United States Department of the Interior

FISH AND WILDLIFE SERVICE

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Memorandum

To: Area Manager, Albuquerque Area Office, Bureau of Reclamation, Albuquerque, New Mexico

From: Field Supervisor, U.S. Fish and Wildlife Service, New Mexico Ecological Services Field Office, Albuquerque, New Mexico

Subject: U.S. Fish and Wildlife Service's Biological Opinion on the Effects of the Bernalillo Priority Site Project proposed by the Bureau of Reclamation

This document transmits the U.S. Fish and Wildlife Service's (Service) biological opinion on the effects of the proposed Bernalillo Priority Site Project in the Albuquerque Reach of the Rio Grande, Bernalillo County, New Mexico. This biological opinion concerns the effects of the proposed action on the endangered Rio Grande silvery minnow (*Hybognathus amarus)* (silvery minnow), the endangered southwestern willow flycatcher (*Empidonax trailli extimus)* (flycatcher), and the threatened bald eagle (*Hailiaeetus leucocephalus)* (eagle*)*. Your request for formal consultation, in accordance with section 7 of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 531 *et seq.*) was received on October 21, 2005.

This biological opinion is based on information submitted in the Middle Rio Grande Project Bernalillo Priority Site Project Biological Assessment dated October 18, 2005; meetings between Reclamation and the Service; site visits; and other sources of information available to the Service. A complete administrative record of this consultation is on file at the Service's New Mexico Ecological Services Field Office (NMESFO).

You have determined that the proposed project may affect, is not likely to adversely affect, the flycatcher and eagle. We concur with these determinations for the following reasons:

Flycatcher

The proposed action is not expected to adversely affect flycatchers because neither suitable nor potentially suitable habitat for flycatchers currently exists within the project area. The closest occupied flycatcher habitat occurs on the Pueblo of Isleta and Ohkay Owingeh (San Juan) Pueblo, approximately 30 miles south and 70 miles north of the project area, respectively.

Habitat conditions within the project area may be improved for flycatchers as a result of splitting the river channel and redirecting the secondary river channel away from the east levee. The east river bank will be protected, vegetation will be allowed to re-establish, and the narrow band of existing vegetation will remain intact. In addition to protecting existing habitat, the proposed action will create approximately 1.43 acres (0.58 hectare) of islands or bars resulting from the deposition of sediments along the existing portion of the river channel and on the island created in between the two river channels. The islands and bars would initially be inundated at an annual frequency of 75 to 80 percent, thereby allowing only emergent vegetation to establish. However, as the islands and bars stabilize and build up, young woody riparian vegetation could establish in the center and eventually create potentially suitable flycatcher habitat. Along the east side of the existing river channel, approximately 2.36 acres (0.95 hectare) of the old channel will be filled and replanted. This would add to the existing habitat along the east side of the river channel and help ensure bank stability. The island resulting from the creation of the second channel will be replanted, further increasing the amount of potentially suitable habitat.

Eagle

Terrestrial habitat within the project area is composed of scattered cottonwoods with an understory of willow, saltcedar, Russian olive, and weed species. In addition, several snags that offer suitable perching structures for bald eagles have been identified in the project area. Bald eagles only breed in a few isolated locations in New Mexico, none are located near the project area. Wintering bald eagles are present within the Middle Rio Grande Valley and have been observed flying and perching in the project area. This population of winter migrants will not be adversely affected by the proposed action because the distance from the project area to the bald eagle wintering areas is sufficient to avoid noise impacts.

Eagles may roost within the project area. Therefore, the proposal includes requirements that the project area be surveyed daily prior to activity. If, as a result of those surveys, an eagle is observed within 0.25 mi upstream or downstream of the active project site in the morning before project activity starts, or following breaks in project activity, the contractor will suspend all activity until the bird leaves of its own volition, or a U. S. Bureau of Reclamation (Reclamation) biologist, in consultation with the Service, determines that the potential for harassment is minimal. If an eagle arrives during construction activities or is beyond that distance, construction need not be interrupted. If eagles are found consistently in the immediate project area during the construction period, Reclamation will contact the Service to determine whether formal consultation is necessary. It is expected that implementation of these actions will reduce effects to the eagle to an insignificant level.

The remainder of this biological opinion will deal with the effects of implementation of the proposed action on the silvery minnow.

Consultation History
Reclamation and the Service conducted a site visit to review the proposed project on March 30, 2005, prior to initiation of formal consultation. A Biological Assessment was received by the Service on October 21, 2005. A draft Biological Opinion was provided to Reclamation on May 28, 2006.

BIOLOGICAL OPINION

DESCRIPTION OF PROPOSED ACTION

Purpose and Objective
The Bernalillo Priority Site Project (Project) proposed by Reclamation is necessary to protect the integrity of the east levee and canal system along the Albuquerque Reach of the Middle Rio Grande between the U.S. Highway 550 bridge and the northern boundary of the Pueblo of Sandia (See Figure 1). The banks of the river are close to the east levee and pose a potentially serious threat to project facilities and public health and safety. The Project proposes to create a secondary high flow channel, realign the main river channel, and install bendway weirs to reduce bank erosion threatening the levee.

Project
The proposed action for protection of the east levee and canal system is to install a series of bendway weirs and rootwad revetments and split the existing flow into two channels (See Figure 2). The eastern channel (main channel) would follow a similar pathway to the existing river channel, except that the existing river bend would be lengthened and moved away from the levee. Existing native vegetation along the east levee would not be disturbed during the construction process and additional riparian/wetland habitat would be created as part of the proposed action (See Figure 3).

The proposed action is anticipated to occur during the summer of 2006. Features of the proposed action are described below, in the probable order in which they would occur. Construction equipment to be utilized includes bulldozers, excavators (land-track and amphibious), water trucks, scrapers, dump trucks, loaders, and motor graders.

<u>Removal/Disposal of Jetty Jacks and Exotic Vegetation</u>
Jetty jacks within the project area will be removed from the site. This process requires construction access of 30 feet to the left and right of the center line of each jetty jack line.

The removal of jetty jacks promotes more natural habitat conditions, provides better construction access for other project features, and eliminates a potential safety hazard.

Non-native vegetation, including Russian olive (*Elaeagnus angustifolia*) and saltcedar (*Tamarix* spp.) will be removed from the project area. These species are considered invasive and are often affiliated with highly altered hydrologic regimes (U.S. Bureau of Reclamation 2005b). The removal of existing cottonwood trees (*Populus* spp.) and other native plants will be minimized to the extent practical during all project phases. Removed vegetation will be mulched and spread out evenly (not to exceed a height of 12 inches) on the ground surface throughout the project area.

Secondary Channel Excavation

A secondary channel will be excavated to split the river flow into two channels at the upstream end of the existing sharp bend. The secondary channel will be excavated while the river remains in its current alignment. Earth plugs will be placed at both ends of the secondary channel until its excavation is complete. Excavated earth material will be temporarily placed between the secondary channel and the existing main channel (See Figure 2). When material is excavated from below the waterline, the excavator bucket will be tilted after it is clear of the water surface so that water can drain out of the bucket before the material is deposited on land. Once excavation is complete, the earth plugs will be removed to connect the secondary channel to the river.

The secondary channel will be approximately 780 feet, with a top width of 50-110 feet, and a depth of 4-7 feet. The gradient of the secondary channel will be the same as that of the main channel. However, over time, the main channel is expected to develop a deeper thalweg or pool feature on the outside of the bend, resulting in a maximum depth of 1-2 feet deeper than the secondary channel. During high-flow conditions, approximately one-third (about 5,000 cubic feet per second [cfs]) of the total flow is expected to flow through the secondary channel; approximately one-sixth of the total flow during low-flow conditions (about 500 cfs).

Channel Diversion and Dewatering

After the secondary channel is connected to the river, a temporary earthen berm will be built in the main channel at the upstream end of the constructed island to divert the flowing water into the secondary channel. The berm will also be used as a roadway for hauling excavated material to the eastern bankline. An additional earthen berm may be placed at the downstream end of the main channel to prevent water from backing up into active construction areas. If necessary, water remaining in the main channel may be partially dewatered using pumps. A minimum of 400 square feet of pool area with a depth of at least 3 feet will be maintained throughout the construction phase.

Bendway Weir Installation

Bendway weirs will be used in the project area to control excessive deepening and reduce adjacent riverbank erosion on the outer bank. Bendway weirs will also provide additional bank stability and reliability during high flows to protect the eastern levee against bank erosion. Scour is expected near the toe of each weir, as well as the development of a new thalweg approximately 25 feet away from the new bankline. To reduce the probability that the new thalweg will migrate outward and undermine the weirs, weir stones will be placed in the old channel on the existing grade. Weir rock placed by the excavator into the water will be released from the excavator bucket while submerged, rather than being dropped from above the water surface. Fill will be placed between and on top of the weirs to create the new bankline and floodplain surface.

A total of thirteen bendway weirs will be used in the project area: eight weirs at the bend and five additional weirs buried behind the new bankline. The purpose of the additional weirs (up to four) is to prevent outflanking by future channel meandering. The bendway weirs will be constructed of nominal D50 (~12-inch) riprap. In general, the weirs will have a top width of 3 feet and a height of 4 feet. The weir height will be larger (up to 10 feet) in localized areas where the bed of the existing channel is below the elevation of the newly constructed channel bed. The weirs that are not fully buried will extend 25 feet into the channel and have root lengths of 25-75 feet.

Main Channel Realignment

The main (eastern) channel will be realigned to lengthen the abrupt bend and move it away from the levee. The realignment will be achieved by partially filling and replanting the existing channel. Approximately 2.4 acres of the existing channel will be filled. The on-site excavated material from the secondary channel and the west side of the main channel will be used to create a new bankline and provide fill between and on top of the weir roots to create new floodplain surfaces. Fill material will be moved into place using a combination of bulldozers, scrapers, excavators, and dump trucks. Any additional earth material will be placed along the existing bankline upstream of the bendway weirs and contoured to match the existing terrace.

Fill placement and the excavation of the new main channel will occur systematically to ensure that the area of ponded water remains as one continuous pool capable of sustaining fish throughout construction. When material is excavated from below the waterline, the excavator bucket will be tilted after it is clear of the water surface so that water can drain out of the bucket. Fill material will be released from the excavator bucket while submerged, rather than being dropped from above the water surface.

Berm Removal

The earthen berms will be removed when the bendway weirs have been installed and the main channel has been realigned. Using an excavator, the downstream berm will be removed first, followed by the upstream berm. The berm material will be excavated until the berm area matches the contours of the adjacent channel areas. Excavated berm material will be placed on the central island or the east bank and will be contoured to achieve a natural appearance. When material is excavated from below the waterline, the excavator bucket will be tilted after it is clear of the water surface so that water can drain out of the bucket before the material is deposited on land. After the earthen berms are removed, the main flow of the river will return to the eastern channel, with some flow remaining in the secondary channel to the west.

