CHAPTER 1 PURPOSE AND NEED FOR ACTION

1.1 Introduction

The Middle Rio Grande Conservancy District (MRGCD) along with its project partners HabiTech in Laramie, Wyoming; New Mexico State University in Las Cruces, New Mexico; and the Bureau of Reclamation Denver Technical Service Center, are proposing to implement habitat enhancement measures in three drain outfalls in the upper Isleta Reach of the Middle Rio Grande (MRG) (Fig. 1). These features will create and/or improve perennial refugia habitat for the endangered Rio Grande silvery minnow. The proposed project is funded by, and is under the oversight of, the Middle Rio Grande Endangered Species Act Collaborative Program (Collaborative Program). The Isleta Reach is bounded upstream by Isleta Diversion Dam and downstream by San Acacia Diversion Dam.

Rio Grande silvery minnows (*Hybognathus amarus*, RGSM) have recently been found using drains in the Middle Rio Grande Project between Belen and Corrales, New Mexico. During the summer of 2004, 122 silvery minnows were collected in the outfall from the irrigation drainage system into the dry bed of the Rio Grande in the upper Isleta Reach of the Middle Rio Grande (MRG) (Ford 2004). The US Fish & Wildlife Service (USFWS), Albuquerque, sampled from 800 to 1,000 silvery minnows in the Peralta Drain in the Isleta Reach and in 2005 found numerous minnows in the drain's outfall when river flows receded (Hatch, pers. comm.). These observations indicate that drains and their outfalls into the MRG are functioning as refugia for silvery minnow during periods of river channel dewatering and as important rearing habitat for species conservation. Drains intercept underground flows and can remain wet year round even when the MRG goes dry (Tetra Tech 2004).

The Habitat Restoration Plan for the Middle Rio Grande (Tetra Tech 2004) provides guidance for the ESA Collaborative Program. The Restoration Plan emphasizes the importance of large woody debris in restoring habitat for the silvery minnow and has listed placement of large woody debris as a restoration tool. The Restoration Plan indicates that the historic channel of the Rio Grande probably contained appreciable amounts of large woody debris resulting from channel avulsions and bank failures. However past channelization and river maintenance activities reduced habitat complexity along the MRG. River maintenance activities included the removal of logs and trees to prevent the obstruction or deflection of river flows (USBR 1993); as well as mowing, root plowing, and herbicide treatments of bank and bar vegetation which reduced the amount of woody debris in the river. Snagging of standing trees was frequently practiced after high flow events, which commonly caused bank erosion and undermined trees (USBR 1993). These past activities limited the extent of woody debris, as well as islands and ephemeral side channels in the MRG and reduced complex, low velocity habitats (TetraTech 2004).

1.2 Background

1.2.1 Role of Large Woody Debris in River Systems

In addition to the new information on the potential of drains to serve as perennial wetted habitats for silvery minnow, there is an extensive body of literature available on the function of woody debris in providing aquatic habitat and increasing fish survival from which to draw inferences and design guidance for this project (Lassettre 1999; Bryant and Sedell, 1995; Harmon et al., 1986). Research on sand bed rivers in the southeastern U.S. provide insight on how large woody debris may interact on sandy channels of the MRG. For example, Wallace and Burke (1984) demonstrated that snags and other woody habitats are the major stable substrate in sandy-bottomed streams of the Southeast, providing substrate for macroinvertebrates and habitat and cover for fish. Adding large woody debris to streams is a common restoration tool for enhancing fish habitat and survival (Talmage et al. 2002; Reeves et al. 1991; Hilderbrand et al. 1998; and Wesche 1985).

A significant amount of research in North America has been done in determining the role of woody debris in providing habitat for fish in general and covers study areas in the Pacific Northwest, the Southeast, the Midwest, as well as Australia. Such research, while not conducted in rivers of the desert Southwest, does provide a general understanding of how large woody debris functions in creating habitat, and how various fish species use such habitat. Research in large, complex, highly modified desert rivers such as the Rio Grande in New Mexico, is just beginning. The work done to date suggests a strong linkage between woody debris and RGSM relative abundance. Dudley and Platania (1996) found the majority (70%) of RGSM associated with debris piles during the winter, despite the rarity of such habitats in the MRG. Dudley and Platania (1997) also noted a dramatic shift from pool and backwater habitat use in summer to habitats having instream debris piles during the winter. Broderick (2000) found relatively large numbers of silvery minnow wintering beneath debris piles at the lower end of the Low Flow Conveyance Channel, but none were found in any other habitat type during January sampling.

