USIBWC Rio Grande Canalization Project

River Management Plan

International Boundary and Water Commission, U.S. Section

Last Updated November 12, 2014

River Management Plan

USIBWC Rio Grande Canalization Project

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ABBREVIATIONS

BA - Biological Assessment
BMP - Best Management Practice
BRO - USIBWC Boundary and Realty Office
cfs - cubic feet per second
CWA - Clean Water Act
CY - cubic yards
EBID - Elephant Butte Irrigation District
EIS - Environmental Impact Statement
EMD - USIBWC Environmental Management Division
ESA - Endangered Species Act
ESD - USIBWC Engineering Services Division
EWTP - Environmental Water Transaction Program
Flycatcher - Southwestern Willow Flycatcher
IBWC - International Boundary and Water Commission, both U.S. and Mexican Sections
MOU - Memorandum of Understanding (or Memorandum of Agreement)
NDVI - Normalized Differential Vegetation Index
NEPA - National Environmental Policy Act
NMDOT - New Mexico Department of Transportation
NMOSE - New Mexico Office of the State Engineer
NRCS - Natural Resources Conservation Service
NWP - Nationwide Permit
OHM - Ordinary High Water Mark
O&M - USIBWC Operations and Maintenance Division
Opinion - Biological and Conference Opinion
POD - Point of Diversion
PPE - Personal Protective Equipment
RGCP - Rio Grande Canalization Project
ROD - Record of Decision
ROW - Right of Way
RPM - Reasonable and Prudent Measure
SANWR - San Andres National Wildlife Refuge
SCS - Soil Conservation Service (now NRCS)
SHPO - State Historic Preservation Officer
USACE - U.S. Army Corps of Engineers
USBR - U.S. Bureau of Reclamation
USFWS - U.S. Fish and Wildlife Service
USGS - U.S. Geological Survey
USIBWC - International Boundary and Water Commission, U.S. Section
WRN - Water Right Number

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cover photo: View from Rincon Railroad Bridge looking north towards the Rincon Siphon restoration site, May 2012. E. Verdecchia

USIBWC Canalization River Management Plan -

PART 1 - INTRODUCTION AND OVERVIEW

1.1 Rio Grande Canalization Project (RGCP)

The Rio Grande Canalization Project (RGCP), located in Doña Ana and Sierra Counties in New Mexico and El Paso County, Texas, extends for 105.6 miles along the Rio Grande from Percha Diversion Dam in New Mexico, to approximately 200 feet (61 meters) downstream from American Diversion Dam where the Rio Grande begins to form the international boundary at El Paso, Texas and Ciudad Juarez, Chihuahua (see Figure 1-1). The RGCP is designed to provide flood protection against a 100-year flood and assures releases of waters to Mexico from the upstream Elephant Butte and Caballo Reservoirs in accordance with the 1906 Convention between the United States and Mexico. The U.S. Section of the International Boundary and Water Commission (USIBWC) was granted authority to construct, operate, and maintain the project through the Act of June 4, 1936, 49 Stat. 1463, Public Law No.648.

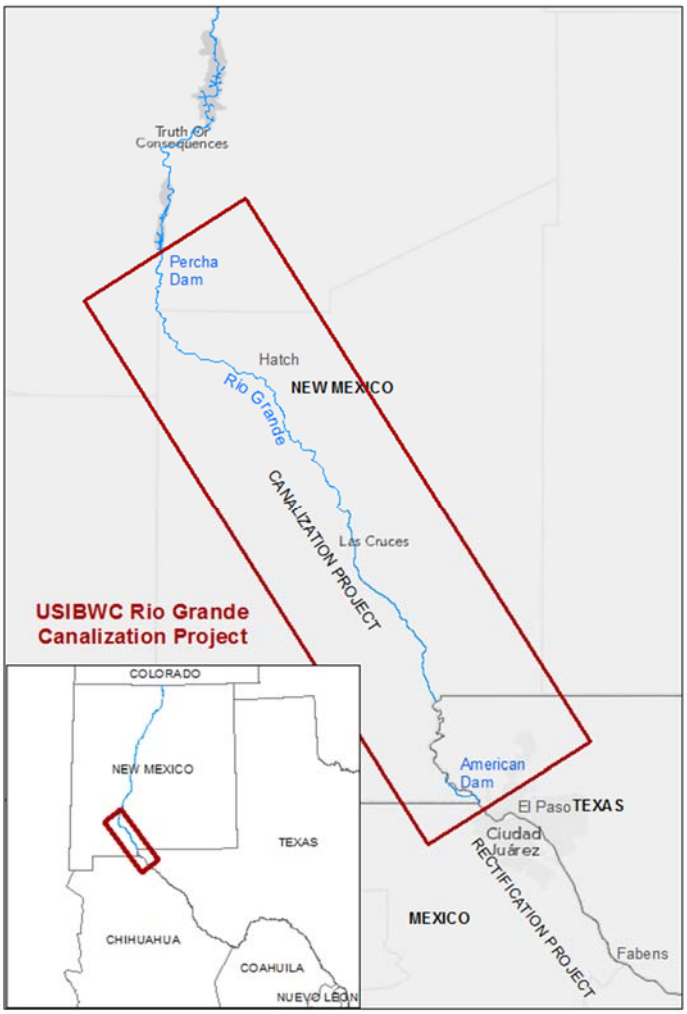

Figure 1-1. Rio Grande Canalization Project location

1.1.1 Statutory Authority

The USIBWC operates and maintains the RGCP under the requirements of the 1906 Convention, the Act of June 4, 1936 (Public Law 648; 49 Stat. 1463), and 22 U.S.C 277 (implementing regulations for the USIBWC). The USIBWC also must follow federal laws enacted after the 1936 RGCP authorization, such as the National Environmental Policy Act (NEPA), the Endangered Species Act (ESA), and the Clean Water Act (CWA). These laws require compliance as part of USIBWC's statutorily-required duties.

1.1.2 RGCP Record of Decision

This River Management Plan is being updated in accordance with USIBWC's 2009 *Record of Decision on the River Management Alternatives for the RGCP*. In compliance with NEPA, in 1999, the USIBWC began a public scoping and consultation process to develop alternatives for an Environmental Impact

Statement (EIS) on river management of the RGCP. In 2001, an Alternatives Formulation Report was issued, and in 2003, the Reformulation of River Management Alternatives Report was issued, leading to the release of the Draft EIS in December 2003 for public comment. The Final EIS was issued in July 2004 (Parsons 2004a), with a Record of Decision (ROD) expected in August 2004. On August 3, 2004, New Mexico Governor Bill Richardson, U.S. Senators Jeff Bingaman and Pete Domenici, and other stakeholders from New Mexico requested a delay in signing the ROD in order to address concerns of stakeholders. From 2004 to 2009, the RGCP Collaborative, a group of stakeholders working with USIBWC on the RGCP, revisited aspects of the EIS, biological assessments, hydraulic modeling, and technical assessments to address stakeholder concerns.

The RGCP EIS evaluated four long-term River Management Alternatives: a) No Action, b) Flood Control Improvement, c) Integrated Land Management, and d) Targeted River Restoration. The goals were to accomplish flood control, water delivery, and operation and maintenance activities in a manner that would enhance or restore the river ecosystem. Following an 8-year consultation process with stakeholders, the USIBWC selected the Integrated Land Management Alternative and the RGCP ROD was finally signed by USIBWC Commissioner Ruth on June 9, 2009 (USIBWC 2009). The ROD committed USIBWC to a 10-year implementation of the Integrated Land Management Alternative as well as 30 conceptual river restoration sites developed by the U.S. Army Corps of Engineers (USACE) documented in the Conceptual Restoration Plan of March 2009 (USACE 2009). The total cost was estimated initially at just over $5 million and included restoration projects throughout the 105-mile project area (USACE 2009). USIBWC later estimated the total cost to be closer to $11.1 million.

The Integrated Land Management Alternative addressed the following issues:

- Continued RGCP Mission – USIBWC will continue mission operations of water delivery and flood control, as well as levee improvements to meet flood capacity;
- Water Use and Environmental Water Transactions – The Conceptual Plan estimated water used by restoration sites and USIBWC would acquire or lease water to offset depletions as result of restoration sites
- Maintaining Farmland in production – Nearly all measures will be implemented on USIBWC property, and the remaining measure would only take place through voluntary cooperative agreements with private landowners
- Environmental Improvements – USIBWC will balance mission while improving the environmental quality of the river as well enhancing multiple-use of RGCP (hike and bike trails, horse trails, boating)
- ESA Liability – USIBWC will comply with Endangered Species Act (ESA), complete a Biological Assessment and ESA Section 7 consultations to provide regulatory assurances to stakeholders for the federally and state endangered Southwestern Willow Flycatcher;
- Channel Maintenance – USIBWC will:
    - update the river management plan to incorporate new strategies for channel maintenance;
    - establish a data collection and evaluation program for channel maintenance;

  - update and evaluate river cross section data and hydraulic model (in 4-5 year cycles);
  - conduct in-channel enhancements at 3 arroyos (Yeso, Placitas, Angostura) and one inset floodplain (Yeso West)
- Floodway Vegetation Management – USIBWC will:
  - restore 553 acres on 30 conceptual restoration sites within the floodplain, including 4 sites with in-channel enhancements;
  - minimize or reduce mowing at these sites
  - make permanent three (3) "no-mow" zones ;
  - reduce grazing by phasing out grazing leases;
  - implement up to 1,983 acres of managed grasslands;
  - actively remove and control salt cedar and Russian thistle.

The ROD set a 10-year implementation period where the first Phase (2009 to 2014) included studies, pilot projects of restoration sites, and the creation of an environmental water rights transaction framework, and the second Phase (2014 to 2019) includes completing the implementation of the remaining restoration sites. Adaptive Management will guide the implementation of environmental measures (USIBWC 2009).

1.1.3 RGCP Endangered Species Consultation

In 2010 and 2011, the USIBWC contracted a number of technical studies to begin implementation of the ROD, including groundwater and soil surveys, cultural resource surveys, endangered species surveys, and a biological assessment (BA). The latter two, in conjunction with the ROD and Conceptual Restoration Plan, became the basis for reinitiating consultation with the U.S. Fish and Wildlife Service (USFWS) to address the potential impacts of the ROD activities on the endangered Southwestern Willow Flycatcher (flycatcher), in accordance with the ESA. The Section 7 consultation process resulted in USFWS issuing a Biological and Conference Opinion (Opinion) in August 2012 (USFWS 2012b), which committed the USIBWC to several Reasonable and Prudent Measures (RPM) to ensure the creation and protection of habitat for the flycatcher. Floodplain management decisions affecting the flycatcher are incorporated into the Part 2 - Floodplain Management Plan, as well as Part 3 - Endangered Species Management Plan.

1.2 River Management Plan Objectives

This River Management Plan (RMP) was developed to provide a guide for preserving and enhancing the resources of the RGCP in a manner consistent with USIBWC mission requirements and recent USIBWC resource management commitments. The objectives of this RMP are to outline management procedures of the RGCP in order to provide USIBWC staff with a guide to:

- Fulfill statutory duties to operate and maintain the RGCP,
- Complete mission requirements of flood control and water delivery while preserving and restoring natural resources,
- Implement the requirements outlined in the ROD,
- Ensure compliance with the Opinion and related ESA consultation, and

- Ensure compliance with other federal and state regulations.

This RMP updates and replaces the 2004 River Management Plan for the RGCP prepared by Parsons for the USIBWC (Parsons 2004a). This RMP document is divided into multiple parts:

Part 1 - Introduction and Overview

Includes the River Management Objectives and Background of the RGCP

Part 2 - Floodplain Management Plan

Describes levee, floodplain, and vegetation management procedures along the floodplain within the USIBWC Right of Way (ROW) in the RGCP, including ROD implementation actions

Part 3 - Endangered Species Management Plan

Describes conservation management procedures, many of which are included in Part 2, to protect endangered, threatened, and candidate species of the Endangered Species Act, and includes the Flycatcher Management Plan

Part 4 - Channel Maintenance Plan

Includes dredging and channel maintenance protocols, hydrologic and hydraulic modeling, and permit information

Part 5 - Field Guide to Common Native & Non-Native Flora & Fauna in the RGCP Riparian Zone

Includes photographs of common animals and plants in the RGCP, for the purposes of quick identification to assist the field staff in determining areas that should not be disturbed

Part 6 - No-Mow Zones Maps

Includes a map book outlining the green zones, no-mow zones, and other maintenance zones on an aerial background

Part 7 - References

1.3 Updating the RMP

Parts 2 through 6 each have their own approval signatures and will be updated and dated according to agency needs. Part 4 recommends timeframes for updating the Channel Maintenance Plan. Whenever any Part of this RMP is updated, the date in the footer of the appropriate Part should reflect the new date. In addition, the cover page should have a revised "Last Updated" date, and the Table of Contents and References should also be updated.

USIBWC Canalization River Management Plan -

PART 2 - FLOODPLAIN MANAGEMENT PLAN

Approval Signatures

José A. Nuñez, P.E.
Principal Engineer, Engineering Division
11/20/14
Date

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Date

2.1 Introduction

This section of the River Management Plan outlines USIBWC management policy for the floodplain, vegetation, river banks, and levees of the Rio Grande within the USIBWC Right of Way (ROW) from Percha Dam in Doña Ana County, New Mexico downstream to American Dam in El Paso County, Texas.

2.2 Levees

The RGCP flood control system was completed in 1943 to provide protection from the 100-year flood. Flood control in the RGCP relies on flow regulation by upstream reservoirs that include Elephant Butte Dam, completed in 1916, and Caballo Dam, completed in 1938. During non-irrigation season, the reservoirs are used for storage and regulation of winter flows. In addition to the flow regulation, flood control in the RGCP relies on the use of levees to contain flooding in areas with insufficient natural terrain elevation. The levee system extends for 57 miles along the west side of the RGCP, and 74 miles on the east side for a combined total of 131 miles of levees. The levees, ranging in height from about 3

feet to about 10 feet, are designed and maintained to provide 3 feet of freeboard during the 100-year design flood in most reaches. The levees have a gravel maintenance road along the top (Parsons 2004a).

2.2.1 Levee Maintenance

Levee maintenance along the entire RGCP is conducted on a routine basis per the RGCP Operations & Maintenance Manual. Levees are inspected regularly at the beginning of each flood season and immediately after each flood event. Levee maintenance equipment consists of water trucks, graders and rollers for levee surface, and slope grading and blading activities. Maintenance includes encouraging grass growth on the levee slopes for erosion control, cutting brush and tall weeds from the slopes, and repairing levee slopes following flooding. Levee slopes are mowed to prevent growth of brush and trees that could obstruct flows, or cause damage to the levee as a result of penetration by roots of plants.

Levee roadways are generally unpaved gravel roads designed for passage of operations and maintenance personnel and equipment. Levee maintenance includes road grading and resurfacing with gravel as needed. The entire levee road system for RGCP is resurfaced within a 20-year cycle. No dozers are used as part of levee maintenance activities (SWCA 2011).

USIBWC has an informal agreement with the U.S. Bureau of Reclamation (USBR) to remove small amounts of water (less than 20 acre feet per year) from the river for levee maintenance purposes. A formal Memorandum of Understanding is in the works for this activity.

2.2.2 Levee Rehabilitation and Construction

The *Final Environmental Assessment for Flood Control Improvements to the Rio Grande Canalization Project* completed in December 2007, outlines USIBWC actions for raising the elevation of a number of levee segments for improved flood protection, as well as additional levee construction improvements (USIBWC 2007). USIBWC continues to implement construction and rehabilitation projects. Many of the levee improvement projects were conducted from 2009 to 2013. Certain segments of the river levees are currently still in design phase, including Canutillo and Sunland Park areas. USIBWC Engineering Services Division (ESD) continually evaluates the flood containment capacity of the floodplain and certifies that the levees meet standards set by the Federal Emergency Management Agency (FEMA).

Additional levee work remains for the Vado Reach, Courchesne Reach, Nemexas Reach, and the Canutillo Reach. The *Final Supplemental Environmental Assessment - Flood Control Improvements to the Rio Grande Canalization Project in Vado, New Mexico* from July 2014 documents levee work and associated river re-alignment for the Vado Reach.

2.2.3 Mitigation for Construction Activities

Whenever USIBWC has construction activities underway in the floodplain, USIBWC and its contractors should follow these mitigation requirements (SWCA 2011).

Water Resources Protection

- During construction near the river, best management practices (BMPs) and spill control procedures will be used to prevent contamination and increased erosion to the river. Servicing of heavy equipment will be done outside of the riparian zone.

- Sediment for restoration bankwork (USACE 2009) on New Mexico restoration sites may be moved to nearby floodway locations and stabilized by revegetation during shavedowns and bank preparation. Shavedowns will be designed to promote backflow inundation and reduce the possibility of sediment entering the river.
- Proper permits or authorization is required for any river water use related to construction activities, such as water spraying for dust abatement.

Soil Protection

- Temporary materials and equipment-staging areas for construction areas will be reclaimed and revegetated with suitable native woody trees, shrubs, and native grasses and forbs. The USIBWC will monitor performance of these environmental measures.
- Signage will indicate that riparian use and access will be limited during construction activities to limit erosion, minimize damage to vegetation, and provide refuge areas where wildlife can remain undisturbed.
- Levees will be reinforced if construction activity threatens levee protection.

Wildlife Protection

- Construction should occur outside of the migratory bird breeding season from September 1 through February 28; If construction is necessary during the migratory bird breeding season, surveys will be conducted per Section 2.3.1 and treatment will be selected to minimize the effect.
- A 0.25-mile buffer zone will be established around flycatcher territories. Buffer zones may also be established for the yellow-billed cuckoo under the guidance of the USFWS.
- No construction activities will be conducted in known habitats of listed or sensitive species. If construction activities must occur during the flycatcher breeding season and within the buffer zones, USIBWC will utilize Best Management Practices listed in Section 3.1.16, Table 3-7.

