BUREAU OF RECLAMATION

Programmatic Draft Environmental Assessment for the Middle Rio Grande Angostura/Albuquerque Reach Habitat Restoration Project

Upper Colorado Basin Region; Albuquerque Area Office

AAO-EA-25-003

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Mission Statements

The U.S. Department of the Interior protects and manages the Nation's natural resources and cultural heritage; provides scientific and other information about those resources; and honors its trust responsibilities or special commitments to American Indians, Alaska Natives, and affiliated Island Communities. The mission of the Bureau of Reclamation is to manage, develop, and protect water and related resources in an environmentally and economically sound manner in the interest of the American public.

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ACRONYMS AND ABBREVATIONS

°C	degrees Celsius
ABQ Reach	Angostura/Albuquerque Reach
ABCWUA	Albuquerque Bernalillo County Water Utility Authority
ACC	Avenida Cesar Chavez
BEMP	Bosque Ecosystem Monitoring Program
BGEPA	Bald and Golden Eagle Protection Act
BO	2016 Middle Rio Grande Water Operations Final Biological and Conference Opinion
CBP	Corrales Bosque Preserve
CFR	Code of Federal Regulations
cfs	cubic feet per second
CWA	Clean Water Act
DPS	distinct population segment
EA	environmental assessment
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
FONSI	Finding of No Significant Impact
GSA	GeoSystems Analysis, Inc.
HEC-RAS	Hydrologic Engineering Center River Analysis System
I-25	Interstate 25
I-40	Interstate 40
ITA	Indian Trust Asset
LWD	large woody debris
MBTA	Migratory Bird Treaty Act
MRG	Middle Rio Grande
MRGCD	Middle Rio Grande Conservancy District

NDC	North Diversion Channel
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NM 500	New Mexico State Road 500
NMAC	New Mexico Administrative Code
NMDA	New Mexico Department of Agriculture
NMED	New Mexico Environment Department
NMISC	New Mexico Interstate Stream Commission
NMMJM	New Mexico meadow jumping mouse
NMOSE	New Mexico Office of the State Engineer
NMRipMap	New Mexico Riparian Habitat Map
NWR	National Wildlife Refuge
NPDES	National Pollutant Discharge Elimination System
NWP	Nationwide Permit
PCBs	polychlorinated biphenyls
PDN	Paseo del Norte
project	Middle Rio Grande Angostura/Albuquerque Reach Habitat Restoration Project
Reclamation	Bureau of Reclamation
RGSM	Rio Grande silvery minnow
RGVSP	Rio Grande Valley State Park
RM	River Mile
RTK	real-time kinematic
SDC	South Diversion Channel
SLO	New Mexico State Land Office
SWCA	SWCA Environmental Consultants
SWRP	Southwest Reclamation Plant
USACE	U.S. Army Corps of Engineers

USC	United States Code
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
WOTUS	waters of the United States

CHAPTER 1 – INTRODUCTION

This environmental assessment (EA) has been prepared to evaluate and disclose the potential environmental effects of the proposed Middle Rio Grande (MRG) Angostura/Albuquerque Reach (ABQ Reach) Habitat Restoration Project (Proposed Action, or project). The federal action that requires this EA is the issuance of a joint license agreement (or agreements) from the Middle Rio Grande Conservancy District (MRGCD) and the Bureau of Reclamation (Reclamation) to the New Mexico Interstate Stream Commission (NMISC) to allow the habitat restoration project to be constructed on Reclamation- and MRGCD-administered lands. The project is proposed by the NMISC Rio Grande Bureau and Reclamation is the lead federal agency.

The Proposed Action is a multi-phased riparian and floodplain habitat restoration project intended to benefit the Rio Grande silvery minnow (*Hybognathus amarus;* RGSM) and other federally listed species that occur along the MRG including the section of the Rio Grande (river) between the Angostura and Isleta diversion dams (ABQ Reach) (Appendix A: Figure A.1). The Proposed Action consists of 80 separate habitat restoration project areas that combined cover a maximum of 370 acres on the east and west banks and on islands within the channel of the MRG in the ABQ Reach (Appendix A: Figure A.2). The Proposed Action also includes proposed spoils and access road plans. Together the proposed 80 restoration areas, access roads, and spoils locations constitute the 'project area.'

The Proposed Action would provide maintenance, adaptive management, and newly constructed restoration within and in addition to the existing project areas of the NMISC MRG Riverine Restoration Project, which included two main phases (Phase I and Phase II/IIa) initiated in 2005 with construction completed in 2009. Of the 80 proposed habitat restoration project areas, 34 envelop or partially overlap existing habitat restoration sites that had undergone National Environmental Policy Act (NEPA) analysis, including preparation of two EAs, and associated review processes (Appendix B: Table B.1) (SWCA Environmental Consultants [SWCA] 2005, 2007).

This document has been prepared in compliance with NEPA and the Council on Environmental Quality's implementing regulations at 40 Code of Federal Regulations (CFR) 1500–1508 (2020, as amended 2024).[1] An environmental impact statement will be prepared if potentially significant impacts to environmental resources are identified. A Finding of No Significant Impact (FONSI) will be issued if no significant impacts are identified.

1.1 Project Location and Legal Description

The Proposed Action is in Bernalillo and Sandoval Counties, New Mexico, along 19.6 miles of the east and west banks of the MRG, as well as on vegetated islands in the main channel. The restoration sites are in the area that extends from the North Diversion Channel downstream to

[1] Executive Order 14154, *Unleashing American Energy* (Jan. 20, 2025), and a Presidential Memorandum, *Ending Illegal Discrimination and Restoring Merit-Based Opportunity* (Jan. 21, 2025), require the Department to strictly adhere to the National Environmental Policy Act (NEPA), 42 U.S.C. §§ 4321 *et seq.* Further, such Order and Memorandum repeal Executive Orders 12898 (Feb. 11, 1994) and 14096 (Apr. 21, 2023). Because Executive Orders 12898 and 14096 have been repealed, complying with such Orders is a legal impossibility. The Bureau of Reclamation verifies that it has complied with the requirements of NEPA, including the Department's regulations and procedures implementing NEPA at 43 C.F.R. Part 46 and Part 516 of the Departmental Manual, consistent with the President's January 2025 Order and Memorandum.

the south side of where Interstate 25 (I-25) crosses the MRG, north of the Isleta Pueblo (see Figure A.2). The Proposed Action is on lands jointly managed by Reclamation and MRGCD on the MRG. The City of Albuquerque Open Space Division, the Village of Corrales, and the New Mexico State Land Office are also stakeholders with management responsibility of selected habitat restoration sites under review. The Proposed Action does not overlap with Pueblo or private lands.

