CITY OF ALBUQUERQUE
HABITAT RESTORATION PROJECT
FINAL ENVIRONMENTAL ASSESSMENT

Prepared for

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1.0 PURPOSE AND NEED FOR ACTION

1.1 INTRODUCTION

The City of Albuquerque Open Space Division (City) seeks to implement part of the Reasonable and Prudent Alternative (RPA) in the March 2003 U.S. Fish and Wildlife Service Biological Opinion (BiOp) for Reclamation's Water and River Maintenance Operations, the U.S. Army Corps of Engineers' (USACE) Flood Control Operations, and Related Non-Federal Actions on the Middle Rio Grande, New Mexico, 2003 (U.S. Fish and Wildlife Service [USFWS] 2003) and to address priority habitat restoration goals of the Middle Rio Grande Endangered Species Act Collaborative Program (Collaborative Program). The City proposes to implement river and riparian restoration techniques for the benefit of the federally listed Rio Grande silvery minnow (silvery minnow) and southwestern willow flycatcher (flycatcher), specifically activities to improve habitat within the Albuquerque Reach of the Rio Grande. Restoring riverine and riparian habitats that support these species is considered an essential element for the recovery and ongoing success of these species (Federal Register [FR] 1993) and the Middle Rio Grande Bosque ecosystem.

Changes in riverine ecosystem processes and habitats have been linked to declines in silvery minnow, the last remaining member of a guild of small, pelagic spawning minnows native to the Rio Grande (Sublette et al. 1990; Bestgen and Platania 1991). Altered riparian ecosystem functions due to habitat loss and encroachment of non-native vegetation have contributed to the decline of southwestern willow flycatcher (Sogge et al. 1997). Restoring specific riverine and riparian habitats that support silvery minnow and flycatcher in river reaches where flow is more assured is a priority for the Collaborative Program (MRG ESA Collaborative Program Request for Proposals, October 2004).

The City of Albuquerque Habitat Bosque Restoration Project (Project) is led by the City of Albuquerque (City) Open Space Division. The Project will apply several habitat restoration techniques within the Rio Bravo subreach of the Middle Rio Grande to create and improve habitat for silvery minnow and flycatcher. The Project is primarily funded by the Bureau of Reclamation (Reclamation) through the Collaborative Program, with partial funding by the City. This Environmental Assessment (EA) has been conducted to evaluate the impacts of the implementation of these habitat restoration techniques and projects on other resources and their relationship to other projects and undertakings, in compliance with the National Environmental Policy Act (NEPA) (42 U.S.C. 4331–4335).

1.2 PROPOSED ACTION

The Proposed Action involves the design and implementation of various habitat restoration/rehabilitation techniques to restore aquatic and riparian habitat for the benefit of silvery minnow and flycatcher within the Albuquerque Reach of the Middle Rio Grande (MRG) (Figure 1.1). Specific rehabilitation and restoration activities will occur within the river floodplain at three locations within the Rio Bravo to South Diversion Channel subreach

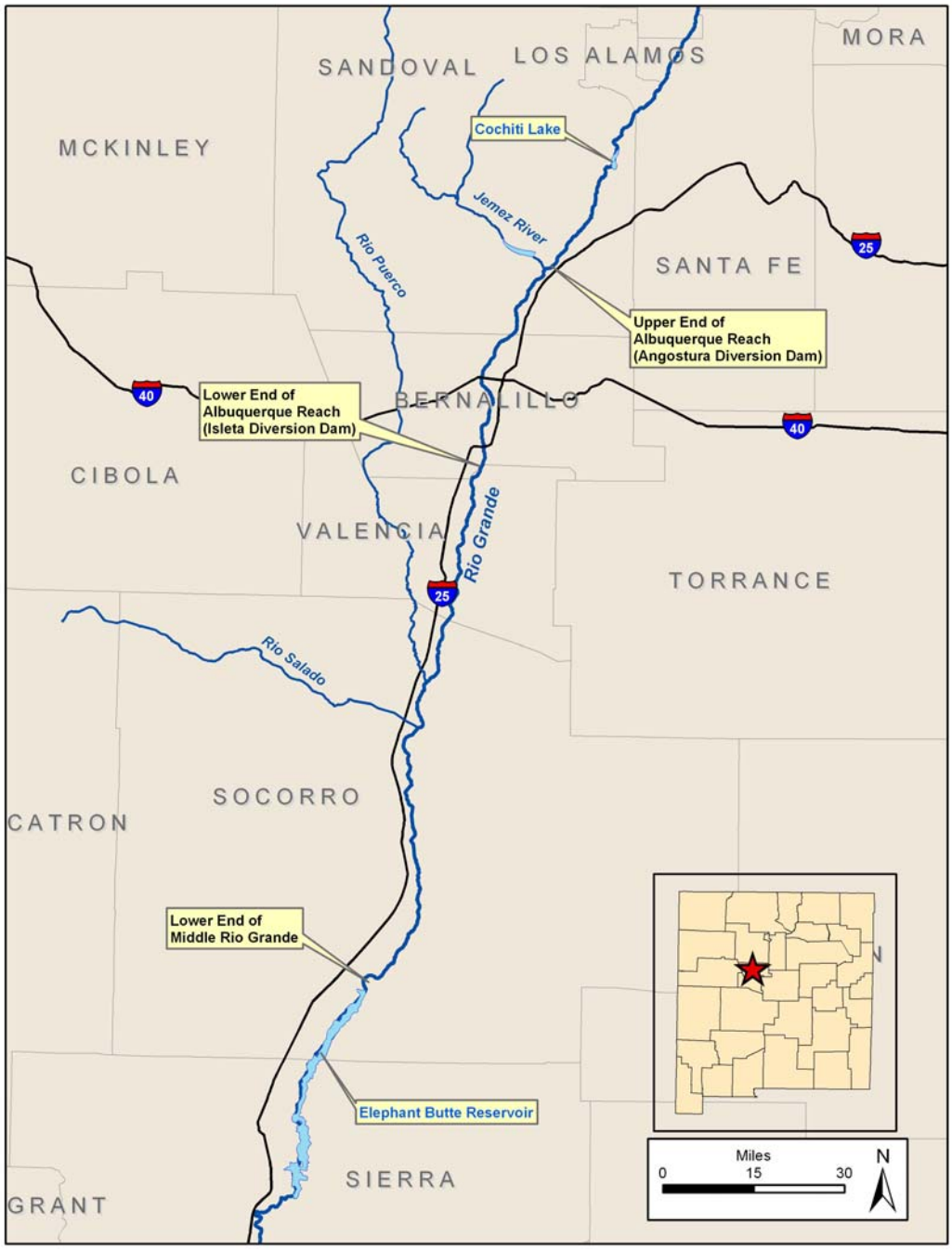

Figure 1.1. Project area location map.

(Figure 1.2). Site-specific projects will be implemented for the benefit of silvery minnow, flycatcher, and the riverine ecosystem as a whole.

The Rio Bravo North site covers 31.5 acres on the east side of the channel, approximately 0.4 mile north of the Rio Bravo Bridge (Figure 1.3). During the field survey performed for this project, the selected site was characterized by mixed native and non-native riparian vegetation. However, the majority of the area was cleared of non-native vegetation in March 2006 as part of the City-funded portion of the Project and is now an open cottonwood bosque with scattered New Mexico olive and black willow. The bankline vegetation within the project area was left undisturbed during clearing activities and remains characterized by a cottonwood canopy with an understory dominated by Russian olive and tamarisk. An ephemeral side channel approximately 1,012 feet long will be excavated and designed for inundation at 3,000–4,000 cubic feet per second (cfs) in the main stem of the Rio Grande. The upstream end of the channel will incorporate a bankline scour and placement of large woody debris (LWD) that will act to slow the velocity of water entering the feature while providing low-velocity habitat for silvery minnow. Within the bosque, two depressions of approximately 1 acre each will be excavated to function as surface water catchments that will encourage the recruitment of native vegetation for the benefit of southwestern willow flycatcher. In addition, 120 jetty jacks will be removed from this location to improve access in the event of wildfire.

The Rio Bravo South site, on the west side of the Rio Grande approximately 0.6 mile south of the Rio Bravo Bridge, consists of a 20.3-acre point bar with intermittent stands of native willow and non-native vegetation (Figure 1.4). The bar will be modified to create low-, mid-, and high-flow habitat to support multiple lifestages of silvery minnow. Techniques will include constructing ephemeral channels and bankline scours. Four 0.25-acre scours will be excavated on the east side of the bar to create low-velocity habitat for silvery minnow. Three channels will be excavated the length of the bar. The easternmost channel will be designed to function at 500 cfs in the mainstem, the center channel at 1,500 cfs, and the westernmost channel at 2,500 cfs. The combined area of the four scours will total 1.0 acre, and the combined length of the side channels will be 4,383 linear feet. The variety of inundation levels will provide habitat for silvery minnow at multiple discharge levels in the mainstem of the Rio Grande. The development of ephemeral and low-flow channels and scours at this location will also create seasonal habitat that will benefit breeding and migrating flycatcher. Non-native vegetation will be removed from the bar, and all native vegetation outside of the project footprint will be left intact. LWD will be used to armor select constructed features to minimize erosion and encourage the development of additional mesohabitat for the benefit of silvery minnow.

The third locality is a 6.5-acre island immediately adjacent to the outfall of the South Diversion Channel (SDC) (Figure 1.5). Techniques applied on the island will include constructing low- and high-flow ephemeral channels and bankline scours for the benefit of silvery minnow. Non-native vegetation will be removed from the island, and all native vegetation will be left in place. LWD may be placed near the banks of the island and near the inflow of newly constructed ephemeral channels. Two 0.25- acre scours will be excavated to act as low-velocity habitat for silvery minnow. Two channels, one 500 linear feet long designed for inundation at 500 cfs and one 752 linear feet long to be inundated at 2,500 cfs, will be excavated through the island to

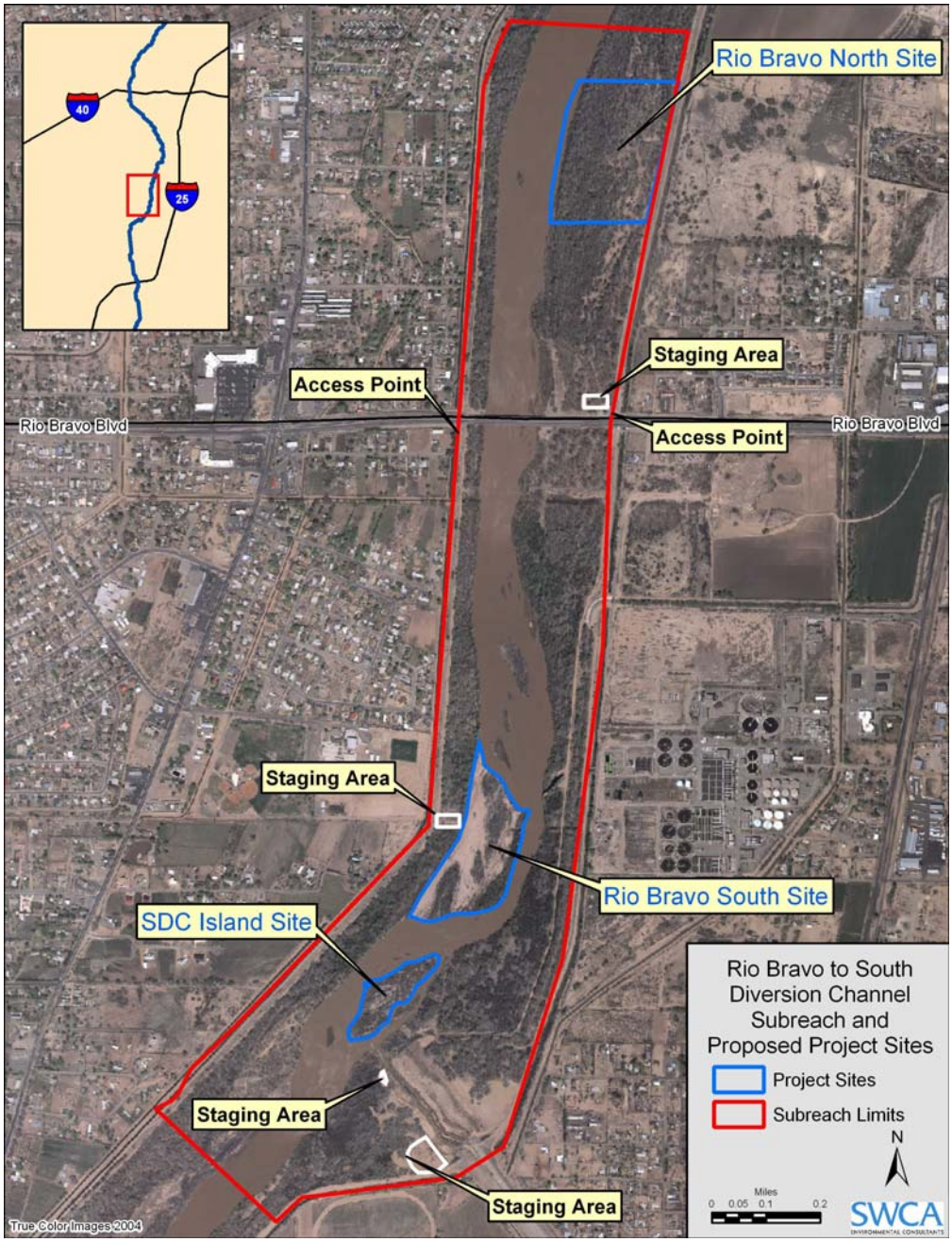

Figure 1.2. Rio Bravo Subreach and project sites.