Aquatic Habitat Protection

- If fish are stranded when equipment is operating in the river or arroyo tributaries, they will be salvaged and put into the main river channel.
- Work in the channel should be conducted during low-flow or dry river conditions.

2.3 Vegetation Management

The USIBWC has jurisdiction on about 9,000 acres of land within the RGCP Right of Way (ROW). The floodplain within the ROW is maintained to reduce erosion potential, remove potential obstructions that could reduce flood containment capacity, help stabilize stream banks, control weed and brush including saltcedar, and provide wildlife habitat at suitable locations. Vegetation is managed by mowing, mechanical or chemical treatment, through provisions in leases, or through cooperative agreements for recreation areas. This section discusses vegetation management and new alternatives that USIBWC will implement to meet ROD requirements, such as the implementation of managed grasslands.

2.3.1 Bird Breeding Season

To comply with the Migratory Bird Treaty Act, USIBWC will not mow or conduct management activities within the floodplain or on the levee slopes during the active migratory bird breeding season without a bird nesting survey. For RGCP, the breeding season has been designated by USFWS as March 1 through August 30.

2.3.2 Bird Nesting Surveys

In order to comply with the Migratory Bird Treaty Act, USIBWC may perform management activities (mowing, herbicide treatment, levee grading, etc) on an as-needed basis during the active bird breeding season (March 1 to August 30) only if bird nesting surveys are conducted and impacts and disturbance to any active or potentially active nests are minimized. Maintenance activities will not occur within a35-foot buffer from active nests (HDR 2012).

Survey protocol (HDR 2012) is as follows:

1. Use the field sheet provided to the field office by EMD (Figure 2-1).
2. Using a GPS, record a start coordinate each day for this activity.
3. Walk along a planned route parallel to the flood control area.
4. Adjust distance between surveyors depending on vegetation height and density. Distance should be no more than 30 feet.
5. Look for nests in trees, along banks, on the ground and undercover (Figure 2-2).
6. If a nest or evidence of nesting is found:
    a. Obtain a GPS coordinate.
    b. Write down GPS coordinates and fill out other cells on field sheet (ex: names of surveyors)
    c. Note if the nest is active or inactive.
    d. Identify the species of bird and plant that the nest is in or near, if possible, in the comments section. A basic bird identification guide is available from the EMD staff.
    e. Take a photograph and write the photo number on the field sheet.
    f. Flag a buffer of at least 35 feet from the nest.
    g. Write the “nest number” on the buffer flagging and on the field sheet.
    h. Keep your distance if nest is active!
7. Record a stop coordinate each day.
8. Conduct Post-Action Monitoring within 7 days of management action.
    a. Record a start and stop coordinate each day for this activity.
    b. Verify that buffers were not compromised.
    c. If buffers were not compromised:
        i. Remove the flagging.
        ii. Record not disturbed (ND) on field sheet, date, and sign.
    d. If buffers were compromised:
        i. Take a picture and identify the “nest number”.
        ii. Record the picture number for the appropriate compromised nest number.
        iii. Notify EMD.

9. Field staff should give the field notebook to the administrative staff after each survey event.
10. Administrative staff enters field data into the spreadsheet stored in the Upper Rio Grande Project network drive, under Operations/Bird Surveys.
11. Administrative staff will download photos (from 6.e. and 8.d.) and rename accordingly and/or ensure the current names match the field sheet.

Upper Rio Grande Bird Nesting Survey Field Sheet

Field Office American Dam / EMD

Date	Name of Surveyor(s)	General Location	Nest #	GPS - latitude	GPS - longitude	Photo #	Nest Active/ Inactive (A/I)	Comments	Post-action Monitoring (disturbed/ not disturbed D/ND)	Post-action Photo # (disturbed nests)
6/12/12	R. LittleOwl E. Verdecchia W. Belzer	Americ. Dam	start	31°47'02.8" N	106° 31' 39.4" W	—	—	start of survey - Am. Canal Head Gates		
6/12/12	"	"	1	31 46'52.9	106 31'36.7	061212_nest1	A	egg - (duck?)	ND 6/19/12 EV	
6/12	"	"	2	31 46'52.9	106 31'36.6	061212_nest 2	A	quail activity under palo ~~verde~~ verde	ND 6/19/12 EV	
6/12	"	"	3	31 46'52.4	106 31'39.7	061212_nest 3	A	2 hatched eggs, Dug Nest, salt cedar	ND 6/19/12 EV	
6/12	"	"	end	31° 46' 51.7	106°31'38.6	—	—	above Int Dam end of survey		

Figure 2-1. Sample Field sheet for bird nesting surveys

Figure 2-2. A) Nest in a tree in the floodplain B) Ground nest in the floodplain.

2.3.3 Bird Nesting Survey Training and materials

The USIBWC Environmental Management Division (EMD conducted bird nesting survey protocol training for the USIBWC Upper Rio Grande Project staff of Las Cruces, El Paso, and Fort Hancock on July 17, 2012. EMD will conduct refresher training every spring for all three field offices in the Upper Rio Grande

Project (Las Cruces, El Paso, and Fort Hancock). Refresher training was conducted in March 2013 and 2014. Refresher training can include classroom portion and/or field work. Field office staff should contact EMD staff with questions concerning bird surveys.

EMD provided the following equipment to the all the USIBWC Upper Rio Grande Project field offices for the bird nest surveys: Survey Protocol Reference Guide, point-and-shoot camera, Garmin GPS unit, permanent marker, field books, flagging tape, and carrying case. As needed, EMD can replace bird survey supplies such as flagging tape and field books.

2.3.4 ROD and Biological Opinion Requirements

The ROD outlined changes to vegetation management, as follows:

- Convert 1,983 acres to managed native grasslands;
- Enhance 553 acres with native riparian vegetation.

In addition, the Biological Opinion outlined additional vegetation management:

- Establish of a minimum of 53 acres targeted for flycatcher habitat (dense riparian shrub habitat) by 2017 and up to 119 acres by 2019.

2.3.5 Mow Zones

Other than in No-Mow Zones outlined in subsequent sections, vegetation treatments will continue to be implemented by both USIBWC Operations and Maintenance Division (O&M) and EMD. Vegetation treatments will include annual mowing of approximately 2,500 acres within the 105-mile flood control project corridor.

Mowing of the floodway outside the main channel but between the flood control levees is completed annually to remove obstructions to flood flows and to maintain flood capacity. Mowing of the floodway controls weed, brush, and tree growth, and is conducted at least once each year. Farm tractors with 20-foot rotary mowers are generally used to mow the floodways. Slope mowers are used for vegetation maintenance on the channel banks and levee slopes. Some areas with dense vegetation may require a second mowing. No bulldozers are used for vegetation treatments. Cut-stump treatment and other saltcedar removal occurs at select restoration sites. Mowing during bird nesting season will follow bird nest surveying protocol in Section 2.3.2.

Mowing and maintenance also occurs on the 5 sediment control dams built by Natural Resources Conservation Service (NRCS), as described in Section 4.5.3. In addition, USIBWC may mow irrigation ditches as described in Section 4.10.

Mow areas are also described in Section 2.3.7.

Historically, the USIBWC has conducted mowing within the levee reaches of the RGCP. USIBWC has not been conducting any mowing where there are no levees within the ROW, including the reach from the Percha Diversion Dam downstream to the beginning of the east levee near the Sierra and Doña Ana county line, and from Percha Diversion Dam down to the Hatch Siphon on the west levee. In addition, no levees exist in Seldon Canyon, where USIBWC has limited ROW, and thus USIBWC has not conducted

vegetation maintenance. These reaches, unofficially called the Pre-ROD No-Mow Zones, have become unofficial permanent no-mow zones and offer future habitat restoration opportunities within the river corridor.

2.3.6 USIBWC No-Mow Zones

USIBWC will implement No-Mow zones to include the following:

- 553 acres of habitat restoration sites, as stipulated by the ROD
- 1,983 acres of managed grasslands, as stipulated by the ROD. USIBWC has determined these acres will include:
    - 15-foot wide band of riparian vegetation along the bank of the river, the "fringe" (Figure 2-3A)
    - 100-foot buffers around restoration sites
    - 1/4-mile buffers around flycatcher territories
    - Connectivity no-mow zones to connect flycatcher buffers or restoration site buffers
- Areas within the USIBWC ROW but outside of levees, or where no levees exist, also referred to as the Pre-ROD No-Mow Zones (about 2,856 acres)
- Three (3) no-mow zones called "Green Zones" from the 1999 MOU with Southwest Environmental Center, which were made permanent in the ROD. These include:
    - Percha Dam to Doña Ana County Line (5 river miles on each side of the channel for a total of 10 corridor miles), fringe width 10 to 35 feet adjacent to the river channel (depending on the right of way and geography of the river). This Green Zone is included in the Pre-Rod No Mow Zones.
    - Seldon Canyon (8 river miles on each side for a total of 16 river miles), no vegetation maintenance. This Green Zone is included in the Pre-Rod No Mow Zones.
    - Shalem Bridge to Picacho Bridge (5 river miles on each side for a total of 10 river miles), fringe of 35 feet along the edge of the channel.

Cessation of mowing at restoration sites, riparian fringe, and managed grasslands, along with selective treatment of exotic vegetation, will allow native vegetation to establish itself for the improvement and restoration of riparian habitats. USIBWC will promote the growth of target species including: Goodding's willow (*Salix gooddingii*), Cottonwood (*Populus deltoides ssp*), Coyote willow (*Salix exiqua*), Alkali sacaton (*Sporobolus airoides*), pale wolfberry (*Lycium pallidum*), four-wing saltbush (*Altriplex canescens*), screwbean mesquite (*Prosopis pubescens*), arrow weed (*Pluchea sericea*), three-leaf sumac (*Rhus trilobata*), false indigo (*Amorpha fruticosa*), apache plume (*Fallugia paradoxa*), desert willow (*Chilopsis linearis),* and inland saltgrass (*Distichlis spicata*).

As of June 2013, USIBWC has designated 2,079 acres out of the 2,536 acres allowed in the ROD. However, restoration sites which fall under the Pre-ROD No-Mow Zones (Trujillo) or Seldon Canyon (Broad Canyon Arroyo, Seldon Point Bar) are not included in these No-Mow Zones because no maintenance has been done in the past in these areas. These 3 restoration sites total approximately 52 acres. The Green Zones also have overlap from the 15-foot riparian fringe in the new No-Mow Zones.

Therefore, there are about 350 remaining acres allowed in the ROD to be designated as No-Mow Zones, and these will be designated in future years to accommodate new conditions, such as increased flycatcher buffer areas or new restoration sites.

In addition, some No-Mow Zones include restoration sites that are covered in areas maintained by other entities under recreation leases (Sunland Park)). These are currently marked as No-Mow Zones and included in the 2,134 acres discussed above; initial coordination has been conducted with the City of Sunland Park on the recreation lease changes in management.

2.3.7 Exceptions to No-Mow Zones

USIBWC has established exceptions to the No-Mow Zones in order to comply with USIBWC mission, facilitate maintenance activities, facilitate recreational use as agreed upon with stakeholders, minimize flood impacts, minimize impacts to flood control infrastructure, and reduce flooding bottlenecks. The following are Exceptions to the No-Mow Zones, where USIBWC will continue to mow vegetation:

- Levee slopes,
- 20 feet from levee toe for a maintenance road,
- 300 feet around USIBWC, EBID, and USGS gages,
- 300 feet upstream and downstream of bridges, including the fringe along the river bank beside the bridge (Figure 2-3B) (unless this overlaps a restoration site, in which case the 300 feet may be reduced), and
- Observation points or "windows" through the riparian fringe vegetation of no more than 100 feet, at intervals no more frequent than every 800 feet.

Figure 2-3. A) Left - Riparian fringe No-Mow Zone upstream of Vinton Bridge, and B) Right - mowing within 300 feet of Vinton Bridge (right)

2.3.8 Saltcedar Management in No-Mow Zones

USIBWC and its partners will manage and remove saltcedar growth in the No-Mow Zones. USFWS San Andres National Wildlife Refuge (SANWR) staff and USIBWC EMD staff conducted the first saltcedar removal training for USIBWC Las Cruces and American Dam field office staff on October 2, 2012. Methods are discussed in Section 2.4.

2.3.9 Marking of No Mow Zones

No Mow Zones will be marked in one of three ways:

1. Temporary USIBWC Environmental Zone Flags (Figure 2-4).

Figure 2-4. Temporary USIBWC Environmental Zone Flags marking a No-Mow Zone

2. Semi-permanent Environmental Restoration Orange Markers made of high-impact flexible plastic (also called Delineator Posts) (Figure 2-5A) and larger steel white Restoration Signs (Figure 2-5B)

Figure 2-5. A) Left - Orange Delineator Posts, and B) Right - steel Restoration Signs

3. Using landmarks such as culverts, arroyos, and bridges as the end of each No-Mow Zone. These are delineated on No-Mow Zone Map Book in Part 6 of this RMP.

2.3.10 No-Mow Zone Calculations Methodology

The USIBWC EMD staff delineated the No-Mow Zones and calculated acreages using the following methodology.

- Created a 100-ft buffer around Restoration sites. Original 2009 restoration sites polygon from USACE was modified to include optional areas and revised restoration sites in 2012.

- Created a 0.25 mile buffer around southwestern willow flycatcher detections in 2010, 2011, and 2012.
- Overlapping buffers were unioned then dissolved to make one polygon.
- Buffers were clipped to USIBWC ROW polygon. (Note: this removes property outside ROW such as restoration sites to include Bailey Point Bar.)
- Subtracted river polygon from buffers. River polygon was manually digitized at 1:5000 scale using Bing 2012 imagery.
- Clipped restoration buffer and flycatcher buffer to levee buffer. Levee centerline buffered 50 feet to represent: levee top width of 16 feet with base of at least 20 ft, and 20-foot area from levee toe for maintenance, plus ten feet just to make sure levee footprint is included. Levees may be up to 80 feet wide but 40 feet is used as the minimum. Subtracted levee buffer from no mow zones polygons.
- Added flycatcher buffer and restoration buffer. Used intersect to find overlapping areas with the two buffers.
- Green zones digitized. River polygon buffer of 35 feet to get riparian vegetation next to river.
- Areas inaccessible in between two no-mow zones were digitized as miscellaneous no-mow zone, for connectivity between no-mow polygons.
- All no-mow zones merged to remove sensitivity to flycatcher territories.

2.3.11 Hydraulic Analysis of No-Mow Zones

USIBWC ESD staff will analyze all No-Mow Zones for hydrologic and hydraulic impacts prior to their finalization. The establishment of No-Mow Zones will increase vegetation density, thereby increasing the roughness coefficients. The resulting increase in water surface elevations compared to the existing condition can potentially decrease levee freeboard and/or cause adverse impacts to life and property at certain locations. The location and magnitude of such hydraulic impacts resulting from both the No-Mow Zones and the pre-ROD restoration areas will be evaluated using FLO-2D software. The No-Mow Zones and restoration areas will be overlayed on the FLO-2D grid, and the roughness coefficients increased for grid elements with changes. The FLO-2D model will also be updated for any new structures and levee segments that have been built since the date of the previous model that was used to establish minimum top of levee elevations. Rating curves for new structures will be developed using HEC-RAS models. The FLO-2D model will be run and the resulting water surface elevations will be compared to those in the existing condition model for each grid element. This will yield the magnitude and location of the hydraulic impacts. Engineering analysis will evaluate a worst-case scenario by assuming reasonable maximum roughness coefficients for managed grasslands, riparian fringe, and restoration sites.

2.4 Invasive Species Management

USIBWC will help ensure the long-term persistence of riparian habitats and associated species by removing and controlling invasive species, primarily saltcedar, in the No-Mow Zones. USIBWC will employ validated chemical and mechanical methods, listed below. USIBWC may also address woody debris left from impacts caused by the saltcedar beetle, which is moving into the RGCP.

In No-Mow Zones, the USIBWC will remove invasive species, such as saltcedar, using one of 5 methods. Three methods are chemical: 1) manual/herbicide, 2) mechanical/herbicide, and 3) herbicide only. The last two methods are mechanical: 4) excavation, and 5) mastication. Saltcedar is the main target species and the information below is geared to saltcedar removal, but methods can be employed for other non-native species.

2.4.1 Chemical Methods

1. Manual/ Cut-Stump treatment method

Manual treatment, also called Manual Cut-Stump treatment, methods are prescribed for small monotypic stands of invasive trees/shrubs (e.g., saltcedar) and some stands with mixed native shrubs, or isolated large shrubs. Manual treatment involves manual cutting with a chainsaw (Figure 2-6A) and must be immediately followed by cut-stump herbicidal treatment to kill the root system (USIBWC 2009). Cut-stump herbicidal treatment is performed by applying the herbicide directly on the stump (Figure 2-6B) within 15 minutes of the cutting operation. The herbicide is absorbed by the plant and is translocated to the entire root system, which it kills.

Safety precautions include wearing kevlar chaps, helmet, safety goggles, and ear protection. A strong chainsaw with at least a 22" blade is recommended.

Figure 2-6. A) Left - Manual treatment method involving cutting with chainsaw, and (B) Right - immediate herbicide application on cut stumps.

2. Mechanical and Herbicide/ Mechanical Cut-Stump Treatment

Mechanical and Herbicide treatment, also called Mechanical Cut-Stump Treatment, methods are also prescribed for small monotypic stands and some stands with mixed native shrubs. This method involves cutting or mulching the saltcedar with small equipment such as a skid steer loader with a forestry

attachment, and a second team member immediately applying herbicide (Figure 2-7). Box 2-1 discusses USIBWC herbicide requirements.

Figure 2-7. Mechanical and Herbicide Treatment method. A) Top left - example attachment on skid steer loader. B) Top right - equipment mulching large saltcedar. C) Bottom left - herbicide application on cut saltcedar stems. D) Bottom right - after herbicide.