Vegetation Planting

The Project is estimated to create an area of approximately 3.8 acres of predominately native bosque vegetation. The area gained in the existing channel (approximately 2.4 acres) will be replanted with riparian vegetation (broadcast seed, shrub, willow [*Salix* spp.], and cottonwood) to serve as a habitat enhancement feature. Vegetation planting will occur during an appropriate season to maximize plant survival.

Rootwads and Debris Piles

Rootwads and debris piles will be used as added bank stabilization. Upstream rootwads will protect against erosion caused by island deflection. The rootwads downstream will protect against erosion caused by eddies behind the last weir, as well as protect against the flows that will be directed at this bankline from the eastern channel. The rootwads will be placed simultaneously with the bendway weir installation.

Debris piles located at the upper point of the island will be used to ensure split flow and protect the tip of the island from erosion. Side bar woody debris piles will be used to encourage some localized scour and deposition (topographic heterogeneity) around a naturalized in-stream structure. Debris piles adjacent to the secondary channel will be placed simultaneously with the channel's excavation; debris piles adjacent to the main channel will be placed during the time the main channel is realigned.

Access and Staging

Access to the west side of the project area will occur via Arroyo Venada, from the New Mexico State Highway 528 crossing to the arroyo's mouth at the Rio Grande floodway. An alternate access to the arroyo is via Sheriff's Posse Road, which intersects U.S. Highway 550 west of the Rio Grande. Travel along Arroyo Venada will occur on the tops of the levees that parallel the arroyo. The access road proceeds northeast from the mouth of the arroyo through the floodplain to the west side of the project area. Access will also occur via an existing dirt road that leads from the downstream end of the arroyo levee to an existing access ramp several hundred feet north of the arroyo mouth. West side access roads may be periodically bladed to a maximum width of 18 feet.

Access to the east side of the project area will occur via the top of the levee, beginning at the U.S. Highway 550 bridge in Bernalillo and extending south to the construction site. An earthen ramp will be constructed to allow access from the levee top to the project area. If necessary to ensure safe and convenient access, road improvements (e.g., blading, gravel cap placement) may be made to the levee road and ramp.

Construction materials, including riprap, coir fabric, and rootwads, may be stockpiled on the terrace between the east bank of the river and the levee while construction activities are occurring. Additionally, riprap and other construction materials may be temporarily stockpiled on the terrace west of the levee at the southeast corner of the U.S. Highway 550 bridge.

At the beginning of the project, access will be primarily from the west side. After the secondary channel has been excavated and the river has been diverted into it, primary access will be from the east side. When the river is diverted into the secondary channel, most of the equipment will be between the secondary channel and the main channel. The equipment will then be used to realign the main channel. At the conclusion of the project, the equipment fleet will exit the site to the east. This procedure will minimize the need for equipment to cross flowing water in the river, though it may still occasionally be necessary.

Conservation Measures

Reclamation's construction techniques outlined above are designed to minimize direct contact with silvery minnows, and ensure that ponded water in the original main channel remains capable of sustaining silvery minnows throughout the construction process. The techniques allow silvery minnows present near the work area to move freely as a means of avoiding contact with construction equipment or personnel. Reclamation has also provided the following Environmental Commitments to minimize direct or indirect effects to silvery minnows:

1. Construction of the river channels and placement of bendway weirs and rootwad revetments will be implemented during low flows to minimize the size of the berms and amount dewatering on the construction site. Additionally, temporary berms will be used to direct river flows from the main channel to the secondary channel during the construction process.
2. Management of a refugial pool area within the construction area that provides sufficient depth and area for silvery minnows to avoid construction equipment and activities. Reclamation will coordinate site visits with the Service to evaluate the refugial pool management during construction activities.
3. All constructions spoils and waste would be disposed of at an approved landfill facility.
4. Best Management Practices will be implemented and utilized to prevent stormwater runoff and water pollution from entering the Rio Grande during construction activities.
5. A Reclamation fishery biologist will oversee construction and breaching of temporary berms for redirecting and partial dewatering of the river channel.
6. To protect aquatic habitat from spills or contamination, hydraulic lines will be protected from punctures. Additionally, all fueling will take place outside the active floodplain and all equipment will undergo cleaning and inspection prior to operation. Equipment will be parked on predetermined locations on high ground overnight.

Action Area

The action area is defined as the area from the Angostura Diversion Dam to the Isleta

Diversion Dam and the entire width of the 100 year floodplain within that reach. Silvery minnows in the immediate vicinity of the project area are likely to be directly impacted by excavation equipment used during construction of the main and secondary channels, and the dewatering of such construction areas. Silvery minnows may be indirectly affected by reduced water quality resulting from sediment disturbance and the mobilization of contaminants. Silvery minnow critical habitat may be affected temporarily, but the proposed action is expected to increase and restore potential habitat for the species.

STATUS OF THE SPECIES

Species Description

The silvery minnow currently occupies a 170-mile (275 km) reach of the middle Rio Grande, New Mexico, from Cochiti Dam, Sandoval County, to the headwaters of Elephant Butte Reservoir, Soccorro County (U.S. Fish and Wildlife Service 1994). The silvery minnow is a stout minnow, with moderately small eyes, a small, sub-terminal mouth, and a pointed snout that projects beyond the upper lip (Sublette *et al.* 1990). The back and upper sides of the silvery minnow are silvery to olive, the broad mid-dorsal stripe is greenish, and the lower sides and abdomen are silver. Maximum length attained is about 3.5 inches (90 millimeters [mm]). The only readily apparent sexual dimorphism is the expanded body cavity of ripe females during spawning (Bestgen and Propst 1994).

The silvery minnow has had an unstable taxonomic history, and in the past was included with other species of the genus *Hybognathus* due to morphological similarities. Phenetic and phylogenetic analyses corroborate the hypothesis that it is a valid taxon, distinctive from other species of *Hybognathus* (Cook *et al.* 1992, Bestgen and Propst 1994). It is now recognized as one of seven species in the genus *Hybognathus* in the United States and was formerly one of the most widespread and abundant minnow species in the Rio Grande basin of New Mexico, Texas, and Mexico (Pflieger 1980, Bestgen and Platania 1991). Currently, *Hybognathus amarus* is the only remaining endemic pelagic spawning minnow in the Middle Rio Grande. The speckled chub (*Extrarius aestivalus*), Rio Grande shiner (*Notropis jemezanus*), phantom shiner (*Notropis orca*), and bluntnose shiner (*Notropis simus simus*) are either extinct or have been extirpated from the Middle Rio Grande (New Mexico Game and Fish Department 1998b, Bestgen and Platania 1991).

<u>Legal Status</u>

The silvery minnow was federally listed as endangered under the ESA on July 20, 1994 (Service 1994). The species is also listed as an endangered species by the state of New Mexico. Primary reasons for listing the silvery minnow involved a number of factors, described in the Reasons for Listing section (below).

Critical habitat was proposed for the silvery minnow on June 6, 2002 (67 FR 39205) and was finalized on February 19, 2003 (68 FR 8088). The critical habitat designation extends approximately 157 mi (252 km) from Cochiti Dam, Sandoval County, New

Mexico downstream to the utility line crossing the Rio Grande, a permanent identified landmark in Socorro County, New Mexico. The critical habitat designation defines the lateral extent (width) as those areas bounded by existing levees or, in areas without levees, 300 ft (91.4 meters) or riparian zone adjacent to each side of the bankfull stage of the Middle Rio Grande. Some developed lands within the 300 ft lateral extent are not considered critical habitat because they do not contain the primary constituent elements of critical habitat and are not essential to the conservation of the silvery minnow. Lands located within the exterior boundaries of the critical habitat designation, but not considered critical habitat include: developed flood control facilities, existing paved roads, bridges, parking lots, dikes, levees, diversion structures, railroad tracks, railroad trestles, water diversion and irrigation canals outside of natural stream channels, the Low Flow Conveyance Channel, active gravel pits, cultivated agricultural land, and residential, commercial, and industrial developments. The Pueblo lands of Santo Domingo, Santa Ana, Sandia, and Isleta within this area are not included in the critical habitat designation. Except for these Pueblo lands, the remaining portion of the silvery minnow's occupied range in the Middle Rio Grande in New Mexico is designated as critical habitat (68 FR 8088).

Habitat

The silvery minnow travels in schools and tolerates a wide range of habitats (Sublette *et al*. 1990); yet, generally prefers low velocity (<0.33 ft per second, 10 centimeters/second [cm/sec]) areas over silt or sand substrate that are associated with shallow (< 15.8 inches, 40 cm) braided runs, backwaters or pools (Dudley and Platania 1997). Habitat for the silvery minnow includes stream margins, side channels, and off-channel pools where water velocities are low or reduced from main-channel velocities. Stream reaches dominated by straight, narrow, incised channels with rapid flows are not typically occupied by silvery minnow (Sublette *et al*. 1990, Bestgen and Platania 1991).

Adult minnows are most commonly found in backwaters, pools, and habitats associated with debris piles; whereas, Young of Year (YOY) occupy shallow, low velocity backwaters with silt substrates (Dudley and Platania 1997). A study conducted between 1994 and 1996 characterized habitat availability and use at two sites in the Middle Rio Grande at Rio Rancho and Socorro. From this study Dudley and Platania (1997) reported that the silvery minnow was most commonly found in habitats with depths less than 19.7 inches (50 cm). Over 85 percent were collected from low velocity habitats (<0.33 ft/sec, 10 cm/sec) (Dudley and Platania 1997, Watts *et al*. 2002).

<u>Critical Habitat</u>

The Service has determined the primary constituent elements (PCEs) of silvery minnow critical habitat based on studies on silvery minnow habitat and population biology (68 FR 8088). The PCEs of critical habitat for the silvery minnow include:

1. A hydrologic regime that provides sufficient flowing water with low to moderate currents capable of forming and maintaining a diversity of aquatic habitats, such as, but not limited to the following: backwaters (a body of water

connected to the main channel, but with no appreciable flow), shallow side channels, pools (that portion of the river that is deep with relatively little velocity compared to the rest of the channel), and runs (flowing water in the river channel without obstructions) of varying depth and velocity – all of which are necessary for each of the particular silvery minnow life-history stages in appropriate seasons (e.g., the silvery minnow requires habitat with sufficient flows from early spring (March) to early summer (June) to trigger spawning, flows in the summer (June) and fall (October) that do not increase prolonged periods of low or no flow, and relatively constant winter flow (November through February));

2. The presence of eddies created by debris piles, pools, or backwaters, or other refuge habitat within unimpounded stretches of flowing water of sufficient length (i.e., river miles) that provide a variation of habitats with a wide range of depth and velocities;

3. Substrates of predominantly sand or silt; and

4. Water of sufficient quality to maintain natural, daily, and seasonally variable water temperatures in the approximate range of greater than 1 ºC (35 ºF) and less than 30 ºC (85 ºF) and reduce degraded conditions (e.g., decreased dissolved oxygen, increased pH).