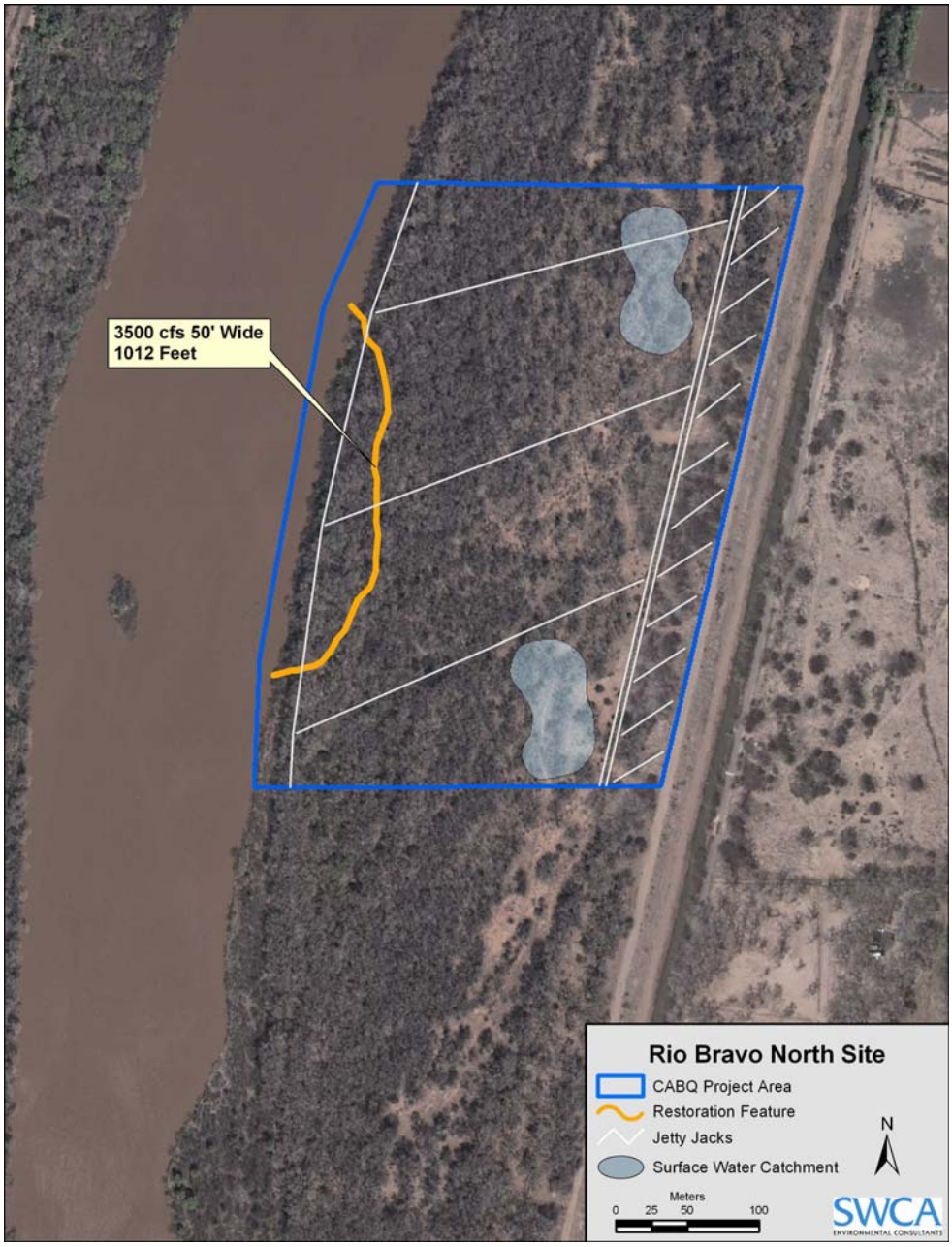

Figure 1.3. Techniques to be implemented at the Rio Bravo North Site include ephemeral channel construction, surface water catchments, jetty-jack removal, bankline scours, placement of LWD, and revegetation with native plant species.

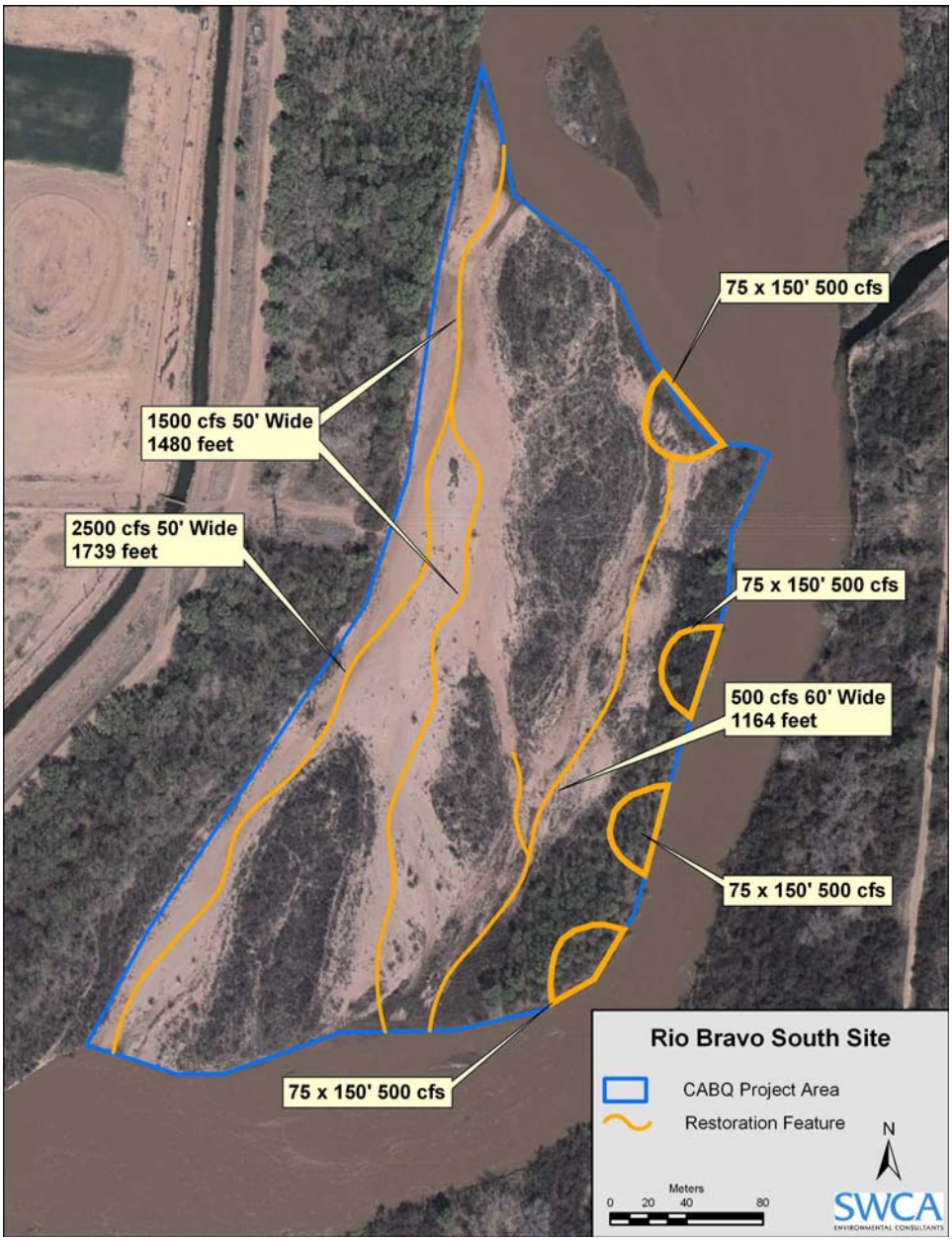

Figure 1.4. Techniques to be implemented at the Rio Bravo South Site include ephemeral channel construction, placement of LWD, bankline scours, and revegetation with native plant species.

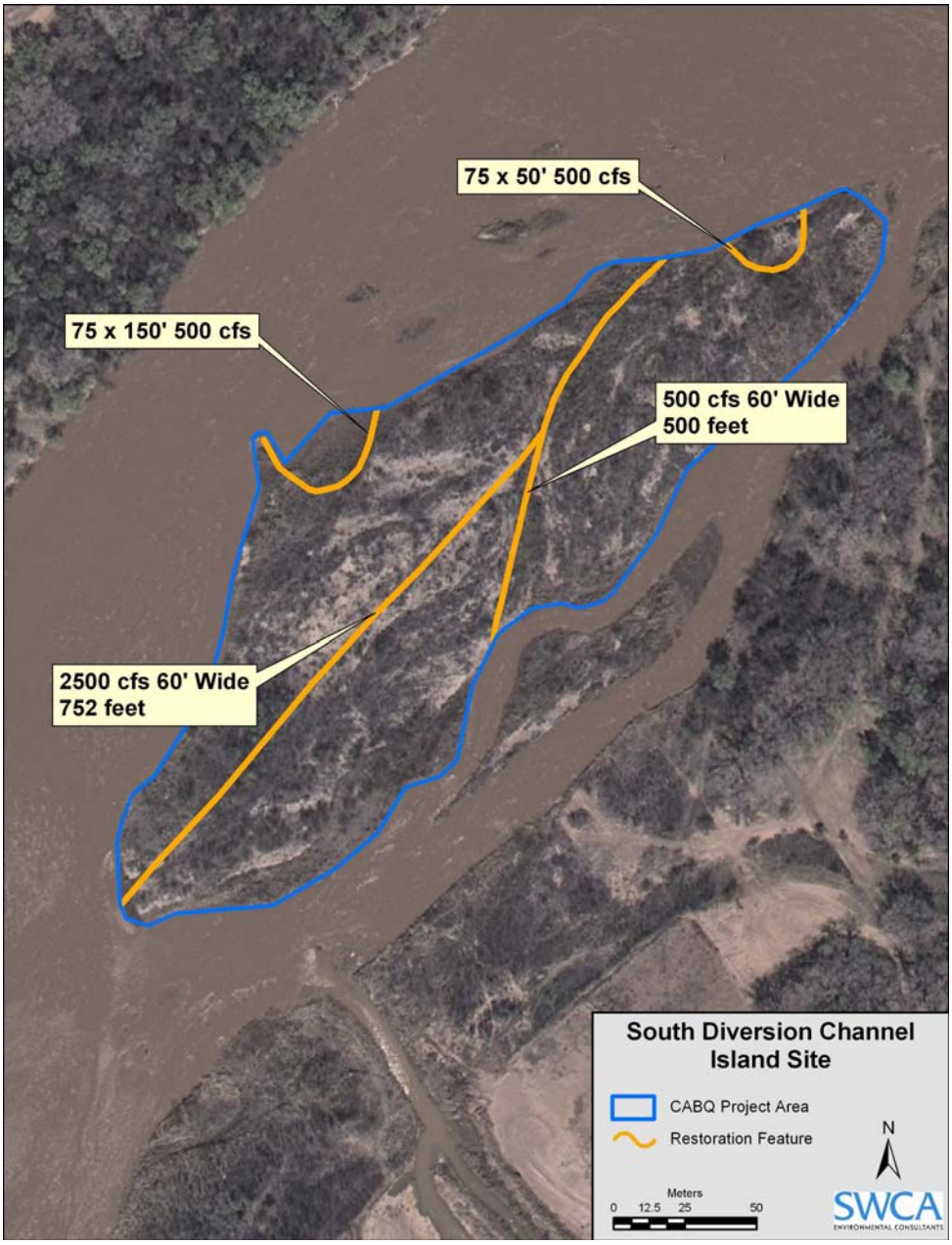

Figure 1.5. Techniques to be implemented at the SDC Island Site include ephemeral channel construction, placement of LWD, and bankline scours.

increase low-velocity habitat for silvery minnow and increase native vegetation recruitment for the benefit of flycatcher.

Modifications to the three project sites will take place outside of migratory-bird nesting season and during a period of low flow between spring 2007 and spring 2008. A total of 58.3 acres (23.6 ha) of habitat will be created as a result of the proposed Project, including 6,647 linear feet of low-flow and ephemeral channels, 1.5 acres of low-velocity scallop habitat, and 2.0 acres of surface-water catchments.

1.3 PURPOSE AND NEED

The purpose of the proposed action is to develop and construct rearing, young-of-year, and over-wintering habitat for Rio Grande silvery minnow and to thin non-native vegetation and create habitat for the benefit of southwestern willow flycatcher. The creation of silvery minnow and flycatcher habitat will be completed using various habitat restoration techniques at three locations within the Rio Bravo subreach of the Middle Rio Grande. Non-native vegetation thinning will be completed on a 20.3-acre point bar and a 6.5-acre island. Vegetation will be cleared using techniques described in the Collaborative Program's Habitat Restoration Plan for the Middle Rio Grande (Tetra Tech 2004). Vegetation clearing will benefit flycatcher by reducing competition between native and non-native vegetation, which will encourage the recruitment of dense native vegetation. Techniques used to create silvery minnow habitat will also benefit flycatcher by establishing open-water habitat adjacent to stands of native willow.

The Proposed Action is needed to satisfy federal requirements under the 2003 MRG BiOp (USFWS 2003). The BiOp requires the funding and collaborative execution of habitat restoration projects on the Middle Rio Grande that will improve survival of flycatcher and all life stages of silvery minnow, as specified in RPA element S (USFWS 2003).

The RPA directs the action agencies and the parties to the consultation 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 regeneration stands of willows and cottonwood to benefit the silvery minnow and the flycatcher, or their habitats (USFWS 2003:95–96). It further directs the agencies to conduct a total of 1,600 acres of habitat restoration for silvery minnow and flycatcher, with areas north of the San Acacia diversion dam being of the highest priority in the short term.

1.4 ISSUES

ECOLOGICAL VALUES

The Rio Grande floodplain, including the riparian corridor or Bosque and the river channel, is highly valued by the residents of Albuquerque and New Mexico for its natural beauty, the recreational value of the natural trails, the importance of the area as a refuge for birds and other wildlife, and the presence of rare and protected species. The proposed project area is managed cooperatively by the City of Albuquerque Open Space Division and the Middle Rio Grande

Conservancy District (MRGCD). The proposed project area is part of the 4,300-acre Rio Grande Valley State Park, which extends south from Sandia Pueblo in the north through Albuquerque to Isleta Pueblo. Conservation of the Bosque's aesthetic, recreational, and ecological value is a high priority for the City and for surrounding communities. As a result, actions within the Rio Grande and its floodplain can be controversial.