3. Herbicide Only (Basal Bark Method)

Herbicide Only, also referred to as Basal Bark, treatment methods are prescribed for isolated small shrubs of saltcedar. Basal Bark herbicidal treatment involves application of the herbicide together with an oil penetrant to the lower 30 to 45 cm (12–18 inches) of the trunk or stem (Figure 2-8). Basal Bark and cut-stump techniques can be done at any time of year except for the green-up period (spring) (SWCA 2011).

Figure 2-8. Herbicide Only/Basal Bark method involving herbicide application to the stem of a small plant

2.4.2 Herbicide Treatment

Box 2-1 discusses herbicide requirements. Herbicide treatments should occur for at least two subsequent years and will continue on as needed, based on monitoring outcomes.

The following best management practices will be followed when using herbicide applications of any kind.

Water Resources Protection

- Herbicide will be applied directly to targeted plants in a manner to minimize runoff to surface water. All herbicides will be licensed herbicides and will be used in conformance with labeled instructions. Herbicides will not be aerially applied over open water; instead, formulations labeled for use in or near aquatic habitats will be used.

Vegetation Protection

- Herbicides will be sprayed by hand application to targeted species, whenever feasible. Herbicides will not be aerially applied on areas where sensitive riparian vegetation such as cottonwoods, willows, and screwbean mesquite are extensively intermingled with saltcedar.
- Vegetation will be monitored (species, composition, abundance and distribution) before and after vegetation treatments. Saturated and ponded areas will be avoided during mechanical and chemical treatments.

Box 2-1. HERBICIDE USE REQUIREMENTS

- Herbicide application should be under the direct supervision of an experienced herbicide applicator
- Herbicides to be used consist primarily of Garlon 4 and Habitat.
- Garlon 4 can be used as needed throughout most of the project sites, except within a 9-m (30-foot) buffer of the river channel or a seasonal pond
- All herbicide products will be stored, mixed, applied, and disposed of in compliance with material safety data sheets and label instructions.
- Herbicides will not be applied during windy conditions exceeding 15 miles per hour or when rain is forecast within three days.
- Spray equipment will be properly maintained and calibrated to ensure accurate application according to manufacturer's and label instructions.
- For all application methods, no treatment with a non-aquatic label herbicide will be made within 9 m (30 feet) of water to avoid the possibility of spray drift.

Wildlife Protection

- Vegetation treatments with herbicide will occur outside the nesting season (i.e., September 1 through March 1). If treatments must occur during the migratory bird-nesting season, surveys will be conducted and active nests will be marked and avoided.

Air Quality Protection

- The amount of vapors will be minimized by dispensing herbicide in a vegetable oil solution limiting airborne particulates. Application of this treatment will not occur during high-wind conditions.

Herbicides to be used consist of Garlon 4 and Habitat. Other herbicides can be used as long as they meet the requirements stated above and in Box 2-1. Best management practices ensure that both Garlon 4 and Habitat will be applied in a targeted fashion (spot spraying) using low-pressure application methods and only when there is little or no hazard of spray drift to ensure that the minimum to no amount of herbicide contacts non-target vegetation, soil, or water. Garlon 4, to the extent that it comes into contact with soil, adheres tightly to soil particles; the potential to leach from soil into groundwater is minimal.

Herbicide treatment requirements are listed Box 2-1 (SWCA 2011).

A. **Garlon 4/Triclopyr**

Garlon 4 is a formulation of triclopyr. Garlon 4 will be used as needed throughout most of the project sites, except within a 9-m (30-foot) buffer of the river channel and seasonal ponds. Triclopyr is the preferred herbicide for control of saltcedar, as it is effective year-round outside the green-up period (time period when saltcedar emerges from winter dormancy until after first flower), affects only woody broad-leaved plants (not grasses), and has limited mobility in soil (SWCA 2011).

Garlon 4 should be diluted at a ratio of 1 to 3 with vegetable oil (25% Garlon 4, 75% vegetable oil or biofuel). Six to 8 ounces of blue dye can be added to ensure that applicators know where herbicide has been applied.

B. **Habitat/Imazapyr**

Habitat is an isopropylamine salt of Imazapyr. Habitat is approved for aquatic use and can be applied within this buffer area where needed.

Imazapyr is a non-selective herbicide used for the control of a broad range of weeds, including terrestrial annual and perennial grasses and broadleaved herbs, woody species, and riparian and emergent aquatic species.

Habitat should be mixed with water at a ratio of 1 to 10 (10% habitat, 90% water). As with Garlon-4, 6-8 ounces of blue dye can be added.

2.4.3 Herbicide Treatment Safety and Training

At least one person on each crew of herbicide applicators should have at least 3 years of experience with chemical application. The Upper Rio Grande Project Facility Supervisors should be trained and, if possible, licensed or State-certified in herbicide application. Reference materials on pesticide application should be available for the staff if questions arise. Part 5 includes a field guide so that the field crew can identify common native and exotic plant species.

Herbicide applicators should follow Safety Data Sheets (SDS) (previously Material Safety Data Sheets (MSDS)) and have Personal Protective Equipment (PPE), including gloves, goggles, and breathing mask, if necessary. USIBWC staff should refer to safety guidelines established by USIBWC Safety and Security Office through the hazard communication program, specifically Appendix N to the USIBWC Safety Manual.

2.4.4 Mechanical Treatment

Mechanical invasive species treatment may consist of extraction or mastication. Typically, mechanical extraction methods will only be utilized within the first year, with foliar, basil, or cut stump herbicide follow-up treatments, as described above, in subsequent years.

Mechanical treatment should follow the best management practices listed below.

Water Resources Protection

- Manual, rather than mechanical, removal of saltcedar will be used during maintenance on the river margin. Woody debris as a result of saltcedar reduction will be mulched, burned, or removed from the floodway.

Soil Protection

- Heavy equipment used for brush reduction will minimize impacts to native brush. Crews will evaluate the least invasive equipment available to be used for each activity. Heavy equipment can be tracked, not wheeled, for less brush impact. Heavy equipment that is wheeled and not tracked may leave ruts when turning, but may also compact the soil less.
- Mechanical treatment will be conducted in weather conditions that provide for dryer soil conditions to avoid creating ruts and compacting soil.

4. Mechanical Excavation Treatment Method

Mechanical Excavation treatment methods are prescribed for large monotypic stands; for example, a plot of 20 acres with only saltcedar is a prime candidate to employ this method (Figure 2-9A). This method involves using an excavator to completely remove the entire shrub along with its root ball.

Extraction is performed with a clasping thumb attachment fitted on an excavator, front-end loader, or backhoe (Figure 2-9B). The thumb attachment grasps the plant at or below the root crown and extracts the plant and its roots from the soil (SWCA 2011). Care will be taken by an experienced operator to remove as much of the root crown and lateral roots as possible to reduce damage to existing native plants (USFWS 2012a).

A tracked skid steer loader, such as a Bobcat, with a brush rake attachment can be used to rake and pile slash as well as smooth divots or ruts back to the original grade.

The extracted debris (Figure 2-9C and 2-9D) can be placed immediately in piles or trucks to be hauled away (USIBWC 2009), or else it may be windrowed and masticated on-site. If the debris is left in piles, it is left to dry several months, and can be subsequently burned when appropriate. See Section 2.5 Prescribed Burns for additional information.

The extraction method is useful in areas where desirable native shrub and herbaceous vegetation would not be disturbed. It is especially useful in controlling saltcedar, whose taproot structure minimizes disturbance and resprouting.

Figure 2-9. Mechanical Excavation Treatment method at the Broad Canyon Arroyo restoration site. A) Top left - example of monotypic stand of saltcedar. B) Top right - equipment excavating saltcedar. C) Bottom left - landscape after excavation. D) Bottom right - debris piles.

5. Mechanical Mastication Treatment Method

The mastication technique is based on the use of a mastication head—essentially a wood chipper or grinder—mounted on a tracked vehicle. Typically the mastication head has carbide teeth that break up the vegetation by grinding it. Mastication can be conducted with an excavator equipped with a flail mower attachment (SWCA 2011).

Masticated mulch may be hauled away or redistributed on the floodplain to provide organic material and a base for seed germination.

2.5 Prescribed Burns

For restoration work where debris collected with mechanical methods that is not hauled off in trucks, USIBWC, or USIBWC partners, will conduct prescribed burns. USIBWC will ensure debris has enough time to dry out (typically 6-9 months, but can depend on wood type, size, and weather conditions).

USIBWC will have a burn plan, appropriate burn permits, and appropriate environmental documentation. USIBWC will coordinate with appropriate entities including local municipalities, emergency services districts, Forest Service crews, and the USFWS New Mexico Fire District to prepare all plans and regulatory compliance documentation as well as mobilize resources to implement burning under prescription. The cities of Las Cruces and El Paso as well as Doña Ana County require permits to burn. Sierra County currently has an "Open and Controlled Burn Restriction Ordinance" (Ordinance No. 11-006 signed in 2011.

Burns will be conducted in appropriate weather conditions and with certified fire staff. The 2004 EIS briefly covered prescription burning for the selected alternative (Parsons 2004a). The Broad Canyon Arroyo restoration site has its own environmental analysis, which included prescription burning, conducted by the USFWS on behalf of the USIBWC (USFWS 2012a).

In addition to the restoration sites, USIBWC may conduct a burn rotation once every 10 years of the managed grasslands to regenerate plants and seeds, as recommended by USFWS (USFWS 2012a). USIBWC will complete necessary environmental documentation prior to conducting burn rotations.

The USIBWC will use the following best management practices when conducting or planning prescribed burns.

Water Protection

- Prescribed burns will incorporate best management practices (e.g., careful selection of fire lines and weather conditions, avoid intense burns) to limit runoff into the river.

Vegetation Protection

- Prescribed burns will be conducted in accordance with techniques identified in a plan to be developed by the USIBWC with guidance from federal and state resource management agencies. Degraded or burned areas will be inter-seeded with native grasses and forbs to further enhance the establishment of desirable browse and forage species.

Air Quality Protection

- Smoke management techniques will be used to determine smoke dispersion prior to prescribed burns.

Cultural Resources Protection

- USIBWC Cultural Resources Specialist will conduct pre- and post-burn site inspections for cultural resources.

2.6 Restoration Sites

2.6.1 Restoration Sites

USIBWC will follow the *Conceptual Restoration Plan and Cumulative Effects Analysis for the Rio Grande - Caballo Dam to American Dam, New Mexico and Texas* (Conceptual Plan) (USACE 2009) and the updated *Site Implementation Plans - Rio Grande Canalization Project River Restoration Implementation Plan* (TRC 2011). Changes to the Conceptual Plan and Site Implementation Plans will be documented and maintained by EMD. The Conceptual Plan originally contemplated 30 sites; some sites have been removed or added. Table 2-1 lists the 27 restoration sites as of December 2012.

Table 2-1 Updated USIBWC Restoration Sites for RGCP

Site #	Site Name	River Mile and Bank	Acres	Target Habitat Type(s)	ET difference	GW well	Comments
1	Trujillo	103 W	14	Dense riparian shrubs, woodland	0	Y	Active restoration site
2	Jaralosa	94.9 E	4.5	Open riparian woodland	5.0	Y	
3	Yeso Arroyo	94 W	10.6	Aquatic Habitat	-26.5	N	Needs USACE permit; needs review of potential levee impacts
4	Yeso East	93.7 E	9.7	Open riparian woodland	10.7	Y	
5	Yeso West	93.5 W	2.5	Aquatic Habitat	-6.3	N	Inset floodplain
6	Crow Canyon A	92 E	90	Riparian savanna & shrubland	81.4	Y	Active restoration site
7	Crow Canyon B	90.5 E	25.6	Dense riparian shrubs, meadow	17	Y	Active restoration site
8	Placitas Arroyo	85 W	21.8	Aquatic Habitat	-14	N	Needs USACE permit; needs review of potential levee impacts
9	Rincon Siphon A through D	82.5 E	16.3 (expanded to 28)	Dense riparian shrubs	31	Y	Active restoration site
10	Angostura Arroyo	80 W	15.4	Aquatic Habitat	-16.9	N	Needs USACE permit; needs review of potential levee impacts
11b	Broad Canyon Arroyo	68 E	30	Dense riparian shrubs, saltgrass meadow	0	Y	Active restoration site
14	Broad Canyon Ranch South	66.8 W	20.6	Saltgrass meadow	0	N	Private property (NMSU); some of the site is currently being restored by NMSU
15	Seldon Point Bar	66 E	7.7	Dense riparian shrubs	1	Y	Land acquired in 2011; Active restoration site
16	Bailey Point Bar	64E	16.6	Dense riparian shrubs	0	N	Private land; site dependent on USIBWC purchase of land

17	Shalem Colony	50.5 E	14.2	Screwbean mesquite & riparian grassland	5	N	Minimal work - mesquites already established. Needs saltcedar removal only
18	Leasburg Extension Lateral WW 8	47.8 E	4.1 (expanded to 30)	Dense riparian shrubs	10.3	Y	Active restoration site; Site expanded
19	Clark Lateral	43.5 E	6	Dense riparian shrubs	14.9	Y	Requires supplemental irrigation
20	Mesilla Valley Bosque State Park	41.5 W	31.8	Riparian forest, shrubland, meadow and grassland	14.4	N	Active restoration site. See IBM14A0021 for State Parks collaboration. Site covers USIBWC land, but State of NMhas long-term lease
21	Mesilla East	41 E	15.8 (expanded to 70 in 2012)	Dense riparian shrubs	39.5	Y	Active restoration site; Site expanded
22	Berino West	25.5 W	10.3	Dense riparian shrubs and forest	25.8	Y	Active restoration site
23	Berino East	24.5 E	9.5	Dense riparian shrubs	23.3	Y	Active restoration site
24	Vinton A	17 W	14.7	Riparian forest	25.7	Y	
25	Vinton B	16 W	20	Riparian woodland	22	Y	
26	Valley Creek	9W	22	Riparian woodland	22.9	Y	Through City of El Paso river park trail system
27	NeMexas Siphon	7 W	16.7	Dense riparian shrubs	0	Y	Ownership in question
28	Country Club East	6.8 E	29	Riparian forest & woodland	51.4	Y	
29	Sunland Park	4E	28.8	Riparian woodland	31.7	Y	Under lease to City of Sunland Park through 2017; Through river park trail system
30	Anapra Bridge	3 E	11	Open riparian woodland	5.5	Y	Under lease to City of Sunland Park through 2017; Through river park trail system

Restoration sites that have been eliminated from the original Conceptual Plan include Lack Property and Bailey Point Bar because USIBWC was unsuccessful in obtaining the property, as well as Pasture 18 because the Conceptual Plan did not recommend it. However, Bailey Point Bar was opened up back on the real estate market in 2013 and is still a possible site but depends on USIBWC successful acquisition. The NeMexas Siphon site ownership is disputed and restoration work depends on a resolution of the property dispute. In addition, Broad Canyon Middle was removed because it is currently being restored by the Interstate Stream Commission and Bureau of Land Management. The Biological Opinion references "Site #31," which refers to the Horner Property near Radium Springs; however, this site has been eliminated because USIBWC was unsuccessful in obtaining the property.

Broad Canyon Arroyo was added as a restoration site after the original Conceptual Plan. USIBWC is considering a wetlands project at Montoya Drain as an alternate site to one of the aquatic habitat types listed in Table 2-1.

Restoration sites may be changed, added, or dropped as appropriate. USIBWC may expand current restoration sites in lieu of implementing all restoration sites. Sites that are being expanded under current implementation include Leasburg Extension Lateral and Mesilla East. Sites being considered for expansion include Crow Canyon and Rincon Siphon. Alternate sites should still fall within the acreages outlined in the ROD. Because islands and sandbars are transient features within the channel, USIBWC will not depend on or expand on habitat located within the channel for restoration purposes.

USIBWC field staff may assist in site preparation, planting, and maintenance. Restoration work is subject to available federal funding.

USIBWC has had multiple re-vegetation efforts over the years, including a tree planting program in from 1972 to 1977 which involved planting combinations of species in small groves of 8-15 trees. Another re-vegetation effort in 1996-1997, the USIBWC planted over 600 cottonwoods and willows in areas near Country Club, Mesquite Bridge, Santo Tomas Bridge, Shalem Bridge, and upstream of Mesilla Dam. The 2009 restoration sites will compliment any previous planting actions.

2.6.2 Groundwater Monitoring Wells

In 2013 and 2014, USIBWC contractors installed 55 shallow groundwater monitoring wells at 19 restoration sites and one no-mow area. These selected areas are: Anapra Bridge, Berino East, Berino West, Broad Canyon Arroyo, Clark Lateral, Country Club East, Crow Canyon A, Crow Canyon B, Jaralosa, Leasburg Extension Lateral, Mesilla East, Below Mesilla Dam, Rincon Siphon, Seldon Point Bar, Sunland Park, Trujillo, Valley Creek, Vinton A, Vinton B, and Yeso East. Wells were not installed on restoration sites that are not USIBWC property or on restoration sites targeted for aquatic habitat.

There are 22 automated loggers collecting daily data, one at each of the selected restoration sites, with two at Rincon Siphon and 2 at Below Mesilla Dam. The rest of the wells will have manual monitoring, at a frequency depending on resources and season. At a minimum, all wells will be monitored biannually before and during irrigation releases.. Wells were drilled to depths ranging from 12 to 16 feet deep, and the Below Mesilla Dams wells were 20 feet deep. Each well is numbered and capped with a steel, yellow case.

2.7 Monitoring of Restoration Sites

In 2013, USIBWC established a monitoring protocol for restoration sites. The goals of the monitoring are to determine whether the habitat type is being achieved and measure the success of the restoration site. The monitoring protocol includes (Lodwick 2012):

- Field checklist to document native and nonnative plants at site and site conditions
- Groundwater levels monitoring sheet
- Monitoring methods, data collection and visual monitoring

- Establishment of photo points, maintain GPS coordinates and upload progress photos onto website quarterly, if possible
- Maintain lists of species growing at each site
- Estimate vigor and density of plantings
- Estimate percent survival rate of pole plantings.

