Technical Appendix 4

Mitigation Opportunities Report For the La Plata River Corridor

Huntington Ranch, Southern Ute Indian Tribe, Taylor, and Boyle Properties

Draft Report

Animas-La Plata Project
Mitigation Opportunities Report for the La Plata River Corridor

Huntington Ranch, Southern Ute Indian Tribe, Taylor, and Boyle Properties

DRAFT REPORT

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Submitted To:

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PREFACE

The U.S. Bureau of Reclamation (Reclamation), in cooperation with the Ute Mountain Ute and Southern Ute Indian Tribes, states, and other project sponsors, proposes to construct the Animas-La Plata Project (ALP Project) in southwestern Colorado and northwestern New Mexico as set forth in the Colorado Ute Indian Water Rights Settlement Act (Public Law 100-585). Since the completion of the ALP Project's Final Environmental Statement in 1980, Reclamation initiated additional environmental analyses necessary to ensure compliance with the National Environmental Policy Act, Section 404 of the Clean Water Act, Endangered Species Act, as well as other federal and state statutory requirements. The results of these analyses were summarized in the Final Supplement to the Final Environmental Statement (FSFES) for the ALP Project (Reclamation 1996). The FSFES was filed with the U.S. Environmental Protection Agency (EPA) in April of 1996.

Reclamation completed a conceptual mitigation and monitoring plan for the ALP Project and attached it as Appendix M to the FSFES (BIO/WEST, Inc. 1996). The conceptual plan provided a framework for proposed mitigation measures in terms of: hydrology, geomorphology, water quality, riparian-wetlands, fish and wildlife. It was concluded that most impacts to these resources could be mitigated within the La Plata River corridor, especially those unavoidable impacts to native fish and riparian-wetlands.

In 1997, Reclamation initiated an investigation to assess specific mitigation opportunities and potential for properties along the La Plata River corridor located between the Cherry Creek confluence and a point approximately 1 mile downstream of the Long Hollow confluence. This study area includes properties owned by the Southern Ute Indian Tribe, C.W. Huntington, M.& B. Taylor, B.& A. Taylor, and D. Boyle. On May 1, 1997, an interagency scoping meeting was held at Reclamation's offices in Durango, Colorado to discuss mitigation issues and opportunities pertinent to these properties. Participating agencies included personnel from Reclamation, EPA, U.S. Fish and Wildlife Service, Southern Ute Indian Tribe, Colorado Division of Wildlife, New Mexico Department of Game and Fish, San Juan Water Commission, Animas-La Plata Water Conservation District, and BIO/WEST, Inc. Based on the results of this scoping meeting, Reclamation began field studies and analyses to address the mitigation issues raised by the participating agencies.

This document presents the preliminary findings of the investigation. General background about the development of mitigation for the ALP Project is described in Chapter 1. General description of the study area and its resources relative to the La Plata River watershed is provided in Chapter 2. The existing condition of the study area is described in Chapter 3. Potential conservation and mitigation opportunities for riparian-wetlands, fish, wildlife, and threatened and endangered species are described in Chapter 4. Finally, a framework for managing, maintaining, and monitoring the study area as a mitigation site is provided in Chapter 5.

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CHAPTER 1. INTRODUCTION

1.1 BACKGROUND

Reclamation updated environmental compliance for the Animas-La Plata Project (ALP Project) in 1996 with the completion of the Final Supplement to the 1980 Final Environmental Statement (FSFES) (Reclamation 1996). Although a Record of Decision (ROD) for this document has not been signed, Reclamation assumes that ultimately a project would be constructed within the next few years with impacts similar to those described for the Preferred Alternative in the FSFES. Currently, issues pertaining to the configuration of the ALP Project are being negotiated between various factions as mediated by the State of Colorado, most commonly referred to as the Romer/Schoettler Process.

The purpose of Romer/Schoettler Process is to recommend an ALP Project that would provide long-term water supplies to meet the needs of southwestern Colorado and northwestern New Mexico and to resolve Colorado Ute Indian water rights issues (per P.L. 100-585). Therefore, it is believed that whatever ALP Project is recommended for construction, it would likely include a water storage reservoir and affect flows in the Animas River. It could also affect flows in the La Plata River. The impacts associated with the general ALP Project design were described in the FSFES. The magnitude of these impacts would vary depending on the timing, duration, and amount of river flow depletions, and on the location and construction of project facilities. Based on the assumptions described above, Reclamation believes a mitigation plan that protects, restores and/or enhances portions of key riverine and associated riparian-wetland habitats within the La Plata River corridor, could be generically applied to a wide range of ALP Project configurations. A mitigation plan would be refined to meet the specific mitigation needs of the final ALP Project.

In 1997, Reclamation began an investigation to assess mitigation potential along the La Plata River corridor. The study area for the mitigation assessment is an approximately 5-mile long section of the river corridor located below the Cherry Creek confluence to a point near the Colorado and New Mexico state line (Figure 1-1). This section of the river corridor maintains perennial flow, something that is extremely limited on the La Plata River downstream of Hesperus, Colorado. Lands within the study area are either privately owned or within the Southern Ute Indian Tribe (SUIT) Lands. Within the study area, one ranch with large acreage along the La Plata River corridor became available for purchase in 1996. Also, another property within the study area has more recently been listed for sale.

1.2 PURPOSE AND OBJECTIVES

Although the ecology of the river corridor has been impacted by human development and land uses, it maintains important, and otherwise limited, riverine and riparian-wetland habitats. Both

Figure 1-1. —Vicinity map of the La Plata River corridor study area.

the U.S. Fish and Wildlife Service (Service) and the U.S. Environmental Protection Agency (EPA) have concurred with Reclamation on the importance of protecting this section of the La Plata River corridor from further degradation. Accordingly, these agencies have also agreed with Reclamation that mitigation applied within this perennial flowing section of the La Plata River would be appropriate for off-setting ALP Project impacts that would occur within either the Animas or La Plata River drainages.

The purpose for assessing mitigation opportunities and potential within the study area was thus threefold:

(1) Provide Reclamation the necessary information to make an informed decision whether to acquire (through land title purchase or conservation easement) either all or portions of those privately-owned properties that were assessed.

(2) Provide the Southern Ute Indian Tribe with information regarding the mitigation opportunities on those Tribal lands that were assessed.

(3) Provide a basis from which to begin negotiating specific mitigation measures and credits for the ALP Project with other state and federal agencies, most importantly the Service and the EPA.

Therefore, the objectives of the assessment were to:

(1) Evaluate existing resource conditions within the study area

(2) Evaluate mitigation potential in terms of restoration, enhancement, and/or creation of riverine and riparian-wetland habitats for each property within the study area

(3) Develop a range of mitigation measures that could be applied at each property and evaluate the resultant benefits to native fish, wildlife, and threatened and endangered species

(4) Develop the framework for managing, maintaining, and monitoring the study area as a mitigation site for the benefit of multiple resources

(5) Estimate costs for implementing mitigation measures and for managing, maintaining, and monitoring the mitigation site.

1.3 LIMITATIONS

Reclamation believes applied mitigation initiatives within the study area would offset future impacts associated with the ALP Project, or provide enhancement opportunities, to native fishes, riparian-wetland habitats, numerous wildlife species and possibly to federally protected

threatened and endangered species. By taking advantage of existing opportunities, there is great potential for developing a contiguous mitigation "package" that protects and improves limited riverine and riparian-wetland habitats along a 5-mile section of the La Plata River corridor. These same opportunities may not exist if Reclamation waits to initiate mitigation efforts until after a final ALP Project configuration is settled.

There is some degree of risk associated with this proactive approach. First, it assumes an ALP Project that affects river flows and includes water storage would be constructed. Second, it assumes if an ALP Project is constructed, it would include federal involvement. Third, it assumes that the mitigation benefits gained from acquiring, protecting, and improving these properties would be viewed by all involved as having substantial value in offsetting ALP Project-related impacts. Last, if no ALP Project is constructed, and no mitigation is required, Reclamation may not easily justify retaining the acquired properties in federal ownership. This could ultimately result in Reclamation disposing of the acquired properties.

Another limitation of the mitigation assessment is the assumption that a constructed ALP Project would be limited to a 57,100 acre-feet flow depletion to the San Juan River. This flow depletion was identified as a key component of the reasonable and prudent alternative provided by the Service as a result of a Jeopardy Opinion rendered through formal consultation on the ALP Project under provisions of the Endangered Species Act (U. S. Fish and Wildlife Service 1991). For the purposes of this report, it is assumed that flow depletions would result from diversions from the Animas River and that the ALP project would neither deplete nor augment flows within the La Plata River study area.

Last, the assessments discussed herein were severely restricted due to time constraints limiting data collections both qualitatively and quantitatively; therefore, many of the resource issues discussed are based in part on professional judgement. Nevertheless, as discussed above, Reclamation believes the report to have sufficient information allowing for an informed decision to be made as to the value of protecting these properties either through fee title acquisition or easement agreements. If approval is given to move forward with achieving this goal, it is expected more detailed studies would be implemented to refine the assessment of resource values and plan for site-specific mitigation measures within the study area.

CHAPTER 2. STUDY AREA OVERVIEW

This chapter presents a descriptive overview of the study area in both a watershed and local context. In recent years, federal agencies have adopted watershed-based approaches for evaluating water- and land-resource management decisions, with the watershed being the fundamental management unit. We therefore provide a brief overview of the character and resources of the watershed of the La Plata River. The second section of this chapter identifies and describes those lands within the study area. Specifically, we discuss the location, land ownership, physical character, and existing and historical land uses of the La Plata River corridor. Additionally, we explain how we have subdivided the study area by geomorphic segments and river reaches for analysis and discussion of the existing environment (Chapter 3), and by land owner for discussion of mitigation opportunities and potential (Chapter 4).

2.1 LA PLATA RIVER WATERSHED

2.1.1 Watershed Description

The study area is located in the eastern Colorado Plateau semidesert province. The La Plata River is a tributary of the San Juan River, which in turn is a tributary of the Colorado River. The La Plata River originates in the La Plata Mountains about 25 miles northwest of Durango, Colorado and generally flows southward to its confluence with the San Juan River near Farmington, New Mexico (Figure 1-1). In its headwaters, the watershed consists of relatively erosion-resistant, igneous rock formations that have been uplifted to form a forested mountain chain that rises to more than 13,000 feet. Near the town of Hesperus, Colorado, the mountains merge toward the south into an area of mesas, plateaus, and shallow canyons carved into more easily eroded, sedimentary rocks.

The La Plata Mountains are mesic and receive more than 30 inches of precipitation per year—much of which accumulates as winter snowpack that provides the following year's water supply. The lowlands to the south of the mountains are semiarid to arid. Average annual precipitation is only about 8 inches a year near Farmington. There is dryland farming on the tablelands rising above the La Plata River, and irrigated farming is undertaken where water can be diverted from the La Plata River or one of its major tributary streams.

2.1.2 Hydrology

The hydrologic characteristics of the La Plata River have a profound influence on the riparian-wetland, fishery, and wildlife resources of the watershed. Flow in the La Plata River is characteristic of many western rivers that have watersheds containing both a semiarid plains or plateau region and a higher mountainous area. The flow hydrograph typically crests during from midsummer until the following year's spring runoff event. However, rainfall-induced floods

springtime melting of the mountain area snowpack (Figure 2-1). Streamflow is generally low that originate as overland runoff in the watershed's lowlands may occur from July through October. These flood events have high peak-discharge flows but are short-lived, with the entire flood event usually lasting less than one or two days, and sometimes just a few hours. Late-summer floods typically have higher instantaneous peak flows compared to spring snowmelt floods, with this trend becoming more apparent downstream from Hesperus. La Plata River high flow conditions produce large suspended sediment loads and turbid water, a condition that increases downstream due to an increasing number of arroyo tributaries. Average annual streamflow of the La Plata River in the study area is about 26,000 acre-feet. Mean annual discharge is about 36 cfs.

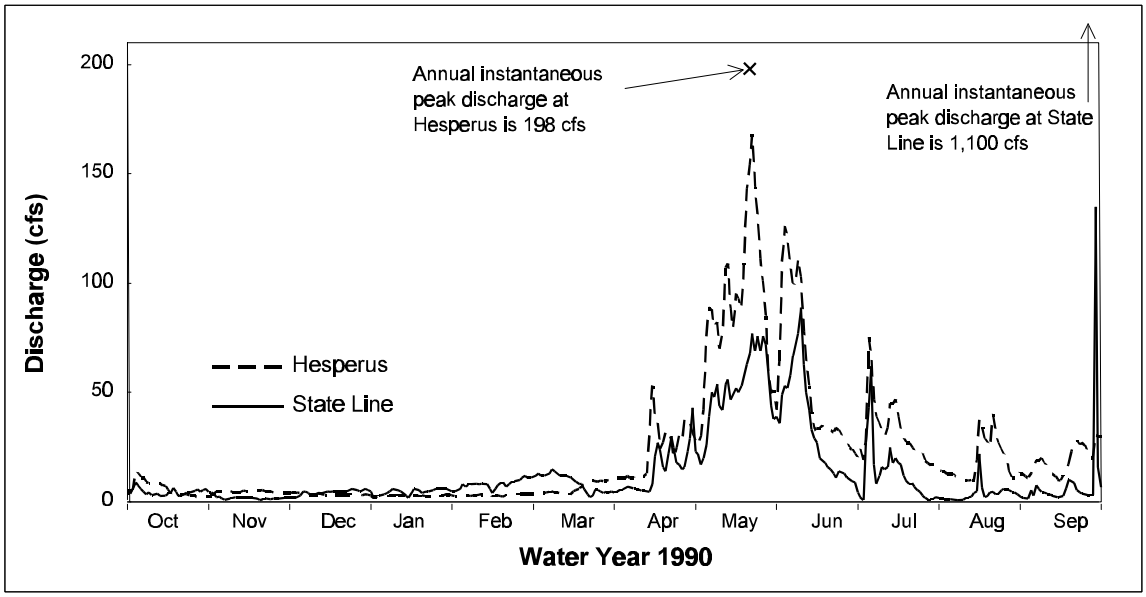

Figure 2-1. —La Plata River hydrographs as recorded at the Hesperus, Colorado, and Colorado-New Mexico State line gages for water year 1990, a fairly typical year. Also shown are the annual instantaneous peak discharges that occurred at these locations.

In addition to seasonal variations in annual streamflow, streamflow also varies along the length of the La Plata River. In general, flows tend to decrease downstream from Hesperus mostly due to irrigation diversions. Based upon data from three gaging stations on the La Plata River, mean annual streamflow decreases from 45 cfs at Hesperus, to 36 cfs at the Colorado-New Mexico state line, to 29 cfs at Farmington. However, flow along the river's course is much more variable than is indicated by mean flow at the three gages.