ECONOMIC COMMITMENTS FOR ENDANGERED SPECIES RECOVERY

The Project will be partially funded by the Collaborative Program, a multi-agency body of signatories working to meet the terms of a comprehensive Biological Opinion covering the endangered silvery minnow and flycatcher in the Middle Rio Grande (USFWS 2003). Additional funding will be provided by the City as part of the local match to the Collaborative Program. Since the inception of the Collaborative Program, the federal government, through Reclamation, has been the source of funding for numerous projects. The 2003 MRG BiOp requires the funding and collaborative execution of habitat restoration projects to improve survival of all life stages of the flycatcher and silvery minnow and to aid in their recovery. The execution of the BiOp involves commitments of substantial economic resources by the signatories of the MRG Collaborative Program Memorandum of Agreement (MOA). NEPA disclosure and public comment on these commitments has not yet taken place. A Notice of Intent to file a Draft Environmental Impact Statement appeared in June 2003 (FR 2003a). In the absence of this NEPA document or a Record of Decision to tier from, this EA will not be able to fully evaluate economic consequences of the Project within the context of the entire economic commitment proposed for endangered species recovery. However, the funding expended to achieve habitat restoration will assist in avoiding jeopardy to the existence of silvery minnow and flycatcher and contribute to the recovery of these endangered species.

2.0 ALTERNATIVES

2.1 INTRODUCTION

The City has considered several techniques for improving aquatic and riparian habitats for silvery minnow and flycatcher within the Middle Rio Grande. The MRG is defined as the Rio Grande and its tributaries from the New Mexico–Colorado state line downstream to the inflow of Elephant Butte Reservoir, equaling the elevation at Elephant Butte Dam spillway crest (4,450 feet above mean sea level) (Figure 1.1). Riverine and riparian habitat restoration techniques planned for the proposed Project are discussed in the Habitat Restoration Plan for the Middle Rio Grande (Tetra Tech 2004) and were developed specifically for compliance with the 2003 MRG BiOp. The specific set of techniques proposed for this Project is evaluated in this EA and summarized in Table 2.1 and Table 2.2. The objectives of these techniques vary, with most serving to improve multiple processes and functions of the riverine and riparian ecosystem. All the proposed restoration techniques can be used to improve silvery minnow and flycatcher habitat (Tetra Tech 2004). Each of the techniques considered incorporates both passive and active restoration elements, an approach that works with the river instead of against it. The adoption of passive restoration techniques provides the best opportunity for long-term success and should be considered whenever possible (Tetra Tech 2004).

2.2 ALTERNATIVES CONSIDERED

Two alternatives, the No Action Alternative and one Action Alternative, are analyzed in detail in this EA.

The Action Alternative comprises seven habitat restoration techniques, including (1) creation of high-flow ephemeral channels and (2) low-flow and high-flow bank-line embayments, (3) removal and control of exotic non-native vegetation, (4) removal of lateral confinements, (5) addition of woody debris, and (6) active restoration of riparian vegetation. (Tetra Tech 2004) (Table 2.1). The seventh technique, construction of surface-water catchments, has been developed by the City to decrease depth to groundwater within the Bosque. All of these techniques will incorporate the benefits of passive restoration. During the evaluation process, the selected techniques were further developed and, in some cases, have been combined with other selected techniques. Detailed descriptions are provided in Section 2.5. The LWD technique remains as described. The high-flow ephemeral channel technique is designated herein as ephemeral channel construction and will be employed at all project sites. High-flow bank-like embayments are referred to as bank scouring, or scours, and will be constructed at all sites. Removal of lateral confinements will be achieved through removal of non-native vegetation and jetty jacks; 120 jetty jacks will be removed at the North Rio Bravo project site. Removal of non-native vegetation will be completed with mastication equipment and manually by hand crews combined with herbicide application. Non-native vegetation removal at the SDC Island site will be completed entirely by hand.

Table 2.1. Proposed Habitat Restoration Techniques

Technique	Description	Benefits of Technique
Ephemeral channel construction	Construction of ephemeral channels on islands and bars to carry flow from the main river channel during low- to high-flow events.	Seasonally dry, but creates shallow, low-velocity aquatic habitats important for silvery minnow egg and larval development during high-flow periods; aids in the establishment of native vegetation; provides open-water habitat for flycatcher.
Bank scouring	Areas cut into banks where water enters, primarily during high-flow events, including spring runoff and floods.	Intended to retain drifting silvery minnow eggs and to provide rearing habitat and enhanced food supplies for developing silvery minnow larvae; aids in the establishment of native vegetation; provides open water habitat for flycatcher.
Surface water catchment construction	Depressions developed within the active floodplain, outside the normal high-water mark.	Acts as a basin to collect surface water; intended to decrease depth to groundwater to promote the recruitment of native vegetation
Removal of lateral confinements	Reduction or elimination of woody vegetation or structural features such as jetty jacks.	Creates wider floodplain with more diverse channel and floodplain features, resulting in increased net-zero and low-velocity habitat for silvery minnow and flycatcher.
Removal and control of exotics	Removal of exotic woody vegetation, by either mechanical techniques or hand crews, with or without herbicide.	Allows for native species to thrive, decreases the chance of catastrophic wildfire, and increases wildlife habitat heterogeneity.
Large woody debris	Placement of trees, root wads, stumps, or branches in the main river channel or along its banks.	Creates slow-water habitats for all life stages of silvery minnow, provides shelter from predators and winter habitat, and provides structure for periphyton growth to improve food availability for silvery minnow; aids in the establishment of native vegetation; provides open-water habitat for flycatcher.
Active restoration of riparian vegetation	Direct seeding of native herbaceous vegetation, pole and whip planting of cottonwood and willow, planting of containerized stock.	Encourages more rapid development of vegetative structure needed for flycatcher breeding; gives native vegetation a “head start” over non-native vegetation.

Table 2.2. Techniques Eliminated from Further Study

Technique	Description	Benefits of Technique	Reason for Elimination
Arroyo connectivity	Clearing of vegetation and/or excavation of pilot channels to bring stranded arroyos to grade with the mainstem Rio Grande.	Could re-establish eddies associated with the mouths of arroyos, which may help to retain silvery minnow eggs and larvae, and increases the supply of sediment to the river.	Technique does not meet Project objectives.
Gradient-control structures	Low head weirs constructed perpendicular to the channel with aprons to simulate natural riffles.	Creates aquatic habitat diversity by producing variable flow velocities and depths.	Technique does not meet Project objectives.
Sediment management	Increased sediment supply through mobilization behind dams, arroyo reconnection, or introduction of spoils.	Supports the observation that silvery minnow is most commonly found in areas where the bed is predominantly silt and sand.	Technique does not meet Project objectives.
Fish passage	Installation of fish passage structures at impoundments to improve longitudinal connectivity of river.	Allows upstream movement of silvery minnow and reduces habitat fragmentation.	Technique does not meet Project objectives.
Main channel widening	Excavation of banks and lateral expansion of active channel.	Intended to reduce average flow velocities and increase total area of lower-velocity, shallow habitat for young-of-year and adult silvery minnow.	Technique is not feasible at Project site due to location of levees and surrounding infrastructure.
Terrace and bank lowering	Removal of vegetation and excavation of soils adjacent to the main channel to create potential for overbank flooding.	Could provide for increased retention of silvery minnow eggs and larvae and increased open water habitat for flycatcher.	Technique is not feasible at Project site due to location of levees and surrounding infrastructure.
River bar and island enhancement	Elimination of channel maintenance and provisions to encourage island and bar formation.	Could improve aquatic habitat heterogeneity by creating backwaters, eddy zones, and shear zones to increase habitat for flycatcher and all life stages of silvery minnow.	Elimination of channel maintenance is not feasible at the Project site.
Destabilization of islands and bars	Involves the physical disturbance (discing, mowing, root-plowing, raking) of islands or bars to remove vegetation and mobilize the features during high flows.	Creates more complex habitat for silvery minnow by reducing average channel depth, widening the channel, and increasing backwaters, pools, eddies, and runs of various depths and velocities.	Technique does not meet Project objectives.

2.3 OTHER ALTERNATIVES CONSIDERED BUT ELIMINATED

An alternative consisting of terrace and bank lowering and the destabilization of islands and bars was reviewed and eliminated from consideration during the evaluation process (Table 2.2). Although these techniques may have positive habitat implications, they were eliminated from this Project because of cost limitations. Alternative locations north of the proposed project sites were also considered but eliminated because of prior land commitments. Additional techniques outlined in Table 2.2 were eliminated from detailed analysis because of cost and incompatibility with the geomorphology of the selected reach.

2.4 NO ACTION ALTERNATIVE

The No Action Alternative assumes that no anthropogenic changes will occur to bars, islands, shoreline environments, and other riverine habitats available to silvery minnow and flycatcher and that no thinning will take place within the Bosque in the Albuquerque Reach at the proposed project locations. Current river operations and trends in riverine and riparian habitat quality and quantity will remain unchanged under the No Action Alternative.

2.5 PREFERRED ALTERNATIVE

DESCRIPTION

The Preferred Alternative consists of the implementation of seven restoration techniques, incorporating both active and passive methods, which will be applied at three sites within the Rio Bravo Subreach between River Mile (RM) 179.3 on the northern end and RM 177.1 on the southern end. Figure 1.2 shows detailed locations of all project sites within the subreach. A total of 58.3 acres (23.6 ha) of habitat will be created as a result of the proposed Project, including 6,647 linear feet of low-flow and ephemeral channels, 1.5 acres of low-velocity scallop habitat, and 2.0 acres of surface-water catchments.

The Rio Grande is a dynamic system, constantly changing both spatially and temporally. An integrative and passive approach will allow, to the extent possible, the development of natural river and floodplain features, including ephemeral secondary channels and lateral migration of the river across modified bars and islands. The application of each of the proposed restoration techniques will be used within the floodplain or channel to work synergistically with natural hydrological processes. The proposed modifications will create conditions under which the Rio Grande could help to shape the features within the river. The outcome will be greater mesohabitat diversity within the active channel and a variety of habitats that will benefit silvery minnow. Flycatcher will benefit from the proposed projects through the creation of open-water habitat and the removal of non-native exotic vegetation that will decrease competition with native species.

All components described below will be used to meet the overall purpose, objectives, and need of the Project. The seven proposed modification techniques that are included in the Preferred Alternative are discussed in detail below. All will incorporate the passive restoration.

HABITAT RESTORATION TECHNIQUES

Bars and islands are common features in braided river systems with significant supplies of sediment such as the Middle Rio Grande. Vegetated islands and bars contract and expand in response to flow and sediment changes within the river. The vegetated islands within the MRG have historically been transient, temporary features. They were commonly displaced or moved during high seasonal flows or removed physically by Reclamation and other entities to maintain river channel capacity during low flows. Bars are transient, unvegetated features of the river that may form into vegetated islands or become part of the riverbank over time. Under current river and climate conditions, where sustained high seasonal flows are rare, a higher percentage of the islands have become vegetated features that restrict channel width and river migration throughout the Albuquerque Reach. The following restoration techniques will be implemented to encourage an environment that simulates historic natural conditions. All seven of the techniques described below will incorporate passive restoration, the process of encouraging the hydrology of the river to work naturally with the environment to create the desired restoration effects (Tetra Tech 2004). Passive restoration is typically used in combination with other restoration techniques that are implemented to encourage a specific goal.

Technique 1: Ephemeral Channels Construction

Ephemeral channels are low-velocity, flow-through channels that are often connected to the main river channel across bars and islands. Backwater habitats, ponds, and wetlands are considered variations of the ephemeral channel technique. These channels are often dry but carry high-discharge flow from the main channel, typically during spring snowmelt and summer storm events. The channels carry water at lower velocities than the main channel and may include mesohabitats such as pools and backwaters with little or no flow. These ephemeral channels create aquatic habitat that will be beneficial to silvery minnow and flycatcher. Ephemeral channels are not intended to provide for overbank flooding.

Construction of an ephemeral channel requires removal of existing vegetation and the disturbance of some sediment or soil. The channels will be cut through bars and islands to a depth that will allow water to flow at a variety of river flows ranging from 500 to 5,000 cfs (Figure 1.3, Figure 1.4, Figure 1.5). The design of ephemeral channels will consider the river flow at which water enters the channel, water retention times, and velocity relationships. The ephemeral channels will be able to accommodate flows to encourage silvery minnow recruitment each year using integrative passive techniques. Flycatcher will benefit from the development of ephemeral channels through the addition of open-water habitat. The open water created through implementation of this technique will also encourage recruitment of native vegetation such as willows and cottonwood, which also benefits flycatcher.

Ephemeral channels could provide sufficient periods of inundation for all life stages of silvery minnow. Channels designed for inundation during high-flow events will dry during lower flows and will not provide habitat for adult silvery minnow, but side channels designed for inundation during low flows may do so. While channels of this kind are proposed primarily for the benefit of silvery minnow, they promote riparian functionality and hydrologic interconnectedness, which also benefit flycatcher and the riparian ecosystem as a whole.

Technique 2: Large Woody Debris

The LWD technique involves the placement of root wads, trees, and branches in the main channel, near the inflow or outflow of side channels, or near the bankline to create aquatic habitats. LWD may be placed in the channel or anchored to the river bottom or bank. Anchored LWD tends to remain in place until decomposition sets in. LWD may be placed in high densities or dispersed throughout the project area. Introducing LWD will promote increased habitat diversity and food availability.

Although LWD has been identified as suitable habitat for silvery minnow (USFWS 2003), no studies have been completed on the MRG to document the effects of LWD on silvery minnow habitat. Prior to the 1930s, conditions in the MRG provided significant quantities of LWD to the channel as stream banks eroded with seasonal floods and the river routinely migrated laterally across the floodplain, removing and transporting LWD from the riparian zone. Modification of the river channel with jetty jacks, levees, and dams for flood control and water delivery is largely responsible for stabilizing the river and floodplain. These activities have also helped to create the monotypic cottonwood gallery found throughout much of the MRG valley. The resulting effects of river management include channel incision, which has essentially eliminated overbank flow in the Albuquerque Reach, reducing the amount of LWD in the river channel. For this technique, LWD will be placed in selected locations. The objective is to increase the amount of LWD present in the Rio Bravo subreach of the MRG to enhance food availability and mesohabitats used by silvery minnow. LWD will also act to armor the inlets and outlets of newly constructed channels, increasing the life of these features.

Technique 3: Bank Scouring

Bank-line scours are areas cut into banks, islands, and bars where flow from the river channel enters and creates a low-velocity habitat. This technique creates habitat primarily during high-flow events; however, it can also be used to create habitat during lower flows. Bank scouring will be used to create areas where the thalweg meets the bank, effectively widening the active channel.