1.2 Need for and Purpose of the Proposed Action

In 2016, the U.S. Fish and Wildlife Service (USFWS) released the Middle Rio Grande Water Operations Final Biological and Conference Opinion (BO), Consultation Number: 02ENNM00-2013-F-0033 (USFWS 2016), as part of the Endangered Species Act (ESA) Section 7 consultation for RGSM, southwestern willow flycatcher (*Empidonax traillii extimus*; flycatcher), yellow-billed cuckoo (*Coccyzus americanus*), New Mexico meadow jumping mouse (*Zapus hudsonius luteus*; NMMJM), Pecos sunflower (*Helianthus paradoxus*), and interior least tern (*Sternula antillarum athalassos*). The NMISC also participates in the Middle Rio Grande Endangered Species Collaborative Program (Collaborative Program) wherein both governmental and non-governmental entities work cooperatively to address ESA-related issues in the MRG.

The State of New Mexico (NMISC) provided its proposed actions and conservation measures for inclusion in the 2016 BO, including Conservation Measure 23 and 47:

> The State will work with its Program partners to maintain existing overbank habitat constructed by the State since 2006 in the Angostura and Isleta Reaches for 15 years, which will result in maintaining habitat availability at a greater range of flows in which spawning, egg incubation, and larval rearing can occur. (USFWS 2016:155)
>
> The State will work with the USACE and Reclamation to identify projects, in addition to the San Acacia Levee and Socorro Levee Projects, that when constructed will allow the USACE to increase its safe channel capacity releases from Cochiti and Jemez Canyon Reservoirs so that higher snowmelt runoff flows can safely be passed through the middle valley. That, in turn, will provide for additional overbanking habitat. (USFWS 2016:161)

The NMISC seeks to further its contribution to the 2016 BO's MRG adaptive management program by implementation of several of its commitments in the 2016 BO (Conservation Measures 51-53; USFWS 2016:162-163) that help the State meet its Rio Grande Compact deliveries and improve its credit status, which increase opportunities for reservoir storage and future credit relinquishment to benefit the ecosystem and threatened and endangered species habitats.

The Proposed Action is intended to improve RGSM habitat and river functionality, including increased river flow efficacy and enhanced ecological conditions for RGSM and for other endangered species, including southwestern willow flycatcher and yellow-billed cuckoo. The Proposed Action would also partially address impacts of increasingly hotter and drier climatic conditions by creating floodplain habitats at lower spring runoff flows for aquatic species.

The purpose of the project is to:

- create and improve habitat for federally listed species within the ABQ Reach by implementing various habitat restoration activities;
- conduct adaptive management and maintenance restoration activities near or within existing habitat restoration sites given the changed river and riparian conditions since original construction was completed between 2006 and 2009; and
- improve water conveyance and habitat conditions within the river channel by reducing channel narrowing and armoring of islands, bank-attached bars, and banklines that potentially have increased net depletions, reduced safe channel capacity and reduced aquatic species habitat.

1.3 Decision to Be Made

Reclamation will decide whether the project as proposed is likely to result in significant impacts on the environment. This decision does not authorize construction of the subject projects. This EA is programmatic in approach and based on a 30% design scenario, with further reviews and permitting to be conducted at the implementation-level license agreement authorization stage prior to construction (see Section 2.3 Implementation Planning and Permitting). During review of each implementation-level license agreement proposal, Reclamation will determine whether prior NEPA analysis in this EA is sufficient and accurate to the proposal or whether additional NEPA analysis is warranted. See Table 1.1 below and Section 2.3.3 for more information on how each future implementation-level project is reviewed and assessed under NEPA.

Table 1.1. Programmatic versus Implementation Reviews and Decisions

Programmatic EA Decision	Future Implementation Review Decision
Based upon a 30% Design Concept. Assumes minor modifications of footprint may be made at implementation phase; assumes not all subreach areas are constructed simultaneously.	Based upon a 65% Design Package. Identifies final project footprint, establishes resource clearances and survey requirements, and will not change after review and approval.
NEPA – Impacts analysis assumes higher than actual expected impacts (assumes approximately 110% of actual).	**NEPA –** Implementation action proposal is reviewed for adherence to impacts thresholds from the Programmatic EA. Determination is made that NEPA disclosure is sufficient and applicable, or that supplemental NEPA review and disclosure are needed.
National Historic Preservation Act (NHPA) – Assumes avoidance or mitigation of significant impacts, assumes implementation actions will undergo full site-specific Section 106 review (including any necessary surveys and consultation).	**NHPA –** Establishes the undertaking; site-specific surveys are conducted as necessary, Section 106 process is implemented, determination of effects is made.

Programmatic EA Decision	Future Implementation Review Decision
ESA – Assumes take coverage under the BO, relies on USFWS concurrence of effects at future implementation-level Section 7 review.	**ESA –** Letter of Inclusion under the BO is developed, any additional habitat or species assessments are conducted, Section 7 consultation is implemented and completed.
Clean Water Act (CWA) – Assumes wetlands impacts up to a certain volume threshold, coverage under Nationwide Permit 27, relies on U.S. Army Corps of Engineers (USACE) concurrence at implementation-level review.	**CWA –** USACE reviews implementation proposal and aquatics inventory reporting, for compliance with Nationwide Permit 27. Pre-construction notification and concurrence are required.
FONSI – Relies on assumption of additional review at the implementation level to confirm impacts disclosures and thresholds are sufficient and upheld, prior to any authorization to construct.	**NEPA Sufficiency** - Implementation action is reviewed to determine if the action complies and is adequately disclosed under prior Programmatic EA disclosure, or the review highlights the need for a Supplemental EA and possible additional FONSI.

1.4 Scoping and Issues

The NMISC or their contractors held seven internal scoping meetings with Reclamation prior to development of this EA. Meetings were held on October 3, 2023, and February 29, May 8, June 14, September 10, October 2, and November 13, 2024. Additionally, one scoping meeting was held with both Reclamation and the MRGCD on January 18, 2024. Issues considered for analysis in this EA were developed in accordance with guidelines outlined in the Reclamation NEPA Handbook (Reclamation 2012). The scoping issues identified are summarized in Table 1.2 and Table 1.3. The impact indicators provided are used to describe the affected environment for each issue identified for detailed analysis in Chapter 3 and to quantitatively assess the impacts of the alternatives. Environmental commitments that would be implemented under the Proposed Action are provided in Appendix C.