Above Hesperus, the river usually flows year-round. Flows between Hesperus and the Cherry Creek confluence are substantially reduced by irrigation diversions having water rights to divert about 270 cfs. Occasionally, these diversions may dewater certain reaches between Hesperus and the Cherry Creek confluence. From about the Cherry Creek confluence to the southern limits of the study area, the river becomes perennial due to the combined inflow from the La Plata River,

Cherry Creek, Long Hollow, ground-water recharge, and several tributary streams draining irrigated lands east of the river. However, summer base flows within the study area are very low and range from about 2 cfs between Cherry Creek and Long Hollow, and about 8 cfs below Long Hollow. Downstream of the study area, several diversions with combined water rights of about 22 cfs may completely dewater the river during the summer months, leaving little to no flow at the Colorado-New Mexico state line. About two miles farther downstream in New Mexico, any flow remaining in the river is generally depleted during the irrigation season by a relatively large irrigation diversion. Downstream to Farmington there are several additional water rights for diversions, but the river is frequently dry during the irrigation season.

Ground water occurs throughout the watershed in sandstone and shale bedrock aquifers, in alluvial aquifers associated with the La Plata River and its tributaries, and in terrace aquifers covering tableland areas. Ground water is not a significant resource in the southern lowlands of the watershed, but the alluvial aquifer along the La Plata River maintains a substantial amount of riparian-wetland vegetation in an otherwise semi-arid environment.

2.1.3 Vegetation

Vegetation communities within the mountainous portions of the watershed are dominated by aspen and spruce-fir forests. Vegetation communities in the watershed's lowlands are typical of those found on the semi-arid Colorado Plateau. Between 8,000 and 6,000 feet in elevation, the landscape is dominated by dry uplands consisting of pinyon pine and juniper woodlands and sagebrush scrubland. As elevation continues to decrease to the south, sagebrush scrubland and desert grassland are the dominant plant communities. Conversion of lowland vegetation communities to industrial, commercial, residential, and agricultural land uses has been common and is ongoing.

Within the mesic mountainous portions of the watershed, riparian and wetland plant communities are both diverse and abundant. However, within the lowlands of the watershed, naturally occurring riparian-wetland communities are very limited in their extent. They occur almost exclusively along the valley bottom of the La Plata River corridor and its major tributaries. These communities have been significantly altered by the diversion of streamflows from the La Plata River and the management of valley bottom lands for agricultural land uses.

Riparian-wetland vegetation also occurs along irrigation ditches and natural drainages receiving ample amounts of irrigation return flows. These artificially created riparian-wetlands would either not exist or be greatly reduced in size if irrigation practices were removed or their efficiency significantly improved.

2.1.4 Fisheries

The fishes of the La Plata River reflect a low-diversity assemblage typical of most mid- to high-elevation tributaries of the Colorado River Basin and the San Juan River Subbasin. Historically, the native ichthyofauna consisted of five confirmed species (Sublette et al. 1990), including roundtail chub (*Gila robusta*), speckled dace (*Rhinichthys osculus*), flannelmouth sucker (*Catostomus latipinnis*), bluehead sucker (*C. discobolus*), and mottled sculpin *(Cottus bairdi*). These species persist in the La Plata River in reduced distribution and abundance along with low numbers of six non-native species: fathead minnow (*Pimephales promelas*), red shiner (*Cyprinella lutrensis*), rainbow trout (*Onchorynchus mykiss*), brown trout (*Salmo trutra*), brook trout (*Salvelinus fontinalis*), and black bullhead (*Ameiurus melas*).

The Colorado River cutthroat trout (*Oncorhynchus clarki pleuriticus*), as well as the endangered Colorado squawfish (*Ptychocheilus lucius*) and razorback sucker (*Xyrauchen texanus*), are also native to the San Juan River Subbasin but were never reported from the La Plata River (Sublette et al. 1990). Because irrigation diversions create barriers and dewater sections of the lower La Plata River, there is little exchange of fishes with the main San Juan River. These barriers effectively prevent the movement of non-native fish present in the San Juan River into the upper La Plata River north of the Colorado-New Mexico state line. Hence, the upper La Plata River is an important enclave for native fish populations of this subbasin.

2.1.5 Wildlife

The variety of wildlife habitats encountered in the La Plata River watershed reflects the diverse topography that occurs in a relatively short distance. The La Plata mountains peak at more than 13,000 feet. From its headwaters, the river drops rapidly into an area of plateaus and mesas. In the vicinity of the study area, elevations are around 6,000 feet. Major wildlife habitats of the watershed range from alpine tundra, aspen and spruce-fir forests in the mountains to semidesert woodland, shrubland, and grassland in the lowlands. A diversity of riparian-wetland habitats occurs along the river and most of its tributaries.

For many wildlife species, a large range of habitats is important in their life cycle. Lower elevation areas, such as those within the study area, can serve as important migration corridors or wintering areas for wildlife that breed at upper elevations. Higher elevation habitats have some measure of long-term protection because they are located within the San Juan National Forest. However, lower elevation areas, in particular the transition area between National Forest lands to the north and study area lands to the south, appear much more susceptible to losses in the future through human development.

2.1.6 Threatened and Endangered Species

Endangered species most likely to utilize riparian-wetland habitats along the La Plata River are the bald eagle (*Haliaeetus leucocephalus*) and the southwestern willow flycatcher (*Empidonax trailii extimus*). Reclamation has conducted surveys for bald eagle and southwestern willow flycatcher over the past few years. Use of communal roosts along the La Plata River corridor by wintering bald eagles has been consistently documented, and it is suspected that they may have attempted nesting within the vicinity of the study area.

Willow flycatchers have been observed along the river corridor. Five willow flycatchers (*Empidonax trailii* ssp.) were confirmed within the study area in May 1997; however, no willow flycatchers were confirmed during subsequent surveys when nesting activities would have taken place (Rhea 1997). It appears that the observed willow flycatchers were using the river valley as a migratory corridor. Use of the river valley by breeding pairs is unknown at this time. Therefore, it is not known whether the observed willow flycatchers were the endangered southwestern willow flycatcher or an unprotected *Empidonax traillii* subspecies. These results are consistent with a survey conducted along the La Plata River by the National Biological Survey in 1994 (Sedgwick 1994), in that migratory willow flycatchers were observed but no breeding pairs were documented. It is believed, however, that suitable habitat exists for this subspecies within portions of the study area and it is possible that this species could utilize riparian-wetland habitats along La Plata River.

It is possible that the endangered peregrine falcon (*Falco peregrinus*) could use the study area for hunting. Loggerhead shrike (*Lanius ludovicianus*), a candidate species, may also utilize riparian-wetland habitats along the river corridor. The status of the loggerhead shrike along the La Plata River corridor has been less documented.

2.2 STUDY AREA DESCRIPTION

There were two main criteria that Reclamation used in selecting a section of the river corridor for evaluating mitigation opportunities and potential. First, and most important, the selected section had to maintain perennial flows; otherwise, mitigation values for native fish and certain wildlife would be very low or nonexistent and the potential for riparian-wetland mitigation would be greatly diminished. Second, because the majority of the land along the river corridor in the lower watershed is in neither federal nor state ownership, the selected section had to include lands whose owner(s) would be willing to sell land titles or easement rights or otherwise participate.

Figure 2-2. —Study area location map.

2.2.1 Location and Land Ownership

The selected study area has perennial river flows and contains about 5 miles of the La Plata River corridor between the confluence with Cherry Creek to the north, and a point approximately 1 mile downstream of the confluence with Long Hollow to the south (Figure 2-2). The eastern and western limits of the study area are defined as the walls of the La Plata River valley. The study area encompasses a total of approximately 462 acres of river corridor and includes land owned by five separate entities. Approximately 9 acres of highway right-of-ways located in the southern portion of the study area are not included in this acreage.

Within the study area, the majority of the land along the river corridor (approximately 68 percent) is currently owned by C. W. Huntington. Mr. Huntington is seeking to sell his property. Reclamation has acquired the first option to purchase Mr. Huntington's property, which includes approximately 309 acres of the La Plata River corridor and 5,680 acres of lands outside of the river corridor. The Huntington property encompasses the river corridor within three separate parcels. The upstream and downstream limits of the study area are defined by the northern and southern property boundaries of the northernmost and southernmost parcels, respectively, of the Huntington property (Figure 2-3) (Table 2-1).

Table 2-1. —Land ownership within the La Plata River corridor study area.

Landowner	Acres of River Corridor within Study Area	Percent Total
C. W. Huntington	309	67%
North Parcel	163	35%
Central Parcel	50	11%
South Parcel	96	21%
Southern Ute Indian Tribe	109	23.5%
North Parcel	87	19%
South Parcel	22	4.5%
Myron and Bob Taylor	30.5	6.5%
Bob and Anna Taylor	2.5	0.5%
Don Boyle	11	2.5%
Total	462	100%

In addition to the Huntington property, the study area includes two parcels of SUIT land that encompass a total of approximately 109 acres (or about 23.5 percent) of the river corridor (Figure 2-3). The SUIT are major stakeholders in the ALP Project and have expressed an interest in evaluating mitigation opportunities on Tribal lands. Near the Long Hollow confluence, approximately 30.5 acres (or about 6.5 percent) of the river corridor are owned by Myron and

Figure 2-3. —Study area ownership map.

Bob Taylor, 11 acres (or about 2.5 percent) are owned by Don Boyle, and 2.5 acres (or about 0.5 percent) are owned by Bob and Anna Taylor (Figure 2-3). Reclamation may consider approaching these private landowners regarding their interest to participate with mitigation for the ALP Project.

Resource characteristics of all properties within the study area were equally assessed.

2.2.2 Physical Description

The La Plata valley is a major landform that has been carved into the landscape by the La Plata River during recent geologic time. The valley, which ranges from about 500 to 1,000 feet across, generally has a north-south bearing although it does display a slightly sinuous pattern. The channel averages about 30-feet wide, but varies dramatically in character from a meandering single-thread channel to a braided channel. The floor of the valley is inset into the surrounding tablelands about 60- to 120-feet vertically (Figure 2-4), and is greatly influenced by the hydrology and fluvial processes of the river. The valley floor has a moist environment capable of supporting riparian-wetland vegetation, whereas the adjacent tablelands, in the absence of irrigation water, can only support semi-arid plant communities.

Figure 2-4. —Typical setting of the La Plata River valley within the study area.

Because the valley has been downcut into a moderately resistant sandstone formation (the Cliff House Sandstone), the valley walls are generally steep and contain rock ledges. Subsequently, there is a sharp transition between the riparian-wetland vegetation on the valley floor and the semi-arid vegetation on the flanking tablelands to the east and west. Between its walls, the valley floor consists of several, relatively flat surfaces of alluvial sedimentary units that have been deposited by the La Plata River. These sedimentary deposits and their associated geomorphic surfaces provide the physical template for the riparian-wetland plant communities of the valley floor. More detailed descriptions of the La Plata River and its valley are provided in Chapter 3.

2.2.3 Land Use

Although prehistoric farming was likely being practiced in the valley by the Anasazi more than 1,000 years ago, modern irrigated farming has been undertaken in the La Plata River valley only since the late 1800s. Within the study area, one irrigation canal diverts water from the La Plata River for irrigation of lands downstream. A couple of very small parcels on the valley floor in the study area were likely farmed during the early 1900s. However, the primary use of study area lands has been and continues to be livestock grazing. More recently, private landowners have been taking advantage of big game use of the river corridor by selling trespass permits for elk and deer hunting.

2.2.4 Study Area Segmentation

The study area was subdivided into three segments (Segments I, II, and III) for geomorphic analyses. These segments (Figure 2-3) divide the study area at locations where there are changes in hydrologic and/or geomorphic conditions of the river and its valley. These changes affect the river channel and its floodprone areas, which in turn affect riparian-wetlands and fish and wildlife habitats. At the Segment I-Segment II division there are several subtle changes in valley and river geomorphology, including changes in valley width, valley slope, character of the stream channel, and texture of valley floor sediments. The division between Segments II and III is located at the confluence with Long Hollow and is based upon that tributary's effect on the hydrology and sedimentology of the La Plata River downstream.

Eleven river reaches were delineated within the study area, primarily to facilitate analyses for native fish habitat (Figure 2-3). Reaches were delineated based on channel features consistent with Rosgen's (1996) Level I geomorphic characterization. Although these divisions of the corridor provide internally consistent segments and reaches for discussing most resources, they are neither absolute nor perfect delineations for all resources discussed herein.

CHAPTER 3. EXISTING CONDITIONS

The existing environment for the study area is described in this chapter in terms of riparian-wetlands, fisheries, wildlife, and threatened and endangered species. Where applicable, descriptions of the geomorphology and hydrology of the river valley are related to the presence of riparian-wetland conditions. Similarly, descriptions of the geomorphology and hydrology of the river channel are related to fish habitat.

For many resources, environmental conditions are similar throughout the study area, especially those conditions within each river segment. Within each river segment, conditions tend to vary the most by property ownership and appear to be most reflective of both past and current land uses. An overview of existing conditions common throughout the study area for each resource is summarized in the General Findings section of Chapter 3. This overview includes resource discussions by river segments and reaches. Site-specific conditions are summarized separately in this chapter for each property within the study area. Methods used to assess resource conditions for riparian wetlands, fisheries and hydrology/geomorphology are described in the technical appendices that are attached to this report.

3.1. GENERAL FINDINGS

3.1.1 Riparian-Wetlands

The overall approach to conducting riparian-wetland analyses closely integrated the evaluation of riparian-wetland vegetation with geomorphology, hydrology, and land use. The river corridor has several geomorphic surfaces within the confines of the valley walls that are the products of fluvial depositional and erosional processes. These surfaces create a mosaic of land patterns on the valley floor that provide a physical template both of disturbance processes and water availability that are requisite for the development of riparian-wetland plant communities (Gregory et al. 1991). In the arid and semi-arid regions of the southwestern United States, riparian-wetland areas are vegetationally distinct from upland areas because rivers and streams provide additional sources of water in an otherwise water-limited environment (Fisher 1995). With increasing distance from the river and/or elevation above the alluvial water table, the fluvial surfaces become drier and there is a transition from the riparian-wetland ecosystem to the upland ecosystem. Therefore, because riparian-wetland plant associations may be related to specific valley landforms and fluvial surfaces, it generally should be possible to predict the vegetation potential of such surfaces even if they have been perturbed by human land uses (Kovalchik and Chitwood 1990).

The fluvial surfaces of the La Plata River valley were differentiated based on their affinity for supporting riparian-wetland conditions. The *zone of influence* is defined as that area within the river valley that is influenced by the river's hydrology—both surface water and ground water. Typically, the zone of influence supports riparian-wetland plant communities that are dependent

on the hydrology and geomorphic processes of the river. Within the study area, three surfaces were identified within the river's zone of influence: (1) the channel-bar subzone, (2) the floodplain subzone, and (3) the low terrace subzone. One surface, the high terrace-alluvial fan, was designated outside the zone of influence (Figure 3-1).