Scours are different from ephemeral channels in that they exchange water with the main channel within a small area instead of along a linear bank line. The purpose of scours is to create lateral migration of the river and to restore natural meandering of the system (William Lettis & Associates 2003; Tetra Tech 2004). Created scours will also provide low-velocity habitat for silvery minnow larvae and drifting eggs, rearing habitat, and increased food availability (Porter and Massong 2003).

Bank-line scours will allow the river to erode areas on one bank and deposit material along the adjacent bank, inducing lateral migration of the river. Lateral migration is essential to the functionality of the river and contributes to the overall health not only of the silvery minnow but also of all species that use the Rio Grande riparian and floodplain areas. This technique will only be applied in areas where such action will not increase flood risk.

Technique 4: Removal of Lateral Confinements

Removal of lateral confinements is a technique used to encourage the natural migration of the river across the floodplain. Jetty jacks that were installed to straighten and narrow the active

channel are removed, which allows for the migration of the river and the potential for increased over-bank flooding. The potential increase in over-bank flooding resulting from this technique will be a direct benefit to flycatcher and silvery minnow (Tetra Tech 2004).

Two methods for removing jetty jacks that are commonly used and may be implemented at the Rio Bravo North project site are hand removal and mechanical removal. Hand removal is a costly and labor-intensive approach but is desirable for areas with dense native vegetation or difficult access. The second method for removal requires the use of heavy equipment such as excavators, which pull the jetty jacks from the ground and stack them for removal and disposal.

Technique 5: Removal and Control of Exotics:

Removal and control of exotic non-native vegetation such as tamarisk (also known as saltcedar), Russian olive, and Siberian elm can aid in the recovery of flycatcher by reducing the potential for wildfire within the Bosque (Tetra Tech 2004). Reducing the density of non-native vegetation also decreases competition with desirable native vegetation such as willow and cottonwood. Multiple techniques have been developed for non-native vegetation control in the Bosque, including mechanical, herbicide, and cut-stump treatments.

Mechanical treatment involves the use of heavy equipment to turn standing vegetation into mulch material by mastication. Rotary mulching heads are attached to either rubber-tire or tracked equipment that can move through the Bosque and target non-native vegetation while leaving desirable species undisturbed. The mulch layer that is left as a byproduct of mastication can be removed from the Bosque or left on-site to aid in moisture retention and erosion control.

In cut-stump treatment, hand crews and chainsaws remove unwanted vegetation. The use of hand crews allows for precise removal of undesirable vegetation and is particularly desirable in stands of mixed native/non-native vegetation. The cut-stump treatment is also beneficial when working on islands or other locations where heavy equipment access is limited. This is the least invasive but most expensive technique available (Tetra Tech 2004).

Herbicide application is used in combination with other control techniques. When using the cut-stump treatment, herbicide is applied with a backpack sprayer directly to the cut stump immediately after felling. Application with a backpack sprayer allows for precise application, minimizing potential application to non-target vegetation. Following mechanical treatment with mastication equipment, herbicide is applied to the foliar area of the re-sprouts of non-native vegetation as a re-treatment during the growing season after mastication. This combination is an effective control technique, often achieving 99% clearance (Tetra Tech 2004). One or more of the following commonly used herbicides will be used in the project: triclopyr ester (e.g., Garlon 4); triclopyr amine (e.g., Garlon 3a); imazapyr (e.g., Arsenal); and glyphosphate (RoundUp). All herbicides will be applied in strict accordance with the product label and under a State of New Mexico–approved pesticide application license.

Technique 6: Active Restoration of Riparian Vegetation:

Replanting of native riparian vegetation encourages the establishment of desired species during restoration efforts. Planting native vegetation can help to prevent the encroachment of noxious weeds after they are removed (Tetra Tech 2004). The active replanting of riparian vegetation can be used to create habitat of the necessary composition for flycatcher breeding habitat.

Common riparian vegetation replanting techniques include pole planting, whip planting, containerized stock planting, and direct seeding. Pole and whip planting are frequently used for willow and cottonwood. Poles and whips are straight, branch-like pieces of the desired species. Holes are dug to the low water table, and the pole or whip is then inserted and the hole backfilled. This technique takes advantage of the regenerative nature of the species. If favorable conditions persist, no maintenance is required for this technique. Planting containerized stock is similar to pole planting, but rooted vegetation grown in a greenhouse is used in place of poles and whips. This is a highly successful technique, with a downside of increased cost. Direct seeding is often the preferred technique for replanting herbaceous vegetation. Seed is broadcast mechanically or by hand to achieve the desired coverage. Alternatively, seed drills can be used to sow the seed beneath the soil surface. Placing the seed beneath the surface allows for protection from the elements and animals that may feed on the seed. All of the described techniques may be used during the proposed Project. Plant species that may be used include cottonwood (*Populus spp.*), Gooding's willow (*Salix goodingii*), coyote willow (*Salix exigua*), false indigo (*Amorpha fruticosa*), and a variety of herbaceous species native to the Rio Grande bosque. Target densities for woody species revegetation will be 120 plant units per acre.

Technique 7: Surface-Water Catchments:

Construction of surface-water catchments is a technique developed by the City to decrease depth to groundwater within the Bosque outside of the ordinary high-water mark. These features consist of depressions in the earth to catch surface-water runoff. The decreased depth to groundwater, coupled with the potential for runoff collection, will provide an environment that will encourage the recruitment of desirable woody native vegetation. Upon maturation of the vegetation, the created habitat will act as refuge for migratory birds, including flycatcher.

Catchments will be created using backhoes and excavators. The fill that is generated during construction will be bermed around the perimeter of the catchment to increase the volume of the feature. Upon completion of construction, the bermed areas of the catchment will be revegetated with native woody species such as coyote willow and New Mexico olive.

3.0 AFFECTED ENVIRONMENT

3.1 INTRODUCTION

This section describes the current condition of resources in the project area that may be affected by the Proposed Action. Resources and related topics discussed include geomorphology and soils, hydrology and hydraulics, water quality, cultural resources, air quality and noise, fish and wildlife, vegetation and wetlands, threatened and endangered species, socioeconomics, visual and aesthetic resources, net water depletions, environmental justice, and Indian trust assets.

The Albuquerque Reach of the Rio Grande extends from the Angostura Diversion Dam to the Isleta Diversion Dam (Figure 1.1). This area has been identified by Reclamation, the City, and the Collaborative Program as a reach of the Rio Grande where habitat/ecosystem restoration projects will be highly beneficial to all life stages of the silvery minnow and flycatcher.

3.2 GEOMORPHOLOGY AND SOILS

The MRG lies in an asymmetric, elongated valley along the Rio Grande rift (Hawley 1978; Chapin 1988). The Rio Grande rift valley is dominated by connected alluvium-filled sub-basins defined by normal faulted mountain ranges. The land flanking the Rio Grande Basin on the east is predominantly mountainous, with merging colluvial-alluvial fans and stream terraces sloping down and westward toward the Rio Grande. The geologic surface west of the river consists of ancestral Rio Grande alluvial deposits with isolated mountains and volcanoes. Near Albuquerque, the land surface generally slopes up to a rolling divide to the Rio Puerco (this surface is known as the Llano de Albuquerque) (Bartolino and Cole 2002). The river channel flows in a wide valley with a fertile but narrow (2–3 miles wide) floodplain that has been cultivated for centuries.

Historically, the shape and pattern of the Rio Grande channel have continuously redefined the spatial distribution of sediments throughout the floodplain. However, in the twentieth and twenty-first centuries, floodway constriction and channel stabilization projects have altered the natural course of the river. For example, flow regulation by dams, levees, and jetty jacks to control the location of the channel has prevented flow from reaching the historic floodplain and caused sediment to accumulate in some areas and be scoured in others (MEI 2003).

Geomorphology plays an important role in describing the evolution of the Rio Grande and in influencing the spatial extent and species diversity of vegetation in riparian areas. The present-day channel consists of clay, silt, sand, and gravel, similar to the ancestral river deposits. In addition to the erosion and transportation of sediment through the main-stem channel, tributary streams can contribute large volumes of sediment to the system. The historic floodplain in other reaches, such as the Albuquerque Reach, has become disconnected from the river (MEI 2003).

The soils of the Rio Grande valley floor are generally derived from recent alluvial deposits. The two soil-mapping units that occur within the proposed project area are the occasionally flooded Vinton and Brazito Soils and the frequently flooded Torrifluvents (USDA 1977). There is a wide

range of soil textures but most are characterized by sand, loamy sand, or sandy loam. These soils range from slightly saline to strongly saline and are moderately alkali-affected.

3.3 HYDROLOGY AND HYDRAULICS

The MRG, as defined by the Collaborative Program, is the portion of the Rio Grande that begins at the Colorado–New Mexico state line, includes the Rio Chama watershed, and flows southward to the headwaters of Elephant Butte Reservoir. Most of the annual flow and discharge that reaches the MRG is generated in the headwaters of the river basin in Colorado and in the Rio Chama in northern New Mexico.

Most of the discharge volume of the Rio Grande is derived from late spring snowmelt. Late summer "monsoon" events produce significant runoff and briefly alter the hydrograph of the river. These summer flows typically carry high sediment loads; however, since 1973 the operations of Cochiti Dam have greatly reduced the total supply of sediment throughout the Albuquerque Reach (S.S. Papadopoulos and Associates [SSPA] 2004). Human activities have produced significant changes in the hydrology of the Rio Grande during the past century. The operation of upstream dams (Heron, El Vado, and Abiquiu Reservoirs on the Rio Chama, Jemez Dam on the Jemez River, Galisteo Dam on the Rio Galisteo, and Cochiti Dam on the Rio Grande) affects flows by storing and releasing water in a manner that generally decreases the spring flood peaks and alters the timing of the annual hydrograph. The 100 greatest daily discharges since 1942 at the Central Gage (8330000) all occurred prior to the construction of Abiquiu and Cochiti Dams (U.S. Geological Survey 2003). However, these operations do not cause significant changes in the annual total discharge of the system. According to U.S. Geological Survey (USGS) gage data, average daily flow for the Central Gage from 1942 to 1974 was 1042.70 cubic feet per second (cfs), while average daily flow from 1975 to 2002 was 1395.75 cfs (data from Upper Rio Grande Water Operations [URGWOPS] Draft EIS 2006).

3.4 WATER QUALITY

Current information for the water quality of the river system in the MRG is available from the USGS, the USACE, Reclamation, the University of New Mexico (UNM), the New Mexico Environment Department, the USFWS, and other sources. Water-quality constituents that are typically monitored include surface water temperature, pH, turbidity, dissolved oxygen (DO), suspended sediments (SSED), conductivity/total dissolved solids (TDS), and fecal coliform. These data may be collected in the Rio Grande, in adjacent canals, or within reservoirs. Typically, the data are collected with automatic data logging devices at stream-gaging locations, or by personnel at specific riverine, canal, or reservoir locations. The available data for the Albuquerque Reach are characterized by a high degree of seasonal variability for several water quality measures, as shown in Table 3.1.

Table 3.1. Average Water Quality Data by Constituent for Central Avenue Gage (1975–2001)

Season	Turbidity (NTU)	DO (mg/L)	pH	Conductivity (mg/L)	Water Temp (°C)	TDS (mg/L)	Fecal coliform (col/100mL)	SSED (mg/L)
Nov-Feb	9.12	10.19	8.08	391.86	6.66	255.08	N/A	539.01
Mar-June	45.57	8.66	7.97	359.11	15.90	209.74	82.50	1167.12
July-Oct	25.67	8.03	8.13	387.95	18.89	273.17	8.00	2114.67

Data from USGS (2003).

New Mexico Environment Department water quality standards have been established for reaches and subreaches throughout New Mexico, including the Albuquerque Reach. The following New Mexico Water Quality Control Commission Standards, as amended through October 11, 2002, are for the Albuquerque Reach between Sandia and Isleta Pueblos:

NEW MEXICO WATER QUALITY STANDARDS (20.6.4.105):

A. Designated Uses: irrigation, limited warm water fishery, livestock watering, wildlife habitat, and secondary contact.

B. Standards:

(1) In any single sample: pH shall be within the range of 6.6 to 9.0, and temperature shall not exceed 32.2°C (90°F). The use-specific numeric standards set forth in 20.6.4.900 New Mexico Administrative Code (NMAC) are applicable to the designated uses listed above in Subsection A of this section.

(2) The monthly geometric mean of fecal coliform bacteria shall not exceed 1,000/100 mL; no single sample shall exceed 2,000/100 mL (see Subsection B of 20.6.4.13 NMAC).

(3) At mean monthly flows above 100 cubic feet per second (cfs), the mean monthly average concentration for: TDS shall not exceed 1,500 mg/L, sulfate shall not exceed 500 mg/L, and chloride shall not exceed 250 mg/L.

(4) Narrative standards are those set forth in section 20.6.4.12 of the State of New Mexico Standards for Interstate and Intrastate Surface Waters. These include, but are not limited to:

i. Bottom Deposits – Surface waters of the State shall be free of water contaminants from other than natural causes that will settle and damage or impair the normal growth, function, or reproduction of aquatic life or significantly alter the physical or chemical properties of the bottom.

ii. Plant Nutrients – Plant nutrients from other than natural causes shall not be present in concentrations that will produce undesirable aquatic life or result in a dominance of nuisance species in surface waters of the state.

iii. Turbidity – Turbidity attributable to other than natural causes shall not reduce light transmission to the point that the normal growth, function, or reproduction of aquatic life is impaired or that will cause substantial visible contrast with the natural appearance of the water.

3.5 CULTURAL RESOURCES AND TRADITIONAL CULTURAL PROPERTIES

Cultural resources include archaeological sites, sites eligible for the State Register of Cultural Properties (SRCP) and/or the National Register of Historic Places (NRHP), and properties of traditional religious or cultural importance (traditional cultural properties, TCPs).

CULTURE HISTORY

The indigenous population in the Rio Grande Valley of New Mexico dates back at least 12,000 years (Cordell 1997). The steady influx of people of European descent into the Rio Grande valley of present-day New Mexico from the sixteenth century onward has given rise to a diverse cultural mosaic and has left a multitude of varied cultural resources that are more than 50 years old. New Mexico was part of the Spanish Colonial Empire until Mexico won its independence in 1821. Twenty-five years later, in 1846, New Mexico was claimed by the United States. These successive cultures have left archaeological sites (habitation, mining, industrial, and other), standing structures, bridges, utilities, and a network of irrigation canals and acequias more than 50 years old (Arrowsmith 1963; Cordell 1997; Rivera 1998; Van Citters 2003).

