US Army Corps
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Albuquerque District

DRAFT ENVIRONMENTAL ASSESSMENT FOR A TEMPORARY DEVIATION IN THE OPERATION OF COCHITI DAM AND JEMEZ CANYON DAM, SANDOVAL COUNTY, NEW MEXICO

May 2008

U.S. Army Corps of Engineers
Albuquerque District
4101 Jefferson Plaza NE
Albuquerque, New Mexico 87109

CONVERSION FACTORS

	From	Multiplier	To
Length	inches	25.4	millimeters
feet	0.3048	meters	
miles	1.6093	kilometers	
Area	acres	0.0407	hectares
	square miles	2.590	square kilometers
Volume	cubic yards	0.7646	cubic meters
	acre-feet	1,613.33	cubic yards
	acre-feet	1,233.5	cubic meters
	acre-feet	325,851	gallons
Flow	cubic feet/second (cfs)	0.0283	cubic meters/second
	cubic feet/second (cfs)	1.983	acre-feet/day
Mass (weight)	tons (short ton)	0.9072	metric tons
Velocity	feet/second (fps)	0.3048	meters/second
Salinity	µSiemens/cm	0.32379	parts/million NaCl
	or µmhos/cm		or mg/liter NaCl
Temperature	° Fahrenheit (°F)	(°F-32)/1.8	° Celsius (°C)

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US Army Corps
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Albuquerque District

FINDING OF NO SIGNIFICANT IMPACT

TEMPORARY DEVIATION IN THE OPERATION OF COCHITI AND JEMEZ DAMS, SANDOVAL COUNTY, NEW MEXICO

The Rio Grande silvery minnow (*Hybognathus amarus*) was listed as endangered by the U.S. Fish and Wildlife Service (Service) in July 1994. The silvery minnow currently occurs only within the 160-mile reach of the Rio Grande from Cochiti Dam to Elephant Butte Lake in New Mexico. In 2003, the U.S. Army Corps of Engineers (Corps) and the U.S. Bureau of Reclamation (Reclamation) formally consulted with the Service pursuant to Section 7 of the Endangered Species Act regarding the continued operation of dams within the Middle Rio Grande valley of New Mexico. In March 2003, the Service issued the *Biological and Conference Opinions on the Effects of Actions Associated with the Programmatic Biological Assessment of Bureau of Reclamation's Water and River Maintenance Operations, Army Corps of Engineers' Flood Control Operation, and Related Non-Federal Actions on the Middle Rio Grande, New Mexico*. The Reasonable and Prudent Alternative of the Biological Opinion requires, in part, that the Corps and Reclamation, annually provide an increase in flow to cue spawning of the Rio Grande silvery minnow (RGSM), if needed. Successful spawning and the subsequent recruitment of young into the adult population is essential to the survival and recovery the RGSM.

The Southwestern Willow Flycatcher (SWFL) was listed as endangered without critical habitat designation on February 27, 1995 (USFWS 1995). The construction of main stream dams, such as Cochiti Dam have contributed to the decline of the flycatcher by reducing the magnitude and frequency of flooding events that help to create and maintain riparian habitat. These riparian communities provide nesting and foraging habitat. Throughout the range of SWFL, these riparian habitats tend to be rare, limiting the population and its distribution. The Cochiti Deviation would partially contribute to implementation of the Reasonable and Prudent Alternative in order to avoid placing these species in jeopardy in accordance with the Endangered Species Act (ESA) 16 U.S.C. 1531 *et seq* under the 2003 Biological Opinion. The Reasonable and Prudent Alternative of the Biological Opinion requires, in part, that the Corps will ensure seasonal overbank flooding over baseline levels to increase the recurrence of inundation to produce suitable riparian habitat for the flycatcher.

Since it was listed 1994, RGSM population gradually declined through 2003, but recently has increased in response to sustained flows of both moderate and exceptional discharge in the Middle Rio Grande. In March 2007, the Engineer Advisers to the Rio Grande Compact Commission requested that the Corps be prepared to deviate from normal operation of its reservoirs to facilitate a spawning and recruitment flow for the RGSM in the Middle Rio Grande during the spring of 2007, if needed. Due to the success of the 2007 deviation which showed a ten-fold increase in RGSM population, the Corps is working with Pueblo de Cochiti, and Santa Ana Pueblo technical staff, to develop a 5-year strategy that entails a range of flexible water operations at Cochiti Lake and Jemez Canyon Reservoir to provide information essential for the RGSM and SWFL long term survival. The experimental information obtained from the deviations could be considered in a new Middle Rio Grande Water Operations Biological Opinion.

The Corps is proposing to implement a temporary deviation from its water control plans for the Cochiti Dam and Lake Project and the Jemez Canyon Dam Project to facilitate spawning and recruitment flows for the RGSM and provide overbanking opportunities to create ideal habitat for the SWFL. The Projects are located in Sandoval County, New Mexico, and were authorized for flood and sediment control, recreation, and development of fish and wildlife resources. All Project facilities and a major portion of

the flood control pool lie within the bounds of the Pueblos. The duration of the planned deviation between both reservoirs is from late February through June beginning in 2009 for the next 5 years. Pueblo de Cochiti, Santa Ana Pueblo and the Rio Grande Compact Commission have provided to the Corps their written consent to the proposed deviation. Prior to implementation, the planned 5-year deviation would require the approval of the Corp's South Pacific Division.

The first proposed action in the deviation is for temporary storage and soon-to-follow release of native Rio Grande water to supplement flows in the main stem of the Rio Grande below Cochiti and Jemez Canyon Dams for the benefit of Middle Rio Grande endangered species. As part of the proposal, the Corps will establish a temporary pool for storage between 5,000 to 20,000 acre-feet at Cochiti Lake and/or up to 20,000 acre-feet at Jemez Canyon Reservoir, depending on the water forecast for the basin. The water would be stored on the ascending limb of the Spring runoff hydrograph when native flows exceed downstream demands, and released at the peak and descending limb of the runoff hydrograph. Storage of the temporary pool would be in the flood pool at Cochiti Lake and would begin in late April or early May. In Jemez Canyon Reservoir, the storage would begin in mid February or early March. The release of stored water would be limited to the amount necessary to provide a minimum RGSM spawning recruitment flow at the Albuquerque gage of 3,000 cfs for seven to ten days or an overbanking flow of up to 5,800 cfs flow at the Albuquerque gage for five days to facilitate willow growth in the Bosque floodway for SWFL as well as provide a RGSM spawning recruitment flow .

It is anticipated that the spawning recruitment release of the stored water would not be more than 500 to 1,000 cfs per day for 10 days from either project. Release of the stored water is expected to start in mid-May to early June. In this scenario the recession of the hydrograph drops by 250 cfs per day until reaching a flow of 1,500 cfs. Any remaining water not needed to meet the spawning recruitment flows would be completely evacuated prior to June 15, with the intention of releasing it prior to the runoff's tailing off, or by June 15 whichever comes first.

The second proposed action in the deviation is for temporary storage and soon-to-follow release of native Rio Grande water to supplement flows in the main stem of the Rio Grande below Cochiti and Jemez Canyon Dams to enhance flows providing an overbank condition downstream from Isleta Diversion Dam. As part of the proposal, the Corps will establish a temporary pool for storage between 30,000 to 45,000 acre-feet at Cochiti Lake and/or up to 25,000 acre-feet at Jemez Canyon Reservoir. The water would be stored on the ascending limb of the Spring runoff hydrograph when native flows exceed downstream demands, and released at the peak and descending limb of the Spring runoff hydrograph. Storage of the temporary pool would be in the flood pool at Cochiti Lake and would begin in late April or early May. In Jemez Canyon Reservoir the storage would begin in mid February or early March. The release of stored water would be limited to the amount necessary to provide a minimum flow of 5,800 cfs for 5 days on the Rio Grande at Albuquerque gage.

The release of the stored water is similar to the first scenario above. It is anticipated that the release of the stored water would not be more than 500 to 2,000 cfs per day for 5 days from either project. In this scenario the recession of the hydrograph drops by 250 cfs per day until reaching a flow of 1,500 cfs. Release of the stored water is expected to start in late April if it is stored in Jemez Canyon Reservoir and mid-May to early June if stored in Cochiti Lake. Any remaining water not needed to meet the overbanking flows would be completely evacuated prior to June 15, with the intention of releasing it prior to the runoff's tailing off, or by June 15 whichever comes first.

The storage of water for the proposed deviation could be done by using Cochiti Lake conservation storage only (recruitment & overbanking), Jemez Canyon Reservoir conservation storage only (recruitment), or both Cochiti Lake and Jemez Canyon Reservoir conservation storage (recruitment & overbanking). Where the storage takes place and how much is required for which action will be determined based on

hydrological conditions in a particular year. No significant or unusual effects on the resources in the action area are foreseen.

Under the no-action alternative, temporary storage of native Rio Grande water at Cochiti Lake and Jemez Canyon Dam for later release to facilitate downstream recruitment flows and provide overbank flows below Isleta Diversion Dam would not occur. The dams would be operated to safely pass inflow according to the existing water control plan. The change in surface elevations at the reservoirs would not exceed normal operating conditions. Reclamation acquires and maintains a pool of Supplemental Water that is used to meet flow requirements of the 2003 Biological Opinion for water operations, for requirements to control the rate of river recession, and, if needed, for a flow spike to trigger silvery minnow spawning. The need for a spawning flow would be determined by the Service in consultation with Reclamation and the Corps. The no-action alternative would have no significant effect on the human environment of the affected area.

The proposed action would result in only minor and temporary impacts to resources in the action area. The following elements have been analyzed and would not be significantly affected by the proposed action: socioeconomic environment, air quality, water quality, noise levels, recreation, flood plains, riparian areas, wetlands, waters of the United States, biological resources, endangered and threatened species, prime and unique farmland, cultural resources, and Indian trust assets.

The proposed action has been fully coordinated with Federal, tribal, and local governments with jurisdiction over the ecological, cultural, and hydrologic resources in the affected area. Based upon these factors and others discussed in detail in the Environmental Assessment, the planned action would not have a significant effect on the human environment. Therefore, an Environmental Impact Statement will not be prepared for the conduct of this planned deviation from the water control plan of the Cochiti Dam and Lake Project and Jemez Canyon Dam.

_____ _____

Date

B.A. Estok
Lieutenant Colonel, U.S. Army
District Commander

CERTIFICATION OF LEGAL REVIEW

The *Environmental Assessment for a Temporary Deviation in the Operation of Cochiti Dam, Sandoval County, New Mexico*, including all associated documents required by the National Environmental Policy Act, has been fully reviewed by the Office of Counsel, Albuquerque District, and is approved as legally sufficient.

M. LeeAnn Summer
Acting District Counsel

26 April 07
Date

DRAFT ENVIRONMENTAL ASSESSMENT FOR A TMEPORARY DEVIATION IN THE OPERATION OF COCHITI DAM, SANDOVAL COUNTY, NEW MEXICO

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ENVIRONMENTAL ASSESSMENT FOR A TEMPORARY DEVIATION IN THE OPERATION OF COCHITI DAM AND JEMEZ CANYON DAM, SANDOVAL COUNTY, NEW MEXICO

1. BACKGROUND, PURPOSE AND NEED

The U.S. Army Corps of Engineers, Albuquerque District (Corps) is proposing a temporary deviation from its normal flood control operation at the Cochiti Dam and Lake Project as well as the Jemez Canyon Dam Project, Sandoval County, New Mexico. This planned deviation from the current water control plans would entail a proposal to implement a temporary deviation from its water control plans for the Cochiti Dam and Lake Project and the Jemez Canyon Dam Project to facilitate spawning and recruitment flows for the Rio Grande Silvery Minnow, RGSM (*Hybognathus amarus*), and provide overbanking opportunities to create ideal habitat for the Southwestern Willow Flycatcher, SWFL (*Empidonax traillii extimus*). The Projects are located in Sandoval County, New Mexico, and were authorized for flood and sediment control, recreation, and development of fish and wildlife resources. All Project facilities and a major portion of the flood control pool lie within the bounds of the Pueblos. The duration of the planned deviation between both reservoirs is from late February through June beginning in 2009 for the next 5 years. Pueblo de Cochiti, Santa Ana Pueblo and the Rio Grande Compact Commission have provided to the Corps their written consent to the proposed deviation. Prior to implementation, the planned 5-year deviation would require the approval of the Corp's South Pacific Division.

The RGSM was listed as endangered by the U.S. Fish and Wildlife Service (Service) in July 1994 (USFWS 1994). Historically, the silvery minnow occupied the Rio Grande and Pecos rivers from north-central New Mexico downstream to the Gulf of Mexico. Currently the minnow occurs only within the approximately 160-mile reach of the Rio Grande from Cochiti Dam to Elephant Butte Lake. The SWFL was listed as endangered without critical habitat designation on February 27, 1995 (USFWS 1995). The species is restricted to historically rare and sparsely distributed dense riparian associations of willow, cottonwood, buttonbush, and other deciduous shrubs and trees throughout the southwest United States.

In 2003, the Corps and the U.S. Bureau of Reclamation (Reclamation) formally consulted with the Service pursuant to Section 7 of the Endangered Species Act regarding the continued operation of dams within the middle Rio Grande valley of New Mexico. In March 2003, the Service issued the *Biological and Conference Opinions on the Effects of Actions Associated with the Programmatic Biological Assessment of Bureau of Reclamation's Water and River Maintenance Operations, Army Corps of Engineers' Flood Control Operation, and Related Non-Federal Actions on the Middle Rio Grande, New Mexico* (USFWS 2003a). The Reasonable and Prudent Alternative of the Biological Opinion requires, in part, that the Corps and Reclamation, annually provide an increase in flow to cue spawning of the Rio Grande silvery minnow, if needed. Flow increases for spawning were provided by Reclamation in 2002 and 2003 through the use of purchased water.

Since it was listed as endangered in 1994, RGSM population gradually declined through 2003—a period that included an extended drought in New Mexico. During 2004 and 2005, the population increased nearly to its size at the time of listing in response to sustained flows of both moderate and exceptional discharge in the middle Rio Grande (see Section 3.07). In 2006, despite the relatively high population levels, spawning and the subsequent development of young fish were poor, and the population index decreased by nearly a magnitude (Dudley and Platania 2007). Successful spawning and the

recruitment of young into the adult population is needed in 2007 (and subsequent years) to avoid jeopardizing the continued existence of the Rio Grande silvery minnow.

In 1992 the Service was petitioned to list WIFL as an endangered species under the Endangered Species Act (ESA). Subsequently, the Service published a proposal in 1993 to list the subspecies as endangered with critical habitat (58 FR 10694). After numerous delays and a lawsuit, the Service published a final determination of critical habitat in 1997 (Service 1997).The willow flycatcher is a widely distributed summer resident of much of the United States and southern Canada (Brown 1988). Historically, the southwestern willow flycatcher was widespread across the southwestern United States, breeding in riparian habitats ranging from sea level to approximately 7,000 feet in Arizona, southern California, New Mexico, southern Nevada, southern Utah, southwestern Colorado, west Texas, and extreme northwest Mexico (Phillips 1948, Service 1995, McKernan and Braden 2001, Smith et al. 2004). In New Mexico southwestern willow flycatcher breeding territories have been documented on the upper, middle, and lower Rio Grande; the Rio Chama; the Zuni River; and the middle and lower Gila River (Sogge et al. 1997, Williams 1997, Finch and Kelly 1999, Marshall 200). During presence/absence surveys conducted along the middle Rio Grande, 334 southwestern willow flycatcher were documented, of which 274 were thought have been resident southwestern willow flycatcher and 60 were reported as migrant males (Reclamation 2005).