Table 1.2. Issues Identified for Detailed Analysis

Issue No.	Issue	Impact Indicator
Issue 1	Potential impacts to vegetation	▪ Acres of surface disturbance ▪ Acres of native vegetation removed ▪ Acres of nonnative vegetation removed
Issue 2	Potential impacts to aquatic resources	▪ Acres of wetlands impacted by the project
Issue 3	Potential impacts to water quantity and water quality	▪ Estimated depletions ▪ Estimated increase of sediment load during and after construction ▪ Changes in water quality from sediment transport during construction

Issue No.	Issue	Impact Indicator
Issue 4	Potential impacts to federally listed threatened and endangered species and proposed species	▪ Acres of suitable habitat modified during construction ▪ Acres of critical habitat within and adjacent to the project area ▪ Qualitative discussion of impacts to threatened and endangered species' critical habitat and suitable habitat ▪ Acres of wetted habitat impacted during project construction ▪ Acres of wetted RGSM critical habitat impacted during construction
Issue 5	Potential impacts to land use and land access	▪ Acres made inaccessible during construction ▪ Changes in defined land uses within the project area ▪ Qualitative discussion of impacts to trails
Issue 6	Potential impacts to Indian Trust Assets	▪ Qualitative discussion of consideration for Indian Trust Assets in the general area

The following issues (Table 1.3) were determined insignificant or not applicable and are not analyzed in greater detail within this document.

Table 1.3. Resources Eliminated from Further Analysis

Issue	Rationale for Elimination from Further Analysis
Potential air quality and visibility impacts from fugitive dust and emissions generated by ground-disturbing activities	All areas within Bernalillo and Sandoval Counties, New Mexico, are in attainment with National Ambient Air Quality Standards (U.S. Environmental Protection Agency 2024a). During construction, air quality would be temporarily impacted by pollution from exhaust emissions and dust, including fugitive dust generated by transporting excavated sediment to spoil locations. Air pollution from motorized construction equipment and dust dissemination would end after each construction phase. The minor increase in emissions from short-term construction activities would not be expected to exceed the ambient air quality standards for any criteria pollutants in the project area or Bernalillo and Sandoval Counties. Vegetation in the bosque would provide a buffer between fugitive dust at construction sites and sensitive receptors in the area (such as people recreating and residential neighborhoods). Additionally, site areas would be closed to the public during times of construction, reducing the risk of dust inhalation by the public. Design features listed in the environmental commitments would be followed to minimize air quality impacts from fugitive dust.

Issue	Rationale for Elimination from Further Analysis
Potential impacts to soils from equipment access and installation of in-stream features	Soils in the project area are subject to ongoing human disturbance due to existing public access as well as natural processes. Under the Proposed Action, the islands and bars within the channel, as well as portions of the channel banks, would be altered to create the desired habitat types. There would be soil disturbance, including sediment excavation, from construction of the Proposed Action (see Table 2.1). The overall effects are expected to be within normal parameters for a sand-bed river system. Design features Soil-1 through Soil-5, as well as Restore-1, listed in Appendix C would be followed to minimize soil impacts.
Potential impacts to migratory birds	Direct impacts to migratory birds would be avoided by conducting work activities outside the normal breeding and nesting season (April 15–August 15). If performing activities within this time frame is necessary, the appropriate nesting bird surveys would be conducted prior to construction activities. If nesting birds are detected, the NMISC would coordinate and consult with Reclamation and the USFWS before work begins to determine the appropriate next steps. Potential impacts to migratory birds would be avoided or minimized by using the environmental commitments listed in Appendix C.
Potential impacts to wildlife	The Proposed Action would produce short-term, direct impacts to wildlife in the immediate area of construction due to vegetation (habitat) removal. Human activity and noise from construction equipment would likely result in the temporary displacement of general wildlife such as amphibians, reptiles, and small mammals inhabiting the bosque and vegetated islands. There is potential for direct mortality from heavy equipment use. The short-term effects of habitat loss and displacement would be outweighed by the long-term benefits, including aquatic habitat creation and increased food abundance within mesohabitats, of a healthier riparian ecosystem.
Potential impacts to bald and golden eagles	The project as proposed is in compliance with the Bald and Golden Eagle Protection Act (BGEPA) of 1940 (16 USC 668-668d). The Proposed Action is not anticipated to cause take of individual bald or golden eagles, their nests, or their eggs. To prevent impacts to bald or golden eagles, any vegetation removal during the breeding season (March through August) could be preceded by a preconstruction nesting survey up to 2 weeks prior to vegetation removal to establish the occupancy status of any suitable nests detected within the project area. Bald and golden eagles may begin nesting as early as February. Large trees that may provide suitable habitat for bald eagles would be surveyed, marked, and avoided during project implementation. Project design feature Bird-3 (Appendix C) will be implemented to minimize any potential impacts to bald and golden eagles.

Issue	Rationale for Elimination from Further Analysis
Potential impacts to the integrity of known cultural sites	This EA analysis assumes that any and all significant effects to cultural or historic resources would be avoided at the implementation review phase. To meet regulatory requirements under Section 106 of the National Historic Preservation Act, Reclamation will be required to review each future implementation-level action proposal for potential effects to cultural resources, and where previous survey data is not available or is insufficient there will be the need for additional Class III pedestrian cultural resources survey ahead of any authorization for ground-disturbing activities. Pedestrian survey is unlikely to provide great insight into the current integrity of sites within the river channel that have been buried or destroyed due to inundation; however, the proposed project could have implications for potentially intact subsurface remains in areas outside the active river channel. With the assumption that all significant effects to known cultural resources are avoided during implementation-level reviews, this issue is not analyzed in further detail. An initial desktop review (SWCA 2024a) was conducted of all proposed restoration sites and access areas. The desktop review analyzed the known resources found within each subreach and 100-meter project buffer zone. North Diversion Channel subreach has seven sites; none intersect any project components. Two are eligible, one is not eligible, two are unevaluated, and two eligibilities are not entered. Paseo del Norte subreach has 11 sites; six intersect project components. Two are listed in the National Park Service's National Register of Historic Places, seven are eligible, and two are not eligible. Interstate 40 (I-40) subreach has 37 sites; 18 intersect project components. Six are eligible, 17 are not eligible, seven are unevaluated, seven eligibilities are not entered, and LA 138857 has been destroyed. Avenida Cesar Chavez subreach has 11 sites; nine intersect project components. Six are eligible, two are not eligible, one is unevaluated, and two eligibilities are not entered. SDC subreach has six sites; five intersect project components. Four are eligible, one is not eligible, and one is unevaluated.
Potential impacts to cultural, sacred, and traditional places	As part of its Section 106 responsibilities, Reclamation must formally consult with interested Tribes. There are currently eight Tribes with affiliation and interest in Bernalillo County. There are no known traditional cultural properties in the area; however, it is always possible that Tribes have recently created or identified new traditional cultural properties. Consultation will occur between the lead agency and the Tribes during each implementation-level review action.

