



June 2015

RIO RANCHO BOSQUE OPEN SPACE INTEGRATED MANAGEMENT PLAN

Prepared for: City of Rio Rancho Parks and Recreation Department
Funding provided by: New Mexico Interstate Stream Commission

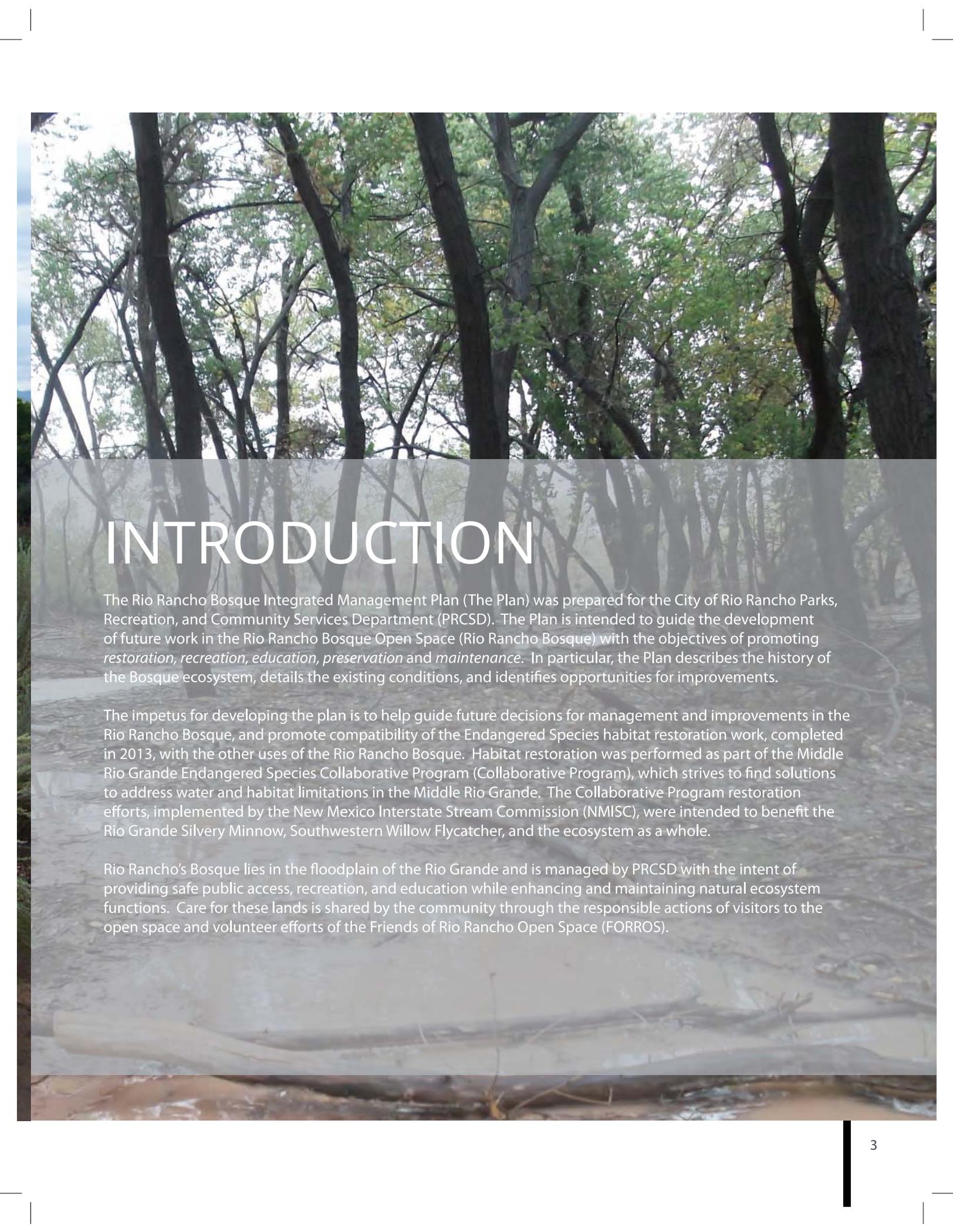
Prepared by: Brown, green & more, LLC and Golder Associates, Inc.



TABLE OF CONTENTS

- Introduction.....3
- Goals of the Plan.....4
- Background14
- History of the River15
- Restoration Timeline20
- Open Space Overview22
- Willow Creek25
- Middle Bosque33
- North Beach41
- Upper Bosque Trail.....47
- Conclusion53
- Acknowledgements55
- Common Bosque Flora and Fauna60





INTRODUCTION

The Rio Rancho Bosque Integrated Management Plan (The Plan) was prepared for the City of Rio Rancho Parks, Recreation, and Community Services Department (PRCSD). The Plan is intended to guide the development of future work in the Rio Rancho Bosque Open Space (Rio Rancho Bosque) with the objectives of promoting *restoration, recreation, education, preservation* and *maintenance*. In particular, the Plan describes the history of the Bosque ecosystem, details the existing conditions, and identifies opportunities for improvements.

The impetus for developing the plan is to help guide future decisions for management and improvements in the Rio Rancho Bosque, and promote compatibility of the Endangered Species habitat restoration work, completed in 2013, with the other uses of the Rio Rancho Bosque. Habitat restoration was performed as part of the Middle Rio Grande Endangered Species Collaborative Program (Collaborative Program), which strives to find solutions to address water and habitat limitations in the Middle Rio Grande. The Collaborative Program restoration efforts, implemented by the New Mexico Interstate Stream Commission (NMISC), were intended to benefit the Rio Grande Silvery Minnow, Southwestern Willow Flycatcher, and the ecosystem as a whole.

Rio Rancho's Bosque lies in the floodplain of the Rio Grande and is managed by PRCSD with the intent of providing safe public access, recreation, and education while enhancing and maintaining natural ecosystem functions. Care for these lands is shared by the community through the responsible actions of visitors to the open space and volunteer efforts of the Friends of Rio Rancho Open Space (FORROS).



GOALS OF THE PLAN

The overall goal of this Plan is to guide future development and improvement work in the Rio Rancho Open Space Bosque, with a focus on *restoration, recreation, education, preservation and maintenance*.

The Plan's intent is to provide a balance between the need for *restoration and preservation*, with inclusion of encouraging *education* and allowing *recreation*.

RESTORATION



RECREATION



EDUCATION



PRESERVATION &
MAINTENANCE



RESTORATION



Restoration is the process of repairing a natural ecosystem from an altered or threatened condition to a healthier sustainable condition through a variety of active and passive actions. One of Rio Rancho's goals is to facilitate restoration of the ecosystem and wildlife habitat in the Bosque Open Space. *Restoration* concepts for Rio Rancho Bosque include the removal and control of exotic vegetation, restoration of native riparian vegetation, hydro-modification, and wetland creation. Restoration will encourage more dynamic changes in the floodplain through bankline lowering, vegetation rooting and grubbing and river geomorphic modifications.

One aspect of *restoration* of the ecosystem is maintaining the biological integrity of the system. Biological integrity is the ability of an ecosystem to sustain a balanced natural biological community, even under stress. Biological integrity is built on the assumption that a decline in the values of an ecosystem's functions are primarily caused by human activity or alterations. The more an environment and its original processes are altered, the less biological integrity it holds for the community as a whole. If these processes were to change over time naturally, without human influence, the integrity of the ecosystem would remain intact. The integrity of the ecosystem relies heavily on the processes that occur within it because they determine what organisms can inhabit an area and the complexities of their interactions.

With that said, the Rio Rancho Bosque is located within an urban setting. *Restoration* of the Rio Rancho Bosque needs to be balanced between the desire to meet the biological integrity and the need for community use. Restoration will always include the management of human activities and use. A critical piece of restoration is trail creation. By directing people through specific routes, trails provide recreational access with respect to the restoration efforts/needs. Much of this type of work can be performed by the many volunteer groups associated with the City of Rio Rancho and its Open Space. Workbooks including details could be created to direct volunteers efforts describing approved methods of restoration such as proper removal of exotics, debris relocation, and pole and whip planting.

The restoration goals of Rio Rancho Open Space align well with the Collaborative Program goal of restoring habitat for the two Middle Rio Grande endangered species, the silvery minnow and southwestern willow flycatcher. The NMISC, as members of the Program in the interest of ensuring broad Endangered Species Act coverage for Middle Rio Grande water users, is currently implementing river restoration activities that will create, enhance and maintain silvery minnow egg retention, larval and young of year rearing and over-wintering habitat.



RESTORATION OBJECTIVES AND POLICIES

Objectives:

1. Sustain the Rio Rancho Open Space Bosque in its natural condition for future generations.
2. Intervene with restoration actions in areas where the Bosque ecosystem is degraded.
3. Protect designated ecologically sensitive areas throughout the Rio Rancho Bosque.
4. Provide habitat for endangered species and encourage natural river processes.

Policies:

1. All restoration activities shall abide by local, state and federal laws and regulations, such as the Migratory Bird Treaty Act, Endangered Species Act, and Clean Water Act.
2. Restoration activities shall utilize volunteer organizations to the extent possible and be conducted at times when public visitation is lowest.
3. Restoration activities in the Rio Rancho Bosque shall be closely coordinated with Rio Rancho Parks and applicable partners.

RECREATION



Recreation is the creation of a resource that provides people of all ages the opportunity to enjoy themselves and interact with the environment. Rio Rancho Bosque offers the opportunity for recreation that fit in a natural setting. The existing Rio Rancho Bosque provides many recreational opportunities including walking, hiking, jogging, bird watching, horseback riding, and biking. Willow Creek offers a wildlife viewing blind for bird watching on the Upper Bosque Trail while North Beach has opportunities for small boat launching for rafting, kayaking and canoeing. The seclusion of the Middle Bosque allows for more reflective recreation such as sketching, painting, and geo caching. Mile markers along the Upper Bosque Trail would inform walkers/runners of exact distances traveled.

Recreation in the Rio Rancho Bosque may need to be controlled as much as possible to meet the *restoration* and *preservation* goals of the ecosystem. By deliberately creating *recreation* improvements and activities, it is possible to direct the public's use and access of the Rio Rancho Bosque in a way that does not conflict with *restoration* and *preservation* efforts.

It is a delicate task to balance preservation and public access. Opening the Rio Rancho Bosque to "low impact" *recreation* is incidental to the PRCSD's goal of maintaining the Rio Rancho Bosque ecosystem. As the city grows the demands for access and use of the Rio Rancho Bosque will increase.

This Plan provides suggestions for management techniques that allow recreational uses to occur without impacting the Bosque's natural condition. Low impact recreational improvements are those that emphasize the use of natural materials and concentrate human impact to relatively small areas.



Photo credit by Albuquerque Journal, Lee Ross



RECREATION OBJECTIVES AND POLICIES

Objective:

1. Allow residents and visitors to use the Rio Rancho Bosque without changing its character or sacrificing its unique ecology.
2. Manage recreational use through the development of a well planned access and trail network.
3. Design new low impact recreation improvements that minimally disturb the natural environment.

Policies:

1. The City of Rio Rancho shall limit development to low impact recreational and educational uses.
2. Day use areas, such as picnic grounds, shall not be located near ecologically sensitive areas.
3. A trail consolidation plan shall be implemented to minimize dispersed traffic.
4. No motorized vehicle access shall be allowed to or within any Bosque area , except for authorized public safety and maintenance.
5. Enforcement of chapter 94.2 of the municipal code "Parks and Open Spaces", Rio Grande Bosque, will prevent non-compatible uses of and activities within the Rio Rancho Bosque.
6. Outside of the Regional Multi-Use Trail Alignment Plan, no paved trails shall be constructed in the Rio Rancho Bosque.
7. Some unpaved trails shall be compliant with the Americans with Disabilities Act.
8. Recreation rules and regulations shall be posted at all major Rio Rancho Bosque entrances.
9. The City of Rio Rancho shall approve organized events within the Rio Rancho Bosque to prevent inappropriate uses.

EDUCATION



Education is an important management component necessary for the *preservation* and *maintenance* of the Rio Rancho Bosque. *Education* allows the public to learn about how the ecosystem works and what is required to maintain a natural functioning system. The goal is to continue to develop educational opportunities that include multiple interfaces with the public, especially special interest groups such as school children and volunteer organizations. Education about the habitat of the Rio Rancho Bosque, in particular water and endangered species in the Middle Rio Grande Watershed and responsible stewardship of the Open Space are important goals for the PRCSD.

Educational and interpretive signage can currently be found along the Willow Creek trail system. The City is encouraged to continue that *education* throughout the open space. Bird descriptions could be located adjacent to the wildlife blind in Willow Creek along with descriptions of vegetation types. From this vantage point, there are opportunities to view wetlands and upland vegetation. Signage and way finding exist at both Willow Creek and North Beach. Additional materials such as field guides and nature walk booklets could be created to provide the visitor a more in-depth experience. The development of mobile apps have been used in other parks for interpretation and education. This plan provides suggestions for management techniques that allow recreational uses to occur without impacting the Bosque's natural condition. Low impact recreational improvements are those that emphasize the use of natural materials and concentrate human impacts to relatively small areas. Water safety signage located at North Beach near the small boat launch area with take-out and put-in locations along the river would be informative.





EDUCATION OBJECTIVES AND POLICIES

Objective:

1. Create educational programs that allow visitors to learn about the Rio Rancho Bosque through both passive and active participation frameworks, for example, provide educational signage (passive) and Bosque bird watching walks (active).
2. Provide educational materials that inform visitors of appropriate activities allowed in the Rio Rancho Bosque.
3. Promote environmental stewardship among Rio Rancho residents and visitors within the Rio Rancho Bosque.

Policies:

1. Celebrate local and national events throughout the Rio Rancho Bosque, such as National Trails Day.
2. Sponsor educational seminars featuring expertise from local professionals, CRR, staff and volunteers.
3. Create specific youth and over-50 programs to encourage environmental stewardship of the Rio Rancho Bosque.
4. Approval by the City of Rio Rancho of research, monitoring, and educational projects performed in the Rio Rancho Bosque is necessary.
5. The City of Rio Rancho shall approve organized educational events, such as school field trips, within the Rio Rancho Bosque to prevent inappropriate uses.
6. Development of an educational program with the assistance of the Rio Rancho Fire Department is needed to promote fire safety in the Rio Rancho Bosque.

