reservoir and the available water in storage in Navajo Reservoir, for a sharing of the available water in the following manner: The prospective runoff shall be apportioned between the contractors diverting above and those diverting at or below Navajo Reservoir in the proportion that the total normal diversion requirement of each group bears to the total of all normal diversion requirements. In the case of contractors diverting above Navajo Reservoir, each such contract shall provide for a sharing of the runoff apportioned to said group in the same proportion as the normal diversion requirement under said contract bears to the total normal diversion requirements of all such contracts that have been made hereunder: *Provided*, That for any year in which the foregoing sharing procedure either would apportion to any contractor diverting above Navajo Reservoir an amount in excess of the runoff anticipated to be physically available at the point of his diversion, or would result in no water being available to one or more such contractors, the runoff apportioned to said group shall be reapportioned, as near as may be, among the contractors diverting above Navajo Reservoir in the proportion that the normal diversion requirements of each bears to the total normal diversion requirements of the group. In the case of contractors diverting from or below Navajo Reservoir, each such contract shall provide for a sharing of the remaining runoff together with the available storage in the same proportion as then normal diversion requirement under said contract bears to the total normal diversion requirements under all such contracts that have been made hereunder.

...

The procedures to be followed and the steps to be taken to implement section 11 of public Law 87-483 were set forth in mathematical terms of formulas provided by the US Bureau of Reclamation in Navajo Indian Irrigation and San Juan-Chama Participating Projects, New Mexico, 85th Congress, 2nd Session, Senate Report No. 2198, August 5, 1958, at pages 67-69, as follows:

The evaporation factor E is here handled as a reduction to inflow. By this process water users above, below, and from Navajo Reservoir stand a share of the Navajo Reservoir evaporation loss. The principle could also apply if evaporation was considered as an addition to, or part of, total demand. In this latter event, it would be necessary to assign a share of the evaporation loss to the group of contractors above Navajo and to the group below such that $D_a + D_b$ would continue to equal D, even though D contained the evaporation factor E.

The results of the two methods could be the same by appropriate assignment of the evaporation factor E. For simplicity, however, the first-described method has been adopted herein. Evaporation cannot here be considered a reduction in available water stored in Navajo Reservoir as to do this would require only those users from or below Navajo to stand the evaporation loss.

In those years in which a shortage is anticipated, or has been determined to exist under the terms of section [11], it will be necessary to make at least monthly estimates of inflow and storage content, with corresponding adjustments if needed in apportioned supply.

Definitions of the symbols used in the formulas are as follows:

- R = Available water stored in Navajo Reservoir.
- E = Estimated evaporation for year concerned.
- I = Anticipated or forecasted inflow (minus uses not subject to sharing) into Navajo Reservoir for year concerned. ($I = I_a + I_b$).
- I_a = Available runoff (inflow) apportioned to the group of contractors above Navajo Reservoir.
- I_b = Available runoff (inflow) apportioned to the group of contractors below Navajo Reservoir.
- I_p = Available runoff physically available at point of contractor's diversion.

- D = Total normal diversion requirements of all contractors. ($D = D_a + D_b$).
- D_a = Total normal diversion requirements of the group of contractors above Navajo Reservoir.
- $D_{a 1, 2, 3, \text{ etc.}}$ = Normal diversion requirements of respective contractors diverting above Navajo Reservoir.
- D_b = Total normal diversion requirements of [the] group of contractors diverting from or below Navajo Reservoir.
- $D_{b 1, 2, 3, \text{ etc.}}$ = Normal diversion requirement[s] of respective contractors diverting from or below Navajo Reservoir.

Step 1—Determination of water shortage

“Such contracts shall make provision, in any year in which the Secretary anticipates a shortage taking into account both the prospective runoff originating above Navajo Reservoir and the available water in storage in Navajo Reservoir, for sharing available water * * *.”

A water shortage is determined to exist when the available water stored in Navajo Reservoir (R) and the anticipated or forecasted inflow into the reservoir (I) is less than the total normal diversion demand of all contractors, or

$$R + (I - E) < D$$

Step 2—Apportionment of available water supply between contractors above and those at or below Navajo Reservoir

In the event it is determined by step 1 that a water shortage exists, the prospective runoff, the right to which the United States is entitled as defined in the proposed amendment to section [11], would be “apportioned between the contractors diverting above and those diverting at or below Navajo Reservoir in the proportion that the total normal diversion requirement of each group bears to the total of all normal diversion requirements,” or

The share of available inflow for the group of contractors above Navajo Reservoir, (I_a), is

$$\frac{D_a}{D} \times (I - E)$$

The share of available inflow for the group of contractors below Navajo Reservoir, (I_b), is

$$\frac{D_b}{D} \times (I - E)$$

Step 3—Sharing of available runoff apportioned to contractors above Navajo Reservoir

“In the case of contractors diverting above Navajo Reservoir, each such contract shall provide for a sharing of the runoff apportioned to the said group in the same proportion as the normal diversion requirement under said contract bears to the total normal diversion requirements of all such contracts,” or

$$\frac{D_{a1}}{D_a} \times I_a,$$

$$\frac{D_{a2}}{D_a} \times I_a,$$

and so forth, for each of those contractors.

Step 4—Reapportionment when water apportioned is in excess of runoff available to contractor above Navajo Reservoir

“Provided, That for any year in which the foregoing sharing procedure either would apportion to any contractor diverting above Navajo Reservoir an amount in excess of the runoff anticipated to be physically available at the point of his diversion, or would result in no water being available to one or more such contractors, the runoff apportioned to said group shall be reapportioned as near as may be among the contractors diverting above Navajo Reservoir in the proportion that the normal diversion requirement of each bears to the total normal diversion requirements of the group.

Actually, the manner of handling this provision will depend upon physical factors of amount of diversion and respective locations of points of diversion of contractors to each other. In general, the provision would be accomplished in the following manner when the procedure of step 3 results in apportioning more water to a contractor (D_{a1}) than is physically available at his point of diversion:

$$D_{a1} = I_p$$
$$\frac{D_{a2}}{D_a - D_{a1}} \times (I_a - I_p)$$
$$\frac{D_{a3}}{D_a - D_{a1}} \times (I_a - I_p),$$

And so forth.

Step 5—Sharing of remaining available runoff and available stored waters among contractors at or below Navajo Reservoir

“In the case of contractors diverting from or below Navajo Reservoir each such contract shall provide for a sharing of the remaining runoff together with the available storage in the same proportion as the normal diversion requirement under said contract bears to the total normal diversion requirements under all such contracts,” or

$$\frac{D_{b1}}{D_b} \times (I_b + R)$$
$$\frac{D_{b2}}{D_b} \times (I_b + R)$$
$$\frac{D_{b3}}{D_b} \times (I_b + R),$$

and so forth, for each of those contractors.

Other than San Juan-Chama Project contractors, contractors for water from the Navajo Reservoir water supply are the Navajo Nation for irrigation uses on the Navajo Indian Irrigation Project, the Jicarilla Apache Nation for uses pursuant to the Jicarilla Apache Tribe Water Rights Settlement Act (Public Law 102-441), the Hammond Conservancy District for uses on the Hammond Irrigation Project, and Williams Gas. The Hammond Conservancy District contract for 23,000 acre-feet of diversion is perpetual, but the Williams Gas contract for 50 acre-feet of diversion expires in 2028. The Jicarilla Apache Nation’s settlement contract for up to 33,500 acre-feet of diversion and 25,500 acre-feet

of depletion per year is perpetual, and the Nation subcontracts water for uses diverting below Navajo Reservoir, including for 16,200 acre-feet of diversion and depletion by the Public Service Company of New Mexico at the San Juan Generating Station beginning 2006 and ending 2027 and for several small uses under short-term subcontracts. The Navajo Nation's contract for diversion of up to 508,000 acre-feet per year for use on the Navajo Indian Irrigation Project would be superseded by the settlement contract proposed as part of the San Juan River Basin in New Mexico Navajo Nation Water Rights Settlement Agreement. Pursuant to the Settlement Agreement and the proposed authorization of the Navajo-Gallup Water Supply Project, the Navajo Nation also would be entitled to receive under the proposed settlement contract up to 22,650 acre-feet of diversion and 20,780 acre-feet of depletion for its uses in New Mexico under the project. If Congress authorizes the Navajo-Gallup Project, the Jicarilla Apache Nation would use 1,200 acre-feet of its contract water supply through the project and would subcontract 7,500 acre-feet of its contract supply for long-term use by the City of Gallup for its share of the project.