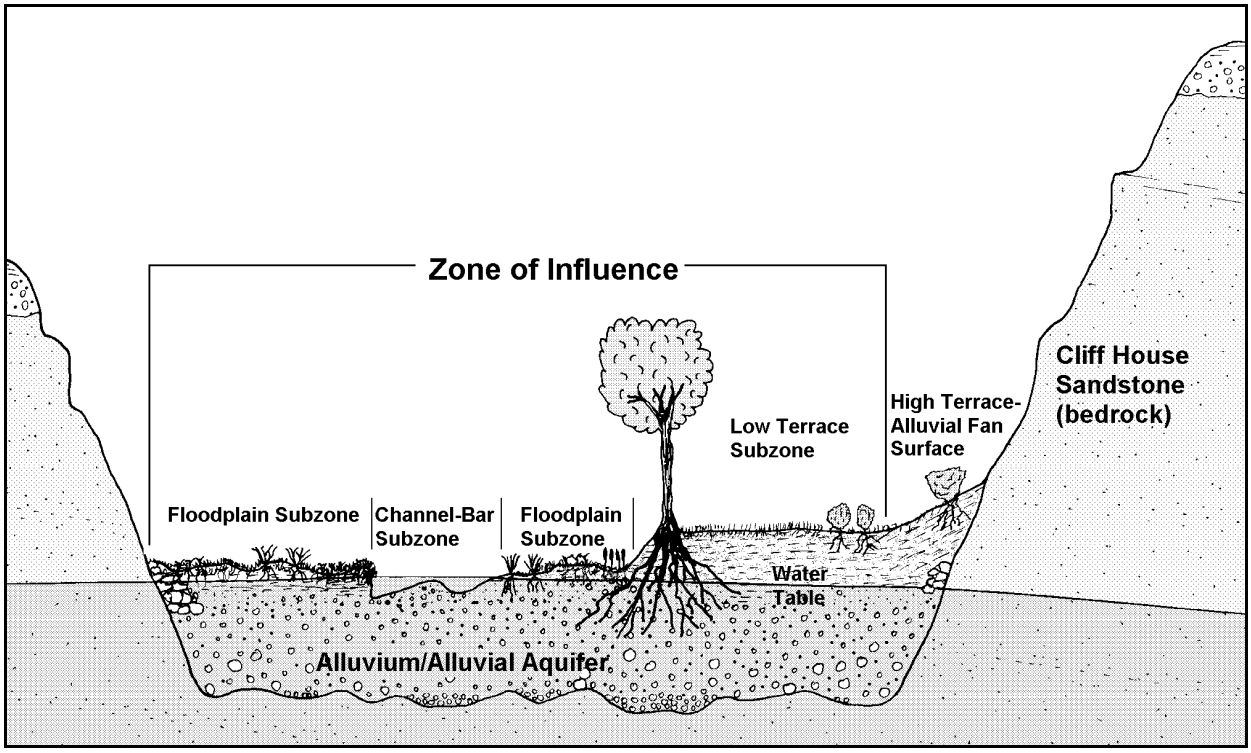

Figure 3-1. —Cross-section of La Plata River valley bottom.

The area of most active fluvial processes is herein termed the *channel-bar subzone* (Figure 3-1). This subzone incorporates the river channel and generally encompasses a band of recently deposited sediment on either one or both riverbanks. This subzone is subject to frequent flooding and is prone to rapid erosion and/or deposition. Its surface is located within one to two feet of normal flow level and depth-to-ground water is typically shallow. Plant communities in the channel subzone are those that are water tolerant and whose recruitment requires a bare-sediment nursery condition. Dominant plant species include narrowleaf cottonwood (*Populus angustifolia*), sandbar willow (*Salix exigua*), and tamarisk (*Tamarix ramosissima*). Seedling recruitment of these species appears to occur on an annual basis, but mortality is high due to scouring flood flows and/or livestock depredation. Nevertheless, multiple classes of seedling-sized cottonwoods, willows, and tamarisk (1-6 years) were observed within this subzone throughout the study area. Although livestock grazing suppresses these communities from reaching their full potential (Figure 3-2), the degree of suppression can vary greatly among the

Figure 3-2. —Example of grazing restricting the height of young cottonwoods. Note height of less-grazed tree of same size class in foreground.

parcels within the study area. Frequent deposition and scouring of substrates limit the establishment of herbaceous plant communities.

Located about 2-feet above the channel is the *floodplain subzone* (Figure 3-1). This is a predominantly depositional environment, with clays, silts, and sands acreted from suspension during flooding. A lesser flood frequency on a surface with a relatively shallow ground-water table allows for the establishment of herbaceous vegetation. Plant communities of the floodplain subzone include wet meadows of riparian sedges (*Carex spp.*), arctic rush (*Juncus arcticus*), grasses (*Agrostis spp.*, *Hordeum jubatum*, and *Poa spp.*) and various forbs. Marshes of bulrush (*Scirpus spp.*), spike rush (*Eleocharis spp.*) and cattail (*Typha lattifolia*) occur in oxbow meander scars and chute channels where the ground-water table intersects the floodplain. Cottonwood, willow, and tamarisk communities are also present; although, their recruitment is probably limited, occurring mainly on sandy sediment deposited near riverbanks or in chute channels after moderately large floods.

Located 3- to 6-feet above floodplain level is the *low terrace subzone* (Figure 3-1). This subzone may have been the floodplain prior to turn-of-the century channel incision that resulted in the modern-day floodplain. Presently, the terrace subzone is rarely flooded. Hydrological reductions in surface and ground water from upstream diversions, lack of overbank flooding, and greater height above the ground-water table make this a drier microenvironment within the zone of

influence. Upland grass/forb and sagebrush are the prevalent plant communities on the terrace subzone. However, very old and deep-rooted cottonwood trees survive on this terrace because their roots extend to the ground-water table. Apparently, these trees were recruited around the turn of the 20th Century when this subzone was the river's floodplain or when it was overtopped by large flood flows. The understories of these cottonwoods lack other herbaceous and shrubby riparian-wetland plants and are dominated by upland grasses, forbs, and mature sagebrush. This subzone may support cottonwood, tamarisk, Russian Olive, willow, and/or riparian grass/forbs communities where moisture levels are elevated by irrigation returns or tributary inflows which raise the local ground-water table.

Between the valley wall and the low terrace subzone are two surfaces not included within the zone of influence. These surfaces have been combined into the *high terrace-alluvial fan* (Figure 3-1). These surfaces are about 6-feet higher in elevation than the low terrace subzone. Because of their greater elevation above the river, these surfaces are unaffected by present-day river processes and hydrology. Typical plant communities are scrub oak, upland grass/forb, and sagebrush. Riparian-wetland vegetation may occur where non-river water sources raise the local ground-water table.

Within the study area, a total of approximately 405 acres of plant communities and cover types were delineated within the river's zone of influence. (See Appendix B for a detailed description of plant community types and how they were identified and mapped.) Of this total, approximately 238 acres occur in Segment I (Table 3-1, Figure 3-3). Segment I contains about twice as much channel-bar subzone than floodplain subzone and has the greatest extent of low terrace subzone. This is reflected by the presence of approximately 49 acres of the cottonwood, Russian olive, tamarisk, 40 acres of the willow community type and 45 acres of the riparian grass/forb type. The shrub community types are strongly correlated with the channel-bar subzone and the riparian grass/forb with the floodplain subzone. Approximately 40 acres of desert grassland/shrubland and 32 acres of the upland grass/forb, which are correlated with the low terrace subzone, are present in Segment I.

Cottonwood and willow recruitment were observed throughout Segment I, although livestock grazing appears to prevent the full development of these communities. Similarly, livestock grazing prevents both the riparian and upland grass/forb communities from reaching their full potential. The presence of Kentucky bluegrass, alfalfa and red clover in the riparian/grass forb communities suggests that there were attempts to convert these areas to livestock pasture. Tamarisks are present, but are not problematic because they do not form dense, monoculture thickets. Additionally, the removal of mature tamarisk clumps for livestock pasture appears to have helped keep this undesirable species in check. In general, the effects of livestock grazing and the presence of tamarisk are similar in Segments II and III.

Table 3-1. —Summary of Plant Communities and cover classes within the La Plata River's zone of influence.

Vegetation Class		Segment I	Segment II	Segment III	TOTALS
10	**Russian Olive and/or Tamarisk [1]**	0	1	8	**9**
11	**Pinyon / Juniper**	1	0	2	**3**
12	**Conifer / Oak**	0	0	0	**0**
13	**Cottonwood [1]**	1	0	3	**4**
14	**Cottonwood, Russian Olive, Tamarisk [1]**	49	36	25	**110**
15	**Oak**	1	1	4	**6**
16	**Willow [1]**	40	6	2	**48**
20	**Grass / Forb Upland**	32	19	8	**59**
21	**Grass / Forb Riparian [1]**	45	8	0	**53**
22	**Desert Grassland / Sagebrush**	40	7	12	**59**
23	**Emergent Wetlands [1]**	6	3	1	**10**
27	**Sagebrush / Cottonwood**	4	1	2	**7**
30	**River [1]**	13	6	6	**25**
31	**Side Channels / Back Water**	1	0	0	**1**
40	**Residential, Industrial, and Roads**	0	0	3	**3**
50	**Irrigated Farmlands, Pasture / Grazing**	0	0	0	**0**
60	**Bareground / Weeds**	1	0	0	**1**
61	**Gravel, Sand, and Mud Bars [1]**	4	1	2	**7**
TOTALS		**238**	**89**	**78**	**405**

[1] Riparian-wetland classes

A total of approximately 89 acres of plant communities and cover types occur within the zone of influence in Segment II (Table 3-1, Figure 3-3). The upper portion of Segment II has several large alluvial fans. The dominant plant community in the upper portion is the upland grass/forb type (19 acres), which occurs on the terrace and high-terrace/alluvial fan subzones associated with these fans. Riparian-wetland vegetation is limited to the narrow channel-bar and floodplain subzones. In the lower portion of Segment II where the channel-bar subzone is most prevalent, cottonwood, tamarisk, Russian olive and willow communities are most common (36 acres).

Figure 3-3. —Existing conditions, Map 1.

Figure 3-3. Existing conditions, Map 2.

Figure 3-3. Existing conditions, Map 3.

Figure 3-3. Existing conditions, Map 4.

Figure 3-3. Existing conditions, Map 5.

Both river hydrology and sedimentology change greatly in Segment III because of the influence of Long Hollow, which contributes about 40 mi^2 of watershed area to the La Plata River. In addition , Segment III has been significantly affected by large turn-of-the-20th Century floods and by human activities of stream alteration and highway construction. Approximately 4,000 feet of the La Plata River channel has been straightened, relocated, or otherwise modified below

Figure 3-4. — Reach of straightened and leveed channel in Segment III, Reach 10. Note that woody vegetation has established on the banks since completion of relocation activities.

its confluence with Long Hollow (Figure 3-4). In addition, river water is diverted into a small irrigation canal located on the western riverbank near the Long Hollow confluence. Leakage from the canal probably affects ground-water conditions and vegetation growth below it on the west side of the valley for most of the length of Segment III.

A total of approximately 78 acres occurs within the zone of influence in Segment III (Table 3-1, Figure 3-1). Channel straightening and reconstruction of the riverbank in this segment have artificially created large expanses of channel-bar subzones. This is reflected by the prevalence of cottonwood, tamarisk, Russian olive and willow communities that occupy these disturbed areas.

3.1.2. Fisheries

The La Plata River is known to support 11 species of fish, including five native species and six non-native species (Table 3-2) (Sublette et al. 1990, Miller et al. 1995). Native species include roundtail chub, flannelmouth sucker, bluehead sucker, speckled dace, and mottled sculpin. Non-native species include fathead minnow, red shiner, rainbow trout, brown trout, brook trout, and black bullhead.

Table 3-2. —Historic and present composition of fish species of the La Plata River in the vicinity of the study area.

Common Name	Scientific Name	Historic/Native Status	Present	
			Status	Percent By No.[1]
Family Cyprinidae				
Roundtail chub	*Gila robusta*	Native	Native	1.01
Speckled dace	*Rhinichthys osculus*	Native	Native	68.78
Fathead minnow	*Pimephales promelas*		Non-native	1.56
Red shiner	*Cyprinella lutrensis*		Non-native	<0.01
Colorado squawfish	*Ptychocheilus lucius*	Native	Extirpated	0.00
Family Catostomidae				
Flannelmouth sucker	*Catostomus latipinnis*	Native	Native	20.70
Bluehead sucker	*Catostomus discobolus*	Native	Native	7.38
Razorback sucker	*Xyrauchen texanus*	Native	Extirpated	0.00
Family Salmonidae				
Rainbow trout	*Onchorynchus mykiss*		Non-native	0.16
Brown trout	*Salmo trutta*		Non-native	0.13
Brook trout	*Salvelinus fontinalis*		Non-native	0.01
Family Cottidae				
Mottled sculpin	*Cottus bairdi*	Native	Native	0.25
Family Ictaluridae				
Black bullhead	*Ameiurus melas*		Non-native	0.01

[1] Miller et al. (1995)

Of the five native species, the roundtail chub is of concern in Colorado, where it is classified as a "sensitive species," and in New Mexico, where it is classified as "State Endangered Group II." Because the La Plata River is one of only five tributaries of the San Juan River with remnant populations of roundtail chub, protecting this species and its habitat is a primary objective in managing the La Plata River. The endangered Colorado squawfish, razorback sucker, humpback chub (*Gila cypha*), and bonytail (*Gila elegans*) do not occur in the La Plata River.

In March, July, and September of 1994, Miller et al. (1995) reported speckled dace (69% of total number), flannelmouth sucker (21%), bluehead sucker (7%), fathead minnow (*Pimephales promelas*, 1%), roundtail chub (1%), and mottled sculpin (<1%) as the most common species at six sampling stations of the La Plata River in New Mexico and Colorado (Table 3-2). Flows in New Mexico were intermittent because of irrigation withdrawals, and fish populations were typically dispersed with low numbers of individuals. While intermittent flows in the lower La Plata River may prevent exchange of native fish with the San Juan River, these flows and some concrete irrigation diversions also appear to be effective fish barriers to upstream movement of non-native fishes into areas occupied by native species near the Colorado-New Mexico state line. This may be a beneficial effect because certain non-native fishes are competitors and/or predators that can reduce or inhibit populations of native fish species.

Of the five native fish species, the roundtail chub has the most distinct habitat requirements for pool/eddy complexes with associated overhanging and lateral cover. Although roundtail chub in large rivers typically use large recirculating eddies and rocky shorelines (Valdez et al. 1982), the pool/eddy complex with overhanging cover has been identified as habitat most commonly used by the species in tributary streams, including Fossil Creek and Wet Beaver Creek, Arizona (Barrett and Maughan 1995); the Blacks Fork River, Wyoming (Richards and Holden 1981); the Dolores River, Colorado (Valdez et al. 1992); and the La Plata River, Colorado (Miller et al. 1995).