PRESERVATION & MAINTENANCE



Preservation and Maintenance are necessary to ensure the protection of the Rio Rancho Bosque ecosystem. Because large scale floods no longer redefine the Bosque, *preservation* and *maintenance* are needed for the Rio Rancho Bosque to remain viable for years to come.

PRCSD maintains the Rio Rancho Bosque area using crews from the Department. General monthly quality control reviews are necessary for trail maintenance. Large tasks occur semi-annually with erosion and weed control, mowing, fire prevention, trail repair, and parking lot maintenance. It is advisable that dedicated permanent resources for the Open Space program and trail management are established to maintain this important resource.

One of the most pressing reasons for consistent Rio Rancho Bosque *preservation* and *maintenance* is protection from wildfire. The Rio Rancho Fire Department is responsible for protecting the Rio Rancho Bosque. The fire department works with other local jurisdictions to make sure citizens are protected. The department has a number of brush trucks specifically designed for wildfires, and all firefighters are trained to handle such situations. Crews are on high alert during the dry season, preparing and watching for fires. Any spark or open flame in the bosque could start a fire, which may spread quickly during windy days. An overall fire management plan is recommended to assure the protection of the Rio Rancho Bosque. This plan may include annual steps to prepare for fire season such as access control, public education, accessibility, and fire protection. This would insure that general information regarding fire access, fire planning, and fire restrictions are intact.

Partnerships are important to the *preservation* and *maintenance* of the Bosque. Partnerships between State Forestry and their Inmate Crew Program have proved successful. The NMISC, Collaborative Program, and other partners continue to help the quality of the overall Bosque ecosystem.



PRESERVATION AND MAINTENANCE OBJECTIVES AND POLICIES

Objective:

1. Minimize the likelihood and impact of human and natural caused wildfire.
2. Stop the spread of noxious weeds throughout the Rio Rancho Bosque.
3. Maintain established trails to deter the creation and usage of new “rogue” trails including amenities.
4. Control regrowth of non-native plants in restored areas and promote a diversity of native flora and fauna.

Policies:

1. All preservation and maintenance activities shall abide by local, state, and federal regulations, such as the Endangered Species Treaty Act.
2. Utilize the City’s resources and volunteer organizations to implement a Bosque Maintenance Plan that addresses monthly, bi-annual, and annual maintenance needs of established trails and their amenities.
3. Plan and implement an emergency fire control and access strategy.
4. Identify permanent funding sources for preservation and maintenance activities that includes noxious weed control, along with flora and fauna control.
5. Participate in current Collaborative Program processes within the Middle Rio Grande that may be a source of expertise, planning, and funding.



BACKGROUND OF THE RIO RANCHO BOSQUE OPEN SPACE

Rio Rancho is the third largest city in New Mexico with a population of about 90,000 plus. The PRCSD manages about 500 acres of parks, fields, and open spaces including recreation centers. Among the Rio Rancho land assets, the Rio Rancho Bosque is unique in that it is managed to emphasize the natural environment.

The Rio Rancho Bosque occupies about 178 acres on the west bank of the Rio Grande, which can be accessed from Highway 528 through Rivers Edge Neighborhoods (see Regional Map page 23). In November 2000 the City enacted municipal code 94.20, creating the Bosque preserve and the ordinance to protect it. The City's PRCSD and numerous volunteers

collaborate to manage this natural area. The Rio Rancho Bosque provides opportunities for walking, cycling, and horseback riding on natural surface trails that parallel and access the river. The river can be accessed through the Rio Rancho Bosque for water activities, such as fishing and canoeing. An outdoor classroom was created near the Willow Creek Loop trail so that people of all ages can learn and appreciate our local bosque environment.





HISTORY OF THE RIVER

“Bosque” is a Spanish word meaning “forest or woodland,” used here to describe dense stands of vegetation characterized by cottonwoods and willows that occur on the floodplain of the Rio Grande.

The Rio Grande watershed (355,500 square miles) is the fifth largest in North America, extending 2,000 miles from its headwaters in the San Juan Mountains of Colorado to the Gulf of Mexico near Brownsville, Texas (see page 6). The Middle Rio Grande as described is centered in a semiarid region where potential evaporation far exceeds precipitation. On average, about 1.1 million acre-feet (AF) of

water passes through the Middle Rio Grande each year. An acre-foot equals 325,851 gallons. Water is supplied to the Rio Grande from the upper basin in Colorado, and from the Sangre de Cristo Mountains and Rio Chama watersheds in New Mexico. Consistent with the climate of this region, native flows are subject to significant variability. Over the last century annual mean streamflow ranged from about 495 to

3,580 cubic feet per second (cfs).

Historically, flows in the Rio Grande were perennial, except during periods of severe drought when the channel dried locally. Peak flows most often occur in late spring in response to snowmelt runoff, while episodic floods occur in association with summer monsoons. Tree-ring and historical evidence suggests that severe and

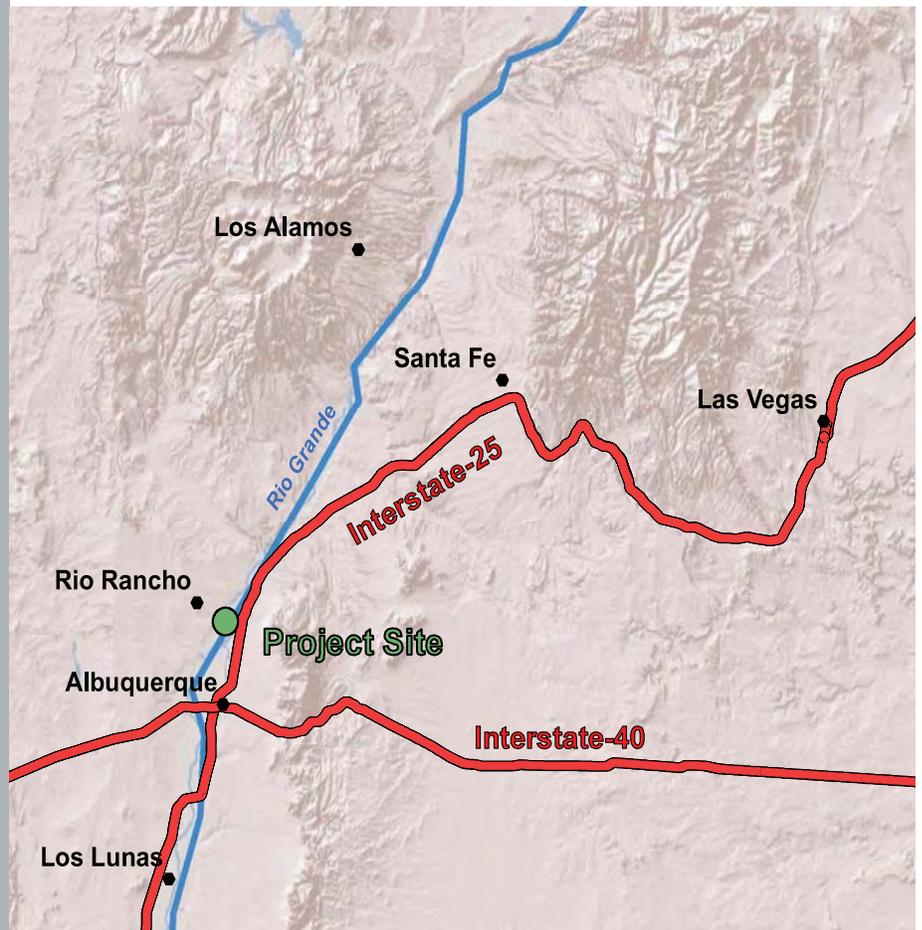
RIO GRANDE WATERSHED



MIDDLE RIO GRANDE BASIN



PROJECT SITE



BOSQUE RIVER FLOWS

Aerial photography of the Rio Grande along the Rio Rancho Bosque shows how the channel has become progressively narrower and deeper and banklines have stabilized with native and non-native vegetation.



900 cfs
October, 1996



1550 cfs
March, 2004



616 cfs
February, 2011

prolonged droughts occur two to three times each century. References to floods are common in the historical record and it is estimated that between 1849 and 1942 about 50 moderate to large floods (greater than 10,000 cfs) occurred in the Middle Rio Grande. The largest floods were estimated to have ranged from 50,000 to 100,000 cfs. The flood of 1874 destroyed almost every building between Alameda and Barelás. The communities of Tome, Valencia, and Belen were under water during the spring flood of 1884. Tome was later washed away in a 1905 flood.

Property damage and loss of agricultural capacity associated with floods prompted the establishment of flood control measures in the early 1900s. The 1941 flood was the last catastrophic flood in the Middle Rio Grande. This event flooded the low lying parts of Albuquerque and inundated the town of San Marcial and resulted in continued Federal intervention.

The Rio Grande, including its tributaries and Rio Grande Basin groundwater aquifers, provide the water supply for the majority of New Mexico's citizens and are fundamental to the economics of the region. Water management activities were implemented through-

out the 20th century to address needs related to flood protection, consistent water supplies, conveyance, and water delivery obligations for New Mexico under the Rio Grande Compact (Compact). The Rio Grande Compact, signed in 1938 between the state of Colorado, New Mexico, and Texas and approved by the U.S. Congress, apportioned the water in the Rio Grande Basin.

As New Mexico entered the 21st century, water managers had to accommodate broader environmental considerations. The water management activities that fostered agricultural and urban developments along the Rio Grande also resulted in detrimental impacts on the riparian ecosystem. Water managers must now consider the habitat and water requirements of the Federal and State endanger species, particularly the Rio Grande silvery minnow (*silvery minnow; Hybognathus amarus*) and the southwestern willow flycatcher (flycatcher; *Empidonax traillii extimus*).

The Bosque, the riparian habitat for the flycatcher, and aquatic habitat of the silvery minnow, is influenced by hydrologic conditions. Because water in this basin is considered to be fully appropriated and Compact deliveries

must be met, changes in water use for habitat and ecosystem improvement purposes have important societal, economic, public safety, and ecological consequences. Water used in these improvements must be accounted for in accordance with state statutes.

Sediment Dynamics

The character of the channel and floodplain affect aquatic habitat and riparian ecosystems. Rivers are dynamic systems that adjust their nature in response to changes in flow and sediment regime. Like most rivers in alluvial valleys, the location, pattern, and cross-sectional profile of the Rio Grande has changed episodically in response to natural variations in flow and sediment supply. Changes in the hydrology and sediment supply following construction and operation of the flood and sediment control facilities established in the 1950s and 1970s explain much of the modern channel morphology, including pattern, channel narrowing, channel incision, and changes in bed material composition.

Historically, bars and islands (vegetated bars) were common features of the Rio Grande. A report from the 1893 U.S. Census indicated that several large

“

Night and day the river flows. If time is the mind of space, the River is the soul of the desert. Brave boatmen come, they go, they die, the voyage flows on forever. We are all canyoneers. We are all passengers on this little mossy ship, this delicate dory sailing round the sun that humans call the earth. Joy, shipmates, joy.

Edward Abbey,
The Hidden Canyon — A River Journey

”



islands occurred near Sandia Pueblo, "which rose about 6 feet above the level of the river and were covered with cottonwood groves. The uppermost island was estimated to be 700 acres." The size and location of islands and bars changes in response to flows. This process is well documented for the channel near the Rio Rancho Bosque, where the amount of channel has decreased over the past 15 to 20 years as the bars and islands have coalesced and stabilized. (see page 7) As vegetation becomes established on the bars the rate of sediment accumulation increases. The vertical and lateral growth of the bars results in a decrease in the amount of area that can be flooded.

Sediment entering the floodplain from arroyos on the west side of the Rio Rancho Bosque no longer reaches the river. Recently, large monsoonal storms in 2006 and 2013 impacted the Willow Creek area as coarse gravel sediment settled on trails and wetlands. Movement of arroyo deposits into the river is difficult now as the river course has occurred over time.

Vegetation

One of the most extensive and continuous riparian forests in the southwestern United States occurs in the broad valleys along the Rio Grande in New Mexico. The Rio Grande Bosque is estimated to have existed for more than 2 million years and was probably dominated by cottonwoods. The life cycle of cottonwood Bosque was inextricably tied to a rejuvenation process associated with floods, which removed older trees and willows and allowed for re-establishment of new forest, often in very different areas. Because the potential for catastrophic floods is now limited by public water supply constraints and safety considerations, human intervention is now required to perpetuate the riparian and Bosque ecosystems.

The introduction of exotic tree species in the early 20th century further complicates the preservation and perpetuation of the cottonwood and willow ecosystems. Salt cedar, Russian olive, and other tree species, which were introduced for erosion control or ornamental purposes, aggressively compete and crowd out native species. The removal and control of these weed species requires concerted and continuous efforts. The labor involved in the control of these species is well known to the City of Rio Rancho and community volunteers that have worked to restore the conditions in the Rio Rancho Bosque to more native conditions.

Prior to intervention by the City of Rio Rancho and FORROS in 2003, the vegetation over much of the Rio Rancho Bosque was characterized by mixed stands of cottonwood with heavy infestations of salt cedar and Russian olive. An aggressive species removal and control program was implemented by the City of Rio Rancho and FORROS. This work over the past 10 to 11 years has greatly improved the vegetation composition in the Bosque. (see Vegetation Map, Figure 1) The vegetation currently ranges from open cottonwood galleries on the higher terrace positions, to dense willow thickets on the more recently stabilized islands and bars along the river.



RESTORATION TIMELINE

A timeline of the restoration work within the Bosque.



Much of the following work was made possible through grants received by the Friends of Rio Rancho Open Space (FORROS) and their hands-on work. "Community-based cooperative projects have improved the wildlife habitat and public accessibility beyond our expectations," said Jay Hart, Director, City of Rio Rancho PRCSD.