Monitoring work may be accomplished by USIBWC staff, contracting staff, or USFWS staff. Monitoring reports will be produced at least once during each growing season. Results will be displayed visually as appropriate, such as photo time lapses, graphs of water levels or planting survival rates. The monitoring protocol will be approved and maintained by EMD. Groundwater level monitoring is discussed in Section 2.6.2.

In addition to restoration site monitoring, USIBWC will monitor flycatcher populations according to Section 3.12. The monitoring results for flycatcher sites will be sent to USFWS by the permitted entity conducting the surveys, and a summary included in the USFWS submittals (Section 3.16).

2.8 Water Rights for Restoration Sites

All restoration sites with a net depletion of water will be required to have water rights to offset allocated system water. Net depletions will be calculated as the difference in evapotranspiration (ET) losses as estimated in the Conceptual Restoration Plan, but across the entire site. For example, if a 10-acre area which has historically been mowed (with less than 2.4 ft/year ET rate) is replaced by riparian forest (with 4.8 ft/yr ET), then this site must have water rights of 10 acres to account for losses to the system. If a site is cleared of dense saltcedar (4.9 ft/yr) and is targeted for dense riparian shrub habitat (4.9 ft/yr), then net ET is zero and that site does not need to have a water right. Sites requiring water rights to offset net depletions, as calculated by the Conceptual Plan, are listed in Table 2-2. To maintain consistency with EBID procedures, no credit will be taken for sites with net depletions that are negative. In addition to purchasing or lease water rights for net depletions, USIBWC may also purchase water rights for supplemental irrigation of restoration sites.

The ROD also committed the USIBWC to evaluate the possibility of a peak restoration flow of 3,500 cfs every 3 to 10 years. The ROD stated that the estimated average amount of environmental water needed to augment irrigation releases to achieve a 3,500 cfs release is 9,500 ac-ft per augmentation event. USIBWC would purchase water rights for the additional environmental water. In drought years, the agency could purchase or lease water rights and apply them to the sites which would benefit from this peak to simulate peak release conditions (overbank conditions) in lieu of the peak release.

Restoration sites with recommended water rights for supplemental irrigation or in lieu of a peak release are also listed in Table 2-2.

USIBWC and its cooperators have established rules and procedures for environmental water transactions in 2013, and will be documented in the USIBWC Environmental Water Transaction Framework (EWTF). From 2014 to 2019, USIBWC and its cooperators will pursue purchases or leases of water rights to meet ROD requirements. USIBWC and its cooperators have estimated that USIBWC needs a minimum of 475 acres of water rights.

The purchase and lease of water rights must follow all state, federal, and local regulations governing real property, water transfers and water rights ownership. USIBWC Legal will be responsible for preliminary title opinions associated with water rights purchases, as well as communication with Department of Justice.

USIBWC may choose to defer responsibilities to a cooperating entity to fulfil its ROD requirements.

Additional information on the Environmental Transaction Program is in Section 3.1.5.

Table 2-2. Restoration Sites Requiring Water Rights for Offset of Net Depletions or Recommended Supplemental Irrigation

Site #	Site Name	Acres	ET difference	Offset Water Right Required?	Supplemental Irrigation Recommended?
1	Trujillo	14	0	NO	Recommended
2	Jaralosa	4.5	5.0	YES	Recommended
3	Yeso Arroyo	10.6	-26.5	NO	NO
4	Yeso East	9.7	10.7	YES	Recommended In Lieu of Peak Release
5	Yeso West	2.5	-6.3	NO	Recommended In Lieu of Peak Release
6	Crow Canyon A	90	81.4	YES	Recommended
7	Crow Canyon B	25.6	17	YES	Recommended In Lieu of Peak Release
8	Placitas Arroyo	21.8	-14	NO	NO
9	Rincon Siphon A through D	16.3 (28)	31	YES	Recommended In Lieu of Peak Release
10	Angostura Arroyo	15.4	-16.9	NO	NO
11b	Broad Canyon Arroyo	30	0	NO	NO
14	Broad Canyon Ranch South	20.6	0	NO	Recommended In Lieu of Peak Release
15	Seldon Point Bar	7.7	1	NO	Recommended In Lieu of Peak Release
17	Shalem Colony	14.2	5	YES	NO
18	Leasburg Extension Lateral WW 8	4.1 (30)	10.3	YES	Recommended
19	Clark Lateral	6	14.9	YES	Required
20	Mesilla Valley Bosque State Park	31.8	14.4	YES	NO
21	Mesilla East	15.8 (70)	39.5	YES	Recommended In Lieu of Peak Release
22	Berino West	10.3	25.8	YES	Recommended In Lieu of Peak Release
23	Berino East	9.5	23.3	YES	Recommended In Lieu of Peak Release
24	Vinton A	14.7	25.7	YES	NO
25	Vinton B	20	22	YES	NO
26	Valley Creek	22	22.9	YES	NO
27	NeMexas Siphon	16.7	0	NO	Recommended In Lieu of Peak Release
28	Country Club East	29	51.4	YES	Recommended In Lieu of Peak Release
29	Sunland Park	28.8	31.7	YES	Recommended In Lieu of Peak Release
30	Anapra Bridge	11	5.5	YES	Recommended In Lieu of Peak Release

2.9. Recreational Activities

2.9.1 Allowed Activities

The USIBWC allows the public's non-intrusive use of USIBWC-controlled lands, including the floodplain, channel, and levees, for recreational activities such as walking, jogging, fishing, horseback riding, and other activities having a minimal impact on the levees and floodplain. The Rio Grande is a navigable river, and hence the channel up to the high water mark is open to compatible public use; however, USIBWC does not have designated public recreational access points to the river such as boat ramps.

2.9.2 Prohibited Activities and Enforcement

The USIBWC strictly prohibits the use of motor vehicles, including full-size and all-terrain vehicles, in the floodway, in the channel, and on the levee. The USIBWC also prohibits camping and littering on USIBWC-controlled lands.

In addition, felony violations and crimes of significant interest such as, but not limited to, threats to persons or property, vandalism, and the use or presence of firearms on USIBWC property are all prohibited. The exception to firearms is in selected areas that are open to hunting (See Section 9.3).

Signs are posted at bridges and access points to trails listing prohibited activities.

The USIBWC has granted authority to the Doña Ana County, New Mexico, and the El Paso County, Texas local sheriff to enforce state law and local ordinances on U.S. Government property. An MOU with the Doña Ana County Sheriff is being implemented. Local sheriffs' offices should be notified of any such prohibited activities.

2.9.3 Hunting

Hunting has been strictly prohibited on USIBWC-controlled lands in Doña Ana County; however, in 2014 USIBWC opened up selected areas to avian hunting in the RGCP. In 2014, these areas were:

- From Highway 187 bridge near Derry to the Highway 187 bridge north of Hatch,
- From Highway 154 south of Hatch to the end of the levees north of Seldon Canyon (State Road 393 on the east river bank), and
- From Highway 28 south of Mesilla to Highway 189 in Vado.

Specific information is available in the *Final Environmental Assessment: Allowing Avian Hunting in Designated Areas along the Rio Grande Canalization Project, Sierra and Doña Ana Counties, New Mexico* http://www.ibwc.gov/Files/FINAL_EA_Hunting_in_Canal_072514.pdf. USIBWC is working with New Mexico entities, particularly New Mexico Department of Game and Fish, on enforcement of hunting regulations on USIBWC property.. Hunting information will be posted on the USIBWC website: http://www.ibwc.gov/home.html.

2.10 Leased Areas/ Areas Maintained by Non-USIBWC Entities

The USIBWC administers a land lease program in the RGCP, therefore some areas of the floodplain are not maintained by USIBWC. Leases for grazing are no longer being renewed. However, USIBWC

continues to lease 66 acres for crop leases. In addition, over 250 acres are leased through collaborative agreements for recreational use.

Lease management is regulated according to the USIBWC Directive Volume III, Chapter 501 "National Environmental Policy Act (NEPA) Procedures for USIBWC Real Property Actions and Management of Environmental Impact" issued on March 13, 2002. The directive assigns to the Principal Engineer, Engineering Department the authority to issue revocable licenses and leases on USIBWC real property. Administration of the USIBWC real property program and preparation or oversight of the preparation of contractual agreements for USIBWC real property activities or works is assigned to the Boundary and Realty Office (BRO).

All licenses, leases, permits, and easements are initiated and coordinated through the BRO. The Boundary and Realty Officer will coordinate and work with other USIBWC support divisions and field offices to assist in the monitoring of contractual agreements made with regard to USIBWC real property. With input from appropriate staff elements, the Boundary and Realty Officer has the authority to request corrective action of a lessee if a violation of an agreement is found, and/or to issue a notice of termination of the agreements.

No permanent structures may be constructed in leased areas without the written permission of USIBWC.

2.10.1 Grazing Lease Program

The grazing lease program is currently being phased out, as required by the ROD, and as recommended by the U.S. Environmental Protection Agency. One lease remains, approximately one mile downstream of Mesilla Dam on the east side of the river and extends to the Santo Tomas Highway Bridge.

2.10.2 Leases for Recreational Use Areas

Table 2-3 lists the USIBWC leases through which various entities have to maintain river parks along the floodplain.

Table 2-3 Recreational Use Areas Within the RGCP ROW

Recreational Area	Operating Organization	Acreage within ROW	Description
Sunland Park	City of Sunland Park, NM	57 acres, east floodway	Beginning at Frontera Road down to below Anapra Bridge, day use. Includes swings and picnic tables.
Rio Grande River Park	City of El Paso, Sunland Park and other cooperating entities	Unknown - up to 100 acres, east and west floodways	Only in planning phases; no leases have been issued. Will connect bike trails from Country Club to Sunland Park.
El Paso County River Park	City of El Paso , TX and El Paso County, Texas	150 acres, west and/or east floodway	Country Club Bridge to NM state line
Anthony Country Club	Anthony Country Club, Anthony NM	33 acres, east floodway	62-acre privately operated golf club

Mesilla Valley Bosque State Park	New Mexico State Parks	100 acres, west floodway	Habitat restoration and recreational purposes. Includes roadway and levee maintenance throughout the state park
La Llorona Park	City of Las Cruces, NM	5 acres, east floodway	Possible expansion up to 475 acres. 11 linear miles originally planned for multi-purpose use from Shalem Colony bridge to Mesilla Dam (both floodways)
Percha Dam State Park	New Mexico State Parks	13 acres, west floodway	LSF/G-1744. Beginning at the southern tip of Percha Dam State Park extending about half mile downstream Contemplated but not executed

2.11 Access to Levee Roads and Gates

Most levees are closed to public vehicle access by locked vehicle gates. Field offices maintain control of key access. Community groups needing access to the levee roads for the Adopt-a-River Program cleanups can obtain keys prior to their cleanup and will be required to return the keys after use.

Road barriers may also be installed on the floodplain to block dirt roads, particularly on restoration sites. These are installed and maintained on an as-needed basis.

See Section 2.9 for public access for recreational activities.

2.12 Adopt-a-River Program

The USIBWC Adopt-a-River Program began in 2000 to involve the community members in the care of the river, to assist the USIBWC field offices to pick up trash for easier vegetation maintenance in the floodway, and to promote a litter-free Rio Grande floodplain. Community groups adopt a section of river, approximately 2 miles long, and conduct two or three cleanups each year. The group will notify USIBWC Adopt-a-River Coordinator about dates of cleanups, who will in turn notify the appropriate USIBWC field office which will pick up and dispose of the trash bags the next business days after the cleanup. The USIBWC will purchase and post signs acknowledging the volunteer group and the adopted section. Currently the program extends from Las Cruces in Doña Ana County, NM to the El Paso/Hudspeth County line in Texas. Coordinators are Rebecca Little Owl and Elizabeth Verdecchia in EMD.

Program information and brochures are located at http://www.ibwc.gov/CRP/adoptariver.htm.

2.13 Other activities within the floodplain

2.13.1 Tree Debris

USIBWC will leave standing trees in the floodplain unless they pose a threat for flood debris. See Section 4.9 for more information.

2.13.2 Sediment Excavation and Disposal within the ROW

USIBWC may excavate sediment from areas within the ROW for levee repair. In addition, USIBWC may designate upland spoil areas for sediment disposal. See Section 4.11 for more information.

2.14 Coordinating with EMD

Any action not described above, especially any action involving ground disturbance, should be run through EMD to ensure that the action complies with all environmental regulations.

2.15 Stakeholder Involvement and ROD Implementation Group

USIBWC continues to inform stakeholders and gain their input during the process of ROD implementation. ROD Implementation Group meetings are held regularly (every 2 months, on average, although they can be as far apart as bi-annually), alternating between Las Cruces and El Paso for meeting locations. USIBWC ESD, EMD, and O&M participate in the meetings with stakeholders. Stakeholders involved in the ROD Implementation Group include:

- Irrigation Districts (EBID and El Paso County Water Improvement District #1)
- Environmental Groups (Audubon New Mexico, Southwest Environmental Center, Paso del Norte Watershed Council)
- Other federal agencies (USBR, USFWS)
- Representatives of elected officials in New Mexico and Texas

2.16 Adaptive Management

The ROD states that "an adaptive management strategy will be used in implementing river management alternatives" (USIBWC 2009). Adaptive management is a science-based decision process which allows for the outcomes of the management actions to be monitored and the results could lead to adjusted management decisions. It is an experimental approach to making decisions which facilitates continuous learning from the results. It allows for scientific information and experimentation to guide management decisions. Adaptive management requires ongoing effort, funds, and staffing to support monitoring and related science programs, evaluation of strategies, and management adjustment (Daily 2006).

USIBWC will use adaptive management strategies to review policies set forth in this RMP. USIBWC will consider input from the ROD Implementation Group to modify any necessary policy to adapt to new information or science, to address a new issue or concern, to address an inefficient policy, or to increase efficiency or productivity in work load. Changes to current policies resulting from adaptive management strategies should not increase the financial burden of the agency.

USIBWC will review the RMP at least every 2 years and update as necessary to include advancing science and lessons learned in management.

2.17 Long Term River Management of Restoration Sites

USIBWC will investigate the option of working with cooperators, such as the USFWS, on long-term management of the restoration sites. One option is to hand over management or land to the USFWS for an unofficial or official National Wildlife Refuge within the RGCP.

USIBWC Canalization River Management Plan -

PART 3 - ENDANGERED SPECIES MANAGEMENT PLAN

Approval Signatures

José A. Nuñez, P.E. — Date: 11/20/14
Principal Engineer, Engineering Division

Carlos Peña, Jr., P.E. — Date: Nov 17, 2014
Principal Engineer, Operations Division

Gilbert Anaya — Date: 11/20/14
Division Chief, Environmental Management Division

This section of the RMP outlines conservation measures that the USIBWC is required to implement in order to avoid adverse effects on federally listed species (endangered, threatened and candidate species) and their habitats. The majority of this section (Section 3.1.1 through 3.1.18) is focused on measures to protect the endangered Southwestern Willow Flycatcher (flycatcher). Although this plan is specifically geared to address the flycatcher, many of the management recommendations outlined are also applicable to other listed species, such as the yellow-billed cuckoo, a candidate species of the Endangered Species Act. Conservation measures for federally listed species other than the flycatcher are described in Sections 3.2.1 and 3.2.2.

SUBPART 3.1 FLYCATCHER MANAGEMENT PLAN

3.1.1 Introduction

3.1.1.1 Biological Opinion

In 2011 and 2012, the USIBWC consulted with the U.S. Fish and Wildlife Service (USFWS), in accordance with Section 7 of the Endangered Species Act, on possible effects of the proposed Integrated Land Management Alternative for Long-Term Management (Land Management Alternative) of the Rio Grande Canalization Project (RGCP) in Sierra County and Doña Ana County, New Mexico, and El Paso County, Texas. of the on the endangered southwestern willow flycatcher (*Empidonax traillii extimus*) (flycatcher) and on the flycatcher's proposed critical habitat. The Integrated Land Management Alternative was selected in the USIBWC 2009 Record of Decision (ROD) (see Section 1.1.1).

The 2012 Biological and Conference Opinion (Opinion) dated August 30, 2012 [Consultation NO. 02ENNM00-2012-F-0016 and Previous Consultation No. 2-22-00-I-025] (USFWS 2012b) provides Reasonable and Prudent Measures (RPM) that the USIBWC will undertake to ensure the protection of the flycatcher. RPM 2 stipulates that the USIBWC will "implement a flycatcher management plan by October 1, 2015, to minimize flycatcher disturbance and quantify and manage flycatchers and their habitat."

The RPMs are outlined in Box 3-1. The terms and conditions of RPM 1 and 2 are listed in Box 3-2 and 3-3, "Requirements of the USIBWC to maintain Flycatcher Habitat" and "Requirements of this Flycatcher Management Plan," respectively.

3.1.1.2 USIBWC Goals to Protect Flycatchers

USIBWC management goals are to conduct necessary operations and maintenance activities while avoiding adverse impacts to flycatcher populations and habitat. USIBWC aims to establish a minimum of 53.5 acres (21.7 ha) of flycatcher breeding habitat by 2017, and as many as 119 acres (48 ha) by 2019, as stipulated in RPM 1. USIBWC envisions a potential of 40 future flycatcher territories in the USIBWC restoration sites (from Table 1 in the Opinion).

BOX 3-1. Reasonable and Prudent Measures in the USIBWC Biological Opinion

The following Reasonable and Prudent Measures (RPMs) were established by the USFWS to minimize impacts of incidental take due to ROD implementation:

RPM 1. Operations, maintenance, and the Land Management Alternative of the RGCP must maintain at least 53.5 ac (21.7 ha) of dense riparian shrub habitat suitable as flycatcher breeding habitat, during the months of May through August for the duration of the project by 2017 and as many as 119 ac (48 ha) by 2019.