The habitat of flannelmouth suckers has not been described in small streams, although Miller et al. (1995) captured most adults in the La Plata River in pools and most juveniles in glides; in the larger Colorado and Gunnison Rivers, adults rest in deep pools and feed at the base of large cobble riffles (Valdez et al. 1982a). Miller et al. (1995) also found most adult bluehead suckers in pools and glides and most juveniles in glides and riffles. In the Colorado River in Grand Canyon, adult bluehead suckers use large cobble riffles and shallow pools, and annually ascend to spawn in small tributaries such as Bright Angel Creek and Kanab Creek (Otis 1994), Shinumo Creek (Allan 1993), and the Little Colorado River (Mattes 1993). Maddux and Kepner (1988) reported bluehead suckers spawning in small gravel beneath rock outcrops in Kanab Creek. The speckled dace is a small fish and tends to use shallow habitats; Miller et al. (1995) captured equal numbers of adults and juveniles in pools, glides and riffles of the La Plata River. These four native species typically spawn on cobble riffles in spring and early summer at water temperatures of 16 to 24° C. The eggs incubate less than 10 days and tiny larvae drift downstream into flooded bottomlands, backwaters, and quiet shoreline habitats where they rear as juveniles.

Mottled sculpin are not a major consideration in the study area because habitat for this species is more suitable upstream of the study area. This is evidenced by their low capture rates (0.25 percent of total captures) near the study area by Miller et al. (1995) (Table 3-2).

River reaches were evaluated to assess the longitudinal distribution of existing fish habitat and the potential for habitat improvement. The evaluation considered biologic, geomorphic, and hydrologic conditions as they affect fish habitat (See the fisheries and river channel technical appendices (Appendices C and D, respectively) for detailed descriptions of methods and results.) Habitat characteristics were described as:

- reaches where fish habitat was "excellent" (with few evident anthropogenic impacts) and worthy of protection or preservation management strategies; these reaches require minimal action and are valuable as reference reaches from which to compare the efficacy of restoration programs (Case 1995, Beschta 1997 cited in Kauffman et al. 1997),

- reaches where fish habitat was "good" and could be enhanced through changes in current land use practices or without large expenditure of money; these reaches require moderate planned action to improve the value of existing river reaches,

- reaches where fish habitat was "fair" and could be restored but at costs and with some risk of failure; these reaches require substantial investment in time and money to re-establish processes, functions, and related biological, chemical, and physical linkages between the aquatic and associated riparian ecosystems,

- reaches where fish habitat was "poor" and restoration is possible but very costly due to extreme conditions of alteration, degradation, or because land ownership and current management practices prevent corrective management strategies.

Existing fish habitat for each of the geomorphic reaches within Segments I, II, and III is described qualitatively in Figure 3-3 (Existing Conditions Map). Within Segment I, habitat in reaches 1, 4, and 6 was good for speckled dace and bluehead sucker because of a prevalence of swift runs and cobble/gravel riffles, but there were few pools for suckers and no pool/eddy complexes for roundtail chub. The habitat in reaches 2, 3, and 5 was only fair for these species, primarily because the stream channel was extensively braided, shallow, and exposed. The only section of good habitat was in reach 4 where the river flowed against the valley wall, exposing boulders and debris that created some pool/eddy complexes with overhanging cover.

Within Segment II, reach 7 was classified as good habitat for speckled dace and bluehead sucker, but fair for flannelmouth sucker, and reach 8 was fair habitat for all three species. Short sections within each reach were considered good habitat for roundtail chub where the river flowed against the valley wall, exposing boulders and overhanging cover as described for reach 4 above.

Within Segment III, the habitat in reach 9 was good for speckled dace, flannelmouth sucker, and roundtail chub with pools and lateral cover provided by concrete slabs and boulders placed by landowners. The channel in reach 10 was braided and habitat was fair for speckled dace. In reach 11, there were deep pools and large gravel riffles with some overhanging bank cover, as good habitat for flannelmouth suckers; in reach 12, habitat quality was only fair with some pools but little cover. Reach 13 was considered the best habitat for roundtail chub in this portion of the La Plata River. Pool/eddy complexes with overhanging cover were abundant and much of the riparian zone was in tact.

A further assessment of roundtail chub habitat in the La Plata River was completed for each of the subject properties. Roundtail chub habitat was identified and described based on past capture locations. Past collections (Miller et al. 1995) showed that a pool/eddy complex with overhanging, instream, or lateral bank cover best described the habitat used by juvenile and adult roundtail chub. For the purposes of this mitigation assessment, this habitat complex was termed a "fish habitat unit" (FHU), and it was assumed that this habitat complex was selected by roundtail chub in the study area.

The greatest concentration of roundtail chubs is known to occur at the Baird Property, which is approximately 2.5 miles downstream of the study area (Figure 2-2). The Baird Property encompasses a relatively unperturbed portion of the river corridor and supports mature riparian-wetland vegetation along its riverbanks. Habitat features within the Baird Property were used as a basis to assess roundtail chub habitat within the study area properties. Based on the features associated with FHUs in the Baird Property, the study area properties were surveyed and the number of FHUs per mile of stream was determined for each property. This portion of the assessment provided a measure of the amount and distribution of existing fish habitat.

3.1.3 Wildlife

The study area supports a relatively diverse mosaic of upland, riparian-wetland, and riverine habitats for a variety of wildlife guilds, including: big game, small mammals, raptors, waterfowl and shorebirds, neotropical migratory birds, game birds, reptiles and amphibians. Usually, the habitats of the river corridor support a greater amount of wildlife use compared with the adjacent, semi-arid uplands of sagebrush, pinyon pine, and juniper. However, the value of these habitats can vary greatly along the river corridor depending on past and current land uses, proximity to human settlements, and the amount of water diverted from the river.

Overall, habitats in Segments I and II are in the best condition, relative to the study area, because they are the farthest removed from human development and settlement. The primary factor limiting wildlife values in these segments is the intensity of livestock grazing, which varies depending on land ownership as discussed later in this chapter. Segment III tends to support the least amount of wildlife values due to the obliteration of habitats that has resulted from channel straightening, road construction, and irrigation diversions. Also, habitats in Segment III are close to human settlements and disturbances caused by highway traffic.

3.1.4 Threatened and Endangered Species

Bald eagles are not known to nest within the study area; however, communal roost sites for wintering bald eagles are known to occur. Communal roost sites consist of mature but isolated cottonwood trees that are usually on the low terrace subzone (Figure 3-5). Reclamation has completed surveys for bald eagles during the winters of 1993-94, 94-95, 95-96, and 96-97. During this 4-year period, three separate communal roost sites were observed in Segment I

Figure 3-5. —Example of isolated mature cottonwood tree on low terrace subzone. Note extent of pasture conversion within the river corridor.

(reaches 2, 4, and 6) and one site was observed in Segment II, reach 7 (Figure 3-3). Wintering bald eagles were observed consistently using these roost sites between the months of December and March.

Younger stands of cottonwoods and dense thickets of willows and tamarisk on the floodplain and channel bar subzones provide potential habitat for the southwestern willow flycatcher, which is a neotropical migrant. Surveys for southwestern willow flycatchers were conducted for the study area on May 30, June 14, and July 3, 1997, according to the protocols established by the Service, which included both field observations and vocalizations using the playback method (i.e., using a recording of the species distinctive call to elicit a response) (Sogge et al. 1997). The first survey period resulted in responses from five separate willow flycatchers, one in Segment III and four in Segment II (Rhea 1997). Subsequent surveys resulted in no responses or observations. Because

no other responses were elicited during the second and third surveys, it is not possible to determine whether the willow flycatchers were of the southwestern subspecies, or whether the study area is used by breeding pairs. It is assumed that the birds were using the study area as a migratory corridor.

Breeding pairs of southwestern willow flycatchers are known to nest along the San Juan River to the south and the Dolores River to the north. Rhea (1997) speculated that although nesting willow flycatchers were not identified within the study area in 1997, the existing riparian-wetland vegetation along certain reaches of the river corridor provides suitable nesting habitat for this species. Nevertheless, at this time it is only known that willow flycatchers use the study area as a migratory corridor.

Within the study area, habitat is limited for both bald eagle and southwestern willow flycatcher. Grazing practices throughout the study area limit the development of multi-storied shrub communities (particularly willows), which is essential for nesting willow flycatchers. Similarly, grazing has kept cottonwood stands from reaching maturity. Subsequently, mature cottonwood stands throughout the study area are usually decadent. Apparently, several trees either deadfall or are cut each year. Each remaining tree becomes increasingly important for bald eagle use because there is no suitable age-class to replace these trees.

A mature peregrine falcon was observed in Segment I, reach 4 during the Spring of 1997 (Rhea 1997). The falcon was perched in a cottonwood tree. It is assumed that the falcon was using the river corridor for hunting because suitable nesting habitat is marginal at best within the study area. Peregrine falcon typically nest on high cliffs. To date, loggerhead shrike have not been recorded in the study area.

3.2 HUNTINGTON PROPERTIES

3.2.1 Riparian-Wetlands

A total of approximately 279 acres of plant communities and cover classes were identified within the zone of influence at the Huntington Properties (Table 3-3). The northern parcel is in Segment I, reaches 1, 2, 3, and 4. The northern parcel contains the greatest acreage of riparian-wetlands and is the least disturbed of the three parcels as is shown by the presence of about 35 acres of willow communities, compared with 24 acres of mixed cottonwood, Russian olive, and tamarisk communities, which tend to indicate past disturbances. Both the central and southern parcels have greater amounts of the mixed cottonwood, Russian olive, and tamarisk compared with willow. However, the northern parcel is not pristine. The 33 acres of grass/forb riparian communities in the northern parcel appear to have been native willow and cottonwood communities that were converted to livestock pasture. Areas converted to livestock pasture lack deep-rooted trees and shrubs to help stabilize riverbanks. Subsequently, riverbanks bordering pastures have accelerated erosion causing channel widening and sedimentation (Figure 3-6). In addition, grazing pressure prevents the establishment of mature cottonwood and willow stands at

Table 3-3. —Summary of Plant Communities and cover classes within the zone of influence at the Huntington Properties.

Huntington Properties					
Vegetation Class		**Northern Parcel**	**Central Parcel**	**Southern Parcel**	**TOTALS**
10	**Russian Olive and/or Tamarisk [1]**	0.0	0.0	8.0	**8.0**
11	**Pinyon / Juniper**	0.5	0.0	1.5	**2.0**
13	**Cottonwood [1]**	0.0	0.5	3.0	**3.5**
14	**Cottonwood, Russian Olive, Tamarisk [1]**	24.0	10.5	34.0	**68.5**
15	**Oak**	0.5	0.0	4.5	**5.0**
16	**Willow [1]**	35.0	0.5	2.5	**38.0**
20	**Grass / Forb Upland**	26.0	3.0	17.5	**46.5**
21	**Grass / Forb Riparian [1]**	32.5	5.0	3.0	**40.5**
22	**Desert Grassland / Sagebrush**	7.0	6.0	14.5	**27.5**
23	**Emergent Wetlands [1]**	0.0	6.5	1.5	**8.0**
27	**Sagebrush / Cottonwood**	2.0	1.5	1.5	**5.0**
30	**River [1]**	7.5	3.0	6.0	**16.5**
31	**Side Channels / Back Water**	0.5	0.0	0.5	**1.0**
40	**Residential, Industrial, and Roads**	0.0	0.0	3.5	**3.5**
60	**Bareground / Weeds**	0.5	0.0	0.0	**0.5**
61	**Gravel, Sand, and Mud Bars [1]**	1.0	0.5	3.0	**4.5**
TOTALS		**137.0**	**37.0**	**104.5**	**278.5**

[1] Riparian-wetland classes

certain high-use locations. These conditions are also common on central and southern parcels, and are confounded by summertime flow reductions caused by irrigation diversions upstream of the study area.

The central parcel is also in Segment I and rests mostly in reach 6. It is bordered to the north and south by SUIT lands. The central parcel has been grazed more heavily than the northern parcel and is dominated by cottonwood, Russian olive, and tamarisk communities (Table 3-3). An approximately 6-acre emergent wetland complex occurs in the northern area of this parcel. An alluvial fan greatly constricts the zone of influence and thereby limits the presence of riparian-wetland plant communities in the southern area of the parcel (Figure 3-3).

Figure 3-6. —Channel widening and bank erosion in Reach 2. Floodplain and terraces on the right have had vegetation converted to pastureland. To the left background, willows are being recruited on the channel-bar level.

The southern parcel is located in the lower portion of Segment II and in Segment III, reaches 8, 9, 10, and 11. Most of the area in reach 8 appears to have been moderately grazed and its plant communities are in relatively good condition. Cottonwood and willow recruitment are evident by the presence of multiple age/size classes at several locations; however, tamarisk and Russian olive are prevalent throughout the reach. Reaches 9, 10, and 11 have been significantly perturbed by both livestock grazing, irrigation diversions, and alteration of the river channel and floodplain. As a result, a significant amount of native vegetation has been removed and replaced with non-native tamarisk and Russian olive. In addition, a significant portion of the zone of influence has been "dried" resulting in the establishment of upland vegetation at locations that historically supported riparian-wetland vegetation.

3.2.2 Fisheries

The number of FHUs per mile of stream on the Huntington Property varied from a low of 2.4 within the northern parcel to 8.8 within the central parcel (Table 3-4), as compared with 42.0 FHUs per mile of stream on the Baird Property, where the majority of roundtail chub were found by previous investigators (Miller et al. 1995). A small portion of reach 4 (RM 36.4-36.2) in the northern Huntington parcel and a small portion of reach 7 (RM 34.8-34.6) in the central Huntington parcel were rated as "good" roundtail chub habitat (Figure 3-3).

Table 3-4. —Comparison of existing native fish habitat for the Huntington Properties.

Property Parcel	River Miles	Stream Length (miles)	FHUs per Mile (length in meters)	Eroding Banks per Mile (length in meters)	Native Fish Habitat Quality	
					Roundtail Chub	Other Native Species[1]
Huntington (Northern Parcel)	38.6-36.1	2.1	2.4 (273)	4.6 (890)	poor - fair	good
Huntington (Central Parcel)	35.4-34.6	0.8	8.8 (190)	10.0 (312)	fair	good
Huntington (Southern Parcel)	33.9-31.9	1.5	4.0 (146)	10.7 (765)	poor	fair - good

[1] includes flannelmouth sucker, bluehead sucker, speckled dace

3.2.3. Wildlife

Wildlife habitat on the Huntington parcels is relatively diverse. Small cliffs and canyons separate sagebrush shrublands and pinyon/juniper woodlands from the riparian area along La Plata River corridor. Stream channelization, irrigation diversions, and heavy livestock grazing have degraded wildlife habitats to some degree; however, initial field checks show the area has considerable potential for multiple wildlife values. This is consistent with other areas of southwestern Colorado where riparian areas support a disproportionately high species diversity within semiarid landscapes.

Habitat values vary within each Huntington parcel depending on the degree of disturbance, natural topography, and other factors. The relative isolation due to the private ownership and location of the northern, central, and most of the southern parcel away from major roads and human settlement add greatly to the value of the property. Invasion of the area by exotic species, for example tamarisk and Russian olive, is an existing problem although tamarisk is not as extensive as could be expected.

