Final
Environmental Assessment and
Finding of No Significant Impact

For the
Rio Grande Nature Center Habitat Restoration Project

Prepared by

U.S. Army Corps of Engineers
Albuquerque District

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US Army Corps
of Engineers®
Albuquerque District

U.S. ARMY CORPS OF ENGINEERS
ALBUQUERQUE DISTRICT

FINDING OF NO SIGNIFICANT IMPACT
for the
Rio Grande Nature Center Habitat Restoration Project

The Proposed Action would be to restore an ephemeral side channel of the Rio Grande, reconnecting the floodplain of the bosque to the river in order to reestablish native habitat. This action would primarily benefit the Rio Grande silvery minnow (RGSM) and could secondarily benefit the Southwestern Willow Flycatcher (WIFL). Work would be performed as part of implementing 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 proposed project is funded by the Middle Rio Grande ESA Collaborative Program. The approximate cost of the project is $150,000. Two design alternatives and the No Action alternative were considered to meet the overall purpose and need of the project.

The proposed channel is currently full of non-native vegetation, primarily Russian olive, and does not have water running through it. If the Proposed Action were not taken, the channel would continue to fill in with non-native species, would not provide aquatic habitat for the RGSM and the WIFL, and would continue to pose a significant fire danger.

All Best Management Practices described throughout the document would be adhered to during project implementation including: 1) sequencing of construction as described in Section 2, 2) management of sediments, 3) inspection of equipment, 4) compliance with all water quality permits, 5) adherence to the schedule and best management practices discussed in order to avoid impacts to endangered or protected species, or avian nesting species, and 6) oversight by a qualified biologist to monitor adherence to these conditions during construction. These and all other conditions listed in the Environmental Assessment would be adhered to during construction.

Section 404 of the CWA requires analysis of the EPA's 404 (b)(1) Guidelines if the Corps proposes to discharge fill material into a water or wetlands of the United States. A memorandum was obtained from the Corps' Regulatory Program stating that construction of this project meets the conditions of Nationwide Permit No. 33 (Appendix E). As a result, the 404 (b)(1) analysis has been completed for Nationwide 33 and there will not be more than minimal impacts to the environment due to the proposed fill material. All conditions for the Nationwide 33 and 401 water quality certification (Appendix E) would be adhered to during construction.

The planned action would result in only minor and temporary adverse impacts on soils, water quality, air quality and noise levels, aesthetics, vegetation, floodplain, fish and wildlife, and recreational resources during construction. The long-term benefits of the proposed project would outweigh these short-term adverse impacts and include aesthetics, vegetation, fish and wildlife, endangered species, recreational resources and cumulative effects. The following elements have been analyzed and would not be significantly affected by the planned action: socioeconomic environment, hydrology and hydraulics, wetlands, waters of the United States, Indian Trust Assets, prime and unique farmland, geology, environmental justice, HTRW, land use and cultural resources.

The planned action has been fully coordinated with Federal, State, tribal and local governments with jurisdiction over the ecological, cultural, and hydrologic resources of the project area. Based upon these factors and others discussed 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 this project, and the proposed project is recommended for construction.

12 Dec 06
Date

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

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1.0 Introduction

1.1 Project Location and Background

On June 29, 2001, the U.S. Fish and Wildlife Service (USFWS) issued a Biological Opinion (BO) regarding the effects of certain water management practices upon the Rio Grande silvery minnow (*Hybognathus amarus* [RSGM]), the Southwestern Willow Flycatcher (*Empidonax traillii extimus* [WIFL]), the Bald Eagle (*Haliaeetus leucocephalus*), the Interior Least Tern (*Sterna antillarum*), and the experimental-nonessential population of the Whooping Crane (*Grus americana*). The BO was then updated in March 2003 (USFWS, 2003). Specifically, the BO evaluates the implications of the U.S. Bureau of Reclamation's (Reclamation) discretionary actions related to water management and the US Army Corps of Engineer's (Corps) water operation rules, and non-federal water depletions in the middle Rio Grande. The USFWS concluded that the above management practices would likely jeopardize the continued existence of the RGSM and WIFL and, therefore, developed a Reasonable and Prudent Alternative (RPA) that they believe must be implemented in order to avoid placing these species in jeopardy in accordance with the Endangered Species Act (ESA) 16 U.S.C. 1531 *et seq*.

This habitat restoration project is intended to partially fulfill the requirement of habitat restoration under RPA Element S which proposes "to conduct habitat/ecosystem restoration projects in the Middle Rio Grande to increase backwaters and oxbows, widen the river channel, and/or lower river banks to produce shallow water habitats, overbank flooding, and regenerating stands of willows and cottonwood to benefit the RGSM and WIFL or their habitats." This is a goal of the Middle Rio Grande ESA Collaborative Program (Collaborative Program), by which this project is funded. Funds for the Collaborative Program are managed by the U.S. Bureau of Reclamation. The reconnection of side channels is listed as a Restoration Technique in the Habitat Restoration Plan for the Middle Rio Grande (Tetra Tech, 2004).

This project was proposed to the Collaborative Program in February 2003. The project was accepted in fiscal year 2003 and funds were received in October 2004.

In the Middle Rio Grande, the extent and frequency of overbank inundation has been significantly reduced due to management of the river through dams, levees, diversion structures, channelization and jetty jacks. At the Rio Grande Nature Center State Park (RGNCSP), a high bank (approximately five feet above the river bed) restricts the hydrological connection between the river and adjacent riparian habitats. See Figure 1 for a site location map of the RGNCSP.

The remnant channel located on the project site appears to be a natural channel based on an examination of an aerial photograph taken in 1935 by the Soil Conservation Service. This channel was probably once connected to the river. This channel was identified as an historic earthen feature (Estes, 2005) that was historically maintained as a drainage ditch in the bosque.

The proposed project is located in the bosque (forest) on the east side of the river at Rio Grande Blvd. and Candelaria Rd. in Albuquerque at the Rio Grande Nature Center State Park in Albuquerque, New Mexico. The proposed site comprises approximately 15 acres.

Middle Rio Grande

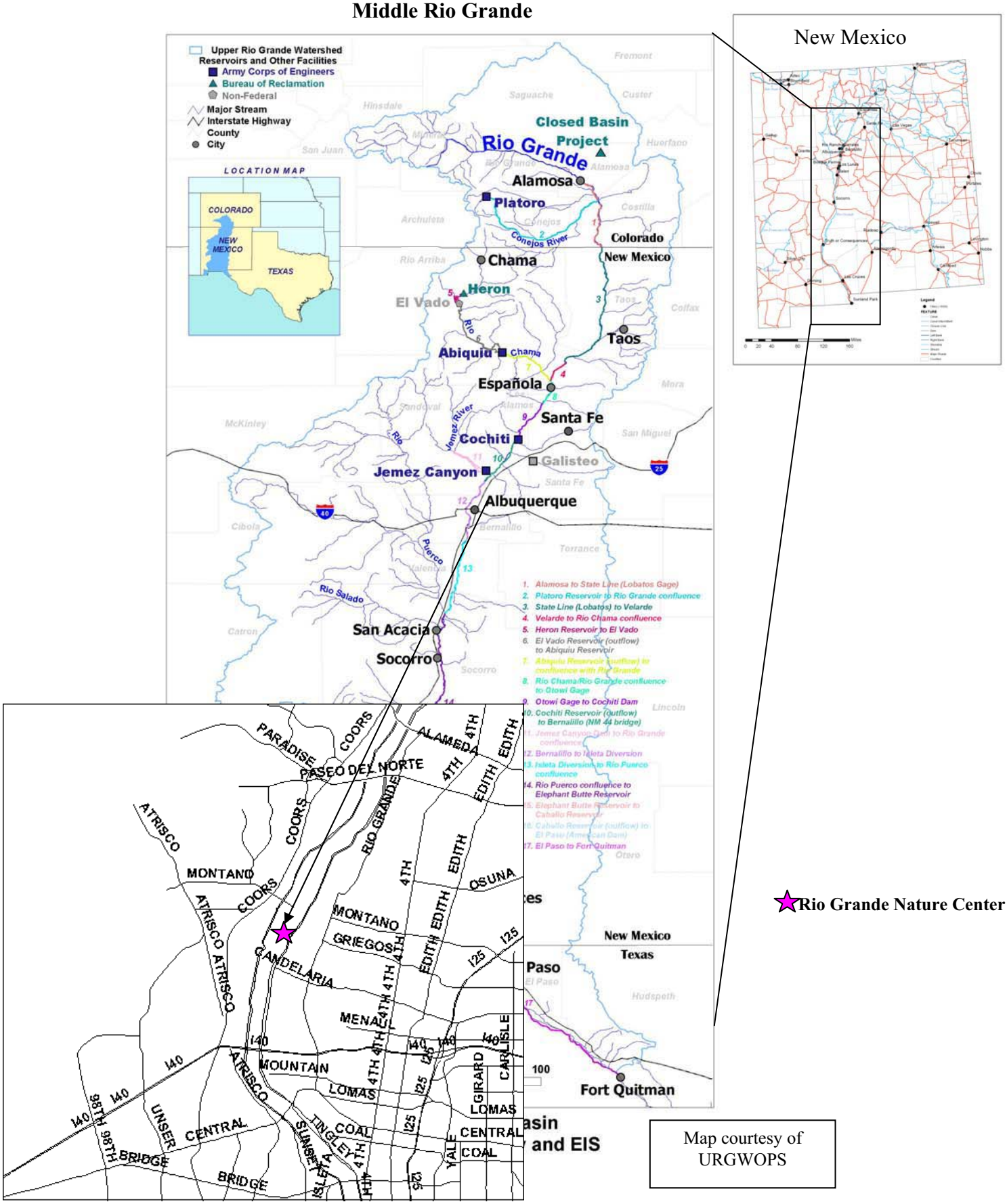

Figure 1. Site Location Map

Figure 2. Rio Grande Nature Center State Park site showing remnant channel (June 2005 aerial photography).

This project has been closely coordinated with the City of Albuquerque Open Space Division (OSD), the Middle Rio Grande Conservancy District (MRGCD), New Mexico State Parks and Recreation Department – RGNCSP, and the Reclamation.

1.2 Purpose and Need

The objectives of the project are to:

1) Restore an abandoned side channel for RGSM habitat.
2) Reconnect existing remnant channel in the riparian zone to the river.
3) Reduce fuel loads in the bosque.
4) Generate seasonally saturated soils favorable to stands of willow that may provide potential habitat for WIFL.
5) In addition, meet overall goals to restore the riparian mosaic and enhance habitat for native species in the project area.
6) Monitor the project for at least 10 years.
7) Provide information about the history of the Rio Grande bosque, the changes made and the impact of those changes which have led to the proposed project.

The purpose of the project is to create additional habitat for the RGSM, and potentially, the WIFL. Side channels may slow transport of RGSM eggs and larvae during high flow events and provide low velocity habitat for RGSM YOY (young of year). There is a low amount of side channel habitat in the Middle Rio Grande today, which provides a need for this type of habitat for the RGSM.

As stated in the March 2003 Biological Opinion, restoration of riparian habitat, terrace lowering and restoring the river's connectivity with the floodplain in order to enhance habitat are prime objectives. This project will meet those needs through manipulation in order to create aquatic habitat suitable for the RGSM, reconnect an old channel to the river and allow regeneration of native vegetation suitable for the WIFL. This project will also meet the priorities of the Interim Steering Committee of the Collaborative Program to complete restoration projects in the Albuquerque Reach. It will also follow many of the recommendations in the Middle Rio Grande Ecosystem: Bosque Biological Management Plan (Crawford et al. 1993) and the Habitat Restoration Plan for the Middle Rio Grande (Tetra Tech, 2004).

1.3 Related Activities

Within the Albuquerque Reach of the Middle Rio Grande, a number of projects are underway to restore riparian and riverine habitat:

- Bosque Wildfire Project – Corps. Under this project the Corps has completed burn restoration, fuel reduction, exotic removal, jetty jack removal, and emergency access features such as bridges and levee repair. This project is documented in the "Environmental Assessment for the Bosque Wildfire Project, Bernalillo and Sandoval Counties, New Mexico, September 2004" (USACE, 2004).
- Middle Rio Grande Riverine Habitat Restoration Project – Interstate Stream Commission (ISC). This project is another Collaborative Program project where the ISC is restoring aquatic habitat for the benefit of the RGSM in the river in the Albuquerque Reach by manipulating islands, bars and banks to mobilize sediments. This project constructed potential RGSM habitat on a riverine bar just south of I-40 on the east side of the river (downstream from the proposed project). This project is documented in the "Middle Rio Grande Riverine Habitat Restoration Project Environmental Assessment, March 2005" (ISC and BOR, 2005).
- Rio Grande Silvery Minnow Sanctuary – BOR. This project proposes to construct a Sanctuary near downtown Albuquerque in the bosque that would contribute to the enhancement and recovery of RGSM in the Middle Rio Grande. This project is documented in the "Rio Grande Silvery Minnow Sanctuary Environmental Assessment – DRAFT, July 2005" (BOR, 2005).
- Albuquerque BioPark Project - The Albuquerque BioPark project is a Corps 1135 Ecosystem Restoration project that consists of approximately 15 acres of pond reconstruction, 9 acres of wetland restoration, and 48 acres of riparian woodland (bosque) restoration in the bosque south of Central Ave. on the east side of the river in Albuquerque. The bosque was restored by enhancing hydrology and native vegetation. Non-native saltcedar and Russian olive were removed through brush cutting, root plowing and localized herbicide application. Project construction is complete and the wetlands are currently being planted with native vegetation.

- Middle Rio Grande Bosque Feasibility Study - The Middle Rio Grande Bosque Feasibility Study is a Study undertaken by the Corps Albuquerque District regarding the long-term restoration of the Middle Rio Grande in the Albuquerque Reach. A 905(b) Reconnaissance study was completed as well as a Supplemental Planning Document. The Feasibility Study is currently in its second year of three. Implementation would take place over a 10-year period.

Additional non-Federal efforts under the same purpose of habitat restoration are underway by the City of Albuquerque Open Space Division (OSD) in terms of thinning of dead wood and non-natives in order to prevent fires during the 2004 fire season. OSD also has an upcoming Collaborative Program project to construct potential RGSM habitat though a Draft Environmental Assessment is not currently complete. The Ciudad Soil and Water Conservation District (SWCD) has also completed some thinning at locations near the Rio Grande Nature Center, the west side of the river south of Montaño Bridge and near the National Hispanic Cultural Center.

1.4 Regulatory Compliance

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

- Clean Air Act of 1972, as amended (42 U.S.C. 7401 *et seq*.)
- Clean Water Act of 1972, as amended (33 U.S.C. 1251 *et seq*.)
- Endangered Species Act of 1973, (ESA) as amended (16 U.S.C. 1531 *et seq*.)
- National Environmental Policy Act (NEPA) of 1969, as amended (42 U.S.C. 4321 *et seq*.)
- Comprehensive Environmental Response Compensation and Liability Act (CERCLA) of 1980, amended by Superfund Amendments and Reauthorization Act (SARA) in 1986, 42 USC 9601 et seq.
- Resource Conservation and Recovery Act (RCRA) of 1976, amended by Hazardous and Solid Waster Amendments in 1984, 42 USC 6901 et seq.
- Corps of Engineers Procedures for Implementing NEPA (33 CFR 230; ER 200-2-2)
- Regulations for Implementing the Procedural Provisions of NEPA (40 CFR 1500 *et seq.*)
- Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations (Executive Order 12898)
- Farmland Protection Policy Act (P.L. 97-90)
- Floodplain Management (Executive Order 11988)
- Protection of Wetlands (Executive Order 11990)
- National Historic Preservation Act of 1966, as amended (16 U.S.C. 470a *et seq*)
- Protection of Historic Properties (36 CFR 800 *et seq*)
- Protection and Enhancement of the Cultural Environment (Executive Order 11593)
- Native American Graves Protection and Repatriation Act of 1990 (25 U.S.C. 3001 *et seq*)
- Archeological Resources Protection Act of 1979 (16 U.S.C. 470)
- Federal Weed Act of 1974 (Public Law 93-269; 7 U.S.C. 2801, et seq.)
- Migratory Bird Treaty Act of 1918 (16 U.S.C 703, et seq.)