Issue	Rationale for Elimination from Further Analysis
Potential impacts to transportation and the existing road network	The Proposed Action is on Reclamation- and MRGCD-administered land, and public access is common. Construction equipment (backhoe, excavator) would be hauled to designated staging areas, and existing levee roads and storm drain channels would be used. Traffic may be temporarily impeded during staging setup and breakdown, primarily due to maneuvering on and off main roads. Most spoils piles are on-site or near construction sites; however, some excavated sediments may be hauled off-site, and traffic may be temporarily impeded during this process. Proposed staging and access would be coordinated with Reclamation, the MRGCD, the Village of Corrales, and the City of Albuquerque Open Space Division. The Proposed Action would not measurably impede traffic or increase daily traffic volumes in the project area, nor would it affect the existing road network, other than introducing a small amount of new access. See Section 3.6 for additional information.
Potential impacts to public health and safety	Construction of the Proposed Action would be completed in accordance with the engineered design plans, federal safety requirements, and Reclamation's safety requirements. Public access to the project area during construction would be restricted, thereby minimizing public health and safety risks. Additionally, the extraction of jetty jacks would positively impact public health and safety through the removal of rusted metal and wires which create tripping, collision, and puncture hazards on public trails and can also impede the activities of, or create a hazard for, emergency responders.
Potential impacts to visual and aesthetic resources	The Proposed Action would not produce any long-term changes in the visual and aesthetic experience of the river user. The project would imitate the natural processes of shifting channel configuration, islands and bars, and the vegetation mosaic that are part of the river's aesthetic value. Channel and bank modifications may be visible to pedestrians and recreationists using bridges, trails, and the river edge, or to adjacent homeowners along the river edge during project implementation. The proposed construction may be visible from bridge crossings at the Alameda, Paseo del Norte, Montaño, I-40, Central, Rio Bravo, and I-25 bridges. Visual and aesthetic impacts of the Proposed Action are expected to be of short duration during construction and limited to the immediate viewsheds near the proposed sites.

Issue	Rationale for Elimination from Further Analysis
Potential noise impacts	The Proposed Action is anticipated to generate ambient noise that exceeds the residential outdoor daytime sound level limit of 60 A-weighted decibels (dBA) (City of Albuquerque 2017). Additionally, construction noise from the Proposed Action may be considered unlawful by the Village of Corrales. Construction equipment to be used during the Proposed Action would create temporary variable noise levels of approximately 80 dBA in the immediate vicinity of the restoration site. However, all construction sites are estimated to be more than 400 feet from any noise-sensitive property. The nearest sensitive noise receptors include the recreating public on nearby trails and residents of nearby homes outside the levees or on the opposite side of the bosque. Under the Proposed Action, noise impacts during heavy equipment use would be short-term, and heavy equipment would be used only during normal business hours to minimize noise disturbance. The riparian vegetation and levees would abate some of the noise generated by the equipment. Additionally, ambient background traffic noise at the bridges would help mask noise from nearby construction sites. A Construction Noise Permit would be obtained from the City of Albuquerque, and a Temporary Noise Permit would be obtained from the Village of Corrales.
Potential impacts to socioeconomics	The Proposed Action would not impact current economic and socioeconomic conditions within Bernalillo or Sandoval Counties. Depending upon available and future funds, the cost of the Proposed Action is estimated at between $3 and $10 million. This estimated range is wide because it depends on the number of projects conducted over the Proposed Action duration of up to 25 years. The Proposed Action would provide beneficial impacts to Bernalillo and Sandoval Counties as it would provide jobs to environmental consultants, planners and design contractors, and construction contractors during its lifespan. Additional funds may be available to local land management entities and to municipal managers, but these contributions would not result in measurable impacts to the local social demographics or economics.
Potential impacts to fire and fuels	The potential for ignition of wildland fire from activities associated with the Proposed Action is low. Construction equipment and vehicles would be maintained to reduce the likelihood of leaking flammable fluids, fire extinguishers would be on-site, and construction would be done in the fall and winter when the risk of wildfire is lower. The Proposed Action would result in long-term benefits to the reduction of wildfires through the removal of ravenna grass (*Saccharum ravennae)*, and other nonnative species that can fuel and increase the severity of wildfires. Additionally, the removal of jetty jacks would increase accessibility to the bosque for firefighting actions.

CHAPTER 2 – PROPOSED ACTION AND ALTERNATIVES

Two alternatives are analyzed in this EA: the No Action Alternative and the Proposed Action.

2.1 No Action Alternative

Under the No Action Alternative, Reclamation would not approve the Proposed Action or joint license agreements, and the Proposed Action would not be implemented.

2.2 Proposed Action

The following description is based on a 30% design phase package developed by the NMISC and its contractors. Appendix D contains the 30% design drawings and a brief technical narrative memo (GeoSystems Analysis, Inc. [GSA] 2024a). The Proposed Action involves the design and implementation of habitat restoration projects intended to enhance, restore, and/or create aquatic habitat for the benefit of RGSM within the ABQ Reach of the MRG. Additionally, the Proposed Action is likely to benefit southwestern willow flycatcher and yellow-billed cuckoo.