Resident mule deer use the parcels, and to some extent the area supports migrating animals in the winter. Major mule deer winter areas, however, occur to the north, northeast, and west of the Huntington parcels. While not normally considered elk winter range, the area is reported to occasionally have elk in the fall, winter, and spring. Elk winter concentration areas occur to the north of the property, and lands east, all the way to the Animas River, are used during winter months. Small mammals include the desert cottontail, long-tailed weasel, badger, striped skunk, beaver, and muskrat. Bird use of the property includes a long list of neotropical migrants, waterfowl, shorebirds, raptors, and upland game species such as Gambel's quail.

Currently, several factors limit wildlife values of the Huntington parcels. Livestock grazing management and perhaps upstream water diversions limit the full development of cottonwood and willow habitats. There is probably some competition for forage between domestic animals and wildlife. Introduced non-native plants, especially tamarisk, spotted knapweed, and thistle, compete with the more valuable native species and may increasingly reduce wildlife values. Presently, more desirable winter range for deer and elk occurs in the vicinity; however, rapid development may alter this significantly in the future. The potential value for significant use by big game animals during winter is now limited by this and by the relative lack of important browse species. Waterfowl and shorebird use is probably limited by reduced river flows, channel straightening, lack of brood habitat, and to a lesser extent lack of nesting habitat.

3.2.4. Threatened and Endangered Species

Two communal roost sites for wintering bald eagle occur in the northern Huntington parcel in reaches 2 and 4, and two communal roost sites occur in the central Huntington parcel, reaches 6 and 7 (Figure 3-3). No roost sites are known to occur in the southern parcel. Presumably, potential roosting habitat is limited in the southern parcel due to a lack of mature, but isolated, cottonwood trees removed from human disturbances.

One willow flycatcher was observed by vocalization near the upper portion of reach eight in the southern Huntington parcel. Potential flycatcher habitat in the northern and central parcels is limited by grazing effects that curtail the development of mature multi-storied riparian-wetland shrub communities.

3.3 SOUTHERN UTE INDIAN TRIBE PROPERTIES

3.3.1 Riparian-Wetlands

A total of approximately 89 acres of plant communities and cover classes were identified within the zone of influence at the SUIT lands (Table 3-5). The northern SUIT parcel is found in Segment I, reaches 4 and 5. The northern parcel has been managed intensively for livestock grazing. Mature riparian tree and shrub species, most notably tamarisk, have been removed in an attempt to increase available pasture (Figure 3-7). The removal of deep-rooted woody vegetation may have contributed to channel braiding in reach 4 (Figure 3-3). Apparently, the continual disturbance caused by intensive grazing and channel braiding has created conditions that select for the establishment of tamarisk. This condition is also prevalent in reach 5 in the area where an unimproved road provides vehicular access to the eastern riverbank.

Table 3-5. —Summary of Plant Communities and cover classes within the SUIT Lands.

SUIT Lands				
Vegetation Class		**Northern Parcel**	**Southern Parcel**	**TOTALS**
10	**Russian Olive and/or Tamarisk** [1]	0.0	1.0	**1.0**
11	**Pinyon / Juniper**	0.0	0.0	**0.0**
13	**Cottonwood** [1]	0.0	0.0	**0.0**
14	**Cottonwood, Russian Olive, Tamarisk** [1]	15.5	5.5	**21.0**
15	**Oak**	0.5	0.0	**0.5**
16	**Willow** [1]	5.0	0.5	**5.5**
20	**Grass / Forb Upland**	1.0	5.0	**6.0**
21	**Grass / Forb Riparian** [1]	8.0	4.0	**12.0**
22	**Desert Grassland / Sagebrush**	30.0	1.0	**31.0**
23	**Emergent Wetlands** [1]	0.0	2.0	**2.0**
27	**Sagebrush / Cottonwood**	1.0	1.0	**2.0**
30	**River** [1]	3.5	1.5	**5.0**
31	**Side Channels / Back Water**	0.0	0.0	**0.0**
40	**Residential, Industrial, and Roads**	0.0	0.0	**0.0**
60	**Bareground / Weeds**	0.0	0.0	**0.0**
61	**Gravel, Sand, and Mud Bars** [1]	2.5	0.5	**3.0**
TOTALS		**67.0**	**22.0**	**89.0**

[1] Riparian-wetland classes

The southern SUIT parcel is located Segment II, reaches 7 and 8 (Figure 3-3). The southern parcel is bordered by privately owned lands to the east and is less accessible than the northern parcel. As a result, it appears that this parcel has less grazing pressure, although livestock are present. The overall condition of riparian-wetland plant communities in the southern SUIT parcel is fair. The southern parcel also supports a greater diversity of riparian-wetland plant communities, including an approximately 2-acre emergent wetland complex in reach 7.

Figure 3-7. —Example of removal of woody riparian-wetland vegetation to increase livestock pasture.

3.3.2 Fisheries

A total of about 1.2 river miles occurs within both the SUIT parcels. The number of FHUs per river mile was 3.3, as compared with 42.0 FHUs per river mile on the Baird Property. One short section within the northern parcel, Segment 1, reach 4 (RM 36.4-36.2) was rated as "good" roundtail chub habitat (Figure 3-3). Similar to the habitat on the Huntington parcels, it was formed by localized bank erosion against the western valley wall that exposed large sandstone boulders. The exposed boulders provide lateral and overhead cover, creating several contiguous pool/eddy complexes. Also, like the Huntington parcels, large single trees or small stands of mature birch, cottonwood, tamarisk, or Russian olive trees provided isolated habitat complexes (Figure 3-8).

About 5 FHUs per river mile were identified in the northern SUIT parcel (Table 3-6). In comparison, no FHUs were identified in the southern parcel, although a very short section of reach 7 (RM 34.8-34.6), where the river abuts the western valley wall, has habitat potential.

3.3.3 Wildlife

The description of the general wildlife conditions and habitat values for the Huntington parcels are, more-or-less, the same for the SUIT parcels.

Figure 3-8. —Example of a single fish habitat unit created by a fallen birch tree in reach 5.

Table 3-6. —Comparison of existing native fish habitat for SUIT lands.

Property Parcel	River Miles	Stream Length (miles)	FHUs per Mile (length in meters)	Eroding Banks per Mile (length in meters)	Native Fish Habitat Quality	
					Roundtail Chub	Other Native Species[1]
SUIT Lands (Northern Parcel)	36.5-35.4	0.8	5.0 (75)	11.3 (455)	fair	good
SUIT Lands (Southern Parcel)	34.6-33.9	0.4	0 (0)	15.0 (275)	poor	fair - good

[1] includes flannelmouth sucker, bluehead sucker, speckled dace

3.3.4 Threatened and Endangered Species

No communal roost sites for wintering bald eagle are known to occur within the SUIT lands. No willow flycatchers were observed on SUIT lands. As with the Huntington Property, grazing effects appear to be the primary factor limiting the establishment of multi-storied riparian-wetland shrub communities preferred by willow flycatchers.

3.4 TAYLOR PROPERTIES

As discussed previously, two separate Taylor properties occur within the study area and are under separate ownership. The Myron and Bob Taylor property is the larger of the two properties and is located above the Long Hollow confluence in Segment II, reaches 7 and 8. The Bob and Anna Taylor property is located mostly in Segment III, reach 9 where Long Hollow confluences with the La Plata River (Figure 2-2).

3.4.1 Riparian-Wetlands

The M & B Taylor property encompasses a total of approximately 29.5 acres of plant communities and cover classes within the zone of influence (Table 3-7). More than 50 percent of this acreage (approximately 16.5 acres) is of the cottonwood, Russian olive, and tamarisk plant community type, and reflects both past and present grazing practices. There is also about 5 acres of the willow community type, most of which consists of a large willow stand at the boundary of reach 7 and 8 (Figure 3-3). It appears that recent grazing practices have been low to moderate because these woody riparian-wetland shrub communities tend to support robust vegetation, although mature streamside vegetation is lacking, suggesting there was intensive grazing during the recent past. Apparently, little recent effort has been made to convert woody vegetation to livestock pasture.

The B & A Taylor property only encompasses about 1.5 acres within the zone of influence. This acreage is made entirely of cottonwood, Russian olive, tamarisk, and river channel (Table 3-7). The property has been disturbed extensively during recent decades in efforts to channelize the river its Long Hollow confluence and to control the flood prone area. Existing plant communities are in poor condition and support little vegetative cover.

3.4.2 Fisheries

The fishery assessments for the Taylor properties were pooled together because of the extremely short section of river channel in the B & A Taylor property and its highly altered condition. The number of FHUs per mile of stream on the Taylor Properties (0.7 mile) was 2.9, as compared with 42.0 FHUs per mile of stream on the Baird Property (Table 3-8). Fish habitat within the Taylor Properties was generally in poor condition with little mature bank vegetation to provide cover.

Table 3-7. —Summary of Plant Communities and cover classes within the Taylor Properties.

Taylor Properties				
Vegetation Class		**M&B Taylor Property**	**B&A Taylor Property**	**TOTALS**
10	**Russian Olive and/or Tamarisk [1]**	0.0	0.0	**0.0**
11	**Pinyon / Juniper**	0.0	0.0	**0.0**
13	**Cottonwood [1]**	0.0	0.0	**0.0**
14	**Cottonwood, Russian Olive, Tamarisk [1]**	16.5	1.0	**17.5**
15	**Oak**	0.5	0.0	**0.5**
16	**Willow [1]**	5.0	0.0	**5.0**
20	**Grass / Forb Upland**	1.5	0.0	**1.5**
21	**Grass / Forb Riparian [1]**	0.5	0.0	**0.5**
22	**Desert Grassland / Sagebrush**	3.0	0.0	**3.0**
23	**Emergent Wetlands [1]**	0.0	0.0	**0.0**
27	**Sagebrush / Cottonwood**	0.0	0.0	**0.0**
30	**River [1]**	2.5	0.5	**3.0**
31	**Side Channels / Back Water**	0.0	0.0	**0.0**
40	**Residential, Industrial, and Roads**	0.0	0.0	**0.0**
60	**Bareground / Weeds**	0.0	0.0	**0.0**
61	**Gravel, Sand, and Mud Bars [1]**	0.0	0.0	**0.0**
TOTALS		29.5	1.5	**31.0**

[1] Riparian-wetland classes

The B & A Taylor property is unique in that it encompasses the present location of Long Hollow's confluence with the La Plata River. Seasonal aggregations of flannelmouth and bluehead suckers to the Long Hollow confluence have been observed. The purpose of these seasonal aggregations is not known at this time.

Table 3-8. —Existing native fish habitat for the M. & B. and B. & A. Taylor Properties.

Property Parcel	River Miles	Stream Length (miles)	FHUs per Mile (length in meters)	Eroding Banks per Mile (length in meters)	Native Fish Habitat Quality	
					Roundtail Chub	Other Native Species[1]
Taylor Properties	34.3-33.0	0.7	2.9 (35)	9.0 (80)	poor	fair

[1] includes flannelmouth sucker, bluehead sucker, speckled dace

3.4.3 Wildlife

The M & B Taylor property encompasses nearly 30 acres of river corridor consisting mostly of riparian-wetland shrub communities of mixed cottonwood, Russian olive, and tamarisk (16.5 acres) and willow (5.0 acres). Compared with the Huntington and SUIT parcels, this property appears to have sustained less grazing pressure in the recent past, although there is a lack of mature streamside vegetation. As a result, these plant communities presently support greater structural diversity, thereby improving habitat values for particular wildlife guilds, especially for neotropical migratory birds (Rhea 1997). The relative isolation of this property from human settlement adds to its wildlife values.

The B & A Taylor property is small and supports relatively little vegetative cover due to its history of human land use. It is next to Highway 140, a frequently traveled road. Subsequently, this property presently supports very little wildlife value (Figure 3-9).

3.4.4 Threatened and Endangered Species

No communal roost sites for wintering bald eagle are known to occur within the Taylor properties. Willow flycatchers were observed by vocalization on the M & B Taylor property in reach 7. These observations occurred in habitats that appear to have been largely inaccessible to livestock.

3.5 BOYLE PROPERTY

The Boyle Property is located in Segment III, reaches 9 and 10. The property has been greatly altered by past and ongoing earthmoving for river channelization and floodplain management. Subsequently, both the riverine and riparian-wetland environments have been significantly disturbed, with various parts of the property in differing stages of recovery.

Figure 3-9. —Looking down the La Plata River valley in Segment III, reach 9. Highway bridge at left crosses Long Hollow flowing from the east.

3.5.1 Riparian-Wetlands

The Boyle Property encompasses a total of about 7.5 acres of plant communities and cover classes within its zone of influence (Table 3-9). The vegetation acreage is entirely cottonwood, Russian olive, and tamarisk and grass/forb upland plant communities. Both plant communities are established on disturbed areas and support little vegetative cover. The grass/forb upland community probably occurs in an area that was riparian-wetlands prior to human disturbance.

3.5.2 Fisheries

The Boyle property contains two very small sections of the La Plata River that has been greatly altered. There is very little habitat value for most native fish and virtually no value for roundtail chub.

3.5.3 Wildlife

Similar to the B & A property in its past land use and proximity to Highway 140, the Boyle property supports very little habitat values for wildlife in its present condition.

Table 3-9. —Summary of plant communities and cover classes within the Boyle Property.

Boyle Property	
Vegetation Class	**TOTALS**
10 Russian Olive and/or Tamarisk [1]	**0.0**
11 Pinyon / Juniper	**0.0**
13 Cottonwood [1]	**0.0**
14 Cottonwood, Russian Olive, Tamarisk [1]	**3.5**
15 Oak	**0.0**
16 Willow [1]	**0.0**
20 Grass / Forb Upland	**3.0**
21 Grass / Forb Riparian [1]	**0.0**
22 Desert Grassland / Sagebrush	**0.0**
23 Emergent Wetlands [1]	**0.0**
27 Sagebrush / Cottonwood	**0.0**
30 River [1]	**1.0**
31 Side Channels / Back Water	**0.0**
40 Residential, Industrial, and Roads	**0.0**
60 Bareground / Weeds	**0.0**
61 Gravel, Sand, and Mud Bars [1]	**0.0**
TOTALS	**7.5**

[1] Riparian-wetland classes

3.5.4 Threatened and Endangered Species

No communal roost sites for wintering bald eagle occur on the Boyle property because there are no mature and isolated trees present, and because the property is too close to Highway 140. There is virtually no habitat available for southwestern willow flycatcher.

3.6 SUMMARY OF EXISTING CONDITIONS

The riparian-wetland ecosystem of the La Plata River corridor supports many biological and physical functions. It creates a diverse mosaic of riparian-wetland plant communities not found on the surrounding tablelands. Although these plant communities are very limited in extent

within the lower watershed, they support numerous fish and wildlife habitat values that would otherwise be absent from the landscape. For certain species, such as the federally listed southwestern willow flycatcher, the riparian-wetland environment of the river corridor may support the only habitat available to them within the entire landscape. Thus, the riparian-wetland ecosystem of the river corridor is a vitally important component for maintaining biotic diversity within the semi-arid landscape of the lower watershed. In addition, the presence of riparian-wetland vegetation improves the flood attenuation and desynchronization capacity of the river's floodplain and helps remove sediment and nutrients from flood waters and overland runoff.