1989

- Bosque land parcels dedicated to the City of Rio Rancho by AMREP Southwest, Inc.

2000

- City created the Bosque Preserve through municipal code 94.20.

2002

- FORROS incorporated as a tax-exempt corporation.

2003 - 2004

- Cleared 23 acres of Russian olive and salt cedar in the Middle Bosque.

2004

- Cleared 5 acres of Russian olive and salt cedar at North Beach.
- Installed 5 groundwater monitoring wells in Willow Creek Bosque.
- Planted native trees and shrubs and preventive spraying of non-native vegetation in the Middle Bosque and North Beach area.
- Heavy equipment extraction of Russian olive and salt cedar throughout 42 acres in the Willow Creek Bosque, removed 38 and buried 20 jetty jacks.
- Installed 6 recycled plastic benches in the North Beach/Middle Bosque, by Eagle Scout Toby Weisenhaus of Troop 1974 and volunteers.

2005

- Removed non-native phreatophytes from 8.5 acres along the Venada Arroyo in the north end of the Bosque.
- Removed dead/dying trees and invasive species from 45 acres of the Willow Creek Bosque.
- Removed salt cedar and Russian olive from 11 acres of sand bars.

2006

- Treated re-growth of non-native vegetation in the Willow Creek Bosque.
- Installed 8 recycled plastic benches in the Willow Creek and Middle Bosque, by Eagle Scout Robert Ortiz of Troop 1974 and volunteers.

2007

- Removed loose tires from tire bales broken by 2006 flooding in the Willow Creek Bosque, by Eagle Scout Barrett Andreasen of Troop 177 and volunteers.
- Installed the 1.2 mile long North Loop trail in the Willow Creek Bosque and repaired flood damaged section of the Willow Creek loop.



2008 - 2009

- Cleared Russian olive and salt cedar from the Willow Creek sandbars and on 25 acres of sandbars in the Middle Bosque.

2009

- Volunteers planted 125 cottonwood poles around the north loop trail in the Willow Creek Bosque.
- FORROS built a wildlife viewing area along the banks of the Rio Grande, south of the Willow Creek loop trail.

2010

- Mowed kocia weeds in Willow Creek Bosque.
- Installed new monitoring well in Willow Creek Bosque.
- Volunteers planted 150 cottonwood poles around North Loop Trail in the Willow Creek Bosque.
- Installed recycled plastic benches, cut north loop "short cut" trail, installed check dams on hillside, removed Russian olive, and installed educational signs with the New Mexico Youth Conservation Corps (NMYCC).
- State Forestry directed inmate crews focused on non-native species removal and spraying in the entire Bosque.

2011

- Installed educational signs along the North Loop trail. Work by Damien Speaker for his Eagle Scout project.
- In Fall 2011, over 50 "beaver wraps" were put around cottonwoods at Willow Creek as part of an Eagle Scout Project.
- State Forestry Inmate Crews focused on non-native species removal and spraying in the entire Bosque.

2012

- NMYCC planted seed balls, manually removed areas of kocia weed, and defined foot paths to try to consolidate pedestrian trails.
- Installed leash and pick up after your dog signs at 30 neighborhood and main access points to the Bosque.
- Planted 50 New Mexico olive seedlings supplied by Tree New Mexico.
- State Forestry directed inmate crews focused on non-native species removal and spraying in the entire Bosque.

2013

- The NMISC and Collaborative Program in conjunction with the City of Rio Rancho and FORROS performed aquatic and riparian floodplain restoration. Aquatic habitat restoration included the construction of the egg retention habitat features, wetland rehabilitation, and wildlife habitat restoration in the Willow Creek and North Beach areas. The restoration involved the removal and redistribution of about 15,000 tons of stream sediment. Upland revegetation was conducted in the sediment redistribution areas to reduce weed problems and increase plant diversity and habitat quality. In the North Beach Area, aquatic habitat was restored and slope stabilization and revegetation was conducted in a tributary arroyo. The work was conducted over about a month using a fleet of heavy equipment. Major funding for this project was provided by the Collaborative Program and NMISC.
- State Forestry directed inmate crews installed - "Fire Danger Rating" signs at 5 locations in the Bosque funded by FORROS.
- Installed 4 avian houses along the new oxbow below the wildlife viewing area. Work by Eagle Scout Adam Garcia.

2014

- Plans for the habitat restoration work are being developed for the Middle Bosque by the ISC and Rio Rancho. The restoration will be similar to the work conducted at Willow Creek and North Beach, with emphasis on restoring aquatic habitat. Additional improvements are intended to enhance the Bosque ecosystem, consolidate the trail network, and improve fire and emergency access. These goals will be balanced with emphasis on maintaining the remote and undeveloped nature of this area.



OPEN SPACE OVERVIEW

The Rio Rancho Bosque Open Space is divided into three distinct areas. (see Regional Map, opposite page) The largest and most well utilized one is the Willow Creek Bosque. The southernmost piece located near the Rio Rancho Waste Water Treatment Plant is known as North Beach. The area in between these two areas is fittingly called the Middle Bosque. Connecting each of these areas is the Upper Bosque Trail.

The vegetation of the Rio Rancho Bosque has fluctuated over time. Prior to the intervention by the City of Rio Rancho and FORROS beginning in 2003, the vegetation over much of the Rio Rancho Bosque was characterized by mixed stands of cottonwood with heavy infestations of salt cedar and Russian olive. The vegetation currently ranges from open cottonwood galleries on the higher terrace positions, to dense willow thickets on the more recently stabilized islands and bars along the river.



REGIONAL MAP OF BOSQUE OPEN SPACE

A more detailed look at the vegetation can be seen on the Vegetation Map (see Vegetation Map, Figure 1). This map shows the classifications of vegetation throughout the three areas of the Rio Rancho Bosque.

Willow Creek is the most versatile consisting of coyote willow near the river, mixed stands of cottonwoods and New Mexico olive trees in more established cottonwood stands, small cottonwood stands located in a few pockets, and a tree willow stand near the wetland area. Large portions of the Bosque consist of mixed grasses along the forest floor.

Most of the **Middle Bosque** is made up of healthy stands of coyote willows along the riverfront and large mature cottonwood stands just below the entire stretch of the Upper Bosque Trail. A large variety of mixed grasses can be found below these cottonwood stands. The **North Beach** is very similar to the Middle Bosque, but on a much smaller scale. Due to the 2013 recent habitat rehabilitation work, young stands of coyote willow can be found.

The Rio Rancho Bosque not only consists of healthy stands of vegetation, but also hosts a wide variety of public amenities. Amenities such as parking facilities, trails, and educational signage can be seen on the Existing Amenities Map. (see Figure 2)

Each distinct area will be described on the following pages including how these areas are already meeting the overall goals of *Restoration, Recreation, Education, and Preservation*. A Proposed Improvements section details how these goals may continue to be met and built upon.

”

Night and day the river flows. If time is the mind of space, the River is the soul of the desert. Brave boatmen come, they go, they die, the voyage flows on forever. We are all canyoneers. We are all passengers on this little mossy ship, this delicate dory sailing round the sun that humans call the earth. Joy, shipmates, joy.

Edward Abbey,
The Hidden Canyon — A River Journey

”





LEGEND

- RIO GRANDE RIVER BOUNDARY
- COTTONWOODS
- COTTONWOODS MIXED WITH NEW MEXICO OLIVE
- COYOTE WILLOW
- TREE WILLOW
- OPEN SPACE WITH MIXED GRASSES

NOTES

- VEGETATION STUDY COMPLETED BY GOLDER ASSOCIATES DURING FEBRUARY AND MARCH 2012 USING THE HINK AND OHMART VEGETATION CLASSES.
- REFERENCES
 - AERIAL PHOTOGRAPH TAKEN FROM MRCCGS, DATED 2010

CLIENT
 OFFICE OF THE STATE ENGINEER
 NEW MEXICO INTERSTATE STREAM COMMISSION
 ALBUQUERQUE, NEW MEXICO

CONSULTANT

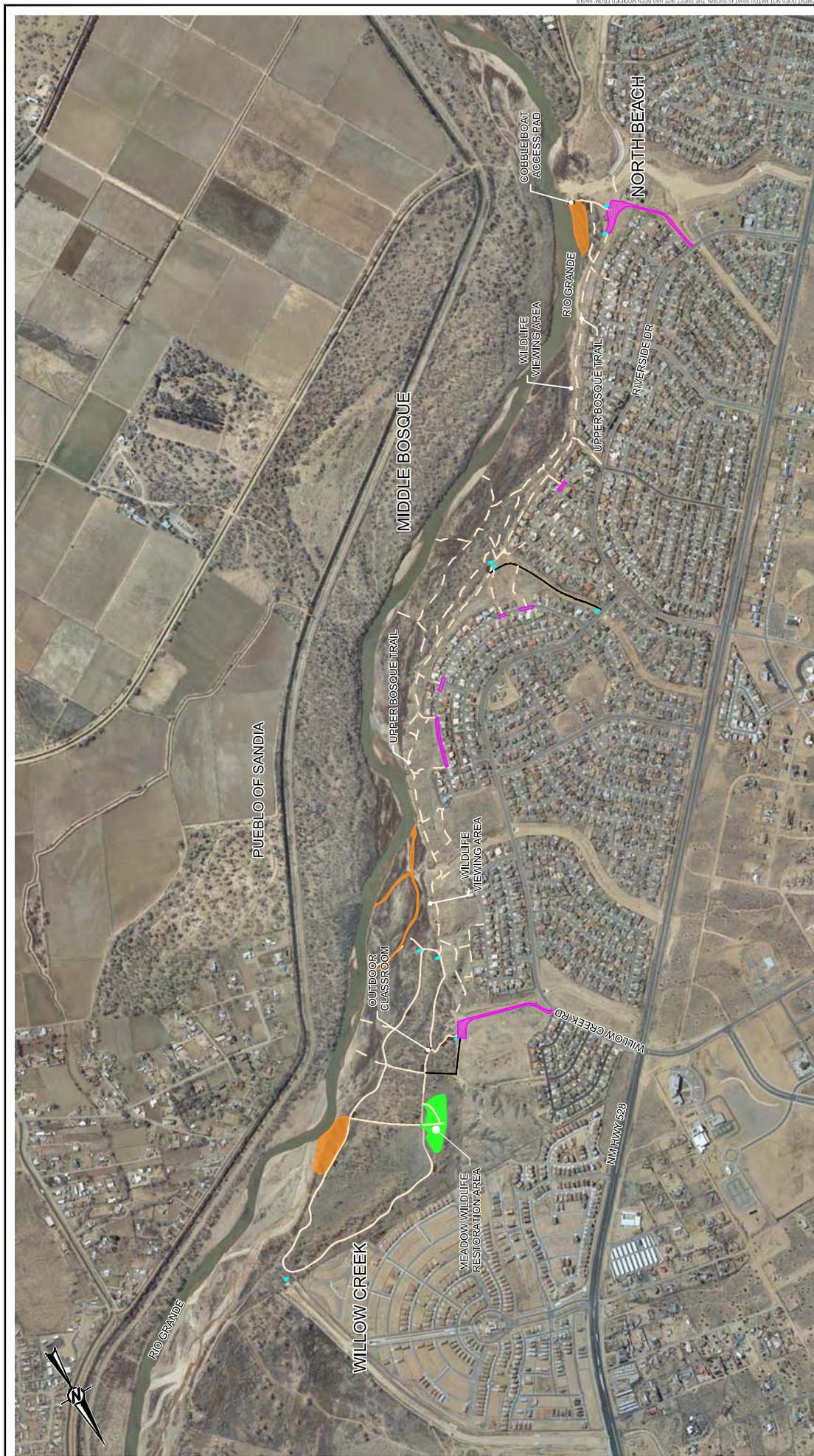


PROJECT
 RIO RANCHO OPEN SPACE PARKS AND RECREATION
 INTEGRATED MANAGEMENT PLAN
 RIO RANCHO, NEW MEXICO

TITLE
 VEGETATION MAP

PREPARED	2014-06-07	POC
DESIGN		POC
REVIEW		LM
APPROVED		LM

PROJECT No. 113-80057
PHASE 0001
R/W 1
FIGURE 1



LEGEND

- DEDICATED TRAIL
- NATIVE TRAIL
- UTILITY ROAD
- 2013 RESTORATION SITE
- ROAD ACCESS AND PARKING AREA
- INFORMATION SIGNAGE
- SITTING BENCH
- 2013 RESTORATION SITE

NOTES

- DEDICATED TRAILS CONSIST OF CRUSHER FINE TREATED WITH POLY-PAVE® OR CONSTRUCTED WITH WOOD CHIPS.
- NATIVE TRAILS CONSIST OF EASTERN MATERIAL WITH MINIMAL VEGETATION.
- INFORMATION SIGNAGE INCLUDES PARK INFORMATION AND FIRE DANGER RATES.

REFERENCE

- AERIAL PHOTOGRAPH TAKEN FROM MRCOG, DATED 2010

CLIENT
 OFFICE OF THE STATE ENGINEER
 NEW MEXICO INTERSTATE STREAM COMMISSION
 ALBUQUERQUE, NEW MEXICO

CONSULTANT

PROJECT
 RIO RANCHO OPEN SPACE PARKS AND RECREATION
 INTEGRATED MANAGEMENT PLAN
 RIO RANCHO, NEW MEXICO

TITLE
 EXISTING AMENITIES

PREPARED	2014-06-07	PDC
DESIGN		PDC
REVIEW		LM
APPROVED		LM

SCALE
 0 500 1000
 FEET

PROJECT No. 113-80057
PHASE 0001
REV. 1
FIGURE 2



WILLOW CREEK (WC)

Willow Creek is most popular of the four areas of the Rio Rancho Bosque Open Space.

The Willow Creek area encompasses 110 acres of bosque with about 2 miles of improved, crusher-fine trails, and a gravel parking area. Willow Creek typically experiences more visitation than the other open space units and is known for its wide multi-use paths. The arroyos, escarpments, and upper terrace occupy about 15.7 acres.