RPM 2. Implement a flycatcher management plan by October 1, 2015, to minimize flycatcher disturbance and quantify and manage flycatchers and their habitat. (USFWS 2012b)

BOX 3-2. Requirements of the IBWC to maintain Flycatcher Habitat

"To implement **RPM 1**, USIBWC shall:

RPM 1.1 Restore and establish 53.5 ac (21.7 ha) of dense riparian shrub habitat suitable flycatcher breeding habitat at the Restoration Sites identified in the BA (or equivalent alternatives) for the duration of the proposed action.

RPM 1.2 At least half (26.8 ac or 10.8 ha) of the dense riparian shrub habitat suitable as flycatcher breeding habitat at Restoration Sites or at equivalent areas must occur within proposed critical habitat (above Leasburg Dam).

RPM 1.3 All flycatcher breeding habitat destroyed or degraded due to future project activities shall be restored at Restoration Sites or equivalent areas within the RGCP to an acreage not less than 53.5 ac (21.7 ha) by IBWC for the duration of the project in accordance with a flycatcher management plan. Suitable breeding habitat may be maintained over time through natural processes and/or active human manipulation.

RPM 1.4 Where there is USIBWC discretion regarding the scheduling of activities, Restoration Sites identified as Priority Category 1 and then Priority Category 2 in Table 1 of this Opinion should be prioritized for all actions, including reducing any project water shortages at the expense of other lower Priority Category sites identified in Table 1.

RPM 1.5 If USIBWC is unable to implement the Water Transfer Framework by 2015, USIBWC will identify and pursue any additional opportunities to improve the quality of flycatcher breeding habitat including, but not limited to, purchase of private property, purchase of additional water rights, obtaining any alternative sources of supplemental water necessary that will offset expected future water table declines, reduced restoration flows, or flycatcher breeding habitat loss.

RPM 1.6 Habitat restoration shall begin as soon as feasible, and occur outside buffer zones that may affect flycatchers as determined by appropriate flycatcher surveys and a flycatcher management plan. Habitat restoration activities may continually occur over time, but 53.5 ac (21.7 ha) of dense riparian shrub suitable as flycatcher breeding habitat at the Restoration Sites must be achieved by October 1, 2017. Additional dense riparian shrub at additional restoration sites totaling 119 ac (48 ha) should be achieved by the end of 2019.

RPM 1.7 IBWC will annually quantify the amount of dense, riparian shrub habitat suitable as flycatcher breeding habitat during the flycatcher breeding season, using methods of quantification described in the flycatcher management plan, and provide that information to the Service.

-- Biological and Conference Opinion, pp. 65-66 (USFWS 2012b)

BOX 3-3. Requirements of this Flycatcher Management Plan

"To implement **RPM 2**, USIBWC shall:

RPM 2.1 Prepare a draft flycatcher management plan for Service and other peer reviewers by December 31, 2013. After peer review of the draft flycatcher management plan by flycatcher experts or wildlife management agencies, including the Service, and any adjustments to reflect peer review and IBWC management needs, prepare and implement the final flycatcher management plan into IBWC rules and environmental operations.

RPM 2.2 Adopt policies and implement procedures that identify and restricts all activities funded, authorized, or permitted by IBWC within predetermined buffer areas or with seasonal timing restrictions necessary to prevent or minimize any adverse effects to flycatcher, its habitat, or its breeding habitat in a flycatcher management plan in the project area.

RPM 2.3 Eliminate mowing and grazing of native riparian vegetation, and forbs within a predetermined buffer area of around flycatchers and flycatcher breeding habitat unless it is demonstrated to be required for conveyance of all flood flows, in a flycatcher management plan.

RPM 2.4 Implement a flycatcher management plan that identifies the number, location, timing, and protocols of appropriate flycatcher surveys.

RPM 2.5 Monitor flycatchers at all Restoration Sites or other areas within the RGCP as described in a flycatcher management plan.

RPM 2.6 Implement a flycatcher management plan that identifies the quantity and quality of flycatcher habitat and dense riparian shrub suitable as flycatcher breeding habitat. Report annually on the amount of flycatcher habitat.

RPM 2.7 Monitor and quantify dense riparian shrub habitat suitable for flycatcher breeding habitat by developing and using a Geographic Information System based model using appropriate satellite imagery during cloud free periods inside the months of May, June, July or August and calculating the Normalized Difference Vegetation Index, or any equivalent measures, based on flycatcher breeding habitat use patterns in the RGCP through an adaptive management process. Quantify dense riparian shrub habitat and flycatcher breeding habitat on maps, determined using statistical or graphical methods of quantifying relationships, and assess areas at each Restoration Site or other areas to determine where breeding habitat is being lost or gained and adopt adaptive management strategies to maintain at least 53.5 ac (21.7 ha) of dense riparian shrub suitable as flycatcher breeding habitat as measured during the breeding, annually.

RPM 2.8 Restoration Sites containing some willow vegetation and insect prey must occur at locations at no greater than at 40 mi intervals to protect and conserve flycatcher migratory stopover habitat and flycatcher migration.

RPM 2.9 IBWC will review the Southwestern Willow Flycatcher Recovery Plan and update the environmental commitments related to flycatcher as appropriate.

RPM 2.10 Include the best available science, partner with stakeholders, agencies, and the public to learn and share information about riparian habitat restoration, flycatcher habitat use and flycatcher habitat optimization and monitoring in the Lower Rio Grande for the duration of the project.

For all RPMs, USIBWC will monitor the implementation of the RPMs and their associated terms and conditions, and report their status to the Service annually. Ensure that the Service receives electronic copies of all annual or other reports quantifying the spatial extent of dense riparian shrub habitat suitable as flycatcher breeding habitat no later than March 31, 2015, for the preceding calendar year ending December 31, 2014, and annually thereafter."
-- Biological and Conference Opinion, pp. 66-67 (USFWS 2012b)

3.1.2 Species Information

3.1.2.1 Species Description and Listing History

The southwestern willow flycatcher (*Empidonax trillii extimus*) (flycatcher) is a small Neotropical migratory songbird (Figure 3-1) that breeds in Arizona, New Mexico, and southern California, plus portions of southern Nevada and Utah, southwest Colorado, and possibly western Texas. It winters in the rain forests of Mexico, Central America and northern South America (USFWS 2002).

Figure 3-1. Southwestern Willow Flycatcher (photo credit Suzanne Langridge, USGS).

The flycatcher was listed as a category 2 candidate species of the Endangered Species Act in 1989. It was elevated to candidate category 1 in 1991 and was finally listed as an endangered species in March 1995 (USFWS 2002). Critical habitat was designated in 1997, revised in 2005, and again in 2013. In the final Critical Habitat Rule from January 3, 2013, the USFWS designated approximately 1,975 stream kilometers (1,227 stream miles) as critical habitat but excluded the RGCP because of USIBWC's existing riparian habitat restoration efforts (USFWS 2013).

Below is a summary of nesting habitat, breeding characteristics, and threats pertinent to USIBWC RGCP; more detailed species information can be found in the 2012 Biological Opinion (USFWS 2012b) and the USFWS 2002 Recovery Plan (USFWS 2002).

3.1.2.2 Nesting Habitat Description

Flycatcher nesting habitat is restricted to relatively dense growths of trees and shrubs in riparian ecosystems in the arid southwestern United States and possibly extreme Northwestern Mexico (USFWS 2002). Flycatchers usually breed in patchy to dense riparian habitats along streams or other wetlands, near or adjacent to surface water or underlain by saturated soil. Common tree and shrub species comprising nesting habitat include: willows (*Salix* spp), seepwillow (*Baccharis* spp), boxelder (*Acer negundo*), stinging nettle (*Urtica* spp.), blackberry (*Rubus* spp.), cottonwood (*Populus* spp.), arrowweed (*Tessaria sericea*), tamarisk/saltcedar (*Tamarix ramosissima*), and Russian olive (*Eleagnus angustifolia*) (USFWS 2002).

Regardless of the plant species composition or height, occupied sites usually consist of dense vegetation in the patch interior, or an aggregate of dense patches interspersed with openings. In most cases this dense vegetation occurs within the first 3 to 6 m (10 to 20 ft) above ground (USFWS 2002; Moore 2007). These dense patches are often interspersed with small openings, open water, or shorter/sparser

vegetation, creating a mosaic that is not uniformly dense. In almost all cases, slow-moving or still surface water and/or saturated soil is present at or near breading sites during wet or non-drought years (USFWS 2002).

Thickets of trees and shrubs used for nesting range in height from 2 to 30 m (6 to 98 feet). Nest sites typically have dense foliage from the ground level up to approximately 4 m (13 ft) above ground, although dense foliage may exist only at the shrub level, or as a low dense canopy (USFWS 2002).

Patch size can vary. Flycatchers have been recorded nesting in riparian habitat patches as small as 0.1 ha (0.25 ac) along the Rio Grande, and as large as 70 ha (175 ac) in the upper Gila River, New Mexico (USFWS 2002). The mean reported size of flycatcher breeding patches was 8.6 ha (21.2 ac), with the majority of sites toward the smaller end, as evidenced by a median patch size of 1.8 ha (4.4 ac) (USFWS 2002). Mean patch size of breeding sites supporting 10 or more flycatcher territories was 25 ha (62 ac). In addition, flycatchers are generally not found nesting in narrow strips of riparian vegetation less than 10 m (33 ft) wide (USFWS 2012b; USFWS 2002).

Nearly all flycatcher nesting sites are associated with lentic water (quiet, slow-moving, swampy, or still) or saturated soil. Along streams, those areas tend to be of relatively low slope or gradient. In the southwest, hydrological conditions at a site can vary. At some locations, water or saturated soil may be present only during the breeding season (May and June); at other sites, vegetation may be immersed in standing water during a wet year but be hundreds of meters from surface water in dry years (USFWS 2002). Physical presence of surface water may be a determining factor of territory establishment for breeding flycatchers (Ahlers and Moore 2009). Territories are typically located within 100 m from water (Hatten, Paxton, and Scogge 2010; Moore 2007) with a mean of 33 m along riparian areas (Moore 2007).

Historically, the flycatcher nested in native vegetation such as willows, buttonbush, boxelder, and Baccharis. Following modern changes in riparian plant communities, the flycatcher still nests in native vegetation where available, but also nests in thickets dominated by non-native saltcedar and Russian olive, as well as in habitats of mixed habitats (USFWS 2002). However, more recent surveys of delta flycatcher populations from the Elephant Butte Reservoir indicate that flycatchers are increasingly using exotic and mixed exotic-dominant stands with greater frequency, possibly due to limited patches of native thickets (Ryan 2012; Ahlers and Moore 2009). Table 3-1 shows the percentage of known flycatcher territories located within major vegetation/habitat types, across all USFWS recovery units, as well as in the Middle Rio Grande.

Table 3-1. Percentage of Flycatcher Territories By Vegetation Type

Vegetation Type	**Percentage of territories**		
	Across all recovery units, 2002 (USFWS 2002)	**Middle Rio Grande, 2010** (Ryan 2012)	**Middle Rio Grande, 2012** (Ryan 2012)
Native (>90%)	49%	61.5%	48.3%
Mixed native/exotic (>50% native)	24%	32.7%	29.3%
Mixed exotic/native (>50% exotic)	17%	5.8%	22.4%
Exotic (>90%)	9%	Combined with exotic dominated	Combined with exotic dominated

Regarding the specific tree which flycatchers use to place their nests, flycatchers use willows the majority of the time; however, flycatchers do use saltcedar to a significant extent, a trend which has been increasing in recent years (Ahlers and Moore 2009). Table 3-2 lists the species used as nest substrate. Flycatchers likely selectively use saltcedar as a nest substrate due to its twig structure. In 2002, 29.2% of nests within Elephant Butte Reservoir were found in saltcedar, which increased to 42.5% in 2008; nest success rates for nests in saltcedar also increased during that time frame (Ahlers and Moore 2009).

Table 3-2. Nest Substrate Species

Vegetation Type	**Percentage of territories**		
	Across all recovery units, 1993-2000 (USFWS 2002)	**Elephant Butte Reservoir, 2002-2008** (Ahlers and Moore 2009)	**Middle Rio Grande, 1999-2012** (Moore and Ahlers 2012)
Willows (*Salix*)	38%	65%	56%
saltcedar	28%	35%	42%
Other (Russian olive, *Baccharis*, cottonwood, boxelder, coast live oak)	34%	<1%	<3%

Flycatcher habitat also has abundant flying insects, such as wasps, bees, flies, dragonflies, flying ants, etc. Flycatcher food availability may be largely influenced by the density and species of vegetation, proximity to and presence of water, saturated soil levels, and microclimate features such as temperature and humidity (USFWS 2012b; USFWS 2002).

3.1.2.3 Migratory Habitat

Migratory habitat is usually comprised of willows and does not require some of the components important for breeding birds such as density, presence of standing water or moist soils, and suitable riparian patch size and structure (USFWS 2012b).

3.1.2.3 Breeding Biology

The flycatcher's primary song, "*fitz-bew*," the primary territorial song of the male, distinguishes it from all other flycatchers and bird species (USFWS 2002). This vocalization, along with the common "*whitt*" call given by both sexes, are used to verify presence of flycatchers during surveying. Flycatchers typically arrive on breeding grounds between early May and early June and have a short breeding season lasting through mid-June to mid-July. Flycatchers build a small open cup nest constructed of leaves, grass, and fibers (Figure 3-2), and typical clutch size is 3 eggs, but ranges from 2 to 7 (USFWS 2002).

Figure 3-2. Flycatcher nest at a USIBWC restoration site, 2012. A mirror attached to a stick is used to check on clutch size and fledgling success.

Flycatchers have a strong sense of site fidelity and typically return to former breeding areas, with as much as 78% return rates; about a quarter of flycatchers move from previous nest areas average distances of 1.2 to 19 mi (USFWS 2002). For this reason, USIBWC is interested in expanding habitat areas near existing territories.

3.1.2.3 Threats

The flycatcher is threatened by many natural and anthropogenic factors, impacting both the habitat quantity and quality as well as the abundance and vulnerability of populations. The primary cause of the flycatcher's decline is loss and modification of habitat (USFWS 2002; Moore 2007). Threats are detailed in the 2002 Recovery Plan and the 2012 Biological Opinion. Table 3-3 below summarizes some of the threats to the flycatcher applicable to the RGCP (USFWS 2002; SWCA 2011; USBR 2012b).

Table 3-3. Threats to the Flycatcher

Category	Threat	Description of Impacts
Habitat Quantity/ Quality	Dams and Reservoirs, and Diversions	Operation of dams modifies, reduces, destroys or increases riparian habitats both upstream and downstream of the dam site. Alters natural hydrological cycle, including min and max flow events. Leads to changes in sediment deposition, floodplain hydration and flushing, and timing of seed dispersal.
	Groundwater Pumping and Water Table	Reduces water in riparian ecosystems and associated subsurface water tables. Recharge to the groundwater aquifer is impacted. Still and slow-moving waters and high water tables associated with alluvial aquifers, which are important for flycatchers, are impacted.
	Drought and Climate Change	Limits water in the system and limits water available for release by dams and reservoirs; deteriorates habitat quality. Increases evaporation. May be accompanied by increasing temperatures, silting from erosion, and non-native plant invasions.
	Changes to Floodplain	Channel narrowing is accompanied by deepening of the channel, thereby the adjoining floodplain is inundated less frequently, and vegetation growth occurs on or near the banks, but reduces the width of the active channel and increases non-native plant species
	Channelization, Channel Narrowing, and Bank Stabilization	Affects riparian systems by separating a stream from its floodplain and preventing overbank flooding; reduces water tables adjacent to streams, increases stream velocity, increases intensity of extreme floods, and reduces volume and width of wooded riparian habitats; Changes to flow and channel result in a current channel pattern that is more narrow and supports less native riparian vegetation

	Livestock Grazing	Can alter plant community structure, species composition, relative abundance of species, and alter stream channel morphology. May also increase cowbird populations.
	Recreation	Can reduce vegetation through trampling, clearing, woodcutting and prevention of seedling germination due to soil compaction; bank erosion; increased incidence of fire; promoting invasion by exotic plant species, promoting increases in predators and scavengers due to food scraps and garbage; noise disturbance
	Fire	Causes immediate and drastic changes in riparian plant density and species composition; flycatcher habitats are neither fire-adapted nor fire-regenerated.
	Agriculture Development	Re-engineering of floodplains, diverting water for irrigation, groundwater pumping, applications of herbicides/pesticides. Increases likelihood or severity of cowbird parasitism. May also affect chemistry, especially salinity, of water and soils.
	Urbanization	Direct and indirect effects, including increased demand for domestic and industrial water use, urban development that can affect natural river processes, decreased infiltration, removal of conservation land, removal of vegetation, increased trash, production of pollutants, and increase of non-vegetated riparian areas.
	Insufficient Migratory Habitat	Migrating individuals must find suitable stopover habitat to replenish energy reserves for the next step in migration.
Changes in Abundance of Other Species	Exotic species	Exotic species (saltcedar) can outcompete native plants and alter food sources.
	Brood Parasitism	Reduces reproductive performance by reducing flycatcher fledglings per female per year. Ex: brown-headed cowbirds lays its eggs in nests of other species and the host species incubate the cowbird eggs and raise the young, which outcompete the host's young.
	Saltcedar Leaf Beetles	Beetles have the potential to spread widely and defoliate large expanses of saltcedar-dominated flycatcher breeding habitat, particularly during the most vulnerable part of nesting season. Changes food abundance, vegetation structure, nest temperature and site humidity.
Vulnerability of Small Populations	Demographic Effects	Small, isolated breeding groups are vulnerable to local extirpation by floods, fire, severe weather, disease, shifts in birth/death rates and sex ratios.
	Genetic Effects	Potential for low genetic variation within populations due to small populations.

3.1.3 Establishment of Habitat

Per RPM 1.1, USIBWC will establish a minimum of 53.5 acres of dense riparian habitat suitable for flycatcher breeding by October 1, 2017, and up to 119 acres by 2019. USIBWC will make the establishment of dense riparian shrub habitat a priority for ROD implementation, as well as for the selection of restoration sites. Target density of flycatcher habitat will vary from approximately 1,000 to 1,200 stems per acre upon maturity (Moore 2007). Target habitat should be comprised mostly of willows. Saltcedar removal will be implemented at restoration sites.