This EA also reflects compliance with all applicable tribal, State of New Mexico and local regulations, statutes, policies, and standards for conserving the environment and environmental resources such as water and air quality, endangered plants and animals, and cultural resources.

2.0 Descriptions of the Proposed Action and Alternatives

2.1 Proposed Action

The Proposed Action would be to restore an existing side channel and reconnect portions of the floodplain of the bosque forest to the river in order to reestablish predominantly native habitat that benefits both the RGSM and WIFL. The north and south ends of the channel are currently blocked. At the northern end of the project site, a new channel would be constructed to connect to the existing channel which runs south perpendicular to the bank of the river and then turns back toward the river and exits (see Figure 3). An embayment would be constructed at the opening to the channel where it meets the river. This embayment would be inundated at lower flows (500 cfs and above). It would be approximately 6 feet deep. Three additional embayments would be constructed off of the side of the channel as well. These additional embayments would be optional (as labeled on Figure 3) depending on the overall cost of the project. They would be approximately 50 feet wide by 50 feet long and about 4.5 feet deep and would be inundated at higher flows and flows would recede into the channel so that fish would not be stranded. Depths of flow for each embayment will vary from 1' to 3' depending on which embayment you are at and the flow rate of the Rio Grande. Design of the embayments would include 'lessons learned' from the Los Lunas Habitat Restoration Project (another Collaborative Program funded project).

A public use trail currently crosses the channel. There is a culvert at this location which would need to be replaced. Where the channel would connect at the south end, a trail crossing also needs to be established. For both of these crossings, two corrugated metal pipe culverts would be installed. The culverts would each be approximately 43" high X 68" wide.

No native trees would be disturbed to construct these embayments. Some of the existing channel (which is currently 20 feet wide at the bottom) would be lowered at different elevations to provide a varied topography and to provide a varied hydrology regime at the site. No native trees would be removed within the channel or on the banks of the channel. A 'hill' would be constructed at the curve at the north end of the channel (see Figure 3) and would only allow high flows through. Low flows would stay on the west side of this channel in the embayment habitat until flows were high enough to overtop it. The length of the channel is approximately 3300 feet. At the southern end of the project site, the channel would be excavated to connect to the existing channel and an embayment would also be constructed at this end to create a shelf that would be inundated at lower flows.

The site is directly adjacent to the current river channel and access from the levee through the riparian forest to the river edge is available. A temporary access road off of the levee/paved trail would be constructed at the two access points described below. Access to the north end of the project area would be along the fence line of the north boundary of the RGNCSP. This area has a dirt trail and is already disturbed. Any additional disturbance caused by equipment accessing the site would be reseeded once construction is complete. Access to the south end of the project would be through the bosque from the levee road. This area has been thinned in previous years and is fairly open. A pathway would be designated (agreed upon by RGNCSP staff) that would allow access without disturbing the existing cottonwood canopy. Any additional disturbance caused by equipment accessing the site would be reseeded once complete. Work within the channel would stay within the channel boundaries as much as possible. Equipment would access

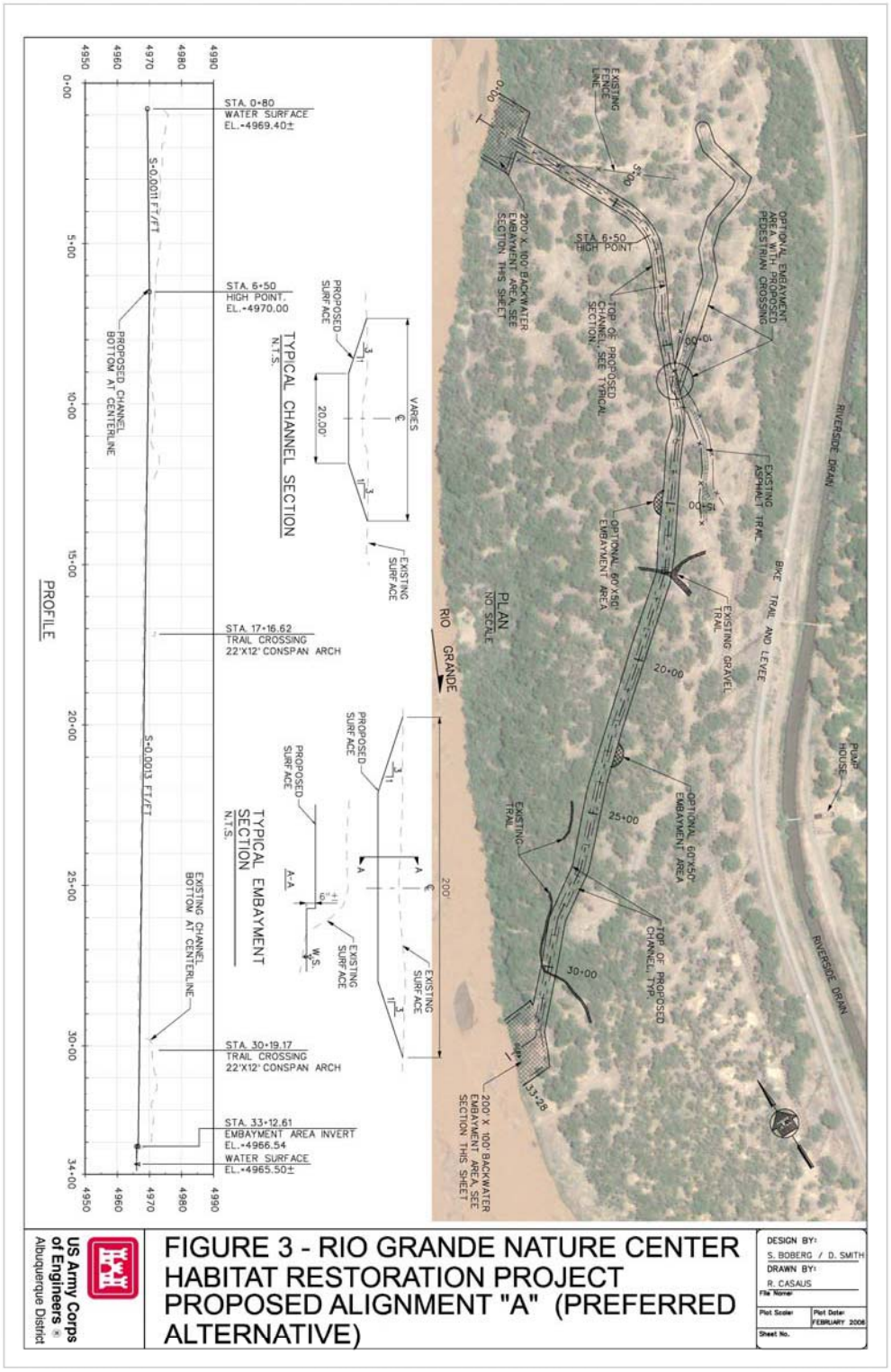

Figure 3. Proposed Action (an 11x17 version is included in Appendix G).

from either end (as described above) and then stay within the channel to complete the vegetation removal (described below) and grading. Equipment would access the site from Gabaldon Rd. to the access bridge across from the drain, travel north on the graveled levee and cross over the paved trail at the RGNCSP grounds to access the bosque. The paved trail (on top of the levee) would be swept to keep it clean. If needed, equipment would be stored overnight in a designated staging area inside of the bosque. This staging area would be protected with chainlink fence. The staging area would be reseeded once the project is complete.

The approximate cost of the project is $150,000 and is broken down among the various features as follows:

Project Feature	**Estimated Cost**
Non-native vegetation and fuel wood thinning	$ 47,500
Herbicide treatment	$ 5,000
Channel excavation	$ 32,500
Channel crossings	$ 50,000
Reseeding	$ 3,000
Revegetation – shrubs and trees	$ 12,000
TOTAL ESTIMATED COST	**$150,000**

Slopes of the channel banks would vary from 1:3 feet to 1:30 feet. Approximately 6,500 yd^3 of material would be required to be excavated. Excavated material would be hauled off site and stored nearby under the Interstate 40 bridge or used as fill at the toe of the levee where it is needed. Some of the material may be placed in slopes of the adjacent channel to build up and vary topography as needed, but on a limited basis.

Prior to excavation of the channel, removal of dead woody vegetation and live non-native vegetation would occur (see Section 2.1.1 below). Approximately 15 acres would be treated using the various methods discussed in Section 2.1.1. Work would take place over an 18-month period from September 2006 through March 2008. No work would take place during the migratory bird nesting season, April 1 through August 30.

Sequencing of the construction is proposed to reduce the amount of potential sediment moving into the river and reduce impacts to the river bank edge. The existing channel would be thinned and excavated first in order to remove the non-native vegetation and grade the bottom of the channel. Then, the opening at the south end would be excavated. Then, the opening at the north end would be excavated last. Excavation of the connections on the north and south end would take place during low flows of the river. A small coffer dam or porta-dam would be installed above the ordinary high water mark when construction is taking place at the bank of the river (at both the north end of the channel and the south end of the channel) (Figure 6). The exact device used to divert the flow of water during construction would be at the discretion of the construction contractor and approved by the Corps.

Table 1. Proposed Action

Action Type	Quantity
Non-native vegetation and fuel wood thinning	15 acres
Herbicide treatment	15 acres
Channel excavation	6500 yds^3
Channel crossings	2-3
Reseeding	5 acres
Revegetation	7 acres

2.1.1 Non-native vegetation and fuel wood thinning

Treatment Methods

There are a number of methods for reducing fuel loads and treating non-native vegetation that have been and are being utilized in the Middle Rio Grande and throughout the Southwest. These methods include both manual and mechanical treatment methods, which are described below.

Manual treatment

Using this method, dead material would be piled up and/or processed by cutting into smaller chunks using a chain saw. Large material would be hauled off. Some would be bucked up for use as fire wood. Smaller material would be chipped using a chipper on site. Chips would either be distributed on site or hauled off depending on the density. No more than 2 inches of chipped material would be left on site. The stump of any live non-native trees that is cut would be treated immediately with herbicide. See Section 3.19 below for a discussion of herbicide treatment. This method would be used along the berms of the existing channel in order to minimize impacts to the bosque internal.

Mechanical treatment

Mechanical control entails the removal of aerial portions of the tree (trunk and stems) by large machinery such as a tree shear or large mulching equipment. Both dead material and live non-native trees would be treated mechanically. This would leave the base of the tree exposed. The stump would be treated immediately with herbicide. Material would be processed as stated above – large material would be hauled off and smaller material would be chipped. This method would be used inside of the channel and on both the north and south ends where the new connections to the channel would be excavated.

Combination treatment

The most efficient methodology for treatment of dead material and non-native vegetation is usually a combination of manual treatment, mechanical treatment and use of herbicide. Some areas may be very thick and the use of manual methods allows them to be opened up for machinery access. Then mechanical equipment can take over while hand crews can move ahead of machinery to keep areas open enough to work in without damaging native vegetation to remain. The methodology to be implemented at each location will be evaluated on a site-by-site basis, and adaptively managed. Specific prescription components to be followed are listed in Appendix A.

Overall, a combination treatment would be utilized to remove non-native trees that are in the middle of the channel (and would impede flows). Manual treatment would be utilized to thin additional non-native vegetation and fuel wood along the banks of the channel. Some Russian olive (*Elaeagnus angustifolia*) would be left for habitat and would be identified with RGNCSP staff and flagged by the Corps Biologist prior to entry by the construction contractor.

Some of the trees would also be bucked up (instead of mulched) to allow a source for fuel wood for the local community. Chips would be spread out on site according to the specifications listed in Appendix A (no more than 2 inches deep) though some may be hauled off to be used at other locations by the sponsoring agencies. Some would be used to create logs to be placed in the embayments for habitat.

The overall goal of treatment of non-native vegetation is to open up the channel to allow it to flow for potential RGSM habitat. Russian olive trees would be left as discussed above. Russian olive and other non-native species exist and would still remain throughout the RGNCSP. Long term management and maintenance of these species is needed to keep the populations down, but the goal is not eradication at this location or with the proposed project.

Revegetation

The area would be replanted with native riparian vegetation. The banks of the channel would be planted with native species such as coyote willow (*Salix exigua*), seepwillow (*Baccharis* spp.), and New Mexico olive (*Forestiera neomexicana*). Some other typical vegetative species that may be planted include: indigo bush (*Amorpha fruticosa*), golden currant (*Ribes aureum*), Rio Grande cottonwood (*Populus deltoides* var. *wislizenii*), black willow (*Salix goodingii*), and peachleaf willow (*Salix amygdaloides* var *wrightii*). The number and approximate spacing of trees and shrubs will be determined after the area has been thinned. The main channel would not be revegetated in order to allow flows to move through. The sides of the channel would be planted with native grass seed using the 'Bosque seed mix' which is shown in Table 2. All disturbed areas to be reseeded would be done with this seed mix.

Table 2. Bosque seed mix

Common Name	Species Name	Rate Pls. Lbs./acre
Indian ricegrass	*Achnatherum hymenoides*	0.93
Side oats gramma	*Bouteloua curtipendulum*	0.68
Blue gramma	*Bouteloua gracilis*	0.26
Bottlebrush squirreltail	*Elymus elymoides*	0.68
Slender wheatgrass	*Elymus trachycaulus*	0.82
Alkalai sacaton	*Sporabolus airoides*	1.87
Western wheatgrass	*Pascopyrum smithii*	1.19
Galleta	*Pleuraphic jamesii*	0.77
Indiangrass	*Sorphastrum nutans*	1.09
Sand dropseed	*Sporobolus cryptandrus*	0.04
Regreen	*Triticum elongatus (sterile cover crop)*	15.56
TOTAL		23.89 Pls. Lbs./acre

The construction zone outside of the channel would be reseeded with native grass between June-August as needed. Wood debris such as large logs remaining after thinning would be placed strategically in order to provide additional habitat once seeding is completed. Shrubs would be planted in the fall and trees would be planted in the winter. A watering tube would be placed along side the shrub plant material and would be watered through the first summer. Trees would be pole planted into the shallow ground water table in areas where they might be periodically inundated by high flows. Then the partner agencies (mentioned in Section 1.1) in this project would be responsible for maintenance and upkeep.

Monitoring, Adaptive Management and Maintenance

The project would be monitored for a number of items, most specifically use by Rio Grande silvery minnow egg, larvae, and adults. The channel would be monitored for use and also to make sure that no fish (of any species) are stranded. Other environmental features of the area would be monitored including vegetation and ground water.

The channel would also be monitored for accumulation of sediment which would require removal. Other maintenance may need to be required periodically and the channel would be monitored for this (such as treatment of resprouts of non-native vegetation).

Part of this monitoring may provide information on design that may require changes. Depending on how high flows move through the channel and potential for maintenance items such as scouring and/or build up of sediment, adaptive management could be enlisted to make changes in the field if it is determined to be needed once the channel is in use.