Sites were selected using a combined desktop and field analytic approach. As an initial step, the NMISC and contract staff completed a rapid site reconnaissance to evaluate construction potential. This visit focused on identifying potential constructability challenges, prioritizing locations for further evaluation, discussing overall project objectives and potential design components, and locating additional sites for further consideration. The sites visited during the rapid site assessment were primarily within previously constructed habitat restoration sites near Central Avenue in Albuquerque. After further evaluation, rapid site assessments were performed throughout the entire study area with the primary goal of locating additional sites throughout the city of Albuquerque and the village of Corrales with potential to meet the project objectives. The rapid site assessments initially focused on assessing sedimentation trends, vegetation community composition, noxious weed presence/absence, and maintenance needs at previously constructed habitat restoration areas. This evaluation resulted in 80 sites proposed for restoration activities. Reclamation and the NMISC are aware of previous restoration site overlap, and design is intended to enhance or maintain previous restoration work and would not conflict with or hinder previous restoration success.

The Proposed Action consists of restoration activities within 80 total habitat restoration project areas (Appendix E: Table E.1) and would occur within the river floodway at five subreach locations (see Figure A.2 in Appendix A):

(1) North Diversion Channel (NDC) Subreach: from the NDC at River Mile (RM) 194 to RM 192;

(2) Paseo del Norte (PDN) Subreach: from the PDN Boulevard northeast bridge at RM 192 to downstream of Montaño Road Northwest at RM 186;

(3) Interstate 40 (I-40) Subreach: from I-40 at RM 186 to downstream of the Avenida Dolores Huerta bridge at RM 181;

(4) Avenida Cesar Chavez (ACC) Subreach: from ACC at the Avenida Dolores Huerta bridge at RM 181 to the South Diversion Channel at RM 177; and

(5) South Diversion Channel (SDC) Subreach: from the SDC at RM 177 to downstream of I-25 at RM 172.5.

The proposed habitat restoration activities include the following earthwork and grading actions:

- Bankline modifications would create shallow and slow-moving water during periods of moderate to high flow to improve RGSM egg retention and larval fish development.
- Island destabilization would create more complex habitat for RGSM by reducing average channel depth, widening the channel, and increasing backwaters, pools, eddies, and runs of various depths and velocities.
- Flow-through channels would create shallow, ephemeral, low-velocity aquatic habitats for RGSM egg and larval development during moderate- to high-flow time periods.
- Backwater channels would retain drifting RGSM eggs, provide rearing habitat, and enhance food supplies for developing RGSM larvae.
- Confluence maintenance would remove sediment from the mouth of previously constructed high-flow channels.
- Jetty jack removal would support the habitat restoration design and wildland fire mitigation and reduce the risk of injury to recreationists.

Additional proposed restoration activities that do not involve earthwork or grading actions include the following:

- Large woody debris (LWD) placement would create slow-water habitats for all life stages of RGSM, provide winter habitat and shelter from predators, and provide structure for periphyton growth to improve food availability for RGSM.
- Nonnative vegetation removal would reduce the spread of nonnative plant species, namely the highly invasive ravenna grass (*Saccharum ravennae*), reduce fuel load, and promote the growth of native plant species.
- Closures of unauthorized pedestrian social trails would reduce additional disturbance within restored habitats. Closures would be implemented using best practices followed by Open Space, including trail signage, placement of woody limbs across junctures, or other non-disturbing methods.

As indicated in Table 2.1, if the Proposed Action is fully implemented, the total area of disturbance is estimated to be up to 488.0 acres.

Table 2.1 Surface Disturbance of the Proposed Action

Project Element	Acres of Surface Disturbance
Restoration Site Activities	370.0
Access Roads	51.0
Spoils	67.0
Total	**488.0**

Details for each proposed habitat restoration project area are provided in Appendix E: Table E.1; the table includes the project area name, associated RM, restoration activity type(s), surface disturbance (acres), and maximum sediment excavation quantity (cubic yards). Table 2.2 captures the maximum disturbance quantities and number of restoration sites for each proposed restoration activity. Section 2.2.1 describes the restoration activities that would be implemented in detail. The proposed access and spoils plans are captured in Sections 2.2.2 and 2.2.3, respectively.

Table 2.2. Surface Disturbance Quantities for Restoration Activities

Restoration Activity	Units	Maximum Quantity
NDC Subreach		
Bankline modification	acres	2
Island destabilization	acres	17
Flow-through channels	acres	N/A
Backwater channels	acres	2
Confluence maintenance	acres	N/A
Total surface disturbance (earthwork/grading)	**acres**	**21**
Total excavated sediment volume	**cubic yards**	**29,893.5**
PDN Subreach		
Bankline modification	acres	69
Island destabilization	acres	53
Flow-through channels	acres	5
Backwater channels	acres	8
Confluence maintenance	acres	N/A
Total surface disturbance (earthwork/grading)	**acres**	**135**
Total excavated sediment volume	**cubic yards**	**121,610.1**
I-40 Subreach		
Bankline modification	acres	44
Island destabilization	acres	18
Flow-through channels	acres	2
Backwater channels	acres	13
Confluence maintenance	acres	1
Jetty jack removal (50 jacks)	acres	1
Total surface disturbance (earthwork/grading)	**acres**	**79**
Total excavated sediment volume	**cubic yards**	**118,697.5**

Restoration Activity	Units	Maximum Quantity
ACC Subreach		
Bankline modification	acres	14
Island destabilization	acres	15
Flow-through channels	acres	2
Backwater channels	acres	6
Confluence maintenance	acres	1
Total surface disturbance (earthwork/grading)	**acres**	**38**
Total excavated sediment volume	**cubic yards**	**43,242.4**
SDC Subreach		
Bankline modification	acres	71
Island destabilization	acres	14
Flow-through channels	acres	1
Backwater channels	acres	10
Confluence maintenance	acres	1
Total surface disturbance (earthwork/grading)	**acres**	**97**
Total excavated sediment volume	**cubic yards**	**115,134.7**
Total surface disturbance (earthwork/grading) for all subreaches	**acres**	**370**
Total excavated sediment volume for all subreaches	**cubic yards**	**428,578.2**

Notes: N/A = not applicable. More than a single proposed individual earthwork and grading restoration activity would occur within the identified habitat restoration project areas (see Appendix E). The maximum quantity (acres and cubic yards) and number of restoration sites associated with each restoration activity were rounded for disclosure. The proposed earthwork and grading restoration activities may include nonnative vegetation treatment.

Applicable design features described in Appendix C would be followed during construction and maintenance of the project. The project would comply with the terms and conditions contained within the project BO (USFWS 2016).