Willow Creek is well developed with educational and interpretive signage, seating areas, an outdoor classroom, and trash containers. The terrain varies in the Willow Creek area, ranging from the nearly level floodplain with limited wetland, extensive riparian vegetation to steep escarpment slopes and upland mesas with grass-shrub communities. About 36 acres is composed of coyote willow-dominated scrublands on the recently stabilized sandbars in the floodplain of the Rio Grande. (see Vegetation Map, Figure 1)

Mature cottonwood forest and open meadow areas occupy the remaining 72 acres on higher historic floodplain. Much of the open meadow area shown on the vegetation map (symbol SG) was previously occupied by a cottonwood forest prior to massive dieback of the stand in the mid- to late-1990s. The dieback areas are variously affected by dense stands of kochia, which is a persistent weed, on the clay soils that are prevalent west of the main loop trail. Native salt grass tends to dominate the sandier soils in the dieback area to the east of the trail. Recent restoration efforts included importation of sandier soils and seeding with adapted native species to reduce the prevalence of kochia.

FORROS and other groups have volunteered many hours removing non-native species from the existing stands of vegetation and replanting cottonwoods in open areas. The

cottonwood dieback area provides an opportunity to establish a younger age class of trees in this area. Planting success is likely to be improved in areas with somewhat higher ground water and by the use of establishment watering during the first year. Cottonwoods planted over the past few years are beginning to show signs of establishment in the dieback area.

Wildlife habitat features were created by piling woody debris, which also isolated fuels to reduce fire hazards. A wildlife viewing blind installed by FORROS is located above the Wetland area along the upper Bosque trail. (see Figure 2) Additional shrub and understory planting will benefit the area by increasing plant diversity in the understory and open areas.

With the exception of localized erosion issues, the conditions in Willow Creek are considered good and preservation

and maintenance are the major focus. The upland mesa area offers opportunities to stabilize the soils, restore vegetation, and establish trails.

In 2013, NMISC, the City of Rio Rancho, Golder Associates Inc., and Wilco Industrial Services completed Phase I of a multi-phase restoration project. The restoration included the re-establishment of a historical side channel with bank lowering, and creation of embayments.

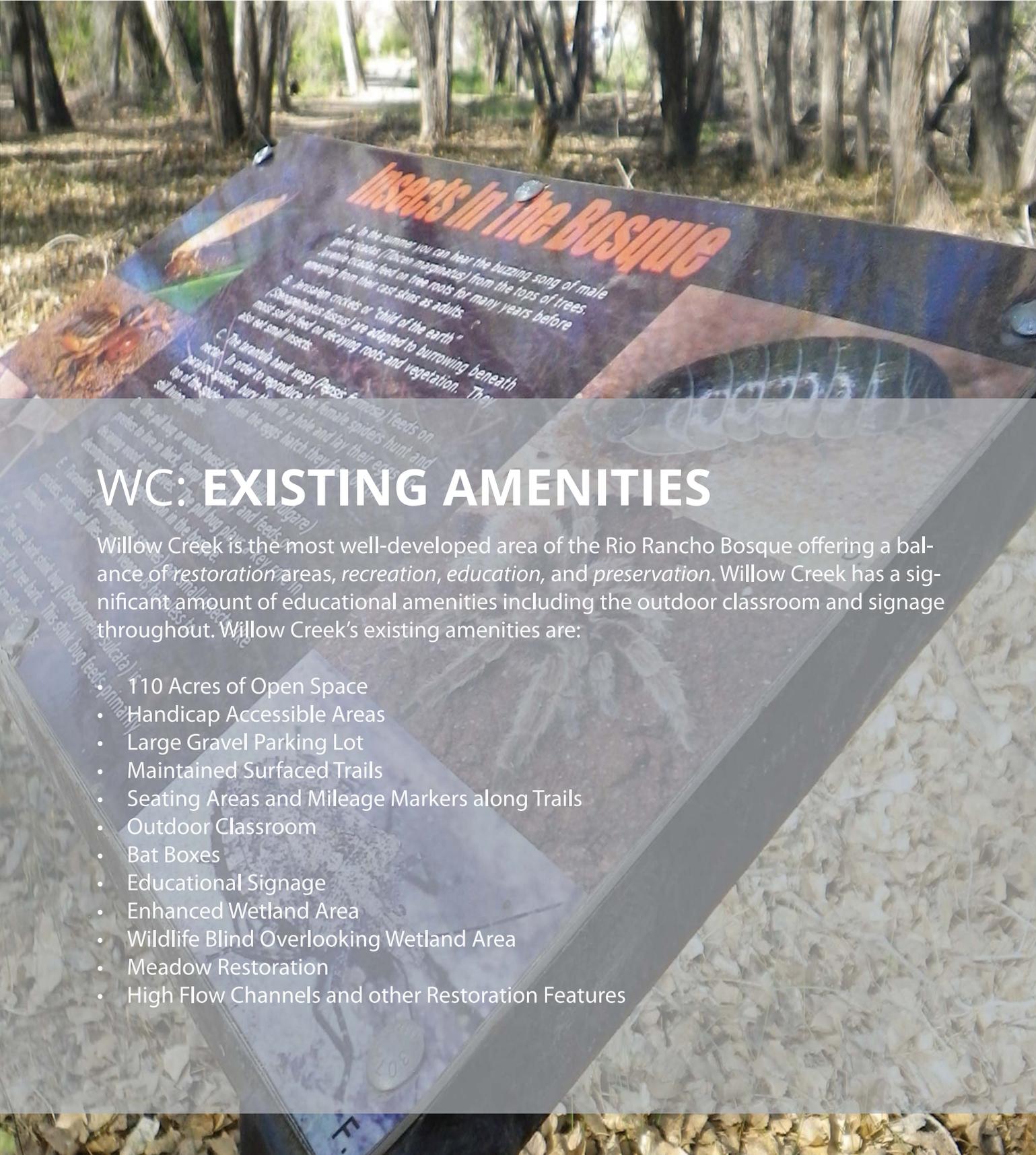
As part of the NMISC project, a new park feature known as the Meadow Wildlife Restoration Area was established with help from FORROS as a walking and viewing area. It included intensive planting of native vegetation. Willow Creek and North Beach received new entrance gateways, signage, and benches. Along with this construction the Willow Creek parking lot was re-graded and additional gravel was installed. Maintenance is very important to continue at Willow Creek due to its high usage for recreational purposes.



Each species on our planet plays a role in the healthy functioning of natural ecosystems, on which humans depend.

William H. Schlesinger, Biogeochemist





WC: EXISTING AMENITIES

Willow Creek is the most well-developed area of the Rio Rancho Bosque offering a balance of restoration areas, recreation, education, and preservation. Willow Creek has a significant amount of educational amenities including the outdoor classroom and signage throughout. Willow Creek's existing amenities are:

- 110 Acres of Open Space
- Handicap Accessible Areas
- Large Gravel Parking Lot
- Maintained Surfaced Trails
- Seating Areas and Mileage Markers along Trails
- Outdoor Classroom
- Bat Boxes
- Educational Signage
- Enhanced Wetland Area
- Wildlife Blind Overlooking Wetland Area
- Meadow Restoration
- High Flow Channels and other Restoration Features

WC: PROPOSED IMPROVEMENTS

Because Willow Creek receives a high amount of daily use, a large percentage of the Proposed Improvements are related to *restoration* and *preservation* goals. These are necessary to maintain the Open Space area to withstand daily use. The following pages show an overall list of Proposed Improvements including possible methods and details on how to achieve the improvements. The Willow Creek Proposed Improvements Map (Figure 3) shows the exact location where these improvements might occur.



1. Parking Lot

- Manage slope erosion along western edge of the parking lot.
- Add informational signage, and community signage to main Willow Creek sign board. This can be a space to promote restoration and recreation events. It can also serve as an educational space to talk about preservation.
- Gravel in parking lot shall be annually maintained. This may require adding gravel and/or basic surface grading.



2. Erosion control along trail

- Address the steep slope on the west side of the southwest trail. Provide retaining wall along the lower edge to hold up the slope. Stockpiled boulders or large tree trunks may be re-purposed for this use.
- Work up the slope by closing in scours.
- Review and analyze the drainage flows along the terrace above the trail to see if this drainage can be appropriately redirected. This step will prevent long term erosion along this slope.



3. Sediment control along trail

- There are a variety of options to alleviate the sediment build up along the southwestern walking trail during large storms.

Option 1: Install erosion control wattles/socks parallel to the slope every 20' from the trail until you reach the arroyo to slowly collect silt during small storms. Promote vegetation on the upper side of the wattles/socks.

Option 2: Install small rock or gabion check dams parallel to the slope to slow down water during medium storms.

Option 3: Raise pathway by installing footbridges or using fill material. Provide drainage culverts below path to allow water and silt to flow through during large storm events.



REFERENCE
 1. AERIAL PHOTOGRAPH TAKEN FROM IMCOG, DATED 2010

NOTES
 1. DEDICATED TRAILS CONSIST OF CRUSHER FINE TREATED WITH POLY-PAVED OR CONSTRUCTED WITH WOOD CHIPS.
 2. NATIVE TRAILS CONSIST OF EARTHEN MATERIAL WITH MINIMAL VEGETATION.

LEGEND

- DEDICATED TRAIL
- NATIVE TRAIL
- PROPOSED TRAIL
- IMPROVEMENT ZONE
- SIGNAGE TO BE ADDED

CLIENT
 OFFICE OF THE STATE ENGINEER
 NEW MEXICO INTERSTATE STREAM COMMISSION
 ALBUQUERQUE, NEW MEXICO

CONSULTANT

PROJECT
 RIO RANCHO OPEN SPACE PARKS AND RECREATION
 INTEGRATED MANAGEMENT PLAN
 RIO RANCHO, NEW MEXICO

TITLE
 WILLOW CREEK
 PROPOSED IMPROVEMENTS

PREPARED	2014-06-07	PDC
DESIGN		PDC
REVIEW		LM
APPROVED		LM

PROJECT No. 113-80057
 PHASE: 0001
 REV: 1

FIGURE 3

WC: PROPOSED IMPROVEMENTS



4. Evaluate upper terrace at Willow Creek lot

- Provide trail entrance area and on street parking is available for users.
- Include a dog waste station, trash receptacle, and trail access.
- Create a new trail along terrace top that take advantage of the views.
- Plant shrubs and natives.
- Remove large blocks/rocks/debris located on the terrace and utilize for other purposes.



5. Maintenance of wildlife viewing area

- Create a designated trail to viewing area.
- Provide educational/interpretive signage.
- Seal and protect wood annually on wildlife viewing blind.
- Add bird identification signs at entrance or within the wildlife viewing blind.



6. Annual maintenance of regulation and educational signage

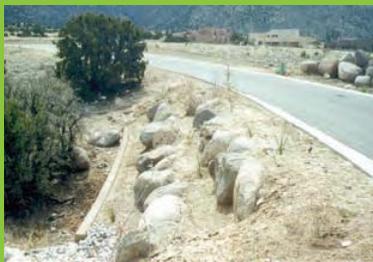
- Replace illegible, outdated, or damaged signs, specifically at Willow Creek parking lot neighborhood entry points along the trail.
- As necessary, add educational/interpretive signage, but keep to a minimum on most trails.

WC: PROPOSED IMPROVEMENT METHODS

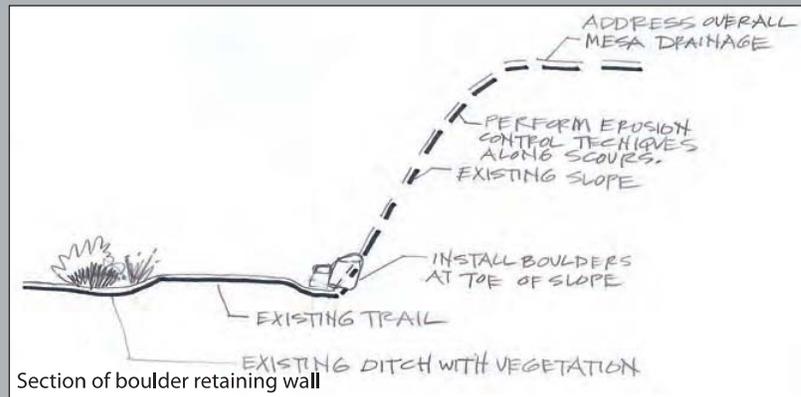
Below are some examples of the types of methods that might be used to implement the Proposed Improvements for Willow Creek.

A. Use boulders as retaining wall

This method could be used to address the Proposed Improvement #2, erosion control along the trail.



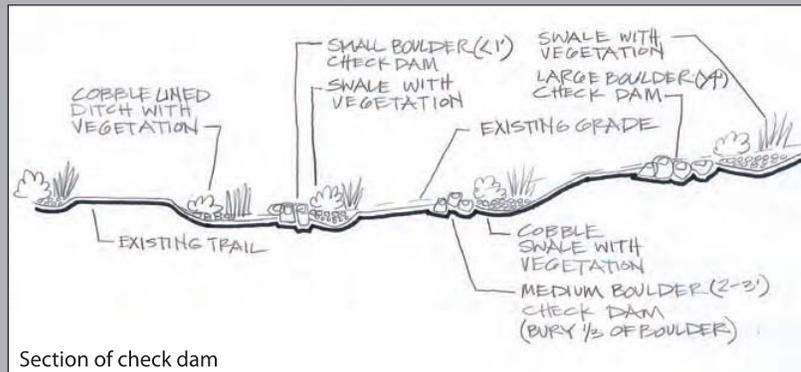
Boulder retaining wall



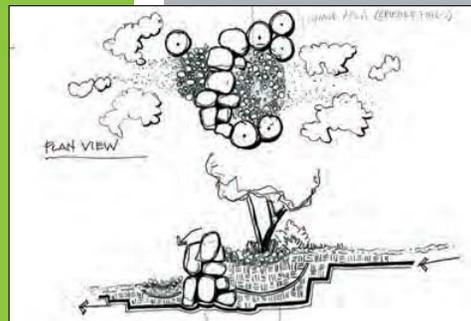
Section of boulder retaining wall

B. Install check dams

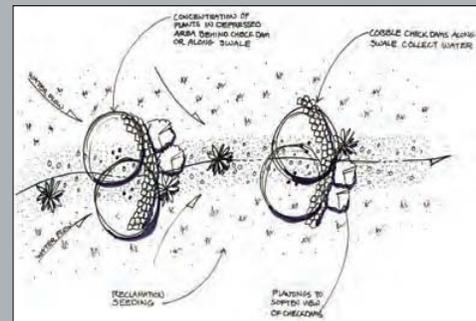
Check dams is one method for controlling silt along the trail (Proposed Improvement #3). The check dams slow down water channels thereby reducing erosion.