However, within the study area, existing riparian-wetland habitats along the river corridor have been perturbed by: removal of vegetation and conversion to pasture, intensive livestock grazing, earthmoving (i.e., dredging and/or placement of fill material) associated with channel and floodplain alterations, and by other human development. Virtually all of the areas mapped as grass/forb riparian appear to have been native cottonwood and/or willow communities converted to agricultural land use, mostly as livestock pasture. In addition, summertime diversions from upstream irrigation greatly diminish river flows and, presumably, the amount of surface and ground water available to support riparian-wetland vegetation. These hydrological reductions, in conjunction with the channel downcutting and widening that occurred around the turn of the 20th Century, may have contributed significantly toward the conversion of riparian-wetlands on the low terrace subzone to mostly upland plant communities.

These changes have also greatly affected the stability of the river channel, presence of streamside vegetation, and habitat potential for native fish. Presently, the best roundtail chub fishery habitats within the study area are at a few locations where the river abuts the western valley wall, exposing large rocks and boulders for cover. In general, the remainder of the river supports too much swift riffles and runs and too few pools with overhanging cover. This condition is mostly due to an overwidening of the river channel that probably has been accelerated by intensive grazing and the conversion of native vegetation to pasture, which lacks the deep root structure to help stabilize riverbanks. The removal of native vegetation, especially cottonwoods and willows, has also resulted in a tremendous reduction in available habitat to bald eagle and southwestern willow flycatcher.

Of the 31 FHUs identified within the subject properties of the study area, 32 percent, 26 percent, and 16 percent of the units were formed by boulders, debris, and tamarisk, respectively. Birch trees, willows, and concrete slabs each formed 6 percent of the FHUs, and box elder and Russian olive each formed 4 percent of the FHUs. In contrast, 62 percent of the 21 FHUs identified in the Baird Property were formed by squawbush, 18 percent by box elder, 10 percent by debris, and 5 percent each by tamarisk and boulders. The Baird Property, where roundtail chub habitat was excellent, had mature riparian-wetland plant communities with large trees and shrubs occurring along the riverbanks.

Within the study area, the quality of roundtail chub habitat varied greatly. The central Huntington parcel had the most roundtail FHUs per river mile (8.8) whereas the southern SUIT

Table 3-10. —Comparison of existing native fish habitat along the La Plata River corridor by property ownership.

Property Parcel	River Miles	Stream Length (miles)	FHUs per Mile (length in meters)	Eroding Banks per Mile (length in meters)	Native Fish Habitat Quality	
					Roundtail Chub	Other Native Species[1]
Huntington (Northern Parcel)	38.6-36.1	2.1	2.4 (273)	4.6 (890)	poor - fair	good
Huntington (Central Parcel)	35.4-34.6	0.8	8.8 (190)	10.0 (312)	fair	good
Huntington (Southern Parcel)	33.9-31.9	1.5	4.0 (146)	10.7 (765)	poor	fair - good
SUIT Lands (Northern Parcel)	36.5-35.4	0.8	5.0 (75)	11.3 (455)	fair	good
SUIT Lands (Southern Parcel)	34.6-33.9	0.4	0 (0)	15.0 (275)	poor	fair - good
Taylor Properties	34.3-33.0	0.7	2.9 (35)	9.0 (80)	poor	fair
Baird Property	30.2-28.8	1.4	42.0 (1520)	14.0 (310)	good-excellent	good

[1] includes flannelmouth sucker, bluehead sucker, speckled dace

parcel had the least (0.0) (Table 3-10). However, all properties had poor roundtail chub habitat when compared to the Baird property (42 FHUs per river mile) (Table 3-10).

The survey of the Baird Property revealed that the factor limiting the formation of good roundtail chub habitat complexes in the study area was the absence of large trees with root wads and overhanging branches that deflect river currents, thereby forming scour pools and eddies. Instead, boulders (which were not found in the valley floor) provided the only habitat where the channel flowed against the lateral valley walls. In contrast, the stream through the Baird Property was classified as "excellent" roundtail chub habitat within a 0.5-mile reach, where there was an abundance of pool/eddy complexes, gravel riffles, overhanging bank cover, and mature streamside vegetation, such as large live trees and standing or fallen tree trunks and associated root wads.

The three parcels of the Huntington Property contain the greatest amount of acreage within the river corridor study area (Table 3-11). All of the northern and central Huntington parcels, SUIT lands, and most of the M & B Taylor property have been moderately-to-severely impacted by livestock grazing and pasture conversions. These areas have a high potential for the natural recovery of riparian-wetland, fishery, and wildlife resources if livestock grazing is curtailed and

Table 3-11. —Comparison of plant communities and cover classes within the La Plata River's zone of influence by property ownership.

Vegetation Class		Huntington Properties	SUIT Lands	M&B Taylor Property	B&A Taylor Property	Boyle Property	TOTALS
10	**Russian Olive and/or Tamarisk [1]**	8.0	1.0	0.0	0.0	0.0	**9.0**
11	**Pinyon / Juniper**	2.0	0.0	0.0	0.0	0.0	**2.0**
13	**Cottonwood [1]**	3.5	0.0	0.0	0.0	0.0	**3.5**
14	**Cottonwood, Russian Olive, Tamarisk [1]**	68.5	21.0	16.5	1.0	3.5	**110.5**
15	**Oak**	5.0	0.5	0.5	0.0	0.0	**6.0**
16	**Willow [1]**	38.0	5.0	5.0	0.0	0.0	**48.0**
20	**Grass / Forb Upland**	46.5	5.5	1.5	0.0	3.0	**56.5**
21	**Grass / Forb Riparian [1]**	40.5	12.0	0.5	0.0	0.0	**53.0**
22	**Desert Grassland/ Sagebrush**	27.5	31.0	3.0	0.0	0.0	**61.5**
23	**Emergent Wetlands [1]**	8.0	2.0	0.0	0.0	0.0	**10.0**
27	**Sagebrush/ Cottonwood**	5.0	2.0	0.0	0.0	0.0	**7.0**
30	**River [1]**	16.5	5.0	2.5	0.5	1.0	**25.5**
31	**Side Channels/ Back Water**	1.0	0.0	0.0	0.0	0.0	**1.0**
40	**Residential, Industrial, and Roads**	3.5	0.0	0.0	0.0	0.0	**3.5**
60	**Bareground / Weeds**	0.5	0.0	0.0	0.0	0.0	**0.5**
61	**Gravel, Sand, and Mud Bars [1]**	4.5	3.0	0.0	0.0	0.0	**7.5**
TOTALS		**278.5**	**88.0**	**29.5**	**1.5**	**7.5**	**405.5**

[1] Riparian-wetland classes

instream flows are improved. In addition to livestock impacts, riparian-wetland conditions of the southern Huntington parcel, B & A Taylor property, and Boyle property have been significantly altered by earthmoving impacts. These properties would require a greater amount of human intervention to recover channel stability, riparian-wetland plant communities, and fish and wildlife habitat values.

CHAPTER 4. MITIGATION OPPORTUNITIES AND POTENTIAL

As was presented Chapter 3, the La Plata River valley has been subjected to both natural disturbances and human-induced perturbations during the past century. Large floods near the beginning of the 20th Century modified the character of the La Plata River and its associated riverine and riparian-wetland ecosystem. Smaller floods and natural readjustment processes have directed the river system toward a narrower, more meandering state with a concomitant floodplain widening during the past 50 years. However, readjustment of the riverine and riparian-wetland ecosystems has been limited by livestock grazing, removal of native woody vegetation, river channelization, and the introduction of non-native plants. Therefore, these ecosystems are functioning less optimally than if there were no human interferences.

This chapter first introduces six mitigation measures that could be undertaken to improve the riverine and riparian-wetland ecosystems in the La Plata River study area. The mitigation measures have differing levels of intervention, management effort and cost, and they range from simply eliminating livestock grazing to complete reconstruction and restoration of the river and riparian-wetland environments. Following sections then address the potential for using these various measures at the subject properties within the study area. A summary of potential mitigation results from property acquisition and the implementation of the various measures is also provided.

4.1 POTENTIAL MITIGATION MEASURES

4.1.1 Elimination of Livestock Grazing

The study area has been affected by cattle and sheep grazing for more than 100 years. On the La Plata River and throughout much of the western United States, Anglo American introduction of livestock began during the latter part of the 19th century. Thereafter ensued a period of vegetation change and stream channel incision often termed the "arroyo problem." Although livestock grazing cannot be unequivocally attributed as the underlying cause of turn-of-the 20th Century channel incision on the La Plata River or other western rivers, recovery to equilibrium conditions and bank stability have undoubtedly been affected by historical and ongoing grazing practices and conversion of native vegetation to livestock pasture (Figure 4-1). Initial field studies have shown young cottonwood trees and willows reduced in size and numbers, introduction of non-native plants in heavily grazed areas, riverside pastures instead of willow thickets, and riverbank trampling. The lack of mature woody vegetation along river banks has accelerated lateral erosion and channel widening and provides no overhanging bank cover necessary for good fish habitat. Likewise, habitat has been reduced for bald eagle, southwestern willow flycatcher, neotropical migratory birds, and other terrestrial wildlife because of the decrease in large-sized trees and shrubs. All resources could benefit by eliminating livestock grazing and allowing the riverine and riparian-wetland ecosystems recover.

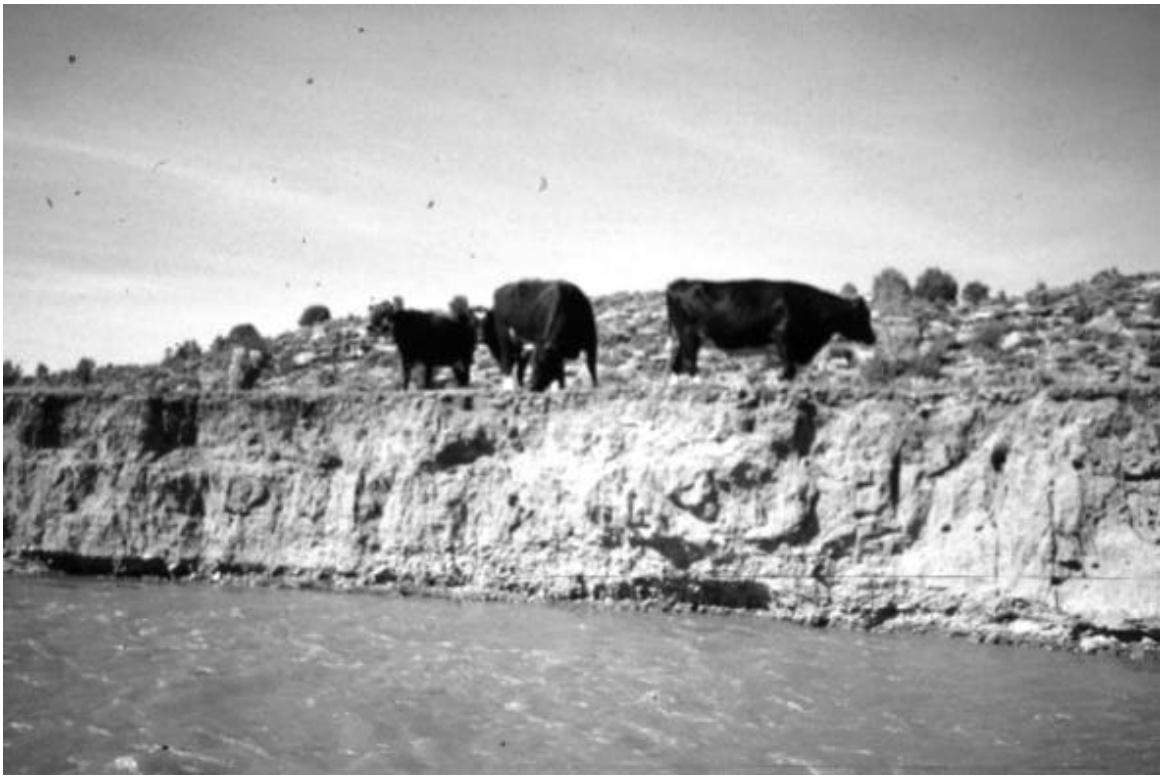

Figure 4-1. —Cattle present on overgrazed pasture located on the low-terrace subzone. Note the lack of roots in the eroded riverbank.

For certain reaches, the elimination of grazing from the study area may be all that is required for ecosystem recovery. Riparian-wetland vegetation often responds quickly to changes in land use management. An initial period of monitoring after livestock removal would provide confirmation of the potential success of this mitigation measure. The recovery of native vegetation should help stabilize riverbanks and eventually result in a narrower, deeper channel with better fish habitat, although stream morphology would likely recover more slowly compared with the recovery of riparian-wetland vegetation. An exact quantification of the extent and rate of ecosystem changes due to grazing elimination in the study area may not be possible, but generally the recovery of riparian-wetland plant communities and associated fish and wildlife values can be predicted with reasonable certainty. Therefore, if the study area is developed as a mitigation site, an initial interim period of no action other than livestock removal should be undertaken for selected reaches to evaluate the rate and extent of ecosystem recovery. Monitoring during the interim period would provide necessary data for implementing future actions (discussed below) under an adaptive management strategy.

The cost for the removal of livestock would be minimal. Additional fencing may be required to prevent livestock from entering the river corridor. The greatest cost would likely entail the monitoring efforts to evaluate the rate and extent of ecosystem recovery, and to determine

whether additional mitigation measures (as described in the following sections) would be warranted.

In summary, elimination of livestock grazing appears to have the greatest potential for improving all resources in the study area with relatively little management effort and costs. Although riparian-wetland vegetation would be most obviously and immediately improved, fish and wildlife values would also benefit in the long term:

- The structural diversity and density of riparian-wetland plant communities would be greatly improved
- Re-establishment of mature streamside vegetation and the elimination of bank trampling caused by livestock would greatly reduce lateral erosion and improve bank stability
- Development of a narrower, more stable stream channel due to greater bank stability
- Improved channel stability and re-establishment of mature streamside vegetation would improve fish habitat
- Recovery of mature cottonwood and willow stands would improve potential habitat for bald eagle and southwestern willow flycatcher
- Neotropical migratory bird habitat, as well as habitat for raptors, game birds, small mammals, reptiles, and amphibians, would also be improved by the recovery of cottonwood, willow and other riparian-wetland plant communities
- Increased browse and grasses would become available to big game animals

4.1.2 Temporary Fish and Wildlife Habitat Structures

Because of the uncertainty regarding length of time for natural ecosystem recovery, temporary measures could be undertaken to improve fish and wildlife habitat more rapidly than unassisted recovery. These measures would be relatively inexpensive to implement and would have low maintenance costs and could consist of the following:

- Enhancing stream habitat. These measures would include placing root wads and boulders, and redirecting flow with inverted-v weirs at selected locations to improve pool/eddy habitat and provide overhanging cover. Certain river reaches are more amenable to these measures than others, particularly areas where the river flows against the valley wall and contains large sandstone boulders.