Per RPM 2.8, restoration sites will be located at intervals closer than 40 miles. In addition, USIBWC established No-Mow Zones for at least 15 feet of riparian fringe along the riverbank throughout almost the entire maintained portion of the levee project, assisting in providing migratory habitat along the length of the RGCP.

USIBWC will use the Conceptual Plan (USACE 2009) and Site Implementation Plans (TRC 2011) as guides for restoration site implementation. In addition, USIBWC will stagger plantings of willow poles across the years to increase structural age and integrity at the flycatcher restoration sites. USIBWC will also aim to expand habitat areas near existing territories due to nesting site fidelity.

3.1.4 Restoration Sites for Flycatcher Habitat

Twelve of the originally contemplated restoration sites in the Conceptual Restoration Plan (USACE 2009) have flycatcher breeding habitat as the target habitat. However, two of these twelve have since been removed from the list because they are not feasible (Bailey Point Bar[1], Lack property). The Broad Canyon Arroyo site has also since been added. The remaining 11 flycatcher restoration sites are listed in Table 3-4. USIBWC will follow the recommendations in the Conceptual Restoration Plan as well as the 2011 Site Implementation Plans (TRC 2011) for habitat restoration techniques.

Table 3-4. Restoration Sites with Target Flycatcher Breeding Habitat

Site Name	River Mile and Bank	Miles to next downstream flycatcher site	USFWS Priority in the Opinion	Flycatcher Acreage	Total Acreage at site	Comments
Trujillo	103 W	12.5	1	10	14	Active Restoration site
Crow Canyon B	90.5 E	8	1	10.6	25.6	Active Restoration site
Rincon Siphon (4 parcels A, B, C, and D)	82.5 E	12	1	18	28	Active Restoration site
Broad Canyon Arroyo	68 E	2	1	4.0	30	Active restoration site
Seldon Point Bar	66 E	2	1	6.9	7.7	Land acquired in 2011; Active Restoration site
Bailey Point Bar	64 E	16.2	3[1]	16.6	36	Depends on successful property acquisition
Leasburg Extension Lateral WW 8	47.8 E	4.3	2	3.1, possibly more	4.1 (expanded to 30)	Active restoration site; Site expanded
Clark Lateral	43.5 E	2.5	2	4.5	6	Requires supplemental irrigation
Mesilla East	41 E	15.5	2	15.8	15.8 expanded to 70)	Active restoration site; Site expanded
Berino West	25.5 W	1	2	10.3	10.3	Active Restoration site

[1] USIBWC attempted unsuccessfully to acquire the Bailey Point Bar in 2011. USIBWC has expressed continued interest to purchase the parcel and will re-evaluate the feasibility of acquiring the Bailey Point Bar if and when the property is back on the market. USFWS included a lower Priority on this site because it is not USIBWC property.

Berino East	24.5 E	17.5	2	5.0	9.5	Active Restoration site
Nemexas Siphon	7 W	4	2	16.7	16.7	Ownership in question

In addition, due to observations of migrant flycatchers in both 2010 and 2011, the riparian portion of the following site has potential to also establish additional flycatcher habitat (even though the original target habitat was designated as riparian woodland), as shown in Table 3-5.

Table 3-5. Restoration Sites with Possibility for Flycatcher Breeding Habitat

Site Name	River Mile and Bank	Miles to next downstream flycatcher site	USFWS Priority in the Opinion	Flycatcher Acreage	Total Acreage at site	Comments
Sunland Park	3 E	--	3	About 5	28.8	Under lease to City of Sunland Park

In addition, pursuant to RPM 2.8, restoration sites containing some willow vegetation and insect prey should occur at locations no greater than 40 mi intervals to protect and conserve flycatcher migratory stopover habitat and flycatcher migration.

See Section 2.6 and 2.7 for additional information on restoration site implementation and monitoring.

3.1.5 Environmental Water Transaction Program

USIBWC is developing an Environmental Water Transaction Program (EWTP) to allow the USIBWC to deliver water to restoration sites and to offset depletions to the allocated water system caused by increased vegetation and evapotranspiration. USIBWC is collaborating with local irrigation districts (i.e. Elephant Butte Irrigation District (EBID)) and other stakeholders to establish rules, procedures, and MOUs to implement the EWTP. EBID passed a policy in June 2013 allowing restoration sites to receive irrigation water. Supplemental water will allow USIBWC to establish flycatcher habitat and maintain it during drought conditions.

USIBWC is also considering the option of purchasing primary groundwater rights that will allow for irrigation of flycatcher habitat during drought years. These primary groundwater rights would not depend on the rules of surface water. The USIBWC currently owns 23.75 acres of primary groundwater rights (New Mexico Office of the State Engineer Water Rights File Numbers LRG 12710-2 and LRG 12725-2) which are currently being unused; USIBWC plans to redirect these water rights as needed for flycatcher habitat.

If core acres or flycatcher restoration sites are deteriorating in habitat quality, USIBWC will consider either supplemental surface or groundwater rights, whichever is appropriate, for the site in question.

In May 2014, the EBID Board approved the transfer of the first water rights to USIBWC property. The Leasburg Extension Lateral Wasteway #8 restoration site was the first site to receive irrigation water in June and July 2014.

The EWTP will be outlined under a separate framework document. See Section 2.8 for additional information on water rights program. See Section 3.1.19 for a drought contingency plan.

3.1.6 Adaptive Management Strategies for Habitat Establishment

Per RPM 2.10, USIBWC will implement adaptive management strategies that will assist the agency in complying with the goals of the ROD and the requirements of the Opinion. USIBWC will include the best available science in monitoring, mapping, and restoration work. In addition, USIBWC will partner with stakeholders, agencies and the public to learn and share information about riparian habitat restoration, flycatcher habitat use, and flycatcher habitat optimization and monitoring in the RGCP.

Specifically, USIBWC is using adaptive management to select the best restoration sites. USIBWC is considering purchasing plots of land that could be used for flycatcher habitat establishment along the river. USIBWC will evaluate the progress of restoration activities as well as established habitat outside of restoration sites on a yearly basis. USIBWC may move, add, or expand restoration sites based on environmental conditions to meet the RPM 1.1 requirement and to benefit the flycatcher.

USIBWC is also implementing adaptive management to the river management in general, as described in Section 2.13.

3.1.7 Vegetation Management

No-Mow Zones are established per Section 2.3.6 and in the Maintenance Zone Maps in Part 6. In addition, grazing leases have been phased out of the RGCP (Section 2.10.1). The following describes No-Mow Zones protecting flycatchers.

3.1.7.1 Buffers

Per RPM 2.3, if any flycatcher territories are present, a 0.25-mile buffer will be established around each territory. Project activity will be excluded from within the buffer zone. These flycatcher buffers are included in the No-Mow Zones outlined in Section 2.3.6. Although they are included in the No-Mow Zones in Maintenance Zone Maps in Part 6, they are not identified specifically as flycatcher buffers in order to protect the sensitivity of the territory locations.

USIBWC will review the flycatcher buffers every 3 years. If flycatcher territories increase in numbers and move toward the edges of the buffers, USIBWC will consider revising or increasing the buffers. USIBWC will consider the acreage outlined in the ROD for areas that are not mowed in order to adjust any buffers as necessary. In addition, significant changes in No-Mow Zones should be re-evaluated for hydraulic/hydrologic impacts on the flood capacity of the RGCP, per Section 2.3.11.

The exception to the 0.25 mi buffer is within USIBWC restoration sites. USIBWC will continue to conduct restoration activities, such as saltcedar excavation and tree planting, at restoration sites falling within the buffer of flycatcher territories. Such activities will follow the best management practices listed in Table 3-7.

3.1.7.2 Exotic species removal

Exotic species, namely saltcedar, will be removed according to methods described in Section 2.4.

Mechanical and chemical vegetation management will be conducted outside the flycatcher breeding season, which typically extends from May 15 through August 15 of each year, to avoid potential effects from human disturbance such as noise and pesticides. Work should be conducted after September 1, if possible, to avoid impacts to straggling flycatchers.

No chemicals will be sprayed within 10 feet of a previously occupied flycatcher nest/territory. Saltcedar will not be removed within 10 feet of a previously occupied flycatcher territory. In cases of extreme drought where native willow stands are weakened or dying due to drought conditions, USIBWC may leave saltcedar along the banks for at some distance around a documented territory until native willows have recovered or native plantings have grown to sufficient heights to replace saltcedar as a nest substrate. The distance of saltcedar left standing around a territory will be determined on a case-by-case basis, depending on the condition of the willows and other vegetation at the site as well as proximity to saltcedar beetle observances.

3.1.8 Vegetation Mapping

As required by RPM 2.7, USIBWC will quantify on a yearly basis the spatial extent in acres of dense riparian habitat suitable for flycatcher breeding within the RGCP. RPM 2.7 recommends using a Geographic Information System based model using appropriate satellite imagery and calculating the Normalized Difference Vegetation Index (NDVI), or any equivalent measures. Table 3-6 lists the acres of dense vegetation outlined by the procedures in the following section.

Table 3-6. NDVI Calculations

Satellite	Imagery Date	From Percha Dam downstream to Leasburg Dam	From Leasburg Dam downstream to American Dam
Landsat 5	August 20, 2011	316 acres	178 acres
Landsat 7	Main data collected from August 30, 2012 with some gaps filled in using July 29 and August 5, 2012 imagery	66 acres	38 acres
Landsat 8	August 9, 2013	334 acres	127 acres
Landsat 8	August 28, 2014	486 acres	453 acres

The NDVI values calculated for 2011-2014 vary significantly. There are several factors that can impact these values. First, local rainfall and monsoon rain events may affect the amount of "greeness" detected during a particular image. For example, in 2011, there were rain events in the upper part of the project area for over a week immediately before the Landsat 5 image was taken. In 2013, there was considerable rainfall in late July before the Landsat 8 image was taken, and in 2014, there were several small rain events in the first three weeks of August before the Landsat 8 image was taken.

Image date can also be a factor; for this reason, image date priority was 1) late August 2) early August 3) late July 4) early July. Satellite equipment may also impact the values, as Landsat 5 was no longer available in 2012 and the available Landsat 7 data had data gaps. Furthermore, the duration of irrigation season can also be a factor. In 2011, irrigation releases from Caballo Dam continued into September, while in 2012 they began decreasing in August. In 2013, releases ended in mid-July, while in 2014 releases decreased in August and ended in the third week of August.

In addition, not all NDVI pixels are flycatcher habitat, since NDVI picks up all dense vegetation, including monotypic saltcedar, cottonwoods, and mesquite within the floodplain. The NDVI is also measuring weed growth. However, USIBWC can evaluate the low-lying areas and areas along the banks which are picking up higher NDVI values in larger acreages to determine feasibility for additional or alternate restoration areas. The NDVI values in Table 3-6 are picking up management changes that include the beginning of not mowing around restoration sites (2011) and the implementation of No-Mow Zones, including the riparian fringe (winter of 2012-2013).

3.1.8.1 NDVI Overview

NDVI is a common method of calculating density of vegetation using visible and near-infrared wavelengths that are reflected from plants as measured from satellite imagery. The calculation is near-infrared radiation minus visible radiation divided by near-infrared radiation plus visible radiation. Calculations of NDVI for a given pixel always result in a number that ranges from minus one (-1) to plus one (+1). No green leaves gives a value close to zero. A zero means no vegetation, and close to +1 (0.8 - 0.9) indicates the highest possible density of green leaves (NASA 2012).

Riparian habitat areas exhibit NDVI values of >0.126, and flycatcher breeding habitat has NDVI values of >0.33 (Hatten, Paxton, and Scogge 2010; Hatten and Scogge 2007). Based on that, USIBWC used NDVI ranges 0.3 to 0.6 for dense riparian habitat suitable for flycatcher breeding.

USIBWC will use Landsat 5, 7, or 8 images provided free by the USGS, with little to no cloud cover, from May, June, July or August. Images are Path 33 Row 38 (southern Canalization Stretch, around Pasture 18 to end of project) and Path 33 Row 37 (northern stretch, Elephant Butte to Seldon Point Bar). NDVI calculations will use bands 3 and 4. Pixel size is 30 by 30 meters. Landsat 8 images began to be collected in 2013 with the same pixel size and similar instrumentation.

3.1.8.2 USIBWC NDVI Calculation Methodology

Because the Biological Opinion calls for at least half of the established habitat to be above Leasburg dam (RPM1.2), the project was divided into two sections: the northern section extended from Percha Dam, south of Caballo Reservoir, to Leasburg Dam, and the southern from Leasburg Dam to American Dam.

NDVI was used for habitat analysis for 2011 and 2012 base conditions. The procedure used and recommended for future calculations is as follows:

1. Start by downloading two Landsat scenes, from the Earth Explorer website:
    a. Go to http://earthexplorer.usgs.gov/, and login.
    b. Download a scene for Path 33, Row 37 (covering the northern section).
    c. Download a second scene for Path 33, Row 38 (covering the southern section).

d. The two scenes should be cloud free, at least over the areas of interest.
e. The scenes must have been acquired during the summer (May - August).
f. Ideally, both scenes will have been acquired on the same day, in succession.

2. Unzip the scenes. The NDVI is computed using only the red and near-infrared bands. For Landsat 8 these are bands 4 and 5, respectively, while for Landsat 5 and Landsat 7 they are bands 3 and 4. While there are several ways to compute the NDVI using various software applications, the easiest method is to use the Raster Calculator in ArcGIS. This will produce the true range of values, from -1.0 to +1.0.
   a. Open an ArcMap .mxd document, and add the two bands.
   b. Open ArcToolbox > Spatial Analyst Tools > Map Algebra > Raster Calculator.
   c. The general formula for the NDVI is (NIR - Red) / (NIR + Red). While this can be calculated in one step in the Raster Calculator, it may be clearer if the process is divided into three steps, in which the numerator and denominator are computed separately, and then used to arrive at the final ratio.
   d. In Raster Calculator, create an expression to compute the numerator, such as:

      num_raster = Float("xxxxxx.tif") - Float("yyyyyy.tif")

      where:

      - "num_raster" is the name you supply for the output raster which will be the numerator. Note that raster names must be less than 14 characters long.
      - "Float" is a function call that will convert the input rasters, which are in integer format, into floating point equivalents. It is critical that these calls be selected from the scrollable list in the dialog, and NOT simply typed in.
      - "xxxxxx.tif" is the name for the NIR band, selected from the list of datasets in the dialog.
      - "yyyyyy.tif" is the name for the Red band, similarly selected.
      - Note that the way to insert the names of the bands into the Float() function calls is to position the cursor between the two parens, then click on the appropriate name from the list in the dialog.

   a. Browse to the desired output location, and enter the same output raster name that was specified in the above expression.
   b. Click OK.
   c. Repeat Steps (d) through (f) to compute the denominator (i.e., the sum of the two bands).
   d. Repeat Steps (d) through (f) to compute the final NDVI (i.e., the ratio of numerator to denominator), using an expression such as:

      ndvi = Float("num_raster") / Float("den_raster")

3. Now that the NDVI layer has been created, it needs to be "clipped" so that only the portion within the USIBWC ROW remains.
   a. The entire USIBWC ROW is located in SDE on the Nossob server, under Z:\SDE.fd_LandManagement\SDE.fc_US_ROW.

b. Make a copy of this feature class on your PC, then edit it to describe the area that you are interested in. Or simply use the polygon "Project_ROW_Boundary" that has been included with the datasets already created. Alternatively, use the ROW boundary feature class maintained by EMD which includes 2013 edits such as the inclusion of the Seldon Point Bar and exclusion of Seldon Canyon lands.
c. Open ArcToolbox > Spatial Analyst Tools > Extraction > Extract by Mask.
d. Fill in the dialog, using the right of way polygon as the mask, and the raster will be clipped to the correct outline.

4. Next, we need to symbolize the clipped NDVI rasters:
   a. Right click the raster layer name, then Properties > Symbology Tab.
   b. On the dialog, select "Classified", under Show:
   c. Specify 3 Classes.
   d. Click the "Classify ..." button.
   e. Enter 3 break values: 0.2, 0.3, and 1.
   f. Click OK. The raster is now classified, and ready to be colored according to taste.
5. The analysis will be done using polygons, so the rasters will have to be converted into a more usable format, then merged into two feature classes.
   a. Note that at this point there are two floating point NDVI rasters, one covering path 33, row 37, and the other path 33, row 38, and that these rasters overlap each other.
   b. Let us assume that one of these rasters is named "ndvi_clipped", and follow it through the necessary computations in Raster Calculator.
   c. Create a new raster, by multiplying each cell by 100:

      ndvi_100 = 100.0 * ("ndvi_clipped")

   d. Convert the new floating point raster to an integer raster:

      int_ndvi_01 = Int("ndvi_100")

   e. Create another new raster by selecting integer values greater than 20. These will correspond to NDVI values of 0.2 to 1.0:

      int_ndvi_02 = Con("int_ndvi_01" >= 20, 2)

   f. Create yet another raster by selecting integer values greater than 30, which correspond to NDVI values of 0.3 to 1.0:

      int_ndvi_03 = Con("int_ndvi_01" >= 20, 3)

   g. Now repeat steps (a) through (f) for the other clipped raster.
6. Next, generate four sets of polygons from these rasters:
   a. ArcToolbox > Conversion Tools > From Raster> Raster to Polygon
   b. While using this tool, be sure to uncheck the box "Simplify Polygons".
7. The output from the previous step are shapefiles, so convert them into feature classes using the Load utility.