1.2.2 Pool Formation

One of the most important functions of large woody debris is the creation and enlargement of scour pools (Abbe et al. 2003). Large wood creates complex channel structure and strongly influences the formation of pools. Pool volume has been found to be directly related to the amount of woody debris in a stream (Carlson et al. 1990; Fausch and Northcote 1992). Stable instream wood accumulations can also increase pool frequency. In some sand-bed channels, virtually all pools can be attributed to either the direct or indirect control of wood (Brooks and Brierley 2002; Webb and Erskine 2003). Tetra Tech (2004) acknowledges that large woody debris may also cause downstream scour forming plunge pools that could be deep-water habitat for silvery minnows. At the scale of channel reaches, wood debris has a strong control on the frequency of pools and bars and can create significant hydraulic roughness, influencing flow velocity, discharge, shear stress, bed load transport rates and reach-average surface grain size (Montgomery 2003).

Scour depths around a snag or log-jam in a sand-bed channel are significantly greater than in unconstrained alluvial channels. Once a rootwad becomes partially embedded in the channel bed it becomes more difficult to move (Abbe et al. 2003). A sediment buttress downstream of a root wad can form in situ by accumulation of sediment in the leeward eddy. Field observations show that sediment commonly accumulates downstream of the eddy created by the root wad and buries part or all of the tree bole. A key concern among many designers in regard to using wood structures is the longevity of wood as a material. How long wood lasts depends on factors such as the type of wood the environment in which it is located, its size and the age of tree at death. If wood remains saturated in freshwater, it can last almost indefinitely (Abbe et al. 2003).

1.2.3 Role in Creating Refugia in Drying Rivers

Pools formed by snags in the channel are particularly important for wildlife, especially in streams with low or no summer flow. When flow ceases, these pools provide the only habitat available for aquatic species, and are a source of recruitment for re-colonization when normal flow returns (Treadwell 1999).

1.2.4 Fine Woody Debris Accumulation & Predation

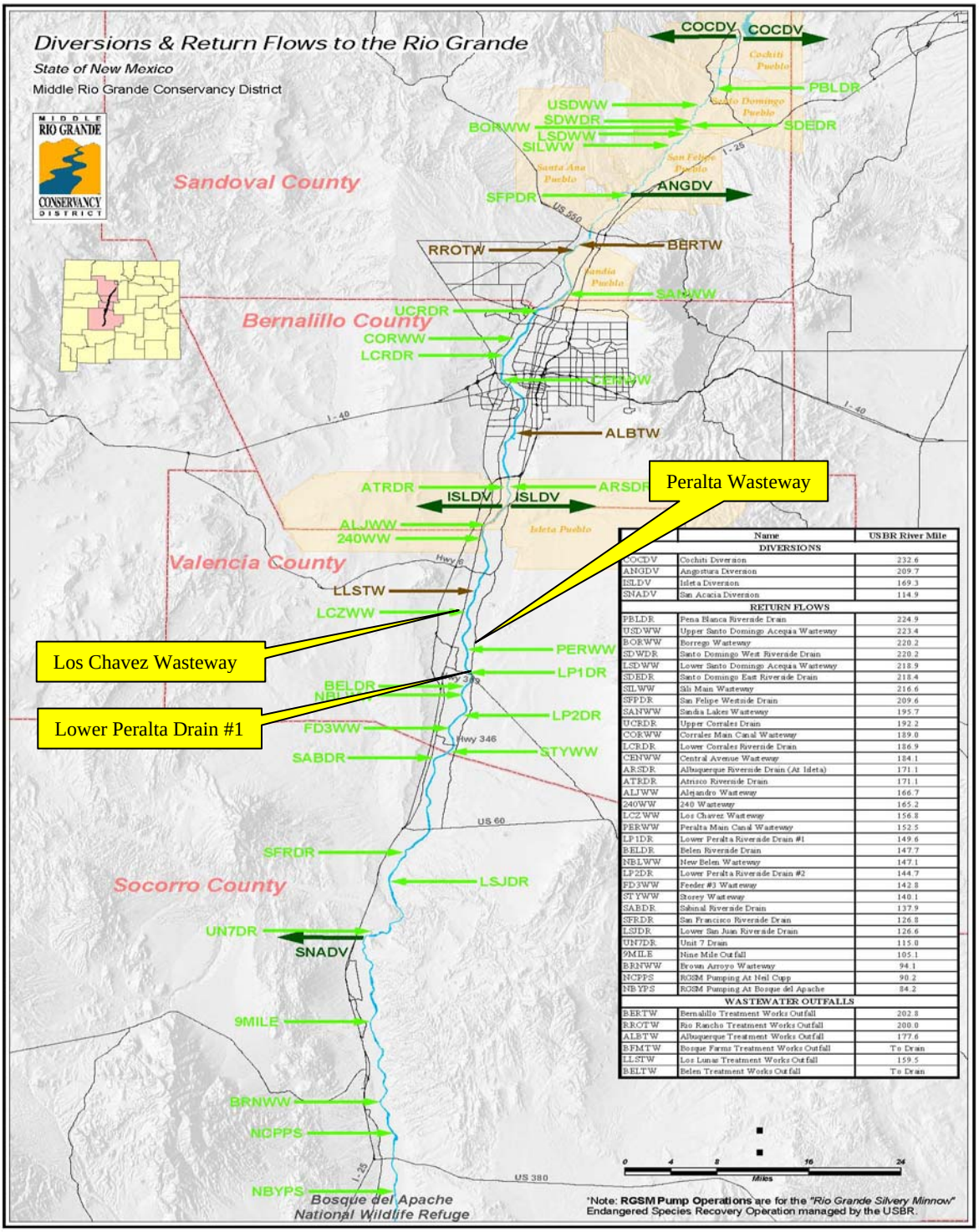
Large woody debris accumulations such as fallen trees, root wads and other mid-channel snags provide structure for periphyton (algal) growth and the retention of drifting organic matter (Treadwell 1999). Additionally smaller pieces of woody debris such as branches, sticks and twigs on the fallen trees or captured from stream drift create sieve-like accumulation structures that can be highly effective in trapping additional drifting materials (Gregory et al. 1991). As water levels recede, fish may become trapped and stranded, much as they do on the floodplain during flood recession. At low water levels exposure of boulders, root masses and large woody debris, and decreasing depth of scour holes, can reduce the range of sheltered places where fish can rest and forage, or conceal themselves from predators, lurk in ambush and launch attacks on prey. Habitat structure (especially structurally complex habitat such as submerged branches, leaf litter and aquatic vegetation) influences fish-assemblage structure (Kennard 1995; Welcomme 2001). Fine woody debris has been found to provide structurally complex habitats that act as refugia from predators and as sites from which foraging forays can be staged (Arthington et al. 2005). Adding fine woody debris to a stream can increase carrying capacity for trout fry and adult population density may increase as a result (Culp et al. 1996).