- Creating artificial nesting habitat. Opportunities exist for developing nest boxes for a variety of birds.

Implementation of any these measures could begin immediately after the acquisition of property titles or easements. Alternatively, based upon initial ecosystem recovery during an interim period, measures could be selected to enhance resource components that are recovering slowly.

4.1.3 Individual Plantings and Removal of Non-native species

Throughout much of the study area, individual plantings could be made to provide temporary habitat improvements in a manner similar to using artificial habitat structures as described above. Ecosystem recovery would, however, be speeded by proper use of native plant materials. Plantings that could provide more immediate habitat improvement than natural recovery and grazing removal alone could include:

- Woody, streamside vegetation. Planting woody, streamside species (e.g., cottonwoods, willows, alders) could allow for a more immediate stabilization of river banks and re-establishment of overhanging cover for fish habitat. Many wildlife species would also benefit from such plantings.

- Cottonwood trees. Large, individuals or clusters of cottonwood trees could be planted at select locations within the floodplain or low terrace subzones where depth to water table is appropriate for the size of tree planted; pole plantings might be most appropriate in some situations. In areas where the water table is at greater depth, it may be necessary to irrigate trees until their roots extend down to the water table. Additionally, fencing may be required to protect planted cottonwoods until they reach a size to be unaffected by wildlife (e.g., beaver, deer, elk). Potential habitat for bald eagle would be most improved by cottonwood plantings at dispersed locations within the study area.

- Removal of undesirable non-native plants. Undesirable non-native plants such as tamarisk, spotted knapweed and thistle, could be readily treated in problem areas.

Similar to installing temporary artificial habitat structures, implementation of any of the vegetation planting/removal measures could begin immediately after property acquisition. Alternatively, they could be delayed and implemented as part of an adaptive management strategy once recovery directions and rates are ascertained. Costs for implementing and maintaining these measures would be relatively inexpensive. Installing temporary irrigation at certain locations may be necessary.

4.1.4 Expansion of Native Fish Habitat

The measure of success of fishery restoration on the La Plata River can be demonstrated only by an increase in numbers of native fish (especially roundtail chub) through an expansion of occupied habitat and expansion of existing populations. Currently, the only known population of roundtail chub on the La Plata River occurs about two miles downstream of the study area, with scattered individuals reported as far upstream as the confluence of Long Hollow. Presumably, lack of suitable habitat is the primary factor limiting the presence of roundtail chub within the study area. Restoration of channelized river reaches in Segment III below Long Hollow (as described in the following section) could allow individuals of the downstream roundtail chub population to emigrate and populate the restored reach and provide for an expansion of the existing population. Although expansion of the existing roundtail chub population is a desirable goal, establishing a second population segment upstream of Long Hollow would enhance the preservation potential of the species in the La Plata River, particularly in the event of a catastrophe, such as a spill of toxic materials into Long Hollow.

An approximately 1-mile long stretch of river in Segment II, including all of reach 7 and the upper quarter of reach 8, has excellent potential for habitat improvement to establish a second roundtail chub population (Figure 4-2). Property control along this stretch of river is primarily Taylor and SUIT, with Huntington controlling a short section at the upper end. Suitable habitat for roundtail chub already occurs in two short segments at the upstream and downstream ends of

Figure 4-2. —Potential area for the establishment of a roundtail chub population above the Long Hollow confluence in Segment II, reach 8.

this section of river. In these locations, the river erodes into low terrace, high terrace-alluvial fan, or the valley wall and exposes large sandstone boulders that provided lateral and overhead cover that create several contiguous pool/eddy complexes. The intervening stretch of river has swift runs and riffles, with few pools and little overhanging bank cover, but offers good recovery potential.

Apparently, recent grazing pressure has been less intensive, resulting in improved streamside vegetation and bank stability compared with majority of the study area. The area could be a model for ecosystem recovery elsewhere within the study area. Temporary overhanging cover would probably be necessary because the streamside vegetation has not yet reached maturity.

The potential for improving habitat and developing a new roundtail chub population in this portion of the La Plata River cannot be fully implemented without the removal of livestock grazing. Recent and current grazing practices throughout most of the study area have virtually eliminated stands of mature trees along the riparian corridor and prevented new growth of cottonwood trees and willows from achieving suitable size to contain the stream course and create pool/eddy complexes with overhanging bank cover. However, because this "natural" recovery of the riparian vegetation may take many years, more immediate actions are warranted to restore and enhance roundtail chub habitat.

The best opportunities for habitat improvement are in the two short end sections where some habitat already occurs. The habitat in these areas can be enhanced and perhaps expanded by placing large root wads and additional boulders along the stream bank to create pool/eddy complexes. Additional habitat enhancement in the intervening reach can be made by placing large root wads along contiguous stream banks. Large trees with root wads and overhanging branches would deflect river currents and form scour pool and eddy habitat and overhanging cover. This type of enhancement can be accomplished with a minimum of labor and cost. Large boulders are not recommended for creating fish habitat except in those sections where some boulders are already exposed as this material is not native to most of the stream corridor.

Improving habitat within and between these reaches would provide habitat above Long Hollow for a second population segment. These reaches have not been sampled for fish, but if roundtail chub presently occur in these reaches, establishing a second population segment is certainly feasible. If roundtail chub do not presently occur in these reaches, fish should be transferred from the downstream population, but the chances for success cannot be evaluated since stockings with wild or hatchery roundtail chub have not been conducted. Use of hatchery fish is not recommended in this situation.

In summary, development of a second roundtail chub population on the La Plata River upstream from Long Hollow could enhance survival of that species on the river. An approximately 1-mile section of river in Segment II could be the locus for a new, secondary population. Development of this population and essential habitat conditions would entail:

- Eliminating grazing to allow streamside vegetation to mature
- Enhancing and/or creating pool/eddy complexes with the placement of native rootwads and boulders
- Providing temporary overhanging cover with the use of native vegetation
- Possibly transferring roundtail chub from the downstream population if there currently are no individuals in the proposed second population area.

4.1.5 Creation of Riparian-Wetlands on the Low Terrace Subzone

As discussed in Chapter 3, the low terrace subzone component is not frequently flooded and is elevated several feet above the water table compared with the channel-bar and floodplain subzones. Therefore, this geomorphic surface bears vegetation transitional to the upland ecosystem with older, deeper-rooted cottonwood trees being the principle riparian species. Nearly 37 percent of the zone of influence (150 of 407 acres) is low terrace subzone. Conversion of at least parts of the low terrace subzone to a more mesic condition would be possible through two options.

One option would be to apply irrigation water to these areas by developing a water supply and water distribution system. A water supply would be developed either from ground water or the La Plata River with distribution to irrigated sites via pipeline or canal system. Various ponding configurations, water depths, and inundation times could be implemented depending upon the specific goals sought for the created riparian-wetland area. Problems of this type of creation include the necessity to acquire a water right, a high long-term maintenance requirement with ongoing costs, and development of a less than natural ecosystem environment.

An alternative option would be undertaken by removing the upper part of the terrace deposit to lower its surface, thereby allowing occasional flooding and reducing depth to the water table to allow subirrigation. This option can in some respects be considered the speeding up of the process of terrace erosion and floodplain construction. If the La Plata River remains at its current level for an extended time, its future lateral movements could eventually erode much of the low terrace subzone, a process that is presently occurring along the river. Undertaking this approach would entail earth removal and lowering the low terrace by three or more feet to floodplain level, with even greater lowering to create artificial oxbows in some locations. It could be possible to create side channels from the main river channel and create flow through wetlands or ponds. Soil amending, reseeding, and artificial plantings would be needed to speed vegetation recovery. This

measure could be employed at locations within all three river segments. Unlike developing an irrigation distribution system on the terrace, this option would require no ongoing maintenance. However, this would be an expensive option as 5,000 or more cubic yards of material would need to be moved per acre of riparian-wetland area created, costing up to $30,000 per acre to design, construct, maintain and manage. The water right issues associated with increasing the subirrigated area along the stream are uncertain.

4.1.6 Holistic Stream Channel and Riparian-Wetland Restoration

The La Plata River in Segment III has undergone significant changes within the past century, due to natural channel straightening and incision, in response to large floods and human actions of channel relocation, bank modification, channel straightening, levee construction, and bridge crossings. Because of these substantial changes, Segment III offers the greatest opportunity within the study area for corrective actions through restoration of the river channel and associated riverine and riparian-wetland ecosystems.

Restoration of this area would require reestablishing a sinuous or meandering plan form channel with a pool and riffle habitat. The channel would be integrated into a newly constructed floodplain, allowing overflow onto the floodplain to occur on a relatively frequent basis. Overflow of flood flows onto the floodplain would allow energy dissipation of high flows thereby preventing channel destruction, and would also provide the environmental conditions necessary for recruitment of certain native plant species. Revegetation of the channel banks and floodplain would be undertaken as part of the restoration process. Using a less affected downstream segment as a template, the restoration concept illustrated in Figure 4-3 has been developed for the La Plata River (BIO/WEST 1996). The concept is a generalization only and will need to be revised to meet specific topographic, hydrologic, and sedimentologic conditions of Segment III.

Restoration of this part of the study area will improve both the riparian-wetland and riverine ecosystems. As it currently exists, the riparian-wetland ecosystem has poor vegetation density and diversity and invading species (tamarisk). Vegetation improvement will enhance wildlife habitat and improve long-term channel stability. However, because of close proximity to Highway 140 and other human disturbances, cottonwoods that become re-established in this area may not provide significant value to bald eagles. River restoration of Segment III may also allow roundtail chubs from the population 2 miles downstream to emigrate and populate this segment. Because mark-recapture data indicate that fish from the downstream population ascend into this river segment, establishing suitable and occupied habitat would constitute an expansion of the existing downstream population.

Reconstruction of the river channel and the physical restoration of riverine and riparian-wetland habitats would be the most costly of the mitigation measures: It costs more than $100,000 per river mile to design, reconstruct, revegetate, maintain, manage, and monitor the river channel.

Figure 4-3. —Conceptual plan for the restoring channelized reaches of the La Plata River and its associated riparian-wetland ecosystem.

4.2 HUNTINGTON PROPERTIES

4.2.1 Riparian-Wetlands

Eliminating grazing would provide the major benefit to the riparian-wetland ecosystem on the Huntington Properties, particularly those lands in Segment I (northern and central parcels) where the channel-bar and floodplain subzones occupy about 110 acres of the valley floor. Reduction or elimination of non-native tamarisk and pasture plantings would enhance recovery of native plant species. Plantings of specific species could be undertaken to provide a local seed stock for more rapid recovery of those species.

Segment II lands within the southern parcel generally have a better riparian condition than those of Segment I. Less steep valley slopes, a higher percentage of silt-clay sediment in the rivers banks, and possibly areas of less intense grazing activity have allowed quicker recovery of the channel and riparian zone. Grazing reduction would enhance riparian-wetland conditions.

Much of the southern parcel, which is located in Segment III, has been affected by channelization and bank reconstruction activities. These activities have had major effects upon both the stream channel and the riparian-wetland area. Vegetation cover is low in this parcel due to the rather recent human perturbations. Although natural recovery of this parcel is possible, a channel reconstruction integrated with the restoration of the riparian-wetland ecosystem, would provide the greatest immediate benefit. Approximately 50 acres of channel-bar and floodplain land could be dramatically improved with such a reconstruction.

Major riparian-wetland creation could be undertaken within the approximately 110 acres of low terrace subzone on the Huntington Property. This area is essentially upland ecosystem, although cottonwood trees on this terrace derive their water supply from the underlying alluvial aquifer. Either of the two previously-described approaches to wetland construction could be undertaken.

4.2.2 Fisheries

Habitat within the northern Huntington parcel is fair to good for speckled dace and bluehead sucker, but poor for roundtail chub and flannelmouth sucker. Recent and current grazing practices have reduced the abundance of pool/eddy complexes and overhanging bank cover. A program of grazing elimination would eventually allow the redevelopment of a better river habitat. However, because riparian vegetation and stream recovery will require a period of years, more immediate actions are warranted to restore and enhance native fish habitat. Habitat for roundtail chub could be enhanced locally with root wads and boulders to create pool/eddy complexes, the best potential for this enhancement is in and around a short section where the river abuts the valley wall. This habitat could be enhanced and expanded by proper placement of additional boulders and root wads to stabilize banks and create overhanging cover, and by installing inverted “V” weirs to direct stream energy.

The central Huntington parcel has good habitat for speckled dace and bluehead sucker, and fair habitat for flannelmouth sucker. Habitat for roundtail chub is poor, except for one short section where the stream flows against the valley wall. Habitat in the section along the valley wall could be more completely enhanced as described above for a similar valley wall section. Additionally, this section of river is only 0.6 mile upstream from another section of good roundtail chub habitat in the southern parcel of the SUIT lands. Developing a contiguous habitat between these two sections would provide nearly 1 mile of good roundtail chub habitat for a potential second population of roundtail chub.

The southern Huntington Parcel has fair habitat for speckled dace and flannelmouth sucker and poor habitat for roundtail chub. Because the river in this property has been channelized, there is little opportunity for habitat enhancement. However, the section does have excellent potential as a stream restoration site. The channel would need to be reconstructed to a meandering configuration and fish habitat could be created accordingly. This section has good potential for success in expanding the existing La Plata River population of roundtail chub.

4.2.3 Wildlife

The Huntington parcels have significant potential for wildlife enhancement. In particular, neotropical bird habitat could be improved, as could habitat for small mammals, reptiles, and amphibians. The Huntington parcels have considerable potential for enhancement of avian species for nesting as well as during migration and wintering periods. Benefits to big game, in particular mule deer, would result but would not be significant. Overall, the property if managed for wildlife would have significant benefits to wildlife. Most important, the importance of restoring and protecting relatively large reaches of streams and their riparian corridors cannot be understated, particularly in an area where human development is occurring at a rapid rate. Without acquisition and management, it is projected that the La Plata River lands will eventually be subdivided and infringed on by residential/ranchette growth. Under this projection, wildlife values would be expected to decrease from existing conditions.

The primary component of wildlife enhancement would consist of habitat improvement by increasing plant species variety, plant density, and the number of plant age classes, particularly older age classes. Grazing elimination would provide the principal means of habitat improvement. If needed, plantings could be made in selected areas. Habitat values for many species could also be gradually enhanced through a program of weed control that targets species such as knapweed and tamarisk. Desired age classes of cottonwoods would be managed with snags preserved. Plantings of native food-producing shrubs and forbs could also be undertaken. Opportunities also exist for developing nest boxes for a variety of birds. In addition to vegetation cover enhancement, commitments to limit recreation and other uses that conflict with wildlife values would also need to be made.