1.1 Future without project (No-Action Alternative)

The No Action Alternative assumes no anthropogenic changes would occur to the channel environment that might provide potential habitat for the RGSM. Over time, if no restoration efforts were attempted, the channel would continue to fill in with non-native species that may pose a fire danger and would not provide aquatic habitat which it has the potential to do. The historic connection to the Rio Grande would not occur and the potential diversity of vegetative habitats would not be achieved. Additional potential habitat for the WIFL would not be created.

1.2 Alternatives Considered but eliminated from further study

The Rio Grande Nature Center site was evaluated and looked at closer using orthophotography (see Figure 4), to determine if the remnant channel could feasibly be reconnected to the river. Under the goal of reconnecting the channel, another alternative was looked at allowing a straighter connection to the north of the existing channel (see Figure 5). This alternative would require additional excavation since the channel would be longer. Under this alternative, approximately 12, 700 yd^3 would need to be excavated – almost double that of the Proposed Action. This would also require additional ground disturbance, trail crossings and would be more expensive. Therefore, this alternative was eliminated from further consideration.

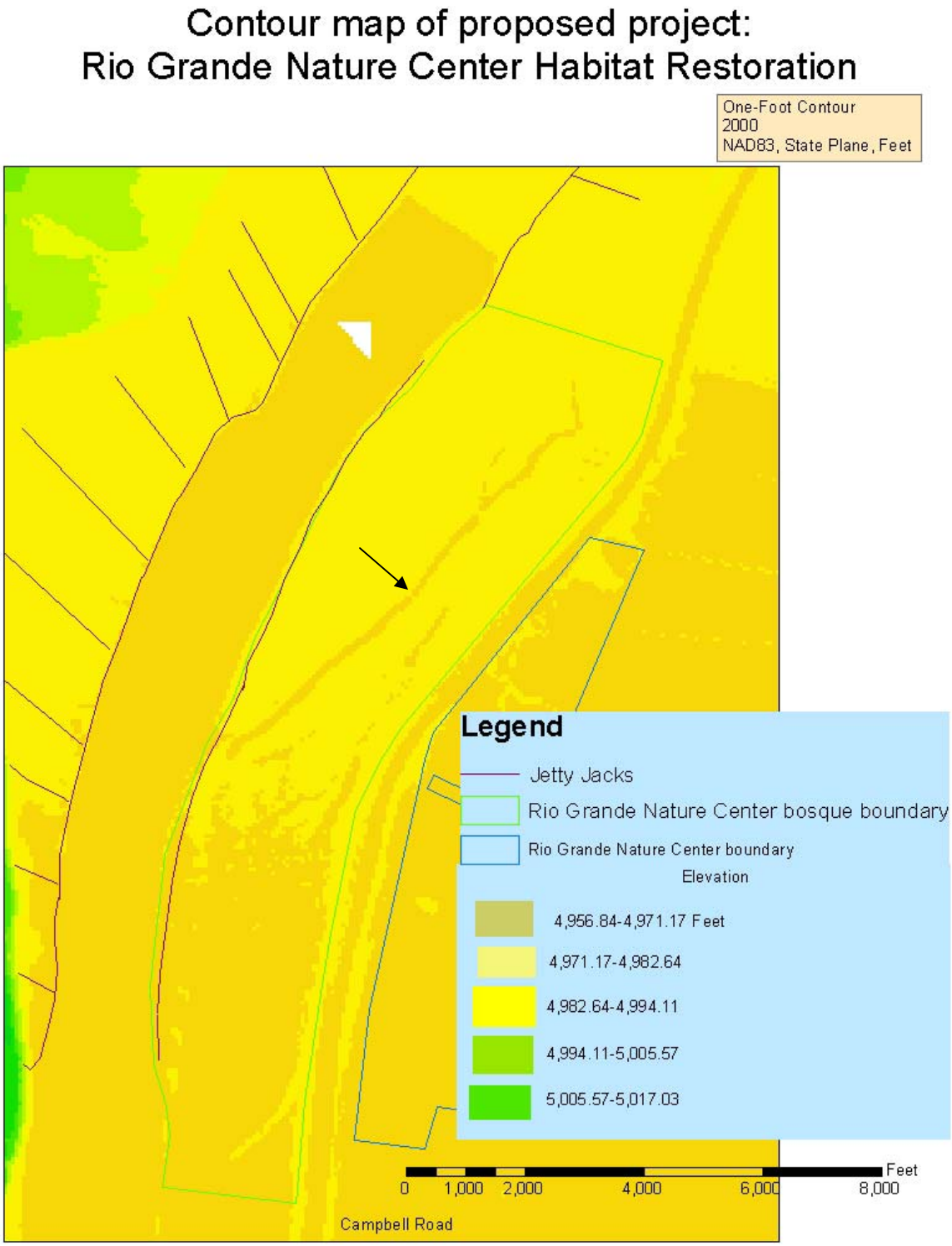

Figure 4. Orthophotography showing existing remnant channel at lower elevation than surrounding bosque.

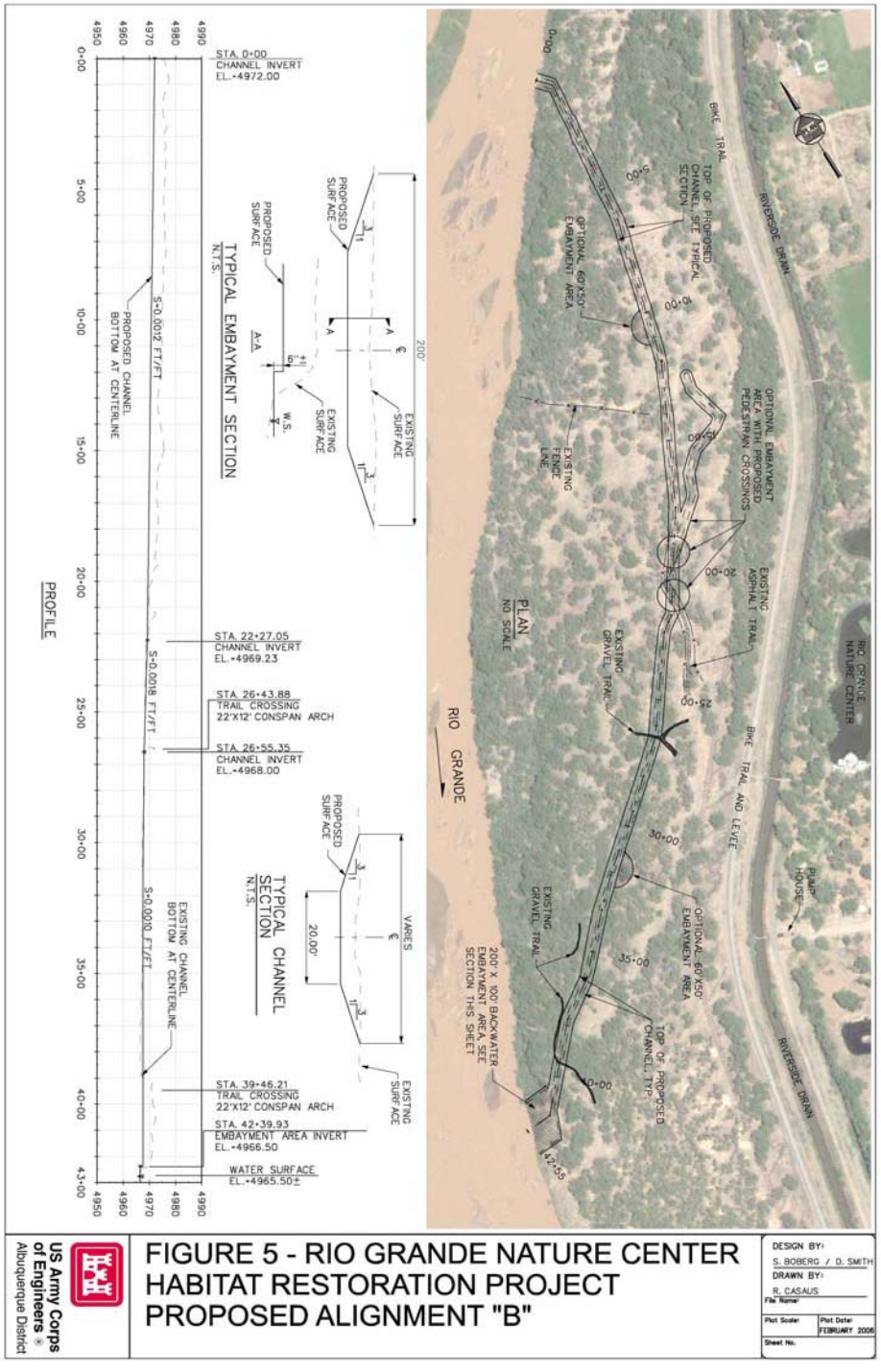

Figure 5. Alternative alignment considered but rejected (an 11x17 version is included in Appendix G).

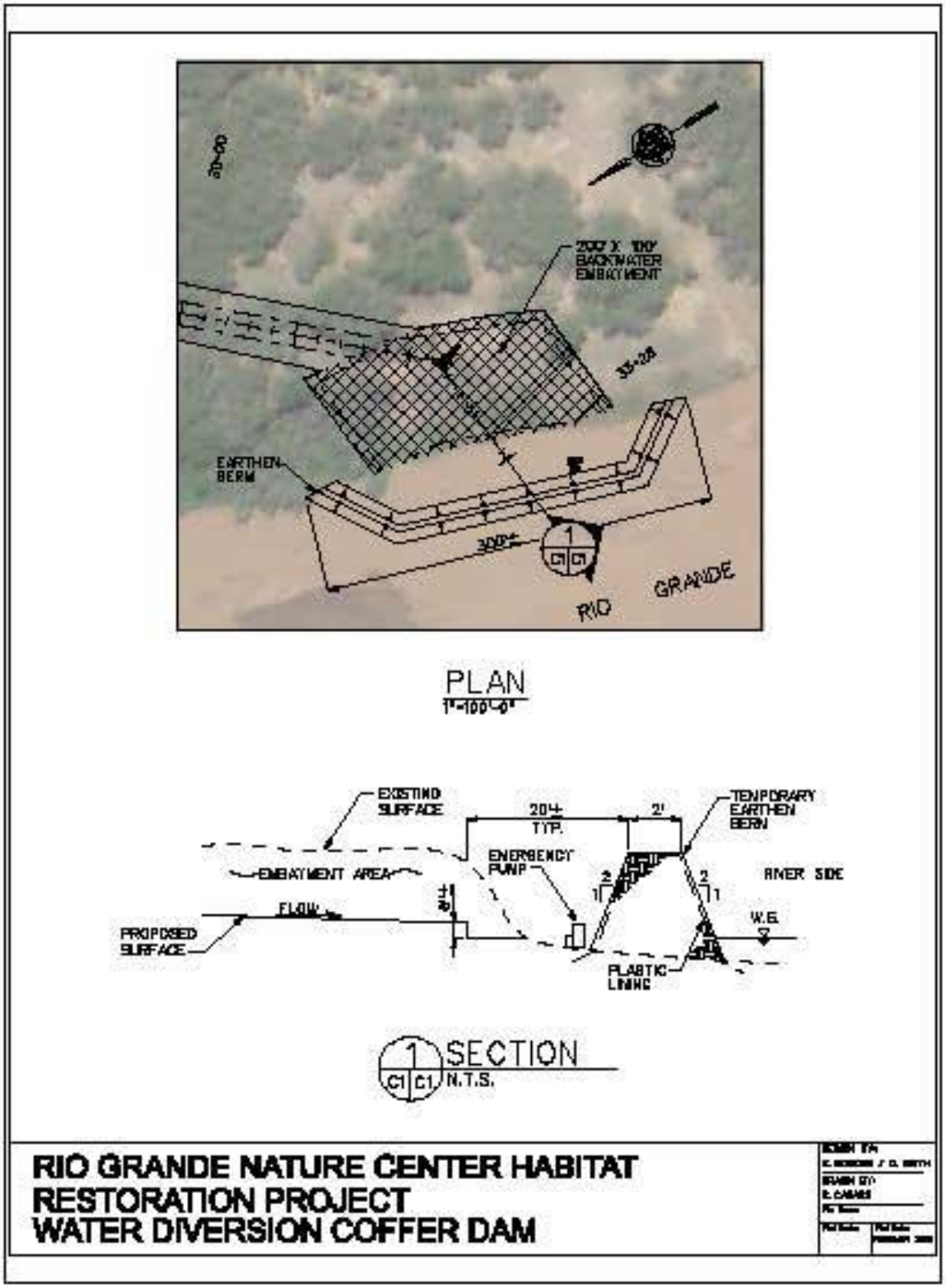

Figure 6. Example of coffer dam

2.0 Existing Environment and Foreseeable Effects

2.1 Physiography, Geology and Soils

The proposed project is in the Middle Rio Grande valley, a wide floodplain of fertile bottomland (USDA 1977). These fertile soils and shallow water tables support riparian and wetland vegetation as well as a variety of resident and migratory wildlife. The Rio Grande valley is a productive agricultural area that contributes to the quality of life and economies of the urban areas of Albuquerque, Corrales, and Bernalillo, New Mexico, as well as several other smaller communities.

The Rio Grande follows a well-defined geologic feature called the Rio Grande graben. The Rio Grande graben contains several thousand feet of poorly consolidated sediment of the Santa Fe Group of middle Miocene to Pleistocene age.

The terrain in the area is characterized by gently sloping plains from the east to the Rio Grande at approximately 4970 feet in elevation. The general soil conditions are deep, nearly level, well-drained soils that are formed in recent alluvium, on floodplains of the Rio Grande.

Soils in the project area are generally Vinton and Brazito according to the SCS 1977 report (USDA, 1977). Adjacent river soils are torrifluvents that are frequently flooded. Vinton and Brazito soils are occasionally flooded. The information in this section was obtained from the soil survey for Bernalillo County (USDA, 1977). These are the broader types of soils in the County and most likely in the project area.

Brazito Series

The Brazito series consists of deep, well-drained soils that formed in recent alluvium on the floodplain along the Rio Grande. Slopes are 0 to 1 percent. Brazito soils are associated with Vinton, Gila, Agua, Anapra, and Glendale soils. In a representative profile, the surface layer is light reddish brown and reddish brown silty clay loam about 9 inches thick. The soil is moderately alkaline throughout. Permeability is rapid below a depth of 3 to 12 inches.

Brazito fine sandy loam

The surface layer differs in texture and in some areas is 12 to 14 inches thick. In most areas the water table is below 60 inches, but in 2 percent of the mapped areas it fluctuates between 45 and 60 inches. Slopes are 0 to 1 percent. Runoff is very slow, and the hazard of water erosion is slight.

Brazito silty clay loam

The surface layer is commonly 12 inches thick. In most areas the seasonal water table is below 60 inches. Slopes are 0 to 1 percent. Runoff is slow, and the hazard of water erosion is slight.

Vinton Series

The Vinton series consists of deep, well-drained soils that formed in recent alluvium on the floodplains of the Rio Grande. Slopes are 0 to 3 percent. Vinton soils are associated with Brazito, Bluepoint, Agua, and Gila soils. In a representative profile, the surface layer is brown sandy loam and pinkish gray loamy sand and pinkish gray very fine sand. The soil is moderately alkaline throughout. Permeability is moderately rapid.

Vinton loamy sand
The surface layer is pale brown. In most areas the water table is below 60 inches, but on about 1.5 percent of the acreage it fluctuates between 45 and 60 inches. Slopes are 0 to 1 percent. Runoff is very slow, and the hazard of soil blowing is moderate to severe.