2.2.1 Restoration Activities

The proposed earthwork and grading restoration activities and geographic locations, including bankline modification, island destabilization, flow-through channels, backwater channels, confluence maintenance, and jetty jack removal areas, were determined by combining the NMISC's habitat restoration goals with the following methodologies:

- Hydrologic models of surface and groundwater were used to understand how the river restoration activities could impact the riparian zone. Hydrologic models included the following:
    - MIKE SHE, an integrated groundwater/surface water model originally developed by Système Hydrologique Européen (SHE), with additional

development and maintenance by Dansk Hydraulisk Institute. MIKE SHE–predicted water surface elevations at a range of discharges were used to assign post-excavation elevation targets within each proposed habitat restoration feature.

  - Hydrologic Engineering Center River Analysis System (HEC-RAS) model that informed the inundation patterns, including frequency and duration, within the MRG. Tailwater conditions from the Rio Grande were incorporated, and several scenarios regarding storm and flood events were considered. The model also supported understanding the velocity within the proposed habitat restoration project areas, including erosive thresholds based on velocity.

- High-resolution (e.g., 1-foot) LiDAR topographic data acquired during 2022 (Reclamation 2022) were used to 1) detect existing depressions that could be targeted for excavation to minimize the area and volume of soil disturbance and 2) directly measure sediment accumulation by comparing different LiDAR sources acquired over the past 10 years.
- Real-time kinematic (RTK) survey data were acquired by GSA in spring 2024 at sites where relatively high sedimentation occurred after the 2022 LiDAR data were acquired.
  - Predicted excavation quantities were derived from a topographic model that combines the 2022 LiDAR data with 2024 RTK surveys.
- Nonnative vegetation cover using recent noxious weed mapping (GSA 2024b) and the New Mexico Riparian Habitat Map (NMRipMap) (Muldavin et al. 2023) were acquired.
- Ravenna grass mapping was used to prioritize deeper excavations where ravenna grass occurs to ensure adequate depth of grading to remove the root zone and promote successful initial treatment.
  - Locations of other nonnative vegetation were prioritized for earthwork/grading restoration activities to promote ecological enhancement and the return of native vegetation.

The additional proposed restoration activities, including LWD placement, nonnative vegetation treatment, and pedestrian access trail plans are being proposed as part of the habitat restoration goals associated with the project.

2.2.1.1 Bankline Modification

In the MRG, and especially in the ABQ Reach, the floodplain is disconnected from the channel during spring runoff. The riverbanks that define the channel are often vertical in sections of the river that are experiencing channel degradation (channel bed lowering due to erosion and lack of new sediment).

The two construction techniques that would be implemented to modify the bankline are creating terraces and bank lowering. These techniques would involve lowering the riverbank and floodplain

height by removing vegetation and excavating and removing sediment to allow overbank flooding. Floodplain terraces would be created by lowering the riverbank to target elevations that increase inundation at discharges between 1,000 and 2,500 cubic feet per second (cfs). Bank terracing and lowering techniques would be applied in areas where such actions would not increase flood risk or damage to levee systems.

The lowered floodplain terraces would remove natural bankline levees (naturally occurring ridge structures that form next to the bank of a river, typically during higher velocity runoff events) and would provide additional low-velocity nursery and spawning habitat. Areas where banks are lowered and/or terraced would be inundated during different stages of flows (not annual events). Lowering and terracing the bank would increase the extent of spawning and larval rearing habitats at low to moderate average runoff conditions. Bankline modification would occur at 33 areas within the five project subreaches (see Table 2.2).

2.2.1.2 Island Destabilization

In the mid-1990s, with the listing of RGSM as a federally endangered species, channel maintenance activities, including island mowing, ceased. With the end of this type of maintenance, island and bank-attached bars began to form and grow as they became heavily vegetated, often with nonnative vegetation. Additionally, flows are somewhat controlled during spring runoff to ensure that safe channel flows occur. Although the Rio Grande historically was much wider and in places formed many island and bar complexes, this was a dynamic process that regulated itself so that sediment and water continued to be transported downstream. Due to decreasing high-flow discharges as well as sustained drought conditions, islands have become permanent, large, vegetated features that create narrower and deeper channels within the river. Dense vegetation is unlikely to be removed by river flows alone once root systems, which resist erosion and stabilize islands, are firmly established (Harvey 2022; Reclamation 2007). The establishment of permanent islands results in reduced aquatic habitat, and reduced channel capacity to transmit water and sediment downstream during spring runoff. This creates a negative feedback loop with the formation of more islands and bars and increases the flood risk to levees.

Island destabilization, particularly on islands that have the potential to become or have become permanent channel features, may assist in alleviating adverse changes to RGSM main channel habitat and improve the quality and quantity of available main channel habitat (USFWS 2003). Island destabilization can be accomplished by planned physical disturbance, such as removing vegetation and destabilizing soil and sediment, mowing vegetation, root-plowing vegetation and sediment, and raking vegetation and surface sediment (Braun et al. 2015).

Selected treatments would be applied to 32 islands within the five project subreaches (see Table 2.2). The conceptual design for vegetated island modification and evaluation considers potential increased sediment retention in modified portions of the river as well as potential flow-through at a range of velocities and depths. Island destabilization activities would involve cutting vegetation and excavating a portion of the island or the entire island. Vegetation removal would be accomplished by root-plowing the island in the treatment area to a depth that would remove all vegetation in that area. The ground surface of the excavated area would be such that inundation during lower river flows would provide RGSM habitat over a wider range of flows, particularly 2,000 to 3,000 cfs.

2.2.1.3 Flow-through Channels

Flow-through channels are low-velocity, ephemeral channels that are connected to the main river channel across bars and islands. These channels are normally dry but carry high discharge flows from the main channel, characteristically during spring snowmelt and summer monsoon events. These channels typically carry water at lower velocities than does the main channel and may include mesohabitats, such as pools and backwaters, suitable for RGSM.

Modification of an ephemeral flow-through channel would require removing vegetation, most likely along the edges of vegetated islands that are not connected to the bank, and disturbing sediment or soil. The channels would be excavated to a depth that would allow water to flow at moderate discharges (1,500–2,000 cfs). Channels may also be excavated along sediment bars that are now connected to the banks. This type of feature provides habitat for RGSM larval development and refuge for young RGSM. Modification of flow-through channels would be applied to nine areas within four of the five project subreaches (see Table 2.2).