DIRECTION TO SECRETARY IN NAVAJO SETTLEMENT AGREEMENT

It is the responsibility of the Secretary of the Interior pursuant to section 11 of Public Law 87-483 to determine whether an anticipated shortage exists, and to determine and apportion the available runoff and storage in accordance with the principles of section 11. Nonetheless, with the possibility of shortages during the recent drought and the possibility of increased demands on the Navajo Reservoir water supply if the Navajo-Gallup Water Supply Project is authorized and constructed, some Navajo Reservoir water supply contractors in the San Juan River Basin and some San Juan-Chama Project contractors in the Rio Grande Basin raised questions as to how the Secretary of the Interior might determine the normal diversion requirements of contractors.

Since passage of Public Law 87-483 in 1962, the United States pursuant to New Mexico State Engineer Permit No. 3215 appropriated 500 cfs of inflow to the San Juan River arising below Navajo Dam to supplement the water supply available at Navajo Reservoir for meeting the diversion demands under Navajo Reservoir water supply contracts. Also, facilities of the Navajo Indian Irrigation Project have been completed to provide water service to about 75 percent of the acreage authorized for the project. The Navajo Nation in three cooperative agreements, which are the Recommendations for San Juan River Administration and Operations for 2003, for 2004 and for 2005, accepted a concept that its diversion requirement would reflect the normal diversion requirement for the amount of acreage and for the crops it will irrigate during the year, as opposed to an authorized diversion amount that may not reflect the current project condition and demand. Certainly, the Secretary in making determinations of normal diversion requirements may consider the use of water available to the United States under Permit No. 3215 to meet diversion requirements of contractors diverting below Navajo Reservoir and the current year demands for water originating above Navajo Reservoir to meet the diversion requirements of contractors for beneficial uses during the year.

In addition, the Settlement Agreement and Navajo-Gallup Water Supply Project authorization would conditionally provide an opportunity for the Navajo Nation to contract with the Secretary of the Interior for delivery of 6,410 acre-feet of water from the Navajo Reservoir water supply for its uses in Arizona under the project. Article IX of the Upper Colorado River Basin Compact provides for the storage and diversion of water in an upper signatory state for consumptive use in a lower signatory state, subject to the rights of water users in the upper signatory state to receive and use water within the apportionment to such state by the compact.

As a result of public comments on the proposed Settlement Agreement, including comments submitted by the City of Albuquerque regarding occurrences and sharing of shortages pursuant to section 11 of Public Law 87-483, section 403 of the settlement act that is Appendix 3 to the Settlement Agreement would provide the following additional direction and guidance to the Secretary as to the determination of normal diversion requirements and allocations of water in a year of shortage pursuant to section 11 of Public Law 87-483:

SEC. 403. SHARING OF AVAILABLE WATER.

(a) INFLOW BELOW NAVAJO DAM. -- Whenever water is available for diversion pursuant to New Mexico State Engineer File No. 3215, the water available shall be distributed, to the extent practical, in proportionate amounts to the diversion demands of all contractors and subcontractors of the Navajo Reservoir water supply diverting below Navajo Dam.

(b) RUNOFF ABOVE NAVAJO DAM. -- For the purpose of implementing the shortage sharing provisions of subsection 11(a) or the Act of June 13, 1962 (76 Stat. 96; Public Law 87-483), the Secretary of the Interior shall determine amounts of shortage and apportionments of water using the normal diversion requirements on the flow of the San Juan River originating above Navajo Dam that are based on:

- (1) the amounts of diversion or water delivery for the current year anticipated to be necessary to irrigate lands in accordance with cropping plans prepared by contractors;
- (2) the annual diversion or water delivery demands for the current year anticipated for non-irrigation uses pursuant to water delivery contracts, including the demand for delivery for uses in Arizona under the Navajo-Gallup Water Supply Project as authorized by section 104 of Title I of this Act, but excluding any current demand for surface water for placement into aquifer storage for future recovery and use; and
- (3) an annual normal diversion demand of 135,000 acre-feet for the San Juan-Chama Project (initial stage) authorized by section 8 of the Act of June 13, 1962.

The Secretary shall not include in the normal diversion requirements the amounts of water that reliably can be anticipated to be diverted or delivered under contract from inflows to the San Juan River arising below Navajo Dam pursuant to New Mexico State Engineer File No. 3215, or the amounts of water anticipated to be supplied through re-use. In the event that the State of New Mexico determines that water uses under Navajo Reservoir water supply contracts or diversions by the San Juan-Chama Project must be reduced in any year for New Mexico to comply with the provisions of the Upper Colorado River Basin Compact (63 Stat. 31), including, but not limited to, Article III and Article IV of the Compact, the Secretary shall reduce the normal diversion requirements if necessary to reflect water use of diversion limitations imposed by the State of New Mexico.

(c) ALLOCATION OF SHORTAGES. -- In the event of shortage, the Secretary of the Interior shall first make an allocation of shortage to the demand on the Navajo Reservoir water supply for delivery for uses in Arizona under the Navajo-Gallup Water Supply Project, up to the full amount

of demand and excluding the amounts of water anticipated to be diverted for such uses from inflows to the San Juan River arising below Navajo Dam pursuant to New Mexico State Engineer File No. 3215. Second, the Secretary shall make an allocation of shortage to the demand on the Navajo Reservoir water supply for delivery for uses allocated pursuant to subparagraph 8.2 of the Settlement Agreement, up to the full amount of demand and excluding any amounts of water anticipated to be diverted for such uses under State Engineer File No. 3215. The remaining amount of shortage, if any, shall be allocated to the normal diversion requirements for uses in New Mexico that are determined pursuant to subsection (b) of this section in accordance with the procedure for apportioning the water supply available above Navajo Dam described in subsection 11(a) of the Act of June 13, 1962 (76 Stat. 96). To determine the occurrence and amount of any shortage to contracts entered pursuant to section 11 of the Act of June 13, 1962, the Secretary shall not include as available storage any water stored in a top water bank in Navajo Reservoir established pursuant to section 405 of this Act. During years in which the Secretary determines and allocates a shortage in the Navajo Reservoir water supply, the Secretary shall not deliver, and contractors of the water supply shall not divert, any of the water supply for placement into aquifer storage for future recovery and use.

(d) APPLICATION OF SHORTAGES. -- The Secretary shall apply the sharing and apportionment of water determined pursuant to subsection 11(a) of the Act of June 13, 1962 (76 Stat. 96), and subsections (b) and (c) of this section on an annual volume basis, and shall not otherwise apply or enforce a percentage or volumetric shortage to the amount of water available for diversion or delivery from the Navajo Reservoir water supply or for diversion by the San Juan-Chama Project on a day to day basis; provided, that this subsection shall not be construed to affect subsection 8(f) of the Act of June 13, 1962.

(e) REVISIONS TO SHORTAGE DETERMINATIONS. -- The Secretary may revise determinations of shortages and apportionments of water under subsection 11(a) of the Act of June 13, 1962 (76 Stat. 96), and this section as water supply conditions materialize or change throughout the year.

(f) COOPERATIVE WATER SHARING AGREEMENTS. -- Nothing in the Act of June 13, 1962 (76 Stat. 96), or in this Act shall be construed to prohibit the Secretary from reallocating water, including in a year of shortage, in accordance with cooperative water agreements between water users for a sharing of water supplies either between the San Juan-Chama Project and water contractors in the San Juan River Basin or among water contractors in the San Juan River Basin, subject to applicable laws.