The Cochiti Dam and Lake Project and Jemez Canyon Dam Project were authorized for flood and sediment control, recreation, and development of fish and wildlife resources by Public Laws 86-645 and 88-293 (see Appendix A). Deviations in flood control operation require approval of the Rio Grande Compact Commission (Commission). Due to the success of the 2007 deviation which showed a ten-fold increase in RGSM population, the Corps is working with Pueblo de Cochiti, and Santa Ana Pueblo technical staff, to develop a 5-year strategy that entails a range of flexible water operations at Cochiti Lake and Jemez Canyon Reservoir to provide information essential for the RGSM and SWFL long term survival. The experimental information obtained from the deviations could be considered in a new Middle Rio Grande Water Operations Biological Opinion.

Regulatory Compliance

This Environmental Assessment was prepared by the U.S. Army Corps of Engineers, Albuquerque District, in compliance with all applicable Federal statutes, regulations, and Executive Orders, including:

- American Indian Religious Freedom Act (42 U.S.C. 1996); and
- Archaeological Resources Protection Act of 1979 (16 U.S.C. 470);
- Clean Water Act of 1972 and Amendments of 1977 (CWA);
- Clean Air Act of 1972, as amended (42U.S.C. 7401 *et seq.*);
- Endangered Species Act of 1973, (ESA) as amended (16 U.S.C. 1531 *et seq.*);
- Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low Income Populations, 1994;
- Farmland Protection Policy Act of 1981, as amended (7 U.S.C. 4201 *et seq.*);
- Federal Actions to Address Environmental Justice in Minority Populations and Low-
- Income Populations (Executive Order 12898);
- Federal Noxious Weed Act of 1974 (Public law 93-269; 7 U.S.C. 2801);
- Floodplain Management (Executive Order 11988);
- National Environmental Policy Act of 1969, as amended (42 U.S.C. 4321 *et seq.*);
- National Environmental Policy Act (NEPA) of 1969 (42 U.S.C. 4321 *et seq.*);
- Regulations of Implementing the Procedural Provisions of NEPA (40 CFR 1500 *et seq.*);

- National Historic Preservation Act of 1966, as amended (16 U.S.C. 470 *et seq.*);
- Native American Graves Protection and Repatriation Act of 1990 (25 U.S.C. 3001 *et seq.*);
- Protection and Enhancement of the Cultural Environment (Executive Order 11593);
- Protection of Historic and Cultural Properties (36 CFR 800 *et seq.*);
- Protection and Enhancement of the Cultural Environment (Executive Order 11593);
- Protection of Wetlands (Executive Order 11990);
- Procedures of Implementing NEPA (33 CFR 230; ER 200-2-2);
- Regulations for Implementing the Procedural Provisions of NEPA (40 CFR 1500 *et seq.*);
- U.S. Army Corps of Engineers' Procedures for Implementing NEPA (33 CFR 230);
- U.S. Army Corps of Engineers' Procedures for Implementing NEPA (33 CFR 230).

This document and associated analyses have been coordinated with the Pueblo de Cochiti and Santa Ana Pueblo. For those portions of the proposed action potentially affecting non-tribal lands, this document also reflects compliance with applicable State of New Mexico regulations and standards for water quality, as well as regulations conserving endangered plants and animals.

2. DESCRIPTION OF THE PROPOSED ACTION AND ALTERNATIVES

2.01. BACKGROUND:

Due to the success of the 2007 deviation which showed a ten-fold increase in RGSM population, the Corps is working with Pueblo de Cochiti, and Santa Ana Pueblo technical staff, to develop a 5-year strategy that entails a range of flexible water operations at Cochiti Lake and Jemez Canyon Reservoir to provide information essential for the RGSM and SWFL long term survival. The experimental information obtained from the deviations could be considered in a new Middle Rio Grande Water Operations Biological Opinion.

The Corps is proposing to implement a temporary deviation from its water control plans for the Cochiti Dam and Lake Project and the Jemez Canyon Dam Project to facilitate spawning and recruitment flows for the RGSM and provide overbanking opportunities to create ideal habitat for the SWFL. The Projects are located in Sandoval County, New Mexico, and were authorized for flood and sediment control, recreation, and development of fish and wildlife resources. All Project facilities and a major portion of the flood control pool lie within the bounds of the Pueblos. The duration of the planned deviation between both reservoirs is from late February through June beginning in 2009 for the next 5 years. Pueblo de Cochiti, Santa Ana Pueblo and the Rio Grande Compact Commission have provided to the Corps their written consent to the proposed deviation.

To determine the potential need for additional water to augment native flows, the Corps used the Riverware-based reservoir-routing model developed by the Upper Rio Grande Water Operations Modeling (URGWOM) Team to evaluate historic Middle Rio Grande streamflow in 2007 using historical hydrologic data since 1973 to derive probabilities of flow versus the flow requirements for the proposed actions.

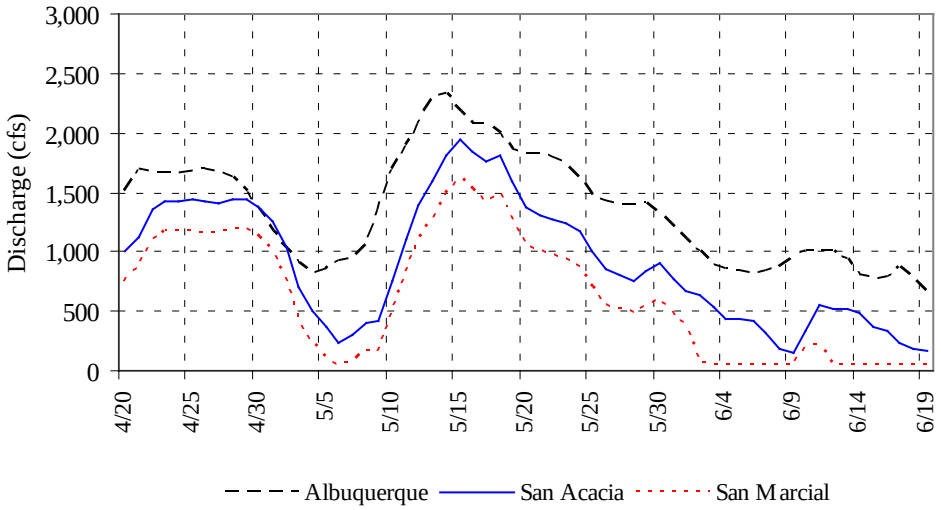

Figure 1. Streamflow forecast 2007 (URGWOM modeling results).

2.02. NO-ACTION ALTERNATIVE

Under the no-action alternative, temporary storage of native Rio Grande water at Cochiti Lake and Jemez Canyon Dam for later release to facilitate downstream recruitment flows would not occur. The dams would be operated to safely pass inflow according to the existing water control plans. The change in reservoir elevations at the lakes would vary depending on the available water to temporarily store and the action. However, all temporary changes are well within normal flood control operations.

The U.S. Bureau of Reclamation (Reclamation) acquires and maintains a pool of Supplemental Water (USBR 2006b) that is used to meet spawning and target flow requirements in the 2003 Biological Opinion for water operation (USFWS 2003a). The availability of water from willing sellers has decreased over the past few years. If the U.S. Fish and Wildlife Service determines that augmentation of native Rio Grande flows to provide sufficient spawning/recruitment opportunities is necessary and the highest priority need (recognizing the limited Supplemental Water supply), then Reclamation would discuss this request with the Service.

2.03. PROPOSED ACTION

The Corps proposes to temporarily store water in the flood control space at Cochiti Lake and Jemez Canyon Dam Reservoir to provide a recruitment flow of 2,500 to 3,000 cfs for 7 to 10 days at Albuquerque. The first proposed deviation is for temporary storage and soon-to-follow release of native Rio Grande water to supplement flows in the main stem of the Rio Grande below Cochiti and Jemez Canyon Dams for the benefit of RGSM. As part of the proposal, the Corps will establish a temporary pool for storage between 5,000 to 20,000 acre-feet at Cochiti Lake and/or up to 20,000 acre-feet at Jemez Canyon Reservoir. The water would be stored on the ascending limb of the runoff hydrograph when native flows exceed downstream demands, and released at the peak and descending limb of the runoff hydrograph. Storage of the temporary pool would be in the flood pool at Cochiti Lake and would begin in late April or early May. In Jemez Canyon Dam Reservoir, the storage would begin in mid February or early March. The release of stored water would be limited to the amount necessary to provide a minimum spawning recruitment flow at the Albuquerque gage of 3,000 cfs for seven to ten days. It is anticipated that the release of the stored water would not be more than 500-1000 cfs per day for up to 10 days from

either project. Release of the stored water is expected to start in mid-May to early June. In this scenario the recession of the hydrograph drops by 250 cfs per day until reaching a flow of 1,500 cfs. Any remaining water not needed to meet the spawning recruitment flows would be completely evacuated prior to June 15, with the intention of releasing it prior to the runoff's tailing off, or by June 15 whichever comes first.

The second proposed deviation is for temporary storage and soon-to-follow release of native Rio Grande water to supplement flows in the main stem of the Rio Grande below Cochiti and Jemez Canyon Dams to enhance flows to provide an overbank condition downstream from Isleta Diversion Dam. As part of the proposal, the Corps will establish a temporary pool for storage between 30,000 to 45,000 acre-feet at Cochiti Lake and /or up to 25,000 acre-feet at Jemez Canyon Reservoir. The water would be stored on the ascending limb of the runoff hydrograph when native flows exceed downstream demands, and released at the peak and descending limb of the runoff hydrograph. Storage of the temporary pool would be in the flood pool at Cochiti Lake and would begin in late April or early May. In Jemez Canyon Reservoir the storage would begin in mid February or early March. The release of stored water would be limited to the amount necessary to provide a minimum flow of 5,800 cfs for 5 days at the Rio Grande at Albuquerque gage.

The release of the stored water is similar to the first scenario above. It is anticipated that the release of the stored water would not be more than 500-2000 cfs per day for 5 days from either project. In this scenario the recession of the hydrograph drops by 250 cfs per day until reaching a flow of 1,500 cfs. Release of the stored water is expected to start in late April if it is stored in Jemez Canyon Reservoir and mid-May to early June if stored in Cochiti Lake. Any remaining water not needed to meet the overbanking flows would be completely evacuated prior to June 15, with the intention of releasing it prior to the runoff's tailing off, or by June 15 whichever comes first.

The commitment to facilitating recruitment flow stems from Endangered Species Act consultation with the U.S. Fish and Wildlife Service. In March 2003, the Service issued the *Biological and Conference Opinions on the Effects of Actions Associated with the Programmatic Biological Assessment of Bureau of Reclamation's Water and River Maintenance Operations, Army Corps of Engineers' Flood Control Operation, and Related Non-Federal Actions on the Middle Rio Grande, New Mexico* (USFWS 2003a). The Reasonable and Prudent Alternative of the Biological Opinion requires, in part, that the Corps and Reclamation, annually provide an increase in flows to cue spawning of the Rio Grande silvery minnow.

Storage would only occur when native flows exceed downstream irrigation demands. Storage would occur on the ascending limb of the runoff hydrograph and would be released at the expected peak of runoff. All water stored under this proposal but not needed to meet the spawning and recruitment flows would be completely evacuated from Cochiti Lake and Jemez Canyon Reservoir no later than June 15 to assure its downstream delivery to Elephant Butte Lake. Losses due to evaporation during temporary storage have been estimated to range from 160 to 200 acre-feet. The Bureau of Reclamation has stated that this loss would be offset using Supplemental Water.

The storage of water for the proposed deviations could be done by using Cochiti Lake conservation storage only (recruitment & overbanking), Jemez Canyon Reservoir conservation storage only (recruitment), or both Cochiti Lake and Jemez Canyon Reservoir conservation storage (recruitment & overbanking). Where the storage takes place and how much is required for which action will be determined based on hydrological conditions in a particular year.

Cochiti Lake would increase approximately 5 to 13 feet for recruitment storage and 18 to 25 feet for storage of overbanking flows. The maximum change at Jemez Canyon Reservoir is approximately 10 to

41 feet for either recruitment storage or overbanking flows. Depending on actual flow conditions, water may be held in storage for 5 to 15 days prior to its release. Figure 2 depicts the changes to surface water elevation at the reservoir according to modeling results. Figure 3 illustrates the expected inflow and outflow rates at Cochiti Lake. If both projects are used in conjunction to store in the conservation pools then the elevation changes would vary and be less than the stated maximums, depending on the amount of storage required in each project. Depending on actual flow conditions, the release of stored water from the reservoir may occur several days later than depicted.

The Corps may evacuate the described temporary pool or any portion thereof as necessary for flood control purposes, in accordance with the Project's authorization. The Corps further reserves the right to take such measures as may be necessary to preserve life and property, including being able to meet emergency situations or to permit maintenance or repair of the dam or appurtenant structures. Regulation and releases will be accomplished with the Corps service gates and the Corps will not be liable or responsible for any loss of stored waters due to any malfunction of the service gates.

As discussed above, the predicted runoff in the Middle Rio Grande may be sufficient to successfully provide spawning and recruitment flows for the minnow; however, even a slight decrease in actual runoff volume could necessitate the need for flow augmentation. The Corps has proposed this water control deviation to temporarily store water in order to be fully prepared if the need arises, and to assure spawning and recruitment flows and possibly overbank flows in future years. The actual schedule of releases from Cochiti Lake and Jemez Canyon Dam Reservoir would be coordinated during routine morning conference calls among Middle Rio Grande reservoir operators and stakeholders.

All Cochiti Dam and Lake Project facilities and a major portion of the flood control pool, lie within the bounds of the Pueblo de Cochiti. A Mutual Understanding Agreement for temporary storage has been signed by the Pueblo and the Corps (see Appendix B). The Corps and the Pueblo de Cochiti would monitor inundation at Cochiti Lake and White Rock Canyon during temporary storage. Spawning and subsequent population levels of RGSM would be documented through an established monitoring program.

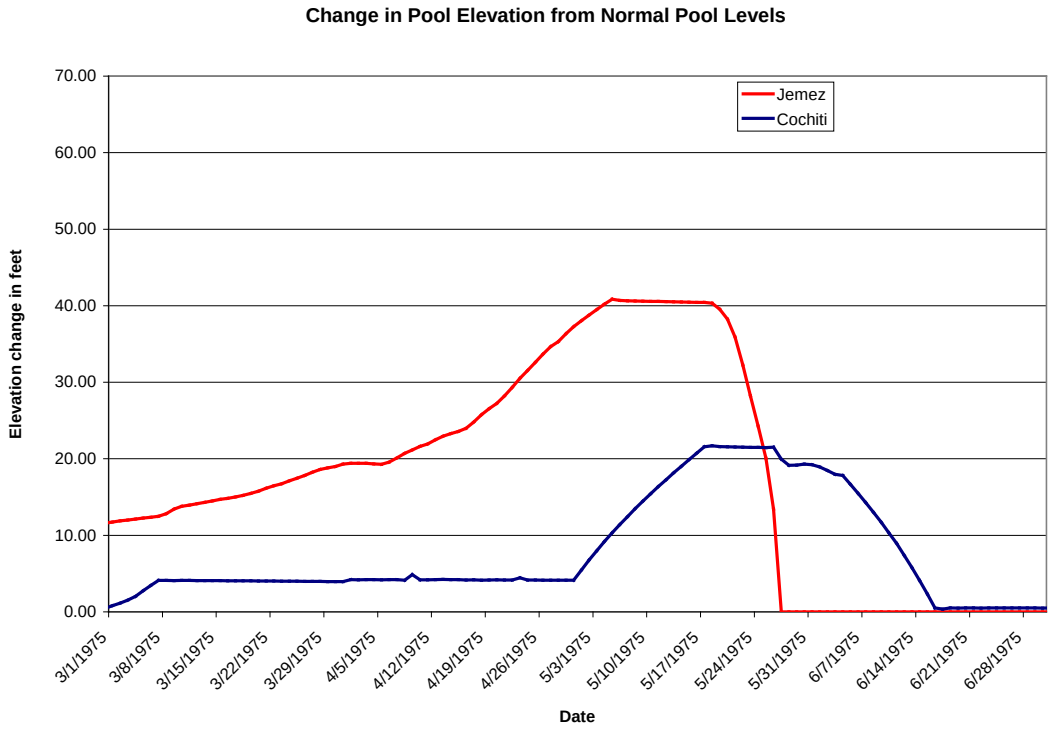

Figure 2. Hypothetical change in surface water elevations at Cochiti Lake and Jemez Reservoir.