These PCEs provide for the physiological, behavioral, and ecological requirements essential to the conservation of the silvery minnow.

Life History

The species is a pelagic spawner that produces 3,000 to 6,000 semi-buoyant, non-adhesive eggs during a spawning event (Platania 1995, Platania and Altenbach 1999). Adults spawn in about a one-month period in late spring to early summer (May to June) in association with spring runoff. Platania and Dudley (2000, 2001) found that the highest collections of silvery minnow eggs occurred in mid- to late May. In 1997, Smith (1999b) collected the highest number of eggs in mid-May, with lower frequency of eggs being collected in late May and June. These data suggest multiple silvery minnow spawning events during the spring and summer, perhaps concurrent with flow spikes. Artificial spikes have apparently induced silvery minnows to spawn (Platania and Hoagstrom 1996). It is unknown if individual silvery minnows spawn more than once a year or if some spawn earlier and some later in the year.

Platania (2000) found that development and hatching of eggs are correlated with water temperature. Eggs of the silvery minnow raised in 30° C water hatched in approximately 24 hours while eggs reared in 20-24° C water hatched within 50 hours. Eggs were 0.06 inches (1.6 mm) in size upon fertilization, but quickly swelled to 0.12 inches (3 mm). Recently hatched larval fish are about 0.15 inches (3.7 mm) in standard length and grow about 0.005 inches (0.15 mm) in size per day during the larval stages. Eggs and larvae

Platania (1995) suggested that historically the downstream transport of eggs and larvae of the silvery minnow over long distances was likely beneficial to the survival of their populations. This behavior may have promoted recolonization of reaches impacted during periods of natural drought (Platania 1995). The spawning strategy of releasing floating eggs allows the silvery minnow to replenish populations downstream, but the current presence of diversion dams (Angostura, Isleta, and San Acacia Diversion Dams) prevents recolonization of upstream habitats (Platania 1995). As populations are depleted upstream, and diversion structures prevent upstream movements, isolated extirpations of the species through fragmentation may occur (Service 1999). Adults, eggs and larvae are also transported downstream to Elephant Butte Reservoir. It is believed that none of these fish survive because of poor habitat and predation from reservoir fishes (Service 1999).

The silvery minnow is herbivorous (feeding primarily on algae); this is indicated indirectly by the elongated and coiled gastrointestinal tract (Sublette *et al.* 1990). Additionally, detritus, including sand and silt, is filtered from the bottom (Sublette *et al.* 1990, Service 1999).

Population Dynamics

Generally, a population of silvery minnows consists of only two age classes: YOY and Age-1 (Service 1999). The majority of spawning silvery minnows are one year old. Two year old fish comprise less than 10 percent of the spawning population. High silvery minnow mortality occurs during or subsequent to spawning, consequently very few adults are found in late summer. By December, the majority (> 98 percent) of individuals are YOY (Age 0). This population ratio does not change appreciably between January and June, as Age 1 fish usually constitute over 95 percent of the population just prior to spawning.

Platania (1995) found that a single female in captivity could broadcast 3,000 eggs in eight hours. Females produce 3 to 18 clutches of eggs in a 12-hour period. The mean number of eggs in a clutch is approximately 270 (Platania and Altenbach 1996). In captivity, silvery minnows have been induced to spawn as many as four times in a year (C. Altenbach, City, *pers. comm.* 2000). It is not known if they spawn multiple times in the wild. The high reproductive potential of this fish appears to be one of the primary reasons that it has not been extirpated from the Middle Rio Grande. However, the short life span of the silvery minnow increases the population instability. When two below-average flow years occur consecutively, a short-lived species such as the silvery minnow can be impacted, if not completely eliminated from the dry reaches of the river (U.S. Fish and Wildlife Service 1999).

Distribution and Abundance

Historically, the silvery minnow occurred in 2,465 mi (3,967 km) of rivers in New Mexico and Texas. They were known to have occurred from Española upstream from Cochiti Lake; in the downstream portions of the Chama and Jemez Rivers; throughout the Middle and Lower Rio Grande to the Gulf of Mexico; and in the Pecos River from Sumner Reservoir downstream to the confluence with the Rio Grande (Sublette *et al.* 1990, Bestgen and Platania 1991). The current distribution of the silvery minnow is limited to the Rio Grande River between Cochiti Dam and Elephant Butte Reservoir, which amounts to approximately 5 percent of its historic range.

The construction of mainstem dams, such as Cochiti Dam and irrigation diversion dams have contributed to the decline of the silvery minnow. The construction of Cochiti Dam in particular has affected the silvery minnow by reducing the magnitude and frequency of flooding events that help to create and maintain habitat for the species. In addition, the construction of Cochiti Dam has resulted in degradation of silvery minnow habitat within the Cochiti Reach. Flow in the river at Cochiti Dam is now generally clear, cool, and free of sediment. There is relatively little channel braiding, and areas with reduced velocity and sand or silt substrates are uncommon. Substrate immediately downstream of the dam is often armored cobble (rounded rock fragments generally 8 to 30 cm (3 to 12 inches) in diameter). Further downstream the riverbed is gravel with some sand material. Ephemeral tributaries including Galisteo Creek and Tonque Arroyo introduce sediment to the lower sections of this reach, and some of this is transported downstream with higher flows (Service 2001, 1999). The Rio Grande below Angostura Dam becomes a predominately sand bed river with low, sandy banks in the downstream portion of the reach. The construction of Cochiti Dam also created a barrier between silvery minnow populations (Service 1999). As recently as 1978, the silvery minnow was collected upstream of Cochiti Lake; however surveys since 1983 suggest that the fish is now extirpated from this area (Service 1999).

Silvery minnow catch rates have declined two to three orders of magnitude between 1993 and 2004. Additionally, relative abundance of silvery minnows declined from approximately 50 percent of the total fish community in 1995 to about 5 percent in 2004. However, in 2004, the October density of silvery minnows was significantly higher ($p<0.05$) than in 2003 and autumnal catch rates increased by over an order of magnitude between those years. Silvery minnow catch rates in 2004 were comparable to those in 2001. Catch rates in 2005 were even higher.

The silvery minnow was the most abundant taxon in October 2005 captures; it comprised about 72 percent of the total catch (Dudley *et al.* 2005). The species was nearly twice as abundant as the next most-abundant taxon (western mosquitofish). The increase in abundance of silvery minnow in 2005 has been comparable to previous years with above average precipitation (e.g., mid 1990s) (Dudley *et al.* 2005). These monitoring results from 2005 indicate that the status of the species has improved markedly compared to fall of 2003.

Increased discharge in the Rio Grande during 2004 contrasted with the extended low-flow conditions observed throughout the Middle Rio Grande during 2003 and 2002. The timing of the 2004 runoff flow was typical of a flow increase that would normally occur at the onset of the spring runoff period. These flows likely resulted in more favorable conditions for the growth and survivorship of newly hatched silvery minnow larvae. It is possible that even low numbers of eggs and larvae could have resulted in greatly increased recruitment success because of the inundation of shoreline habitats, abandoned side channels, and backwaters. Low velocity and shallow areas provide the warm and productive habitats required by larval fishes to successfully complete their early life history.

Spring runoff in 2005 was also above average, leading to a peak of over 6,000 cfs at Albuquerque and sustained high flows (> 3,000 cfs) for more than two months. These flows improved conditions for both spawning and recruitment.

<u>Middle Rio Grande Distribution</u>
Since the early 1990's, the density of silvery minnows generally increased from upstream (Angostura Reach) to downstream (San Acacia Reach). During surveys in 1999, over 98 percent of the silvery minnows captured were downstream of San Acacia Diversion Dam (Dudley and Platania 2002). This distributional pattern has been observed since 1994 (Dudley and Platania 2002) and is attributed to downstream drift of eggs and larvae and the inability of adults to repopulate upstream reaches because of diversion dams.

In 2004 and 2005, however, Dudley *et al.* (2005 and 2006) found that this pattern reversed. Catch rates were highest in the Angostura Reach and approximately equal in the Isleta and San Acacia reaches. The Angostura Reach yielded the most silvery minnow (n=2,226) in 2004, followed by the Isleta Reach (n=442), and San Acacia Reach (n=371). The pattern was likely caused by good spawning conditions (i.e., high and sustained spring runoff) throughout the Middle Rio Grande during April and May followed by wide-scale drying in the Isleta and San Acacia reaches from June-September. High spring runoff and perennial flow in the Angostura Reach appeared to result in relatively high survival and recruitment of larval and juvenile RGSM compared to previous drought years (2002-2003). In contrast, large portions of the Rio Grande south of Isleta Diversion Dam were dewatered in 2004 and young RGSM in these areas were either subjected to poor recruitment conditions (i.e., lack of nursery habitats during low flows) or they were trapped in drying pools where they perished.

Sampling in early 2006 indicates populations are again higher downstream. Of the 6,143 silvery minnows caught in March 2006, 33 were found in Angostura, 2,445 were found in the Isleta Reach, and 3,665 were caught in the San Acacia Reach. Silvery minnow catch rates were 0.19 per 100 m^2 in the immediate project area.

Reasons for Listing/Threats to Survival

The silvery minnow was federally listed as endangered for the following reasons:

1. Regulation of stream waters, which has led to severe flow reductions, often to the point of dewatering extended lengths of stream channel;

2. Alteration of the natural hydrograph, which impacts the species by disrupting the environmental cues the fish receives for a variety of life functions, including spawning;

3. Both the stream flow reductions and other alterations of the natural hydrograph throughout the year can severely impact habitat availability and quality, including the temporal availability of habitats;

4. Actions such as channelization, bank stabilization, levee construction, and dredging result in both direct and indirect impacts to the silvery minnow and its habitat by severely disrupting natural fluvial processes throughout the floodplain;

5. Construction of diversion dams fragment the habitat and prevent upstream migration;

6. Introduction of nonnative fishes that directly compete with, and can totally replace the silvery minnow, as was the case in the Pecos River, where the species was totally replaced in a time frame of 10 years by its congener the plains minnow (*Hybognathus placitus*); and

7. Discharge of contaminants into the stream system from industrial, municipal, and agricultural sources also impact the species (Service 1993b, 1994).

These reasons for listing continue to threaten the species throughout its currently occupied range in the Middle Rio Grande.

Recovery Efforts

The final recovery plan for the silvery minnow was released in July 1999 (Service 1999) and is currently undergoing revision. The primary objectives for recovery are to increase numbers of the silvery minnow, enhance its habitat in the Middle Rio Grande valley, and to reestablish the species in at least three other areas of its historic range.

ENVIRONMENTAL BASELINE

Drought, as an overriding condition of the last decade in the southwest, is an important factor in the environmental baseline. The Rio Grande basin has received below normal precipitation, only adding to the long-term moisture deficits.