The State of New Mexico and the Navajo Nation agree to the guidance provided by section 403 of the settlement act, and specifically to the normal diversion requirement for the San Juan-Chama Project of 135,000 acre-feet per year, only in the context of the Settlement Agreement. An example implementation of the water allocation formula of Section 11(a) of Public Law 87-483, as clarified by section 403 of the proposed settlement act, is provided in Attachment 1 for illustrative purposes. Until Congress enacts the settlement act or otherwise provides additional direction to the Secretary, the Secretary may use his or her discretion to determine the normal diversion requirement for contractors of the San Juan-Chama Project water supply based on the current year demands for contract deliveries below Heron Dam.

FLOWS FOR ENDANGERED FISH HABITAT

The San Juan River Basin Recovery Implementation Program, authorized by Public Law 106-392, in 1999 adopted quantified flow recommendations for the San Juan River below

Farmington that are believed to provide for the habitat needs of endangered fish species in the river, subject to modification through adaptive management. The US Bureau of Reclamation is preparing an Environmental Impact Statement on operating Navajo Reservoir to meet the flow recommendations, or a reasonable alternative, while also operating the reservoir to supply water to contractors of the Navajo Reservoir water supply, including the San Juan-Chama Project contractors by exchange. In consultations under section 7 of the Endangered Species Act (ESA) regarding effects of federal water projects on endangered species in the San Juan River, the US Fish and Wildlife Service has avoided jeopardy opinions by identifying as a reasonable and prudent alternative the operation of Navajo Reservoir to provide flows that promote recovery of the endangered fish species. Such section 7 consultations have been completed for the Navajo Indian Irrigation Project and the Animas-La Plata Project, is nearing completion on Navajo Reservoir operations, and have yet to be initiated for the Hammond Irrigation Project or for the San Juan-Chama Project diversions from tributaries to the San Juan River. The Recovery Implementation Program provides both reasonable and prudent alternatives to avoid jeopardy pursuant to section 7 of the ESA and reasonable and prudent measures to avoid take pursuant to section 9 of the ESA. The possibility that operating the reservoir to meet the flow recommendations might result in shortages in water supply available to meet the diversion demands of contractors is discussed in my March 22, 2005, Memorandum to Congressional staff on San Juan River Basin in New Mexico Navajo Nation Water Rights Settlement Agreement: Issues Relating to the Entitlements, Availability and Sharing of Water for Navajo Reservoir Water Supply Contracts and the San Juan-Chama Project, at pages 30-34.

The City of Albuquerque in its Comments on Navajo-Gallup Settlement, transmitted via letter from Mayor Martin Chavez to State Engineer John D'Antonio dated January 15, 2004, suggested that the San Juan-Chama Project should not share in any regulatory shortages that might be caused by implementation of the Endangered Species Act in the San Juan River Basin. John Stomp's March 28, 2005, Inter-Office Correspondence to Congressional staff on Hydrologic Impacts and Recommendations for the Navajo Nation Water Rights Settlement Agreement appears to repeat the City's suggestion. The Correspondence at page 4 and the ensuing discussion with City representatives at the meeting on March 29, 2005, indicates that the proposal to form a working group to develop procedures for implementing section 11 of Public Law 87-483 may be meant to ensure that the prospective runoff to be apportioned among the contractors includes the amount of water available for environmental flows recommended by the Recovery Implementation Program so as to reduce the risk of increased sharing of shortages to the San Juan-Chama Project. In other words, the City suggests or recommends that the prospective runoff originating above Navajo Reservoir, or the anticipated inflow into Navajo Reservoir (*J*), would be apportioned in accordance with section 11 of Public Law 87-483, after which the releases from Navajo Reservoir required to meet the flow recommendations, or a reasonable alternative, would be supplied out of the runoff apportioned to the contractors in the San Juan River Basin only and not out of the runoff apportioned to the San Juan-Chama Project. My March 22, 2005, Memorandum at page 34 indicates that the City's suggestion is not acceptable to water users in the San Juan River Basin.

Runoff originating above Navajo Reservoir is available to the United States pursuant to State Engineer File No. 2847 for the San Juan-Chama Project, File No. 2848 for the Hammond Irrigation Project, File No. 2849 for Navajo Reservoir storage to provide water for the Navajo Project and other uses, File No. 2873 for Navajo Reservoir evaporation, and File No. 2917 for additional municipal and industrial uses to be supplied from Navajo Reservoir. The amount of runoff originating above Navajo Reservoir that is available to the United States is the inflow to the reservoir (prior to San Juan-Chama Project and Navajo Reservoir water supply contract diversions above the reservoir) less the amount of water required to be released from the reservoir to meet downstream water rights with priority dates senior to June 17, 1955, and to meet obligations of the Upper Division States under the Colorado River and Upper Colorado River Basin compacts. By definition, the prospective runoff above Navajo Reservoir available to the United States, that is, the amount of the anticipated or forecasted reservoir inflow (*I*) that is available to be apportioned to contractors, including the San Juan-Chama Project, is the anticipated runoff already reduced for the more senior uses that are not subject to sharing of shortages.

The water allocation formula of section 11 of Public Law 87-483 handles the evaporation factor *E* as another reduction to inflow. By this process, water users above, below and from Navajo Reservoir stand a share of the Navajo Reservoir evaporation loss. Evaporation cannot here be considered a reduction in available water stored in Navajo Reservoir as to do this would require only those users from or below the reservoir to stand the evaporation loss. Like evaporation loss, the flow demands to maintain populations of endangered fish species in the San Juan River contribute to the total demand on water originating above Navajo Reservoir. The demand for water from Navajo Reservoir to meet the Recovery Implementation Program's flow recommendations, or a reasonable alternative, thus can be handled similarly as a reduction to inflow. In this manner, water users above, below and from Navajo Reservoir stand a share of the risks of shortage in supply caused by providing flows needed to maintain populations of endangered fish species in the San Juan River. Endangered fish flows cannot here be considered a reduction in available water stored in Navajo Reservoir as to do this would require only those users from or below the reservoir to stand the burden and consequent risks of maintaining the populations of endangered fish species in the river.

In terms of the mathematical formulas presented above, either the inflow (*I*) can be redefined as anticipated or forecasted inflow to Navajo Reservoir minus senior uses not subject to sharing and minus releases from the reservoir made to comply with the ESA, or the test for determining whether a shortage exists can be redefined as:

$$R + (I - E - F) < D,$$

where *F* = the demand for water originating above Navajo Reservoir to meet the habitat needs of endangered fish species in the San Juan River, which needs may be less than the flow recommendations during periods of extreme drought. Part of the habitat needs will be met from inflows arising below Navajo Dam. Nothing herein should be construed to establish or to limit any liability on the part of the United States for shortages to contract

deliveries caused by bypassing or releasing water from Navajo Reservoir for purposes of maintaining habitat for populations of endangered fish species in the San Juan River.

BUREAU OF RECLAMATION PLANNING AND CONSULTATION PROCESSES

The Bureau of Reclamation at the beginning and middle of each month updates its hydrologic study of Navajo Reservoir operations for the next 12-24 months. The study includes current reservoir storage conditions and projects inflow and storage conditions for the remainder of the year based on snowmelt runoff and reservoir inflow forecasts at various locations in the San Juan River Basin. Forecasted unregulated inflows to Navajo Reservoir are adjusted for anticipated upstream storage operations at Vallecito Reservoir and for anticipated diversions of the San Juan-Chama Project and any other contract uses above the reservoir. Anticipated San Juan-Chama Project diversions are estimated based on runoff forecasts at the points of diversion for the project and historic relationships of diversions to runoff that take into account the bypass requirements of section 8(f) of Public Law 87-483. Further reductions of project diversions are not included unless the State of New Mexico determines that such reductions are necessary to comply with the Upper Colorado River Basin Compact. The study also does not include any possible priority calls against the project during the late summer and fall months.