1.2.5 Substrate for Benthos

The general lack of channel structure in the MRG that provides stable substrates for algae and invertebrates suggests that introducing snags would enhance overall aquatic productivity and increase food sources for silvery minnows. Treadwell (1999) indicates that the more numerous and complex the array of structures, the greater the likelihood of increasing the aquatic productivity.

The historic channel of the Rio Grande likely contained appreciable amounts of large woody debris (Tetra Tech 2004). Channelization and subsequent maintenance activities along the MRG have reduced the complexity of the channel low velocity habitat. These activities have removed

the diversity of flow-impeding channel structures, such as woody debris, islands and ephemeral side channels.



	Name	USBR River Mile
	DIVERSIONS	
COCDV	Cochiti Diversion	232.6
ANGDV	Angostura Diversion	209.7
ISLDV	Isleta Diversion	169.3
SNADV	San Acacia Diversion	114.9
	RETURN FLOWS	
PBLDR	Pena Blanca Riverside Drain	224.9
USDWW	Upper Santo Domingo Acequia Wasteway	223.4
BORWW	Borrego Wasteway	220.2
SDWDR	Santo Domingo West Riverside Drain	220.2
LSDWW	Lower Santo Domingo Acequia Wasteway	218.9
SDEDR	Santo Domingo East Riverside Drain	218.4
SILWW	Sili Main Wasteway	216.6
SFPDR	San Felipe Westside Drain	209.6
SANWW	Sandia Lakes Wasteway	195.7
UCRDR	Upper Corrales Drain	192.2
CORWW	Corrales Main Canal Wasteway	189.0
LCRDR	Lower Corrales Riverside Drain	186.9
CENWW	Central Avenue Wasteway	184.1
ARSDR	Albuquerque Riverside Drain (At Isleta)	171.1
ATRDR	Atrisco Riverside Drain	171.1
ALJWW	Alejandro Wasteway	166.7
240WW	240 Wasteway	165.2
LCZWW	Los Chavez Wasteway	156.8
PERWW	Peralta Main Canal Wasteway	152.5
LP1DR	Lower Peralta Riverside Drain #1	149.6
BELDR	Belen Riverside Drain	147.7
NBLWW	New Belen Wasteway	147.1
LP2DR	Lower Peralta Riverside Drain #2	144.7
FD3WW	Feeder #3 Wasteway	142.8
STYWW	Storey Wasteway	140.1
SABDR	Sabinal Riverside Drain	137.9
SFRDR	San Francisco Riverside Drain	126.8
LSJDR	Lower San Juan Riverside Drain	126.6
UN7DR	Unit 7 Drain	115.0
9MILE	Nine Mile Outfall	105.1
BRNWW	Brown Arroyo Wasteway	94.1
NCPPS	RGSM Pumping At Neil Cupp	90.2
NBYPS	RGSM Pumping At Bosque del Apache	84.2
	WASTEWATER OUTFALLS	
BERTW	Bernalillo Treatment Works Outfall	202.8
RROTW	Rio Rancho Treatment Works Outfall	200.0
ALBTW	Albuquerque Treatment Works Outfall	177.6
BFMTW	Bosque Farms Treatment Works Outfall	To Drain
LLSTW	Los Lunas Treatment Works Outfall	159.5
BELTW	Belen Treatment Works Outfall	To Drain