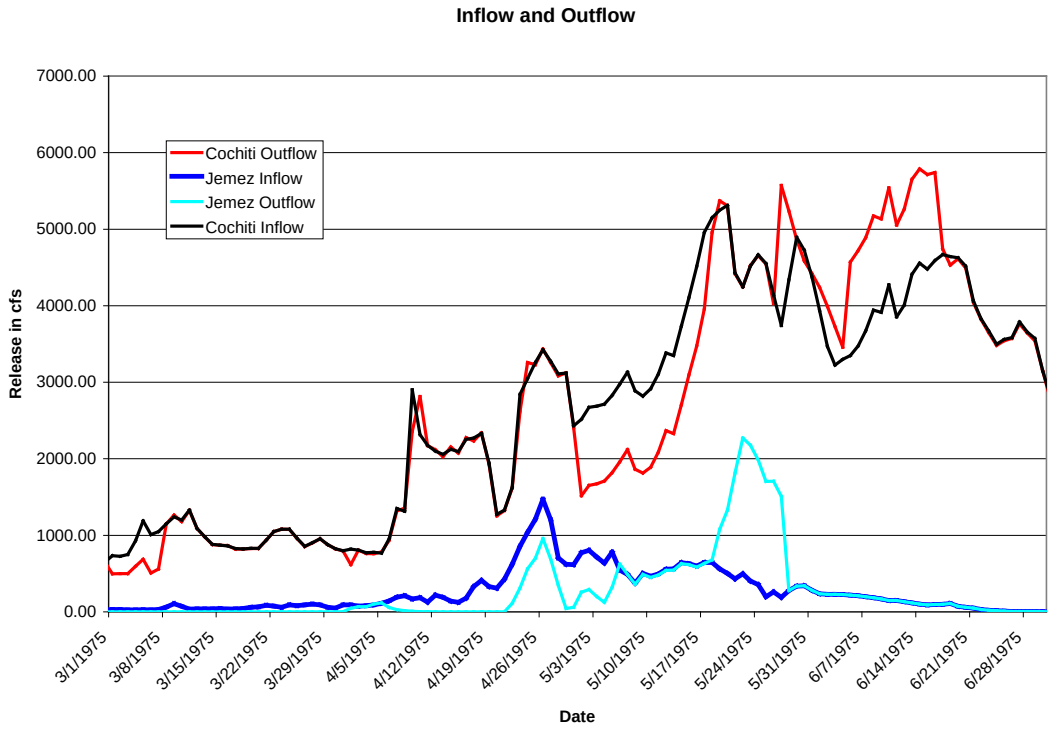

Figure 3. Hypothetical inflow and outflow rates at Cochiti Lake and Jemez Reservoir.

All Jemez Canyon Dam and Lake Project facilities and a major portion of the flood control pool, lie within the bounds of the Santa Ana Pueblo. A Mutual Understanding Agreement for temporary storage has been signed by the Pueblo and the Corps (see Appendix C). The Corps and the Santa Ana Pueblo would monitor inundation and seepage levels during temporary storage. Spawning and subsequent population levels of RGSM would be documented through an established monitoring program.

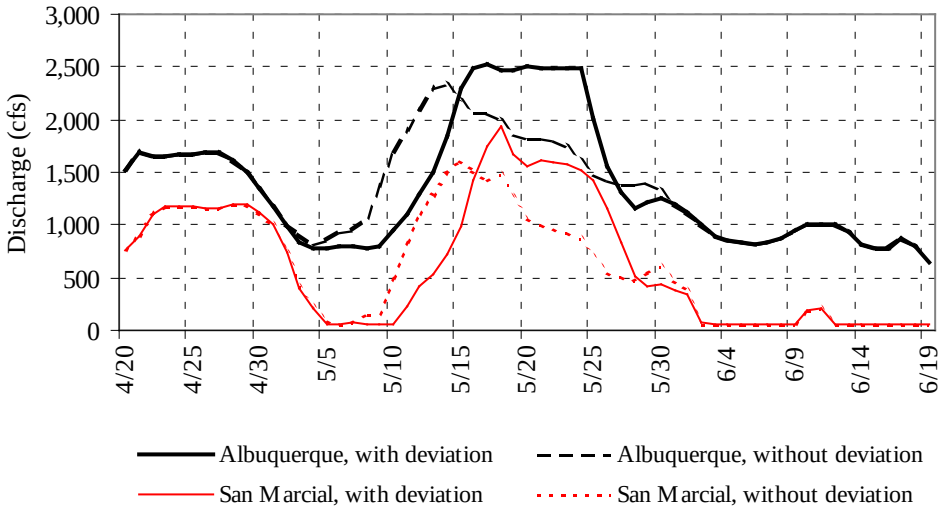

Figure 4. Hypothetical use of temporarily stored water to enhance recruitment flows.

Pursuant to Corps regulation, the Albuquerque District has requested approval of the proposed water control deviation from the Corps' South Pacific Division (see Appendix D). This final Environmental Assessment and a *Finding of No Significant Impact* signed by the District Commander will be included in the final submittal for approval.

2.04. ALTERNATIVES ELIMINATED FROM FURTHER CONSIDERATION

The Corps initially evaluated alternative locations for the temporary storage of water for facilitating recruitment flows. Abiquiu Reservoir was eliminated from further consideration because of storage space limitations and ongoing upstream storage of Rio Chama flows. Reclamation is in the process of storing flows upstream in El Vado Reservoir for the Middle Rio Grande Conservation District and Prior and Paramount water for Pueblos. The conservation storage space in Abiquiu Reservoir may be full in some years. The additional storage of 10,000 acre-feet of water for recruitment flows would raise the pool above the current limit of storage easements (6,220 feet above mean sea level). El Vado Reservoir also was eliminated as an alternative storage location because it is operated by Reclamation.

An alternate solution would be the use of supplemental water (San-Juan Chama water) purchased by the Bureau of Reclamation (Bureau) to meet the flow requirements. Using San-Juan Chama water for spawning recruitment flows and/or overbanking would reduce the Bureau's ability to meet target flows during late June through October. Re-regulating Cochiti Lake and / or Jemez Canyon Reservoir inflow would be a no-cost solution for the federal government.

3. EXISTING ENVIRONMENTAL SETTING

3.01. COCHITI AND JEMEZ CANYON DAMS

The Corps coordinates flood control operations with Cochiti, Abiquiu, Jemez Canyon and Galisteo dams in order to regulate for the maximum safe flow at Albuquerque (7,000 cfs). Congressional authority for the construction of Jemez Canyon Dam is contained in the Flood Control Acts of 1948 (P.L. 80-858) and 1950 (P.L. 81-516). Cochiti Dam is operated by the Corps within the authority of Public Laws 86-645 and 88-293 (Flood Control Act of 1960). Reservoir releases are restricted to the maximum non-damaging capacity of the downstream channel as measured at Albuquerque, approximately 7,000 cfs (USACE 1996). When inflow would exceed the channel capacity of the Rio Grande downstream, flood control storage is initiated. Floodwaters are stored only for the duration required and are evacuated as rapidly as downstream conditions permit. Public Law 86-645 states that deviations in operation must be approved by the Rio Grande Compact Commission.

Cochiti Dam and Lake Project

The Cochiti Dam and Lake Project is located on the mainstem of the Rio Grande, about 50 miles north of Albuquerque (Figure 5). The dam spans both the Santa Fe River and the Rio Grande near their confluence. The Flood Control Act of 1960 (Public Law 86-645; see Appendix A) authorized the construction of Cochiti Dam for flood and sediment control. In 1964, Public Law 88-293 (see Appendix A) authorized the establishment of a permanent pool for the conservation and development of fish and wildlife resources and recreation purposes. The 1,200-acre (approx. 50,000 acre-feet) permanent pool was created, and is maintained, by allocations from the San Juan-Chama Project (trans-mountain diversion). Construction of Cochiti Dam began in 1965 by the Corps and the project was put in operation in 1975.

The dam's spillway crest and the top of the flood control pool space (approximately 582,000 acre-feet) are at an elevation of 5,460.5 feet[1]; and the maximum pool elevation is at 5,474.1 feet (approx. 718,000 acre-feet). The current elevation of the permanent pool (approx. 50,000 acre-feet) is 5,340.2 feet. The majority of the permanent pool creates the large lake visible from the dam. The permanent pool also inundates approximately 3 miles of the Rio Grande channel within White Rock. Between 1975 and 2003, Cochiti Lake has retained approximately 30,760 acre-feet of sediment. The current sediment reserve volume is approximately 78,000 acre-feet.

Flood storage is normally associated with snowmelt runoff during April through June. Summer flood storage is generally the result of short-term, high intensity thunderstorm events. The maximum water storage to date has been 396,167 acre-feet (water surface elevation 5,434.5 feet), which occurred in 1987. This volume included the permanent pool and flood control storage pools.

Flowage easements for flood control were obtained in a series of agreements beginning in 1965. Currently, the flood control pool includes approximately 4,609 acres of the Pueblo de Cochiti, 8,236 acres of the Santa Fe National Forest, 361 acres of Bandelier National Monument, and 345 acres of Los Alamos National Laboratory. The Corps holds fee title to 139 acres within the flood pool (USACE 1996). The flood pool, if inundated, would extend approximately 22.6 miles upstream from the dam.

[1] All elevations in this document indicate feet above mean sea level, NGVD, 1929 datum.

Jemez Dam and Reservoir Project

The Jemez Canyon Dam and Reservoir Project are located on the Jemez River, 2.8 miles upstream from its confluence with the Rio Grande, 5 miles Northwest of Bernalillo, Sandoval County, New Mexico. The Jemez River enters the Rio Grande about 24 miles below Cochiti Dam. Congressional authority for the construction of Jemez Canyon Dam is contained in the Flood Control Acts of 1948 (P.L. 80-858) and 1950 (P.L. 81-516). The facility regulates Jemez River flows for flood damage reduction and sediment retention. Construction of the dam began in May 1950, and it was completed and placed into operation in October 1953. All lands associated with the Jemez Canyon Dam and Reservoir Project (about 6,711 acres) are held in trust by the United States for the benefit and use of the Pueblo of Santa Ana. The Department of the Army and the Pueblo signed an MOU in 1952 (amended in 1978 by P.L. 95-498) which established a perpetual right and privilege for the construction, operation, and maintenance of the Jemez Canyon Dam and Reservoir Project. The Pueblo of Santa Ana reserved the right to use all associated lands for any purposes not inconsistent with those expressly granted to the government for the facility.

The reservoir at spillway crest (elevation 5,232 feet) is about 6 miles long and 1 mile wide. Initial capacity allocations were 73,000 acre-feet for flood control and 44,000 acre-feet for sediment deposition. Top-of-dam elevation is 5,271.6 feet (NGVD), which is approximately 149 feet above the original streambed. Intake floor elevation is 5,125 feet. Flood storage is normally associated with snowmelt runoff during April through June. Summer flood storage is generally the result of short-term, high intensity thunderstorm events. The maximum storage to date has been 72,254 acre-feet (elevation 5,220.3 feet), occurring in 1987.

The Rio Grande downstream from the Jemez River confluence was an aggrading channel; that is, sufficient sediment had accumulated within the channel through Albuquerque by 1960 to raise the river bed 6 to 8 feet above the typical valley floor elevation outside of the levee system (Lagasse 1980). Initial operation for sediment retention in Jemez Canyon Reservoir was to maintain a 24-hour equivalent pool when inflow exceeded 40 cfs. This was effective in trapping sand and larger particles but let clay and most of the silt pass through the dam. Subsequent reworking of material deposited in the reservoir by low flows carried material through the conduit thus reducing trap efficiency and effectiveness of the project to prevent sediment building up in the channel downstream and in the Rio Grande channel. In addition, the pool was of insufficient size so that deposition occurred in the intake structure and against the gates, causing very difficult operation.

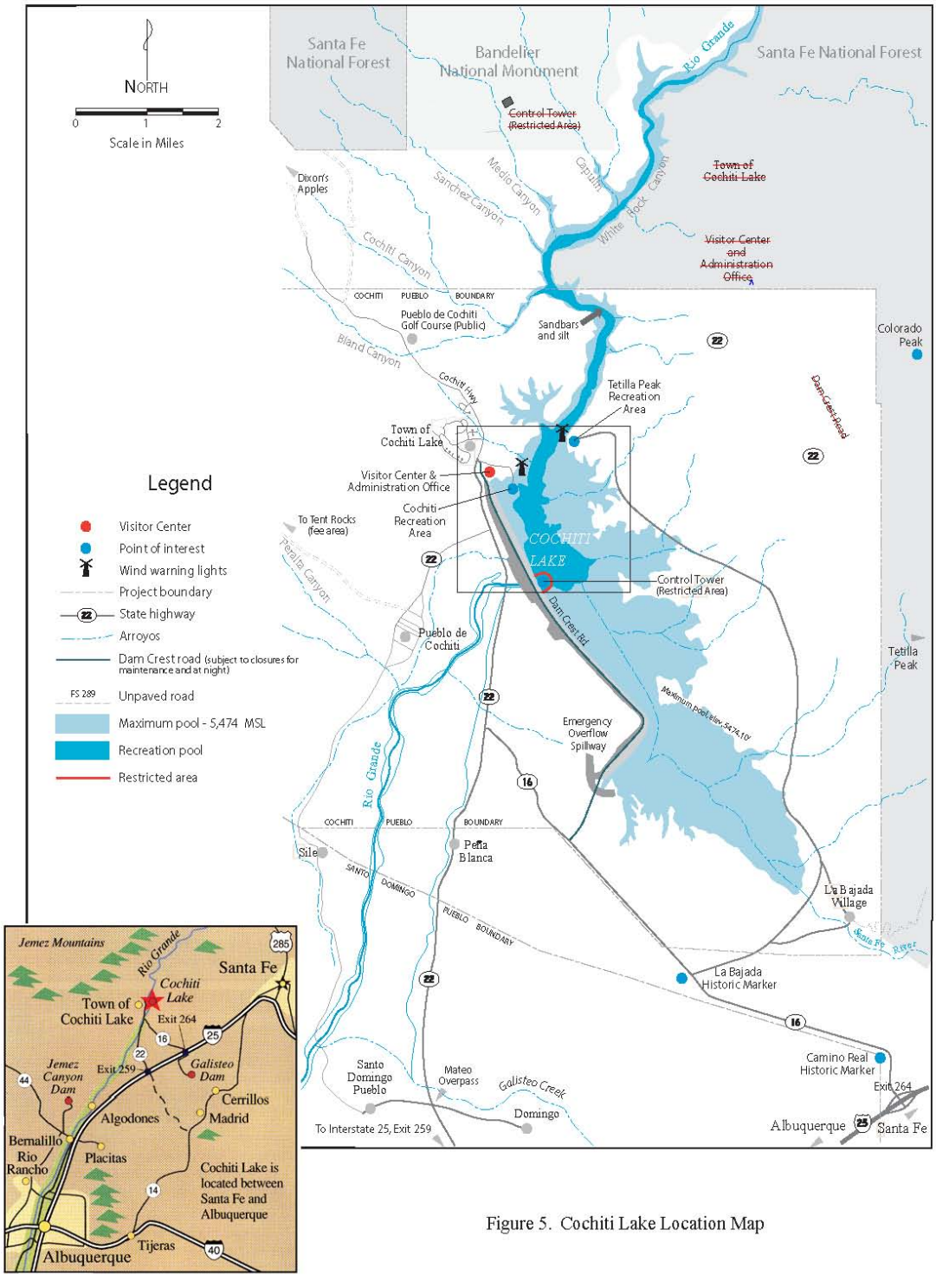

Figure 5. Cochiti Lake Location Map

Figure 5. Cochiti Lake Location Map.