The reservoir operations study shows monthly water budgets for Navajo Reservoir in which Reclamation also considers inflows to the San Juan River from perennial tributaries, primarily from the Animas River, based on seasonal runoff forecasts and projections of how the runoff will materialize over time. Based on anticipated inflows to the San Juan River and anticipated water demands over time for all uses on the San Juan River, including uses under water rights with priority dates senior to June 17, 1955, and diversions at or below the reservoir under contracts and subcontracts for water from the Navajo Reservoir supply, Reclamation determines whether the amount of anticipated inflow to Navajo Reservoir plus the amount of active storage in the reservoir is sufficient to meet the demands on the reservoir while the reservoir also is operated in accordance with minimum reservoir release requirements and operational rules designed to meet the Recovery Implementation Program's flow recommendations for endangered fish habitat in the river. The operational rules include recommendations for scheduling spring peak releases under various scenarios, including scheduling releases in anticipation of spills (Corps of Engineers flood control criteria also must be followed). The study provides monthly the same water budget test of whether a shortage exists as is described by the mathematical formula: $R + (I - E - F) < D$.

Reclamation uses the reservoir operations study both to prepare an annual operating plan for Navajo Reservoir and to adaptively manage and adjust reservoir operations throughout the year. As part of the process to develop and implement an annual operating plan for the reservoir, Reclamation conducts three public meetings during the year to update the public on hydrologic and reservoir conditions and projected operations during the upcoming months and to receive input and suggestions from the public on reservoir operations. The meetings are held in Farmington in or about January, April and August.

The reservoir operations study typically uses the most-probable runoff forecasts; however, it also indicates possible reservoir operations under maximum-probable and minimum-probable runoff conditions. Parallel studies during the period of substantial draw down in Navajo Reservoir storage in 2003, 2004 and 2005 made pursuant to the Recommendations for San Juan River Administration and Operation for 2003, for 2004 and for 2005, respectively, utilized the minimum-probable runoff forecasts with the understanding that water users in the San Juan River Basin would plan for the maximum-probable shortage, if any, early in the irrigation season and adjust towards the most-probable shortage, if any, as the season progressed and runoff actually materialized. The most-probable and minimum-probable snowmelt runoff forecasts largely converge by about June 1. The operations study that is based on April 1, 2005, hydrological conditions and snowmelt-period runoff forecasts for the San Juan River Basin is provided in Attachment 2 for illustrative purposes.

If a shortage is projected based on the most-probable runoff forecasts, or if a shortage is possible under the minimum-probable runoff forecasts, the Bureau of Reclamation pursues avenues of cooperation for the endangered fish to share shortages with water users so as to limit shortages to users. For example, in 2003 and 2004: (1) the Hydrology Committee of the Recovery Implementation Program recognized the occurrence of extreme drought conditions in the San Juan River Basin; (2) the Biology Committee of the Recovery Implementation Program determined that a temporary reduction in the recommended target base flow for the San Juan River could reasonably be made for the year, such reduction to provide for maintenance of existing endangered fish habitat and populations, but not recovery, during the period of extreme conditions; and (3) the US Fish and Wildlife Service, in accordance with principles in the Recovery Implementation Program Document, accepted flows less than the recommended target base flow to share with water users in any shortages that might materialize. The Fish and Wildlife Service's position and practice in the Recovery Implementation Program is that the Program's flow recommendations are not sacrosanct or inviolate.

In a year of anticipated or possible shortage, Reclamation meets with representatives of the Navajo Reservoir water supply contractors, which should include representatives of the San Juan-Chama Project contractors, to review and discuss existing storage conditions, anticipated runoff conditions, contract delivery demands, diversion demands on water originating above Navajo Reservoir, endangered fish habitat flow demands, the reservoir operations study, and any other pertinent information such as extenuating circumstances regarding Navajo Reservoir operations and administration of San Juan River flows (including Navajo Reservoir releases). In 2003, 2004 and 2005, the discussions were extended to include other major water users on the San Juan River due to uncertainties as to administration of water rights on the river. The State Engineer continues to prepare to implement active water resource management, including water rights administration, in the San Juan River Basin. Representatives of the Office of the State Engineer and the Fish and Wildlife Service also participate in the meetings. The Department of the Interior then would determine the existence of any shortage and apply the above-stated procedures to apportion the water supply available in accordance with

the direction given in section 11 of Public Law 87-483 and, if approved by Congress, section 403 of the settlement act; provided, that the Secretary could alternatively apportion the available supply in accordance with an allocation agreed to by the Navajo Reservoir water supply contractors, including the San Juan-Chama Project contractors.

Example Apportionment to Contractors of Water Originating above Navajo Reservoir that is available to the United States in a year of anticipated shortage pursuant to Section 11 of Public Law 87-483 and Section 403 of the Settlement Act

	Total Diversion Demand (af)	Demand Supplied From Inflows below Navajo Dam or from re-use (af)	Normal Diversion Requirement (1) (af)	Group Percentage of Total NM Normal Diversion Requirement (%)	Allocation of Prospective Runoff to Group (2) (af)	Water User Percentage of Group's Total Normal Diversion Requirement (%)	Apportionment of Prospective Runoff to Water User (af)	Apportionment of Available Navajo Reservoir Storage (3) (af)	Total Apportionment of Water Available to the US above Navajo Dam (af)	Total Supply of Water from above Navajo Dam and from Inflows below Navajo Dam (af)
Contract uses above Navajo Reservoir:										
San Juan-Chama Project (4)	135,000		135,000			99.93%	105,799		105,799	105,799
Jicarilla Apache Nation	100		100			0.07%	78		78	78
Subtotal	135,100		135,100	26.47%	105,878	100.00%	105,878		105,878	105,878
Contract uses at or below Navajo Reservoir in New Mexico:										
Navajo Indian Irrigation Project (5)	325,500		325,500			86.73%	255,094	43,365	298,459	298,459
Hammond Irrigation Project (6)	23,000		23,000			6.13%	18,025	3,064	21,089	21,089
San Juan Generating Station (7)	16,200	8,100	8,100			2.21%	6,595	1,106	7,610	15,710
Navajo-Gallup Water Supply Project (8)	22,650	9,425	13,420			3.58%	10,517	1,788	12,305	21,730
Navajo Nation in New Mexico	7,500	3,750	3,830			1.02%	3,002	510	3,512	7,262
City of Gallup	1,200		1,200			0.32%	940	160	1,100	1,100
Jicarilla Apache Nation	50		50			0.01%	39	7	46	46
Williams Gas										
Subtotal	396,100	21,275	375,300	73.53%	294,122	100.00%	294,122	50,000	344,122	365,397
Total uses in New Mexico	531,200	21,275	510,400		400,000		400,000	50,000	450,000	471,275
Contract uses in Arizona:										
Navajo-Gallup Project (Navajo Nation) in Arizona (9)	6,410	3,205	3,270	0.00%	0	0.00%	0	0	0	3,205
Totals	537,610	24,480	513,670		400,000		400,000	50,000	450,000	474,480

Notes:

- (1) That portion of the total diversion demand that is placed on water originating above Navajo Dam.
- (2) Prospective runoff at Navajo Dam available after bypasses, needed to satisfy downstream senior direct flow rights below the dam, endangered fish habitat demands, and minimum dam release rate requirements. Amounts needed to be bypassed for endangered fish habitat demands may be adjusted to reflect shortage sharing between water users and endangered fish, and an iterative process may be used to determine apportionments of prospective runoff. This example and explanation is not to be construed to limit any liability on the part of the United States for shortages to contract deliveries caused by bypassing or releasing water from Navajo Dam for purposes of maintaining endangered fish habitat.
- (3) Storage in Navajo Reservoir available above the minimum operating level, which currently is at elevation 5990 feet to prevent wave erosion below the rip rap on the upstream face of the dam and to maintain physical delivery capability for the Navajo Indian Irrigation Project, and after releases from storage needed to satisfy endangered fish habitat demands and minimum dam release rate requirements. Amounts needed to be released from storage for endangered fish habitat demands may be adjusted to reflect shortage sharing between water users and endangered fish, and an iterative process may be used to determine apportionments of available Navajo Reservoir storage. This example and explanation is not to be construed to limit any liability on the part of the United States for shortages to contract deliveries caused by releasing water from Navajo Reservoir for purposes of maintaining endangered fish habitat.
- (4) The normal diversion demand for the purpose of allocating any shortage is the authorized ten-year average diversion. Water stored in Heron Reservoir is for the exclusive use of San Juan-Chama Project contractors and is not considered in the apportionment of water available in the San Juan River Basin. The supply physically available for diversion by the Project at the points of diversion may be less than the amount of flow available at Navajo Dam that is apportioned to the Project pursuant to section 11 of the Act of June 13, 1962, and the Settlement Act. This is anticipated to be the case during periods of drought and shortage.
- (5) Assumes 3.2 acre-feet withdrawal from Navajo Reservoir needed to irrigate 100,000 acres in current year, plus 2,500 of demand for commercial uses and 3,000 of demand for municipal use leases. The assumed demands are for illustrative purposes only and are not to be construed as a projection of, or limitation to, demands under the Navajo Nation's rights for the Navajo Indian Irrigation Project in any year. Assumes no diversions under File No. 3215 or by re-use.
- (6) Assumes no contract delivery supplied from File No. 3215.
- (7) Supplied under subcontract with Jicarilla Apache Nation. Assumes half of contract delivery anticipated to be supplied from File No. 3215, and a 2% cartage loss from Navajo Dam to the San Juan Generating Station diversion weir.
- (8) Includes direct withdrawals from Navajo Reservoir of 3,800 af for Navajo uses and 1,200 af for Jicarilla uses, plus diversions at the San Juan Generating Station diversion weir of 18,850 af for Navajo Nation uses in New Mexico and 7,500 af for City of Gallup uses under subcontract with the Jicarilla Apache Nation. Assumes half of contract deliveries at the San Juan Generating Station diversion weir anticipated to be supplied from File No. 3215, and a 2% cartage loss from Navajo Dam to the diversion weir. Actual demands in any year may be less than the authorized demands used here for illustrative purposes.
- (9) Navajo-Gallup Water Supply Project uses in Arizona. Assumes half of contract deliveries at the San Juan Generating Station diversion weir anticipated to be supplied from File No. 3215, and a 2% cartage loss from Navajo Dam to the diversion weir. Actual demands in any year may be less than the authorized demands used here for illustrative purposes.

Remarks:

- (1) Storage and apportionment computations to be updated semi-monthly as runoff forecasts change and actual runoff conditions materialize. Updates may shift shortages or allocations from contract uses above Navajo Dam to contract uses below the dam depending on the physical availability of flows to divert at the points of diversion for the San Juan-Chama Project and Jicarilla Apache Nation uses above the reservoir.
- (2) Shortages to the total diversion demands for uses other than the San Juan-Chama Project reflect shortages to deliveries under water supply contracts in the San Juan River Basin. Shortages to the normal diversion requirement of the San Juan-Chama Project may or may not result in shortages to deliveries under Project water supply contracts in the Rio Grande Basin depending upon whether the Project diversions from the San Juan River Basin are more limited by the physical water supply available for diversion by the Project at the points of diversion or the amount of flow apportioned for diversion pursuant to section 11 of the Act of June 13, 1962, and the Settlement Act. The supply physically available at the Project's points of diversion is expected to control during periods of drought when the above apportionment formula would be applied. Also, the occurrences of any shortages to contract deliveries under the Project depends on the amount of water stored in Heron Reservoir, which is apportioned exclusively for delivery and use under the San Juan-Chama Project contracts. The total firm yield of the Project below Heron Dam is 96,200 acre-feet per year, of which 81,200 acre-feet is contracted or reserved for and 15,000 acre-feet is reserved to maintain the recreational pool at Cochilli Lake pursuant to Public Law 88-293.

Attachment 2

CBRFC - Navajo Reservoir Modified Unregulated Most, Maximum and Minimum April-July Inflow Forecasts (acre-feet)													
Forecast Date	Forecast							Apr-Jul Outlook					
	Jan	Feb	Mar	Apr	May	Jun	Jul	Most	%Avg	Max	%Avg	Min	%Avg
Jan	22,000	29,000	80,000					925,000	118%	1,280,000	163%	580,000	74%
MidJan	45,000	33,000	95,000					1,200,000	153%	1,607,000	205%	793,000	101%
Feb		35,000	95,000	230,000				1,230,000	157%	1,560,000	199%	895,000	114%
MidFeb		50,000	95,000	265,000				1,230,000	156%	1,603,000	204%	857,000	109%
Mar			185,000	320,000	450,000			1,280,000	163%	1,610,000	205%	950,000	121%
MidMar			115,000	310,000	475,000			1,220,000	155%				
Apr				310,000	485,000	400,000	125,000	1,320,000	168%				
Apr	Annualized Monthly Distribution			278,776	422,677	441,872	176,675	1,320,000	168%	1,750,000	223%	960,000	122%

April 5th, 2005 Navajo Reservoir AOP

Navajo Reservoir end-of-March 2005 content was about 1,182,000 af, 92% of average. Inflow to Navajo Reservoir in March was about 108,900 af, 125% of average. Releases to the San Juan River were 26,000 af (250 cfs) about 35% of average. Diversions to NIIP were 2900 af. Reservoir releases were increased from 350 cfs to 500 cfs on March 17th, 2005.

The April 5th 2005 Final Forecast was provided by the Colorado Basin River Forecast Center in Salt Lake City. This AOP is based on certain criteria and assumptions as follows:

Minimum Allowable Release: The minimum allowable release is 250 cfs from Nov 3, 2004 through March 31st, 2005. From April 1st through October 31st, the minimum allowable release is 350 cfs based on the most current and reasonable schedule for obtaining the Record of Decision (ROD) for the Navajo Reservoir EIS. The minimum allowable release will be revised to incorporate the ROD if it is signed prior November 1, 2005. (Note: Current release is 500 cfs and releases this summer will likely be higher than the minimum allowable release as a result of hydrologic conditions in the basin which gives Reclamation some operational flexibility.)

SJRIP Target Base Flow: Maintaining the SJRIP target base flow of 500 cfs has an effect on how much water needs to be released from Navajo Reservoir. The proposed 2005 Shortage Sharing Agreement recommends that target base flows be reduced from 500 cfs to 400 cfs for the April through October period, if the Minimum Probable forecast projects the July EOM Content to be below 1,000,000 af. The April forecast does not predict this situation, so under the Minimum Probable, Most Probable and Maximum Probable inflow scenarios, the target base flow is set at 500 cfs from April through October, 2005.

The **Most Probable** modified-unregulated inflow forecast volume is 1,320,000 acre-feet (168% of the 30-year average) for the April-July period. After adjusting for Vallecito Reservoir operation and diversions to San Juan-Chama Project, the Apr-July inflow is projected to be about 1,087,000 af, 160% of the 30-year average. Releases are estimated to be 777,700 af for the 2005 WY and are based on forecasted Animas River flows and requirements to satisfy the SJRIP target flows. The September EOM content is projected to be 1,543,000 af, a WS Elevation of 6074.4 feet (116% of average). This shows a 608,000 af improvement over September 2004 reservoir content. This forecast indicates that no shortages would occur to Navajo Reservoir water contract users and the maximum Spring Fish Release (21 days at 5,000 cfs) would be made as determined by the Flow Recommendations. Ramping up for this release would begin on April 27th. A daily release graph is included in this summary.

The **Minimum Probable** modified-unregulated inflow forecast volume is 960,000 af (122% of the 30-year average) for the Apr-July period. This is a 10,000 af increase from the March forecast. After adjusting for Vallecito Reservoir operation and diversions to San Juan-Chama Project, the Apr-July inflow is projected to be about 787,000 af, 116% of the 30-year average. Estimated releases of about 403,000 af for the 2005 WY are slightly increased from the March Min Probable condition. The September EOM content is projected to be about 1,570,000 af, a WS Elevation of 6076.3 feet (118% of average). This shows a 635,000 af improvement over September 2004 reservoir content. This forecast indicates that shortages would not occur to Navajo Reservoir water contract users and the minimum Spring Fish Release (7 days at 5,000 cfs) would be made as determined by the Flow Recommendations.