Vinton sandy loam, 0 to 1 percent slopes
In most areas the seasonal water table is below 60 inches, but on about two percent of the acreage it is between depths of 45 and 60 inches and the soil is moderately saline. Runoff is slow, and the hazard of soil blowing is severe.

Soils would obviously be disturbed during construction. As stated above, non-native vegetation would be removed from the banks and bottom of the channel and the channel bottom would be graded. The banks would be revegetated with native species but the channel would remain open for flows to move through. Vegetation may come in on its own however.

Prior to construction, all environmental protection measures as expressed by contract clauses, design drawings, or other means would be reviewed with the contractor at a pre-construction conference. Silt fencing would be installed when working near the bank of the river. A small coffer dam or porta-dam would be installed at the channel inlet and outlet during construction. All construction activities would be in compliance with all applicable Federal, state and local regulations. Local soil disturbance permits would be required from the City of Albuquerque. There would be a fair amount of soil disturbance in order to connect and grade the channel. Replanting the banks with native grasses and other vegetation would negate some of these short-term impacts. The channel, however, needs to remain fairly open to allow flows to move through. Therefore, there would be a temporary short-term adverse effect to soils by the Proposed Action.

2.2 Climate

The climate in the vicinity of the proposed project is classified as semi-arid. The average maximum temperature is 70ºF and the average minimum temperature is 44ºF. The average annual precipitation is 7.88 inches. Summer is the rainy season. Half of the annual precipitation falls during the period July to October, typically as brief summer rain storms. The snow season in the Albuquerque area generally extends from November to early in April, but snow seldom stays on the ground for more than one day. The average frost-free season at Albuquerque is 190 days, from mid-April to late in October. Relative humidity averages less than 50 percent and generally less than 20 percent on hot sunny afternoons. Winds blow most frequently from the north in winter, and from the south along the river valley in summer. Wind speed averages nearly nine miles per hour for the year.

2.3 Hydrology and Hydraulics

There are numerous ground water wells through the RGNCSP site that provide data on shallow ground water fluctuation between the river and the levee. The Bosque Ecosystem Monitoring Program (BEMP) ground water well data shows that from 1997 to 1999 the average depth to ground water was 47-67 inches (120-170 cm). In the year 2000, average depth was approximately 67-79 inches (170-200 cm).

The bank is approximately 5 feet above the river bed. This site "appears to be disconnected or less responsive to river flow. Water table depths as well as the lack of spatial and temporal variation in the water table indicate efforts to establish new cottonwoods by seed or pole planting will likely fail without periodic overbank flooding" (Eichhorst et al., 2001).

Since the bank is approximately 5 feet above the river bed, bankfull flows of approximately 6000-7000 cubic feet per second (cfs) still would not provide overbank flooding at the site. Therefore, a reconnection between the floodplain and the river is needed to provide flooding internal to the bosque. In this case, an existing channel is proposed to do that.

The channel is approximately 20 feet wide at the bottom. Removal of non-native vegetation and a reconnection of the channel is proposed to balance each other in terms of water use on the site. River water is proposed to move through the channels though some may move into the embayments, which are more internal and provide some ponding areas. The embayments are proposed to be approximately 50 x 50 feet in size and 4.5 feet deep. Depths of flow for each embayment will vary from 1' to 3' depending on which embayment you are at and the flow rate of the Rio Grande.

The orthophotography shows that these channels are lower than the existing bank and an excavation of the bank would reconnect them. Based on the Albuquerque gage rating curve (USGS no. 32 and no. 33 (for the Albuquerque gage)) and information regarding similar projects such as the Albuquerque Overbank Project, it is estimated that at 3500 cfs the channel would receive a flow by lowering the bank approximately 3 feet.

A representative post-Cochiti annual spring runoff hydrograph with a peak mean-daily flow of 3,770 cfs was used for evaluating restoration alternatives. The preliminary design is based on a flow rate in the Rio Grande of 3140 cfs which is representative of the flow rate taken from the average annual hydrograph that would be sustained for a minimum duration of 21 days. The water surface elevation (WSEL) in the Rio Grande for that flow rate was used as the basis for setting the invert elevation for the RGNCSP channel inlet. The RGNCSP channel inlet was set at one foot below the 3140 cfs WSEL in the Rio Grande. This allows for a spill into the RGNCSP Channel with a flow rate that would vary between 50 and 100 cfs with a velocity that varies between 1 and 2 fps. Under these conditions water depth in the RGNCSP Channel would vary from one to two feet. The representative post-Cochiti annual spring runoff hydrograph and the HEC-RAS hydraulic model used to determine the WSEL in the Rio Grande was developed as part of the Rio Grande Bosque Feasibility Study. There would be no adverse effect on river hydrology and hydraulics.

2.4 Net Water Depletions

The Rio Grande Compact, in effect, limits the amount of surface water than can be depleted in the Middle Rio Grande based upon the natural flow of the river measured at the Otowi gage near Los Alamos (Rio Grande Compact, 1939). In addition, the New Mexico State Engineer has determined the Middle Rio Grande to be fully appropriated. Therefore, any increase in water use in one area of the river must be offset by a reduced use in another area of the river. The New Mexico State Water Plan (Office of the State Engineer/Interstate Stream Commission, 2003)

requires that new projects not result in increases in net water depletions, or that any increases are offset by purchased or leased water rights.

The channel would flow for a 21-day duration on an average year yielding evaporative losses that would be negligible (6.0 acre-feet/year including use of the embayment areas which would stay wet for approximately 6 months out of the year).

The New Mexico Office of the State Engineer (OSE) determined that a permit would be required for the purpose of offsetting the depletions to the Rio Grande caused by the Proposed Action (Appendix D). OSE determined that depletions include the initial filling and any evaporation losses resulting from the increased surface area of surface water. The Collaborative Program would provide any water rights determined to be needed for this project.

There are a number of ground water wells throughout the project area that are being used to monitor seasonal changes in ground water quantity. These wells would continue to be monitored after implementation of the proposed project.

2.5 Water Quality

Section 402(p) of the Clean Water Act (CWA) regulates point source discharges of pollutants into water of the United States and specifies that storm water discharges associated with construction activity be conducted under National Pollutant Discharge Elimination System (NPDES) guidance. Ground disturbance would take place on approximately 15 acres. Therefore, a NPDES permit would be required. A Notice of Intent would be filed, and a Storm Water Pollution Prevention Plan (SWPPP) for the project would be developed and kept on file at the construction site and become part of the permanent project record. The Corps' contractor would obtain the NPDES permit prior to commencement of construction activities. Compliance with these requirements would ensure that the Proposed Action would have no significant effect on the water quality of the Rio Grande. Water quality would be monitored throughout the project. Silt fence would be installed prior to construction in all areas. No adverse impact to water quality is anticipated.

Section 404 of the CWA requires analysis of the EPA's 404 (b)(1) Guidelines if the Corps proposes to discharge fill material into a water or wetlands of the United States. A memorandum was obtained from the Corps' Regulatory Program stating that construction of this project meets the conditions of Nationwide Permit No. 33 (Appendix E). As a result, the 404 (b)(1) analysis has been completed for Nationwide 33 and there will not be more than minimal impacts to the environment due to the proposed fill material. All conditions for the Nationwide 33 and 401 water quality certification (Appendix E) would be adhered to during construction. As a note, the channel post-project would be a jurisdictional water of the United States.

Section 401 of the CWA, (CWA; 33 U.S.C. 1251 *et seq.*) as amended, requires that an applicant for Section 404 authorization also obtain water quality certification for the Proposed Action prior to initiating any proposed construction. For projects located on public or private lands in New Mexico, the New Mexico Environmental Department administers the water quality certification. Certification which was obtained (NMED SWQB File SF-100-2006, Appendix E) and will be adhered to during construction of this project.

The Corps, or their representatives, would monitor and inspect any contractor's compliance with project specifications regarding the conditions set forth under the CWA permits and any best management practices employed to conform to those permit conditions. There may be a short-term adverse effect on water quality during construction along the banks of the river but that portion of construction would take place during low flows of the river and would be performed after the rest of the channel is excavated. Therefore, there would be a minor short-term adverse effect on water quality during construction only.

2.6 Air Quality and Noise

The proposed project is located in New Mexico's Air Quality Control Region No.152, which encompasses all of Bernalillo County and most of Sandoval and Valencia counties. These three counties are "in attainment" (i.e.: do not exceed State and Federal Environmental Protection Agency air quality standards) for all criteria pollutants (NMED, 1997). Air quality in the project area is generally good. The closest Class I area is Bandelier National Monument, approximately 50 miles to the north of the project area. A Class I area is a wilderness area or a National Park. Air quality in the project area is generally good to excellent due to the lack of urban industrial development. Although high winds are common in and around the project area, blowing dust is generally not a problem except during extremely dry years. Airborne particulate and carbon monoxide concentrations from wood burning in the Rio Grande valley are occasionally high during winter months when temperature inversions and wood stove use are both more prevalent. All vehicles involved in construction at the project site would be required to have passed a current New Mexico emissions test and have required emission control equipment (if required).

Since there would be ground disturbance during construction, BMPs to minimize air quality disturbance would be employed. These include tracking out of material by covering trucks to avoid fugitive dust violations; maintaining and sweeping public trails to keep them free of debris and dust; and wetting down work areas. Speed limits on levee roads would be limited to 15 mph, which would also minimize dust.

A fugitive dust permit would be obtained from the City of Albuquerque. All work areas would be continually wet down to minimize dust. Any sediment deposited on the paved trail due to construction would be swept as needed. Therefore, short-term impacts to air quality are anticipated during construction but would be abated to the extent possible using BMPs as described above. There would be no long-term adverse effects to air quality by the Proposed Action.

The OSHA (Occupational Safety and Health Administration) noise standard limits noise levels to 90 dBA averaged over an eight-hour day (29 CFR 1910.95), although hearing damage can begin at levels as low as 80 dBA over an eight-hour day. No worker may be exposed to noise in excess of 115 dBA without protection, which would reduce the exposure below 115 dBA (AFSCME, 2004).

Albuquerque's noise control ordinance was placed into effect in June 1975. The Environmental Health Department's Consumer Protection Division personnel are responsible for enforcing the ordinance. Noise control enforcement may involve many sources of excessive noise: radios, stereos, television, live bands, machinery, equipment fans, air conditioners, construction, vehicle

repairs, motor vehicles, and general noise. The ordinance stipulates a property-line value in which the noise level emitted must not exceed 50 decibels (dB) or 10 decibels above the ambient level; whichever is greater (Mitzelfelt, 1996). For example, if you are playing a stereo, the sound level traveling from the stereo to the neighboring property lines cannot be more than 10 decibels higher than the general noise level existing before the stereo was turned on. Noise level meters are used to measure the sound level as it is crossing the property line. The meters are similar to radar meters the police use for speed detection; however, instead of detecting an object in motion, it detects air pressure (sound waves) in motion and produces a numbered level called decibels.

Equipment to be used during construction would include pieces generating a fair amount of noise. This noise would be somewhat abated in adjacent neighborhoods due to the buffering by the levee road when work is taking place in the bosque. Travel on the levee roads to and from work locations would also create noise during the project. The project would take place during normal work hours between 7:00am and 5:00pm in order to minimize disturbance. All OSHA and local municipality requirements (as described above) would be adhered to. Therefore, there would be minor, short-term noise impacts by the Proposed Action during construction, which would occur only during normal working hours.

2.7 Aesthetics

The overall project goals include creating potential RGSM habitat by reducing fuel loads and thinning of non-native vegetation and excavating the channel. In order to accomplish these goals, construction within the bosque would include machinery of varying sizes (as discussed Section 2.1.1 above). This would cause short-term negative affects to aesthetics during construction. Post-construction, some visual effects would be noticed depending on the level of work required. Therefore, there would be negative, short-term impacts by the Proposed Action to aesthetics during construction and for a short time after construction, but these impacts would decrease over a short period of time. Revegetation of 12 acres of native vegetation and the removal of 15 acres of non-native vegetation would increase the aesthetics of the site after a few years of maturation.

2.8 Vegetation Communities

Vegetation in this area is dominated by native cottonwood (*Populus deltoides* var. *wislizenii*) with a mixed native/exotic understory of shrubs and grasses. Within the nearby 656 x 328 feet (200m x 100m) BEMP site grasses, forbs, and shrubs make up a minor cover component while trees are the dominant group of vegetation (Eichhorst et al., 2001). Exotic trees at the site that are abundant include Russian olive and saltcedar.

Russian olive is a fast growing deciduous tree that can reach up to 40 feet in height (Whitson et al. 2000). An ornamental tree first introduced for landscaping and windbreaks in the late 1800s, Russian olive has spread and is now naturalized throughout the central and western United States. It is highly invasive in seasonally wet riparian and floodplain habitats, where it has been observed to replace native willow and cottonwood species. It can grow under dense stands of saltcedar, out-compete resident plants, and eventually dominate some riparian sites. Plants can tolerate high salt levels in soil and drought (Parker et al., 2005).

Saltcedar is a deep-rooted deciduous shrub or tree that can reach up to 25 feet in height. While initially introduced for erosion control, it has escaped cultivation and can form dense monotypic stands along riparian and floodplain habitats and open savanna-like infestations in upland areas. It is widely distributed throughout the West, and recent surveys estimate over 1.5 million acres are infested in the Southwest alone (Brotherson and Field, 1987).

Plant species survey studies show that cottonwood is the dominant species at the site with Russian olive, squirreltail grass (*Elymus elymoides*), broom snakeweed (*Gutierrezia sarothrae*), white sweet clover (*Melilotus officinalis*), desert false indigo shrubs (*Amorpha fruticosa*), spike dropseed grass (*Sporobolus contractus*) and sand dropseed grass (*Sporobolus cryptandrus*) comprising the remainder of the plant scheme.

As stated in Section 2.1 above, much of the non-native vegetation that is within the channel would be removed (see Table 3 below for a comparison of vegetation change). Some Russian olive trees would be left (approximately 1 in 10) as they are currently used as habitat within the RGNCSP and staff has requested that some be left. Native trees would be left in place along the banks of the channel. Native trees that are present within the channel would be left as well. The banks of the channel would then be revegetated as stated in Section 2.1.1 above. Therefore, there would be short-term impacts to vegetation during construction but this would be offset in the long-term by the planting of native species.

Table 3. Estimated land/water cover change by the proposed project

Dominant cover type	Existing land cover (acres)	Future land cover with restoration (acres)	Future land cover without restoration (acres)
Cottonwood	6	6	4
Willow	0	2	0
Tamarisk (salt cedar)	3	0	5
Russian olive	1	0.5	4
Mixed bosque vegetation (includes willow)	3	2	2
Salt grass	1	2	0
Other grass (specify)			
Clover/sunflower			
Sparse vegetation/bare ground	1	1	0
Open water	0	1.5	
Sand bar	0		
Marshes/wetlands	0	0	
Other			
Total Acres	15	15	15

1.1 Floodplains and Wetlands

Wetlands are lands transitional between terrestrial and aquatic systems where the water table is at or near the surface or the land is covered by shallow water (Cowardin et al. 1979). Saturation with water determines the nature of soil development and, in turn, types of plant and animals inhabiting these areas. Wetlands occurring within the riparian zone may be dominated by the same plant species common in bosque; however, wetlands exhibit wetter soils and support many additional plant and animal species.