Stream conditions in 2004 and 2005 were improved over previous years. The United States Geological Survey (USGS) in Albuquerque, New Mexico reported that stream flow conditions for in 2005 were well above average to significantly above average statewide leading to a peak of over 6,000 cfs at Albuquerque and sustained high flows (> 3,000 cfs) for more than two months. These flows improved conditions for both spawning and recruitment. Despite good runoff, reservoir levels continue to be below average across the state. It would take a least another year or two of well above average precipitation to reach pre-drought reservoir conditions. The spring forecast for 2006 indicates runoff will be well below average. Streamflow is predicted to be between 10 and 67 percent of average (NRCS; http://www.nm.nrcs.usda.gov/snow/watersupply/nr0604.html)

Status of the Species within the Action Area

Past actions have eliminated and severely altered habitat conditions for the silvery minnow. These actions can be broadly categorized as changes to the natural hydrology of the Rio Grande and changes to the morphology of the channel and floodplain. Other factors that influence the environmental baseline are water quality, the release of captively propagated silvery minnows, silvery minnow rescue efforts, on-going research efforts, and past projects in the Middle Rio Grande. Also of importance is the current drought, the expected weather pattern for the near future, and how it may affect flow in the Rio Grande. Each of these topics is discussed below.

<u>Changes in Hydrology</u>

There have been two primary changes in hydrology as a result of the construction of dams on the Rio Chama and Rio Grande that affect the silvery minnow: Loss of water and changes to the magnitude and duration of peak flows.

Loss of Water

Prior to measurable human influence on the system, up to the fourteenth century, the Rio Grande was a perennially flowing, aggrading river with a shifting sand substrate (Biella and Chapman 1977). There is now strong evidence that the Middle Rio Grande first began drying up periodically after the development of Colorado's San Luis Valley in the mid to late 1800s (Scurlock 1998). After humans began exerting more influence on the river, there are two documented occasions when the river became intermittent; during prolonged, severe droughts in 1752 and 1861 (Scurlock 1998). The silvery minnow historically survived low-flow periods because such events were infrequent and of lesser magnitude than they are today. There were also no diversion dams to block repopulation of upstream areas, the fish had a much greater geographical distribution, and there were oxbow lakes, cienegas, and sloughs that supported fish until the river became connected again.

Water management and use has resulted in a large reduction of suitable habitat for the silvery minnow. Agriculture accounts for 90 percent of surface water consumption in the Middle Rio Grande (Bullard and Wells 1992). The average annual diversion of water in the Middle Rio Grande by the MRGCD was 535,280 af (65,839 hectare-meters) for the period from 1975 to 1989 (Reclamation 1993). In 1990, total water withdrawal (groundwater and surface water) from the Rio Grande Basin in New Mexico was 1,830,628 af, significantly exceeding a sustainable rate (Schmandt 1993). Water withdrawals have not only reduced overall flow quantities, but also caused the river to become locally intermittent and/or dry for extended reaches. Irrigation diversions and drains significantly reduce water volumes in the river. However, the total water use (surface and groundwater) in the Middle Rio Grande by the MRGCD may range from 28 – 37 percent (S.S. Papadopulos & Associates, Inc. 2000; U.S. Geological Survey 2002). In addition, a portion of the water diverted by the MRGCD returns to the river and may be re-diverted (in some cases more than once) (Bullard and Wells 1992; MRGCD, *in litt.* 2003).

River reaches particularly susceptible to drying are immediately downstream of the Isleta Diversion Dam (river mile 169), a 5 mile (8 km) reach near Tome (river miles 150-155), a 5 mile (8 km) reach near the U.S. Highway 60 Bridge (river miles 127-132), and an extended 36 mile (58 km) reach from near Brown's Arroyo (downstream of Socorro) to Elephant Butte Reservoir. Extensive fish kills, including tens of thousands of silvery minnows, have occurred in these lower reaches when the river has dried (C. Shroeder, Service, *pers. comm.* 2002). Since 1996, an average of 32 miles of the Rio Grande has dried, mostly in the San Acacia Reach. The most extensive drying has occurred in the last two years when 70 and 68 miles, respectively, were dewatered. Most documented drying events lasted an average of two weeks, before flows returned.

Predatory birds have been seen hunting and consuming fish from isolated pools during river intermittence (J. Smith, NMESFO, *pers. comm.* 2003). Although the number of fish present in any pool is unknown, it must be assumed that many of the fish preyed upon in these pools are silvery minnows. Thus, while some dead silvery minnows were collected during the shorter drying events, it is assumed that many more mortalities occurred than were documented.

Changes to Size and Duration of Peak Flows
Water management has also resulted in a loss of peak flows that historically initiated spawning. The reproductive cycle of the silvery minnow is tied to the natural river hydrograph. A reduction in peak flows and/or improper timing of flows may inhibit reproduction. Since completion of Elephant Butte Dam in 1916, four additional dams have been constructed on the middle Rio Grande, and two have been constructed on one of its major tributaries, the Rio Chama (Scurlock 1998). Construction and operation of these dams, which are either irrigation diversion dams (Angostura, Isleta, San Acacia) or flood control and water storage dams (Elephant Butte, Cochiti, Abiquiu, El Vado), have modified the natural flow of the river. Mainstem dams store spring runoff and summer inflow, which would normally cause flooding, and release this water back into the river

channel over a prolonged period of time. These releases are often made during the summer months, when low flows would normally occur. The releases depart significantly from natural conditions, and can substantially alter the natural habitat. At other times, artificially low flows may limit the amount of habitat available to the species and may also limit dispersal of the species (Service 1999).

In the spring of 2002 and 2003, there was concern that silvery minnows would not spawn because of a lack of spring runoff due to an extended drought. River discharge was artificially elevated through short duration reservoir releases during May to induce spawning by Rio Grande silvery minnow. In response to the releases, significant silvery minnow spawning occurred and was documented in all reaches except the Cochiti Reach (S. Gottlieb, UNM, *in litt.* 2002; Dudley et al. 2004). Fall populations in 2003 and 2004 continued to decrease despite large spawning events, indicating a lack of recruitment.

Mainstem dams and the altered flows they create can affect habitat by preventing overbank flooding, trapping nutrients, altering sediment transport regimes, prolonging summer base flows, and creating reservoirs that favor non-native fish species. These changes may affect the silvery minnow by reducing its food supply, altering its preferred habitat, preventing dispersal, and providing a continual supply of non-native fish that may compete with or prey upon the species. Altered flow regimes may also result in improved conditions for other native fish species that occupy the same habitat, causing those populations to expand at the expense of the silvery minnow (Service 1999).

In addition to providing a cue for spawning, flood flows also maintain a channel morphology to which the silvery minnow is adapted. The changes in channel morphology that have occurred from the loss of flood flows are discussed below.

<u>Changes in Channel Morphology</u>

Historically, the Rio Grande was sinuous, braided, and freely migrated across the floodplain. Changes in natural flow and sediment regimes, narrowing and deepening of the channel, and restraints to channel migration (i.e., jetty jacks) adversely affect the silvery minnow. These effects result directly from constraints placed on channel capacity by structures built in the floodplain and a trapping of sediment behind Cochiti dam (Porter and Massong 2005). These environmental changes have and continue to degrade and eliminate spawning, nursery, feeding, resting, and refugia areas required for species' survival and recovery (Service 1993a).

The active river channel through the reaches where the silvery minnow persists in the Angostura and San Acacia Reaches is being narrowed by the encroachment of vegetation, resulting from continued low flows and the lack of overbank flooding. The lack of flood flows has allowed non-native riparian vegetation such as salt cedar and Russian olive to encroach on the river channel (Reclamation 2001). These non-native plants are very resistant to erosion, resulting in narrowing of the channel. When water is confined to a narrower cross-section, increases in its velocity occur. Fine sediments such as silt and sand are carried away leaving coarser bed materials such as gravel and cobble. Habitat studies during the winter of 1995 and 1996 (Dudley and Platania 1996), demonstrated that a wide, braided river channel with low velocities resulted in higher catch rates of silvery minnows, and narrower channels resulted in fewer fish captured. The availability of wide, shallow habitats at various flows that are important to the silvery minnow is decreasing. Narrow channels have few backwater habitats with low velocities that are important for silvery minnow fry and juveniles.

Within the current range of the silvery minnow, human development and use of the floodplain have greatly restricted the width available to the active river channel. A comparison of river area between 1935 and 1989 shows a 52 percent reduction, from 26,598 acres (10,764 ha) to 13,901 acres (5,626 ha) (Crawford *et al.* 1993). These data refer to the Rio Grande from Cochiti Dam downstream to the "Narrows" in Elephant Butte Reservoir. Within the same stretch, 234.6 miles (378 km) of levees occur, including levees on both sides of the river. Analysis of aerial photography taken by Reclamation in February 1992, for the same river reach, shows that of the 180 miles (290 km) of river, only 1 mile (1.6 km), or 0.6 percent of the flood plain has remained undeveloped.

Development in the flood plain, makes it difficult, if not impossible, to send large quantities of water downstream that would create low velocity side channels that the silvery minnow prefers. As a result, reduced releases have decreased available habitat for the silvery minnow and allowed encroachment of non-native species into the floodplain.

Water Quality

Both point (pollution discharges from a pipe) and non-point (diffuse sources of pollution) sources affect the Middle Rio Grande. Major point sources are waste water treatment plants (WWTPs) and feedlots. Major non-point sources include agricultural activities (e.g., fertilizer and pesticide application, livestock grazing), storm water run off, and mining activities.

Effluents from WWTPs contain contaminants that may affect the water quality of the river. It is anticipated that WWTP effluent may be the primary source of perennial flow in the lower portion of the Angostura Reach during extended periods of intermittency. For that reason the water quality of the effluent is extremely important. In the project area, the largest WWTP discharges are from Albuquerque, followed by Rio Rancho (2 WWTP) and Bernalillo (mean annual discharge flows are 80.4, 2.5, 0.9, and 0.7 cfs, respectively) (Bartolino and Cole 2002). Since 1998, total residual chlorine (chlorine) and ammonia, as nitrogen (ammonia), have been discharged unintentionally at concentrations that exceed protective levels for the silvery minnow.

Albuquerque WWTP effluent discharge records show that during November 1999, the monthly maximum chlorine concentration in the outfall was 0.49 milligrams per liter (mg/L). Additionally, on February 23, 2003, the concentration of chlorine in the outfall was reported to be 0.70 mg/L (C. Abeyta, Service, *in litt.* 2003; D.S. Dailey, City, *in litt.* 2003). Chlorine concentrations of 0.013 mg/L can be harmful to the silvery minnow.

Records also show that the monthly maximum concentration of ammonia during July 2001 was 14 mg/L. At pH 8 and water temperature of 25 °C, ammonia concentrations as low of 3.1 mg/L can be harmful to larval fathead minnow (U. S. Environmental Protection Agency 1999). The fathead minnow has been suggested as a surrogate to evaluate the effects of various chemicals on the silvery minnow (Buhl 2002).