8. Next, combine the polygons into two feature classes:
   a. Edit the feature class representing 0.2 to 1.0, for path 33 row 37, and delete all of the polygons that overlap those in path 33 row 38.
   b. Repeat the previous step for the feature class representing 0.3 to 1.0.
   c. Append the result of Step (a) with the corresponding path 33 row 38 polygons, to create the final combined feature class, representing NDVI values of 0.2 to 1.0.
   d. Similarly, append the result of Step (b) with the corresponding path 33 row 38 polygons to create the final feature class, representing NDVI values of 0.3 to 1.0.
   e. At this point, the two feature classes can be further edited to eliminate the effects of agriculture adjacent to the right of way, for example.
9. Remove all areas located at a distance greater than 100 meters (328 ft) from the river (except for restoration sites outside of that buffer) by clipping to the GIS file (maintained by EMD) "RioGrandebanks100mbuffer_NDVI," which is a file with a 100 m buffer from each bank plus any restoration site that fell outside of the 100 m (See 3.1.8.3).
10. Remove any NDVI polygons that are not within USIBWC property (ex: Seldon Canyon), using the Doña Ana County parcel GIS data, unless they fall within a designated restoration site.
11. Remove all NDVI polygons that could be impacted by agriculture on the edge of the ROW, verifying manually using aerial imagery.
12. Remove all polygons made of single pixels of NDVI greater than 0.3, unless the single pixels are within restoration sites (See 3.1.8.3).
13. Remove polygons within mow areas.
14. The acreages can be determined by adding an "Acres" field to each of the feature classes, and computing the totals. Compute the totals for above and below Leasburg Dam by selecting the appropriate polygons.

Dense flycatcher habitat must also meet the requirements outlined for core acreage in Section 3.1.8.3.

3.1.8.3 Core Acreage in Opinion

Areas calculated by the NDVI procedure outlined in Section 3.1.8.2 will be overlayed with restoration sites. Areas of dense habitat *outside* of the restoration sites will be considered the USIBWC "core" acreage required by RPM 1. These are areas that are naturally maintaining dense habitat without supplemental irrigation and with minimal or no maintenance. Flycatcher habitat established within the restoration sites will be subject to water rights through the EWTP and will supplement the existing core acreage.

Core acreage, and all dense habitat to meet RPM 1, should be suitable flycatcher breeding habitat meeting the following requirements:

1. NDVI of 0.3 or greater (Hatten, Paxton, and Scogge 2010)
2. Minimum patch size of 2 pixels (0.44 ac) (USFWS 2002)
3. Distance to water of 100 m (328 ft), using a buffer of 100 m from riverbank (Hatten, Paxton, and Scogge 2010). The exception to this is if the site is clustered near other observed territories.

3.1.8.4 Other metric options

USIBWC may explore the use landscape metric software (such as FRAGSTAT, LFT, or Patch Analyst) to get acreages.

In addition, USIBWC may explore the possibility of using leaf area index (LAI) to determine density. Although the cost is higher and requires flying of equipment, the accuracy will be improved.

3.1.9 Conservation Recommendations

In the Opinion, USFWS included conservation recommendations that "are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information" (USFWS 2012b, p. 68). Listed below are the Conservation Recommendations and the USIBWC action plan for each.

a. Encourage adaptive management of flows and conservation of water to benefit flycatcher and yellow-billed cuckoo habitat in the Lower Rio Grande.

The ROD recommended periodic restoration peak flows once every 3 to 10 years of a target release of 3,500 cfs from Caballo Dam (requiring 9,500 ac-ft of water per event). USIBWC will continue to work with agencies and irrigation districts to determine the feasibility of various flow regimes for the benefit of the flycatcher. USIBWC is considering the option of leasing additional water rights to simulate peak flows at restoration sites.

b. Work to secure long-term water sources to support habitat restoration activities in the Lower Rio Grande.

USIBWC is working to implement the EWTP for water delivery to habitat. USIBWC and its cooperators will purchase or lease water rights to offset depletions to the allocated system caused by increased vegetation growth at restoration sites, as well as for supplemental irrigation. The EWTP encompasses both surface water acquired and delivered through irrigation districts, as well as primary and supplemental groundwater rights. In addition, inundation maps at releases of 2,000 or 2,500 cfs can show areas that overbank with smaller releases. Water rights purchased by the USIBWC are real property and will remain appurtenant to USIBWC land in perpetuity, as long as USIBWC pays assessment fees to the irrigation district, subject to the availability of funds. See Section 3.1.5 for more information.

c. Monitor, maintain, and expand riparian habitat restoration areas.

Changes to the Conceptual Plan include expansions of current pilot projects under restoration, including expanding Leasburg Extension Lateral WW 8 from 4.1 to 30 acres, and Mesilla East from 15.8 acres to 70 acres. USIBWC agrees that larger restored areas may be more sustainable than many isolated smaller patches of restored areas. USIBWC is also connecting restoration sites with No-Mow zones in between sites in close clusters. In addition, USIBWC is implementing a No-Mow policy of at least 15 feet of riparian fringe throughout the project. This will allow for additional flycatcher migratory habitat between all restoration sites. USIBWC will also be implementing a monitoring protocol, as discussed in Section 2.7 of the RMP.

d. Expand the Yeso West Restoration Site further west into the floodplain. Allow river meanders from Yeso Arroyo Restoration Site to push water onto floodplain near the Yeso West Site.

USIBWC will consider this recommendation when planning/implementing these restoration sites (See Section 4.7).

e. Widen the arroyo mouths of Yeso, Placitas, and Angostora Arroyos, within the floodplain and within USIBWC lands, to encourage riparian vegetation on swales at high and medium flows within the arroyos.

USIBWC will consider this recommendation when planning/implementing these restoration sites (See Section 4.7).

f. Develop and regularly convene a Flycatcher Lower Rio Grande Recovery Management Unit Implementation Subgroup.

USIBWC will implement this recommendation. Initial participants include Bureau of Reclamation, USFWS, other federal and state agencies, irrigation districts, members of groups such as the Paso del Norte Watershed Council, and local NGOs. Face-to-face meetings may be planned around the annual USFWS flycatcher survey training. Meetings may also be conference calls.

g. Coordinate the reporting of flycatcher survey data and its management, collection, entry, and reporting with the Service and other agencies.

USIBWC coordinated with USBR on flycatcher surveys and survey results from 2012 through 2014 and will continue coordination for future surveys. In an effort to reduce duplication of effort, USIBWC and USBR have signed an Interagency Agreement to assist each other with conducting surveys every other year and coordinating the data exchange. (See Section 3.1.12.2)

h. Inform partners and the public about tamarisk beetle issues. Continue to improve an understanding about tamarisk using the latest science.

USIBWC participates in the annual TX/NM/Mexico Saltcedar Biological Control Consortium. USIBWC staff provide presentations and learn the latest science at this workshop. In addition, USIBWC uses this forum to inform stakeholders. USIBWC also maintains in communication with partners monitoring the beetle, including Texas AgriLife, Texas universities, and the Tamarisk Coalition. USIBWC distributes beetle observation location information to stakeholders and Tamarisk Coalition via email when available.

i. Purchase private lands within the floodplain near Bailey Point Bar, Selden Canyon, and Nemexas along with necessary buffer areas to conserve those habitats and restoration options in perpetuity.

USIBWC has purchased a 7.7 acre tract on Seldon Point Bar in Seldon Canyon, which is now a priority for flycatcher restoration work, and the site is being implemented. USIBWC has been in unsuccessful negotiations for two additional properties in Seldon Canyon. USIBWC is working on ownership issues related to the Nemexas property. USIBWC is pursuing the purchase of the Bailey Point Bar . USIBWC

is proactive about acquiring lands that can be used for restoration, particularly if they were outlined in our Conceptual Plan, can provide flycatcher habitat, or have water rights. Additionally, acquiring lands with primary groundwater rights is a transactional approach in the EWTP.

j. Trap Brown-headed Cowbirds and control feral hogs, as needed.

USIBWC does not have staff, resources, or the mission statement to implement this conservation recommendation.

In addition, studies have documented that efforts spent trapping brown-headed cowbirds has little impact on flycatcher nest success rates (Moore 2006; Moore and Ahlers 2003).

k. Monitor ground water levels near Restoration Sites, as needed.

USIBWC has installed 55 shallow groundwater monitoring wells at 19 restoration sites and two non-restoration site areas. 22 wells include automatic reading equipment which collect continuous data, and is currently collecting hourly at most sites. The remaining wells will be for manual data collection. USIBWC will implement a long-term monthly monitoring program. USIBWC may use this data to establish a minimum depth of groundwater to plant trees (for example no trees are planted if groundwater is greater than 15 ft) if no supplemental water is available. In addition, planting depths may be increased if deeper augers are available. USIBWC may also use the data to determine priority sites for supplemental irrigation or to adjust the target habitat type. Monitoring of restoration sites and groundwater wells are discussed in Sections 2.7 and 2.6.2, respectively.

l. Provide for and maintain riparian vegetation along drainage ditches.

USIBWC has designated draft No-Mow Zones throughout the RGCP in accordance with the ROD. Some natural and constructed channels and ditches are included in or adjacent to these No-Mow Zones areas; however, USIBWC has the responsibility to limit vegetation growth in these ditches. Drain ditches in the floodway must be kept clear to assure proper drainage of the irrigation, return flows and storm-water systems. Permitting these ditches to overgrow may impact the function of the valves and obstruct the flow of these systems. USIBWC will evaluate on a case-by-case basis whether targeted drains can be designated as No-Mow, thereby allowing for riparian vegetation to establish in these areas.

3.1.10 Refuge System

USIBWC will work with USFWS to evaluate options and possibilities to establish an official, or unofficial, refuge system for long-term commitment of the restoration. USIBWC could transfer management of the restoration sites to the USFWS or transfer land fee-title while retaining a flood easement. The creation of a National Wildlife Refuge in the RGCP, or expansion of existing refuges, will be explored with USFWS.

3.1.11 Saltcedar Leaf Beetle

Many agencies and organizations, such as Texas AgriLife Extension, Texas A&M, National Park Service, Texas Parks and Wildlife, and USDA, have promoted biological control of saltcedar through a natural predator, the saltcedar leaf beetle (*Diorhabda* spp.) from Asia and Europe. Beetles have been released

throughout Texas since 2004. In 2007, beetles were released along the Rio Grande near Candelaria, Texas. Beetle populations have continued to increase, defoliating miles of saltcedar along the Rio Grande. In summer of 2012, the saltcedar leaf beetle had reached the El Paso/ Hudspeth County line. In the summer of 2013, beetles had entered into the RGCP in the Sunland Park and El Paso area, and were documented as far north as Vado, NM. In summer of 2014, beetles were again documented in Sunland Park and Anthony, New Mexico and El Paso area.

Although the beetle has been successful in controlling saltcedar growth and seeding, it does represent a threat to the flycatcher because beetle defoliation corresponds to vulnerable early breeding season. Flycatchers may be nesting in or near saltcedar which is providing canopy cover to the nest, and beetles will very quickly defoliate a saltcedar during the nesting period. The reduced canopy cover may lead to increased predation and scorching of the nests by the sun.

USIBWC supports the removal of saltcedar during the winter months in flycatcher breeding areas. USIBWC promotes the planting of native vegetation in lieu of saltcedar on restoration sites. In addition, USIBWC restoration sites will provide future breeding habitats to replace many habitat areas affected by future beetle expansion.

Depending on the extent of beetle dispersion, and the impact of defoliation on survivability of saltcedar, there may be significant saltcedar debris throughout the RGCP. USIBWC will remove saltcedar debris from No Mow Zones as resources allow.

3.1.12 Surveys

3.1.12.1 Territory Surveys

Per RPM 2.6, USIBWC will conduct **annual** flycatcher surveys at all Restoration Sites and areas where flycatchers have been observed in previous years. Methods for surveying include contracting the work, conducting the surveys with available and trained USIBWC staff, or collaborating with additional federal organizations with similar objectives, such as the USFWS or USBR.

Surveys will follow USFWS-approved survey protocols and will be performed by permitted staff. Required survey protocol is the USGS Protocol "A Natural History Summary and Survey Protocol

BOX 3-4. Flycatcher Survey Protocol Requirements

- Staff conducting surveys will have completed a formal survey protocol course offered by USFWS or affiliated entity approved by USFWS. Staff should also have a minimum of 40 flycatcher survey observation hours with a certified surveyor.
- Staff conducting surveys should have a permit issued by USFWS for surveying (Form 3-200-55 Federal Fish and Wildlife Permit Application Form)
- Surveys should be conducted a minimum of 3 surveys per site, at least once in each of 3 survey periods: 1) May 15-31, 2) June 1-24, and 3) June 25-July 17.
- If the site will have ground disturbance or other type of project, a minimum of 5 surveys per site are required, with one during the first and second survey period and 3 surveys during the third survey period.
- Each complete survey must be at least 5 days apart. The entire site must be surveyed during each survey period even if it takes multiple days to complete.
- Surveys should be conducted between the hours of 5:00 am to 11:00am.

for the Southwestern Willow Flycatcher," last revised 2010 (Scogge, Ahlers, and Sferra 2010). A summary of protocol requirements are listed in Box 3-4 (Scogge, Ahlers, and Sferra 2010).

Surveys commissioned by USIBWC in 2010 and 2011 included surveys at USIBWC restoration sites only. USBR surveys use a wider approach and survey suitable habitat along the entire river section divided up into sub-segments and surveyed by boat or by foot. USIBWC will adopt the USBR method of surveying in order to accurately assess territories outside of USIBWC restoration sites. The entire stretch of river above Leasburg to Percha Dam will be surveyed. Surveys should focus on areas of more suitable habitat. USBR quantified suitable habitat via a 2012 classification of habitat (Darrel Ahlers, USBR, personal communication 2012).

3.1.12.2 Collaboration with USBR

USBR has a similar need to conduct flycatcher surveys for both the Elephant Butte Reservoir and the RGCP. USBR's 2012 Flycatcher Management Plan recommended that USBR coordinate surveys with USIBWC to avoid duplication of survey effort. USBR recommended that USIBWC survey sites on even years and USBR would survey on odd years (USBR 2012b).

In May 2013, USIBWC and USBR signed an Interagency Agreement (IBM13A0017) to collaborate on biological survey services and to share data. Under this agreement, USIBWC issued a work order to USBR to conduct flycatcher and yellow-billed cuckoo surveys in the RGCP in the 2013 nesting season. USBR conducted surveys in 2014.

3.1.12.3 Nesting Success Surveys

Although not required, USIBWC recommends conducting nesting success surveys at least twice from 2013 to 2019. Nesting success surveys require more follow up visits to territories with hatchlings in order to document the percentage of successful hatchlings. As these types of surveys are more invasive, they will be required to be conducted by certified and qualified personnel with appropriate permits and will likely be contracted out or conducted in conjunction with USBR. Nesting success surveys were conducted in 2013 and 2014.

3.1.13 Environmental Commitments of the Recovery Plan

Per RPM 2.9, USIBWC will review the USFWS Southwestern Willow Flycatcher Recovery Plan about every 3 years and update the environmental commitments related to the flycatcher, as appropriate. This will include nesting and surveying data.

3.1.14 USIBWC Licenses/Leases/Permits

Per RPM 2.2, EMD will review all licenses, leases, and permits for the RGCP and consider potential impacts to flycatchers. USIBWC will not authorize any license, lease, or permit that will potentially harm the flycatcher nesting habitat or observed territory locations within the 1/4 mile buffers. USIBWC will reference compliance with the Migratory Bird Treaty Act and the Endangered Species Act for actions or projects authorized on USIBWC property. See Section 2.10 for additional Lease information.

3.1.15 Dredging/Channel Maintenance

Channel maintenance activities that may potentially adversely impact the flycatcher or its habitat, such as removal of islands that have established flycatcher territories in the river, will require concurrence from USFWS. Dredging and excavation procedures are outlined in Part 4 – Channel Maintenance Plan.

3.1.16 Summary of Best Management Practices for Flycatcher Protection

Table 3-7 below lists a summary of Best Management Practices (BMPs) for overall flycatcher management in the RGCP.

Table 3-7. Summary of BMPs for Flycatcher Management

Action	Management Practice	Applicable Timeframe
General Management Practice	• Establish a 1/4 mile buffer around observed territories where USIBWC will not mow	All year
Any work within 1/4 mile of flycatcher territories	• No work should be conducted during the flycatcher nesting season (May 15 - Sept 1). • If work must be conducted during the breeding season, then to minimize impacts the following is required: o No work conducted prior to 9:00 am o Work should be reduced to shortest time frame possible to minimize impacts o Noise should be kept to a minimum	May 15 - Sept 1
General Management Practice	• Review licenses, permits, and leases for potential impacts to flycatchers	All year
Restoration Sites	• Stagger plantings to increase structural and age diversity • No mowing • Remove saltcedar, unless near a territory with drought-affected willows. Distance of saltcedar left standing will be determined on case-by-case basis, depending on the conditions of the willows and other vegetation at the site. • Consider supplemental water to support flycatcher habitat	All year, as appropriate
Any Action not covered under RMP	• Consult via email with USFWS ESD in Albuquerque to ensure minimal impacts	May 15-Sept 1

3.1.17 Flycatcher Lower Rio Grande Recovery Management Unit Implementation Subgroup

As discussed in Conservation Recommendation f. in Section 3.1.9, USIBWC will lead and facilitate coordination of a Lower Rio Grande Recovery Management Unit Implementation Subgroup to facilitate collaboration with agencies and organizations with input or those working on similar restoration efforts.

3.1.18 Contingency Plan for drought

Considering the Rio Grande in New Mexico has been in extended drought conditions for the past several years, the USIBWC has developed a contingency plan to sustain flycatcher habitat, specifically the 53.5 acres in RPM 1.1, in the event of prolonged and severe drought conditions. The Contingency Plan will focus on two conditions: 1) natural conditions and 2) fortifying restoration sites with supplemental water, and groundwater in particular.

3.1.18.1. Natural Conditions

USIBWC will focus restoration efforts (such as planting) at sites within Seldon Canyon where the main channel naturally retains more water than other more open areas of the river corridor. Natural conditions in Seldon Canyon allow pools of water to stay in the channel during non-irrigation season for longer periods than the rest of the RGCP. Restoration sites in Seldon Canyon are listed in Table 3-8. If water is pooled on the opposite bank, USIBWC may consider routing the ponded water to the bank with the restoration site, pending appropriate permits and if conditions allow.