Historically, the Rio Grande channel wandered widely throughout the floodplain and abandoned channels often contained sufficient ground water discharge to support marshes (cienegas), sloughs (esteros), and oxbow lakes (charcos; Scurlock 1998, Ackerly 1999). Currently, the extent of wetland plant communities within the Middle Rio Grande reach has been significantly reduced. The ground water elevation throughout the valley was significantly lowered by the construction of drains in the 1930s. Wetland areas throughout the floodplain have been directly displaced by agricultural and urban development. Irrigation and flood control operations have reduced the magnitude of discharges within the floodway -- especially during the spring runoff period -- and limit the extent of overbank flooding.

Jurisdictional wetlands (relative to Section 404 of the Clean water Act) do occur adjacent to the project area. 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. Since there are no existing wetlands within the project area, the Proposed Action would not affect wetland communities.

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." Removal of the non-native vegetation may allow the floodplain to expand. Since excavation of the bank to reconnect the channel would occur, there would be an impact to the existing floodplain. The constructed inlet and outlet would be formed and protected with vegetation to hold it in place. Therefore, the overall floodplain would not change. Therefore, the Proposed Action may affect the floodplain, but these impacts are anticipated to be positive and not significant.

3.10 Fish and Wildlife

Common fish species in the project area include river carpsucker (*Carpiodes carpio*), flathead chub (*Platygobio gracilis*), mosquitofish (*Gambusia affinis*), and red shiner (*Cyprinella lutrensis*; Platania, 1993). Less common fish species in the project area include longnose dace (*Rhinichthys cataractae*), channel catfish (*Ictalurus punctatus*), fathead minnow (*Pimephales promelas*), white sucker (*Catostomus commersoni*), and the federally listed Rio Grande silvery minnow (*Hybognathus amarus*).

Some reptiles and amphibian species common to the area include the eastern fence lizard (*Sceloporus undulatus*), New Mexico whiptail (*Cnemidophorus neomexicanus*), Woodhouse's toad (*Bufo woodhousii*), tiger salamander (*Ambystoma tigrinum*), western chorus frog (*Pseudocris triseriata*), bullfrog (*Rana catesbeiana*), northern leopard frog (*Rana pipiens*), Great Plains skink (*Eumeces obsoletus*), New Mexico garter snake (*Thamnophis sirtalis dorsalis*), painted turtle (*Chrysemys picta*), and spiny softshell turtle (*Trionyx spiniferus*) (Morris et al., 2003). Though their occurrence has declined, there is a potential for the Northern leopard frog to occur in the bosque.

Common small mammals in the project area are white-footed mouse (*Peromyscus leucopus*), western harvest mouse (*Reithrodontomys megalotis*), house mouse (*Mus musculus*), tawny-bellied cotton rat (*Sigmodon fulviventer*), and rock squirrel (*Spermophilus variegatus)*; (Hink and Ohmart, 1984; Campbell et al., 1997). The tawny-bellied cotton rat has been noted to exist at the Candelaria Farm Preserve Wetland which is just east of the RGNCSP Discovery Pond (Rebecca Tydings, personal communication). Large mammals found in the project area include beaver (*Castor canadensis*), raccoon (*Procyon lotor*), muskrat (*Ondatra zibethinus*) porcupine (*Erethizon dorsatum*), long-tailed weasel (*Mustela frenata*), striped skunk (*Mephitis mephitis*), rock squirrel, Botta's pocket gopher (*Thomomys bottae*), and coyote (*Canis latrans*) (Hink and Ohmart, 1984; Campbell et al., 1997).

Common avian species that have been detected at the Nature Center since 2003 (Hawks Aloft Inc., personal communication) include Mourning Dove (*Zenaida macroura*), Black-chinned Hummingbird (*Archilochus alexandri*), Northern Flicker (*Colaptes auratus*), Ash-throated Flycatcher (*Myiarchus cinerascens*), American Robin (*Turdus migratorius*), Black-headed Grosbeak (*Pheucticus melanocephalus*), Lesser Goldfinch (*Carduelis psaltria*), Spotted Towhee (*Pipilio maculatus*), Blue Grosbeak (*Guiraca caerulea*), Yellow-billed Cuckoo (*Coccyzus americanus*), Western Screech-Owl (*Otus kennicottii*), Summer Tanager (*Piranga rubra*),

Yellow-breasted Chat (*Icteria virens*) Brown-headed Cowbird (*Molothrus ater*), Great-horned Owl (*Bubo virginianus*), Hairy Woodpecker (*Picoides villosum*), Bewick's Wren (*Thryomanes bewickii*), Cooper's Hawk (*Accipiter cooperii*), Turkey Vulture (*Cathartes aura*), Sharp-shinned Hawk (*Accipiter striatus*), Bald Eagle (*Haliaeetus leucocephalus*), American Kestrel (*Falco sparverius*), Barn Owl (*Tyto alba*), Calliope Hummingbird (*Stellula calliope*), Broad-tailed Hummingbird (*Selasphorus platycercus*), Rufous Hummingbird (*Selasphorus rufus*), Downy Woodpecker(*Picoides pubescens*), Ladder-backed Woodpecker (*Picoides scalaris*), Red-naped Sapsucker (*Sphyrapicus nuchalis*), Olive-sided Flycatcher (*Contopus borealis*), Dusky Flycatcher (*Empidonax oberholseri*), Gray Flycatcher (*E. wrightii*), Cordilleran Flycatcher (*E. occidentalis*), Say's Phoebe (*Sayornis saya*), Western Kingbird (*Tyrannus verticalis*), Cedar Waxwing (*Bombycilla cedrorum*), Yellow Warbler (*Dendroica petechia*), Townsend's Warbler (*D. townsendi*), Black-throated Gray Warbler (*D. virens*), Red-winged Blackbird (*Agelaius pheoniceus*), Great-tailed Grackle (*Quiscalus mexicanus*), Pine Siskin (*Carduelis pinus*), and House Sparrow (*Passer domesticus*).

The Rio Grande is a major migratory corridor for songbirds (Yong and Finch 2002), waterfowl, and shorebirds. At various times of the year, riparian areas support the highest bird densities and species numbers in the Middle Rio Grande. Both the river channel and the drains adjacent to the bosque provide habitat for species such as Mallards, Wood Ducks, Great Blue Herons, Snowy Egrets, Green Herons, Belted Kingfishers and Black Phoebes. Agricultural fields and grassy areas with little woody vegetation are important food sources for Sparrows and other songbirds during migration and winter.

The peak nesting season for birds is April through August. The Migratory Bird Treaty Act (MBTA) (16 U.S.C. 703, et seq.) is the primary legislation in the United States established to conserve migratory birds (USFWS, 2004). The list of the species protected by the MBTA appears in title 50, section 10.13, of the Code of Federal Regulations (50 CFR 10.13). The MBTA prohibits taking, killing, or possessing of migratory birds unless permitted by regulations promulgated by the Secretary of the Interior. The U. S. Fish and Wildlife Service (USFWS) and the Department of Justice are the Federal agencies responsible for administering and enforcing the statute. In order to minimize potential effects on nesting birds in the project area, clearing of live vegetation would only occur between September and April.

Other wildlife such as arthropods, mammals, amphibians and reptiles would also be displaced during implementation of the Proposed Action. There is also the potential to effect amphibitan species in the bosque due to herbicide use. The New Mexico Department of Game and Fish suggested that risks of toxicity to this fauna could be avoided by eliminating the use of herbicide use during the month of September (Appendix D, page 2). Therefore, herbicide use within the project area would only take place between October and April.

Since the ultimate goal is to revegetate with native species, which would create a healthier ecosystem in the long-term for native wildlife, these short-term effects of the project would be outweighed by the long-term benefits to all species. Implementation of the BMPs and timelines mentioned above would also aid in protecting species. Therefore, the Proposed Action would have short-term negative affects on wildlife with long-term positive benefits.

3.11 Endangered and Protected Species

Three agencies who have primary responsibility for the conservation of animal and plant species in New Mexico are the USFWS , 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. 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. Forty-six special status species are known from Bernalillo County.

Protection from harm, harassment, or destruction of habitat is afforded to species protected under the Federal Endangered Species Act. The New Mexico Wildlife Conservation Act and New Mexico Endangered Plant Species Act protect state-listed species by prohibiting take without a permit from the New Mexico Department of Game and Fish or New Mexico Forestry and Resources Conservation Division.

The four species with the potential to occur in the project area are listed or candidates for listing under the Federal Endangered Species Act: Rio Grande silvery minnow (*Hybognathus amarus*, endangered); Bald Eagle (*Haliaeetus leucocephalus*, threatened); Yellow-billed Cuckoo (*Coccyzus americanus occidentalis*, candidate); and Southwestern Willow Flycatcher (*Empidonax traillii extimus*, endangered). Both the Bald Eagle and the Yellow-billed Cuckoo were detected at this site as noted in Section 3.10 above. A discussion of each of these species and the potential effects from the Proposed Action is below.

<u>Southwestern Willow Flycatcher</u>

The Southwestern Willow Flycatcher (WIFL) is found in the U.S. from May until September. It winters in southern Mexico, Central America, and northern South America (Unitt, 1987). In New Mexico, the Southwestern Willow Flycatcher is distributed in nine drainages (Gila, Rio Grande, Rio Chama, Coyote Creek, Nutria Creek, Rio Grande de Ranchos, Zuni, Bluewater Creek, and San Francisco). The WIFL is an endangered species on the U.S. Fish and Wildlife Service Endangered Species List and critical habitat has been designated in the Middle Rio Grande, though not in the proposed project area. As of 1996, it was estimated that there were only about 400 Southwestern Willow Flycatchers in New Mexico, representing about 42% of the total population of the subspecies (WIFL Recovery Team, 2002). Southwestern Willow Flycatchers occur in riparian habitats along rivers, streams, or other wetlands, where dense growth of willows (*Salix* spp.), *Baccharis*, arrowweed (*Pluchea* sp.), saltcedar or other plants are present, often with a scattered overstory of cottonwood (Unitt 1987; Sogge et al., 1997; Finch and Stoleson, 2000). These riparian communities provide nesting and foraging habitat. Throughout the range of Southwestern Willow Flycatcher, these riparian habitats tend to be rare, widely separated, small and often linear locales, separated by vast expanses of arid lands. The Southwestern Willow Flycatcher is endangered by extensive loss and modification of suitable riparian habitat and other factors, including brood parasitism by the Brown-Headed Cowbird (*Molothrus ater;* Unitt, 1987).

The Southwestern Willow Flycatcher is an obligate riparian species and nests in thickets associated with streams and other wetlands where dense growth of willow, Russian olive, saltcedar, or other shrubs is present. Nests are frequently associated with an overstory of scattered cottonwood. Southwestern Willow Flycatchers nest in thickets of trees and shrubs approximately 6 to 23 feet in height or taller, with a densely vegetated understory approximately 12 feet or more in height. Surface water or saturated soil is usually present beneath or next to occupied thickets (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). 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.

Breeding pairs have been found within the Middle Rio Grande from Elephant Butte Reservoir upstream to the vicinity of Española. Southwestern Willow Flycatchers begin arriving in New Mexico in early May. 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 et al. 1997).

Occupied and potential Southwestern Willow Flycatcher nesting habitat occurs within the Middle Rio Grande valley. Occupied and potential 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 Southwestern Willow Flycatchers from the project area occurs along the Rio Grande at Isleta Pueblo. Potential habitat exists adjacent to the proposed project area.

Willow Flycatcher surveys were conducted at the project location in 2004, 2005 and 2006 per the standard protocol (Sogge et al., 1997, as amended). Surveys were conducted by Blue Earth Ecological Consultants, Inc., and Hawks Aloft, Inc., for the Corps of Engineers. During field visits with the USFWS, potential breeding habitat was identified at locations within the project area. Southwestern Willow Flycatcher was not detected during any of these survey periods. Potential habitat is along the bank of the river and would not be disturbed by the proposed project. Yellow-billed Cuckoo was not heard or observed at any of the sites during the survey though they have been documented at this site. Brown-headed Cowbirds were observed throughout all surveys.

Based on these surveys, it is highly unlikely that nesting Southwestern Willow Flycatcher will occupy the project area during the construction period beginning September 2006. No flycatchers were detected during surveys, little suitable habitat would be disturbed, and the Proposed Action would result in the planting of native riparian/wetland vegetation. It is very possible that migrants would be present in the project area in spring and fall. The site would be surveyed again during the 2007 survey season. If nesting Flycatchers are detected then consultation with USFWS would be reinitiated. Designated Critical Habitat was determined for WIFL in November 2005 but is not in the project area. Therefore, the Corps has determined that the proposed work may affect but is not likely to adversely affect, the Southwestern Willow Flycatcher.

Bald Eagle

The Bald Eagle 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 was reclassified as threatened due to breeding population increases throughout the country (U.S. Fish and Wildlife Service 1995). The U.S. Fish and Wildlife Service (USFWS) proposed removing the Bald Eagle from the list of endangered and threatened wildlife in July 1999 (USFWS, 1999); however, final delisting of the species has not yet occurred.

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. The Middle Rio Grande is a key habitat area that includes winter roost and a foraging area. 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, 1995). In New Mexico, these birds typically roost in groups in trees at night, usually in protected areas such as canyons (New Mexico Department of Game and Fish, 1988).

The general daily routine for a wintering Bald Eagle is to leave its roost at dawn for its foraging ground, feed until midmorning, perch for most of the midday, and possibly feed again in late afternoon before returning to its roost site (Hawkwatch International, Inc. 1993). Both adult and juvenile birds may be present in and around the Middle Rio Grande between late November and early March.

Bald Eagle may occur in winter along the Rio Grande, particularly in the north and south ends of the RGVSP (Stahlecker and Cox, 1997). Winter roost locations are known north and south from the project area, including areas between Rio Bravo and I-25 on both sides of the river (Stahlecker and Cox, 1997), and north of the Alameda Bridge (Hawkwatch International, 1993). Bald eagles have been viewed flying over the project site (personal sighting) and were detected by Hawks Aloft as noted in Section 3.10. They have been seen perched very near the proposed outlet of the channel (William DeRagon, personal communication).

The proposed work would occur during the winter, which is when Bald Eagles may be in or near the project area. In order to minimize the potential for disturbing Bald Eagles utilizing adjacent habitat, the following guidelines would be employed: If a Bald Eagle is present within 0.25 mile of the project area in the morning before activity starts, or arrives during breaks in project activity, the contractor would be required to suspend all activity until the bird leaves of its own volition, or a Corps biologist, in consultation with the USFWS, determines that the potential for harassment is minimal. However, if an eagle arrives once activity is underway, or if an eagle were beyond 0.25 mile of the site, activity would not be interrupted.

Implementation of these measures would preserve undisturbed Bald Eagle use of roost, foraging and perching sites in the riparian area adjacent to the project sites. For these reasons, the Proposed Action may affect but is not likely to adversely affect the Bald Eagle.

Yellow-billed Cuckoo

The breeding range of Yellow-Billed Cuckoo (*Coccyzus americanus occidentalis*) extends from California and northern Utah eastward to Southwestern Quebec and south to Mexico. Yellow-Billed Cuckoo is a candidate species to the U.S. Fish and Wildlife Service Endangered Species List, Yellow-Billed Cuckoo has declined precipitously throughout its range in southern Canada, the United States, and northern Mexico. The number of breeding birds has declined by about 42% in the eastern United States (Elphick et al., 2001: 335). It is nearly extinct west of the Continental Divide, having disappeared from British Columbia in the 1920's, from Washington in the 1930's, from Oregon in the 1940's, and from northern-most California in the 1950's. It is extremely rare in the interior West. Its only remaining western "strongholds" are three small populations in California, scattered populations in Arizona (especially on the San Pedro River) and New Mexico (especially the Gila River), and an unknown number of birds in northern Mexico (Center for Biological Diversity, 2000). The species winters in South America (DeGraaf et al., 1991).