3.02. PHYSICAL ENVIRONMENT

The Cochiti Dam and Lake Project is located in the northern part of the Mexican Highland Section of the Basin and Range Physiographic Province (Fenneman 1931). Cochiti Dam is near the southern end of the Española Basin, which includes the Rio Grande Valley from the vicinity of the Rio Chama confluence southward to where the Rio Grande exits White Rock Canyon along the southeast slope of the Jemez Mountains. From this point southward to the Big Bend reach in Texas, the Rio Grande Valley is fairly broad with extensive floodplains and a reduced gradient.

Soil material in the bed of the Rio Grande and Cochiti Lake is alluvial in origin. The deepest (approximately 80 feet) area of sediment deposition is near the southern end of White Rock Canyon, and depth decreases upstream. Sediment accumulation within the main body of Cochiti Lake amount to a few feet. Ildefonso very stony loam is the principal soil series on the slopes of White Rock Canyon. This well-drained soil is forming in alluvium and coluvium, and is derived principally from basalt. Permeability of this soil is high, and available water capacity is low. Runoff is rapid and the hazard of water erosion is moderate (NRCS 1999).

The Jemez Canyon Dam and Reservoir Pool are located on the Rio Jemez entirely within an outcrop of the Santa Fe formation, a Miocene-Pliocene series of the Tertiary system (USDA Soil Conservation Service et al.1977). In the immediate area of the dam and well above the dam height, the Santa Fe formation is overlain by a basalt cap of Quaternary age. Within the delta area there is a minimal amount of basalt talus. The Santa Fe formation is composed of clay, silt, sand, gravel, and cobbles. The formation at the site is generally horizontally bedded; however, the beds are discontinuous both vertically and horizontally.

The Jemez Canyon Reservoir has not been surveyed by soil scientists. Interpolation from other data collected on similar sites off Pueblo lands, indicates that Christianburg-Navajo soils occur principally along the floor of the Rio Jemez valley (USDA Soil Conservation Service et al.1977). They are nearly level, fine-textured alluvium weathered from shale and sandstone and are highly susceptible to erosion. These soils encompass nearly the entire flood pool area of the reservoir and floodplain upstream of the pool area (*i.e.*, below elevation 5,232 feet).

3.03. CLIMATE

The climate of north-central New Mexico can be generally characterized as semi-arid continental, with mild summer and cold winter temperatures. The average precipitation for the area is approximately 10 inches per year, and about 70 percent of this moisture falls during the warmer months of the year (June, July, and August). Summer moisture is carried into the state by southerly and southeasterly air circulation from the Gulf of Mexico and is usually released in brief, often intense thunderstorms. An average of 50 such storms occurs in the area each year. Winter moisture is carried into the state by eastward-moving storms from the Pacific Ocean and is often blocked from reaching the project area by the Jemez Mountains and other mountain ranges to the north and west. Snowfall (averaging 7.4 inches annually) that does reach the project area is generally of short duration.

Temperatures in the area are influenced both by elevation (approximately 5,200 to 5,400 feet above sea level) and the highly variable topography of north-central New Mexico. Cold air draining from the Jemez Mountains is often directed into the project area through White Rock Canyon during the colder months, resulting in somewhat lower temperatures during the winter than might be expected at this elevation. The mean annual temperature is close to 50 degrees F, and usually only about 11 days per year reach 90 degrees F. Most days in November through March have freezing temperatures, but only rarely during winter does the temperature fall to zero degrees F.

Winds in the area are predominantly from the west-southwest during the spring (when strongest) and shift to the north-northwest during the rest of the year. Average wind speeds are approximately 12 miles per hour, increasing to 25 miles per hour or greater about 5 percent of the time. Annual sunshine is nearly 75 percent of the total possible and is important during the summertime in the generation of localized winds and storm systems in the project area.

Since the installation of the weather station at Jemez Canyon Dam in 1954, the maximum annual precipitation was 13.88 inches in 1987 and the minimum was 2.40 inches in 1956. The maximum recorded 24-hour rainfall was 2.75 inches on October 17, 1960. During the winter months, heavy snowfall occurs in the upper mountainous areas of the watershed and snow is light over the lower basin. Snow remains in the mountainous areas above 7,000 ft. elevation from December into April. Below 7,000 feet in elevation, snow seldom stays on the ground more than a few days. The average annual snowfall varies from 10 inches at Jemez Canyon Dam to over 100 inches in the mountains. Jemez Canyon Reservoir reached a record pool elevation on June 2, 1987. Flood control storage starting on 13 April resulted in a maximum elevation of 5,220.3 feet (72,254 acre-feet).

3.04. LAND USES

Lands surrounding Cochiti Lake on Pueblo de Cochiti land are devoted to residential and agricultural (cropland, irrigated and non-irrigated livestock pasture) uses. The Tetilla Peak and Cochiti Recreation Areas are within the Pueblo land easement devoted to floodwater and sediment control for the Cochiti Dam Project. The Corps/Pueblo easement area also contains much of the 1,200-acre permanent pool for recreation and fish and wildlife enhancement. The Pueblo de Cochiti reserved the right to use all associated lands for any purposes not inconsistent with those expressly granted to the Federal Government for the facility.

Lands to the west of the dam at the Town of Cochiti Lake are leased from the Pueblo by private entities and are mainly for residential and recreational uses. Properties at the town of Peña Blanca adjacent to Pueblo de Cochiti and Santo Domingo Pueblo lands are privately owned and, in general, are dedicated to residential and agricultural uses.

North of the Pueblo de Cochiti in White Rock Canyon, the permanent pool and Rio Grande channel are bordered by Santa Fe National Forest on the east, and Bandelier National Monument and Los Alamos National Laboratory property on the west. The U.S. Forest Service, National Park Service, and Department of Energy, are responsible for the management of their respective lands within the Corps' easement for all purpose other than flood control.

Farmland that is protected from conversion or other adverse effects under provisions of the Farmland Protection Policy Act (Public Law 97-98) includes lands defined as prime or unique, or that are of statewide or local importance for the production of food, feed, fiber, forage, or oilseed crops, as determined by the appropriate state or unit of local government agency or agencies. Prime farmland soil survey units within Sandoval County include El Rancho, Jocity, Peralta, Aga, Gilco, and Zia. The latter three soils are present below the dam. There are no prime farmlands within the flood pool easement of the Cochiti Lake Project.

All lands associated with the Jemez Canyon Dam and Reservoir Project are held in trust by the United States for the benefit and use of the people of the Pueblo of Santa Ana. The Department of the Army and the Pueblo of Santa Ana signed an MOU in 1952 (augmented in 1978 by P.L. 95-498) which established a perpetual right and privilege for the construction, operation, and maintenance of the Jemez Canyon Dam

and Reservoir Project. The Pueblo of Santa Ana reserved the right to use all associated lands for any purposes not inconsistent with those expressly granted to the government for the facility.

No livestock are now allowed to graze in the project area; however an occasional breach of fencing may occur with resultant short-term utilization of the area by cattle. Hunting, hiking, fishing, swimming, horseback riding, and ceremonial activities occur near the proposed project impact area.

3.05. HYDROLOGY AND WATER QUALITY

The Rio Grande and Santa Fe River watersheds upstream from Cochiti Dam drain an area of more than 11,000 square miles in northern New Mexico and southern Colorado. The drainage basin lies between the Continental Divide and the Sangre de Cristo Mountains and includes several other tributary streams, including the Rio Chama, Rio Hondo, Red River, and Rio Pueblo de Taos. Snowmelt runoff from high elevations is the most significant contributor to stream flows in the basin.

Stream slopes in the highest elevations of the basin may be several hundred feet per mile, decreasing to 150 feet per mile or less in the Rio Grande Gorge, and only about 10 feet per mile in the Española Valley and White Rock Canyon. From Cochiti Dam downstream, the channel slope is only 4 to 5 feet per mile.

Prior to the construction of Cochiti Dam and other upstream dams, flood flows of 10,000 to 20,000 cfs were periodically recorded in White Rock Canyon and downstream reaches. Present-day discharges in the Rio Grande downstream from Cochiti Dam range from a typical minimum winter flow of about 300 cfs, to spring runoff peaks that, through regulation, do not exceed 7,000 cfs at the Albuquerque gauge. This is the current safe channel capacity water control criterion that is defined in the Cochiti Lake Water Control Manual (USACE 1996).

The elevation of Cochiti Lake during the spring runoff period has reached or exceeded an elevation of 5,348 feet during 13 of the past 32 years (1975-2006). Except for exceptionally long storage periods in 1985 through 1987, this elevation has been inundated for periods of approximately 2 to 60 days between late April and the end of June. The most recent flood control storage occurred in 2005 when the lake reached an elevation of about 5,364 feet.

The New Mexico Water Quality Control Commission (2000) has designated uses and standards for interstate and intrastate streams in New Mexico (by stream segment). Cochiti Lake is designated for use as livestock and wildlife watering, warm water fishery, coldwater fishery, and primary contact. Designated uses of the main stem of the Rio Grande from Cochiti Dam downstream to the Angostura Diversion Works are irrigation, livestock watering, wildlife habitat, secondary contact, coldwater fishery, and warm water fishery. State water quality standards do not apply to tribal lands.

Executive Order 11988 (Floodplain Management) provides Federal guidance for activities within the floodplains of inland and coastal waters. Preservation of the natural values of floodplains is of critical importance to the nation and the State of New Mexico. Federal agencies are required "to ensure that its planning programs and budget requests reflect consideration of flood hazards and floodplain management." The proposed work would not contribute to or result in any additional development of the Rio Grande floodplain or the shoreline of Cochiti Lake.

3.06. BIOLOGICAL RESOURCES

Plant Communities

The project area is located within the Great Basin Conifer Woodland and the Plains and Great Basin Grassland biotic communities as defined by Brown (1982). These biotic communities characterize the vegetation outside of the Rio Grande floodplain. Uplands adjacent to the Rio Grande and Cochiti Lake are vegetated by one-seed (*Juniperus monosperma*) and Rocky Mountain juniper (*J. virginiana* var. *scopulorum*), piñon pine (*Pinus edulis*), Apache plume (*Fulugia paradoxia*), rabbit brush (*Chrysothamnus depressus*), skunkbush (*Rhus tribolata* var. *tribolata*), four-wing saltbush (*Atriplex canescens*), snakeweed (*Gutierrezia glutinosa*), walkingstick cholla (*Opuntia* sp.), prickly pear (*Opuntia fragilia* var. *fragilia*), and a variety of forbs and grasses including phlox (*Phlox* sp.), groundsels (*Senecio bigelovii* var. *hallii*), asters (*Aster* sp.), grama grasses (*Bouteloua* spp.), dropseeds (*Sporobolus* spp.), muhly (*Muhlenbergia torreyia*), and western wheatgrass (*Agropyron occidentale*).

Since the closure of Cochiti Dam in 1974, wetland vegetation has been developing in the lake's delta in White Rock Canyon. Currently, approximately 243 acres of wetlands occur within the reach entailing the permanent pool (NWI 2006). The extent of delta vegetation has increased 60% from the 152 acres estimated in 1993 (Allen *et al*. 1993). Flood control storage during the spring runoff period has inundated the majority of this vegetation in 5 of the 14 years between 1993 and 2006.

Vegetation adjacent to the permanent pool within White Rock Canyon consists of emergent and shrub wetland types. Emergent wetlands — entailing approximately 22 acres — are dominated by cattail (*Typha latifolia*), barnyard grass (*Echinochla crus-galli*), salt grass (*Distichlis spicata*), and inland rush (*Juncus interior*) (Allen *et al*. 1993). Shrub stands (approx. 167 acres) are dominated by coyote willow (*Salix exiguis*) ranging from less than 5-feet to about 12-feet tall. Goodding's willow (*Salix nigra* var. *gooddingii*) trees occur in some larger stands. Approximately 54 acres of mixed emergent/shrub stands occur within this reach (NWI 2006).

The Rio Jemez delta is within the Plains-Mesa Sand Scrub biotic community as defined by Dick-Peddie (1993), and vegetation typical of this community dominates the entire area south of the Rio Jemez on Pueblo of Santa Ana lands. The following grasses and forbs occur in sparse to moderately dense stands throughout the area: black grama, New Mexico feathergrass, western wheatgrass, galleta, sand dropseed, and ring muhly. Shrubs commonly found throughout the area include fourwing saltbush, sand sagebrush, rabbitbrush, and bush penstemon. Unconsolidated sand dunes with sparse pioneer vegetation occur in a portion of this community. At slightly higher elevations, and often interspersed with the sand scrub community, are pinyon pine /one-seed juniper woodlands.

By the early 1970s, vegetation occupied about 624 acres of the 1,143-acre Jemez Reservoir flood pool below an elevation of 5,197 feet (USACE 1976). Vegetation development was likely enhanced by more frequent (but still periodic) flooding due to flood control operations, which generally increased soil moisture and nutrient availability. The widespread invasion of salt cedar throughout the middle Rio Grande Valley during this period also contributed to plant community development at Jemez Canyon Reservoir.

In 1976, the upper portion of the reservoir pool space near the proposed project impact area was vegetated by volunteer salt cedar with a modest understory of salt grass and sedges. A salty crust on the soil surface was common (USACE 1976). A dense and varied riparian community bordered the river channel, which wound through the reservoir (USACE 1976). Mixed stands of willow, cottonwood, Russian olive, and saltcedar were interspersed with western wheatgrass, mat muhly, ring muhly, and shadscale. The relatively moist soils along the river channel were able to sustain willow and cottonwood

growth, while saltcedar dominated the drier soils throughout the remainder of the basin. Tree ages indicated that flood control storage during 1959 and 1965 was responsible for germination of most of the woody vegetation throughout the reservoir.

Vegetation patterns were not markedly different in 1984. The establishment of the 2,000-acre sediment pool in 1979 inundated up to 100 acres of dense saltcedar in the lower portion of the reservoir (USACE 1984). Plant communities in the upstream portion of the reservoir near the proposed project impact area appear to have been affected only locally where sediment deposition patterns were altered as a result of the pool. A narrow band of riparian vegetation occurs along the former sediment pool margins. In the delta area, large mixed stands of Rio Grande cottonwood, Gooding's willow, and coyote willow occur, intermixed with non-native Russian olive, salt cedar, and occasional Siberian elm.

Executive Order 11990 (Protection of Wetlands) requires the avoidance, to the extent possible, of long- and short-term adverse impacts associated with the destruction, modification, or other disturbances of wetland habitats.