The **Maximum Probable** modified-unregulated inflow forecast volume is 1,750,000 acre-feet (223% of the 30-year average) for the April-July period. After adjusting for Vallecito Reservoir operation and diversions to San Juan-Chama Project, the Apr-July inflow is projected to be 1,457,000 af, 215% of the 30-year average. Releases are estimated to be 1,188,000 af for the 2005 WY and are based on forecasted Animas River flows and requirements to satisfy SJRIP target flows. The September EOM content is projected to be 1,530,000 af, a WS Elevation of 6073.5 feet (115% of average) under this scenario. The Maximum Spring Fish Release (21 days at 5000 cfs) would be made. In accordance with the Flow Recommendations, an additional 17 days of 4,000 cfs would be added the beginning of the Spring Fish Release to evacuate excess inflow and keep the reservoir from spilling.

One set of three graphs compare the Minimum Probable, Most Probable, and Maximum Probable February, March and April forecasts for monthly Inflow, Release and End-Of-Month Contents for the 2005 water year. A second set of three graphs compare the Minimum Probable, Most Probable, and Maximum Probable April Final forecasts for monthly Inflow, Release and End-Of-Month Contents for the 2005 water year. A third set of three graphs show the daily release schedule for the Most Probable, Minimum Probable and Maximum Probable conditions.

TABLE II
NAVAJO RESERVOIR - WY2005 - ANNUAL OPERATING PLAN
MOST PROBABLE INFLOW

END OF MONTH	INFLOW** (AF)	% OF AVG. INFLOW	CBRFC FORECAST PERIOD (DATE)	CBRFC Mod & Adj INFLOW VOLUME (AF)	AVERAGE RESERVOIR RELEASES (AF)	AVERAGE RESERVOIR RELEASES (CFS)	% OF AVERAGE RESERVOIR RELEASES	NIIP DIVERSIONS (AF)	NIIP DIVERSIONS (CFS)	EVAP. (AF)	RESERVOIR LIVE CONTENT (AF)	% OF AVERAGE CONTENT	EOM ELEV. (FT)	EOM EL. >8085? (FT)	COE INFLOW LIMIT (AF)	FORECAST IS ___% OF THE COE LIMIT?
*SEP04											935,094	68%	6022.49	no		
*OCT04	42,163	84%			22,317	363	41%	3,651	59	1,305	949,984	71%	6024.04	no		
*NOV04	37,115	111%			15,016	252	28%	-	0	693	971,389	75%	6026.26	no		
*DEC04	35,973	147%			15,500	252	24%	-	0	490	991,372	79%	6028.29	no		
*JAN05	53,427	252%	2/01-7/31	1286576	15,500	252	23%	-	0	500	1,028,799	84%	6032.01	no	2,426,501	53%
*FEB05	90,600	310%	3/01-7/31	1195976	15,000	261	26%	-	0	655	1,103,745	90%	6039.17	no	2,056,555	
*MAR05	108,865	125%	4/01-7/31	1087111	25,993	423	35%	2,922	48	1,418	1,182,286	92%	6046.27	no	1,633,014	
APR05	283,040	189%	5/01-7/31	804072	33,719	567	40%	22,983	386	2,472	1,406,152	103%	6064.50	no	1,096,357	73%
MAY05	342,925	153%	6/01-7/31	461147	200,330	3258	154%	29,713	483	3,968	1,515,065	106%	6072.48	no	644,936	72%
JUN05	318,569	149%	7/01-7/31	142577	212,231	3567	162%	41,812	703	4,854	1,574,737	112%	6076.62	no	260,563	55%
JUL05	142,577	157%			30,744	500	34%	34,744	763	5,072	1,634,554	118%	6080.66	no		
AUG05	92,988	148%			39,582	644	55%	42,110	685	4,132	1,641,718	120%	6081.12	no		
SEP05	74,447	141%			151,743	2550	240%	18,239	307	3,184	1,542,999	116%	6074.43	no		
TOTALS	1,622,688	156%			777,686		82%	208,375		28,743						
	1,087,914	180%			477,024		192%	144,459		15,905						
Minimum	35,973	585.04			142,577	252		-	-	490	949,984		6024.04			
Maximum	342,925				1,286,576	3,567		48,944	763	5,072	1,641,718		6081.12			
Average	135,224				64,805	1,074		18,943	286	2,395	1,295,233		6053.82			

Based on the Most Probable inflow, a spring release of 356,033 af above the 500 cfs base release could be made this year.

Values are statistical average or forecasted.

* Observed value.

Change in storage:

(20,446)

NIP Outlet Works, intake sill elev. = 5,975'

	*OCT04	21406	*JAN05	37427	APR05	223866	JUL05	59818
	*NOV04	19983	*FEB05	74945	MAY05	108913	AUG05	7164
	*DEC04	37427	*MAR05	78542	JUN05	59872	SEP05	-98720

OCT05	42,489	85%			30,744	500	56%	12,397	202	1,966	1,540,382	114%	6074.25	no		
NOV05	31,955	96%			29,752	500	55%	748	13	1,018	1,540,818	115%	6074.29	no		
DEC05	22,775	93%			30,744	500	48%	-	0	718	1,532,132	118%	6073.67	no		
JAN06	20,428	96%	2/01-7/31	691125	30,744	500	46%	-	0	711	1,521,105	122%	6072.90	no	1,934,195	36%
FEB06	27,512	94%	3/01-7/31	663613	27,769	500	48%	-	0	888	1,519,960	124%	6072.81	no	1,640,340	40%
MAR06	76,480	88%	4/01-7/31	587133	30,744	500	41%	4,647	76	1,809	1,559,240	127%	6075.56	no	1,256,060	47%
APR06	135,612	91%	5/01-7/31	451521	33,719	567	40%	23,454	394	2,880	1,634,800	127%	6080.67	no	866,316	52%
MAY06	187,528	83%	6/01-7/31	263993	200,330	3258	154%	30,323	493	4,138	1,587,537	116%	6077.50	no	572,248	46%
JUN06	178,902	83%	7/01-7/31	85091	211,240	3550	161%	42,669	717	4,720	1,507,810	105%	6071.96	no	327,490	26%
JUL06	85,091	94%			24,446	398	27%	47,907	779	4,854	1,515,694	107%	6072.52	no		
AUG06	60,186	96%			39,582	644	55%	42,973	699	3,939	1,489,385	107%	6070.64	no		
SEP06	50,298	95%			24,966	420	39%	18,613	313	3,018	1,493,086	109%	6070.91	no		
TOTALS	919,256	88%			714,779			223,731		30,659						

Assuming a 90% water supply for the 2006 water year, a spring release of 415,537 af above the 500 cfs base release could be made regardless of the perturbation.