Yellow-Billed Cuckoo nests in dense riparian shrub habitat in stands typically at least 25 acres in size (Elphick et al., 2001). They arrive in New Mexico beginning in late April and early May and nest from late May through August (Howe, 1986). Mature cottonwood forest with well-developed willow understory appear to be important characteristics of habitat for Yellow-Billed Cuckoo (Buffington et al., 1997; Gaines and Laymon, 1984). While willows appear to be a preferred nest tree, the species will also nest in dense saltcedar stands (Howe, 1986). Nests are constructed of sticks and are located in dense foliage. Yellow-Billed Cuckoo may nest up to three times a year, with a clutch size of two to six eggs. They may occasionally parasitize nests of other birds, particularly when food is abundant. Yellow-Billed Cuckoo feeds primarily on caterpillars but will also consume bird eggs, frogs, lizards, berries, and other fruits (Erlich et al., 1988). Yellow-Billed Cuckoo forages primarily in the foliage layer of shrubby and woody vegetation. Populations fluctuate markedly in response to variation in caterpillar abundance. Population declines resulting from loss or disturbance of riparian habitat have been consistently reported in the West (Finch, 1992). The greatest factors affecting the Yellow-Billed Cuckoo have been the invasion of exotic woody plants into Southwest riparian systems and clearing of riparian woodlands for agriculture, fuel, development, and attempts at water conservation (Howe, 1986).

Both Hink and Ohmart (1984) and Stahlecker and Cox (1997) reported Yellow-Billed Cuckoo as a nesting bird in the bosque of the Middle Rio Grande. Habitat potentially suitable for nesting of Yellow-Billed Cuckoo is present in the project area. Yellow-billed cuckoos have been inventoried at the site by the U.S. Forest Service Rocky Mountain Research Station (M. Means, personal communication, 2/5/03) and Hawks Aloft (Trevor Fetz, personal communication, 12/9/05). Yellow-Billed Cuckoo has been noted to nest late into October (D. Krueper, personal communication). Surveys for nests in potential habitat would occur through August prior to construction. This habitat would be thinned and revegetated during this project, creating native potentially suitable habitat in the future. Therefore, the Proposed Action may affect but is not likely to adversely affect the Yellow-Billed Cuckoo.

Rio Grande silvery minnow

Rio Grande silvery minnow (*Hybognathus amarus*) historically occurred in the Rio Grande drainage in New Mexico and Texas (Lee et al., 1980; Propst, 1999). The species was historically one of the most abundant and widespread fishes in the Rio Grande drainage (Bestgen and Platania, 1991). In New Mexico, historic range of the species included the Rio Chama from Abiquiu to the Rio Grande confluence, the main stem of the Rio Grande from Velarde downstream to the New Mexico-Texas state line, and the Pecos River downstream from Santa Rosa (Sublette et al., 1990). Rio Grande silvery minnow was extirpated from the Rio Grande downstream of the Pecos River by 1961 and Pecos River proper by the mid-1970s. The species was also extirpated from the Rio Grande upstream from Cochiti Dam and downstream from Elephant Butte Reservoir. One of the greatest threats to its survival is poor water quality (Utton Center, 2004). Currently, Rio Grande silvery minnow is present only in the Rio Grande between Cochiti Reservoir and the upper end of Elephant Butte Reservoir, which represents less than 10% of its historic distribution (Bestgen and Platania, 1991; Propst, 1999). Abundance of Rio Grande silvery minnow has declined markedly from 1994 to the present time and the population has become concentrated in the reach of the Rio Grande between San Acacia Diversion Dam and the headwaters of Elephant Butte Reservoir. Critical Habitat has been designated for the Rio Grande silvery minnow and is within the project area.

Rio Grande silvery minnow is a pelagic-broadcast spawner, producing nonadhesive, semi-buoyant eggs (Platania and Altenbach, 1998). Spawning is initiated by elevated stream discharge and occurs primarily in the late spring and early summer, when water temperatures are 68^{o}F to 75^{o}F (Propst, 1999). Females may produce three to 18 clutches of eggs, each clutch numbering from 200 to 300 eggs. Growth to maturation occurs in about two months. Rio Grande silvery minnow typically live only about one year, with less than 10% of the adult population surviving to up to two years (Platania and Altenbach, 1998; Propst, 1999). Habitat used by adult Rio Grande silvery minnow is characterized by silty to sandy substrate, depths of 8 in to 2.6 ft, and slow to moderate current velocity, 0 ft/sec to 0.98 ft/sec; (Dudley and Platania, 1997). Habitats with slow current velocity and associated cover are used in winter. Rio Grande silvery minnow feeds on algae and detritus (Propst, 1999; USFWS, 1999). Major threats to persistence of Rio Grande silvery minnow include diminution of river flows and dewatering by surface water diversions and dam regulation, modification of aquatic habitats that result in faster current velocities and narrower channels, and introduction of nonnative fishes (U.S. Fish and Wildlife Service, 1999: 1-2). Recovery of Rio Grande silvery minnow requires stabilizing the population in the Middle Rio Grande and reestablishing the species in suitable habitats within its historic range (USFWS, 1999). Over the 2004 and 2005 monitoring season, a large population of Rio Grande silvery minnow was found in the Albuquerque Reach of the Middle Rio Grande.

Rio Grande silvery minnow occurs in the Rio Grande in the project area. Fish obtained from recent salvage operations conducted during river drying events and captive propagation have been stocked in the Albuquerque area in an attempt to restore the population in that reach (J. Brooks, personal communication). Releases of captive-reared Rio Grande silvery minnow have been made at Alameda Bridge, north of the project area. The BMPs mentioned in previous sections would serve to decrease the potential for adverse effects to the minnow from work-site erosion. No work is proposed to take place directly in the channel. Therefore, the Proposed Action may affect but is not likely to adversely affect the Rio Grande silvery minnow.

Designated critical habitat for the species (68 Federal Register 8087: 8135) encompasses nearly the entire project area. Work would not take place in the main channel but it would take place along the bank and it may result in erosion or other inputs into the river. When work is to occur close to the bank of the river, BMPs would be enforced to prevent erosional inputs into the river. These BMPs would include, but would not be limited to: the use of silt fences adjacent to the riverbank to prevent erosion to the river; fueling of vehicles would not take place inside the levees; and equipment and vehicles would be cleaned prior to entering the bosque. Additionally, this project is being constructed to provide potential habitat for the RGSM and would create additional suitable nursery habitat in this reach which would help with the population. Therefore, the Proposed Action may affect but is not likely to adversely modify designated Critical Habitat of the Rio Grande silvery minnow. The Proposed Action may affect but is not likely to adversely affect the Rio Grande silver minnow, and may provide positive benefits to the species.

A Biological Assessment (BA) was submitted to the U.S. Fish and Wildlife Service (Service) on September 5, 2006. A letter regarding the status of the BA was received from the Service on October 10, 2006. These items are in Appendix G. A Biological Opinion (BO) will be issued by the Service in regard to the Rio Grande silvery minnow. The BO and its recommendations would be adhered to during construction.

3.12 Cultural Resources

The Rio Grande Valley in the Albuquerque area has been occupied from ca. 12,000 years ago (BP) to the present time (Judge n.d.; Schmader 1991, 1994; Cordell 1979, 1984, 1997). This small project consists of 15 acres and contains a single site from the historic period. The Historic period post-dates European contact, A.D. 1539 for New Mexico, and is known from written records as well as from archeological materials.

By the middle and late 1600s Spaniards settled in scattered areas along the Rio Grande Valley. Early Spanish settlements consisted of *ranchos* and *haciendas,* which were located along irrigation ditches or *acequias* and agricultural fields (Wozniak 1987). Over time, Spanish agriculture was increasingly based on irrigation water derived from the Rio Grande and brought to the fields by a system of *acequias* that was begun in the early 1600s but not well-developed until the 1700s. By the late 1700s, much of the valley was under cultivation and defined settlements were well established. However, few of these settlements' structural features remain intact today, having been destroyed by flooding and subsequent development. Many of the acequias remain on or near their original alignments (Wozniak 1987:91-92, 97). In 1848, the United States annexed New Mexico, which effected changes in the area's population, economy, settlement and culture. Subsistence farming and herding in the valley slowly began to give way to commercial agriculture, with the subsistence crops such as corn and beans being replaced in some fields with feed crops such as wheat, alfalfa, and sorghum. Although the fertility of Rio Grande Valley soils had long been legendary, 300 years of farming, combined with flooding and a rising water table in places led to a marked decline in agricultural productivity, with the area of arable land having been halved by 1917 (Wozniak 1987:110-112, 130-134).

In 1925, the Middle Rio Grande Conservancy District was formed to organize and improve flood

control, drainage and the patchwork system of acequias that had evolved in the valley (Wozniak 1987:134). Some old ditches were abandoned or remodeled, while new ditches and ground water drains were constructed, with the results that thousands of acres of formerly non-irrigable land were in the process of being opened to cultivation. In the early 20th Century, and continuing after World War II, ongoing population increases tied to Albuquerque's development as a regional center led to greater demand for housing. Consequently, agriculture began to give way to increasing residential development, a trend that continues today.

Records Search

A records search of the New Mexico Historic Preservation Division, Archaeological Records Management Section's (ARMS) database was conducted. One previously documented site was encountered within the project area. LA 145561 was discovered during a Class III cultural resources inventory survey of 1,118 acres conducted for the fire prevention phase of the Bosque Wildfire Project (Estes 2005:69-73).

The historic site, LA 145561 (Figure 7) is a system of water control features located on the floodplain of the east bank of the Rio Grande within the city limits of Albuquerque. The features on this site include one drainage ditch, twelve earthen berms, and three levee segments. Feature 1 is an old river channel remnant that was historically maintained as a drainage ditch in the bosque, and is the channel that is proposed to be reconnected with this project. It measures 1,640 feet (500 meters) in length by 14.8-23 feet (4.5 to 7 meters) in width and varies from 3.3-5 feet (1.0 to 1.5 meters) in depth. The banks of Feature 1 are overgrown with Russian olive and saltcedar. The outlet of the ditch is located on the east bank of the river and is partially filled with alluvial sediments, and overgrown with coyote willows.

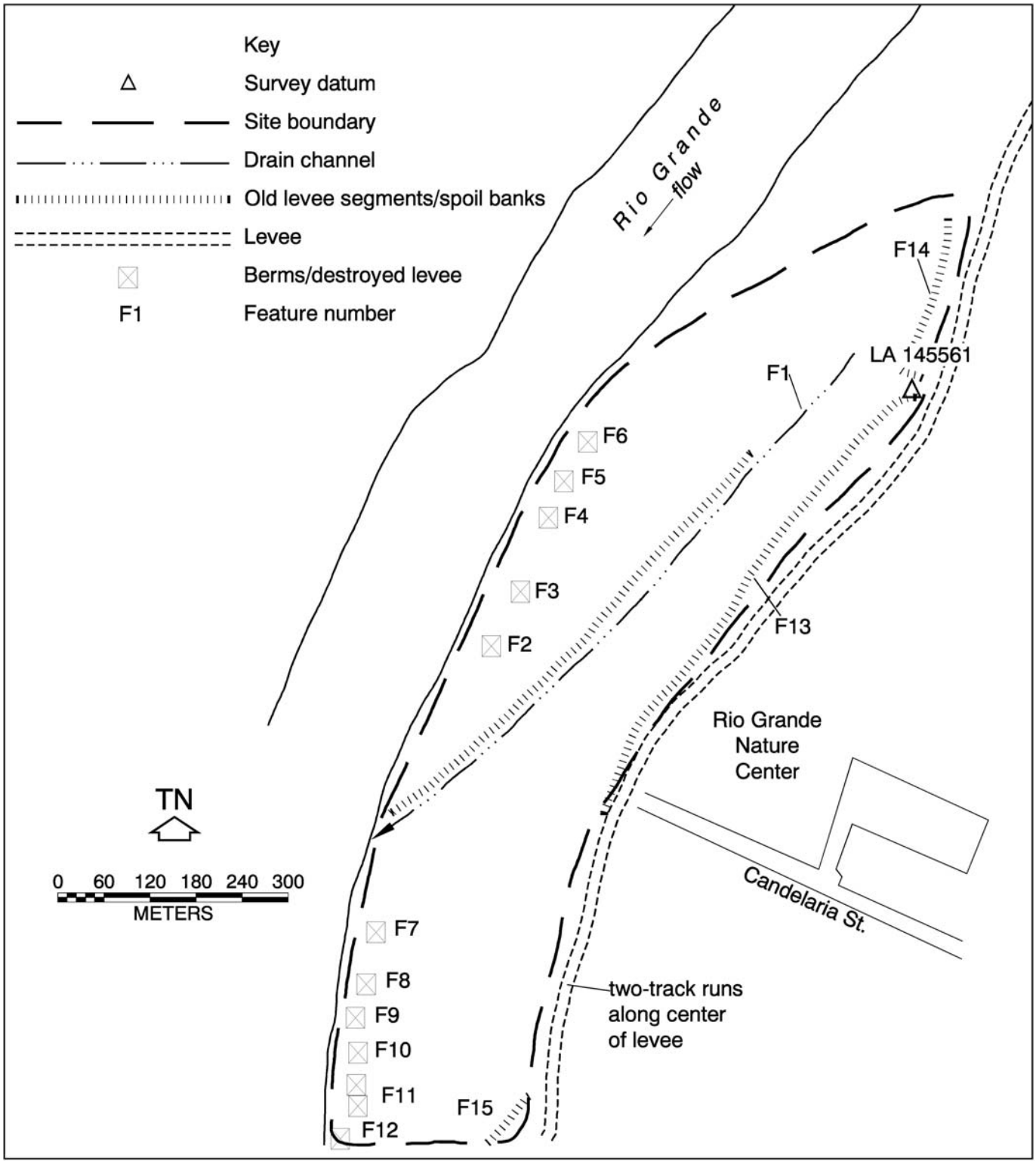

Figure 7. Historic site within the project area

The contemporary USGS 7.5-minute quadrangle Los Griegos, New Mexico (1:24,000 series, 35106-B6; 1972) illustrates Feature 1 as an ephemeral river channel. An examination of aerial photos taken in 1935 by the Soil Conservation Service (Fairchild Aerial Survey 1935:151A-1) suggest that the ditch was located at the eastern most margin of the riverbed. Thus, the ditch appears to be a natural channel maintained to promote drainage in this part of the bosque. Features 2 through 12 are a series of eleven earthen berms that form a north to south alignment between the river and the drainage ditch. The berms resemble ramps because the northern ends of the berms are at the level of the modern ground surface, and they slope upward to the south reaching a height of 5-6.6 feet (1.5–2 meters). The Los Griegos (1972) quadrangle map shows a levee at the approximate location of the berms. These features may be the remains of a poorly constructed levee that was severely damaged by floods. Another explanation is that these berms were earthen jetties placed at regular intervals along the river.

Features 13, 14, and 15 are discontinuous levee segments along the eastern side of the site adjacent to the contemporary levee. Features 13 and 15 have been impacted by construction of the modern levee, while feature 14 was not affected. These old levee segments are non-engineered spoil bank levees. LA 145561 has the potential to yield additional information concerning the agricultural development of this portion of the Upper Middle Rio Grande Valley and to document the activities of the Middle Rio Grande Conservancy District, the U.S. Bureau of Reclamation, and the Army Corps of Engineers from the 1930's to the 1960's. The New Mexico State Preservation Officer has concurred with the U.S. Army Corps of Engineers that LA 145561 is eligible for inclusion in the National Register of Historic Places under criteria "a" and "d" of 36 CFR 60.4 (SHPO concurrence dated November 28, 2005, HPD No. 076136).