Wildlife and Fish

The following vertebrate animal species are known or expected to occur in the general area of Cochiti Lake, White Rock Canyon, the lower Jemez delta on the lands of the Pueblo of Santa Ana, and their surroundings.

Mammals known or likely to be present include little brown myotis (*Myotis lucifugus*), Yuma myotis (*Myotis yumanensis*), pallid bat (*Antrozous pallidus*), big free-tailed bat (*Tadarida macrotis*), desert cottontail (*Sylvilagus auduboni*), black-tailed jackrabbit (*Lepus californicus*), rock squirrel (*Spermophilus variegatus*), Botta pocket gopher (*Thomomys bottae*), beaver (*Castor canadensis*), western harvest mouse (*Reithrodontomys megalotis*), deer mouse (*Peromyscus maniculatus*), white-footed mouse (*P. leucopus*), piñon mouse (*P. truei*), house mouse (*Mus musculus*), meadow jumping mouse (*Zapus hudsonius*), coyote (*Canis latrans*), raccoon (*Procyon lotor*), bobcat (*Felis rufus*), badger (*Taxidea taxus*), striped skunk (*Mephitis mephitus*), mule deer (*Ococoileus hemionus*), and elk (*Cervus canadensis*) (Biella and Chapman 1977, Walker 2001).

Hubbard and Hubbard (1979) reported a total of 154 species of birds occurring at least seasonally at Bandelier National Monument, which borders a portion of Cochiti Lake. Many, if not most, of the same species occur in the Project area as well. Common breeding species include Canada Goose (*Branta canadensis*), Mallard (*Anas crecca*), Turkey Vulture (*Cathartes aura*), Red-Tailed Hawk (*Buteo jamaicensis*), Swainson's Hawk (*B. swainsoni*), American Kestrel (*Falco sparverius*), Killdeer (*Charadrius vociferous*), Mourning Dove (*Zenaida macroura*), Greater Roadrunner (*Geococcyx californianus*), Western Screech-Owl (*Otus Kennecotti*), Great Horned Owl (*Bubo virginianus*), Belted Kingfisher (*Ceryle alcyon*), Northern Flicker (*Colaptes auratus*), Western Kingbird (*Tyrranus vociferans*), Barn Swallow (*Hirundo pyrrhonota*), Scrub Jay (*Aphelocoma coerulescens*), Black-billed Magpie (*Pica pica*), Common Raven (*Corvus corax*), American Crow (*C. brachyrhynchos*), Black-capped Chickadee (*Poecile atricapilla*), Canyon Wren (*Catherpes mexicanus*), American Robin (*Turdus migratorius*), Mountain Bluebird (*Sialia currucoides*), Western Meadowlark (*Sturnella neglecta*), Brown-headed Cowbird (*Molothrus ater*), Spotted Towhee (*Pipilo maculatus*). Common species during migration and winter includes Great Blue Heron (*Ardea herodias*), Northern Shoveler (*A. clypeata*), Ring-Necked Duck (*A. collaris*), Common Merganser (*Mergus merganser*), Sandhill Crane (*Grus canadensis*), American Coot (*Fulica Americana*), Ring-Billed Gull (*Larus pipixcan*), Dark-eyed Junco (*Junco hyemalis*), and White-crowned Sparrow (*Zonotrichia leucohhrys*).

Amphibians and reptiles known to occur in or near the project area include tiger salamander (*Ambystoma tigrinum*), plains spadefoot (*Sciaphiopus bombifrons*), Woodhouse toad (*Bufo woodhousei*), northern leopard frog (*Rana pipiens*), bullfrog (*R. catesbeiana*), painted turtle (*Chrysemys picta*), spiny softshell turtle (*Trionys spiniferus*), lesser earless lizard (*Holbrookia maculata*), eastern fence lizard (*Sceloporus undulates*), plateau whiptail (*Cnemidophorus velos*), checkered whiptail (*C. tesselatus*), western hognose snake (*Heterodon nascius*), coachwhip (*Masticophis flagellum*), glossy snake (*Arizona elegans*), common gartersnake (*Thamnophis sirtalis*), western hognose snake (*Heterodon nascius*), and western diamondback rattlesnake (*Crotalus atrox*) (Degenhardt *et al*. 1996).

Cochiti Lake is primarily a warm-water fishery consisting of northern pike (*Esox lucius*), walleye (*Sander vitrius*), black bullhead, channel catfish, common carp, white bass (*Morone chrysops*), smallmouth bass (*Micropterus dolomieui*), largemouth bass, green sunfish (*Lepomis cyanellus*), white crappie (*Pomoxis annularis*), black crappie (*Poxomis nigromaculatus*), and bluegill (Ortiz 2001). The New Mexico Department of Game and Fish occasionally performs supplemental stockings of walleye, largemouth bass, and channel catfish in the lake. Jemez Canyon Reservoir has no fishery since it remains dry after being drained in 2001.

In a study of the Middle Rio Grande, Plateau Ecosystems Consulting, Inc. (2001) identified 14 fish species within the Cochiti Pueblo reach below the dam. Most common are the longnose dace (*Rhinichthys cataractae*), rainbow trout (*Oncorhynchus mykiss*), brown trout (*Salmo trutta*), white sucker (*Catostomus commersoni*), black bullhead (*Ictalurus melas*), channel catfish (*Icalurus punctatus*), common carp (*Cyprinus carpio*), largemouth bass (*Micropterus salmoides*), river carpsucker (*Carpiodes carpio*), and bluegill (*Lepomis machrochirus*).

3.07. ENDANGERED AND THREATENED SPECIES

Three agencies have a primary responsibility for the conservation of animal and plant species in New Mexico: the U.S. Fish and Wildlife Service, under authority of the Endangered Species Act of 1973 (as amended); the New Mexico Department of Game and Fish, under the authority of the Wildlife Conservation Act of 1974; and the New Mexico Energy, Mineral and Natural Resources Department, under authority of the New Mexico Endangered Plant Species Act and Rule No. NMFRCD 91-1. State of New Mexico regulations do not apply to Pueblo and tribal lands. Each agency maintains a list of animal and or plant species that have been classified or are candidates for classification as endangered or threatened based on present status and potential threat to future survival and recruitment. Of these species, those with potential to be affected by the proposed action are discussed below.

Bald Eagle

The Bald Eagle (*Haliaeetus leucocephalus*) is a winter resident along rivers and at reservoirs in the southwestern United States. This species was listed as Federally endangered in 1967 (32 Federal Register 4001) and again in 1978 (43 Federal Register 6233), but recently was reclassified as threatened due to breeding population increases throughout the country (USFWS 1995b). The Service proposed removing the Bald Eagle from the list of endangered and threatened wildlife in July 1999 (USFWS 1999b) and reopened the comment period for this action in 2006 (USFWS 2006. The Service published the final rule removing bald eagle populations nationwide from the federal list of threatened and endangered species on July 9, 2007.

In New Mexico the Bald Eagle is a winter migrant from the northern border, and southward to the Gila, lower Rio Grande, middle Pecos, and Canadian valleys. Cochiti Lake is a key habitat area that includes winter roost and a concentration area. The lake has a large number of waterfowl from November to March and fisheries supported by the reservoir and river that provide the prey base for foraging eagles.

The Bald Eagle is associated with aquatic ecosystems throughout most of its range. The typical diet of Bald Eagles is fish, with many other types of prey such as waterfowl and small mammals, depending on location, time of year, and population cycles of the prey species (USFWS 1995b). In New Mexico, these birds typically roost in groups in trees at night, usually in protected areas such as canyons (NMDGF 1988).

Both adult and juvenile Bald Eagles are present at and around Cochiti Lake between late November and early March. The Corps conducted aerial surveys for Bald Eagles between 1988 and 1996 during January, the month of highest abundance. During the 9 years of survey, Bald Eagles were present at Cochiti Lake and White Rock Canyon during all 9 years and the number of birds observed ranged from 2 to 20.

Southwestern Willow Flycatcher

The action area is within the current range of the Southwestern Willow Flycatcher (*Empidonax traillii extimus*). The U.S. Fish and Wildlife Service listed the flycatcher as endangered in February 1995 (USFWS 1995a). The flycatcher also is classified as endangered by the State of New Mexico (NMDGF 1987). The current range of the flycatcher includes Arizona, New Mexico, southern California, western Texas, southwestern Colorado, and southern portions of Nevada and Utah (Unitt 1987; Browning 1993). In New Mexico, flycatchers are known to breed in the Rio Grande, Zuni, San Francisco, and Gila river drainages. Available habitat and overall numbers have declined statewide (USFWS 1997). A recovery plan for the flycatcher (USFWS 2002) has been completed.

Loss and modification of nesting habitat is the primary threat to this species (Phillips *et al*. 1964; Unitt 1987; and USFWS 1993b). Loss of habitat used during migration also threatens the flycatcher's survival. Large-scale losses of southwestern wetland and cottonwood-willow riparian habitats used by the flycatcher have occurred (Phillips *et al*. 1964; Carothers 1977; Rea 1983; Johnson and Haight 1984; Howe and Knopf 1991).

The flycatcher is an obligate riparian species and nests in thickets associated with streams and wetlands where dense growth of willow, buttonbush, boxelder, Russian olive, saltcedar, or other plants are present. Nests are frequently associated with an overstory of scattered cottonwood. Throughout the flycatcher's range, these riparian habitats are now rare, widely separated, and occur in small and/or linear patches. Flycatchers nest in stands with a densely vegetated understory approximately 10 to 23 feet or more in height. Surface water or saturated soil is usually present beneath or adjacent to occupied thickets (Phillips *et al*. 1964; Muiznieks *et al*. 1994). At some nest sites, surface water may be present early in the breeding season with only damp soil present by late June or early July (Muiznieks *et al*. 1994; Sferra *et al*. 1995). Habitats not selected for nesting include narrow (less than 30 feet wide) riparian strips, small willow patches, and stands with low stem density. Suitable habitat adjacent to high gradient streams does not appear to be used for nesting. Areas not utilized for nesting may still be used during migration.

Southwestern Willow Flycatchers arrive in New Mexico in late May and early June (Yong and Finch 1997). Breeding activity begins immediately and young may fledge as soon as late June. Late nests and re-nesting attempts may not fledge young until late summer (Sogge and Tibbitts 1992; Sogge *et al*. 1993).

Occupied and suitable flycatcher nesting habitat occurs within the Middle Rio Grande Valley in the 230-mile reach between Velarde and San Marcial: approximately 44 breeding pairs or territorial males were identified in 2004 surveys, approximately 30 were found in 2005 (USBR and USACE 2006) and more than 37 were know to be present in 2006 (USBR 2006a). The largest breeding concentration of flycatchers along the Rio Grande occurs at the headwaters of Elephant Butte Lake (downstream from San Marcial) where 130, 107, and 142 pairs or territorial males were present in 2004 through 2006,

respectively (USBR 2006a). Occupied and suitable habitat is primarily composed of riparian shrubs and trees, chiefly Goodding's willow and peachleaf willow, Rio Grande cottonwood, coyote willow, and saltcedar. The nearest known breeding flycatchers from the study area occur along the Rio Grande near San Juan Pueblo and Isleta Pueblo, approximately 39 miles upstream and 64 miles downstream from Cochiti Dam, respectively.

As previously described, approximately 167 acres of shrub wetlands consisting primarily of coyote willow occur adjacent to the permanent pool along the Rio Grande within White Rock Canyon. At least half of this acreage is estimated to be up to 10 feet in height. Shrub stands are small (mean = 2.7 acres, median = 1.0 acre; N = 61) and scattered along a 6.5-mile reach. Six willow stands range in size from 5 to 11 acres, and a large, 42-acre stand occurs near the mouth of the canyon. Therefore, it is likely that a small portion of this area may be suitable breeding habitat for the flycatcher. Any of these willow stands could be used by flycatchers during migration.

Remoteness and limited accessibility make regular surveys for willow flycatchers very difficult in the 20-mile-long White Rock Canyon. The National Park Service has performed protocol surveys within the Bandelier National Monument portion of the canyon in 1994, 1995, 1997, and 2001. A small number of migrant, but no breeding, flycatchers have been observed during formal and informal surveys within this reach (*pers. comm.*, Stephen Fettig, Biologist, Bandelier Nat. Mon., April 2007).

Critical habitat for the flycatcher was designated throughout its range in July 1997 (USFWS 1997); however, that rule was vacated in 2001 as a result of litigation. The Service re-designated critical habitat in October 2005 (USFWS 2005); however it does not include the action area.

Rio Grande Silvery Minnow

The Rio Grande silvery minnow (*Hybognathus amarus*) formerly was one of the most widespread and abundant species in the Rio Grande basin of New Mexico, Texas, and Mexico (Bestgen and Platania 1991). At the time of its listing as endangered, the silvery minnow was restricted to the Middle Rio Grande in New Mexico, occurring only from Cochiti Dam downstream to the headwaters of Elephant Butte Reservoir, only 5 percent of its historic range (Platania 1991). The Rio Grande silvery minnow was listed as federally endangered under the Endangered Species Act in July 1994 (USFWS 1994). The species is listed by the State of New Mexico as an endangered species. The U.S. Fish and Wildlife Service (Service) documented that de-watering of portions of the Rio Grande below Cochiti Dam through water regulation activities, the construction of main stream dams, the introduction of non-native competitor/predator species, and the degradation of water quality as possible causes for declines in Rio Grande silvery minnow abundance (USFWS 1993a). A recovery plan for the silvery minnow has been completed (USFWS 1999c) and a second draft recovery plan is currently under revision (USFWS 2007).

Critical habitat for this species was designated in the Middle Rio Grande Valley in July 1999 (USFWS 1999a). As a result of litigation, this designation was rescinded, and the U.S. Fish and Wildlife Service re-designated critical habitat in February 2003 (USFWS 2003b). The critical habitat extends from Cochiti Dam downstream for 157 miles; however, the Pueblo lands of Santo Domingo, Santa Ana, Sandia, and Isleta are excluded. Constituent elements of critical habitat required to sustain the Rio Grande silvery minnow include stream morphology that supplies sufficient flowing water to provide food and cover needs for all life stages of the species; water quality to prevent water stagnation (elevated temperatures, decreased oxygen, etc.); and water quantity to prevent formation of isolated pools that restrict fish movement, foster increased predation by birds and aquatic predators, and congregate disease-causing pathogens.

The Rio Grande silvery minnow is a moderately sized, stout minnow, reaching 3.5 inches in total length, which spawns in the late spring and early summer, coinciding with high spring snowmelt flows (Sublette *et al*. 1990). Spawning also may be triggered by other high flow events such as spring and summer thunderstorms. This species produces neutrally buoyant eggs that may drift downstream with the current (Platania 1995) and use floodplain habitats for nursery areas (Pease et al. 2006). The eggs may drift considerable distances at lower flow volumes during spawning (Bestgen and Platania 1991, USFWS 1993a, Platania 1995). Maturity for this species is reached toward the end of the first year. Most individuals of this species live one year, with only a very small percentage reaching age two (Sublette *et al*. 1990, Bestgen and Platania 1991, USFWS 1993a).

Natural habitat for the Rio Grande silvery minnow includes stream margins, side channels, and off-channel pools where water velocities are lower than in the main channel. Areas with detritus and algal-covered substrates are preferred. The lee sides of islands and debris piles often serve as good habitat. Stream reaches dominated by straight, narrow, incised channels with rapid flows would not typically be occupied by the Rio Grande silvery minnow (Sublette *et al*. 1990; Bestgen and Platania 1991).