2.2.1.4 Backwater Channels

The creation of moderate- to high-flow backwater channels would involve removing riverbank and inland vegetation and excavating soils to prescribed depths. Backwater channels with no upstream inlet would be constructed on the bottom of large point bars (at existing low-velocity areas) and islands at a range of elevations that allow for inundation at a range of river flows beginning as low as approximately 800 cfs. Backwater channels would slope slightly, with the downstream end lower in elevation than the upstream end, thereby increasing the amount of RGSM habitat available at a range of river flows.

This technique would be used to increase the amount of low-flow and no-flow habitat areas available to RGSM. The technique is intended to retain drifting RGSM eggs and to provide RGSM rearing habitat and shallow, low-velocity habitats with abundant food supplies for developing RGSM larvae. Forty-one backwater channels would be created within the five project subreaches (see Table 2.2).

2.2.1.5 Confluence Maintenance

Confluence maintenance takes place at the mouth of a tributary that has become plugged with sediment, debris, and vegetation, reducing flow and sediment delivery to the Rio Grande. Excavating the materials that plug the mouth would reconnect tributaries to the river, increasing eddies where adult RGSM and larvae aggregate and creating egg retention sites (Tetra Tech 2004). Confluence maintenance would occur at seven areas within three of the five project subreaches (see Table 2.2).

2.2.1.6 Jetty Jack Removal

Lateral constraints, such as jetty jacks and the densely vegetated natural levees that form around them, decrease the potential for lateral migration of the channel and natural bank erosion processes, ultimately creating a narrower, more linear, and deeper river channel. Removal of jetty jacks would increase the connectivity between the river channel and floodplain by allowing for natural river processes to create wider and more diverse channel and floodplain features (Grassel 2002),

yielding increased low-velocity habitat for all life stages of RGSM. Removal of jetty jacks also provides improved conditions for wildland fire management by allowing firefighters and equipment to navigate more easily through the area. Jetty jacks can be difficult to navigate for recreationalists as well. Wiring creates a tripping hazard, sharp edges of the steel angles and wires can be difficult to see by faster-moving recreationists such as cyclists and equestrians who may collide with them, and the rusted metal poses a risk for tetanus infection. Jetty jacks also detract from the natural beauty of the bosque.

Two project areas within the I-40 subreach are identified for jetty jack removal (see Table 2.2). An estimated 50 jetty jacks occur within the two project areas (see Appendix E); these would be excavated and removed during construction of the project.

Jetty jack removal is proposed only in an area where levees would not be put at risk or where river control activities would not be affected. Jetty jacks would be removed by an excavator, and the remaining void would be filled with excavated soil to bring the elevation of the void to the level of the surrounding ground. Excavated jetty jacks would be stockpiled and removed from the project area in coordination with the MRGCD.

Jetty jacks within the project area are either owned or under the authority of the U.S. Army Corps of Engineers (USACE), Reclamation, or the MRGCD (USACE 2009). The NMISC has initiated a conversation with the three agencies concerning jetty jack removal as part of the project, and a consensus agreement would be reached before removing the jetty jacks.

2.2.1.7 Large Woody Debris Placement

LWD has been identified as suitable habitat for RGSM (USFWS 2003). Large nonnative Siberian elm trees (*Ulmus pumila*) that have been removed from the floodplain would constitute most of the LWD for the project. Additional species such as cottonwood (*Populus* L.) and Russian olive (*Elaeagnus angustifolia*) may be considered for LWD.

Prior to the 1930s, conditions in the MRG naturally provided large quantities of LWD to the channel as stream banks eroded and the river routinely migrated laterally across the floodplain, removing and transporting LWD from the riparian zone. While modification of the river channel and construction of upstream dams for flood control and water delivery are largely responsible for stabilizing the river channel and floodplain, channel incision has essentially eliminated the possibility of overbank flow in the ABQ Reach, thus reducing the amount of LWD available in the river channel. The result of channel stabilization, combined with the absence of overbank flooding, has resulted in the lack of LWD in the present-day channel.

The Proposed Action would place LWD in various locations near planned riverbank modification areas. The placement of LWD is a technique that involves setting root wads, trees, and large branches in the main channel or near the bank to create aquatic habitats. LWD would be placed on or near the riverbank or on islands and bars where it would likely be transported as flows increase. LWD may be placed in high-density location-specific areas or dispersed throughout subreaches. The purpose of this technique is to enhance the mesohabitats available to RGSM.

LWD would be installed using a strategic and opportunistic approach at various suitable project areas within the five project subreaches, with placement and selection of tree species to be

determined on-site during construction. LWD placement would avoid built infrastructure, including diversion dams, bridges, and river gages.

Trees selected for LWD would not be stored within 2 feet of the drip line of any trees to mitigate the potential of ladder fuels. Rootwads would be placed in areas cleared of dry and flammable vegetative material.

2.2.1.8 Nonnative Vegetation Treatment

During construction, nonnative plant species would be removed to achieve the following goals:

- Promote the growth of native plant species
- Enhance available riparian habitats
- Support long-term project stability
- Remove well-established populations of ravenna grass that have aggressively invaded islands and point bars within the ABQ Reach

Each project area may require nonnative vegetation treatment activities, with a focus on the most abundant species: ravenna grass, saltcedar (*Tamarix ramosissima*), and Russian olive. These species are scattered throughout the project areas, and approximately 35 acres are mapped as dominated by nonnative vegetation. These 35 acres are classified by the NMRipMap as Lowland Introduced Riparian Woodland and Scrub or Semi-Natural Riparian Woodland and Scrub (Muldavin et al. 2023). Additionally, nonnative, live or dead trees (saltcedar, Russian olive, and Siberian elm) may be removed from excavation areas within all five subreaches to successfully complete restoration actions.

Large-diameter vegetation, such as trees and large shrubs, would be removed using an excavator fitted with an extraction bucket to mechanically remove vegetation, including rootwads, or would be bulldozed during excavation. For smaller vegetation, the expected removal method is chemical herbicide, mechanical means to remove all biomass, or mastication where the standing biomass is ground and chipped. Mechanical removal of ravenna grass (including root and rhizome fragments) would be implemented to treat that species. Mechanical methods may involve root-plowing/raking using a bulldozer, mowing, chainsaw, or extraction. The root-plowing/raking method would be limited to areas where on-site sediment disposal is expected.