Figure 1. Project Area Map. Three proposed drain outfalls selected for habitat enhancement are highlighted in yellow.

1.3 Proposed Action

The federal action associated with this project includes Reclamation's funding of the work through the Collaborative Program. The Proposed Action involves habitat construction that is anticipated to contribute to the enhancement and recovery of RGSM in the Isleta Reach of the Middle Rio Grande (MRG). The proposed projects are located at the Los Chavez Drain Wasteway; Peralta Wasteway and the Lower Peralta Drain #1. These drains are located upstream of the Highway 309 bridge near Belen, New Mexico.

The project consists of anchoring from three to eight habitat enhancement structures comprised of large cottonwood snags in the MRG channel at each outfall of three drains as they enter the river channel. Such placement provides several advantages. It will take advantage of persistent drain flows to provide refugia at critical times, while not impairing the function of the drains. Such placement should also assure fish access to the river channel when flow conditions allow, and at times of high flow in the MRG, will likely facilitate the scour of main channel pools to further enhance such habitats. The MRG Project irrigation system can be operated in a manner to ensure adequate flows are present at critical times in selected drain outfalls as long as water is available. The presence of large woody debris is anticipated to create slack water and slow water habitats, thus improving adult habitat. The project is proposed for construction during low flow period in the early spring of 2007.

1.4 Purpose and Need for the Action

With the exception of the Albuquerque Reach, the MRG has experienced channel dewatering on a relatively frequent basis. This is a significant source of mortality for the RGSM. Most recently, the USFWS (2006) documented 2005 RGSM rescue and salvage efforts. Over the course of the 2005 irrigation season surface water in the main channel of the Isleta Reach was reduced to isolated pools in a 2 mile section of river just downstream of the Los Chavez Wasteway. This reach was bracketed by a total of 4 river miles in which the river entirely dried out on numerous occasions. In the Socorro Reach a total of 24.5 miles became dry. Perennial surface water in the form of isolated pools persisted over an additional 5 main channel miles of this predominately dry segment of river.

Rescue operations (which consisted of seining pools as flow in the MRG became discontinuous) began in main channel habitats on July 19, 2005 and continued intermittently through September 28, 2005. Seining efforts in the adjacent floodplain habitats began on June 20 and continued through September 26. A total of 80,556 silvery minnow were rescued from the main channel of the Isleta Reach, and 289,860 were rescued from adjacent floodplain habitats. Of the silvery minnows rescued during the 2005 irrigation season, 59% of the estimated total number from both the main channel and floodplain habitats were captured in the Isleta Reach upstream of Belen (USFWS 2006). The frequency of dewatering events and the large numbers of silvery minnows present in the Isleta Reach were two of the primary reasons that the three drain outfall sites were selected for habitat enhancement.