Archaeological resources in the Albuquerque Reach of the Rio Grande floodplain are limited because of poor preservation, alluvial deposition, the long history of agricultural use of the valley floor, and development of the metropolitan area (most private lands) prior to the existence of a preservation ethic. Archaeological work on the West Mesa above the floodplain has contributed to our understanding of the prehistory of the Middle Rio Grande (Schmader 1991, 1994).

Archaeological resources that are listed on the NRHP, or are eligible for listing, are protected under the National Historic Preservation Act (NHPA) of 1966 (16 U.S.C. 470). To determine if any cultural resource sites listed on or eligible for the NRHP are within the project area, SWCA conducted a records search for the proposed Project in the Archaeological Records Management Section (ARMS) database of the New Mexico State Historic Preservation Division. One archaeological site was found that overlapped the SDC Island site, and another three sites were identified within a 500-m buffer zone surrounding the project areas.

TRADITIONAL CULTURAL PROPERTIES

Reclamation has consulted with Native American Tribes and Pueblos that may have an interest in the Project and project area to determine if there are any TCPs that must be considered in the decision-making process. No TCPs or sacred sites were identified within the project area.

3.6 VEGETATION AND WETLAND RESOURCES

The riverbank community along the MRG consists of frequent open sand bars along the main channel. These areas are subject to frequent disturbance from erosion and flood events and typically have little or no vegetation. Sparse growth of young cottonwood, coyote, tamarisk (*Tamarix* sp.), and a variety of annual forbs is occasionally found. Since these areas experience regular scouring during flood events, the vegetation typically does not mature. Characteristics of

vegetated islands within the river channel have also changed significantly. Perhaps due in part to the lack of flood peaks during the current drought, vegetated islands currently support upwards of 18 percent of the vegetation throughout the Albuquerque Reach (Milford et al. 2003). An increase in non-native vegetation has been identified as the most significant indicator of failing ecological health in the riparian ecosystem. Species such as tamarisk, Russian olive (*Elaeagnus angustifolia*), and Siberian elm (*Ulmus pumila*) have more extensive reproductive cycles than native species, allowing them to out-compete native trees in many locations. Reduction of flood peaks and river incision through the Albuquerque Reach also factor in the transformation of riparian forests, since the non-native species are more tolerant of reduced floods and lower water tables.

Comment: No longer Elaeagnus?

Despite the considerable attention that has been devoted to the ecology and biodiversity of the neighboring riparian Bosque (Hink and Ohmart 1984; Crawford et al. 1993), little is known about the in-channel bars, which are perhaps its most diverse and active component. These dynamic environments support young wetland and riparian vegetation and most of the natural regeneration of Rio Grande cottonwoods in the river corridor (Milford and Muldavin 2004).

A narrow band of herbaceous wetland plants dominated by inland saltgrass (*Distichlis spicata*) and Baltic rush (*Juncus balticus*) commonly occurs on the banks of the Rio Grande. Other species that occur in the floodplain include isolated stands of rabbitbrush (*Ericameria nauseosa*), common mullein (*Verbascum thapsus*), coyote willow, Russian olive, and tamarisk. Dominant plant species found in the Bosque are Rio Grande cottonwood (*P. deltoides wislizenii*), tamarisk, and Russian olive. Within the Rio Grande, most in-channel islands and bars are periodically inundated by high flow and support some marsh, meadow, or shrub wetland communities. However, the areas targeted for the Proposed Action are dominated by non-native vegetation and contain limited wildlife habitat value for the species of concern.

3.7 FISH AND WILDLIFE

Changes in river elevation relative to the floodplain and in the hydrologic and sediment regime, as well as the introduction of predatory species (game fish), have affected the fauna of the Rio Grande. Historically, the riparian corridor of the MRG supported a wide diversity of terrestrial species. Prior to increased control measures, the river system periodically contributed water and nutrients to the floodplain and supported a number of aquatic species that are no longer present.

The Rio Grande drainage in New Mexico historically supported at least 21 and perhaps 24 native fish species, representing nine or ten families (Propst 1999). Since the beginning of European settlement along the Rio Grande, this system has lost a larger proportion of its native fish fauna than any other major drainage in New Mexico. Shovelnose sturgeon (*Scaphirhynchus platorhynchus)*, longnose gar (*Lepisosteus osseus*), American eel (*Anguilla rostrata*), speckled chub (*Machrybopsis aestivalis aestivalis*), and Rio Grande shiner (*Notropis jemezanus*) have been extirpated from the Rio Grande in New Mexico, and blue catfish (*Ictalurus furcatus*), if it persists, occurs only in Elephant Butte Reservoir. Rio Grande bluntnose shiner (*Notropis simus simus*) and phantom shiner (*Notropis orca*) are extinct. Rio Grande silvery minnow (*Hybognathus amarus*) is the only state and federally protected fish species currently inhabiting

the Rio Grande, but Rio Grande sucker (*Catostomus plebeius*) and Rio Grande chub (*Gila pandora*) may warrant state protection (Propst 1999).

Common fish species of the MRG include river carpsucker (*Carpiodes carpio*), flathead chub (*Platygobio gracilis*), common carp (*Cyprinus carpio*), western mosquitofish (*Gambusia affinis*), and red shiner (*Cyprinella lutrensis*) (Platania 1993). Less common fish species in the system are channel catfish (*Ictalurus punctatus*), fathead minnow (*Pimephales promelas*), longnose dace (*Rhinichthys cataractae*), white sucker (*Catostomus commersoni*), and the silvery minnow. Western mosquitofish, white sucker, and common carp are introduced species that are now common throughout the MRG.

In the most intensive biological survey of the MRG to date, Hink and Ohmart (1984) found 18 different species of reptiles and amphibians in the MRG. Eastern fence lizard (*Sceloporus undulatus*), New Mexican whiptail (*Aspidoscelis neomexicanus*), and Woodhouse toad (*Bufo woodhousii*) were common and widespread. Several common species in the Middle Rio Grande, such as bullfrogs (*Rana catesbeiana*), leopard frogs (*Rana pipiens*), and Woodhouse toads, are ubiquitous throughout the state. Others, like the chorus frog (*Pseudacris triseriata*) and the common garter snake (*Thamnophis sirtalis*), are unique to the MRG (Hink and Ohmart 1984).

Throughout the year, riparian communities of the MRG provide important habitat during breeding and migration for many bird species. Hink and Ohmart (1984) recorded 277 species of birds within 163 miles of MRG Bosque habitat. Stahlecker and Cox (1997) documented 126 species in the Rio Grande Nature Center State Park (RGNCSP) during the most comprehensive survey of the Bosque in the Albuquerque Reach. The 10 most common species during the winter of 1996–1997 were dark-eyed junco (*Junco hyemalis*), American crow (*Corvus brachyrhynchos*), American goldfinch (*Carduelis tristis*), white-crowned sparrow (*Zonotrichia leucophrys*), American robin (*Turdus migratorius*), Canada goose (*Branta canadensis*), red-winged blackbird (*Agelaius phoeniceus*), mallard (*Anas platyrhynchos*), European starling (*Sturnus vulgaris*), and house finch (*Carpodacus mexicanus*). The 10 most common species in the Bosque during the summer of 1997 were black-chinned hummingbird (*Archilochus alexandri*), red-winged blackbird, black-headed grosbeak (*Pheucticus melanocephalus*), spotted towhee (*Pipilo maculatus*), brown-headed cowbird (*Molothrus ater*), mourning dove (*Zenaida macroura*), Bewick's wren (*Thryomanes bewickii*), black-capped chickadee (*Poecile atricapillus*), cliff swallow (*Petrochelidon pyrrhonota*), house finch, and European starling (Stahlecker and Cox 1997). The most abundant bird species found along the river in winter were mallard, Canada goose, and wood duck (*Aix sponsa*). Red-tailed hawk (*Buteo jamaicensis*), Cooper's hawk (*Accipiter cooperii*), western screech-owl (*Otus kennicottii*), and great horned owl (*Bubo virginianus*) were also identified (Stahlecker and Cox 1997).

Hink and Ohmart (1984) recorded 35 mammal species in their study of the MRG, and Campbell et al. (1997) observed 14 mammal species in their survey of the Albuquerque Reach. Based on both surveys, the most common small mammals in the proposed project area include white-footed mouse (*Peromyscus leucopus*), western harvest mouse (*Reithrodontomys megalotis*), and house mouse (*Mus musculus*) (Hink and Ohmart 1984; Campbell et al. 1997). Less common small mammals include pocket gophers (Geomyidae) and rock squirrels (*Spermophilus variegates*). Mesomammals in the area include coyote (*Canis latrans*), common raccoon

(*Procyon lotor*), American beaver (*Castor canadensis*), and common muskrat (*Ondatra zibethicus*). Several species of bats also utilize the MRG.

3.8 THREATENED, ENDANGERED, AND SPECIAL STATUS SPECIES

The agencies that have primary responsibility for the conservation of plant and animal species in New Mexico are the USFWS, under authority of the Endangered Species Act (ESA); the New Mexico Department of Game and Fish (NMDGF), under authority of the New Mexico Wildlife Conservation Act of 1974; and the New Mexico Energy, Minerals and Natural Resources Department, under authority of the New Mexico Endangered Plant Species Act. These agencies maintain lists of plant and animal species that have been classified, or are potential candidates for classification, as Threatened or Endangered (Table 3.2). Protection from harassment, harm, or destruction of habitat is granted to species protected under the ESA. The New Mexico Wildlife Conservation Act and New Mexico Endangered Plant Species Act protect state-listed species by prohibiting take without proper permits.

Table 3.2. Threatened (T), Endangered (E), Species of Concern (S), Candidate (C), and Proposed (P) Plant and Wildlife Species Known to Occur in Bernalillo County

Note: Animals and plants that could occur in the project area are shown in **boldface**.

Common Name (*Scientific name*)	**Status**		**General Habitat**
	Federal	**State**	
Invertebrates			
Slate millipede (*Comanchelus chihuanus*)	S	–	Plains mesa grassland
Fish			
Rio Grande silvery minnow (*Hybognathus amarus*)	**E**	**E**	**Silt and sand substrates with slow backwaters**
Birds			
Northern goshawk (*Accipiter gentilis*)	S	–	Dense coniferous and mixed-woodland areas
Baird's sparrow (*Ammodramus bairdii*)	S	T	Winters in prairie areas
Western burrowing owl (*Athene cunicularia hypugea*)	S	–	Semi-arid grasslands and prairies, often associated with prairie dog towns
Common black-hawk (*Buteogallus anthracinus*)	**–**	**T**	**Woodlands along lowland streams**
Mountain plover (*Charadrius montanus*)	S	–	Semiarid grasslands and plains
Black tern (*Chlidonias niger*)	S	–	Vegetated marshes
Western yellow-billed cuckoo (*Coccyzus americanus*)	**C**	**–**	**Dense riparian shrub**
White-eared hummingbird (*Hylocharis leucotis borealis*)	–	T	Montane riparian areas
Southwestern willow flycatcher (*Empidonax traillii extimus*)	**E**	**E**	**Dense riparian groves of willow or saltcedar**

Table 3.2. Threatened (T), Endangered (E), Species of Concern (S), Candidate (C), and Proposed (P) Plant and Wildlife Species Known to Occur in Bernalillo County, continued

Note: Animals and plants that could occur in the project area are shown in **boldface**.

Common Name (*Scientific name*)	**Status**		**General Habitat**
	Federal	**State**	
Birds (continued)			
American peregrine falcon (*Falco peregrinus anatum)* Arctic peregrine falcon; listed for "similar appearance" (*F.p. tundrius*)	S	T	Montane species; prefer to perch in open areas, often near water.
Whooping crane (*Grus americana*)	E	E	Marshes and prairie potholes
Bald eagle (*Haliaeetus leucocephalus*)	**T**	**T**	**Winters along shores of rivers and lakes**
Neotropic cormorant (*Phalacrocorax brasilianus*)	-	T	Rivers, lakes, and reservoirs with adjacent wooded areas
Mexican spotted owl (*Strix occidentalis lucida*)	T	–	Mature mixed-conifer and pine-oak forests
Bell's vireo (*Vireo bellii*)	–	T	Riparian areas, piñon-juniper woodland, and Chihuahuan desert scrub
Gray vireo (*Vireo vicinior*)	–	T	Open woodlands with well-developed grasses
Mammals			
Townsend's big-eared bat (*Corynorhinus townsendii*)	S	–	Caves and rocky outcroppings in scrub deserts and piñon-juniper woodlands
Spotted bat (*Euderma maculatum*)	–	T	Rocky outcroppings, mature forests, caves
Black-footed ferret (*Mustela nigripes*)	E	–	Prairies; associated with prairie dogs
Pecos River muskrat (*Ondatra zibethicus ripensis*)	S	–	Riparian areas in Chihuahuan desert scrub and piñon-juniper woodlands
New Mexican jumping mouse (*Zapus hudsonius luteus*)	**S**	**T**	**Forb-grass communities in Jemez Mountains**
Plants			
Plank's catchfly (*Silene plankii*)	–	S	Rock outcrops
Santa Fe milkvetch (*Astragalus feensis*)	–	S	Sandy benches, gravelly hillsides, granitic and metamorphic rocks in juniper savanna or on barren areas
Sandia alumroot (*Heuchera pulchella*)	--	S	Limestone cliffs in montane forests
La Jolla prairie clover (*Dalea scariosa*)	–	S	Sandy clay banks and bluffs, often disturbed
Sapello Canyon larkspur (*Delphinium sapellonis*)	–	S	Montane areas in the Sandia Mountains

Information taken from Sublette et al. 1990; NMRPTC 1999; NMDGF 2004a; USFWS 2004.