Past actions have reduced the total habitat from historic conditions and altered habitat conditions for the Rio Grande silvery minnow. Narrowing and deepening of the channel, lack of side channels and off-channel pools, and changes in natural flow regimes have all adversely affected the Rio Grande silvery minnow and its habitat. These environmental changes have degraded spawning, nursery, feeding, resting, and refugia areas required for species survival and recovery (USFWS 1993a). In addition, flood control and diversion dams block upstream migration and restrict the species' redistribution. The coarser substrate, deeper channel, and higher velocities that occur in the incised channel downstream of the Cochiti Dams do not provide the conditions where large numbers of Rio Grande silvery minnows are known to occur.

Inundated floodplains provide nursery habitat for many riverine larval fish (Coutant, 2004) to escape the current and initiate feeding, including silvery minnows (Pease, 2004). Recent channel incision through much of the Middle Rio Grande has abandoned the historical floodplain (Massong et al. 2006), significantly reducing access to floodplain nursery habitats during years with reduced runoff discharge (Porter and Massong 2004). In-channel surfaces (bank attached bars and islands) provide floodplain-like surfaces when spring flow reaches 2000-3000 cfs (Tashjian and Massong 2006).

Since it was listed as endangered in 1994, the silvery minnow population gradually declined through 2003 (also an extended period of drought conditions in New Mexico). During 2004 and 2005, the population increased nearly to its size at the time of listing in response to sustained flows of both moderate and exceptional discharge in the middle Rio Grande (see Figure 6). The population rebounded in 2007 from a population index (CPUE) of 1.37 / 100 m^2 (Dudley and Platania 2006) to 9.96 / 100 m^2 (Dudley and Platania 2007b).

Nursery habitat studies demonstrated utilization of inundated pointbars by silvery minnows during the recruitment flow manipulation at Cochiti Reservoir (Bureau of Reclamation 2007). A total of 2,173 silvery minnow eggs were collected in 189 of the 2,525 kicknet and 785 seine samples (total 3,310). There were 324 silvery minnows among the 5,865 fish captured during the study. The timing and nursery habitat components (depth, vegetation, other variables) used by silvery minnow larvae requires more quantification by focused studies.

The silvery minnow population index (based on standard sampling methodology at 20 locations) has been found to be positively correlated to peak annual discharge within the Middle Rio Grande (Dudley and Platania 2007a). Figure 7 dramatically illustrates this relationship from 1993 to 2006. At Albuquerque, the catch rates of minnows during October was significantly correlated ($p<0.001$) with the

annual number of days that discharge exceeded 2,000 or 3,000 cfs. Similarly, the number of days that discharge exceeded 2,000 cfs at the San Marcial gauge was highly correlated (p<0.001) with the October catch rate. These results, along with the significant population increase observed in 2004 in response to relatively moderate spring discharges, indicate that target flows for successful silvery minnow recruitment be 2,500 to 3,000 cfs for 7 to 10 days at Albuquerque.

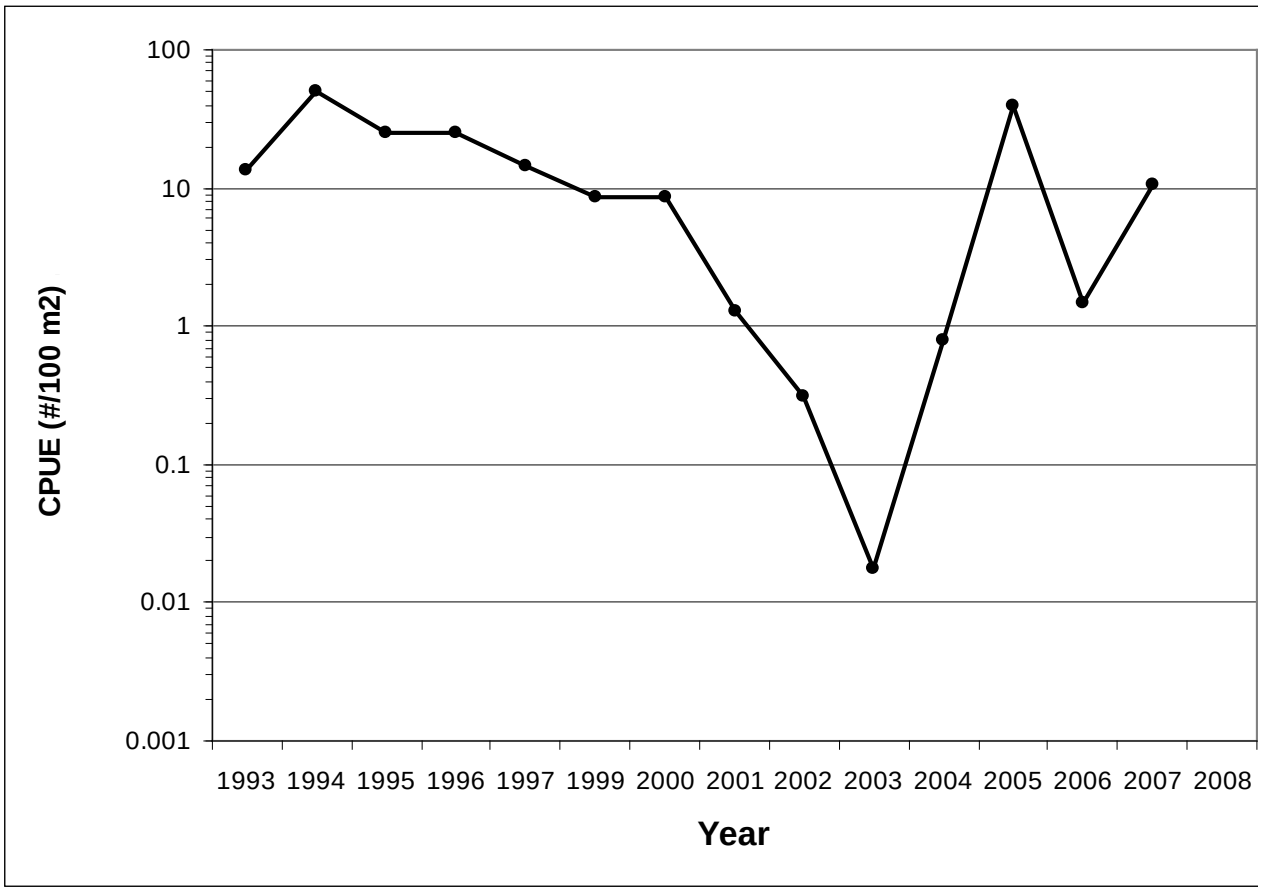

Figure 6. Rio Grande silvery minnow catch rates (catch per unit effort, CPUE) during October, 1993-1997 and 1999-2007. Solid circles indicate mean. Horizontal lines represent different orders of magnitude.

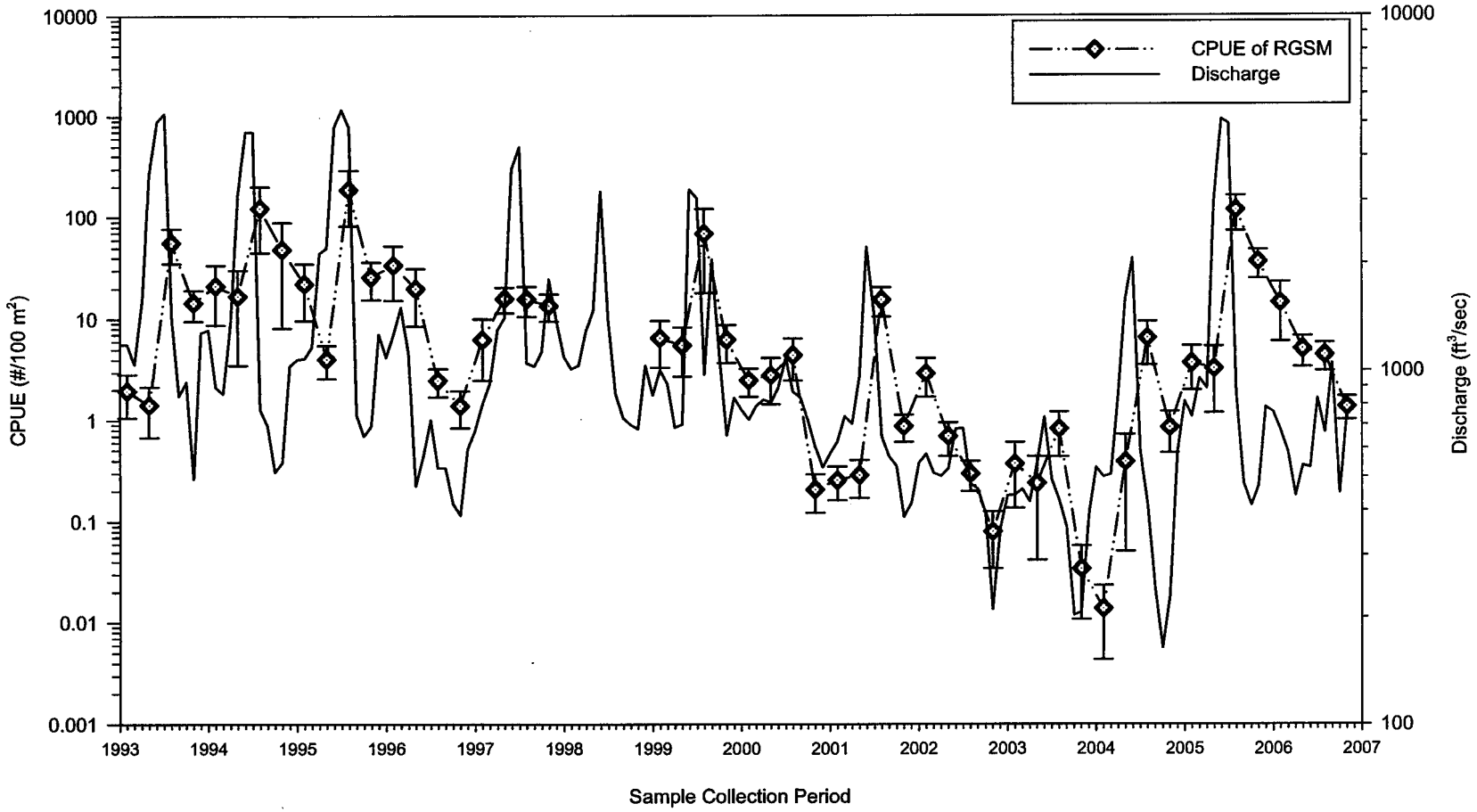

Figure 7. Time sequence of quarterly Rio Grande silvery minnow catch rates at population monitoring sites and discharge at the Albuquerque gauge. Diamonds indicate sample means for each survey and capped bars represent the stand error. (From Dudley and Platania 2007.)

3.08. CULTURAL RESOURCES

Culture History

The proposed action at Cochiti Lake and the Jemez Canyon Reservoir are within the Northern Rio Grande archaeological region as defined by Wendorf and Reed as the Northern Rio Grande Region (Rodgers, 1979:16). This brief cultural overview is based on the results of survey and excavation conducted by the Office of Contract Archeology for the National Park Service and the Corps in the mid-1970s, resulting in the four-volume set of archaeological research at Cochiti Dam (e.g., Biella and Chapman 1979).

The approximately 12,000 years of cultural interaction in this area has been subdivided into broadly defined periods based on constellations of artifacts recovered archaeologically. The ecological characteristics of the action areas on both pueblos, and of the surrounding region, include semiarid with low productivity, and seasonal and annual variability of rainfall and temperature. The primary adaptation to this ecosystem for the 10,000 years was a hunter-gatherer adaptation that relied on short-term resource exploitation and frequent moves. The earliest sites date between approximately 10,000 B.C. and 5,500 B.C. and represent the Paleo-Indian big-game hunters of the now extinct Pleistocene megafauna. Clovis Points (10,000 B.C. to 9,000 B.C.), generally associated with mammoth, and Folsom Points (9,000 B.C. to 8,000 B.C.) associated with the extinct *Bison antiquus* are found in isolation and at small sites. Other extinct game animals include camel, sloth, and horse. No sites from this time period occur in the area of the proposed project. Most Paleo-Indian sites in the nearby Albuquerque area have been recorded during survey, although some excavation occurred prior to housing construction on the west mesa. The range of site types identified includes tool manufacturing, resource processing related to hunting, and base camps occupied for longer periods of time. Many of these sites are on high ground with unobstructed views (Rodgers 1979:16-17). Following the Folsom Period a series of Paleo-Indian Point types have been recognized in the Southwest and New Mexico. These include Hell Gap, Midland, Plainview, Milnesand, Meserve, and Scottsbluff. Diagnostic Paleo-Indian spear points are generally lanceolate-shaped with central flutes removed from both sides of the point's stem; other tools that have been recovered include scrapers, knives, perforators, and informally utilized flakes. While plant gathering and processing occurred, the artifacts associated with these activities have not been generally recognized.

The Archaic Period extends from approximately 5,500 B.C. to A.D. 400 and represents a continuation of the hunting-gathering adaptation; however, the population of plants and animals is similar to those found today. The absence of the Pleistocene mega-fauna represents the primary difference from the preceding Paleo-Indian Period. Both large and small animals were hunted and trapped. Based on the increasing presence of grinding stones, manos and metates, it is clear that the processing of plants became more important later in the Archaic period. Towards the end of the Archaic, longer-term habitation sites that include shallow pit houses are found in areas of the Southwest including central New Mexico. Two major changes occurred towards the end of the Archaic. Indications of maize appear in the archaeological record by about 2,000 B.C.; however, maize became relatively more common after 1,000 B.C, although it was not a major food resource until after 500-700 A.D. The second major change was the appearance of the bow and arrow by about A.D. 400 or 500. The result was the replacement of the spear and spear thrower as the primary weapon. Archaic-period sites were recorded during the 1975 archaeological survey of the Cochiti proposed reservoir pool area. Several lithic scatters lacking diagnostic projectile points, but possibly from the Archaic Period, occur within the Jemez Canyon Reservoir area. Limited activity Archaic Period sites without diagnostic projectile points, especially those exposed on the surface, can be difficult to identify and are recorded as temporally unknown sites. The undiagnostic lithic scatter is the most commonly recorded site in the state of New Mexico, as represented in the state's Laboratory of Anthropology data base. Along the Rio Grande within northern and central New Mexico, the Archaic–Period inhabitants are referred to as the Oshara Tradition. This Period is subdivided into six temporal

phases based on differing diagnostic projectile points and other tools (Rodgers 1979:16-18; Bayer 1994: 250-252).

The Archaic Period is succeeded by the Ancestral Pueblo Period. Depending on the location within New Mexico, between three and five major temporal phases are recognized and are based on a host of characteristics, including house forms and construction techniques, settlement patterns, pottery types, and other elements of material culture. While hunting and gathering continued, reliance on agricultural products continually increased. Pit house villages, some with larger communal structures, indicate larger social groups living in one location for longer periods of time. Through time there is a transition from pit house villages to living and storage rooms on the surface while a few below ground structures are used for communal and religious purposes. As populations increased, these small surface houses were replaced with large rock and or adobe buildings of up to several hundred rooms. Not all of the rooms were necessarily occupied at once, as older portions were replaced by newer and, in some cases, larger rooms.