Although we do not have complete records for the other WWTPs, in the summer of 2000, the Rio Rancho WWTP released approximately one million gallons of raw sewage into the Rio Grande. Chlorine treatment was maximized in an attempt to reduce the public health risk. Ammonia was reported at 37 mg/L on July 13, 2000, and at 17.1 mg/L on July 27, 2000 (City of Rio Rancho, *in litt.* 2000). Nonetheless, no violations of chlorine or ammonia effluent limits were recorded. This suggests that the averaging of measurements and/or the frequency of water quality measurements is insufficient to detect water quality situations that would be toxic to silvery minnows. The Rio Rancho WWTP now uses ultraviolet disinfection (Dee Fuerst, City of Rio Rancho, *pers. comm.* 2003) so the release of chlorine should no longer occur. However, high concentrations of ammonia could still be discharged during an upset. The Bernalillo WWTP is still operating under a permit issued in 1988 that does not restrict the discharge of lethal concentrations of chlorine to the Rio Grande. The extent of impact from this discharge to the Rio Grande is unknown. A new permit is under review that will regulate chlorine and ammonia discharges, although the risk of accidental discharges would remain.

In addition to chlorine and ammonia, WWTP effluents may also include cyanide, chloroform, organophosphate pesticides, semi-volatile compounds, volatile compounds, heavy metals, and pharmaceuticals and their derivatives, which can pose a health risk to silvery minnows when discharged in concentrations that exceed the protective water quality criteria (J. Lusk, Service, *in litt*. 2003). Even if the concentration of a single element or compound is not harmful by itself, chemical mixtures may be more than additive in their toxicity to silvery minnows (Buhl 2002). The long-term effects and overall impacts of chemicals on the silvery minnow are not known.

Large precipitation events wash sediments and pollutants into the river from surrounding lands through storm drains and intermittent tributaries. Contaminants of concern to the silvery minnow that are frequently found in storm water include the metals aluminum, cadmium, lead, mercury, and zinc, organics such as oils, the industrial solvents trichloroethene and tetracholoroethene (TCE), and the gasoline additive methyl tert-butyl ether (USGS 2001).

Harwood (1995) studied the North Floodway Channel (Floodway) of Albuquerque, which drains an urban area of about 90 square miles and crosses Pueblo of Sandia lands. He found that storm water contributions of dissolved lead, zinc, and aluminum were significant and posed a threat to the water quality of the Rio Grande. Because the Floodway crosses lands of the Pueblo of Sandia and enters their portion of the Rio Grande, the pueblo requested that the Environmental Protection Agency conduct toxicity tests on water in the Rio Grande collected below the Floodway. Aquatic crustaceans exposed to this water were found to have significant reproductive impairment and mortality when compared with controls. Additionally, larval fish also experienced significant mortality and/or narcosis when exposed to water and bed sediment collected from this same area on April 22, 2002 (http://oaspub.epa.gov/enviro/pcs det_reports. detail_report?npdesid=NM0022250). This study indicates that storm water runoff can impact the water quality of the Rio Grande and the aquatic organisms that live in the river.

Sediment is the sand, silt, organic matter, and clay portion of the river bed, or the same material suspended in the water column. Ong *et al.* (1991) recorded the concentrations of trace elements and organochlorine pesticides in suspended sediment and bed sediment samples collected from the Middle Rio Grande between 1978 and 1988. These data were compared to numerical sediment quality criteria (Probable Effects Criteria [PEC]) proposed by MacDonald *et al.* (2000). According to MacDonald *et al.* (2000) most of the PECs provide an accurate basis for predicting sediment toxicity to aquatic life and a reliable basis for assessing sediment quality in freshwater ecosystems. Although PECs were developed to assess bed (bottom) sediments, they also provide some indication of the potential adverse effects to organisms consuming these same sediments when suspended in the water column.

Semi-volatile organic compounds are a large group of environmentally important organic compounds. Three groups of compounds, polycyclic aromatic hydrocarbons (PAHs), phenols, and phthalate esters, were included in the analysis of bed sediment collected by the USGS (Levings *et al.* 1998). These compounds were abundant in the environment, are toxic and often carcinogenic to organisms, and could represent a long-term source of contamination. The analysis of the PAH data by Levings *et al.* (1998) show one or more PAH compounds were detected at 14 sites along the Rio Grande with the highest concentrations found below the Cities of Albuquerque and Santa Fe. Polycyclic aromatic hydrocarbons and other semi-volatile compounds affect the sediment quality of the Rio Grande and may affect silvery minnow behavior, habitat, feeding, and health.

Pesticide contamination occurs from agricultural activities, as well as from the cumulative impact of residential and commercial landscaping activities. The presence of pesticides in surface water depends on the amount applied, timing, location, and method of application. Water quality standards have not been set for many pesticides, and existing standards do not consider cumulative effects of several pesticides in the water at the same time. Roy *et al.* (1992) reported that DDE, a degradation product of DDT, was detected most frequently in whole body fish collected throughout the Rio Grande. He suggested that fish in the lower Rio Grande may be accumulating DDE in concentrations that may be harmful to fish and their predators.

In addition to the compounds discussed above, several other constituents are present and affect the water quality of the Rio Grande. These include nutrients such as nitrates and phosphorus, total dissolved solids (salinity), and radionuclides. Each of these also has the potential to affect the aquatic ecosystem and health of the silvery minnow. As the river dries, pollutants will be concentrated in the isolated pools. Even though these pollutants do not cause the immediate death of silvery minnows, the evidence suggests that the amount and variety of pollutants present in the Rio Grande, could compromise their health and fitness (Rand and Petrocelli 1985).

<u>Silvery Minnow Propagation and Augmentation</u>

In 2000, the Service identified captive propagation as an appropriate strategy to assist in the recovery of the silvery minnow. Consistent with Service policy (65 FR 183), captive propagation is conducted in a manner that will, to the maximum extent possible, preserve the genetic and ecological distinctiveness of the silvery minnow and minimize risks to existing wild populations.

Silvery minnows are currently housed at four facilities in New Mexico including: the Dexter Fish Hatchery; New Mexico State University Coop Unit (Las Cruces); the Service's New Mexico Fishery Resources Office (NMFRO), and the City of Albuquerque's propagation facilities. These facilities are actively propagating and rearing silvery minnows. Silvery minnows are also held in South Dakota at the USGS, Biological Resources Division (BRD) Lab, but there is no active spawning program at this facility.

Since 2000 more than 600,000 silvery minnows have been propagated using both adult wild silvery minnows and wild caught eggs and then released into the wild. Wild gravid adults are successfully spawned in captivity at the City of Albuquerque's propagation facilities. Eggs are raised and released as larval fish. Marked fish have been released by the NMFRO since 2002 under a formal augmentation effort funded by the Collaborative Program. Silvery minnows are released into the Angostura reach of the river near Alameda Bridge to ensure downstream repopulation. Eggs left in the wild have a very low survivorship and this ensures that an adequate number of spawning adults are present to repopulate the river each year. While hatcheries continue to successfully spawn silvery minnows, wild eggs are collected to ensure genetic diversity within the remaining population.

<u>Ongoing Research</u>

There is ongoing research by the NMFRO and University of New Mexico (UNM) to examine the movement of silvery minnows. Augmented fish are marked with a visible fluorescent elastomer tag and released in large numbers in a few locations. Crews sample upstream and downstream from the release site in an attempt to capture the marked fish. Preliminary results indicate that the majority of silvery minnows disperse a few miles downstream. One individual was captured 15.7 miles (25.3 km) upstream from its release site (Platania, *et al.*2003). Monitoring within 48 hours after the release of the 41,500 silvery minnows resulted in the capture of 937 fish. Of these, 928 were marked and 927 were collected downstream of the release point.

In 2002, a hybridization study involving the plains minnow and silvery minnow was conducted to determine the genetic viability of hybrids. Plains minnow are found in the

Pecos river where reintroduction of silvery minnow is being considered. The results are preliminary because the number of trials was low and because there is some question about the fitness of the females used in the experiments. The plains minnow and silvery minnow did spawn with each other and the hybrid eggs hatched. However, none of the larvae lived longer than 96 hours. The control larvae (non-hybrids) for both the plains minnow and silvery minnow lived until the end of the study (24 days) (Caldwell 2002).

Due to the increased efforts in captive propagation, recent studies by UNM have focused on the genetic composition of the silvery minnow. This research indicates that the net effective population size (Ne) (the number of individuals that contribute to maintaining the genetic variation of a population) of the silvery minnow in the wild is between 60-250 fish (T. Turner, UNM, *pers. comm*. 2003). It has been suggested that a Ne of 500 fish is needed to retain the long-term adaptive potential of a population (Franklin 1980). No significant genetic differences have been found in populations isolated in the different reaches of the Rio Grande (D. Alo UNM, *pers. comm*. 2002). Because the number of wild fish in the river appears to be low, the addition of thousands of silvery minnows raised in captivity could impact the genetic structure of the population. The propagation effort should be sufficient to maintain 100,000 to 1,000,000 fish in the wild (T. Turner, UNM, *pers. comm.* 2003). For instance if it were determined that 50,000 silvery minnow were in the wild, a minimum of 50,000 adult fish should be in propagation facilities. We do not know how many fish are in the wild so it is difficult at this time to determine the exact number needed in propagation facilities. However, to insure against a catastrophic event where most wild fish are lost, it is suggested that 100,000 to 1,000,000 silvery minnow should be kept in propagation facilities to maintain a sufficient amount of genetic variability for propagation efforts (T. Turner, UNM, *pers. comm*. 2003). Approximately 300,000 silvery minnows are currently being maintained in captivity (M. Ulibarri, USFWS *pers. comm*. 2005).

<u>Permitted and/or Authorized Take</u>

Take is authorized by section 10, and incidental take is permitted under section 7. These permits and/or authorizations are issued by the Service. Applicants for section 10 permits must also acquire a permit from the State to "take" or collect silvery minnows. Many of the permits issued under section 10 allow take for the purpose of collection and salvage of silvery minnows and eggs for captive propagation. Eggs, larvae, and adults are also collected for scientific studies to further our knowledge about the species and how best to conserve the silvery minnow. Since 2000, the Service has reduced the amount of take permitted for voucher specimens as a result of the increasingly precarious status of the species in the wild.

Incidental take of silvery minnows is authorized through section 7 consultation associated with the March 2003, programmatic biological opinion on water operations and maintenance in the Middle Rio Grande, the City of Albuquerque Drinking Water project, the Isleta Island Removal Project, the Tiffany Plug Removal Project, and the Interstate Stream Commission's (ISC) Habitat Restoration Project.

Factors Affecting Species Environment within the Action Area

On the Middle Rio Grande, the following past and present federal, state, private, and other human activities, in addition to those discussed above, have affected the silvery minnow and its critical habitat:

1. Release of Carryover Storage from Abiquiu Reservoir to Elephant Butte Reservoir: The Army Corps of Engineers (Corps) consulted with the Service on the release of water during the winter of 1995. Ninety-eight thousand af (12,054 hectare-meters) of water was released from November 1, 1995 to March 31, 1996, at a rate of 325 cfs (9.8 cm). This discharge is above the historic winter flow rate. Substantial changes in the flow regime that do not mimic the historic hydrograph can be detrimental to the silvery minnow.