Livestock elimination would increase browse and grasses available to big game animals; resident deer numbers would be expected to increase and it is possible that more winter use of the area

would occur. The area would not be expected to become a significant elk wintering area, but land use trends in the general area may force these animals into areas such as the Huntington parcels in future years. Conversion of winter ranges on private lands to residential and other uses in the future may result in unexpected use patterns by big game. The La Plata drainage may remain as a migration corridor from summer ranges and this fact may increase the value of the Huntington parcels in the future.

Non-riparian areas of the Huntington Property outside the river valley could be improved by long-term grazing control associated with weed control, restoration of unneeded roads, and possibly some vegetation manipulation. Although upland areas are not the key focus of the property acquisition, they could be improved for wildlife and would also serve as a buffer zone for the riparian areas. In these areas fencing would be a key development. A system of artificial water tanks, such as guzzlers, could be very cost effective methods of increasing diversity, populations, and improving distribution of wildlife.

4.2.4 Threatened and Endangered Species

The Huntington parcels afford a unique location, visually and thermally protected by adjacent mesas. Presently, three communal wintering bald eagle roost sites are known to occur on the property, and willow flycatchers are known to have used the area. Potential to maintain and enhance these parcels for both the bald eagle and southwestern willow flycatcher is dependant on habitat improvement. Management practices that would enhance vegetation are the central element of threatened and endangered species population expansion. Grazing elimination is therefore essential. Bald eagle roost trees must be protected from woodcutting, fire, or other actions that would prematurely down them. Snags must be preserved. Planting cottonwood trees will be necessary to replace the stand.

Without the purchase of the Huntington parcels, development is likely with the attendant loss of bald eagle roost sites. This is what occurred to a former roost site downstream near Pioneer Ditch. In the winter of 1993-1994 as many as 15 bald eagles were counted at this site. Houses were built the following summer and bald eagles have not been seen at that site during surveys since the houses were constructed.

4.3 SOUTHERN UTE INDIAN TRIBAL LAND

4.3.1 Riparian-Wetlands

The two parcels of SUIT land have had a history of both natural disturbance and human-induced perturbations similar to that of the Huntington Property. However, the river in these parcels shows no sign of river channelization, but grazing activity has been heavy. Removal of grazing would allow nearly 50 acres of channel-bar and floodplain riparian-wetland to significantly recover. A total of approximately 39 acres of low terrace subzone could have its riparian plant communities enhanced.

4.3.2 Fisheries

Habitat within the northern SUIT parcel was fair to good for speckled dace and bluehead sucker, but because of extensive livestock grazing and trampling of stream banks, there appears to be little opportunity for habitat enhancement. The channel in this reach would require extensive restoration before fish habitat could be improved. Nevertheless, reduction or removal of grazing pressure could help the stream recover. Habitat within the southern SUIT parcel is slightly better, but there is erosion and extensive livestock trampling and an absence of large woody vegetation. A short section could provide good roundtail chub habitat with enhancement measures of proper placement of root wads, boulders, and inverted "V" weirs. As described above, using habitat improvement to connect this section with a section of roundtail chub habitat on the Huntington Property would provide about one mile of enhanced roundtail chub habitat.

4.3.3 Wildlife

Opportunities for wildlife on the SUIT lands are similar to those described for the Huntington parcels in 4.2.3. Inclusion of these lands would add significantly to the project by creating a larger block of habitat.

4.3.4 Threatened and Endangered Species

Because the SUIT lands adjoin the Huntington parcels, activities on them directly affect species on the Huntington parcels. One willow flycatcher has been detected on the northern parcel of SUIT Lands, and a bald eagle roost site is located within the southern parcel. To maximize benefits to protected species and other wildlife, a management plan would need to be devised to work in concert with actions on the Huntington parcels. Practices similar to those described in 4.2.4 are recommended to maximize the potential of the SUIT lands.

4.4 TAYLOR PROPERTIES

4.4.1 Riparian-Wetlands

These properties are essentially contained within Segment II and have existing conditions and mitigation potential similar to the Huntington Southern Parcel lands contained within that segment. Less steep slopes and a higher percentage of silt-clay sediment in the floodplain has allowed good recovery of the channel and riparian zone from turn-of-the-century flooding. Also, because parts of the Taylor valley bottom lands are somewhat less accessible to grazing, their better condition may be the result of less intense livestock intensity. Grazing reduction will somewhat enhance the wetland riparian condition on about 24 acres of channel-bar and floodplain area. About 7 acres of the low terrace subzone could be enhanced.

4.4.2 Fisheries

The Taylor Properties are within a relatively short section of stream containing fair to good habitat for flannelmouth sucker, bluehead sucker, and speckled dace. Although habitat is poor for roundtail chub, this property is adjacent to a short section of SUIT lands with good roundtail chub habitat. It may be possible to expand this habitat into the Taylor Properties through proper placement of root wads, boulders, and inverted "V" weirs.

4.4.3 Wildlife

Opportunities for wildlife on the Taylor Properties are similar to those described for the Huntington parcels in Section 4.2.3. Inclusion of these lands would add significantly to the project, creating a larger block of habitat.

4.4.4 Threatened and Endangered Species

Three willow flycatchers have been detected near the Taylor Properties just upstream from Long Hollow. The bald eagle roost site on the Huntington parcel's and SUIT land's boundary also adjoins the M & B Taylor Property. Activities recommended for both the Huntington parcels and SUIT lands would be applicable to the Taylor Properties. If all parcels of the three owners were managed in concert, it would provide maximum benefit to protected species and other wildlife as well.

4.5 BOYLE PROPERTY

4.5.1 Riparian-Wetlands

Virtually all of the Boyle property has been significantly altered from its natural state, mostly due to river channelization. Grazing removal may allow for a partial recovery of riparian-wetland plant communities over time, especially for streamside vegetation. However, the presence of tamarisk is problematic and its removal would be necessary to ensure the more desirable communities of willows and cottonwoods would become established. In total, approximately 9 acres of channel bar, floodplain, and low terrace subzones could be reconstructed for ecosystem restoration. The reconstruction would be similar to that described for the southern Huntington parcel in Segment III.

4.5.2 Fisheries

Restoration of native fish habitat would be completed similarly to that described for the southern Huntington parcel in Segment III, with similar resultant benefits.

4.5.3 Wildlife

Wildlife values would be restored in a manner similar to that described for the southern Huntington parcel in Segment III, with similar resultant benefits.

4.5.4 Threatened and Endangered Species

Mitigation measures would restore native cottonwood and willow communities at the Boyle property, thereby restoring potential habitat for both bald eagle and southwestern willow flycatcher. However, bald eagle would probably avoid the area for use as communal roosting because of its close proximity to Highway 140. In contrast, southwestern willow flycatcher would potentially use the restored habitats during migratory periods and possibly for nesting.

4.6 MITIGATION SUMMARY

Because the La Plata River corridor has been subjected to both natural disturbances and human-induced perturbations, the riverine and riparian-wetland ecosystems of the study area are at less than their potential condition. Six mitigation treatments are recommended to improve the riverine and riparian-wetland ecosystems in the La Plata River study area. Whereas one treatment would enhance all four resources considered herein, others would be more resource-specific. Table 4-1 illustrates which particular resources would be enhanced by each of the six treatment measures.

Table 4-1. —Comparison of benefits that would be associated with mitigation measures prescribed for the La Plata River corridor study area.

Mitigation Measure	Resource			
	Riparian-Wetland	Fisheries	Wildlife	Threatened and Endangered Species
1. Eliminate livestock grazing	Yes	Yes	Yes	Yes
2. Temporary habitat structures	No	Yes	Yes	No
3. Individual plantings	Yes	Yes	Yes	Yes
4. Enhance native fish habitat	Possibly	Yes	Yes	No
5. Riparian-wetland creation	Yes	No	Yes	Yes
6. Holistic restoration	Yes	Yes	Yes	Yes[1]

[1] Because of proximity to residential development and state highway in the Segment III restoration reach, improvements for bald eagle roosting will likely have limited value.

As Table 4-2 indicates, a key component of any mitigation plan should be elimination of livestock grazing from study area, as this action will benefit all resources. The adverse effects of livestock grazing have been well documented in the scientific literature, and the study area shows many of these effects. Grazing elimination would produce a cascade affect of enhancement of all resources. Recovery of streamside cottonwood trees, for example, would enhance bank stability, which would cause channel narrowing and provide better fish habitat, while simultaneously providing potential eagle roosting sites that would have greater longevity due to better channel stability. Grazing elimination would most probably provide the best overall treatment option for the ultimate recovery and renaturalization of the riverine and riparian-wetland ecosystems within the study area.

Although grazing elimination should be an essential component of resource enhancement within the study area, grazing elimination alone will not necessarily provide for a quick recovery of all resources. Vegetation recovery will be quick, but attainment of mature stands of cottonwoods may take decades, thereby making eagle habitat recovery a slow process. Likewise, changes in channel geomorphology and an associated improvement of fish habitat will take many years, with the modes and rates of change contingent upon unpredictable future hydrologic conditions. Direct intervention treatments to speed resource enhancement processes could be undertaken. However, an adaptive management strategy may prove worthwhile. Grazing elimination could be immediately undertaken, with the resource effects monitored to evaluate improvements. Areas or resources that are slow to derive benefits from grazing elimination alone could then be enhanced with the intervention treatments.

Finally, a particular problem that must be considered is that the study area valley bottom lands are currently under the control of five separate landowners. The Huntington properties cover the greatest part of the corridor, particularly at its upstream and downstream ends. The SUIT lands and Taylor properties cover a substantially smaller portion in the middle of the corridor, and the Boyle property (not discussed herein) covers a small part of Segment III. Unfortunately, the mixture of land ownerships splits the river valley "down the middle" in several instances. Without control of most or all of these properties, resource benefits may be dramatically reduced. For example, eagle nesting on one property may be adversely affected by residential development on an adjoining property. Likewise, the river provides connectivity to fluvial processes, so that bank erosion on an uncontrolled upstream property may adversely affect the channel in a reach on controlled property. Because of the patchwork of ownership along the study area, mitigation goals may not be fully achievable without cooperation and/or participation of all land holders.

A summary of mitigation potential for all resources for each property within the study area is summarized in Table 4-2.

Table 4-2. —Mitigation potential for resources per property ownership within the La Plata River corridor study area.

CHAPTER 5. INTERIM MANAGEMENT AND MONITORING

If Reclamation adopts a strategy of using study area mitigation benefits to offset environmental losses incurred by developing the ALP Project, then a program to ensure mitigation success must be implemented. The program will be developed with assistance from federal and state agencies and other ALP Project participants. The land will be actively managed between the purchase of land title(s) or easement(s) and the implementation of the mitigation program. This chapter provides a brief overview of an interim program for the management and monitoring of the study area properties. It is introductory only, written to give the reader a basic outline of a successful program approach.

5.1 INTERIM MANAGEMENT

Should Reclamation purchase the Huntington or other study area properties, an interim land management plan would be further developed. The development of the management plan would be lead by Reclamation using a multi-disciplinary team. Interim refers to the period between property purchase and that point in time when Reclamation completes site-specific mitigation plans and begins implementation of those plans. The interim plan would be modified as decisions are made concerning mitigation criteria and land management direction. If and when Reclamation purchases the property (provided all purchase criteria are met), a land management agency would be named to manage the property. It is presently assumed that the Colorado Division of Wildlife (CDOW), the SUIT, or possibly another agency would be selected as the land management agency.

Due to the lack of a fully defined ALP Project and limited project funds, Reclamation would not proceed with the development and implementation of a definite mitigation/enhancement program until the mitigation requirements for the ALP Project are fully defined and funded. In the interim, it is anticipated that Reclamation and/or a management agency would manage any acquired property(s) to prevent further degradation of the values for which the property(s) is to be managed. There would be two primary management objectives during the interim period:

(1) The lands would be managed primarily for the enhancement of riparian/wetlands, native fish, wildlife, and threatened and endangered species. Other uses compatible with these primary management issues could be considered and evaluated as the definite mitigation/enhancement program is developed.

(2) No incompatible management uses contrary to the resource enhancement objectives would be permitted on the described property. This would likely include, but would not necessarily be limited to: off road vehicle uses, recreation development and use, development of public roads, gravel extraction, livestock grazing, and special uses that could lead to degradation of existing resource values.

To meet the primary management objectives, the following would be implemented:

- Livestock grazing would be eliminated.
- No trails, picnic areas, camping areas, or special parking would be constructed for public use.
- Noxious weed control would be implemented, where needed.
- Public access for hunting and fishing could be allowed, dependent on effects on fish and wildlife resources. For that portion of the study area located within SUIT lands, Tribal hunting and fishing would be allowed as provided by law.
- Fencing would be constructed and maintained to keep out adjacent stock, as needed.
- Applicable signs would be posted to notify the public of property management practices and rules.
- Land use planning and management objectives would give high priority to the preservation of significant archaeological resources.
- A fire management plan would be prepared and implemented, as part of the land management plan.
- No public wood gathering or cutting would be allowed.

5.2 RESOURCE MONITORING

An interim resource monitoring program would be implemented immediately after acquisition of the study area properties. The monitoring program would have three primary objectives:

(1) Provide a thorough assessment of baseline conditions.

(2) Collect information regarding the rate of recovery for selected resources.

(3) Evaluate the effectiveness of management and enhancement strategies.

To a large degree, aspects of the first objective have already been undertaken, with various resource data having been collected to provide the knowledge base for this document. However, many data collected to date are of a preliminary or reconnaissance level. A thorough, detailed documentation of baseline (i.e., pre-enhancement) conditions is essential so that improvements in resource values can be unambiguously determined. Collection of resource information would be

continued for an extended period of years to evaluate resource recovery rates and the effectiveness of specific enhancement strategies. These data would be essential for an adaptive management strategy by which the more effective mitigation/enhancement measures could be more fully employed with less effective measures dropped from use.

Although full details of an interim monitoring plan would be developed later, it would include the assessment of both physical and biological parameters. Physical conditions, although not usually considered resources in the same light as plants, fish, and wildlife, are important limiting factors that shape the environment for biotic resources. The evaluation of future biotic trends must consider both natural changes in the physical environment and how human land management change the physical environment. Therefore, it is expected that the interim monitoring program would minimally collect data about:

- Climatology, hydrology, water quality, and geomorphology
- Riparian/wetland plant communities
- Fisheries
- Wildlife
- Threatened and endangered species.

CHAPTER 6. LIST OF PREPARERS

This Mitigation Opportunities Report for the La Plata River corridor study area was prepared by BIO/WEST, Inc. and its subconsultants, and by the U.S. Bureau of Reclamation, Upper Colorado Region. A list of persons responsible for the preparation of this report is shown below.

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CHAPTER 7. REFERENCES AND SUPPORTING MATERIALS

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APPENDICES

APPENDIX A: GEOMORPHOLOGY

APPENDIX B: RIPARIAN- WETLANDS

APPENDIX C: FISHERIES TECHNICAL APPENDIX

APPENDIX D: LA PLATA RIVER CHANNEL EVALUATION

APPENDIX E: WILDLIFE

Rhea Environmental Consulting report on neotropical bird surveys (including southwestern willow flycatcher) and analysis of existing and potential habitat.