Habitat restoration at the Rio Grande Nature Center would involve earth moving activities that would utilize portions of an old river channel that is associated with the historic earthen features/structures that comprise LA 145561. The old river channel was historically maintained as a drainage ditch; therefore, the proposed project would return the channel/ditch to its historic function as well as providing riparian habitat. Mechanical excavation that would reconnect the channel/historic ditch to the Rio Grande would not significantly affect any of the earthen features that comprise LA 145561; therefore the proposed project would have "No Adverse Effect to Historic Properties." A letter of concurrence from the SHPO is shown in Appendix C.

No comments have been received from scoping inquires with American Indian Tribes regarding this project or from numerous similar habitat restoration projects in the Albuquerque area. At this time, no traditional cultural properties are known to occur in the project area. A copy of the USACE staff cultural resources documentation for this project that was submitted to SHPO (Corps' Report No. COE-2005-019) is available upon request.

3.13 Socioeconomic Considerations

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 would be used to describe the socioeconomic context. Bernalillo 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. Specific information for recreation in the local area and Region of Influence are relevant and also presented.

The proposed project is in Bernalillo County, New Mexico. The population in Bernalillo County was estimated at 573,675 in 2002 (U.S. Census Bureau, 2002). It is approximately 1166 square miles with 477 persons per square mile. It is generally urban in character.

In 1999, Bernalillo County had a per capita personal income (PCPI) of $20,790. In 2000, Sandoval County had a PCPI of $22,247. This PCPI ranked 5th in the State of New Mexico, and was 101 percent of the State of New Mexico average, $21,931, and was 75% of the national average, $29,469. The average annual growth rate for the State of New Mexico was 3.9 percent and for the nation was 4.2 percent (U.S. Census Bureau 2001 a,b).

The demographics at the county, state, and national levels are compared in Table 4**.** When compared to the national level, the population of Bernalillo 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 in the County (4.2 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, Bernalillo County has the same percentage of Hispanics as the State.

Consequently, the population of Bernalillo 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 RGNCSP serves several nearby schools that receive Title 1 funding. An effort by the Friends of the Rio Grande Nature Center also provides outdoor educational activities for low-income families.

Table 4. Profile of Demographic Characteristics, Year 2000

Geographic Area	*Total Population*	*Race (Percent of Total Population)**						
		White	*Black or African American*	*American Indian and Alaska Native*	*Asian*	*Native Hawaiian and Other 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
Bernalillo (County	573,675	70.8	2.8	4.2	1.9	0.1	16.1	42

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

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 Bernalillo County are somewhat better than the state, at 12.9 percent. Therefore, Bernalillo County, when compared to the state, is not disproportionately low-income (U.S. Census 2000).

The cost of the project is comparable with other work of this type being completed in the area, in the county and in the state. The economy in the local area, county and state is in line with the cost of the project as described. Therefore, the Proposed Action would not adversely affect the current socioeconomic conditions of Bernalillo County.

3.14 Land Use and Recreational Resources

Land Use

The proposed project area is located in Bernalillo County. The area is within the Facilities of the Middle Rio Grande Project. The bosque area within Albuquerque is designated as the Rio Grande Valley State Park through the Park Act of 1983 and is cooperatively managed by the City of Albuquerque OSD and the MRGCD. The project site is located in the Rio Grande Nature Center State Park which is managed by New Mexico State Parks Department. At this point in time, all of the agencies have a major interest in this project and have agreed to continue to collaborate on construction of this project. The RGNCSP has a lease from the MRGCD to use this part of the bosque and the OSD has a Joint Powers Agreement with MRGCD for joint management operation of the RGVSP. These relationships have been long-term and are planned to continue. The federal agencies of Reclamation and the Corps have also had a long-term involvement in this stretch of the river. All parties have agreed to continue collaborative work to manage, maintain and monitor this site. All applicable permits and licenses would be obtained from the appropriate agency as listed above.

Adjacent to the project area (outside of the levees), farming is still a major land use at the Candelaria Farm Preserve. The proposed project would have no effect on current uses of water for agriculture, ranching, residential, or other activities in the area. State of New Mexico designated uses and standards applied to the Rio Grande would not be affected by the proposed project.

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.

The project areas are within the Facilities of the Middle Rio Grande Project boundaries and would not affect adjacent agricultural land use and would not change current land status. Therefore, the Proposed Action would not affect these land resources.

Recreational Resources

Within the RGVSP, a paved trail along the east side of the river exists along the levee from Alameda Blvd. south to south of Rio Bravo Blvd. (approximately 18 miles in length). Equipment would access the site from Campbell Rd. and cross over the paved trail to access the bosque. The paved trail would be swept to keep it clean. Trails within the bosque exist on both sides of the river in the RGVSP and are a natural surface (in most cases dirt though in some cases a formalized crusher fine trail has been constructed). Various levels of recreation take place on the paved trail including jogging, bicycling, roller blading and walking. Any damage incurred to the paved trail due to construction activities would be repaired. A temporary road off of the levee/paved trail would need to be constructed for access. On the natural surface trails, jogging and walking take place but mountain biking and horseback riding are also favorite uses. No motorized vehicles except for maintenance and emergency vehicles are allowed per City of Albuquerque and Bernalillo County ordinances.

At the Rio Grande Nature Center State Park (RGNCSP), there are various maintained trails (see Figure 8). The Bosque Loop Trail is a defined trail with a gravel surface. The Riverwalk Trail is a natural surface trail (dirt). The Aldo Leopold Trail is a paved trail. The channel that is proposed to be reworked in the Proposed Action runs adjacent to the Aldo Leopold Trail on the west side of the trail (see Figure 3) and goes under the Bosque Loop Trail where a culvert already exists. The culvert under the Bosque Loop Trail would need to be replaced with a higher capacity crossing. Some revetment against the Aldo Leopold Trail where the channel runs adjacent to it may also need to be put in place. The channel would also cut across the Bosque Loop Trail where it would connect to the river. For both of these crossings, two corrugated metal pipe culverts would be installed. The culverts would each be approximately 43" high X 68" wide. Additionally, if the optional embayment is constructed to the north and east of the channel, a crossing of the Aldo Leopold Trail would need to be included. Therefore, the channel would cross the trail in two places (though one crossing already exists at the Bosque Loop Trail) and come up adjacent to the Aldo Leopold Trail where some revetment may need to be put in to keep the trail in place. The two new crossings would also have railings on either side for pedestrians to safely walk across them.

The RGNCSP has signage and interpretation along the existing trails. This interpretation would remain and can be further enhanced to explain the project. Within the vicinity of the trail, signs would also be posted describing the project and that there may be endangered species present (both RGSM and/or flycatcher). These signs would explain the benefit of the project but also advise that there is a penalty for harassing endangered species.

RGNC staff and interpreters would coordinate alternate routes for interpretive walks while construction is underway. The Corps would work with each local land manager (as designated above) to rehabilitate existing trails if they are disturbed during construction. RGNCSP and Corps staff would monitor trail damage and restoration.

Within the RGNCSP, construction activities would temporarily impede recreational activities in the project area being worked in. All work zones would be designated and signed with cautionary information. The paved trail would be kept clean for use by Park visitors as much as

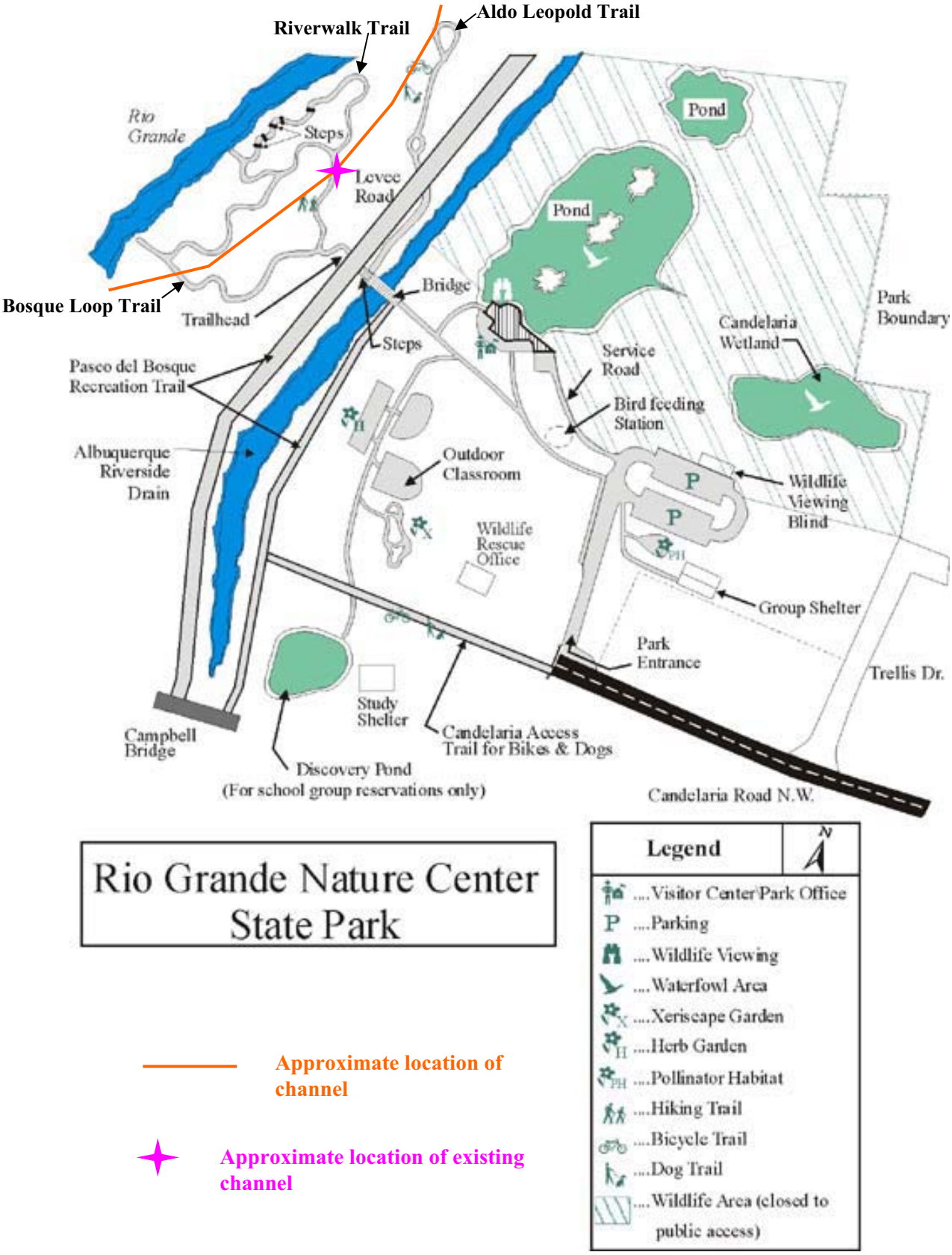

Figure 8. Recreational facilities at the Rio Grande Nature Center State Park

possible and all machinery and vehicles would yield to Park users. Inside the bosque, where natural surface trails are present they would be kept intact by revegetating and seeding outside of those areas. The project would be completed in phases as described in Section 2.0. Therefore, some level of access would always be made available though some sections of a trail would have to be closed off during construction.

All precautions noted above would be taken to notify recreational users of work within the area and to maintain existing facilities. The Corps would work with each local land manager (as designated above) to rehabilitate existing trails if they are disturbed during construction.

The Proposed Action would have short-term effects on recreational use but these effects would be temporary. The Proposed Action would improve existing and potential future recreational use by opening areas up and also provide a new culvert crossing for the Bosque Loop Trail.

3.15 Indian Trust Assets

Indian Trust Assets (ITAs) are legal interest in assets held in trust by the United States Government for Indian tribes or for Indian individuals. Some examples of ITAs are lands, minerals, water rights, hunting and fishing rights, titles and money. ITAs cannot be sold leased, or alienated without the express approval of the United States government. 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. Secretarial Order 3175 and Reclamation ITA policy require that Reclamation assess the impacts of its projects on ITAs. An inventory of all ITAs within the proposed project area is required. If any ITAs are impacted, the mitigation or compensation for adverse impacts to these assets must be accomplished. As part of the public review of this draft Environmental Assessment in accordance with Secretarial Order 3175 and Reclamation ITA policy, all pueblos and tribes with potential interests in this area are being notified for their review and input. No comments have been received from scoping inquires with American Indian Tribes regarding this project or from numerous similar habitat restoration projects in the Albuquerque area. No ITAs were identified.

3.16 Hazardous, toxic and radioactive waste (HTRW)

The USACE Geotechnical and Hazardous, Toxic, and Radioactive Waste Branch performed a site reconnaissance of the project area on December 5, 2005. No wastes or materials of concern were observed at the proposed project site. Nothing was observed that would preclude the Proposed Action.

The Material Safety Data Sheets for the herbicides presented in the Proposed Action, (Section 3.19 and Appendix B of this report), have been reviewed and no lasting toxicological or detrimental ecological effects from the use of these products are known. These herbicides would be applied according to the manufacturer's instructions. When used in the manner intended and per manufacturers instructions the herbicide application area is not considered a

contaminated or waste area. Excess herbicide would be disposed in accordance with all Federal, State, and Local regulations.

3.17 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 (EO12898), *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations,* which was issued by President Clinton on February 11, 1994. 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."

Environmental justice considerations addressed in this assessment involve both population demographics, including ethnic, racial, or national origin characteristics, and persons in poverty, including children under age 18. In order to determine whether environmental impacts affect minority or low-income populations, it is necessary to establish a basis of comparison, referred to as the "region of comparison." This area consists of the geopolitical units that include the proposed project. Most environmental effects from the Proposed Action, in this instance, would be expected to occur in Bernalillo County, New Mexico.

Executive Order 12898 (Environmental Justice) requires "to the greatest extent practicable and permitted by law, and consistent with the principles set forth in the report of the National Performance Review, each Federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies and activities on minority populations and low-income populations…" The project would not disrupt or displace any residential or commercial structures. The work has been reviewed for compliance with this order and it has been determined that the Proposed Action would not adversely affect the health or environment of minority or low-income populations.

3.18 Noxious Weeds

The Federal Noxious Weed Act of 1974 (Public law 93-269; 7 U.S.C. 2801) provides for the control and eradication of noxious weeds and their regulation in interstate and foreign commerce. Executive Order 13112 directs Federal agencies to prevent the introduction of invasive (exotic) species and provides for their control and to minimize the economic, ecological, and human health impacts that invasive species cause.

In addition, the State of New Mexico, under administration of the United States Department of Agriculture, designates and lists certain weed species as being noxious (Nellessen 2000). "Noxious" in this context means plants not native to New Mexico that may have a negative impact on the economy or environment, and are targeted for management or control. Class C listed weeds are common, widespread species that are fairly well established within the state. Management and suppression of Class C weeds is at the discretion of the lead agency. Class B weeds are considered common within certain regions of the state but are not widespread. Control objectives for Class B weeds are to prevent new infestations, and in areas where they are already abundant, to contain the infestation and prevent their further spread. Class A weeds have limited distributions within the state. Preventing new infestations and eliminating existing infestations is the priority for Class A weeds. In order to prevent this, all equipment would be cleaned with a high-pressure water jet before leaving an area and entering a new area.