Table 3-8. Sites within Seldon Canyon that may have natural conditions to be supported without supplemental irrigation

Site	Maximum Acres to be Sustained Without Irrigation	Opinion Priority	Comments	ROD Offset Required water rights?
Broad Canyon Arroyo, lower terraces	4 to 6	1	Due to geometry and terrain, site would be difficult to irrigate	NO
Seldon Point Bar	7	1	Site will be double protected with groundwater	NO
Total Acres	**13**			

Note: Bailey Point Bar will be added to Table 3-8 if USIBWC successfully acquires the property. The maximum acres to be sustained without irrigation are 16, offset water rights are not required, and the Opinion Priority was 3.

3.1.18.2. Supplemental Irrigation

Supplemental irrigation can be done either with surface water or with groundwater. Some sites are candidates for both surface and ground water irrigation; in these cases, the most feasible will be implemented depending on the circumstances. Priority sites for each kind of irrigation were chosen based on site conditions and based on the priority listing assigned by USFWS in Table 1 of the Opinion.

3.1.18.2.a. Supplemental Irrigation - Surface Water

Surface Water irrigation will occur within the framework of the EWTP, as described in Sections 2.8 and 3.1.5. Sites with priority for surface water irrigation are listed in Table 3-9. The EBID as a participant of the EWTP is covered under the Incidental Take Statement of the Opinion for these sites as long as the USIBWC maintains the 53.5 acres of flycatcher habitat.

Table 3-9. Priority Sites for Surface Water Irrigation				
Site	**Acres to be Irrigated**	**Opinion Priority**	**Can be irrigated with surface Water Via**	**ROD Offset Required water rights?**
Crow Canyon B	26	1	Hatch Canal; Also a priority for groundwater	YES
Trujillo	14	1	Trujillo lateral	NO
Leasburg Extension Lateral WW8	6 (and up to 30)	2	Leasburg Extension Lateral Wasteway 8 (Irrigation in 2014)	YES
Mesilla East	16 (and up to 70)	2	California Lateral WW13 or Alamo Drain	YES
Total Acres	**62**			

3.1.18.2.b. Supplemental Irrigation - Groundwater

Groundwater is an important element for critical drought periods. Groundwater will allow irrigation of poles in critical early spring timeframe when trees are beginning to bud, and will ameliorate tree stress and vulnerability caused by heat in the summer prior to irrigation flows being released into the river. Groundwater rights can pump their full allotment of water, based on the groundwater priority, and are not held to shortages during drought conditions as surface water rights are.

Sites irrigated with groundwater need a legal Point of Diversion (POD) approved by the New Mexico Office of the State Engineer (NMOSE). They also need a designated and approved Place of Use. Groundwater rights are subject to the rules and regulations imposed by the State of New Mexico in Title 19, Chapter 27 Part 1 of the New Mexico Administrative Code (19.27.1 NMAC).

USIBWC owns 23.83 acres of groundwater rights (Water Right File Numbers (WRN) LRG-12725-2 and LRG 12710-2. As of fall of 2014, USIBWC is working with the NMOSE to transfer these rights (change the place of use) to 2 restoration sites (Rincon Siphon and Seldon Point Bar). USIBWC will also apply for a permit for a new POD to construct a new groundwater supply well at the sites. Possible issues that may arise during the NMOSE review of the application include a determination that USIBWC has forfeited or abandoned the rights for non-use as well as a requirement to have surface water offsets for wells close to the river.

USIBWC may also pursue the acquisition of additional groundwater rights. Sites with a priority for groundwater rights are listed in Table 3-10.

Table 3-10. Priority Sites for Groundwater Irrigation				
Site	**Acres to be Irrigated**	**Opinion Priority**	**Comments**	**ROD Offset Required water rights?**
Crow Canyon B	26	1	Also a priority for surface water	YES
Rincon Siphon A-B	16	1	LRG 04770-S is a nearby well. No EBID infrastructure for surface water irrigation	YES

Seldon Point Bar	7	1	Outside of EBID boundaries; No EBID infrastructure for surface water irrigation	NO
Total Acres	65			

Note: Bailey Point Bar will be added to Table 3-10 if USIBWC successfully acquires the property. The maximum acres to be sustained without irrigation are 16, offset water rights are not required, and the Opinion Priority was 3. This tract is outside of EBID boundaries and there is no EBID infrastructure for surface water irrigation at this site.

3.1.18.3. Groundwater Monitoring and Non-drought Year Prioritization

In 2013 and 2014, USIBWC installed a network of 55 shallow groundwater monitoring wells (Section 2.6.2 and 3.1.9.k). USIBWC will use the data to determine planting depths and irrigation needs, as well as to further refine this Contingency Plan for drought.

Because the RGCP has been in drought conditions for the past several years, USIBWC will be focusing initial restoration implementation efforts on sites listed in Tables 3-8 to 3-10. USIBWC is placing priority on all sites with a target of dense riparian habitat (Section 3.1.4), and all except 4 sites appear in Tables 3-8 to 3-10. Berino East and Berino West are additional sites being implemented in fiscal years 2014 and 2015. Depending on data from groundwater monitoring, Tables 3-8 to 3-10 may be modified for more suitable site conditions during extended drought.

3.1.19 Schedule of Future Tasks

In order to implement the RPMs and meet the goals of the Opinion and the ROD, the USIBWC has identified the following future tasks and timelines.

Table 3-11. Schedule of Future Tasks

Area	Task	Target Date	RPM
Restoration	Continue restoration work under the USFWS Interagency Agreement, including planting an estimated 20,000 trees at 9 sites (Trujillo, Crow Canyon, Broad Canyon Arroyo, Seldon Point Bar, Rincon Siphon, Leasburg Extension Lateral WW8, Mesilla East, and Mesilla Bosque).	Through March 2016	1.1, 1.2, 1.4, 1.6, 2.8
	Implementation of Berino East and Berino West restoration sites	Winter 2014-2015	1.1, 1.4, 1.6
	Complete purchase of Bailey Point Bar	Decemmber 2014	1.1, 1.2
	Purchase NeMexas Siphon property	2015 or 2016	1.1, 1.6
Channel Maintenance	Survey 160 cross sections	Winter 2014-2015	
	Conduct investigations to evaluate alternatives to channel maintenance	By 2015	2.2, 2.10
	Continue discussions with stakeholders on channel maintenance	Through 2015	2.2, 2.10

	Finalize Channel Maintenance Plan with USFWS and stakeholder input	2015	
Environmental Water Transaction Program	Complete 2 trial transactions of water rights	June 2014	1.1, 1.5
	Irrigate first restoration site, Leasburg Extension Lateral WW8	Summer 2014	1.1
	Finalize Environmental Transfer Framework Document	December 2014	
	Purchase and/or lease additional supplemental water rights for supplemental irrigation and offsets of water depletions	2014-2017	1.1, 1.2, 1.4
River Management Plan	Finalize the River Management Plan, the Flycatcher Management Plan	2014	2.1

3.1.20 Reporting to USFWS

Annually, USIBWC will submit the following documents to USFWS:

- Annual Survey Data, including territory locations, GPS coordinates, field sheets, etc. (except when submitted by USBR)
- Progress Report of restoration activities and status
- NDVI calculation of current dense acreage throughout the RGCP, and maps showing those acres

Electronic copies will be submitted by March 31 of the following year to nmesfo@fws.gov and if necessary by mail to the New Mexico Ecological Services Field Office, 2105 Osuna Road NE, Albuquerque, NM 87113.

SUBPART 3.2 - OTHER ENDANGERED SPECIES

3.2.1 Federally listed species

There are 4 federally listed species that are known or likely to occur within the RGCP (SWCA 2011), besides the flycatcher. Table 3-7 lists these species and their affects determination from the 2011 Biological Assessment and from USFWS in the 2012 Biological Opinion.

Table 3-7. Federally listed species in the RGCP other than flycatcher

Common Name (Species Name)	Status	County where Species Occurs and/or listing Applies	Range or Habitat Requirements	Potential for Occurrence in RGCP	BA Effects Determination	USFWS BO Effects Determination
Aplomado falcon (*Falco femoralis septentrionalis*)	E	Sierra and Doña Ana counties, El Paso County	Documented at Mesilla Valley Bosque State Park in 2010	Known to occur	May affect, but is not likely to adversely affect	May affect, but is not likely to adversely affect
Least tern (*Sterna antillarum*)	E	Sierra and Doña Ana counties	Migratory species occurring in North America during the breeding season, when it is associated with water (e.g. lakes, reservoirs, rivers) Documented in the RGCP including at Mesilla	Known to occur	May affect, but is not likely to adversely affect	May affect, but is not likely to adversely affect
Yellow-billed Cuckoo (*Coccyzus americanus)*	C*	Sierra and Doña Ana counties, El Paso County	Western subspecies nests preferentially in large patches of moist cottonwood-willow woodland, where it prefers high canopy closure for nesting. Documented on some proposed RGCP restoration sites	Known to occur	Not likely to jeopardize	No determination
Sprague's pipit (*Anthus spragueii*)	C	Sierra County	Within NM migrates in the northeast and winters in the southwest and occasionally in the southwest. Uses grasslands of intermediate height and sparse to intermediate vegetation density; prefers native prairies.	May occur	May affect, but is not likely to adversely affect	No determination

** Proposed to be listed as Threatened in 2014.*

3.2.2 Actions to protect

For these species, USIBWC will allow these species to leave on their own volition when encountered prior to or during restoration activities.

3.2.2.1 Yellow-Billed Cuckoo

In 2012, the yellow-billed cuckoo is a Category 3 Candidate Species. In October 2013, the USFWS issued a proposed rule to change the status of the yellow-billed cuckoo to Threatened. The decision was extended December 2013 and again in April 2014. If approved, the cuckoo would be listed in late 2014. USIBWC will initiate consultation with USFWS if the cuckoo is upgraded from a candidate species. In August 2014 the USFWS proposed Critical Habitat for the yellow-billed cuckoo; however, the RGCP was not part of the proposed critical habitat designation.

USIBWC restoration sites with a target habitat type of riparian woodland or forest, particularly sites with plantings of cottonwoods and willows in association with overbank lowering, bank cuts, natural levee breeches, secondary channels, bank destabilization, and construction of inset floodplains, have the potential to benefit the yellow-billed cuckoo (SWCA 2011).

Yellow-billed cuckoos have been recorded at or near several of the proposed restoration sites (Trujillo, Crow Canyon, Broad Canyon Arroyo, Berino East, and Berino West). Excavation work at Broad Canyon excluded a portion of saltcedar to be excavated in order to protect the cuckoo existing habitat. When additional habitat is established, USIBWC will return to remove saltcedar on the remaining parcel at Broad Canyon Arroyo.

The Yellow-billed cuckoo is benefited from the planting of cottonwoods. From 2011 to 2013, the USIBWC and USFWS planted about 300 cottonwood trees and over 3,300 total native trees (willows and cottonwoods). From 2013 to 2016, the USIBWC plans to plant another 20,000 trees, including over 1,000 cottonwoods. These efforts will assist the USIBWC to provide cuckoo habitat.

Yellow-billed cuckoos have a large nesting range and need at least 37 acres of deciduous, riparian forest and at least 7 acres of closed canopy, with a canopy height of 5 to 30 m (16-98 feet) and a vegetation understory averaging 1 to 6 m (3-20 feet) (SWCA 2011). The foraging habitat is even larger, averaging 48.4 acres (SWCA 2011). Because of the large nesting and foraging habitats, buffers around observed birds during nesting season are more difficult to implement. USIBWC will work with USFWS to determine reasonable buffers around observed yellow-billed cuckoo sites. Larger and expanded restoration sites are also preferred.

3.2.2.2 Other species

Restoration sites with saltgrass meadow will beneficially impact the Sprague's pipit (SWCA 2011).

The least tern habitat is generally lacking in the RGCP, including sandbars, alkali flats, and non-vegetated shorelines (SWCA 2011); restoration sites with aquatic habitat or inset floodplains could benefit the least tern.

USIBWC Canalization River Management Plan -

PART 4 - CHANNEL MAINTENANCE PLAN

Approval Signatures

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Jose A. Nuñez, P.E. Date

Principal Engineer, Engineering Division

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Carlos Peña, Jr., P.E. Date

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________________________________ ____________

Gilbert Anaya Date

Division Chief, Environmental Management Division

THIS PART OF THE USIBWC CANALIZATION RIVER MANAGEMENT PLAN IS STILL UNDER DEVELOPMENT – TO BE FINALIZED IN 2015

USIBWC Canalization River Management Plan -

PART 5 - FIELD GUIDE TO COMMON NATIVE & NON-NATIVE FLORA & FAUNA IN THE RGCP RIPARIAN ZONE

Approval Signatures

Gilbert Anaya 11/20/14

Gilbert Anaya Date

Division Chief, Environmental Management Division

5.1 Introduction

This Field Guide is intended to provide information on common plants and animals found within the USIBWC lands in the RGCP, in order to assist field staff and environmental staff in management decisions. Native species should generally be left to thrive in areas designated as No-Mow Zones and restoration sites, whereas non-native species can be disturbed or removed in these and other areas. This guide is by no means an exhaustive reference, and staff are encouraged to seek additional biological references if positive identification of a species is not accomplished with this guide. In addition, if field staff encounter a threatened or endangered species, they should call EMD immediately.

5.2 Native Plants of the Rio Grande Riparian Zone

Black Willow / Goodding's Willow

Coyote Willow

Cottonwood



Three-leaf Sumac


New Mexico Olive



Screw-bean Mesquite


Honey Mesquite

Saltgrass (Right: exotic bermuda grass in gloved hand, native saltgrass in right hand)

Yerba Mansa

False Indigo

Wolfberry

Sacaton grass

Chusa grass

Bulrush

Sacred Datura

Four-winged saltbush

Cocklebur

Rabbitbrush

Baccharus/ seep willow

Velvet ash tree

5.3 Native Special Status Species of Wildlife of the Rio Grande Canalization Riparian Zone


Southwestern Willow Flycatcher (Endangered)

Yellow-Billed Cuckoo (ESA Candidate Species)

Aplomado Falcon (Endangered)

Interior Least Tern (Endangered)

Peregrine Falcon (Texas Threatened)

Chihuahuan Desert Lyre Snake (Texas Threatened)

5.4 Non-native Flora and Fauna

Salt cedar / Tamarisk

Giant Cane / Arundo Donax



Russian Thistle/ "Tumbleweed"


Kochia

Exotic Elm (Siberian or Chinese)

5.5 Additional Resources and Photo Sources

5.5.1 Additional Resources

- The Vegetation Types of Texas, including Cropland
  www.tpwd.state.tx.us/publications/pwdpubs/pwd_bn_w7000_0120/
- Field Guide for the Identification and Use of Common Riparian Woody Plants of the Intermountain West and Pacific Northwest Regions
  http://www.nrcs.usda.gov/Internet/FSE_PLANTMATERIALS/publications/idpmcpu7428.pdf
- The Grasses and Grass-like Plants of New Mexico
  https://archive.org/details/grassesgrasslike00woot
- Invasive Riparian Plant Identification Guides
  http://www.epa.gov/naaujydh/pages/publications/authored/EPA620R-06003EMAPSWFieldOperationsManualAppendixD.pdf

5.5.2 Photo Sources:

All photos E. Verdecchia, USIBWC except for the following:

Southwestern Willow Flycatcher – USFS Colorado Plateau Research Station
http://sbsc.wr.usgs.gov/cprs/research/projects/swwf/wifllook.asp

Yellow Billed Cuckoo – The Cornell Lab of Ornithology http://www.allaboutbirds.org/guide/Yellow-billed_Cuckoo/lifehistory

Aplomado Falcon – US Department of Defense & US Fish and Wildlife Service Northern Aplomado Falcon factsheet
http://www.fws.gov/endangered/esa-library/pdf/aplomado_falcon_fact_sheet.pdf

Interior Least Tern – Oklahoma Department of Wildlife Conservation
http://wildlifedepartment.com/wildlifemgmt/endangered/least_tern.htm

American Peregrine Falcon – Texas Parks and Wildlife Department
http://www.tpwd.state.tx.us/huntwild/wild/species/amperegrine/

Chihuahuan Desert Lyre Snake – UTEP Biodiversity Collections, Centennial Museum-
http://www.utep.edu/leb/PleistNM/taxa/Trimorphodon.htm

USIBWC Canalization River Management Plan -

PART 6 - NO-MOW ZONE MAPS

Approval Signatures

José A. Nuñez, P.E
Principal Engineer, Engineering Division

11/20/14
Date

Carlos Peña, Jr., P.E
Principal Engineer, Operations Division

Nov. 17, 2014
Date

WORKING DRAFT

6.1 Introduction

The Maintenance Zone maps show areas where USIBWC will refrain from vegetation management throughout the RGCP. The methodology and justification for maintenance zones is documented in Part 1, Floodplain Management Plan.

6.2 Maps

No-Mow Zone MAPS are in working draft format. The latest version is June 2013. Finalization is depending on further hydrologic and hydraulic analysis.

The current draft version of the map book is a series of 33 maps at 1:20,000 scale at 11x17 inches. Each page covers a width of 5 miles. Grid rectangles for each map sheet are shown and are 5,000 m (3.1 miles) wide. Sheets are rotated so that the maximum length appears on the sheet; the North arrow direction is also shown.

Imagery Source: ESRI Bing Hybrid Basemap or 2011 USIBWC orthoimagery. Right of Way is unofficial; it is digitized in 2011 by URS from USIBWC Canalization Alignment Maps and modified by EMD in 2013. No-mow zones include USIBWC restoration sites, Green Zones, flycatcher buffers, and connectivity zones for managed grasslands.

Map created by USIBWC Environmental Management Division June 2013. For questions contact Elizabeth Verdecchia 915-832-4701.

USIBWC Canalization River Management Plan -

PART 7 - REFERENCES

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