2. Corrales, Albuquerque, and Belen Levees: These levees contribute to floodplain constriction and habitat degradation for the silvery minnow. Levees at these sites result in a reduction in the amount and quality of suitable habitat for the silvery minnow.

3. Santa Ana River Restoration Project: In August 1999, Reclamation consulted with the Service on a restoration project located on Santa Ana Pueblo in an area where the river channel was incising and eroding into the levee system. This project included a Gradient Restoration Facility (GRF), channel re-alignment, bioengineering, riverside terrace lowering, and erodible bank lines. The primary component of the Santa Ana Restoration Project is the GRF, which should control river hydraulics upstream of its location and also river bed control. The GRF was designed to: (1) store more sand sediments at a stable slope for the current sediment supply; (2) decrease the velocities and depths and increase the width in the river channel upstream; (3) be hydraulically submerged at higher flows while simultaneously increasing the frequency and duration of overbank flows upstream; (4) provide velocities and depths suitable for passage of the silvery minnow through the structure; and (5) halt or limit further channel degradation upstream of its location. The channel re-alignment involved moving the river away from the levee system and over the grade control structure, and involves excavation of a new river channel and floodplain. Another significant component of the Santa Ana Restoration project is riverside terrace lowering for the creation of a wider floodplain. The bioengineering and deformable bank lines also assist in establishing the new channel bank and regenerating native species vegetation in the floodplain.

4. Creation of a Conservation Pool for Storage of Native Water in Abiquiu and Jemez Canyon Reservoirs and Release of a Spike Flow: The City of Albuquerque created space (100,000 af) in Abiquiu Reservoir and the Corps created space in Jemez Canyon Reservoir to store Rio Grande Compact credit water for use in 2001, 2002, and 2003 for the benefit of listed species. The

conservation pool was created with the understanding that the management of this water would be decided in later settlement meetings or during water operations conference calls. In addition, a supplemental release (spike) occurred in May 2001 to accommodate movement of sediment as a part of habitat restoration and construction on the Rio Grande and Jemez River on the Santa Ana Pueblo.

5. Programmatic Biological Opinion on the Effects of Actions Associated with the U. S. Bureau of Reclamation's, U.S. Army Corps of Engineers', and non-federal Entities' Discretionary Actions Related to Water Management on the Middle Rio Grande: The Service completed this biological opinion on March 17, 2003, determining the effects of water management by the applicants on the silvery minnow and flycatcher. This biological opinion had one RPA with several elements. These elements set forth a flow regime in the Middle Rio Grande and described habitat improvements necessary to alleviate jeopardy to both the silvery minnow and flycatcher.

6. Albuquerque Drinking Water Project: The Drinking Water Project, involves the construction and operation of: (1) A new surface diversion dam north of Paseo del Norte Bridge, (2), conveyance of raw water from the point of diversion to the new water treatment plant, (3) a new water treatment plant on Chappell Road NE, (4) transmission of treated (potable) water to residential and commercial customers throughout the Albuquerque metropolitan area, and (5) aquifer storage and recovery. During typical operations, the project will divert a total of 94,000 acre-feet per year (afy) of raw water from the Rio Grande (47,000 afy of City San Juan-Chama water and 47,000 afy of Rio Grande native water) at a near constant rate of about 130 cubic-feet per second (cfs) (3.68 cms). Peak diversion operations will consist of up to 103,000 afy being diverted at a rate of up to 142 cfs (4.02 cms). A new water treatment plant with a normal operating rate of 84 million gallons per day (mgd) (381.9 million liters per day [mld]) and a peak capacity of about 92 mgd (418.2 mld) or 142 cfs (4.02 cms) will be constructed as part of the proposed action. Consultation on this project was completed in October, 2003. Construction is currently underway.

7. Silvery minnow salvage and relocation: During river drying, the Service's silvery minnow salvage crew captures and relocates silvery minnows. Since 1996, nearly 700,000 silvery minnow have been rescued and relocated to wet reaches, the majority of which were released in the Angostura Reach. Over 600,000 of the 700,000 silvery minnows salvaged were rescued in 2005. Of these, 96.3 percent were transported alive (Service 2006). The effect of translocating silvery minnows on the population is not known.

8. Habitat Restoration Projects: Several habitat restoration projects have been completed in the Albuquerque reach through the Collaborative Program.

These projects include two woody debris installation projects to encourage the development of pools and wintering habitat, and a river bar modification project south of the I-40 Bridge designed to create side and backwater channels on an existing bar as well as modify the top surface of the bar to create habitat over a range of flows. Additionally, this winter, the ISC started a multi-year habitat restoration program that implements several island, bar, and bank line modification techniques throughout the Albuquerque Reach. Approximately 24 acres of habitat were restored in the Phase I

Summary

The remaining population of the silvery minnow is restricted to approximately 5 percent of its historic range. Every year since 1996, there has been at least one drying event in the river that has further reduced the silvery minnow population. The population is unable to expand its distribution because three diversion dams currently block upstream movement and Elephant Butte Reservoir blocks downstream movement (Service 1999). Augmentation of silvery minnows with captive-reared fish will continue, however, continued monitoring and evaluation of these fish is necessary to obtain information regarding the survival and movement of individuals.

Water withdrawals from the river and water releases from dams severely limit the survival of silvery minnows. The consumption of shallow groundwater and surface water for municipal, industrial, and irrigation uses continues to reduce the amount of flow in the Rio Grande and eliminate habitat for the silvery minnow (Reclamation 2002). However, under state law, the municipal and industrial users are required to offset the effects of groundwater pumping on the surface water system. The City of Albuquerque, for example, has been offsetting their surface water depletions with 60,000 af per year (Reclamation 2002). The combined effect of water withdrawals and the drought mean that discharge from WWTPs and irrigation return flows will have greater importance to the silvery minnow and a greater impact on water quality. Lethal levels of chlorine and ammonia have been released from the WWTPs in the last several years. In addition, a variety of organic chemicals, heavy metals, nutrients, and pesticides have been documented in storm water channels feeding into the river and contribute to the overall degradation of water quality.

Although various conservation efforts have been undertaken in the past and others are currently being carried out in the middle Rio Grande, and abundance in recent years is increasing, the threat of extinction for the silvery minnow continues because of the high probability of continued drought, the fragmented and isolated nature of currently occupied habitat, and the absence of silvery minnows in other parts of the historic range. The increased abundance of silvery minnow in 2004 and 2005 is a positive sign. Nevertheless, the threats that endanger this species have not been eliminated.

EFFECTS OF THE ACTION

Effects of the action refer to the direct and indirect effects of an action on the species or critical habitat, together with the effects of other activities that are interrelated and interdependent with that action, which will be added to the environmental baseline. Indirect effects are those that are caused by the proposed action and are later in time, but are still reasonably certain to occur.

Silvery minnows are present in the Albuquerque reach (Dudley et al. 2005), and are expected to be present within the action area. The primary adverse effects of the proposed action on the silvery minnows result from the presence of heavy equipment in the water during river maintenance and channel construction activities, excavation below the bankline, and deposition of sediment into the river. Adverse effects may also result from the mobilization of contaminants in the channel and along access points. The project is also expected to have beneficial effects to silvery minnows as habitat conditions improve and additional suitable habitat is created.

Direct Effects

Adverse effects to silvery minnows are anticipated for those individuals present in the immediate project area. Direct impacts to silvery minnows are likely to occur from equipment used during the excavation of the main and secondary river channels, and the dewatering of such construction areas. The secondary river channel will be excavated within a presently dry portion of the existing floodway, with earthen plugs placed at the upstream and downstream ends of the channel. Such construction techniques are used to minimize contact with silvery minnows and the potential for harm or harassment. However, silvery minnows may be crushed or removed from the water by the excavation equipment as the newly created secondary channel meets the existing floodway, both at the upstream and downstream ends. Also, silvery minnows may be crushed or removed from the water during the berm removal process.

Following the construction of the secondary channel, earthen berms will be placed on the upstream and downstream ends of the main channel to redirect water into the secondary channel. These berms will create a pooled area, to be managed as a temporary refugia area for silvery minnows to avoid construction activities. Yet, within this refugia area, silvery minnows may be harmed or harrassed by personnel and/or the use of equipment within this area. Direct impacts to silvery minnows will be minimized in the refugia area, for the area allows the silvery minnows to freely move around to avoid contact with the equipment or personnel. Also, personnel will operate equipment to facilitate avoidance and escapement of silvery minnows and other fish in the construction area.

Construction activities are scheduled to occur during the summer, fall and winter months of 2006, when river flows are lower. After the completion of the secondary channel, the main channel will be partially dewatered for construction activities. Partial dewatering may harm silvery minnows that become stranded in small disconnected pools. To minimize impacts to the species, Reclamation will coordinate with the Service on the need for silvery minnows to be transported away from the project area.

Indirect Effects

Reduced water quality through the presence of equipment in the river and disturbance of sediment may have an indirect effect on silvery minnows. During access to the project area, equipment may cross flowing water in the river, creating the potential for disturbed sediment and associated contaminants to disperse downstream and affect water quality. When in shallow water, equipment may disturb the water-sediment interface (Reclamation 2005a). Sediment disturbance may also occur in areas where new low-flow habitat is being created (e.g., bendway weirs). Additionally, the possibility of spills or contaminants associated with heavy equipment and fuel use, has the potential to adversely affect water quality for the silvery minnow. To reduce indirect effects to silvery minnows from reduced water quality, Reclamation has designed their access to the project area in such a way as to reduce the need for equipment to enter the river channel. Conservation measures (page 7) will minimize the likelihood of contaminants related to spills. The increase in bottom substrate disturbance and reduction in water quality are expected to have minimal effects to silvery minnows.

Beneficial Effects

The proposed action will benefit the silvery minnow through the restoration of their habitat. Splitting the river flow into two channels increases the width-to-depth ratio of the river. The resulting decrease in depth and velocity benefits juvenile and adult silvery minnows by increasing the total amount of preferred habitat conditions (<40 cm deep and <10 cm/s water velocity) (Reclamation 2005b). The decrease in water velocity also allows sediment deposition to occur in the shallower channel, improving habitat conditions. In addition, areas of low velocities and sediment deposition provide favorable conditions for all life stages of silvery minnows. The proposed action is anticipated to create 70,200 square feet (1.6 acres) of suitable habitat for the species (Reclamation 2005b).