TABLE
NAVAJO RESERVOIR - WY2005 - ANNUAL OPERATING PLAN
MINIMUM PROBABLE INFLOW

END OF MONTH	INFLOW** (AF)	% OF AVG. INFLOW	CBRFC FORECAST PERIOD (DATE)	CBRFC FORECAST INFLOW VOLUME (AF)	AVERAGE RESERVOIR RELEASES (AF)	AVERAGE RESERVOIR RELEASES (CFS)	% OF AVERAGE RESERVOIR RELEASES	NIP DIVERSIONS (AF)	NIP DIVERSIONS (CFS)	EVAP. (AF)	RESERVOIR LIVE CONTENT (AF)	% OF AVERAGE CONTENT	EOM ELEV. (FT)	EOM EL. >6085? (FT)	1993 CODE INFLOW FORECAST LIMIT (AF)	FORECAST IS % OF THE COE LIMIT?
*SEPT04	42,163	84%			22,317	363	41%	3,651	59	1,305	935,094	68%	6022.49	NO		
*NOV04	37,115	111%			15,016	252	28%	-	-	693	949,984	71%	6024.04	NO		
*DEC04	35,973	147%			15,500	252	24%	-	-	490	991,372	75%	6026.26	NO		
*JAN05	53,427	252%	2/01-7/31	986000	15,500	252	23%	-	-	500	1,028,799	79%	6028.29	NO		
*FEB05	90,600	310%	3/01-7/31	895400	15,000	270	26%	-	-	655	1,103,745	84%	6032.01	NO	2,426,501	41%
*MAR05	108,865	125%	4/01-7/31	786535	25,983	423	35%	2,922	48	1,397	1,182,307	90%	6039.17	NO	2,056,555	34%
APR05	203,806	136%	5/01-7/31	582729	29,752	500	35%	22,983	386	2,328	1,331,050	92%	6046.27	NO	1,632,993	30%
MAY05	239,262	106%	6/01-7/31	343466	58,512	952	45%	29,713	483	3,662	1,478,424	97%	6058.68	NO	1,171,918	50%
JUN05	234,512	109%	7/01-7/31	108955	115,240	1,937	88%	41,812	703	4,629	1,551,255	103%	6069.85	NO	681,687	38%
JUL05	108,955	120%			22,580	367	25%	46,944	763	5,029	1,585,657	110%	6075.00	NO	284,045	
AUG05	63,273	101%			39,582	644	55%	42,110	685	4,121	1,563,116	114%	6077.37	NO		
SEP05	55,973	106%			27,743	466	44%	18,239	307	3,167	1,569,939	114%	6075.82	NO		
TOTALS	1,273,922	122%			402,726		43%	208,375		27,977			6076.30	NO		
Minimum	35,973			108,955	15,000	252		-	-	490	949,984		6024.04			
Maximum	239,262			986,000	115,240	1,937		46,944	763	5,029	1,585,657		6077.37			
Average	106,160			617,181	33,560	556		17,365	286	2,331	1,275,586		6052.42			

Based on the Minimum Probable Inflow, a spring release of 113,256 cfs above the 500 cfs base release could be made this year.
NIP Outlet Works, intake sill elev. = 5,975'
217,869

Values are statistical average or forecasted.
* Observed value.

Change in storage:

	*OCT04	*NOV04	*DEC04	*JAN05	*FEB05	*MAR05	APR05	MAY05	JUN05	JUL05	AUG05	SEP05
	14880	21406	19983	37427	74945	78562	148743	147375	72631	34401	-22641	6823

OCT05	35,576	71%			21,521	350	39%	12,397	202	1,999	1,569,599	116%	6076.28	NO		
NOV05	30,959	93%			16,256	273	30%	748	13	1,040	1,582,514	119%	6077.15	NO		
DEC05	23,483	96%			15,545	253	24%	-	-	739	1,588,713	123%	6077.65	NO		
JAN06	20,728	98%	2/01-7/31	690729	15,407	251	23%	-	-	740	1,594,294	127%	6077.95	NO	1,861,006	37%
FEB06	27,411	94%	3/01-7/31	663318	14,194	256	24%	-	-	932	1,606,579	132%	6078.79	NO	1,553,721	43%
MAR06	76,979	88%	4/01-7/31	586338	25,000	407	34%	4,647	76	1,906	1,652,006	134%	6081.80	NO	1,163,294	50%
APR06	131,813	88%	5/01-7/31	454525	100,000	1,681	119%	23,454	394	2,974	1,657,391	129%	6082.16	NO	843,587	54%
MAY06	187,531	83%	6/01-7/31	266994	200,330	3,258	154%	30,323	493	4,193	1,610,076	118%	6079.01	NO	549,640	49%
JUN06	181,903	85%	7/01-7/31	85091	211,240	3,550	161%	42,669	717	4,793	1,533,278	107%	6073.75	NO	302,022	28%
JUL06	85,091	94%			24,446	398	27%	47,907	779	4,938	1,541,078	109%	6074.31	NO		
AUG06	60,186	96%			39,582	644	55%	42,973	699	4,009	1,514,699	109%	6072.45	NO		
SEP06	50,298	95%			24,966	420	39%	18,613	313	3,073	1,518,344	111%	6072.71	NO		
TOTALS	911,959	88%			708,487			223,731		31,336						

Assuming a 90% water supply for the 2006 water year, a spring release of 466,446 cfs above the base release could be made next year regardless of the perturbation.

TABLE III
NAVAJO RESERVOIR - WY2005 - ANNUAL OPERATING PLAN
MAXIMUM PROBABLE INFLOW

END OF MONTH	INFLOW** (AF)	% OF AVG. INFLOW	CBRFC FORECAST PERIOD (DATE)	CBRFC FORECAST INFLOW VOLUME (AF)	AVERAGE RESERVOIR RELEASES (AF)	AVERAGE RESERVOIR RELEASES (CFS)	% OF AVERAGE RESERVOIR RELEASES	NIIP DIVERSIONS (AF)	NIIP DIVERSIONS (CFS)	EVAP. (AF)	RESERVOIR LIVE CONTENT (AF)	% OF AVERAGE CONTENT	EOM ELEV. (FT)	EOM EL. >6065? (FT)	COE INFLOW FORECAST LIMIT (AF)	FORECAST IS ___% OF THE COE LIMIT?
*SEP04											935,094	69%	6022.49	no		
*OCT04	42,163	84%			22,317	363	41%	3,651	59	1,305	949,984	71%	6024.04	no		
*NOV04	37,115	111%			15,016	252	28%	-	0	693	971,389	75%	6025.26	no		
*DEC04	35,973	147%			15,500	252	24%	-	0	490	991,372	79%	6028.29	no		
*JAN05	53,427	252%	2/01-7/31	1,657,289	15,500	252	23%	-	0	500	1,028,799	84%	6032.01	no	2,426,501	68%
*FEB05	90,600	310%	3/01-7/31	1,566,689	15,000	270	26%	-	0	655	1,103,745	90%	6039.17	no	2,056,555	76%
*MAR05	108,865	125%	4/01-7/31	1,457,824	25,983	423	35%	2,922	48	1,397	1,182,307	92%	6046.27	no	1,632,993	91%
*APR05	373,158	250%	5/01-7/31	1,084,666	184,463	3100	220%	22,983	386	2,341	1,345,679	98%	6059.83	no	1,157,200	91%
*MAY05	451,085	201%	6/01-7/31	633,581	259,835	4226	200%	28,713	483	3,704	1,503,511	105%	6071.65	no	656,525	97%
*JUN05	421,855	197%	7/01-7/31	211,726	297,521	5000	227%	41,812	703	4,706	1,581,327	112%	6077.08	no	253,973	83%
*JUL05	211,726	233%			147,769	2403	162%	46,944	763	5,082	1,593,259	115%	6077.89	no		
*AUG05	109,632	175%			39,582	644	55%	42,110	685	4,191	1,617,007	118%	6079.49	no		
*SEP05	84,057	159%			150,000	2521	237%	18,239	307	3,176	1,529,649	115%	6073.50	no		
TOTALS	2,019,655	194%			1,188,485		126%	208,375		28,241						

Minimum	35,973	211,726	15,000	252	15,000	500	55%	-	0	490	949,984	71%	6024.04	no <th> <th> </th></th>	<th> </th>	
Maximum	451,085	1,657,289	297,521	5000	297,521	5000	227%	46,944.2	763	5082	1,617,007	115%	6079.49	no		
Average	168,305	1,101,962	98,040	1642	98,040	1642	227%	17,364.6	286	2353	1,283,169	118%	6052.96	no		

Based on the Maximum Probable Inflow, a spring release of 763,834 af above the base release could be made this year.

Values are statistical average or forecasted.

* Observed value.