The Developmental Period dates between A.D. 600 and 1200 and can be subdivided into Early and Late depending on the predominance of either pit house or above- ground architecture. Early in the period the associated ceramics are similar to those found throughout northern New Mexico; later in time the stylistic attributes, including paint, design, and temper, become more locally diagnostic. The Coalition Period, A.D. 1200 to 1325 marked a more intensive use of the Pajarito Plateau, north of the project location. There was a change in the decorated pottery from mineral-base to carbon-base painted pottery and, as suggested by the number, size, and distribution of larger permanent habitation and seasonally-specific special-use sites, there was a marked increase in the population. The Classic Period, A.D. 1325 to 1600, spans the time of the widest settlement distribution, the largest sites, and the earliest Spanish contact, beginning with the Coronado Expedition in 1540. After several additional exploratory expeditions, the first permanent Spanish occupation in New Mexico began in 1598 near the present location of Ohkay Owingeh (San Juan) Pueblo. Glaze-painted pottery was introduced for the first time. Increasingly severe and widespread droughts and a variety of impacts from European colonizers including new diseases and resettlement of the Indians disrupted the native populations. Through time there was a gradual consolidation of the population into relatively few settlement (Rodgers 1979:18-22; Bayer 1994:252-255).

The Historic Period is characterized by rapid change and acculturation between the Indians, Spanish, Mexicans, and Americans. The Period, dating from about A.D. 1540 to the present, can be divided into seven phases reflecting differing aspects of social interaction. These phases include Spanish Exploration, followed by Colonization, the Pueblo Revolt, Spanish and Mexican Colonial, United States Territorial, and Statehood.

Currently, there are four major linguistic groups among the Pueblo Indians of the Southwest—Zuni, Uto-Aztecan (Hopi), Tanoan, and Keres. There are seven major dialects of Keres, including the western groups of Acoma and Laguna; and the eastern groups of Santo Domingo, San Felipe, Cochiti, Zia, and Santa Ana. There is general agreement among researchers and the eastern Keres that the recent ancestral homeland of Cochiti and Santa Ana, after A.D. 1300, included locations in the Puerco River area and the Jemez Mountains, including the Pajarito-Frijoles River areas, locations adjacent to the Rio Grande, the Galisteo Basin and perhaps the site of Paa-ko on the eastern side of the Sandia Mountains. However, there is less agreement concerning their ancestor's location prior to A.D. 1300. Based on a variety of materials recovered archaeologically, including ceramics, many believe that their ancestors originated from the general area around Mesa Verde and the Four Corners of New Mexico, Colorado, Arizona, and Utah. There is also a general agreement that many Keresan ancestors lived in the Galisteo Basin particularly in and around the region of turquoise deposits and San Marcos Pueblo (Akins 1993:139-144; and Bayer 1994:247-266).

Cochiti Reservoir Archaeological Survey

The intensive archaeological survey for the Cochiti Reservoir was conducted in two stages in early to mid-1975. The first area to be surveyed was the permanent pool, and the second was the flood control pool; this sequence was adopted so that any required excavations could be completed in advance of the rising water following completion of the dam. The standards employed for the archaeological work were up to the requirements of that era. The interval between the surveyors varied from 10 to 15 meters depending on terrain and vegetative cover and both archaeological sites and isolated occurrences were recorded (Biella and Chapman 1977:173-175). These are the standards generally used today.

A total of 325 archaeological sites were documented; 102 within the boundaries of the permanent pool and 223 in the flood control pool. Twenty of these sites were previously recorded by others. The majority of the sites are either nonstructural artifact scatters frequently associated with hearths or small one- to three-room structures with associated artifact scatters. Only one large pueblo (200 to 400 rooms) was recorded. Additional classes of sites included rock shelters, depressions, agricultural terraces, corrals, pens, and petroglyphs. Any single site location may contain remains from several temporal periods. At the time of the surveys, there were approximately 90 artifact scatters, 187 ancestral Pueblo sites, and 85 historic-period sites. There are three major periods of occupation represented by the sites: Late Archaic, 800 B.C. to A.D. 400; ancestral Pueblo, A.D. 600 to A.D. 1600; and Historic, A.D. 1540 to the present (Biella and Chapman 1977:201).

Traditional cultural properties occur within and adjacent to both projects.

Jemez Canyon Reservoir Archaeological Survey

No archaeological work occurred at the time of the 1950 to 1953 Jemez Dam construction; however, two archaeological surveys were conducted in conjunction with later undertakings at the dam. The first survey was conducted in 1977. The survey included a 200-foot wide road right-of-way for an entrance road to the dam from Highway 44, the realignment of the old haul road into the canyon, and a 10-acre overlook recreation area. A total of 10 limited activity sites were discovered. These included one prehistoric ceramic and lithic scatter from the Classic Period; four undiagnostic lithic scatters; one field house with no associated artifacts; two small habitation structures with associated corrals; and two religious sites (Ward 1977).

The second archaeological investigation, a survey of 1,200 acres in the flood pool, occurred in 1979 in conjunction with the establishment of a permanent 2,000 acre-foot sediment pool. A total of 18 archaeological sites and 17 locations of isolated artifacts were recorded. Seven prehistoric sites; six early historic sites, dating after A.D. 1550; and five sites from the recent historic, after A.D. 1700, were recorded. The kinds of sites recorded include petroglyphs, lithic scatters, habitation, agricultural, and ranching.

No excavations were conducted. During the survey, a small number of sherds and lithics were collected in order to accurately determine their typological categories. These artifacts were returned to the Pueblo in 1980 (Rodgers 1980). Traditional cultural properties occur within and adjacent to both projects.

3.09. SOCIOECONOMICS

Cochiti Lake and the Jemez Canyon Reservoir pool are in Sandoval County. The county is roughly 3,709 square miles in size, with approximately 24.2 persons per square mile. It is generally rural in character and has one minor urban center. The Town of Bernalillo (the county seat) and City of Rio Rancho have populations of 6,611 and 51,765, respectively, in 2000. Both communities are considered "bedroom communities" of the Albuquerque metropolitan area. The total population of Sandoval County in 2000 was 89,908 (U.S. Census Bureau 2000a).

Principal employment sectors include agriculture and service. Over the past 25 years, the Pueblo of Santa Ana has developed a successful agricultural enterprise centered on the production and processing of organic blue corn products. Other natural resource enterprises include sand and gravel mining and a native plant nursery. Extensive recreational and entertainment attractions include the Santa Ana Star Casino, the Prairie Star Restaurant, a 27-hole golf course, and a 22-field soccer complex. The Tamaya Hyatt resort opened in December 2000.

Socioeconomic resources include population and economic activity, as reflected by personal income, employment distribution, and unemployment. Some related secondary components, such as housing availability and public services, are not considered in this analysis because the action has no potential to generate measurable changes in populations that would create demand for these resources. Statistics at the county, state, and national level will be used to describe the socioeconomic context. Sandoval County serves as the Region of Influence in which most impacts can be expected to occur, and the state and region serve as regions of comparison.

In 2000, Sandoval County had a per capita personal income (PCPI) of $22,247. This PCPI ranked fifth in the State of New Mexico, and was 101 percent of the State of New Mexico average of $21,931, and was 75% of the national average of $29,469. In 1990, the PCPI of Sandoval County was $14,404 and the county ranked ninth in the State. The average annual growth rate of PCPI over the past 10 years was 4.7 percent. The average annual growth rate for the State of New Mexico was 3.9 percent and for the nation was 4.2 percent (BEA 2002a,b).

Table 1. Profile of Demographic Characteristics, Year 2000.

		Race (Percent of Total Population)*						
Geographic Area	Total Population	White	Black or African American	American Indian & Alaska Native	Asian	Native Hawaiian & Pacific Islander	Some Other Race	Hispanic or Latino (of any race)
U.S.	281,421,906	75.1	12.3	0.9	3.6	0.1	5.5	12.5
New Mexico	1,819,046	69.9	2.3	10.5	1.5	0.2	19.4	42
Sandoval County	89,908	68.1	2.2	17.2	1.5	0.2	14.4	29.4
Bernalillo (Town)	6,611	63.3	1.0	4.6	0.3	0.2	34.3	74.8
Rio Rancho (City)	51,765	82	3.4	3.4	2.1	0.3	13.1	27.7

* Percentages may add to more than 100% because individuals may report more than one race.
(Source: U.S. Census Bureau 2001a,b.)

The demographics at the county, state, and national levels are compared in Table 1. When compared to the national level, the population of Sandoval County has proportionately more persons of Hispanic background, while less of other minority groups, including Asian and Black. However, racial composition is similar to the state as a whole, with a higher percentage of American Indian and Alaska Native (17.2 percent compared to 10.5 percent for New Mexico). It should be noted that persons of Hispanic or Latino origin might be White or any other race. In addition, roughly 14.4 percent claimed to be of some other race, while only 5.5 percent did so at the national level. When compared to New Mexico, Sandoval County has a lower percentage of Hispanics. Consequently, the population of Sandoval County is not disproportionately composed of minority groups compared to the region, although there may be specific locations where this is not the case.

The percentage of the population in New Mexico living below poverty (19.3 percent) is higher than for the nation (13.3 percent). Similarly, the percent of children living below poverty in New Mexico (27.5 percent) is considerably higher than the nation (19.3 percent). Poverty conditions in Sandoval County are somewhat better than the state, with 12.9 percent below poverty and 17.7 percent of children below poverty. Therefore, Sandoval County, when compared to the state, is not disproportionately low-income (U.S. Census Bureau 2000a,b).

3.10. INDIAN TRUST ASSETS

Indian Trust Assets are legal interests in property held in trust by the United States for Indian tribes or individuals. Examples of trust assets include land, minerals, hunting and fishing rights, and water rights. The United States has an Indian Trust Responsibility to protect and maintain rights reserved by or granted to Indian tribes or individuals by treaties, statues, executive orders, and rights further interpreted by the courts. This trust responsibility requires that all federal agencies take all actions reasonably necessary to protect such trust assets.

3.11. RECREATION

Public recreation facilities have been developed at two primary areas at Cochiti Lake: the Cochiti (west shore) and Tetilla Peak (east shore) Recreation Areas. Recreation activities include camping; picnicking; cold-water fishing; sailing and boating (at "no wake" speeds); sail-boarding; swimming; sightseeing; and wildlife viewing. The highest visitation at the lake occurs during the months of April through September. Overall, there is sustained public use of the area throughout the year. The Visitation Estimation and Reporting System (VERS) utilized by the Corps defines a “visit” as the entry of one person into a recreation area or site to engage in one or more recreation activities. A “visit” is a “head count” of visitors and does not measure amount of use or length of stay.

The Visitation Estimation and Reporting System program estimates percentages of visitors participating in various activities based on a recreation use survey conducted in 1991. Visitors entering a recreation area were surveyed to document the types of recreational activities that they planned to participate in during their visit. The following are the results of the types and percentages of recreational activities that visitors planned to participate in while visiting Cochiti Lake in the months of April, May, and June:

- Sightseeing: 36.9%
- Fishing: 25.2%
- Picnicking: 22.4%
- Boating: 20.2%
- Swimming: 13.4%
- Camping: 11.6%
- Other activities: 9.3%

Public access to Santa Fe National Forest land in White Rock Canyon is very limited and no recreational facilities exist within this reach. Within Bandelier National Monument, visitors can enjoy hiking, sightseeing, and wildlife viewing within Frijoles Canyon to its confluence with the Rio Grande. Monument lands downstream from Frijoles Canyon comprise a designated wilderness area and public access for backpacking and hiking is relatively low, in accordance with National Park Service policy.

4. FORESEEABLE EFFECTS OF THE NO-ACTION AND PROPOSED ACTION ALTERNATIVES

In the draft Environmental Assessment for the proposed action, impacts were evaluated based on the storage levels needed for recruitment and overbank flows. The temporary storage of native Rio Jemez flow may begin in early March. The temporary storage of native Rio Grande flow may begin about mid-April.

4.01. PHYSICAL ENVIRONMENT

The no-action and proposed action alternatives would not adversely affect geology and soils.

4.02. LAND USE

The no-action and proposed action alternatives would not adversely affect agricultural or grazing lands and practices at the Pueblo de Cochiti, or prime agricultural lands downstream from the dam. Groundwater in the agricultural fields located immediately downstream of Cochiti Dam are affected by fluctuating reservoir levels. To help mitigate this downstream response to reservoir water surface levels, drains were designed and installed in the areas of concern. Design models used for the design of the drains assumed pool elevations higher and for longer durations than those described for this proposed deviation. Therefore the deviation described should not adversely affect current operation and capacity of the drains.

The proposed deviation at Cochiti Dam and Reservoir and resulting increase in water surface elevation and subsequent drawdown for the durations cited does not pose any dam safety concerns for this project.

4.03. HYDROLOGY AND WATER QUALITY

The proposed storage of native Rio Grande flow would slightly decrease downstream discharges for approximately two weeks prior to peak runoff. Active storage at Cochiti Lake would only occur when native flows exceed downstream irrigation demands. Water may be held in storage for 5 to 45 days prior to its release. The timing, duration, and magnitude of storage for the proposed action is similar to past flood control storage operation at Cochiti Dam since its closure in 1974. No significant or unusual effects on the hydrology or water quality of the Rio Grande are foreseen.

Because storage would be limited to the ascending limb of the spring runoff hydrograph, the expected peak discharge would not be reduced by the proposed action. Rather, the peak discharge would be increased by approximately 250 to 500 cfs by the proposed action. The relatively small amount (160 to 200 acre-feet) of evaporation and conveyance loss estimated for the proposed action would be offset by the equivalent release of Supplemental Water by the Bureau of Reclamation. The no-action alternative would not affect hydrology, losses, or water quality. Should Reclamation utilize Supplemental Water from upstream reservoirs to facilitate recruitment flows, the passage of that water through Cochiti Dam and Lake would not alter the expected surface water elevation.

Normal operation would continue at Cochiti Lake and Jemez Canyon Reservoir in regards to flood and sediment control. As part of this agreement the Corps may evacuate the described temporary pool or any portion thereof as necessary for flood control purposes, in accordance with authorized project purposes. The Corps further reserves the right to take such measures as may be necessary to preserve life and property, including being able to meet emergency situations or to permit maintenance or repair of the

dams or appurtenant structures. Regulation and releases will be accomplished with the Corps service gates and the Corps will not be liable or responsible for any loss of the stored waters resulting from releases made to accomplish the project's flood control purpose or due to any malfunction of the service gates or inspection and maintenance of the gates that may be necessary to assure the proper and safe operation of the projects. If all parties agree on the deviation, it is expected that the Corps will be the lead agency in making release decisions in consultation with the U.S. Fish and Wildlife Service, Bureau of Reclamation and the Rio Grande Compact Engineer Advisers.

We do not anticipate any flood threat from this operation. Approximately 4% of the flood space will be needed for this deviation at Cochiti Lake if storing for recruitment flows and approximately 10% would be needed if the maximum amount (45,000) is stored for overbanking flows. At Jemez Canyon Reservoir storage would take place in the sediment pool, therefore it would have no impact on the flood space for this deviation if storing for recruitment flows or overbanking flows. The amount of storage at Jemez Canyon Reservoir is limited by the storage up to the sediment pool which is approximately 25,000 acre-feet. If the runoff forecast increased sufficiently and flood space was needed, the water would not be stored and any stored water under the deviation would be immediately evacuated. Therefore, it does not impair the existing flood control regulation/operation at the project.

The maximum change in elevation at Cochiti Lake is approximately 5 to 13 feet for recruitment storage and 18 to 25 feet for storage of overbanking flows. The maximum change at Jemez Canyon Reservoir is approximately 10 to 41 feet for either recruitment storage or overbanking flows. If both projects are used in conjunction to store in the conservation pools then the elevation changes would vary and be less than the stated maximums, depending on the amount of storage required in each project.

Effect on Environment: Storage of native water in Cochiti Lake is subject to compliance with the National Environmental Policy Act (NEPA). Compliance of NEPA has been accomplished with the attached EA and the Finding of No Significant Impact (FONSI). This action will not negatively affect any federal threatened or endangered species or critical habitat. A detailed description of project features and the associated environmental and cultural setting are described in the EA. Fish & Wildlife Service's (FWS) response in regards to this action is that they concur with the finding. (See Attachments X & X: Environmental Assessment and Concurrence from the FWS).