FISH

Rio Grande Silvery Minnow *(Hybognathus amarus)*

The silvery minnow is a moderate-sized, stout minnow, reaching 3.5 inches in total length, that spawns in the late spring and early summer, coinciding with high spring snowmelt flows (Sublette et al. 1990). Spawning also may be triggered by other high-flow events such as spring and summer thunderstorms. The species is a pelagic spawner, producing neutrally buoyant eggs that drift downstream with the current (Platania 1995). The eggs hatch in 2 to 3 days, and the larvae may continue to drift or become retained in backwaters or embayments. The species normally lives about 2 to 3 years in the wild. Natural flow regimes, movement within their limited remaining range, and habitat diversity are important to completion of the life cycle.

The silvery minnow was listed as Endangered by the USFWS in 1994 (FR 1994a) and has been listed as Endangered at the state level since 1979. Historically, the silvery minnow was one of the most widespread and abundant fishes in New Mexico. The species has declined as a result of impacts from dewatering, channelization and flow regulation for irrigation, diminished water quality, and competition/predation by non-native species. The species is endemic to New Mexico, where it historically occupied large rivers with shifting sand substrates. In the Rio Grande, the silvery minnow ranged from the confluence of the Rio Chama near Española to the Gulf of Mexico, and in the Pecos River from near Santa Rosa to its confluence with the Rio Grande (Propst 1999). The silvery minnow currently occupies less than 10 percent of its historic range and is found only in the Rio Grande from Cochiti Reservoir downstream to Elephant Butte Reservoir (Propst 1999).

Natural habitat for the Rio Grande silvery minnow includes stream margins, side channels, and off-channel pools where water velocities are lower than in the main channel. Areas with detritus and algal-covered substrates are preferred. The lee sides of islands and debris piles often serve as good habitat. Stream reaches dominated by straight, narrow, or incised channels with rapid flows will not typically be occupied by the silvery minnow (Sublette et al. 1990; Bestgen and Platania 1991). Critical habitat for the silvery minnow was designated by the USFWS from the Highway 22 Bridge downstream to the headwaters of Elephant Butte Reservoir, including the Albuquerque Reach. This designation became effective February 19, 2003 (FR 2003b). Constituent elements of critical habitat required to sustain the Rio Grande silvery minnow include, in brief: (1) a hydrologic regime that provides sufficient flowing water to maintain a diversity of aquatic habitats; (2) the presence of eddies providing a variety of habitats; (3) substrates predominantly of sand or silt; and (4) water of sufficient quality to maintain variable water temperatures (USFWS 2003).

The 2003 MRG BiOp (USFWS 2003) requires habitat restoration projects on the MRG that will improve survival of all life stages of the endangered silvery minnow and other endangered species. The BiOp identified the need for increased availability of low-velocity habitat and silt and sand substrates to provide food, shelter, and sites for reproduction for silvery minnow and thereby alleviate jeopardy to the continued existence of the species in the MRG.

Silvery minnow populations within this reach have been monitored on an ongoing basis by UNM and the USFWS. Generally, the data collected indicate that silvery minnow are rare throughout

the reach, and many of the individuals collected are adults (Dudley et al. 2003). This data set indicates that the population may benefit by retaining eggs, larvae, and juveniles in upstream areas like the Albuquerque Reach, where they can contribute to population growth and aid in the recovery of the species.

BIRDS

Common Black-Hawk *(Buteogallus anthracinus)*
The common black-hawk is listed as Threatened by the State of New Mexico and may occur in the Albuquerque Reach (NMDGF 2004b). Though the common black-hawk is considered rare in Bernalillo County, nesting was observed in the Isleta Reach during the summer of 2003 (Williams 2003). The species primarily occupies riparian woodlands, particularly areas with well-developed cottonwood galleries, or a variety of woodland and marsh habitats along permanent lowland streams. Breeding black-hawks require mature riparian forest stands near permanent water. Most birds winter south of the U.S., although some records report occurrences within southern Arizona and the Gulf coast in Texas. The diet of this riparian-obligate species consists mainly of fish, insects, crayfish, amphibians, and reptiles, but occasionally they will take small mammals and birds. Loss of riparian habitat poses the greatest risk to the species. In 1996 the NMDGF estimated 60 to 80 breeding pairs in the state.

Western Yellow-billed Cuckoo *(Coccyzus americanus occidentalis)*
The western yellow-billed cuckoo is a USFWS Candidate subspecies that occurs locally along riparian corridors throughout New Mexico. Ideal habitat is dominated by a cottonwood canopy with a well-developed willow understory. Western yellow-billed cuckoo diet consists mainly of caterpillars but may also include various insects, some fruit, and the occasional lizard or frog (NMDGF 2004c). The breeding range of western yellow-billed cuckoo extends from California and northern Utah north and east to southwestern Quebec and south to Mexico. In New Mexico, historical accounts indicate that the western yellow-billed cuckoo was locally very common along the Rio Grande, but rare statewide (NMDGF 2004c). Both Hink and Ohmart (1984) and Stahlecker and Cox (1997) reported western yellow-billed cuckoo as a nesting bird in the Bosque of the Middle Rio Grande.

Southwestern Willow Flycatcher (*Empidonax traillii extimus*)
The flycatcher is considered Endangered by both the USFWS and the State of New Mexico. The subspecies is restricted to dense riparian vegetation along select waterways in New Mexico, Arizona, western Texas, southern Utah, Nevada, and California. The decline of the species has been attributed to loss of riparian habitat, brood parasitism, and lack of adequate protective regulations. The historic range of southwestern willow flycatchers included riparian areas throughout Arizona, California, Colorado, New Mexico, Texas, Utah, and Mexico. Critical habitat was designated for the flycatcher in 1997 (FR 1997) along 599 miles of streams and rivers in California, Arizona, and New Mexico, but was later withdrawn. In October 2004, the USFWS proposed a new designation of critical habitat for the flycatcher (FR 2004) that was approved in October 2005 (FR 2005). The current range of critical habitat in the Middle Rio Grande consists of four segments: Taos Junction Bridge to the northern boundary of Ohkay Owingeh (San Juan) Pueblo (28.5 miles); the southern boundary of Isleta Pueblo to the northern boundary of Sevilleta National Wildlife Refuge (NWR) (44.2 miles); the southern boundary of

Sevilleta NWR to the northern boundary of Bosque del Apache NWR (27.3 miles); and the southern boundary of Bosque del Apache NWR to Milligan Gulch at the northern end of Elephant Butte State Park (12.5 miles). The Rio Grande Valley State Park was excluded from designation as critical habitat because of actions being taken under the City's Bosque Action Plan.

The flycatcher prefers dense riparian thickets, typically willows with a cottonwood overstory. Dense riparian woodlands adjacent to open water or moist soils are particularly important as breeding habitat.

In New Mexico, the flycatcher occupies riparian habitat along the Rio Grande, Rio Chama, Zuni River, San Francisco River, and Gila River drainages and is generally found within 150 feet of a water source. During spring and fall migration the species occurs statewide, although migration patterns are not well understood. On the Rio Grande, the subspecies occurs near Velarde, Isleta, the Sevilleta NWR, the Bosque del Apache NWR, San Marcial, and Fort Selden.

Bald Eagle (*Haliaeetus leucocephalus*)
This species is listed as Threatened by both the USFWS and the State of New Mexico. Bald eagles are associated with habitats near open water. In New Mexico, bald eagles commonly winter adjacent to rivers and lakes, or where carrion is available. The major food items of bald eagles in New Mexico are waterfowl, fish, and carrion (NMDGF 2004d). Bald eagles are uncommon during the summer and have limited breeding sites in New Mexico, though nests have been documented in the extreme northern and western portions of the state. The number of birds wintering in the state has been steadily increasing. Important wintering areas include the upper Rio Grande, but seldom the Middle Rio Grande. The bald eagle commonly winters along the Rio Grande between the Buckman diversion point and Cochiti Reservoir.

MAMMALS

New Mexican Jumping Mouse (*Zapus hudsonius luteus*)
The New Mexican jumping mouse (*Zapus hudsonius luteus*) is listed by the USFWS as a Species of Concern and is considered Threatened by the State of New Mexico. Also known as the New Mexico meadow jumping mouse, the species is endemic to New Mexico and Arizona. The New Mexican jumping mouse is restricted to mesic habitats, preferring permanent streams, moderate to high soil moisture, and dense and diverse streamside vegetation consisting of grasses, sedges, and forbs (NMDGF 2004e). In the Rio Grande Valley, the species occurs mainly along the edges of permanent ditches and cattail stands. The proposed project area contains one small wetland area, less than 0.02 acre in size, that will be avoided during project activities. Surveys (Hink and Ohmart 1984) have failed to detect the New Mexican jumping mouse north of Isleta Marsh. It is therefore unlikely that the species occupies the project area.

3.9 SOCIOECONOMICS

The proposed project location is in the City of Albuquerque in Bernalillo County, New Mexico. This analysis does not focus on all aspects of economics within the proposed project area, but considers only the projected economic costs of the Preferred Alternative and economic statistics at the state, county, city, and local levels to describe the economic context of the Project.

According to the 2000 Census, New Mexico had a population of 1,819,046, with 556,678 persons residing in Bernalillo County. Bernalillo County is approximately 1,166 square miles in area, with an average of 477 persons per square mile, and is considered urban in character.

In 2000, Bernalillo County had a per capita personal income (PCPI) of $27,253. The average PCPI for the State of New Mexico was $21,931, which was 75 percent of the national average, $29,469 (U.S. Census Bureau 2004a, 2004b). Average annual growth in PCPI was 3.9 percent for the State of New Mexico and 4.2 percent nationwide.

Federal expenditures in the State of New Mexico accounted for $17,478 billion in 2002 (U.S. Census Bureau 2002). State expenditures amounted to $63,611 million in 2002 (New Mexico Department of Finance and Administration 2002). The City of Albuquerque's fiscal year 2006 budget is set at $846.5 million (City of Albuquerque 2005). The estimated cost of the Proposed Action is $781,500.

3.10 VISUAL AND AESTHETIC RESOURCES

The Bosque area within Albuquerque is valued for the visual and aesthetic appeal of mature forest and flowing water in an arid landscape. The riparian areas are designated as the Rio Grande Valley State Park (RGVSP) through the Park Act of 1983, which is managed by the City of Albuquerque Open Space Division and the MRGCD. The 5000-acre RGVSP extends through the City of Albuquerque, from Sandia Pueblo on the north to the Pueblo of Isleta on the south (RGVSP 2004).

The Bosque and river are visible to the public from many bridge crossings, such as the Rio Bravo Bridge. These bridge vistas of the river and Bosque provide thousands of urban residents with a regular and important visual aesthetic experience. The Bosque and river are also enjoyed for their aesthetic value from many foot and horse trails. Trails within the Rio Grande Bosque exist on both sides of the river, including a 16-mile-long paved trail on the east side. Recreation activities include, but are not limited to, walking, jogging, bicycling, roller-blading, horseback riding, fishing, and wildlife watching. No motorized vehicles except maintenance and emergency vehicles are allowed in the Bosque, making the aesthetic experience of the recreating public one of a forest and riverside that is full of the sounds and sights of water and forest.

3.11 AIR QUALITY AND NOISE

The proposed project area and Bernalillo County fall within New Mexico's Air Quality Control Region No. 152 (New Mexico 2004). This area is in attainment for all priority pollutants (lead,

nitrogen dioxide, particulate matter, ozone, and sulfur oxides) except carbon monoxide, which is presently in maintenance status. The closest Class I area (a national park or wilderness area) is Bandelier National Monument, 30 miles north of the proposed project area. Air quality in the project area is considered good. Due to inversions and an increase in the use of wood-burning stoves, carbon monoxide and airborne particulates are occasionally high in the Rio Grande valley during winter months. All vehicles involved in project activities will have emission control equipment that has passed City of Albuquerque emissions tests. A fugitive dust permit will be obtained from the City, and Best Management Practices (BMPs), such as wetting down disturbed areas to minimize dust, will be followed during project activities.

Noise levels are limited to 90 decibels A-weighted (dBA) averaged over an 8-hour day by the Occupational Safety and Health Administration (29 CFR 1910.95). No worker may be exposed to 115 dBA averaged over an 8-hour day without hearing protection. City of Albuquerque (1975) noise standards require that powered equipment be operated only between the hours of 7 a.m. and 10 p.m. Monday through Saturday and 9 a.m. to 10 p.m. on Sundays (City of Albuquerque 1975).

3.12 NET WATER DEPLETIONS

The Rio Grande Compact limits the amount of surface water that can be depleted (consumed) annually in the MRG 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 that the MRG is fully appropriated. Therefore, any increase in water use in one sector of use must be offset by a reduction in use in another sector such that senior water rights or New Mexico's ability to meet its downstream delivery obligations are not impaired. Therefore, the New Mexico State Water Plan (Office of the State Engineer/Interstate Stream Commission 2003) requires that habitat restoration projects do not result in increases in net water depletions, or that any increases that do occur because of project activities are offset by purchased or leased water rights.

3.13 ENVIRONMENTAL JUSTICE

Executive Order 12898 (FR 1994b), Environmental Justice in Minority and Low-Income Populations, requires consideration of adverse impacts that will disproportionately affect such populations. Compared to demographics on the national level, the population of Bernalillo County has proportionately more persons of Hispanic and Native American background and fewer persons of African-American andr Asian background. Ethnic comparisons for the State of New Mexico are proportionally similar to those for Bernalillo County. It should be noted that persons of Hispanic background might claim identification with another ethnic group as well.

3.14 INDIAN TRUST ASSETS

Indian trust assets (ITAs) are legal interests 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 U.S. Government. 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, adverse impacts to these assets must be mitigated or compensation must be provided.

4.0 ENVIRONMENTAL CONSEQUENCES

4.1 INTRODUCTION

This EA uses scientific and analytic evaluation to compare the No Action and Proposed Action Alternatives. This chapter of the EA evaluates the direct, indirect, and cumulative impacts to all resources described in Chapter 3, Affected Environment. In addition, environmental commitments, which will provide ongoing guidance for the proposed Project, are summarized.

4.2 GEOMORPHOLOGY AND SOILS

Under the No Action Alternative, the geomorphology of the Rio Grande will likely remain stable, though current drought conditions may cause the channels between islands to continue to narrow and deepen. In the absence of frequent high discharges, the river in this reach will continue to have high velocities and will have limited meandering capability, a process that is important in moving and redefining islands and bars. Islands and bars will be stabilized with increasingly mature vegetation, predominantly non-native species. The geomorphic trends produced under the No Action Alternative are unfavorable for the Rio Grande silvery minnow because of decreased capacity for egg retention and larval success and decreased presence of quality mesohabitat.