Section of check dam



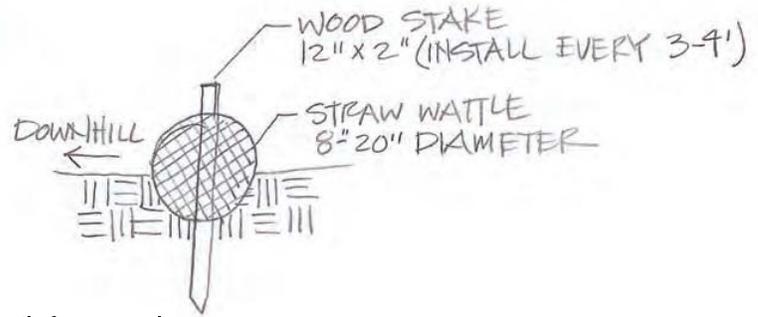
Check dam plan view and section



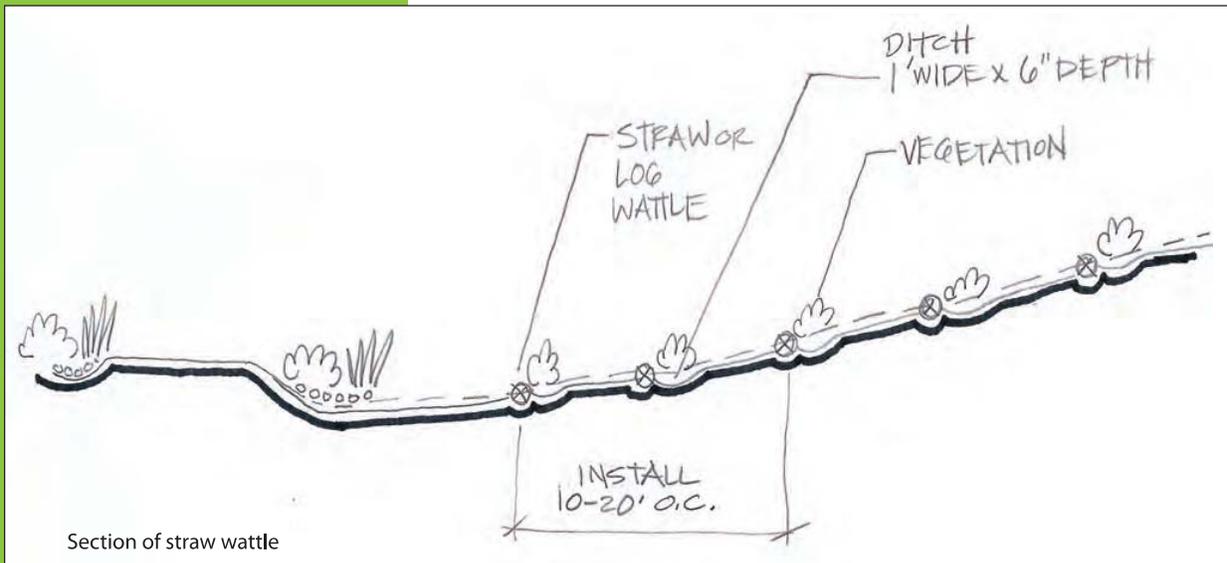
Check dam plan view

C. Lay down straw wattles

Straw wattles act similarly to check dams in that they slow the water down over an expansive slope. In addition, they provide wicking to retain moisture. This can also help with Proposed Improvement #2 or #3.



Detail of straw wattle



Section of straw wattle



Straw sock wattles along slope

D. Schematic design for upper terrace at Willow Creek

The terrace above the existing parking lot provides a great opportunity to implement additional recreational amenities for the public. Some ideas for this area include a small parking lot, trail, dog waste station, and native plant materials.



Plan view sketch of potential improvements for the upper terrace at Willow Creek



MIDDLE BOSQUE (MB)

The Middle Bosque offers a quiet, serene place to enjoy the outdoors.

The Middle Bosque occupies about 55 acres, including 43 acres of willow shrubland on the recent floodplain and 12 acres of cottonwood forest on the higher terrace (see Vegetation Map Figure 1). Accessible only by foot or bike from the Upper Bosque Trail, the Middle Bosque is less visited area of the overall Rio Rancho Bosque and offers opportunities for solitude.

The Middle Bosque has many unimproved narrow trails crossing through it, with a fairly wide, flat trail through the cottonwood area.

The uncontrolled nature of the trails confers a rustic character to the area, but is undesirable from a wildlife habitat and fire access perspective. In addition, numerous steep "short cut" trails have been pioneered from the Upper Bosque Trail down into the Middle Bosque which has created erosion along the Upper Bosque trail.

A trail consolidation plan in the Middle Bosque is needed to address excessive dispersion of foot traffic, erosion reduction, and fire access.

Exotic species removal in this area has resulted in a fairly healthy balance of cottonwood overstory, New Mexico olive mixed understory, and native grasses along the ground. Thus, minimal vegetation efforts are needed, other than continued exotics maintenance.

The Middle Bosque willow area will eventually become cut off from over bank flows that are needed for these riparian areas. Plans are in place to improve and expand aquatic and riparian habitat along the river. Wetland restoration opportunities exist at the storm drain outfalls that discharge into the Middle Bosque.

Some trail work is recommended in the Middle Bosque to encourage visitors to access the Bosque effectively and to reduce damage and erosion.



Plans for the habitat restoration work are being developed for the Middle Bosque by the NMISC and the City of Rio Rancho. The restoration will be similar to the work conducted at Willow Creek and North Beach, with emphasis on restoring aquatic habitat. Additional improvements are intended to enhance the Bosque ecosystem, consolidate the trail network, and improve fire and emergency access. These goals will be balanced with emphasis on maintaining the remote and undeveloped nature of this area.

Fires in the Bosque are an ever increasing concern for all due to the extended droughts that have occurred in the past several decades. Improving access in the Middle Bosque to allow for emergency vehicles can be coordinated with other restoration activities planned.



As children, small creatures endlessly fascinate us; as adults, we can protect them so as to inspire future children.

Les E. Watling, Marine Ecologist





MB: EXISTING AMENITIES

As the least accessible area of the Rio Rancho Bosque, the Middle Bosque has few Existing Amenities and there are no plans for development in this area other than improving wildlife habitat and maintaining vegetation. The Middle Bosque has some of the healthiest stands of vegetation.

- 55 Acres of Open Space
- Proximity of Trails to the River
- Healthy Native Vegetation
- Single Track Trails
- Multiple Pedestrian Trail Connections from Neighborhoods

MB: PROPOSED IMPROVEMENTS

The Middle Bosque backs up to many neighborhood streets thereby allowing easy access to the adjacent neighborhoods. This provides an opportunity to create amenities related to *education* and *recreation* with respect to the main goals of *restoration* and *preservation* already in place here. The following pages show an overall list of Proposed Improvements including possible methods and details showing ideas of how to achieve the improvements.



1. Provide improved access to Middle Bosque and address erosion

- Address the steep “short cut” trails into the lower Middle Bosque. Provide safer graded access into the area from the Upper Bosque Trail. Some sections may require steps or switchbacks to provide a gentle trail incline. In both options, logs from cottonwood trees can be used to help retain the slope and as a barrier to prevent access to areas that are vulnerable to erosion.



2. Identify neighborhood access points and trail hierarchy

- Create consistent wayfinding and signage to be used throughout the Rio Rancho Bosque. This would include neighborhood entrance signage, trail signage, mileage markers, rules and regulations, and amenities such as benches, trash receptacles, and dog waste stations.

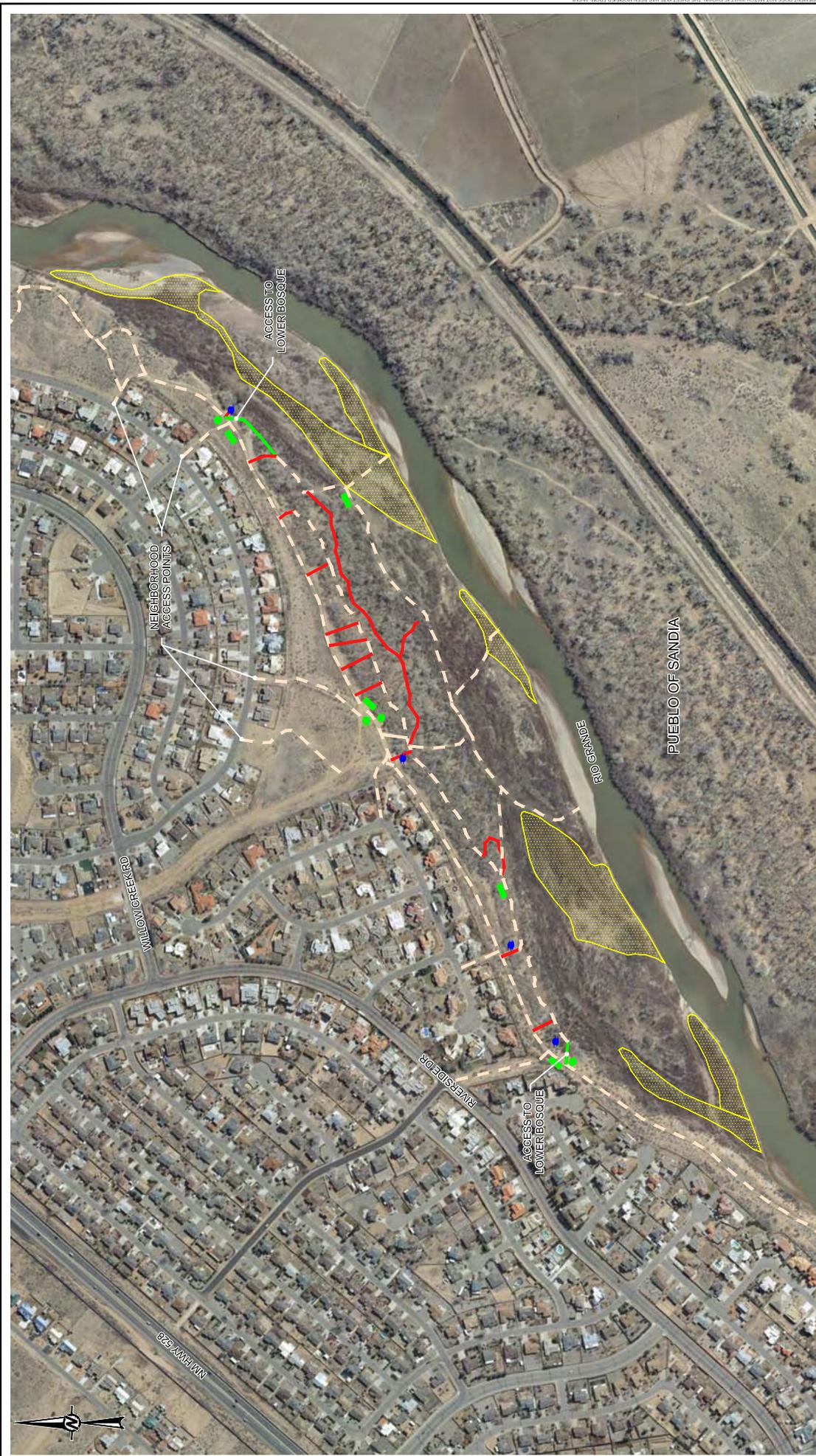


3. Address drainage culverts

- Provide management strategy for small outfall drainage culverts throughout the Middle Bosque. Design outfalls to allow for water harvesting opportunities.
- Coordinate with SSCAFCA and City of Rio Rancho Public Works Department on the large outfall culverts. The management of this water will require engineered solutions. Re-use water within the Bosque to encourage expansion of wetland areas.

4. Improve river connectivity with Middle Bosque

- The river remains constricted along the Middle Bosque. Lowering on banklines and other techniques will improve native vegetation growth and provide for spring runoff habitat for aquatic species.



LEGEND

- DEDICATED TRAIL
- NATIVE TRAIL
- PROHIBITED TRAIL
- PROHIBITED TRAIL (TO BE BLOCKED OR REMOVED)
- PHASE II RESTORATION SITE (FUTURE PROJECT SITE)
- DRAINAGE CULVERTS
- SIGNAGE TO BE ADDED
- SEATING TO BE INSTALLED

NOTES

1. DEDICATED TRAILS CONSIST OF CRUSHER FINE TREATED WITH POLY-PAVEOR OR CONSTRUCTED WITH WOOD CHIPS.
2. NATIVE TRAILS CONSIST OF EARTHEN MATERIAL WITH MINIMAL VEGETATION.
3. PROHIBITED TRAILS CONSIST OF PATHS WORN INTO FOREST AS DERIVATIVE FOOT PATHS.
4. DRAINAGE CULVERTS PROVIDE IDEAL LOCATIONS FOR WETLAND OPPORTUNITIES

REFERENCE

1. AERIAL PHOTOGRAPH TAKEN FROM MRCOG, DATED 2010

CLIENT
 OFFICE OF THE STATE ENGINEER
 NEW MEXICO INTERSTATE STREAM COMMISSION
 ALBUQUERQUE, NEW MEXICO

CONSULTANT

PREPARED PDC 2014-06-07
DESIGN PDC
REVIEW LM
APPROVED LM

PROJECT TITLE
 RIO RANCHO OPEN SPACE PARKS AND RECREATION
 INTEGRATED MANAGEMENT PLAN
 RIO RANCHO, NEW MEXICO

PROJECT No. 113-80057
PHASE 0001
REV. 1
FIGURE 4

MB: PROPOSED IMPROVEMENTS

The Middle Bosque Proposed Improvements Map (Figure 4) shows the exact location where these improvements might occur in particular the consolidation to three lower bosque access points.