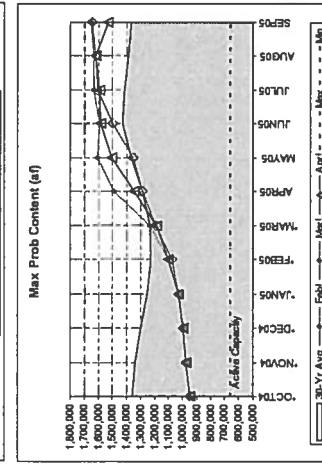
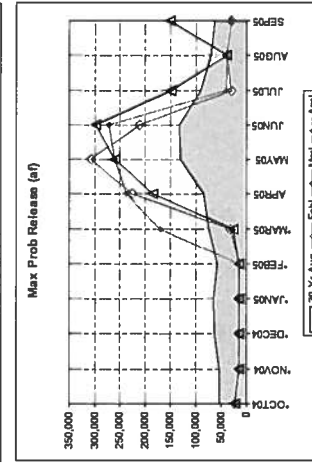
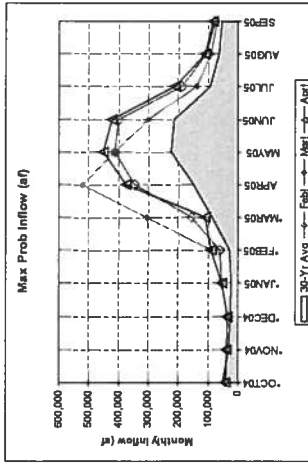
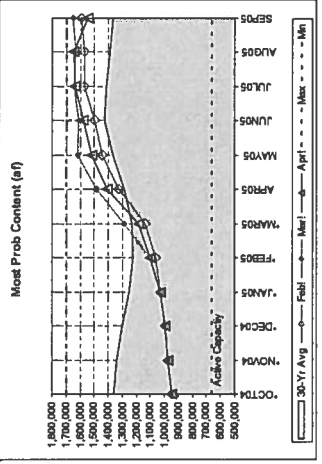
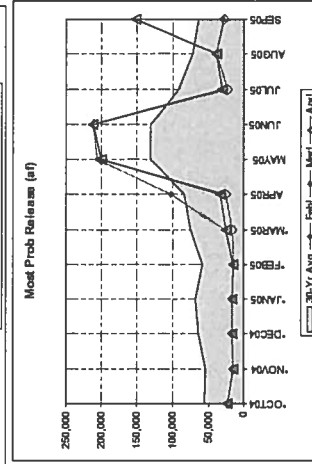
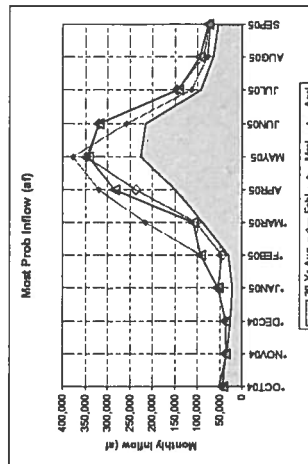
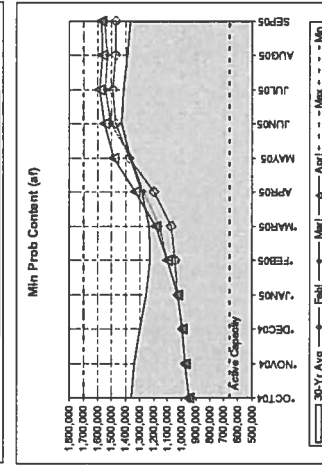
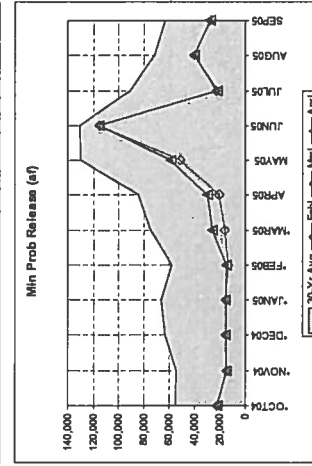
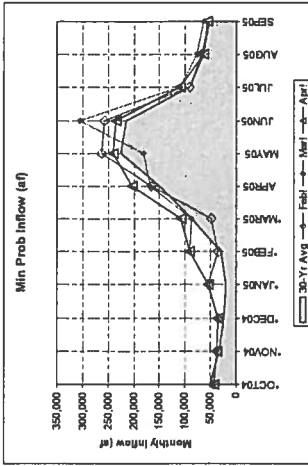
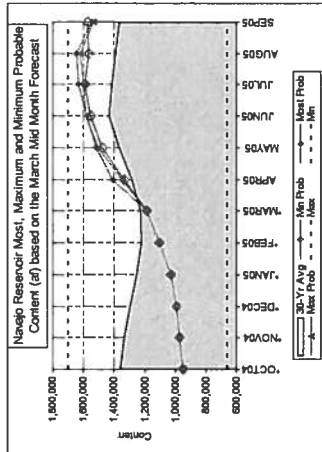
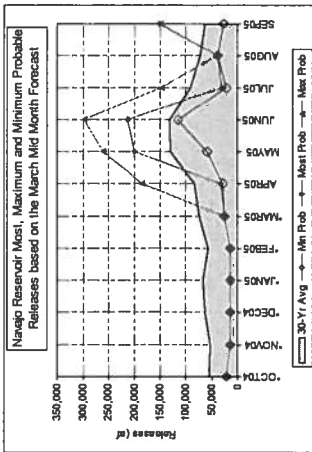
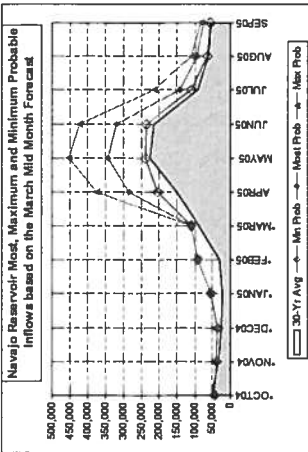
Change in storage:

	*OCT04	*NOV04	*DEC04	*JAN05	*FEB05	*MAR05	APR05	MAY05	JUN05	SEP05	JUL05	AUG05	SEP05
NIIP Outlet Works, intake sill elev. = 5,975'				176900	65858	-70862							

(37,993) -9,5773388

Month	Inflow	% of Avg	Forecast Period	Forecast Inflow	Average Release	% of Average Release	NIIP Diversion	Evap	Reservoir Live Content	% of Average Content	EOM Elev	EOM El. >6065?	COE Inflow Forecast Limit	Forecast is ___% of COE Limit?	
OCT05	53,570	107%			30,744	500	56%	12,397	202	1,956	1,538,123	113%	6074.09	no	
NOV05	31,919	96%			29,752	500	55%	748	13	1,017	1,538,525	115%	6074.12	no	
DEC05	22,431	92%			30,744	500	48%	-	0	716	1,529,496	118%	6073.49	no	
JAN06	20,228	95%	2/01-7/31	691731	30,744	500	46%	-	0	710	1,518,270	121%	6072.71	no	1,937,030
FEB06	27,412	94%	3/01-7/31	664319	27,769	500	48%	-	0	887	1,517,026	124%	6072.61	no	1,643,274
MAR06	77,480	89%	4/01-7/31	566839	30,744	500	41%	4,647	76	1,806	1,557,309	127%	6075.42	no	1,257,991
APR06	133,313	89%	5/01-7/31	453526	29,752	500	35%	23,454	394	2,878	1,634,539	127%	6080.65	no	866,578
MAY06	186,531	83%	6/01-7/31	266995	135,868	2,210	105%	30,323	493	4,211	1,650,668	121%	6081.71	no	508,927
JUN06	181,904	85%	7/01-7/31	85091	140,331	2,358	107%	42,669	717	4,999	1,644,573	115%	6081.31	no	190,727
JUL06	85,091	94%			31,000	504	34%	47,907	779	5,250	1,645,507	117%	6081.38	no	
AUG06	60,187	96%			39,582	644	55%	42,973	699	4,258	1,618,882	117%	6079.61	no	
SEP06	50,303	95%			24,966	420	39%	18,613	313	3,266	1,622,340	119%	6079.84	no	
TOTALS	930,371	89%			581,894		62%	223,731		31,955					

Assuming a 90% water supply for the 2005 water year, a spring release of 215,959 af above the base release of 500 cfs could be made next year regardless of the perturbation.



The SJRIP recommends four possible hydrograph releases. Based on the April forecast, the maximum hydrograph release is most likely this spring.