Under the Proposed Action, the Project will undertake actions to alter a point bar and island within the channel as well as parts of the channel bank and Bosque to create the desired habitat types. In doing so, the current local geomorphology is anticipated to change slightly. Under the Proposed Action there will be minimal to moderate soil disturbance levels. The overall effects will be monitored, but are expected to be beneficial and completely within normal parameters for a sand-bed river system.

Before the initiation of construction activities, environmental protection measures will be reviewed at a pre-project meeting with the appropriate federal and state agencies. All activities will comply with local, state, and federal regulations. To mitigate negative effects from erosion, native vegetation will be planted in specific disturbed areas.

4.3 HYDROLOGY AND HYDRAULICS

Under both the No Action and the Proposed Action Alternatives, there will be no change in the amount or duration of flow in the river. The Proposed Action will work with the existing hydrologic conditions to develop the desired habitat types.

4.4 WATER QUALITY

The No Action Alternative will likely result in water quality that continues to meet applicable standards for most physical constituents, such as surface water temperature, pH, turbidity,

dissolved oxygen (DO), conductivity/total dissolved solids (TDS), suspended sediments (SSED), and fecal coliform.

Under the Proposed Action, no adverse impact to surface water or groundwater quality is anticipated. The Clean Water Act (CWA) provides protection for wetlands and waters of the United States from impacts associated with dredged or fill material in aquatic habitats, as defined under Section 404(b)(1). CWA compliance is required for all aspects of the Project that take place within the ordinary high-water mark, and since most work associated with the Proposed Action will be completed within jurisdictional areas, a 404 permit was obtained. Compliance with the CWA ensures that the Proposed Action will have no adverse effect on the water quality of the MRG. Water quality will be monitored and evaluated during the construction phase of the Project and for a period of 10 years after completion.

The Proposed Action will result in temporary changes in the measures for physical constituents, particularly for turbidity and total dissolved solids, because of the movement and dispersal of sediments within the river channel. Short-term and localized adverse effects to water quality may occur, but are not expected to exceed applicable standards.

4.5 CULTURAL RESOURCES AND TRADITIONAL CULTURAL PROPERTIES

Under the No Action and Proposed Action alternatives, no impacts to existing cultural resources or TCPs are anticipated.

4.6 VEGETATION AND WETLAND RESOURCES

Increased frequency of flooding is anticipated under the Proposed Action, compared to the No Action Alternative. Riparian vegetation is, by definition, subject to intermediate levels of disturbance from flooding. Reduced levels of annual maximum flows under the No Action Alternative have reduced these natural processes. Under the Proposed Action, some native and non-native vegetation will be disturbed by mechanical means during the implementation of the restoration techniques. Bank, island, and bar modification will require the removal of all vegetation within the footprint of the disturbance area. Non-native vegetation removal at all three sites will, by the nature of the action, completely remove the target non-native vegetation, and likely cause non-lethal disturbance to some non-target native vegetation.

Each proposed technique has different levels of potential impact on riparian vegetation. All vegetative communities, native and non-native, will be altered to some degree at the selected locations under the Proposed Action. Dead and downed native deciduous species may be used for in-channel placement as LWD. Living native deciduous species will be avoided. Some herbaceous floodplain species may be trampled during construction, but impacts will be moderate and transitory.

The Rio Grande, including the proposed project locations, is a USACE jurisdictional waterway. Executive Order 11990 (Protection of Wetlands; FR 1977a) requires the avoidance of short-term and long-term adverse impacts associated with the destruction, modification, or other disturbance

of wetland habitats. Compliance with Section 404 of the CWA will prevent net loss of wetlands due to Project actions. As a result, the Proposed Action will not impact wetland communities in the project area. Executive Order 11988 (Floodplain Management; FR 1977b) provides federal guidance for activities within the floodplains of inland and coastal waters and requires federal agencies to "ensure that its planning programs and budget requests reflect consideration of flood hazards and floodplain management." The proposed modifications will not result in significant changes in flooding patterns outside the existing floodplain.

4.7 FISH AND WILDLIFE

Short-term adverse impacts to fish and wildlife resources will not occur under the No Action Alternative. Long-term adverse effects on breeding and foraging fish, avian species, and mammals may occur; however, they will be gradual and difficult to quantify under current riparian processes. Such effects will result from long-term alterations to riparian ecological processes, encroachment of non-native species, increased fire hazard, and increased depth to groundwater.

By comparison, the Proposed Action will produce short-term direct impacts on wildlife in the immediate area of disturbance and long-term beneficial effects on wildlife from improved ecological function and aquatic habitat. To avoid direct impact to migratory birds protected by the Migratory Bird Treaty Act (MBTA) (16 U.S.C. 703, et seq.), clearing and grubbing of woody vegetation will be scheduled between August 15 and April 15, outside of the normal breeding season for many migratory avian species. Should vegetation removal be implemented between April 15 and August 15, pre-construction nesting bird surveys should be conducted to identify potential MBTA issues. Any positive pre-construction survey results for migratory birds will be brought to the attention of the USFWS to determine methods of MBTA impact avoidance.

Other wildlife species that likely inhabit the proposed project area, such as reptiles, mammals, and amphibians, will be temporarily displaced and could experience mortality during the implementation of the Proposed Action. These effects will be outweighed by the long-term benefits of a healthier riparian ecosystem. No long-term adverse impacts on fish species are expected to occur under the Proposed Action. Long-term benefits from aquatic habitat creation and increased food abundance within mesohabitats are expected.

4.8 THREATENED, ENDANGERED, AND SPECIAL STATUS SPECIES

RIO GRANDE SILVERY MINNOW (*HYBOGNATHUS AMARUS*)

The No Action Alternative will have no impact on the current trends of silvery minnow populations in the Albuquerque Reach. The channel in the Albuquerque Reach is incised and degradation is expected to continue (Porter and Massong 2004). Limited numbers of silvery minnow have been identified in the project area (M. Porter, personal communication 2006). Increasing the amount and/or quality of suitable riverine habitat is essential for successful application of supplemental augmentation and rescue efforts for effective silvery minnow population management.

The Proposed Action may affect and is likely to adversely affect silvery minnow during construction; and may affect but is not likely to destroy or adversely modify silvery minnow critical habitat. Minnow critical habitat may be impacted by short-term increases in turbidity and other water quality parameters and the operation of heavy equipment within designated critical habitat. The primary objective of the Proposed Action is to create additional habitat for various lifestages of silvery minnow. The Proposed Action may provide beneficial effects to silvery minnow and their critical habitat, including improved egg and larval retention in the Albuquerque Reach, increased recruitment rates, and increased survival of young-of-year and adult silvery minnow.

Silvery minnow critical habitat encompasses the entire project area (FR 2003b). Short-term effects on silvery minnow critical habitat may occur during and immediately following habitat restoration activities from the operation of heavy machinery and the removal of vegetation. However, the slow movement of the equipment, coupled with the sensitivity of silvery minnow to sound, their high swimming speed, and access to the water column around the equipment make it possible, but unlikely, that any silvery minnow will be physically harmed by the equipment. Best Management Practices will be enforced to minimize impacts during periods of work.

WESTERNYELLOW-BILLED CUCKOO (COCCYZUS AMERICANUS OCCIDENTALIS)

The No Action Alternative will not change the riparian habitats used by this species, and no effects will occur.

The Proposed Action may affect but is not likely to adversely affect the western yellow-billed cuckoo. Noise generated by heavy machinery during construction could disturb cuckoo in the project area. Additionally, the removal of non-native vegetation could potentially decrease habitat availability for the species. To minimize impact on this and other riparian species, clearing and grubbing of woody vegetation will be scheduled between September and April. Should vegetation removal and construction be implemented during the breeding season (April–August), pre-construction breeding bird surveys will be conducted and monitoring performed to assure avoidance of impacts. Any positive pre-construction survey results for migratory birds will be brought to the attention of the USFWS in order to determine methods of MBTA impact avoidance.

SOUTHWESTERN WILLOW FLYCATCHER (*EMPIDONAX TRAILLII EXTIMUS*)

The No Action Alternative will not disturb the riparian vegetation; therefore, this alternative will have no effect on the species.

The Proposed Action will take place outside of the breeding season for southwestern willow flycatcher and will not directly affect the species. The Proposed Action may affect but is not likely to adversely affect southwestern willow flycatcher. Noise generated by heavy machinery during construction could disturb migrating flycatcher in the project area. Additionally, the removal of non-native vegetation could potentially decrease habitat availability for the species. To minimize impact on this and other riparian species, clearing and grubbing of woody

vegetation will be scheduled between September and April. Should vegetation removal and construction be implemented during the breeding season (April 15–August 15), pre-construction breeding bird surveys will be conducted and monitoring performed to assure avoidance of impacts. Any positive pre-construction survey results for migratory birds will be brought to the attention of the USFWS in order to determine methods of MBTA impact avoidance.

A thorough analysis of flycatcher and potential impacts to flycatcher habitat associated with the proposed Project has been completed as part of the Biological Assessment for this Project (SWCA Environmental Consultants 2006).

BALD EAGLE (*HALIAEETUS LEUCOCEPHALUS*)

The No Action Alternative will not disturb the riparian vegetation where this species may occur; therefore, this alternative will have no effect on the species.

The Proposed Action may have short-term potential effects on bald eagles during construction, related to temporary noise and other disruptions. Removal of woody vegetation and other construction activities may take place during the winter months when bald eagles may be in the proposed project area. Best Management Practices will be employed to minimize the potential for disturbing bald eagles. If a bald eagle is visible within 0.25 mile of the proposed project area in the morning when activity starts, or arrives during breaks in activity, the contractor will be required to suspend all construction activity until the bird leaves on its own volition, or the project biologist, in consultation with the USFWS, determines that the potential for harassment is minimal. However, if a bald eagle arrives during construction activities, or is observed 0.25 mile or more from the construction site, activity will not be interrupted. The Proposed Action may affect but is not likely to adversely affect the bald eagle.

COMMON BLACK-HAWK (*BUTEOGALLUS ANTHRACINUS*)

The No Action Alternative will not make any changes to riparian vegetation used by this species; therefore, no adverse impacts to this species or its habitat will occur.

The Proposed Action will include clearing of woody vegetation but not mature gallery trees. Therefore, the Proposed Action should have no adverse impact on the common black-hawk. As a precautionary measure, the City or its contractor or project biologist will follow the same protocol as that for bald eagles during construction activities.

NEW MEXICAN JUMPING MOUSE (*ZAPUS HUDSONIUS LUTEUS*)

Lack of suitable habitat in the project areas makes it unlikely that either the No Action Alternative or the Proposed Action will have an adverse effect on the New Mexican jumping mouse.

4.9 SOCIOECONOMICS

The long-term economic consequences of No Action are unknown at this time and difficult to assess. These impacts may be greater than the Proposed Action due to the significant costs of other silvery minnow habitat restoration options that have been proposed by the Collaborative Program.

The Proposed Action will not adversely affect current economic and socioeconomic conditions within Bernalillo County. The cost of the Proposed Action will be $781,500. This amount is low in comparison with combined state and federal expenditures in Bernalillo County and the City of Albuquerque and will not adversely affect current economic conditions.

Under the No Action and the Proposed Action Alternatives, there will be temporary increases in federal and state spending in Bernalillo County to provide habitat restoration for the silvery minnow. Regardless of this Proposed Action, the MRG BiOp of 2003 requires that aggressive measures be taken to improve and restore aquatic habitat for the silvery minnow, and that those measures should be conducted in all areas of critical habitat. The signatories to the Collaborative Program have identified the Albuquerque Reach as an area of high priority, since the area is upstream of Elephant Butte Reservoir and water quantity is more reliable here than in more southern reaches, and therefore better able to support the duration of downstream egg drift required for successful silvery minnow breeding.

4.10 VISUAL AND AESTHETIC RESOURCES

The No Action Alternative will continue to provide long-term aesthetic value to RGVSP visitors and unimpeded vistas of the Rio Grande and the riparian forest from the Rio Bravo Bridge. There will be no short-term changes in the visual and aesthetic experience. Long-term impacts to the river and Bosque from changes in the channel configuration will be so slow as to be imperceptible to the public.

The Proposed Action will likely produce long-term changes in the visual and aesthetic experience of the public from the bridges, trails, and riverside areas adjacent to the project area. The current condition of the Bosque, with considerable non-native vegetation, is the only condition that many local residents have experienced. After the removal of non-native vegetation from the project sites, the Bosque will be less densely vegetated, replicating historic conditions. While some of the public may perceive the more natural look of the Bosque as pleasing, others may consider the new look to be less aesthetically desirable than the current condition.

The short-term impacts of equipment operation may also disturb the aesthetic experience of individuals within the RGVSP. The proposed construction areas may be visible from the Rio Bravo Bridge. The visual and aesthetic impacts of construction associated with the proposed Project will be brief and limited to the relatively few pedestrians using the trails near the Project, but the intensity of this short-term impact may be experienced as high by those who regularly use these trails for their natural aesthetic value.

4.11 AIR QUALITY AND NOISE

The project areas are in a natural area and a park with nature trails and other recreational uses in which a quiet atmosphere is expected. The No Action Alternative will hold ambient noise levels to the current condition.

The Proposed Action is not anticipated to generate ambient noise that exceeds the City of Albuquerque Noise Ordinance. Construction equipment to be used during the Proposed Action will create temporary variable noise levels that will likely exceed allowable ambient noise of 80 dBa in the immediate vicinity of the restoration site. Construction sites are anticipated to be more than 500 feet from any sensitive noise receptors. The nearest noise receptors will include the recreating public on nearby trails and residents of nearby homes and businesses outside the levees. Under the Proposed Action, noise impacts during heavy equipment use will be short term and occur during normal business hours to minimize noise disturbance. The riparian vegetation and levee will abate some of the noise generated by the equipment. A Construction Noise Permit may be issued by the City of Albuquerque if sensitive noise receptors are identified within 500 feet of restoration construction sites.

Construction equipment will temporarily generate fumes and air emissions under the Proposed Action. The level of air emissions is anticipated to be low and in compliance with local and federal air emission standards.