The placement of bendway weirs benefits the silvery minnow by creating shallow river habitat with low-velocity flow and sand or silt substrate, which the species prefers. Bendway weirs direct the high-velocity flow away from the outside bend and provide a series of eddies and low-flow habitats that allow settling of smaller sediments in the space between the weirs. With each bendway weir extending approximately 25 feet into the channel and a total length of affected river being approximately 1,115 feet, the maximum possible area of improved silvery minnow habitat will be approximately 27,900 square feet (0.64 acre) (Reclamation 2005b).

Rootwad revetments may provide natural instream shelter to silvery minnows. Such features provide natural habitat for juvenile and adult silvery minnow by slowing current velocities in microhabitats surrounding these features and providing cover.

In the short term, the proposed action may adversely affect individual silvery minnows; yet, in the long term, the quality and quantity of suitable habitat in this reach of the river will increase, leading to improvements in the status of silvery minnows far into the future. Over a longer period, channel realignment at this location will have a beneficial effect on silvery minnow habitat (Service 2001).

Critical Habitat

This biological opinion does not rely on the regulatory definition of "destruction or adverse modification" of critical habitat at 50 CFR 402.02. Instead, we have relied upon the statutory provisions of the Act to complete the following analysis with respect to critical habitat.

The entire action area of the proposed restoration project encompasses designated critical habitat for the silvery minnow from the Angostura Diversion Dam to the Isleta Diversion Dam, excluding Santa Ana and Sandia Pueblo lands. Silvery minnow critical habitat may be affected temporarily, but the proposed action is expected to increase and restore potential habitat for the species. Direct and indirect effects of the proposed action are likely to have a positive impact on three of the four PCEs of critical habitat for the silvery minnow. Channel splitting, creation of low-flow habitats, sediment deposition, and instream cover provide habitat types included as PCEs of silvery minnow critical habitat. Such habitat types include, but are not limited to the following: backwaters, shallow side channels, pools, and runs of varying depth and velocity; substrates of predominantly sand or silt; and the presence of eddies created by debris piles, pools, or backwaters, or other refuge habitat within unimpounded stretches of flowing water of sufficient length (i.e., river miles) that provide a variation of habitats with a wide range of depth and velocities. These PCEs of critical habitat for the silvery minnow provide for the diversity of aquatic habitats essential to the conservation of the species. As such, designated critical habitat for the silvery minnow will remain functional to serve its intended conservation role for the species.

Cumulative Effects

Cumulative effects include the effects of future state, tribal, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act. Cumulative effects include:

- Increases in development and urbanization in the historic floodplain that result in reduced peak flows because of the flooding threat. Development in the floodplain makes it more difficult, if not impossible, to transport large quantities of water that would overbank and create low velocity habitats that silvery minnow prefer. Development also reduces overbank flooding favorable for the silvery minnow.

- Increased urban use of water, including municipal and private uses. Further use of surface water from the Rio Grande will reduce river flow and decrease available habitat for the silvery minnow.

- Contamination of the water (i.e., sewage treatment plants, runoff from small feed lots and dairies, and residential, industrial, and commercial development). A decrease in water quality and gradual changes in floodplain vegetation from native riparian species to non-native species (i.e., saltcedar) could adversely affect the silvery minnow and its habitat. Silvery minnow larvae require shallow, low velocity habitats for development. Therefore, encroachment of non-native species results in less habitat available for the silvery minnow.

- Human activities that may adversely impact the silvery minnow by decreasing the amount and suitability of habitat include dewatering the river for irrigation; increased water pollution from non-point sources; habitat disturbance from recreational use, suburban development, and removal of large woody debris.

The Service anticipates that these types of activities will continue to threaten the survival and recovery of the silvery minnow by reducing the quantity and quality of habitat through continuation and expansion of habitat degrading actions.

CONCLUSION

After reviewing the current status of the silvery minnow, the environmental baseline for the action area, the effects of the proposed action, and cumulative effects, it is the Service's biological opinion that the Bernalillo Site Priority Project, as proposed in the October 18, 2005 biological assessment, is not likely to jeopardize the continued existence of the silvery minnow. Recent sampling data have shown significant increases in numbers of silvery minnow. The Bernalillo Site Priority Project is likely to have a short-term adverse effect on individual silvery minnows, which may be present in the action area, but impacts will be minimal. Direct impacts to silvery minnows are likely to occur from equipment used during the excavation of the main and secondary river channels, the dewatering of such construction areas, and the deposition of sediment into the river for habitat improvement. However, Reclamation has designed their project and construction techniques to minimize contact with silvery minnows and the potential to harm or harass the species. In addition, berms will be used to create a pooled area, which will be managed as a temporary refugia for silvery minnows to avoid construction activities. Reclamation has also committed to coordinating with the Service on the need for silvery minnows to be transported away from the project area if silvery minnows become stranded in small disconnected pools as a result of dewatering.

The proposed action is anticipated to have a long-term positive impact on designated critical habitat for the silvery minnow through improvements and availability of suitable habitat. The splitting of the river channel and creation of low-flow aquatic habitat will restore habitat consistent with the PCEs of silvery minnow critical habitat. The short-term impacts to critical habitat do not affect the ability of the primary constituent elements to serve the intended function and conservation role of silvery minnow critical habitat. Therefore, the Service concludes that the proposed action is not likely to destroy or adversely modify designated critical habitat for the silvery minnow.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is defined by the Service as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of this incidental take statement.

The measures described below are non-discretionary, and must be undertaken by Reclamation so that they become binding conditions of any grant or permit issued, as appropriate, for the exemption in section 7(o)(2) to apply. The action agency has a continuing duty to regulate the activity covered by this incidental take statement. If Reclamation (1) fails to assume and implement the terms and conditions or (2) fails to require adherence to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, Reclamation must report the progress of the action and its impact on the species to the Service as specified in the incidental take statement. [50 CFR §402.14(i)(3)]

Amount or Extent of Take Anticipated

The Service has developed the following incidental take statement based on the premise that the Bernalillo Site Priority Project will be implemented as proposed. Take is expected in the form of harm and harass as: 1) silvery minnows are crushed or removed from the water by excavation equipment when the newly created secondary channel meets the existing floodway, both at the upstream and downstream ends; 2) silvery minnows are crushed or removed from the water during the berm removal process; 3) silvery minnows are stranded in disconnected pools during the partial dewatering of the main channel; 4) silvery minnows affected by personnel and/or the use of equipment in the water; 5) deposition of sediment into the river; and 5) disturbed sediment and associated contaminants disperse downstream and along access points, reducing water quality.

The Service anticipates that up to 42 silvery minnows may be taken during channel modification, berm removal, dewatering, and sediment deposition in the river. Recent monitoring indicates that 0.19 silvery minnows per 100 square meters (Dudley 2006 *pers. comm.*) are currently present in the action area. Approximately 5.5 acres of open water habitat may be affected by the proposed action. Therefore, up to 4,229 silvery minnows may come into contact with equipment, personnel, or fill material. We assume that 1 out of every 100 silvery minnows encountered may be harmed or harassed by activity associated with the proposed action. Therefore, if more than 42 silvery minnows are found dead, the level of anticipated take will have been exceeded.

The Service notes that this number is only a best estimate of the amount of take that is likely under the proposed action. Thus, estimated incidental take may be modified from the above estimated number should other silvery minnow monitoring information, data from silvery minnow rescue operations, or other research indicate substantial deviations from estimated values. In this case, further consultation, may be necessary.

Effect of the Take

The Service has determined that this level of anticipated take is not likely to result in jeopardy to the silvery minnow. Monitoring data from 2005 have shown significant increases in the abundance of silvery minnow. The Bernalillo Site Priority Project is likely to have minimal short-term adverse effects on individual silvery minnows, and beneficial effects to silvery minnow critical habitat.

Reasonable and Prudent Measures

The Service believes the following RPMs are necessary and appropriate to minimize impacts of incidental take of the silvery minnow from the Bernalillo Site Priority Project.

1. Minimize take of silvery minnows due to construction activities, partial dewatering of the main channel, and habitat improvement activities (deposition of sediment into the river).
2. Manage for the protection of water quality from activities associated with the access and use of construction equipment.
3. Continue to work collaboratively with the Service on the Middle Rio Grande Endangered Species Act Collaborative Program.

Terms and Conditions

In order to be exempt from the prohibitions of section 9 of the ESA, the action agency must comply with the following terms and conditions, which implement the reasonable and prudent measures described above and outline required reporting/monitoring requirements. These terms and conditions are non-discretionary.

To implement RPM 1, Reclamation shall:

1. Monitor presence/absence of silvery minnows at construction sites, and use adaptive management to modify construction activities, partial dewatering, and habitat improvement activities, as appropriate.
2. Report findings of injured or dead silvery minnows to the Service.

To implement RPM 2, Reclamation shall:

1. Schedule, to the extent possible, all crossings during dry soil conditions.
2. Report to the Service, water quality measurements taken before, during, and after construction activity.
3. Report significant spills of fuels, hydraulic fluids, and other hazardous materials to the Service.

To implement RPM 3, Reclamation shall:

1. Work to further conduct habitat/ecosystem restoration projects in the Middle Rio Grande to benefit the silvery minnow.

The reasonable and prudent measures, with their implementing terms and conditions, are designed to minimize the impact of incidental take that might otherwise result from the proposed action. If, during the course of the action, this level of incidental take is exceeded, such incidental take represents new information requiring reinitiation of consultation and review of the reasonable and prudent measures provided. The Federal agency must immediately provide an explanation of the causes of the taking and review with the Service the need for possible modification of the reasonable and prudent measures.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the ESA directs federal agencies to utilize their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information. The Service recommends the following conservation activities:

1) Encourage adaptive management of flows and conservation of water to benefit the silvery minnow.

RE-INITIATION NOTICE

This concludes formal consultation on the action(s) described in the October 21, 2005 biological assessment. As provided in 50 CFR § 402.16, re-initiation of formal consultation is required where discretionary federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) The amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this biological opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this biological opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending re-initiation.

In future correspondence on this project, please refer to consultation number 22420-2006-F-0009. If you have any questions or would like to discuss any part of this biological opinion, please contact Jennifer Parody of my staff at (505) 761-4710.