Effect on other agencies and individual interests: The Pueblo de Cochiti, Rio Grande Compact Engineer Advisers, Bureau of Reclamation, Middle Rio Grande Conservancy District and FWS support this action. Storage of native water will occur only when all rights are met. (See Attachment D: The Mutual Understanding and Agreement (MUA) with the Pueblo de Cochiti). (See Attachment E: The Mutual Understanding and Agreement (MUA) with the Santa Ana Pueblo).

The Middle Rio Grande Conservancy District, the Rio Grande Compact Commission (RGCC), and Bureau of Reclamation have been notified of the proposed operation. Coordination with the FWS, Pueblo de Cochiti, and Santa Ana Pueblo has taken place and they support the proposal.

The no-action and proposed action alternatives would not encourage or induce floodplain development as addressed in Executive Order 11988.

4.04. BIOLOGICAL RESOURCES

The timing, duration, and magnitude of storage for the proposed action at Cochiti Dam are similar to that of flood control storage activities since 1974. Plant species in the wetland and riparian habitats within White Rock Canyon are adapted to periodic inundation. Willows (*Salix nigra* and *S. exigua*) can survive flooding for more than 60 days and exhibit increased growth when inundated (Ohmann et al. 1990, Amlin and Rood 2001). Most plant species are beginning to break dormancy in late-April and early May when inundation due to reservoir storage would begin, and temporarily submerged plants would generate new growth following the evacuation of stored water.

The majority of riparian willow habitat occurs at within the southern 5-mile reach of White Rock Canyon, and the substrate is one to two feet high at the channel bank. Willows range from 5- to 12-feet in height. Given the elevations of the stands most susceptible to inundation, willow communities in White Rock Canyon would not be adversely affected by 60-day inundation up to elevation 5,350 feet (NGVD 1929), and up to 45 days of flooding above that elevation. The maximum duration of the proposed storage scenarios is estimated to be 60 days starting April 15th up to an elevation of 5,350 feet, and 45 days starting by May 1st for elevations above 5,350 feet.

As in past years, inundation would not be detrimental to the growth and survival of wetland and riparian communities within White Rock Canyon, as evidenced by the 60% increase in these communities since 1993. The Corps would monitor the depth of flooding in White Rock Canyon and follow up with a site visits later in the growing season to determine plant response to the proposed temporary inundation.

The fairly extensive wetland and riparian vegetation at the Jemez Reservoir delta would not be adversely affected by the proposed plan. The delta area would still be subject to periodic inundation by river flow at the current frequency. Groundwater levels within and immediately adjacent to the existing pool would increase during the proposed action.

Terrestrial wildlife species utilizing plant communities bordering the Rio Grande and Rio Jemez would be temporarily displaced from these communities by inundation during the planned deviation. Again, this short-term (10 to 20 days) effect would be no different from that of the existing flood storage regime at either reservoir. Under the proposed action, aquatic species (e.g., waterfowl and fish) would have greater access to inundated areas and food resources than under the no-action alternative.

4.05. ENDANGERED AND THREATENED SPECIES

Wintering Bald Eagles leave central New Mexico for northern breeding in early to mid-March. The proposed action would have no effect on the threatened Bald Eagle.

The proposed action could displace migrant Southwestern Willow Flycatchers from inundated emergent and shrub wetland habitats in the southern portion of White Rock Canyon. Suitable foraging habitat and cover exists immediately upstream and approximately 8 miles downstream from the inundated reach. It is the Corps' determination that the proposed action may affect, but would not adversely affect, the endangered Southwestern Willow Flycatcher. Designated Critical Habitat for the flycatcher does not occur within the action area at Cochiti Lake.

The proposed action may affect, but would not adversely affect the endangered Rio Grande silvery minnow. Rather, the species is expected to directly benefit from the increased spawning and recruitment potential provided by augmented flows in the Middle Rio Grande. Similarly, the proposed action would not adversely modify designated Critical Habitat for the minnow downstream from Cochiti Dam, but would improve aquatic habitat conditions due to the timely increase in discharge. The Service has

concurred with the Corps' determinations of effects on listed species and designated critical habitat (see Appendix B).

4.06. CULTURAL RESOURCES

The proposed short-term storage of 10,000 acre-feet in the flood control pool and its schedule of release would impact no new land. The volume of water involved in the planned deviation would increase the elevation of the lake surface by approximately seven feet. The change would be from the top of the permanent pool, 5,341 feet above sea level, to 5,348 feet above sea level. This seven-foot increment has been at least partially flooded 23 times out of the last 32 years (1975 to 2006), including three years in which the water elevation was continuously above 5,413 feet. It was continuously under water from 1996 through the spring of 1999. The record elevation is 5,435 feet during the 1987 season. A total of seven sites were recorded during the 1975 survey between elevation 5,341 feet and 5350 feet above sea level, and one of these sites, LA 5011, was excavated (Biella, Enloe, and Eck in Biella 1979:43-54).

The seven sites recorded in the affected elevation increment include: five ancestral, or possible ancestral, Pueblo sites: LA 5011, LA 5012, LA 13042, LA 13312, and LA 13319; one lithic scatter of unknown cultural affiliation, LA 5350; and a single masonry room also of unknown cultural affiliation, LA 13301 (Biella and Chapman 1977:209-223). In keeping with the agreements between the Corps, the National Park Service (NPS), and the State Historic Preservation Officer (SHPO), LA 5011 was excavated, as noted. The other sites were not considered for excavation. Given the shallow depth of the sites (10 to 30 cm), slopes that vary from 5 percent to 27 percent, the loosely consolidated soil, and the repeated inundation with shoreline erosion resulting in stepped benches, these sites no longer retain sufficient integrity to warrant additional archaeological investigation.

The mitigation of effects to archaeological sites in both the permanent pool and the flood control pool was the result of consultation between the NPS, the Corps, and the SHPO. The proposed action is within the activities anticipated prior to dam construction and the consultation. The mitigation of effects was completed with the publication of the reports of survey, excavation, and analyses referenced above. The proposed action would not raise the water level higher than that which was planned for the original flood-control pool. The authorized purposes of the dam are flood and sediment control, recreation, and development of fish and wildlife resources. The proposed action conforms to these authorized purposes; therefore, there is no need to further consult concerning impacts to historic properties. The planned action will have no adverse effects on any archaeological resource.

The Pueblo de Cochiti is an active partner in this project, and it would only occur with the express consent of the Pueblo. In April, the Pueblo and the Corps signed a Mutual Understanding Agreement for the proposed temporary storage at Cochiti Lake. (see Appendix B). Consistent with the Departments of Defense's American Indian and Alaska Native Policy, signed by Secretary of Defense William S. Cohen on October 28, 1998, and based on the State of New Mexico, Indian Affairs Department's 2007 Native American Consultations List, the tribes with interest is activities in Sandoval County were contacted regarding this proposed project (see Appendix B). To date no responses have been received.

4.07. SOCIOECONOMIC RESOURCES

The no-action and proposed action alternatives would have no impacts to socioeconomic conditions in the action area or the region.

4.08. ENVIRONMENTAL JUSTICE

The planning and decision-making process for actions proposed by federal agencies involves a study of other relevant environmental statutes and regulations, including Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations. The essential purpose of EO 12898 is to ensure the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Fair treatment means that no groups of people, including racial, ethnic, or socioeconomic groups, should bear a disproportionate share of the negative environmental consequences resulting from industrial, municipal, and commercial operations or the execution of federal, state, tribal and local programs and policies.

Also included with environmental justice are concerns pursuant to EO 13045, Protection of Children from Environmental Health Risks and Safety Risks. This EO directs federal agencies to identify and assess environmental health and safety risks that may disproportionately affect children under the age of 18. These risks are defined as "risks to health or to safety that are attributable to products or substances that the child is likely to come into contact with or ingest."

The proposed action area is within a Native American pueblo and county with a relatively high Hispanic population. As described previously, no suitable alternative locations for storage were identified within the Rio Grande basin. The effects of the proposed action are similar in type, extent and magnitude as those associated with flood control storage activities.

No increased risk to the health and safety of citizens or children are inherent in the no-action and proposed action alternatives.

4.09. INDIAN TRUST ASSETS

The proposed action has been closely coordinated with the Pueblo de Cochiti, and will not be implemented without the written agreement of the Pueblo. The no-action and proposed action alternatives would not adversely affect Indian trust assets.

4.10. RECREATION

As is the case with flood control storage, the proposed action would necessitate the closure of certain recreational facilities. The swimming beach along the western shore will be inundated for the duration of storage and would be closed to the public for safety reasons for approximately eight weeks. Two vault toilets (constructed to endure periodic inundation) would be pumped, cleaned, and closed from about May 1 through June 15. Public rest rooms would still be available on both the east and west sides of the lake. From about mid-May through early June, the Santa Cruz access road on the east side of the lake — which leads to the preferred sailboarding launch site — would be inundated and inaccessible. Both Universally Accessible Fishing Piers (one on each side of the lake) will be inaccessible from mid-May through mid-June.

An increased of reservoir elevation at Cochiti Lake five feet (or higher) above the permanent pool would result in closure of the swim beach. Increasing the water surface elevation more than 11 feet above the permanent pool would close some picnic shelter and restrooms, require the fishing docks to be moved, closure of one universally accessible fishing dock, close the Santa Cruz road to the Tetilla Recreation Site, and adjustment of the boat ramps. An increase of water surface elevation greater than 25 feet above the permanent pool would result in total closure of day use facilities other than the boat ramps.

The elevation of Cochiti Lake may be approximately three to five feet higher than normal during Memorial Day weekend which traditionally has the highest public visitation rate over the April through October recreation season. Lake levels have been greater than three feet above the permanent pool elevation on the Memorial Day weekend in 10 the past 32 years as a result of flood control storage.

Because inundation would only directly affect the shoreline-based activities of swimming, fishing, and windsurfing, the overall impact to recreational opportunities at the Cochiti Lake would not be significant. The Corps will advise recreational interest groups and the general public of the potential closure of facilities through advance notices in local media and through the Corp's campground reservation system.

4.11. CUMULATIVE EFFECTS

The National Environmental Policy Act defines cumulative effects as "…the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions."

Over the past several years, extensive efforts have been made towards the survival and recovery of endangered species in the Middle Rio Grande valley. Actions that focus on the Rio Grande silvery minnow include provision of water for meeting target flows (USACE 2001, USBR 2006b); breeding and rearing facilities; salvage operations; and completed and proposed habitat improvement projects. The proposed deviation in the operation of Cochiti Dam would have a positive impact on the environment and recovery of the silvery minnow the potential cumulative effects of other Federal and non-federal agencies, pueblos and non-profit groups.

5. PREPARATION, COORDINATION AND PUBLIC REVIEW

5.01. PREPARATION

This Environmental Assessment (EA) was prepared by the U.S. Army Corps of Engineers, Albuquerque District. The Product Delivery Team and principal preparers included:

Michael Porter – Fishery Biologist
William DeRagon - Biologist
Don Gallegos - Hydraulic Engineer
Ronald Kneebone, Ph.D. - Tribal Liaison
Craig Lykins – Senior Park Ranger, Cochiti Lake
April Sanders - Project Manager
John Schelberg, Ph.D - Archaeologist
Mark Sidlow, P.E. - Hydraulic Engineer

Jacob Pecos, Director of the Department of Natural Resources, Pueblo de Cochiti, was instrumental in the planning and coordination associated with this action.

The Albuquerque District Independent Technical Review Team consisted of:

Gregory Everhart - Cultural Resources
Dennis Garcia, P.E. - Reservoir Control
Champe Green, CWB - Ecology and compliance
Cynthia Piirto - Recreation and reservoir operation

5.02. COORDINATION AND CONSULTATION

Agencies and other entities contacted formally or informally in preparation of this Environmental Assessment included:

Pueblo de Cochiti
Coalition of Six Middle Rio Grande Basin Pueblos
New Mexico Interstate Stream Commission
New Mexico State Historic Preservation Office
Rio Grande Compact Commission
U.S. Bureau of Reclamation, Albuquerque Area Office
U.S. Fish and Wildlife Service
U.S. National Park Service, Bandelier National Monument

5.03. PUBLIC REVIEW OF THE DRAFT ENVIRONMENTAL ASSESSMENT

In accordance with Council on Environmental Quality and U.S. Army Corps of Engineers regulations for implementing the National Environmental Policy Act, the public review period for the draft EA was fifteen days (April 9-23, 2007) because of the immediate need to store water during the snowmelt runoff period. The availability of the draft Environmental Assessment was advertised in legal notices appearing daily in the *Albuquerque Journal* and the *Santa Fe New Mexican* from April 9 through 23, 2007.

The Corps formally presented the proposed action to the Coalition of Six Middle Rio Grande Basin Pueblos on April 13, 2007; and to the Tribal Council of the Pueblo de Cochiti on April 16, 2007. The proposed action was presented to the general public at two meetings in Albuquerque on April 16, 2007, hosted by the Corps and Reclamation regarding the Annual Operating Plan for Middle Rio Grande reservoirs.

The distribution list announcing the availability of the draft EA for public review and comment included:

Alliance for the Rio Grande
American Southwest Ichthyological Research
Assessment Payers Association of the MRGCD
Boat Owners of Cochiti, Inc.
City of Albuquerque
Coalition of Six Middle Rio Grande Basin Pueblos
Cochiti Community Development Corporation
Defenders of Wildlife
HabiTech, Inc.
Los Alamos National Laboratory
Middle Rio Grande Endangered Species Act Collaborative Program
Middle Rio Grande Conservancy District
New Mexico Attorney General's Office
New Mexico Department of Agriculture
New Mexico Department of Game and Fish
New Mexico Environment Department
New Mexico Governor's Office
New Mexico Interstate Stream Commission
New Mexico Sailing Club
New Mexico State University, Department of Fishery & Wildlife Sciences
New Mexico State University, Water Resources Research Institute
New Mexico Windsurfers Association
Pueblo de Cochiti
Pueblo of Isleta
Pueblo of San Felipe
Pueblo of San Juan
Pueblo of Sandia
Pueblo of Santa Ana
Pueblo of Santo Domingo
Pueblo de Cochiti
Rio Grande Compact Commission
Rio Grande Restoration
Rio Grande Water Rights Association
Sonosky, Chambers, Sachse, Endreson & Mielke, LLP
S.S. Papadopulos & Assoc.
SWCA Environmental
Tetra Tech EM, Inc.
University of New Mexico, Biology Department
University of New Mexico, School of Law
U.S. Bureau of Indian Affairs
U.S. Bureau of Land Management, Taos
U.S. Bureau of Reclamation, Albuquerque Area Office
U.S. Department of Energy, Los Alamos Area Office
U.S. Department of Interior
U.S. Fish and Wildlife Service, New Mexico Ecological Services Field Office
U.S. Fish and Wildlife Service, Bosque del Apache National Wildlife Refuge
U.S. Fish and Wildlife Service, Dexter National Fish Hatchery
U.S. Geological Service

U.S. Geological Service, Jemez Mountain Field Station
U.S. Park Service, Bandelier National Monument
U.S. Senator Bingaman’s Office
U.S. Senator Domenici's Office
USDA Forest Service Rocky Mountain Research Station
USDA Forest Service, Santa Fe National Forest
William J. Miller Engineers, Inc.

5.04. PUBLIC REVIEW COMMENTS AND CORPS RESPONSES

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