4. Preserve and maintain

- Preserve and protect existing vegetation by vigilant monitoring and removal of exotic and unwanted species.
- Re-seed bare areas, and plant and maintain established new shrubs and trees.
- Improve flood plain habitat and river connectivity.



5. Establish fire equipment access

- Work with the NMISC and the City of Rio Rancho Fire Department to identify optimum access to the Middle Bosque.
- Emergency plan to address fire and rescue service to the Middle Bosque.



6. Annual maintenance of regulation and educational signage

- Replace illegible, outdated, and damaged signs as necessary, specifically at all neighborhood entry points and along the trail.
- Provide educational/interpretive signage.

7. Re-engineer surface water outfalls

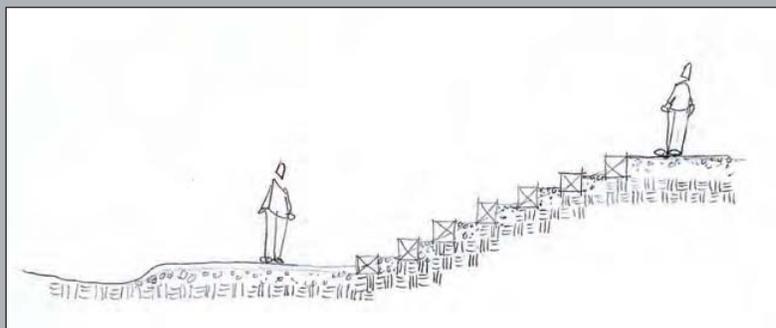
- Improve street entry points to strain out large objects.
- Re-contour outfall to allow for better distribution of water.
- Camouflage culverts to reduce graffiti.

MB: PROPOSED IMPROVEMENT METHODS

Below are some examples of the types of methods that might be used to implement the Proposed Improvements in the Middle Bosque.

A. Install steps down to the lower Bosque.

Install steps or switchbacks to provide safer access to the MB. This may require handrails and appropriately sized risers for trail access.



Section of steps along steep slope



Example of steps leading into Bosque at North Beach

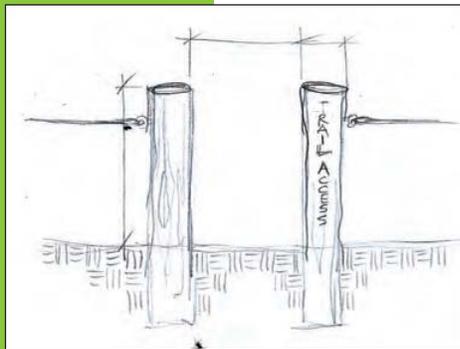


Access without grading creates erosion problems

B. Provide consistent signage for easy neighborhood navigation.

Examples of existing signage elements throughout the WC Bosque are shown.

Signage and wayfinding should use similar materials and keep a consistent theme throughout the entire Rio Rancho Bosque. The MB would be confined to signs, benches, and other improvements at the entrance and exit areas to maintain a more natural setting within the area



Existing signage and benches at Willow Creek



Existing signage at pedestrian entrance areas



Existing interpretive signage throughout bosque

C. Design water harvesting strategies at all drainage culverts.

Examples of existing storm water outfalls both large and small.
(Proposed Improvement #3)



Large storm water drainage culverts into the Rio Rancho Bosque result in intermittent pools of stagnant water



Large storm water culverts draining into the Rio Rancho Bosque



Small inlet from storm water culvert



NORTH BEACH (NB)

The most easily accessible and southern most section of the Rio Rancho Bosque with direct river access.

The North Beach area encompasses about 6 acres of bosque and floodplain, with 0.2 miles of trail. This area is accessible by vehicles, has an unimproved parking area (1.8 acres), trash disposal facilities, signage, and seating. North Beach provides the closest access to the river for water activities. A relatively low gradient, semi-improved, gravel trail extends about 500 feet from the parking area to the river. A cobble-gravel platform exists near the river to facilitate river access. The traditional, alternative river access was from the channel of Barrancas Arroyo. A steep, wide tread staircase connects the local trail to the Upper Bosque Trail at the north end of North Beach.

The riparian forest, occupying about 2.5 acres on the higher terrace, is

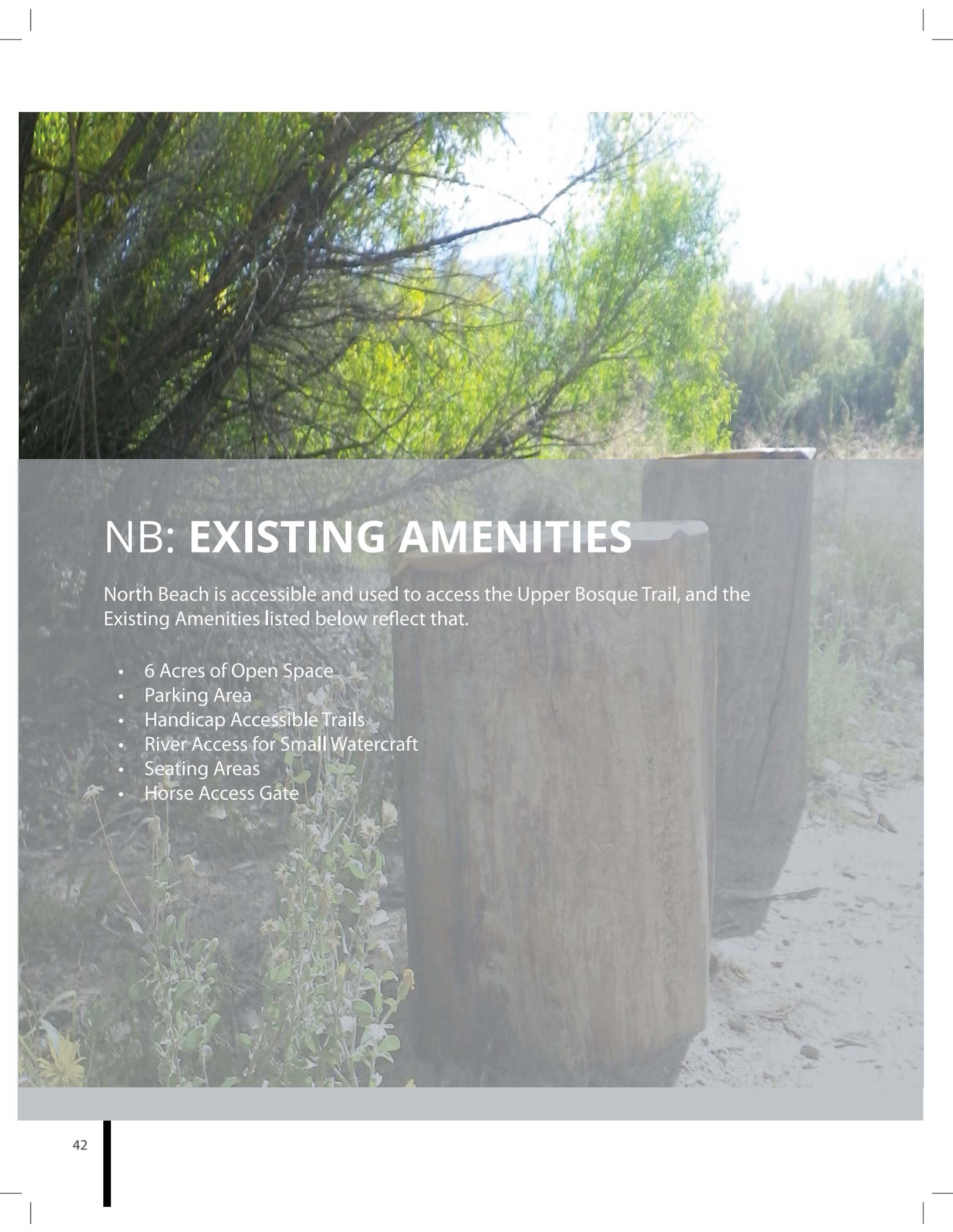
composed of mature cottonwoods with scattered Russian olive. The lower terrace has recently sprouted coyote willow and a few cottonwoods. Additional cottonwood plantings onto the floodplain would extend the overall habitat value in this area.

Limiting the size and re-organizing the parking area would reduce the potential for maintenance and allow re-establishment of native plants. The trail to the river has one section that is steeper than optimal and prone to erosion. Grade adjustments or installation of a culvert would improve access, particularly for transport of canoes and light watercraft. Although not allowed in the area, motorized recreational vehicles occasionally trespass in this area, probably because access is not effectively limited in the

adjacent Barrancas Arroyo.

In 2013, the river restoration project completed at North Beach involved lowering the river shore and creating an embayment channel. The embayment and bench lowering provided an ideal silvery minnow habitat. The crusher-fine trail was added to provide an access path to the river shore and the cobblestone-gravel provided a low cost erosion-resistant shoreline for launching small watercraft. The project provided approximately 2.3 acres of improved habitat.

The North Beach, located at the Southeast end of the Upper Bosque Trail, is the starting point for trail running, horseback riding, hiking/ walking and boating.



NB: EXISTING AMENITIES

North Beach is accessible and used to access the Upper Bosque Trail, and the Existing Amenities listed below reflect that.

- 6 Acres of Open Space
- Parking Area
- Handicap Accessible Trails
- River Access for Small Watercraft
- Seating Areas
- Horse Access Gate

NB: PROPOSED IMPROVEMENTS

Although small in area, North Beach provides access for Rio Rancho Open Space Bosque *recreational and educational* opportunities especially for the citizens who do not live in the adjacent neighborhoods. Some of the Proposed Improvements listed are to upgrade or replace Existing Amenities, such as re-configuring and landscaping the expansive parking lot. The North Beach proposed improvements are shown in Figure 5.



1. Re-vegetate bare areas

- Re-seed bare areas.
- Install tube pots and tall pots to encourage new shrub and tree growth.
- Provide additional shade throughout North Beach by planting trees.



2. Parking lot re-organization

- Address the expansive parking lot by re-organizing the space. Fence off area to be preserved and protected after re-seeding.
- Narrow the entrance road to further protect the adjacent native area.



3. Enhance trails and address steep entrance

- Update trails with a new crusher fines trail similar to the one in the Willow Creek area.
- Review steps to ensure they meet health, safety, and welfare standards. Redesign and replace as necessary.

NB: PROPOSED IMPROVEMENTS

The North Beach Bosque Proposed Improvements are shown in Figure 5. They include upgrading old signs and providing new ones where needed.



4. Provide and maintain additional interpretive/educational signage

- Create consistent wayfinding and signage to be used throughout the Rio Rancho Bosque. This would include neighborhood entrance signage, trail signage, mileage markers, rules and regulations, and amenities such as benches, trash receptacles, and dog waste stations.
- Large community signage should mimic the precedents set at the Willow Creek entrance.
- Provide interpretive and educational signage, especially addressing water access and safety.



5. Preserve and maintain

- Preserve and protect existing vegetation by vigilant monitoring and removal of exotic and unwanted species.
- Re-seed barren areas needing vegetation, and plant and establish new shrubs and trees.



6. Annual maintenance of regulation and educational signage

- Replace illegible, outdated, and damaged signs as necessary, specifically at the North Beach parking lot, and neighborhood entry points across the arroyo, and along the trail.
- Provide educational/interpretive signage.



LEGEND

- DEDICATED TRAIL
- NATIVE TRAIL
- PROPOSED TRAIL
- IMPROVEMENT ZONE
- SIGNAGE TO BE ADDED

NOTES

1. DEDICATED TRAILS CONSIST OF CRUSHER FINE TREATED WITH POLY-PAVE® OR CONSTRUCTED WITH WOOD CHIPS.
2. NATIVE TRAILS CONSISTS OF EARTHEN MATERIAL WITH MINIMAL VEGETATION.

REFERENCE

1. AERIAL PHOTOGRAPH TAKEN FROM IMCOG, DATED 2010

CLIENT
 OFFICE OF THE STATE ENGINEER
 NEW MEXICO INTERSTATE STREAM COMMISSION
 ALBUQUERQUE, NEW MEXICO

CONSULTANT

PROJECT
 RIO RANCHO OPEN SPACE PARKS AND RECREATION
 INTEGRATED MANAGEMENT PLAN
 RIO RANCHO, NEW MEXICO

TITLE
 NORTH BEACH
 PROPOSED IMPROVEMENTS

PREPARED	2014-06-07	PDC
DESIGN		PDC
REVIEW		LM
APPROVED		LM

PROJECT No. 113-80057
 PHASE: 0001
 REV: 1

FIGURE 5

NB: PROPOSED IMPROVEMENT METHODS

Below are some examples of the types of methods that might be used to implement the Proposed Improvements for North Beach.

A. Re-vegetate

Due to the expansive parking lot and other high use areas, there will be a need to restore the existing land by re-seeding. This addresses Proposed Improvement #1.



Example of drill seeding technique



Example of drill seeding technique

B. Parking lot

Re-organization of the parking lot at North Beach is recommended to slow speeds and reduce vehicular play. This addresses Proposed Improvement #2.



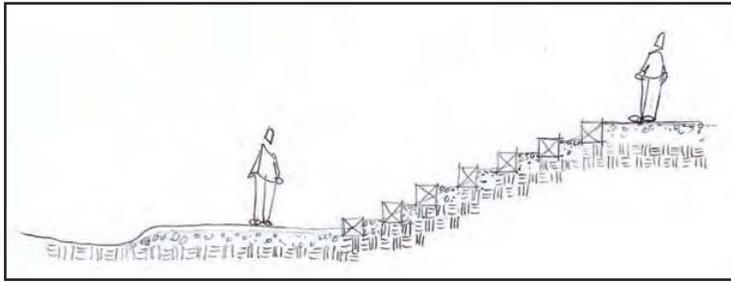
Existing parking lot



Example of a well organized parking lot at a public open space area

C. Install steps at access point with steep slopes.

Install steps, on the north side of the North Beach, in order to provide a safe access to the lower Bosque. This may require handrails and appropriately sized risers for trail access. This addresses Proposed Improvement #3.