These guidelines apply to both the removal of saltcedar, which is considered a Class C weed as well as the potential for Class A, B, or C weeds that might establish after thinning of non-native species occurs. It is anticipated that due to efforts to treat resprouts of non-natives and replanting of native species, that this should belay new infestation of weedy species. This would, however, be monitored. Regrowth of all vegetation would be monitored throughout the duration of the project for infestation by noxious weeds and non-native species such as saltcedar and Russian olive. Also, in addition to the BMPs discussed above, the contractor would be required to wash all equipment being used before entering the project area. Therefore, it has been determined by the Corps that the Proposed Action is within compliance of the Federal Noxious Weed Act and there would be a beneficial effect from removing salt cedar and Russian olive from the proposed project.

3.19 Herbicide Application and the Environmental Fate of Chemicals

Herbicide application would be used after manual and/or mechanical treatment of non-native vegetation. Non-native vegetation within the channel would be treated prior to opening the north end of the channel to the river. The preferred herbicides to use are Garlon®4 (for treatment of resprouts) and Garlon® 3A (for initial treatment). These are both selective herbicides which means that they can kill certain groups of plants and have little or no effect on other plants. These herbicides should not be used near surface water or saturated soils. Within the channel, where water would enter at some point in time after construction, only aquatic approved herbicide would be used (Renovate 3® (triclopyr) is the preferred herbicide). Herbicides would only be used between October and April in order to protect amphibian species from potential exposure and to allow work to take place outside of the avian migratory nesting season.

Garlon® is the commercial version of triclopyr and generally contains one or more inert ingredients. The contents of two triclopyr formulations are: Garlon® 3A: triclopyr (44.4%), and inert ingredients (55.6%) including water, emulsifiers, surfactants, and ethanol (1%); and Garlon ®4: triclopyr (61.6%), and inert ingredients (38.4%) including kerosene. Triclopyr acts by disturbing plant growth. It is absorbed by green bark, leaves and roots and moves throughout the plant. Triclopyr accumulates in the meristem (growth region) of the plant. Surfactants used

would include non-ionic surfactants that have been approved for use in aquatic habitats (such as Induce).

Basal bark and cut surface treatments can be done at any time of year. Triclopyr should be applied only when there is little or no hazard of spray drift. It should be applied immediately to the stump of the cut tree (within two hours). Triclopyr is active in the soil, and is absorbed by plant roots. Microorganisms degrade triclopyr rapidly; the average half-life in soil is 46 days. Triclopyr degrades more rapidly under warm, moist conditions. The potential for leaching depends on the soil type, acidity and rainfall conditions. This herbicide is selective to woody plants and has little to no effect on grasses (Parker et al., 2005). It has been certified and labeled to be used near water by the Environmental Protection Agency (EPA, 1998). After use, the public must remain away form the area for 48 hours. Signage would be placed at areas after they have been treated.

Triclopyr is slightly toxic to practically non-toxic to soil microorganisms. Practically nontoxic is defined as a probable lethal oral dose for humans at less than 15 g/kg (Klaassen et al., 1986). Triclopyr is toxic to many plants if applied directly. Even very small amounts of spray may injure some plants. That is why it is to be applied directly to the stump of the tree being treated. The ester form of triclopyr, found in Garlon® 4, is more toxic, but under normal conditions, it rapidly breaks down in water to a less toxic form. Triclopyr is slightly toxic to practically non-toxic to invertebrates. Slightly toxic is defined as a probable lethal oral dose for humans at 5-15 g/kg (Klaassen et al., 1986). Triclopyr and its formulations have not been tested for chronic effects in aquatic animals. Triclopyr is slightly toxic to mammals. In mammals, most triclopyr is excreted, unchanged, in the urine. Triclopyr and its formulations have very low toxicity to birds. Triclopyr is non-toxic to bees. Triclopyr and its formulations have not been tested for chronic effects in terrestrial animals. The exposure levels a person could receive from these sources, as a result of routine operations, are below levels shown to cause harmful effects in laboratory studies. Inert ingredients found in triclopyr products may include water, petroleum solvents, kerosene, surfactants, emulsifiers, and methanol. Methanol, kerosene and petroleum solvents may be a toxic hazard if the pesticide is swallowed. Non-ionic surfactants and emulsifiers are generally low in toxicity. The formulated products are generally less toxic than triclopyr. Garlon® 3A is a skin irritant and a severe eye irritant.

The U.S. Forest Service has evaluated health effects data in the development of both pesticide background statement documents and environmental impact statements for pesticide use on forest lands. These health effects evaluations have taken into consideration the potential for both worker and public exposure from Forest Service operations. This information has been used in assessing health risks and consequently in formulating protective measures to reduce risk to workers and to the public.

It has been found by other agencies in the area currently using these herbicides (MRGCD, OSD and the Bosque del Apache National Wildlife Refuge) that both Garlon® 4 (mixed 25-75% with vegetable oil) or Garlon® 3A (mixed 50-50% with water) have been successful.

Garlon® 4 would be used for initial treatment and has been shown to be more successful in cut-stump treatments (Doug Parker, personal communication). Garlon® 3A would be used for treatment of resprouts once they have grown at least 3 feet in height. Garlon® 3A has been shown to be more effective on smaller stems and resprouts (Doug Parker, personal communication).

Based on the information described above, these herbicides would be used as described. All required permitting and licensure would be obtained by the contractor. Prior to application, all chemicals would be specifically approved per manufacturer's instructions. Mixing and application of these herbicides would be done so in accordance with all manufacturer's instructions and proper personal protective equipment would be worn. Storage and mixing would also be performed following manufacturer's instructions. Storage would not be allowed on site within the bosque. Follow-up inspections and monitoring post-herbicide application would be performed at all locations.

3.20 Cumulative Effects

NEPA 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." Environmental impacts associated with the bosque in Albuquerque have been evaluated relative to the Corps' Proposed Action.

Other projects in the region

Currently, the Corps, BOR, and the New Mexico Interstate Stream Commission are signatories of the Memorandum of Agreement to conduct the Upper Rio Grande Water Operations Review and prepare a Programmatic Water Operations Environmental Impact Statement. That study is being prepared by the parties in accordance with NEPA and would present alternatives for analyzing water operations at federally operated facilities in the Upper Rio Grande Basin and would evaluate the environmental, economic, and social effects of these alternatives. It is not anticipated that the proposed project would add cumulatively to the environmental effects of any of the water operations alternatives that may be considered and/or adopted by the water operations review.

The Middle Rio Grande Endangered Species Act Collaborative Program is a multi-agency organization that has funded a number of habitat restoration projects in the project area. These are listed in Section 1.3. It is anticipated there would be no cumulative negative impacts considered with these projects though there could be a net positive effect

The City of Albuquerque is constructing a diversion dam in the Rio Grande south of Alameda to divert San Juan/Chama water into the City's water supply system. The City of Albuquerque has begun construction of water intakes and a crossing in the Rio Grande at Campbell Road. These

words are in the river and are proposed not to effect river flows except at minimal levels when the Dam is raised which would only be at low flows (500 cfs or less) (USBR, 2004).

The City of Albuquerque Open Space Division and others have been thinning areas in the bosque as discussed in Section 1.3 above. Between Montano Bridge and I-40 on the east side of the river, approximately 75% of the riparian habitat has been thinned of dead wood and non-native vegetation.

The Corps is involved in two 1135 Ecosystem Restoration projects within the RGVSP between I-40 and Bridge Blvd. The Albuquerque Biological Park and Wetland Restoration Project south of Central Avenue was completed in October 2005 and is also discussed in Section 1.4. The Ecosystem Restoration at Route 66 project, which is the bosque in the area between I-40 and Bridge Blvd. is currently in planning stages. The Proposed Action would not conflict with the plans for these projects and enhancements from all projects would benefit one another.

Proposed Action Effects

Over the past two years, approximately 2500 bosque acres have burnt or been physically removed or thinned for research, ecosystem restoration, or fire prevention purposes in the Albuquerque Reach of the Rio Grande. Under the Corps' proposed plan, non-native shrubs would be removed from an additional 15 acres. As described in Sections 2.1.1 and 3.8, native shrubs and trees would be replanted along the banks of the channel. Following the maturation of planted vegetation, the Corps estimates that approximately the same acreage of native-dominated shrub habitat would result. While revegetation eventually avoids a significant adverse effect from the Proposed Action, there would remain a short-term adverse effect on wildlife populations until planted shrub communities mature. It is estimated that a minimum of 10 years would be required for planted shrubs to achieve stature and densities resembling existing conditions.

Additionally, the goal of the project is to create habitat for the RGSM which would include a wetted channel. This would create a diversity of habitat that does not currently exist at the site and may encourage wetland plant species to inhabit the area. This habitat would match up nicely with the river bar habitat created by Reclamation below I-40.

In summary, it is proposed that this project would have a positive impact on the environment resulting from the potential cumulative effects of other Federal and non-Federal agencies.

4.0 Conclusion

4.1 Summary of Effects

Table 5. Summary of Effects

Existing Environment	Foreseeable Effects
Physiography, Geology, Soils	Short-term adverse effect on soils
Hydrology and Hydraulics	No effect on river H&H
Water Quality	Short-term adverse effect
Air Quality and Noise	Short-term adverse effects
Aesthetics	Short-term negative effects with long-term positive effects
Vegetation Communities	Short-term negative effects with long-term positive effects
Floodplains and wetlands	Long-term positive effect Wetlands No adverse effect
Fish and Wildlife	Short-term negative effects with long-term positive effects
Endangered and Protected Species	May affect but not likely to adversely effect: Southwestern Willow Flycatcher, Bald Eagle, Yellow-Billed Cuckoo, Rio Grande silvery minnow, Rio Grande silvery minnow critical habitat; Potential positive benefits to RGSM
Cultural Resources	No adverse effect to Historic Properties
Socioeconomic Considerations	No adverse effect
Land Use and Recreational Resources	Short-term negative effects with long-term positive effects
Indian Trust Assets	No adverse effect
Environmental Justice	No adverse effect

The summary of effects above includes some short-term adverse effects during construction and long-term benefits. These benefits are described in the next section as well as throughout the text.

4.2 Project Benefits

Benefits for RGSM

As stated above, the Proposed Action would provide potential habitat for the RGSM. This project along with others under the ESA Collaborative Program (mentioned in Section 1.3 above) are working to provide potential habitat for this endangered species. This channel would provide a ephemeral side channel habitat for the RGSM and potential refuge during spawning, egg, and/or juvenile stages. This project would be closely monitored to determine the benefits for the RGSM which are proposed to occur as an outcome of the Proposed Action.

Benefits of Fuel Reduction, Removing Non-native Species, and Revegetation with Native Species

Long-term benefits proposed by the project include reduction in fire potential, potential water savings, potential decreased soil salinity, and increased wildlife habitat value over the long-term.

Fuel loads in the Middle Rio Grande have built up over the last 50 years or more due to the lack of flooding and disconnect between the river and bosque. Flood flows used to carry away debris and allow for quicker processing of vegetative material. Since this does not readily occur, much of the dead material has built up over that period of time and created an extreme fire danger. A reduction in these fuel loads, especially in the ladder fuels (which create a ladder between the floor of the bosque and the cottonwood canopy), can greatly reduce the chance of a catastrophic fire were one to occur. This older material is also extremely dry and flammable. Removal and processing of this material is crucial to preventing future fires.

Numerous studies have documented that saltcedar uses more water than native riparian species. In the Middle Rio Grande, dense stands of saltcedar have been shown to have higher evapotranspiration (ET) rates than a mature cottonwood stand with a closed canopy (a more typical native riparian habitat) (Dahm et al., 2002). A number of projects and research efforts throughout the Southwest state that saltcedar use more water than native Southwestern vegetation; therefore a potential water gain may be realized as a result of saltcedar removal.

It is estimated that the average annual water loss due to ET in the Middle Rio Grande riparian corridor is 20-50% of that reach's total water depletion (Dahm et al. 2002). Bosque ET appears to be higher in dense stands of saltcedar, and in mature stands of cottonwood containing extensive understories of saltcedar and Russian olive, than it is in less dense saltcedar stands and mature cottonwood stands with few understory trees (Dahm et al. 2002). Thus reduction of tree densities, especially those of invasive species occurring either in monospecific stands or in the subcanopies of mature cottonwood stands, is basic to an increased potential water quantity. This 'balance' for revegetation with native species is greatly needed during this time of natural drought conditions.

Saltcedar are fire-adapted species and have long taproots that allow them to intercept deep water tables and interfere with natural aquatic systems. Saltcedar disrupts the structure and stability of native plant communities and degrades native wildlife habitat by out-competing and replacing native plant species, monopolizing limited sources of moisture, and increasing the frequency, intensity and effect of fires and floods. Although it provides some shelter, the foliage and flowers of saltcedar provide little food value for native wildlife species that depend on nutrient-rich native plant resources (Muzika and Swearingen, 1999). Birds prefer to nest in native vegetation that contain their preferred physical structure and food source. Overall, the possible short term ill effects resulting from saltcedar control and the Proposed Action should be strongly mitigated through the replacement of saltcedar with a younger, more diverse native riparian community which would add to biodiversity at the landscape level.

Saltcedar control in mixed saltcedar/native bosque would reduce stress to native species, which are competing with exotic vegetation, and would reduce wildfire hazards (Taylor, 1999). Substrate for native species regeneration within these sites would also be provided as a result of saltcedar control and decreased salinity of the soil. This alternative would maximize the production of indigenous species such as salt grass, willow, and native wet meadow species, to

potentially support greater numbers of native bird species and other wildlife. The Proposed Action would also greatly decrease the fire hazard by thinning non-natives as well as dead material.

5.0 Preparation, Consultation, and Coordination

5.1 Preparers

Ondrea Hummel - Biologist
Cheryl Fogle – Archaeologist
Steve Boberg - Hydrologist
Cecilia Horner – Environmental Engineer
Debbie Smith - Engineer
Julie Hall - Ecologist (QC)
Gregory Everhart - Archaeologist (QC)
William DeRagon - Biologist (QC)

5.2 Consultation and Coordination

Agencies and other entities contacted formally or informally in preparation of this EA include:

U.S. Bureau of Reclamation
U.S. Fish and Wildlife Service
City of Albuquerque
Middle Rio Grande Conservancy District
New Mexico State Parks – Rio Grande Nature Center State Park
Hopi Tribe
Isleta Pueblo
Laguna Pueblo
Navajo Nation
Sandia Pueblo
White Mountain Apache Tribe
Ysleta del Sur Pueblo

5.3 Distribution List

U.S. Bureau of Reclamation
U.S. Fish and Wildlife Service
City of Albuquerque, Open Space Division
Middle Rio Grande Conservancy District
New Mexico State Parks – Rio Grande Nature Center State Park
Alvarado Gardens Neighborhood Association
Rio Grande Compound Neighborhood Association
Thomas Village Neighborhood Association
Thomas Village Patio Neighborhood Association
Los Griegos Neighborhood Association
Los Duranes Neighborhood Association
Rio Grande Blvd. Neighborhood Association
Vista Grande Neighborhood Association
Grande Heights Neighborhood Association
West Bluff Neighborhood Association
Friends of the Rio Grande Nature Center

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Personal Communications

Brooks, Jim. USFWS Fisheries Resources Office.

DeRagon, William. USACE Environmental Resources Section

Fetz, Trevor, Hawks Aloft Inc.

Means, Michael. US Forest Service.

Krueper, Dave. USFWS Regional Office, Migratory Bird Program.

Parker, Doug. USFS Regional Office.

Tydings, Rebecca. Rio Grande Nature Center State Park.