Sincerely,

Russ Holder
Acting Field Supervisor

cc: Assistant Regional Director, Region 2 (ES)
Regional Section 7 Coordinator, Region 2 (ES)

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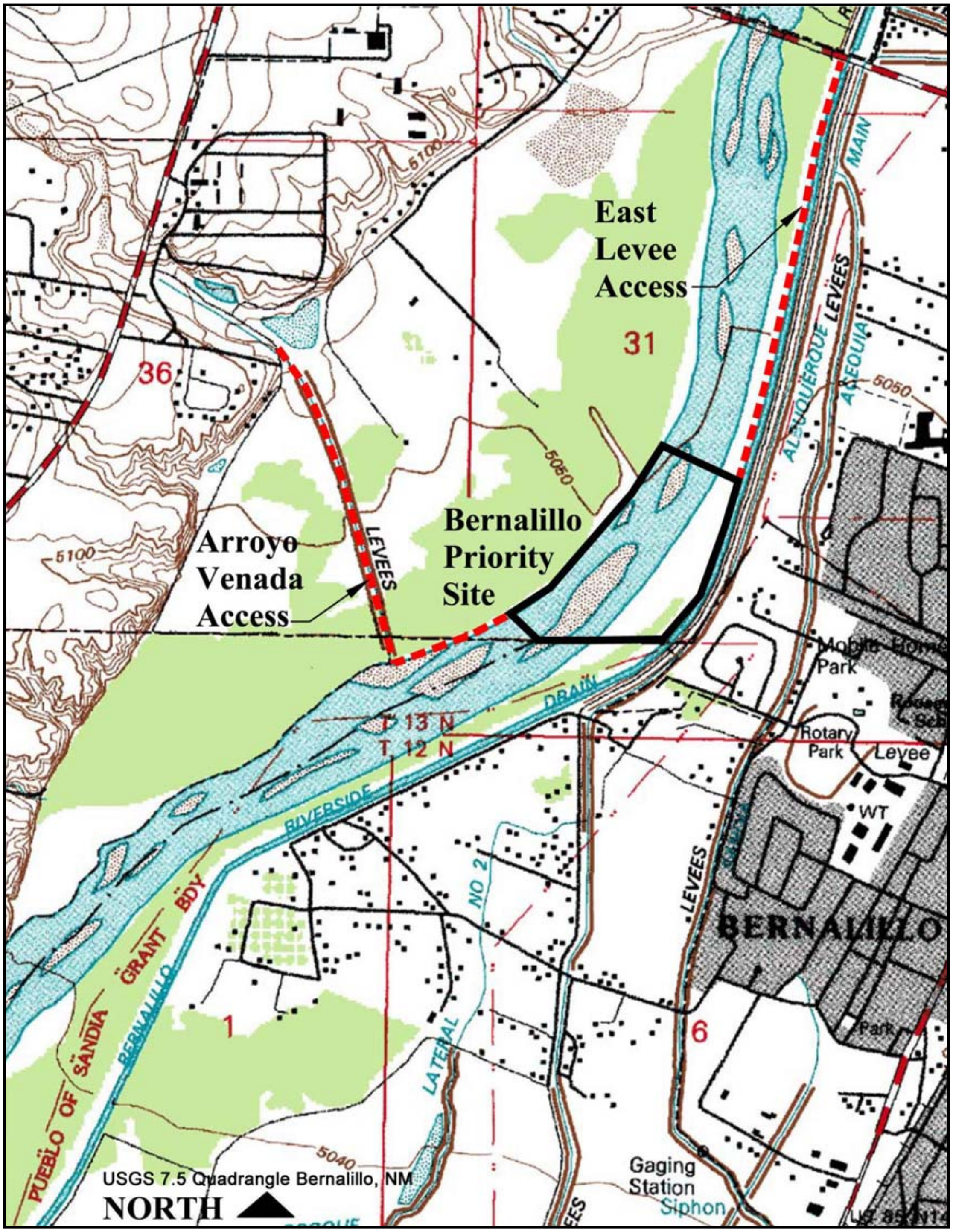

Figure 1. Bernalillo Priority Site (location area) location map.

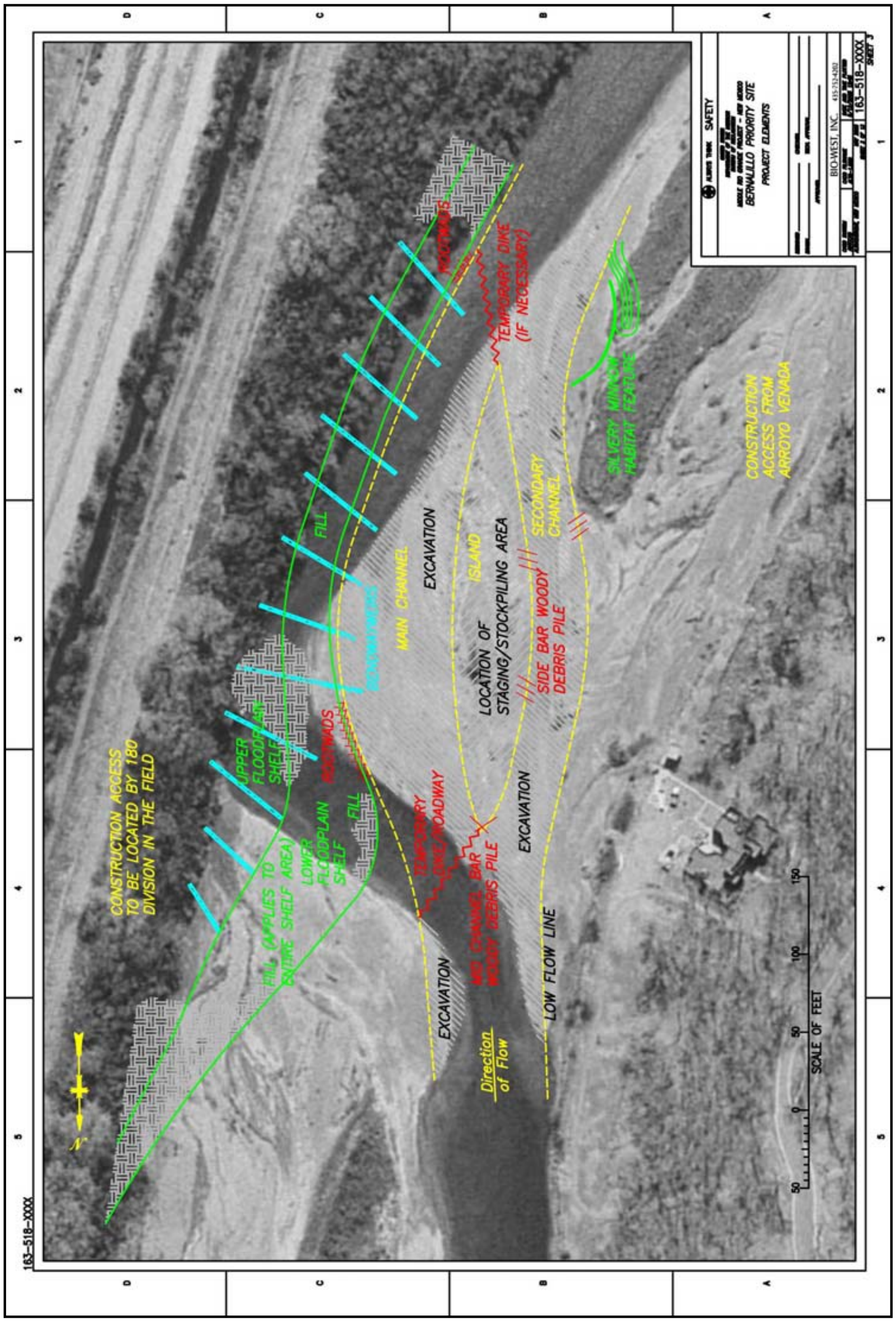

Figure 2. Construction Drawing Showing Pre-Project Conditions and Proposed Action.

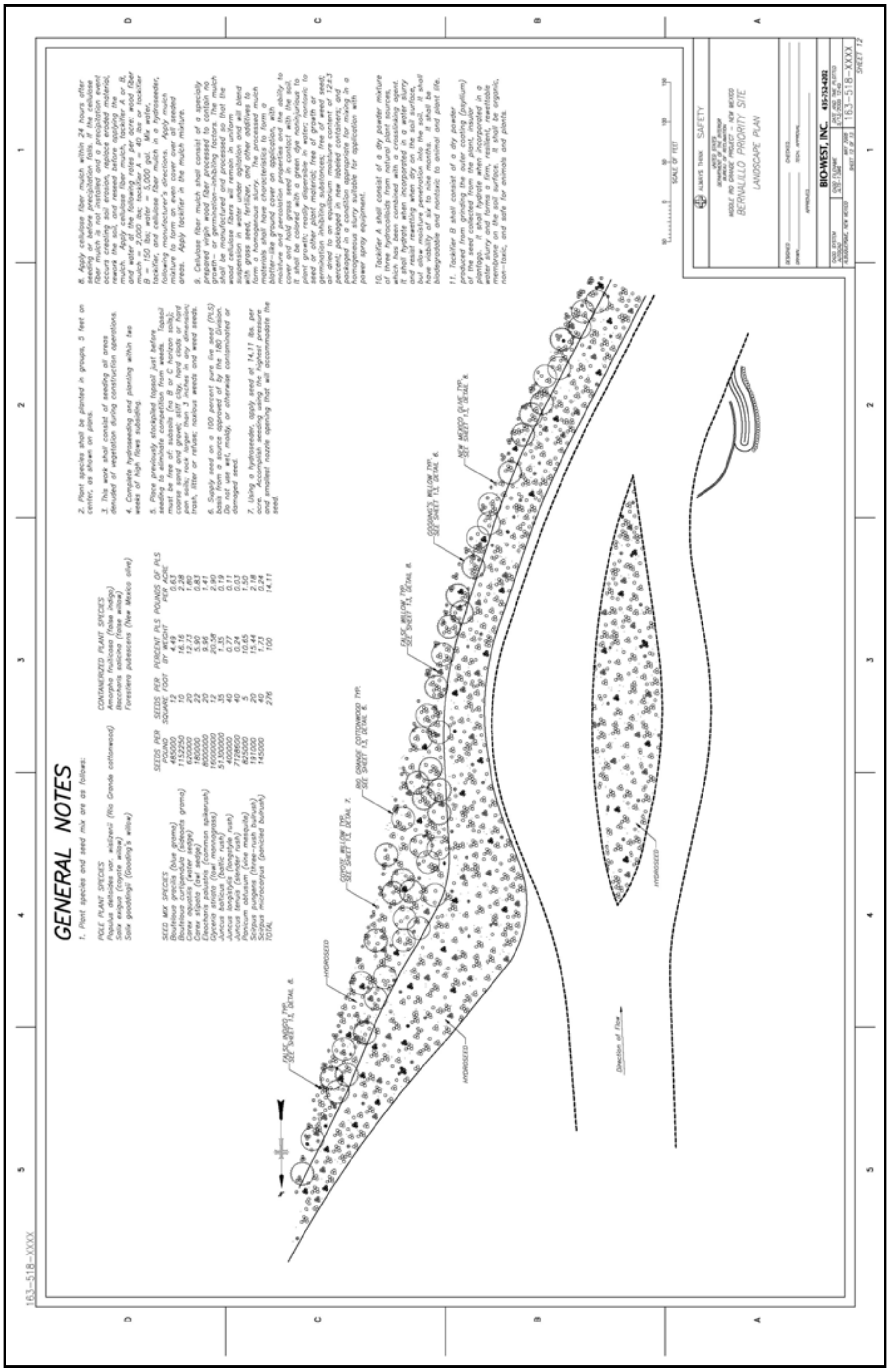

Figure 3. Construction Drawing Showing Proposed Action Revegetation Plan.