Section of steps along steep slopes

D. Provide consistent signage for easy wayfinding.

Examples of existing signage elements throughout the Bosque. Signage and wayfinding should use similar materials and keep a consistent theme throughout the entire Rio Rancho Bosque. This helps with neighborhood identity and access as noted in Proposed Improvements #4 & #6.



Entrance signage at North Beach



Provide adequate wayfinding along trails to direct trail users to appropriate arroyo crossing



UPPER BOSQUE TRAIL (UBT)

The Upper Bosque Trail provides connectivity to the entire City of Rio Rancho Bosque Open Space, offering beautiful vistas of the Rio Grande and Sandia Mountains.

The Upper Bosque Trail runs parallel on the bluff overlooking the Rio Grande. It extends 2 miles from Willow Creek south to North Beach (see Map page 23). This trail is the main artery connecting the 3 sections of the Rio Rancho Bosque with surrounding neighborhoods and with Corrales.

For most of its length, the trail follows a utility corridor and is a wide, low gradient earthen path that is easily traversed. However, where the trail crosses major arroyos it steepens and is more difficult to travel. Erosion in localized sections of the trail over the past few years has occurred.

Heathy vegetation exists throughout the Upper Bosque Trail but removal of non-natives has caused slope degradation which leads to erosion. Strategically located reclamation planting will slow runoff and reduce erosion and eventually stabilize these

sections. Other methods presented in this Plan can be used.

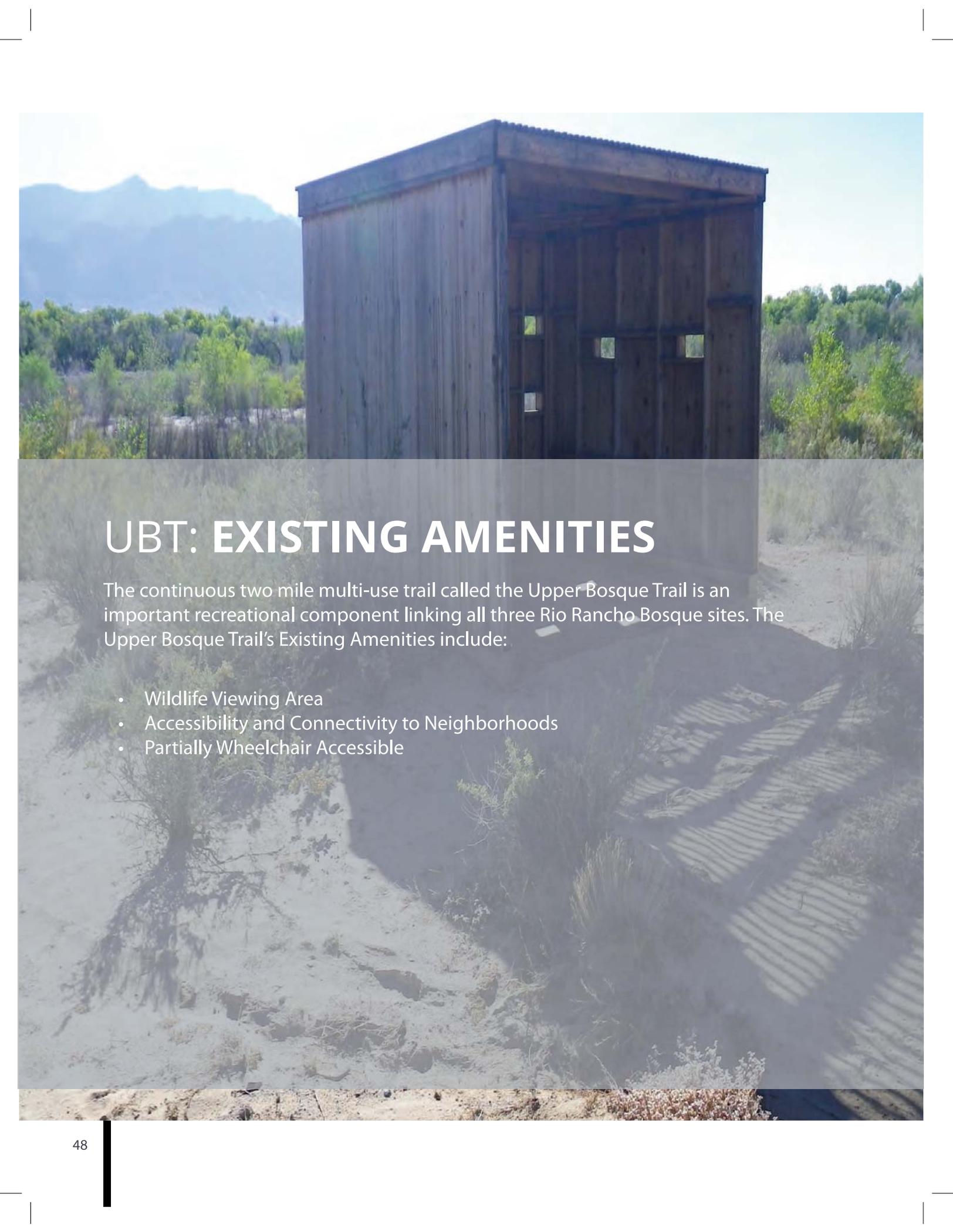
The Upper Bosque Trail can be accessed through secondary trails located off of nearby streets, parks, and arroyos, as well as from the Willow Creek and North Beach parking lots.

The Upper Bosque Trail generally lacks signage along the trail or on secondary access points. Enhancement of the trail could be achieved with better trail marking and educational signage, such as geologic history of Sandia Mountains and rift valley at a good vantage point.

The Upper Bosque Trail is the starting point for cross country training, hiking/walking, horseback riding, river access, and connection to Trailhead Park.

Public motor vehicle access is prohibited. The trail is best suited for pedestrian and mountain bike access.



A photograph of a wooden observation tower with a corrugated metal roof, situated in a desert landscape. The tower is made of dark wood and has several small windows. In the background, there are green bushes and mountains under a clear sky. The foreground shows a sandy path leading towards the tower.

UBT: EXISTING AMENITIES

The continuous two mile multi-use trail called the Upper Bosque Trail is an important recreational component linking all three Rio Rancho Bosque sites. The Upper Bosque Trail's Existing Amenities include:

- Wildlife Viewing Area
- Accessibility and Connectivity to Neighborhoods
- Partially Wheelchair Accessible

UBT: PROPOSED IMPROVEMENTS

The Proposed Improvements focus on *restoration* and *preservation* of the existing Upper Bosque Trail. The following pages provide potential solutions for *restoration* and *preservation* of the trail and enhancements to *recreation* and *education*.



1. Add wayfinding and mileage markers

- Provide mileage markers from the beginning of Upper Bosque Trail.
- Create consistent wayfinding and signage to be used throughout the Rio Rancho Bosque. This would include neighborhood entrance signage, trail signage, mileage markers, rules and regulations, and amenities such as benches, trash receptacles and dog waste stations.
- Large community signage should mimic the precedents set at the Willow Creek entrance.
- Provide interpretive and educational signage in select areas.
- Trail connection with Corrales and Bernalillo should be considered.



2. Drainage analysis

- Conduct a drainage analysis of arroyos entering the Upper Bosque Trail. A better understanding of the frequency and magnitude of runoff in the arroyos is needed before funds are used to restore the Upper Bosque Trail in these locations.



3. Address smaller erosion scours and gullies

- Utilize vegetation and other soft engineering methods to minimize erosion scours throughout the trail system. Address scours properly based on the size of the erosion cut. Small scours can be addressed using materials found on site. Medium scours may require materials on site and some larger materials that will need to be brought in. Large scours may require engineering techniques to prevent future erosion.

UBT: PROPOSED IMPROVEMENTS

The Middle Bosque and North Beach Proposed Improvements Maps (Figures 4 and 5) shows the locations where these improvements could be made on the Upper Bosque Trail.



4. Address large arroyo crossing

- Enlist engineering best management practices for controlling large erosion issues at the arroyos. This will require coming together with stakeholders, municipalities, and consultants to brainstorm the best solution.



5. Preserve and maintain

- Preserve and protect existing vegetation by vigilant removal of exotic and unwanted species.
- Re-seed areas needing vegetation along with planting and establishing new shrub growth.



6. Annual maintenance of regulation and educational signage

- Replace illegible, outdated, and damaged signs as necessary, specifically at neighborhood entry points, and along the trail.
- Provide educational/interpretive signage.

UBT: PROPOSED IMPROVEMENT METHODS

Below are some examples of the types of methods that might be used to implement the Proposed Improvements along the Upper Bosque Trail.

A. Wayfinding and mileage marker

Signage and wayfinding should use similar materials and keep a consistent theme throughout the entire Rio Rancho Bosque. This promotes neighborhood identity and access as noted in Proposed Improvement #1.



Example of existing informational signage



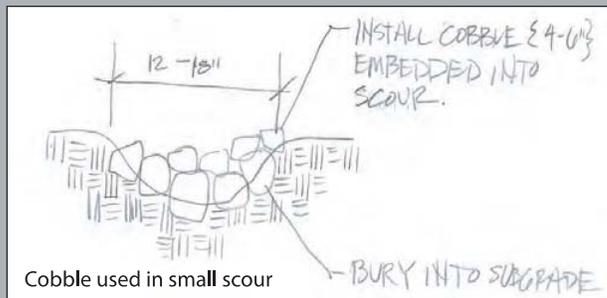
Example of existing mileage markers in Willow Creek

B. Repair small erosion scours

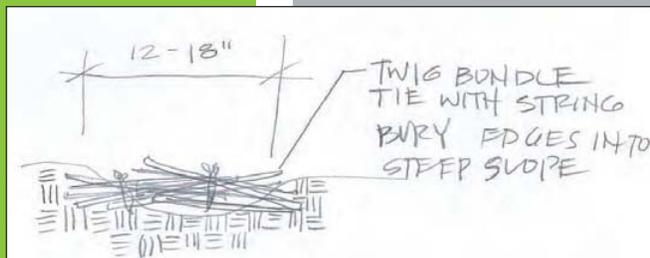
There are small erosion scours located all along the Upper Bosque Trail. Most of these can be managed once a drainage analysis is performed. Until then, the community may want to repair them. Small scours can be repaired using cobble or twig bundles (Proposed Improvements #3).



Example of small scour



Cobble used in small scour



Twig bundle used in small scour



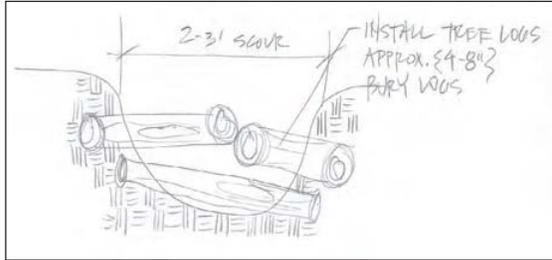
Example of erosion control technique in small scour

C. Repair medium and large erosion scours

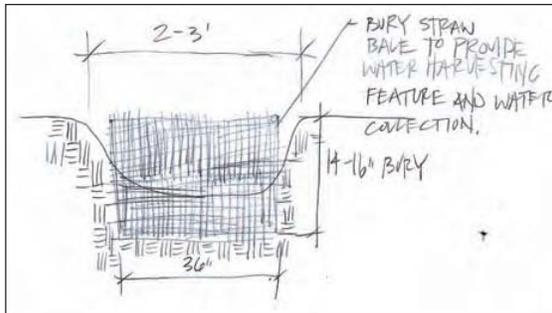
There are medium and large erosion scours located all along the Upper Bosque Trail. Most of these can be managed once a drainage analysis is performed. Medium and large scours can be repaired as seen in the adjacent detail using logs or straw bales. (Proposed Improvements #3)



Example of medium scour



Log wattles in medium scour



Hay bale in large scour



Example of large scour



Log wattle used in large scour and filled with fill

D. Address arroyo crossing.

Create crossings at arroyos that address health, safety, and welfare. This addresses Proposed Improvements #4.



Example of large scour



Steep arroyo crossing along the Upper Bosque Trail



REFERENCE
 1. AERIAL PHOTOGRAPH TAKEN FROM MRCOG, DATED 2010

CLIENT
 OFFICE OF THE STATE ENGINEER
 NEW MEXICO INTERSTATE STREAM COMMISSION
 ALBUQUERQUE, NEW MEXICO

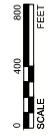
CONSULTANT

PROJECT
 RIO RANCHO OPEN SPACE PARKS AND RECREATION
 INTEGRATED MANAGEMENT PLAN
 RIO RANCHO, NEW MEXICO

TITLE
RESTORATION PLAN

PREPARED	2014-06-07
DESIGN	POC
REVIEW	LM
APPROVED	LM

PROJECT No. 113-80057 PHASE: 0001 REV: 1 FIGURE: 6





CONCLUSION

The City of Rio Rancho will protect the Bosque Open Space for its future generations.

The Rio Rancho Open Space Bosque is an important natural and recreational resource for the City of Rio Rancho. There are many diverse interests and needs for the area, and there was interest in incorporating these into a management plan for the 180+ acre Bosque.

This Plan describes the overall goals for management of the Bosque with respect to Restoration, Recreation, Education, Preservation and Maintenance. This plan also provides some general policies that will help in protecting key attributes of the Bosque.

A description of the historical changes in the hydrology and geomorphology of the Rio Grande and how such changes have impacted the ecology of the region is described in the Plan. These changes must be considered when making decisions that attempt to restore the Bosque to its historic condition.

The most significant change in the Rio

Rancho area is that the high variability of river flows that occurred in the past, which included large-scale flooding, has been significantly dampened through flood control and upstream dams. These hydrologic changes have been accentuated by the drought conditions that have prevailed over the past several decades. The loss of natural flooding and proliferation of non-native vegetation in the Bosque has created the need for human intervention to restore native riparian and aquatic habitat.