Guidance for the development of the Proposed Action stems from three sources: Reasonable and Prudent Alternative (RPA) Element S and Conservation Recommendation 22 in the 2003 Biological Opinion and the Habitat Restoration and Improvement Focus Area in the Collaborative Program. In 2003, the U.S. Fish & Wildlife Service (USFWS) issued its Biological Opinion on the Bureau of Reclamation's Water and River Maintenance Operations, Army Corps of Engineers' Flood Control Operations, and Related Non-Federal Actions on the Middle Rio Grande, New Mexico (USFWS 2003). Reasonable and Prudent Alternative (RPA) Element S directs the agencies to conduct habitat restoration projects as follows:

> In consultation with the Service and appropriate Pueblos and in coordination with parties to the consultation, action agencies shall conduct habitat/ecosystem restoration projects in the Middle Rio Grande to increase backwaters and oxbows, widen the river channel, and/or lower river banks to produce shallow water habitats, overbank flooding, and regenerating stands of willows and cottonwood to benefit the silvery minnow, the flycatcher, or their habitats. Projects should be examined for depletions. It is the Service's understanding that the objective of the action agencies and parties to the consultation is to develop projects that are depletion neutral. By 2013, additional restoration totaling 1,600 acres (648 hectares) will be completed in the action area. In the short term (5 years or less), the emphasis for silvery minnow habitat restoration projects shall be placed on river reaches north of the San Acacia Diversion Dam. This restoration will be distributed throughout the action area. Habitat restoration projects fulfilling RPA element J, from the June 29, 2001, biological opinion, shall be completed. The action agencies and parties to the consultation, in coordination with the Service, shall develop time tables and prioritize areas for restoration. Projects should result in the restoration/creation of blocks of habitat 24 hectares (60 acres) or larger. Consultation with the Service for each site will tier to this biological opinion.
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> Monitoring will be conducted for each project annually for 10 years in order to assess whether created habitats are self-sustaining, successfully regenerating, and are supporting the flycatcher and silvery minnow. Monitoring reports will be provided to the Service by January 31 of each year. Adaptive management principles will be used, if necessary, to obtain successful restoration of silvery minnow and flycatcher habitats. The environmental evaluation process for two projects should begin within 30 days of issuance of this biological opinion and construction should begin no later than twelve months from that date.
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> *Rationale – Creation of riparian habitat will help distribute and stabilize sediment and provide the low velocity, backwater habitats needed by the silvery minnow and flycatcher. Overbank flooding is necessary to sustain the native riparian vegetation and wetlands that the flycatcher requires for shelter, feeding, and breeding. The project size is derived from a flycatcher site on the Middle Rio Grande that has contained several nesting pairs in recent breeding seasons. Element S will help alleviate jeopardy to the continued existence of the species by improving existing habitat and increasing the total amount of habitat for silvery minnows. Low velocity habitat and silt and sand substrates provide food, shelter, and sites for reproduction, and are essential for the survival and reproduction of silvery minnow. This element will help alleviate adverse modification to*

> *silvery minnow critical habitat by providing for the necessary habitat components of primary constituent elements 1 and 2.*

Section 7(a)(1) of the ESA directs Federal agencies to use 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. Conservation Recommendation No. 22 (USFWS 2003) is relevant to the proposed action and is stated as follows:

> Reclamation should, when possible, cooperate with parties to the consultation to use drains and other works in a manner likely to provide temporary or permanent refugia in the river for the silvery minnow. Potential works will be determined in coordination with the Service and other agencies.

The Habitat Restoration and Improvement Focus Area described in the 2005 and 2006 requests for proposals for the Collaborative Program places emphasis on projects that aid in the prevention of silvery minnow extinction as well as on significant short term measures that include habitat restoration that will benefit silvery minnow populations. The projects expected to benefit silvery minnow include those that establish still or slow-water aquatic habitat in and adjacent to the river channel, and those measures that increase aquatic habitat diversity, specifically through the use of woody debris in the river channels. Additionally, the Collaborative Program identifies habitat restoration in the Isleta Reach as high priority. The proposed action will aid in the prevention of extinction of silvery minnow by creating and enhancing perennial wetted habitat in drain outfalls. The proposed action would further benefit silvery minnow by increasing aquatic habitat diversity through the placement of woody debris in the river channel, in this case at the mouth of drain outfalls in the MRG channel.

1.5 Relevant Statutes, Regulations, and Other Plans

The proposed action does not conflict with any known State or local planning or zoning ordinances. The proposed action would also be required to conform to the provisions of Section 7 of the Endangered Species Act and the Migratory Bird Treaty Act as administered by the U.S. Fish and Wildlife Service and Section 106 of the National Historic Preservation Act (NHPA) as administered by the New Mexico State Historic Preservation Officer (SHPO). Section 401 and 404 Permits will be obtained to meet the requirements of the Clean Water Act.

CHAPTER 2 ALTERNATIVES

2.1 Introduction

This chapter describes the two alternatives analyzed in this EA, the No Action Alternative and the Proposed Action. Seven other drain outfall sites were evaluated but were not selected for habitat enhancement due to the configuration of the drain outfall and/or lack of reliable flows in the drains, and were eliminated from further analysis.