4.12 NET WATER DEPLETIONS

The No Action Alternative will maintain current levels of water depletions in the Albuquerque Reach, as identified in previous studies (SSPA 2004). The goal of the Proposed Action is to neither increase nor decrease depletions. All of the proposed work will occur within the 660-foot-wide river channel, where river water level and river surface open area fluctuate significantly. Therefore, the work will not likely increase depletions to any measurable or calculable degree. Actions on the river channel banks at the Rio Bravo North site that could potentially increase depletions will be analyzed further as required by the Office of the State Engineer (OSE). The City will submit a permit application, including this EA and other pertinent documentation as necessary, for this location. Work will not occur at locations where permits are deemed necessary until the necessary permits have been secured. Evaluations of the net depletion effects of each proposed technique will be evaluated over the course of the Project. Restoration techniques that are determined to add significant levels of depletion to the surface waters of the Rio Grande will be curtailed unless offset with other sources of water.

4.13 ENVIRONMENTAL JUSTICE

The Proposed Action complies with Executive Order 12898 (FR 1994b), Environmental Justice in Minority and Low-Income Populations. The proposed Project is located on the active floodplain of the Rio Grande, between the flood control levees within the Albuquerque Reach of the river. Outside of the levees, nearby land use along this reach includes residential neighborhoods of multiple economic strata, as well as commercial and industrial uses.

Regardless of the level of impacts, they will be similar throughout the reach. There will be no disproportionately high or adverse human health or environmental effects on minority or low-income populations due to either the No Action or Action alternatives.

4.14 INDIAN TRUST ASSETS

No ITAs were identified in the project areas and therefore no associated impacts are anticipated for either the No Action or the Proposed Action alternative.

4.15 IRRETRIEVABLE COMMITMENT OF RESOURCES

The implementation of the Project will result in the commitment of resources such as fossil fuels, construction materials, and labor. In addition, city and federal public funds will be expended for the construction of the proposed Project.

4.16 CUMULATIVE IMPACTS

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 or person undertakes such other actions" (42 U.S.C. 4331–4335). Cumulative environmental impacts associated with the Rio Grande, including islands and riparian areas, have been evaluated for the following projects relative to the Proposed Action.

CITY OF ALBUQUERQUE – OPEN SPACE DIVISION

The City of Albuquerque Open Space division has been conducting extensive clearing of non-native vegetation from within the Rio Grande Valley State Park Bosque. A considerable portion of these thinning efforts is taking place adjacent to the proposed project sites. The thinning process is intended to reduce fuel loading within the Bosque, thus reducing the risk of future catastrophic wildfire. While much of the City's thinning has been completed in support of Collaborative Program projects, these projects have been completed under separate environmental compliance completed by the USACE for fuels reduction.

MIDDLE RIO GRANDE ENDANGERED SPECIES ACT COLLABORATIVE PROGRAM

The Collaborative Program has initiated and funded multiple habitat restoration projects, including City and USACE restoration projects near the location of the Proposed Action. Silvery minnow augmentation funded by the Collaborative Program should provide positive synergistic interactions with habitat that will be created by this Project.

UPPER RIO GRANDE WATER OPERATIONS ENVIRONMENTAL IMPACT STATEMENT

The USACE, the New Mexico Interstate Stream Commission (NMISC), and Reclamation are signatories to an MOA to develop integrated water operations rules for several dams on the Rio Grande upstream of the project area (URGWOPS 1999). A draft environmental impact statement for the program was released in January, 2006 (URGWOPS 2006).

CITY OF ALBUQUERQUE SAN JUAN–CHAMA DRINKING WATER PROJECT

The City has initiated construction of a diversion dam in the Rio Grande south of the Alameda Bridge to divert San Juan–Chama water for the City's drinking water supply. The City is currently constructing water intakes and a crossing of the Rio Grande at Campbell Road for the same project. Several proposed habitat restoration projects are specified for the Albuquerque Reach as mitigation for adverse effects from this Project (Reclamation 2004).

MIDDLE RIO GRANDE BOSQUE WILDFIRE PROJECT AND WETLAND RESTORATION PROJECT

The USACE is involved in a Bosque Wildfire Project throughout the Albuquerque Reach of the Rio Grande, thinning riparian vegetation at selected locations adjacent to the river. The USACE is also involved in Ecosystem Restoration projects at the Albuquerque Biological Park and the Wetland Restoration Project south of Central Avenue (USACE 2004).

NMISC RIVERINE HABITAT RESTORATION PROJECTS

The New Mexico Water Trust Board and the NMISC are conducting projects to improve silvery minnow habitat. These projects include increasing scientific knowledge of available food for aquatic species within the MRG and incorporating LWD for improved mesohabitat (Tetra Tech 2004).

ASSESSMENT OF CUMULATIVE IMPACTS

The cumulative effects of the Proposed Action plus the described related projects could produce short-term changes in several aspects of the existing hydrology, hydraulics, and fluvial geomorphology within the affected subreach. The Proposed Action could affect other specific downstream restoration projects by changing local fluvial geomorphology and hydrology. Other projects listed here could affect the Proposed Action by altering physical processes upon which the proposed techniques depend. Changes in upstream water operations could augment and improve or could decrease the effectiveness of proposed projects.

While all the parties to these various actions recognize the need for dramatic change in the riverine ecosystem to provide better support for the endangered silvery minnow, the complex cumulative outcome of multiple actions will be unpredictable and potentially adverse to water quality and various indicators of silvery minnow reproductive success. The only effective means of dealing with the complex cumulative effects in ESA critical habitat will be to coordinate efforts among all parties. Sound scientific measurement of the baseline parameters most closely

associated with silvery minnow success needs to be accomplished and a detailed silvery minnow monitoring protocol should be implemented. Further development and approval of an adaptive management strategy so that it is in place early in the implementation phase of the Proposed Action will facilitate a rapid response to potentially adverse indicators.

4.17 SUMMARY OF EFFECTS AND SITE SUITABILITY

Different techniques considered for restoration will have short-term effects on some environmental resources but long-term beneficial effects on biological resources, including flycatcher, silvery minnow, and silvery minnow critical habitat. The overall effects of the proposed restoration techniques are summarized in Table 4.1.

Table 4.1. Environmental Consequences of Proposed Restoration Techniques on Environmental Resources under the Proposed Action and No Action Alternatives

Environmental Resources	Proposed Action	No Action
Geomorphology and Soils	Short-term adverse impact to geomorphology; long-term beneficial effects on the altered channel features	Development of channel features that are unfavorable for silvery minnow egg retention and for larval and adult success will continue
Hydrology and Hydraulics	Short-term minimal adverse impact to hydrology; long-term positive effect	No change in the amount or duration of flows in the Albuquerque Reach
Water Quality	Short-term effects within applicable water quality standards; no long-term adverse effects	No change in levels of constituents such as pH, dissolved oxygen, temperature, turbidity
Cultural Resources and TCPs	No adverse effects on archaeological resources or TCPs	No change to cultural resources or traditional cultural properties
Vegetation and Wetlands	Limited short-term adverse effects on herbaceous vegetation; permanent removal of non-native woody vegetation; long-term beneficial effects on native vegetation	Continuation of current trends in vegetation such as increases in non-native species and woody vegetation
Fish and Wildlife	Short-term adverse impacts; long-term positive effect on fish and wildlife abundance and diversity from habitat improvements	Continued adverse trends toward decreased fish and wildlife abundance and diversity
Threatened, Endangered, and Special Status Species	Short-term likely to adversely affect Rio Grande silvery minnow; short-term may affect/not likely to adversely affect western yellow-billed cuckoo, willow flycatcher, and bald eagle; long-term positive effects on silvery minnow and flycatcher	Continued adverse trend toward decreased habitat for silvery minnow and flycatcher
Socioeconomics	No adverse effects; the costs of implementing the Project are within the annual range of variability for federal expenditures for Bernalillo County	No short-term change in socioeconomics anticipated
Visual and Aesthetic Resources	Short-term negative impacts; long-term positive effect	No long-term or short-term changes in the visual and aesthetic experience
Air Quality and Noise	Short-term adverse impact from increased ambient noise levels	No change in air quality or noise
Net Water Depletions	No adverse effects anticipated, further evaluation required	No change in net water depletions
Environmental Justice	No adverse effect	No change in environmental justice
Indian Trust Assets	No ITAs identified; no adverse effects	No change in ITAs

All proposed activities will take place within the Rio Bravo to South Diversion Channel subreach. A site assessment completed to evaluate this subreach included the collection of photographs and GPS data, and GIS analysis in the laboratory. Work at this location will create beneficial habitat for silvery minnow and flycatcher. All access will be through the existing levee roads and transmission line access roads. Proposed staging and access will be coordinated with the City Open Space Division, MRGCD, and Reclamation.

4.18 ENVIRONMENTAL COMMITMENTS

The following environmental commitments will be undertaken by the City:

- Clean Water Act compliance is required for all aspects of the Project within jurisdictional waters of the U.S. Since most work associated with the Proposed Action will be completed within floodplain areas regulated by this law, a 404 permit was obtained. A state water quality certification permit under Section 401 of the CWA was also obtained for the Project.

- Storm-water discharges under the Proposed Action will be limited to ground-disturbing activities outside the mean high water mark. All such activities will be evaluated for compliance with National Pollutant Discharge Elimination System (NPDES) guidance, a NPDES permit, or a Storm Water Pollution Prevention Plan. The 404 and 401 permitting processes has been completed for the Proposed Action.

- To avoid direct impacts to migratory birds protected by the Migratory Bird Treaty Act (MBTA) (16 U.S.C. 703, et seq.), clearing of woody vegetation and construction will be scheduled between August 15 and April 15, outside of the normal breeding season for many avian species. Should vegetation removal and construction be implemented during the breeding season (April 15–August 15), pre-construction breeding bird surveys will be conducted and monitoring performed to assure avoidance of impacts to migratory birds. If any positive pre-construction survey results or observations of migratory species occur during construction, all activities will be suspended pending coordination with and guidance from the USFWS.

- To avoid negative visual impacts resulting from vegetation removal, native vegetation will be planted after the removal of current vegetation during habitat restoration activities.

- A Temporary Construction Noise Permit may be required by the Albuquerque Environmental Health Department prior to construction, as specified in the local Noise Ordinance, Article 9 Section 9-13.

- If it is determined by the OSE that net depletions will occur as a result of the Project, the City will submit a permit application, including this EA and other pertinent documentation as necessary. Work will not occur at locations where permits are deemed necessary until the necessary permits have been secured.

- Wetlands will be avoided during all phases of construction and in the location of staging areas and access routes to the construction areas.

- Monitoring will be performed at each site to ensure that project goals are met.

- Cumulative impacts of adjacent habitat restoration projects will be evaluated as they come online, and adaptive management techniques will be used for elements of the Project when appropriate.

- Appropriate permits for the Rio Grande Bosque and river access and staging areas will be acquired prior to the commencement of the Proposed Action.

- Endangered Species Act compliance has been addressed through consultation with the USFWS regarding potential impacts to threatened and endangered species. Rio Grande silvery minnow critical habitat encompasses the entire project area (FR 2003b) in the river channel. The southwestern willow flycatcher uses the proposed project area during migration. BMPs will be enforced to minimize potential impacts to silvery minnow and flycatcher from direct construction impacts during periods of work. Consultation with the USFWS has determined the most effective BMPs.

- Reclamation has coordinated with the State Historic Preservation Officer for purposes of NHPA Section 106 compliance and has completed consultation with interested Tribal entities. The Project is committed to avoidance of any TCPs in the project area. Should evidence of possible prehistoric or historic cultural resources or other archaeological data be discovered during the course of this action, work will cease at that location and the Reclamation Area Archaeologist will be notified by phone immediately with the location and nature of the findings. Care will be exercised to avoid disturbing or damaging artifacts or fossils uncovered during operations, and the proponent will provide such cooperation and assistance as may be necessary to preserve the findings for removal or other disposition by the U.S. Government.

- Annual monitoring of the following resources will be conducted for a minimum of ten years after project completion:
    - Rio Grande silvery minnow
    - Southwestern willow flycatcher
    - Water quality
    - Vegetation

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6.0 CONSULTATION AND COORDINATION

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

Bernalillo County Flood Control Authority
Hawks Aloft
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Middle Rio Grande Conservancy District
Middle Rio Grande Endangered Species Act Collaborative Program
New Mexico Department of Game and Fish
New Mexico Environment Department
New Mexico Interstate Stream Commission
New Mexico State Historic Preservation Division
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Appendix A
Site Photos

Figure A.1. Rio Bravo North site.

Figure A.2. Rio Bravo North site.

Figure A.3. Rio Bravo South site.

Figure A.4. Rio Bravo South site.

Figure A.5. SDC Island site.

Figure A.6. SDC Island site.

Appendix B
Acronyms

ARMS - Archaeological Records Management Section
BiOp - Biological Opinion
BMP - Best Management Practice
CWA - Clean Water Act
DO- dissolved oxygen
EA – Environmental Assessment
ESA – Endangered Species Act
FR – Federal Register
ITAs - Indian Trust Assets
LWD - large woody debris
MBTA - Migratory Bird Treaty Act
MEI – Mussetter Engineering, Inc.
MOA- Memorandum of Agreement
MRG – Middle Rio Grande
MRGCD - Middle Rio Grande Conservancy District
NEPA - National Environmental Policy Act
NHPA - National Historic Preservation Act
NMAC - New Mexico Administrative Code
NMDGF - New Mexico Department of Game and Fish
NMISC – New Mexico Interstate Stream Commission
NMRPTC – New Mexico Rare Plant Technical Council
NPDES - National Pollutant Discharge Elimination System
NRHP - National Register of Historic Places
NWR - National Wildlife Refuge
OSE - Office of the State Engineer
PCPI - per capita personal income
RBN – Rio Bravo North
RBS – Rio Bravo South
RGNCSP - Rio Grande Nature Center State Park
RGVSP – Rio Grande Valley State Park
RM - River Mile
RPA – Reasonable and Prudent Alternative
SDC - South Diversion Channel
SRCP - State Register of Cultural Properties
SSED – suspended sediments
SSPA – S.S. Papadopulos & Associates, Inc
TCP - traditional cultural property
TDS- total dissolved solids
UNM – University of New Mexico
URGWOPS - Upper Rio Grande Water Operations
USACE – U.S. Army Corps of Engineers
USFWS - U.S. Fish and Wildlife Service
USGS – U.S. Geological Survey