While the Bosque is in good condition overall, this Plan recommends priorities for management of the Rio Rancho Bosque. Native vegetation within Rio Rancho Bosque appears to be in good condition as a result of work accomplished over the past ten years. The PRCSD in conjunction with community and local volunteer groups, especially FORROS, have nearly eliminated noxious riparian species, like salt cedar and Russian olive. Continued efforts under the leadership

of PRCSD will be required to control the re-invasion of undesired plants, especially as the river no longer serves to distribute seed sources of native plants, such as willows. Cottonwoods also depend on flooding to germinate seedlings. Cottonwood groves must now be managed to ensure that old, sick, or dying trees are replaced with new trees or alternative vegetation.

Habitat restoration that lowers portions of the Bosque's floodplain to inundate at lower river flows and widens the river channel should continue to be planned and implemented with partners such as the state and federal government. Such work has been shown to increase willows and cottonwood sprouting and growth, and



also provides spring and monsoonal habitat for many fishes, including the Rio Grande silvery minnow.

The PRCSD can work to control the localized nuisance weed (kochia) that is prevalent in parts of Willow Creek. Since a large cottonwood dieback in the early 2000s, the kochia infestation has persisted due in part to the area's soil type and lack of trees that serve to shade out kochia.

During the NMISC's 2013 restoration project, some of the kochia infested area had coarse sands placed over it, followed by planting of salt grasses and other native plants. Monitoring of the "meadows area" will continue over the next several years to determine if it was successful in reducing kochia. The kochia infested area is identified on the Overall Restoration Plan (Figure 6) as a re-seeding and planting zone. It is recommended that a site-specific restoration plan be completed and implemented to address kochia control.

The PRCSD's highest priority in the Middle Bosque area is to improve both pedestrian and emergency (fire) access from the Upper Bosque Trail to support its Recreation and Preservation goals. Consolidation of the existing dispersed trail network in this area will improve wildlife habitat and visitors' experiences. The Middle Bosque is targeted for a habitat restoration by the NMISC along the river in the next several years to improve habitat for endangered species. Opportunities are being considered to address the trail network and fire access in conjunction with such projects.

The Upper Bosque Trail connects the three areas of the Rio Rancho Bosque and is heavily used by hikers/walkers, runners, horseback riders, and bicyclists. Erosion along parts of the trail, has resulted in limited access for some users. The PRCSD is taking some steps to control and prevent further erosion along the Upper Bosque Trail. A more comprehensive plan is recommended that evaluates methods to improve the trail's

condition over the long-term and to identify partnerships and funding opportunities.

Trail maintenance through several of the larger arroyos needs to be carefully considered before investments are made. Of particular concern is erosion of the trail by and in an arroyo just south of Willow Creek that limits access to the Middle Bosque. This could be selected as the first remediation site should funding become available.

The PRCSD is already well engaged in promoting education. The department wishes to continue its partnership with FORROS, other volunteer organizations, and the Rio Rancho Schools to provide educational materials about the Bosque and promote good stewardship of this resource.

The PRCSD should continue to maintain its clearly marked trail system that provides educational placards and viewing areas in the Willow Creek area.

Bosque events can emphasize awareness and appreciation of this important ecosystem; this plan suggests some educational opportunities for visitors and Rio Rancho residents.

The PRCSD's other priorities include obtaining funds for specialized maintenance equipment, maintaining the preservation gains of the past years, and improved coordination with volunteer organizations that work in the Bosque. Seeking technical and financial support from federal and state agencies is recommended to increase the PRCSD's ability to reach these goals.

The opportunity for its residents to enjoy this beautiful Bosque Open Space will certainly enhance the attraction of businesses and residents to the City of Rio Rancho.



ACKNOWLEDGEMENTS

Golder Associates, Inc., and Brown, green & more, LLC created the following document in coordination with the City of Rio Rancho Parks Department and the New Mexico Interstate Stream Commission (NMISC). Preparation of the document was funded by the NMISC and it was printed by NM State Printing & Graphics.

Special thanks go to the City of Rio Rancho Parks, Recreation, and Community Services Department (PRCSD) and Friends of the Rio Rancho Open Space (FORROS), both of whom provided invaluable guidance and advice through all phases of this project. Thank you also to the many members of the public who participated in the public meetings.

Through our continued collaboration, may we bring to fruition the promise of *restoration, recreation, education, preservation* and *maintenance* of the Rio Rancho Bosque Open Space envisioned in this plan.





COMMON BOSQUE FLORA AND FAUNA

- Plant Species in the Middle Rio Grande Bosque
- Fish Species in the Middle Rio Grande
- Animal Species in the Middle Rio Grande Bosque

1. Plant Species in the Middle Rio Grande Bosque

SPECIES	COMMON NAME
Warm Season Grass	
<i>Bouteloua gracilis</i>	blue gramma
<i>Bouteloua curtipendula</i>	sideoats grama
<i>Hilaria jamesii</i>	galleta
Cool Season Grass	
<i>Sporobolus cryptandrus</i>	sand dropseed
<i>Sporobolus airoides</i>	alkali sacaton
<i>Carex</i>	sedge
Shrubs	
<i>Atriplex canescens</i>	4 wing saltbush
<i>Eurotia lanata</i>	winterfat
<i>Chrysothamnus nauseosus</i>	rubber rabbitbush
Forbs	
<i>Cleome serrulata</i>	rocky mountain beeplant
<i>Verbena stricta</i>	purple verbena
<i>Oenothera pallida</i>	white evening primrose
<i>Castilleja linearifolia</i>	narrow leaf indian paintbrush
<i>Dalea candida</i>	prairie coneflower
<i>Linum lewisii</i>	blue flax

”

Water, water, water . . . There is no shortage of water in the desert but exactly the right amount, a perfect ratio of water to rock. Of water to sand, insuring that wide, free, open, generous spacing among plants and animals, homes and towns and cities, which makes the arid West so different from any other part of the nation. There is no lack of water here, unless you try to establish a city where no city should be.

Edward Abbey, *The Wilderness Reader*

”



2. Fish Species in the Middle Rio Grande

FAMILY AND SPECIES*	COMMON NAME	HISTORICAL	CURRENT
CIPENSERIDAE (sturgeons)			
<i>Scaphirhynchus platyrhynchus (n)</i>	shovelnose sturgeon	X	-
ANGUILLIDAE (freshwater eels)			
<i>Anguilla rostrata (n)</i>	American eel	X	-
CATOSTOMIDAE (suckers)			
<i>Carpiodes carpio (n)</i>	river carpsucker	X	X
<i>Catostomus (Catostomus) commersoni (e)</i>	white sucker	-	X
<i>Catostomus (Pantosteus) plebeius (n)</i>	Rio Grande sucker	X	X
<i>Cycleptus andora</i> s (n)	blue sucker	X	-
<i>Ictiobus bubalus (n)</i>	smallmouth buffalo	X	X
<i>Moxostoma congestum (n)</i>	gray redhorse	X	-
CENTRARCHIDAE (sunfishes)			
<i>Lepomis (Chaenobryttus) cyanellus (e)</i>	green sunfish	-	X
<i>Lepomis macrochirus (n)</i>	bluegill	X	X
<i>Micropterus dolomieu (e)</i>	smallmouth bass	-	X
<i>Micropterus punctulatus (e)</i>	spotted bass	-	X
<i>Micropterus salmoides salmoides (e)</i>	largemouth bass	-	X
<i>Pomoxis annularis (e)</i>	white crappie	-	X
<i>Pomoxis nigromaculatus (e)</i>	black crappie	-	X
CHARACIDAE (characins)			
<i>Astyanax mexicanus (n)</i>	Mexican tetra	X	-
CLUPEIDAE (herrings)			
<i>Dorosoma cepedianum (n)</i>	gizzard shad	X	X
<i>Dorosoma petenense (e)</i>	threadfin shad		
CYPRINIDAE (minnows)			
<i>Carassius auratus (e)</i>	goldfish	-	X
<i>Cyprinella lutrensis (n)</i>	red shiner	X	X
<i>Cyprinus carpio (e)</i>	common carp	-	X
<i>Dionda episcopa (n)</i>	roundnose minnow	X	-
<i>Gila andora (n/E)</i>	Rio Grande chub	X	X
<i>Hybognathus amarus (n)</i>	Rio Grande silvery minnow	X	X
<i>Macrhybopsis aestivalis aestivalis (n)</i>	speckled chub	X	-
<i>Notemigonus crysoleucas (e)</i>	golden shiner	-	X
<i>Notropis jemezianus (n/E)</i>	Rio Grande shiner	X	-
<i>Notropis orca (n/E)</i>	phantom shiner	X	-
<i>Notropis simus simus (n/E)</i>	bluntnose shiner	X	-
<i>Pimephales promelas (n)</i>	fathead minnow	X	X
<i>Platygobio gracilis (n)</i>	flathead chub	X	X
<i>Rhinichthys cataractae (n)</i>	longnose dace	X	X



2. Fish Species in the Middle Rio Grande

FAMILY AND SPECIES*	COMMON NAME	HISTORICAL	CURRENT
ICTALURIDAE (bullhead catfish)			
<i>Ameiurus melas (e)</i>	black bullhead	-	X
<i>Ameiurus natalis (e)</i>	yellow bullhead	-	X
<i>Ictalurus punctatus (e)</i>	channel catfish	-	X
<i>Ictalurus furcatus (n)</i>	blue catfish	X	-
<i>Pygodictis olivaris (n)</i>	flathead catfish	X	X
LEPISOSTEIDAE (gars)			
<i>Lepisosteus osseus (n)</i>	longnose gar	X	-
PERCICHTHYIDAE (temperate basses)			
<i>Morone chrysops (e)</i>	white bass	-	X
<i>Morone saxatilis (e)</i>	striped bass	-	X
PERCIDAE (perches)			
<i>Perca flavescens (e)</i>	yellow perch	-	X
<i>Stizostedion vitreum (e)</i>	walleye	-	X
POECILIIDAE (livebearers)			
<i>Gambusia affinis (n)</i>	western mosquitofish	X	X
<i>Poecilia latipinna (e)</i>	sailfin molly	-	X
SALMONIDAE (trouts)			
<i>Oncorhynchus mykiss (e)</i>	rainbow trout	-	X
<i>Oncorhynchus mykiss. X clarki hybrid (e)</i>	cutthroat-rainbow hybrids/cutbows	-	X
<i>Oncorhynchus clarki virginalis (n)</i>	Rio Grande cutthroat trout	X	-
<i>Salmo trutta (e)</i>	brown trout	-	X
SCIAENIDAE (drums)			
<i>Aplodinotus grunniens (n)</i>	freshwater drum	X	-

(e) = exotic, (n) = native, and (n/E) = native extinct species in the Rio Grande of New Mexico. All names according to AFS (1991).

2. Wildlife Species in the Middle Rio Grande Bosque

SPECIES	COMMON NAME
Amphibians	
<i>Bufo woodhousii</i>	woodhouse toad
<i>Scaphiopus cauchii</i>	couch's spadefoot toad
<i>Spea bombifrons</i>	New Mexico spadefoot toad
<i>Pseudacris triseriata</i>	western chorus frog
<i>Ranapiens</i>	northern leopard bullfrog
<i>Ambystoma trigrinum</i>	tiger salamander
Reptiles	
<i>Terrapene ornata</i>	ornate box turtle
<i>Chrysemys picta</i>	painted turtle
<i>Apalone spinifera</i>	spiny softshell turtle
<i>Chelydra serpentina</i>	snapping turtle
<i>Aspidoscelis neomexicana</i>	New Mexico whiptail
<i>Sumeces obsoletus</i>	great plains skink
<i>Schloporus cowlesi</i>	prairie lizard
Birds	
<i>Archilochus alexandri</i>	black chinned hummingbird
<i>Branta canadensis</i>	Canada goose
<i>Geococcyx californianus</i>	greater roadrunner
<i>Megascops kenicoti</i>	western screech owl
<i>Bubo virginionus</i>	great horned owl
<i>Buteo jamaicensis</i>	red-tailed hawk
<i>Falco peregrinus</i>	perigrine falcon
<i>empidonax traillii extimus</i>	sputhwestern willow flycatcher*
Insects	
<i>Pepsis formosa</i>	tarantula hawk wasp
<i>Armadillium vulgare</i>	pill bug
<i>Aphonopela species</i>	taratula species
<i>Brochymena sulcata</i>	tree bark stink bug
<i>Latrodectus hesperus</i>	western black widow spider
<i>Scalopendra heros</i>	desert centipede
<i>Castilleja linearifolia</i>	narrow leaf indian paintbrush
<i>Dalea candida</i>	prairie coneflower
<i>Linum lewisii</i>	blue flax
Mammals	
<i>Peromyscus leucopus</i>	white-footed mouse
<i>Reithrodontomys megalotis</i>	western harvest mouse
<i>Mus musculus</i>	house mouse
<i>Castir canadensis</i>	beaver
<i>Onadatra xibethicus</i>	common muskrat
<i>Myotis yumanensis</i>	yuma myotis
<i>Myotis occultus</i>	Arizona myotis
<i>Lepus californicus</i>	black-tailed jackrabbit
<i>Procyon lotor</i>	common racoon



American kestrel



Black grosbeak

2. Wildlife Species in the Middle Rio Grande Bosque

<i>Spermophilus cariegatus</i>	rock squirrel
<i>Erethizon dorsatum</i>	common porcupine
<i>Mephitis mephitis</i>	striped skunk
<i>Canis latrans</i>	coyote
<i>Urocyon cinereoargenteus</i>	grey fox
<i>Felis rufus</i>	bobcat

*migratory flythrough areas along the MRG Corridor



Western tanager



Cooper's hawk



RIO RANCHO BOSQUE OPEN SPACE INTEGRATED MANAGEMENT PLAN

New Mexico Interstate Stream Commission
www.ose.state.nm.us

City of Rio Rancho
www.ci.rio-rancho.nm.us

Brown, green & more, LLC
www.browngreenandmore.com

Golder Associates, Albuquerque
www.golder.com