Nonnative species that are not selected for use as LWD would be removed, hauled off-site, or mulched on-site to reduce the fuel load prior to any on-site storage of vegetative materials. Any vegetative material that is cut on-site (and not used for LWD) would be either 1) piled overnight and then hauled off or 2) mulched on-site to a "fine" consistency or size. Any vegetative material cut on-site and piled overnight would be piled at no higher than chest height (4.5 feet) and not within 2 feet of the dripline of standing trees. Mulch would not be placed within 2 feet of the drip line of native cottonwood or willow (*Salix* sp.) trees and would be scattered at a depth not to exceed 3 inches, where applied.

2.2.1.9 Pedestrian Access Trails

The project could include the closure of unauthorized pedestrian trails near and within the

proposed habitat restoration project areas within the I-40 subreach through use of signage and debris placement over trail spurs. Any closure of unauthorized pedestrian trails would be done through coordination with and support from the City of Albuquerque Open Space Division. Unauthorized pedestrian trails are not planned by managing agencies and are spontaneously created by recreationists. The closure of unauthorized pedestrian trails could enhance ecosystem health and focus recreation on the existing and designated City of Albuquerque Open Space trail system (trail system).

Additionally, temporary closure of portions of the trail system could occur during construction activities. The project would not impede long-term recreational access within the bosque as the formally established trail system would remain unchanged after construction activities. No new trails would be constructed as part of the Proposed Action.

Prior to construction, educational signage would be created to inform the public of trail closure and habitat restoration activities.

2.2.2 Access Road Plan

The Proposed Action would include an access road plan for construction and maintenance activities. The use of existing access roads and trails would be prioritized to avoid and minimize disturbance to riparian habitat and native vegetation to the greatest extent possible.

During construction, approved contractors would use existing access roads with no modifications, modified existing access roads and trails, and proposed new access roads and trails as defined below:

- **Existing Access Roads with No Modifications**: The existing access roads available for use with no need for modifications will be prioritized for use, totaling up to 14,192.0 linear feet within the project areas. Existing access roads include two-track ungraded dirt roads, and well-defined off-highway roads (graded dirt and/or cement roads). Access roads within this category would not require widening, grading, or vegetation removal.
- **Existing Access Roads and Trails with Modifications**: Two-track roads and bare earth, asphalt, and gravel trail systems would need to be upgraded to accommodate construction equipment and safe access for construction contractors. These roads and trails may be widened up to 14 feet for one-way traffic, totaling up to 46,123.0 linear feet and a maximum of 15.0 acres of surface disturbance. Modifications could include widening, grading, and vegetation removal including tree limbing. Any access road and trail upgrades, including native vegetation removal, would be minimized to the greatest extent possible to preserve the bosque, including upland and riparian habitat.
- **Existing Access Roads and Trails with Modifications and Additional Vegetation Removal:** Two-track roads and bare earth, asphalt, and gravel trail systems surrounded by dense, obstructive vegetation would need to be upgraded to accommodate construction equipment and safe access for construction contractors. These roads and trails may be widened up to 14 feet for one-way traffic, totaling up to 41,393.0 linear feet with an estimated 14.0 acres of surface disturbance. Modifications would include grading and vegetation removal, including tree limbing. Additional vegetation removal

outside of the widened roads would be necessary, up to 5.5 feet on each side of the road or trail resulting in an estimated 11.0 acres of additional vegetation removed. Any access road and trail upgrades, including native vegetation removal, would be minimized to the greatest extent possible to preserve the bosque, including upland and riparian habitat.

- **Proposed New Access Roads and Trails**: New access roads and trails, totaling up to 17,740.0 linear feet within the project areas, may be required during construction of the project. Short sections of established trails may be permanently rerouted around restoration activities. The access roads and trails would be graded to 14 feet wide for one-way traffic, resulting in approximately 6.0 acres of surface disturbance. Additional vegetation removal outside of the widened roads would be necessary, up to 5.5 feet on each side of the road or trail with an estimated 5.0 acres of additional vegetation removed. Native tree species would be avoided to the greatest extent possible. The access roads would remain for the 25-year duration of project activities.

Table 2.3. captures the maximum linear footage and acreage of each access road type. The Excavation Depth and Contour Figures in Appendix D depict the proposed access plan.

Table 2.3. Proposed Access Road Plan

Access Road Type	Maximum Length (feet)	Maximum Surface Disturbance (acres)
Use of existing access roads, no modifications	14,192	No new disturbance
Existing access roads and trails, widened to 14 feet	46,123	15.0
Existing access roads and trails, widened to 14 feet with additional vegetation removal	41,393	14.0 (ground disturbance) 11.0 (vegetation removal only)
Proposed new access roads and trails	17,740	6.0 (new ground disturbance) 5.0 (vegetation removal only)
Total	**119,448**	**51.0**

Construction of new roads, as well as the expansion of existing roads and trails, would be completed by ripping soils after construction to avoid soil compaction. Reseeding with native grasses would occur along roadsides (see design features Restore-1 and Vegetation-5 in Appendix C).

2.2.3 Spoils Plan

The Proposed Action includes the need to place excavated soil and materials in upland areas during construction. Final locations for spoils piles will be reviewed and authorized by Reclamation and the MRGCD during the implementation review phase ahead of construction (see Section 2.3). For the purposes of providing comprehensive analysis in this EA, a total of 166 potential spoil pile locations have been preliminarily identified (Table 2.4; see Excavation Depth and Contour Figures in Appendix D). Exact placement of the spoils could be subject to change during pre-construction review.

Table 2.4. Estimated Spoils Pile Quantity and Surface Disturbance by Subreach

Subreach	Number of Spoil Piles	Surface Disturbance (acres)
NDC	3	1.0
PDN	57	12.0
I-40	50	32.0
ACC	26	10.0
SDC	30	12.0
Total	**166**	**67.0**

If river conditions allow, some excavated sediment could be placed into the river for movement downstream, pending approval from Reclamation and the USACE prior to any release. Design features captured in Appendix C would be followed to allow sediment into the river.

Additionally, other off-site or on-site beneficial spoils uses may be identified by stakeholder agencies, for the following types of actions, before, during and after construction, if and where approved by appropriate agencies:

- Assist City of Albuquerque revegetation and/or weed control efforts
- Improve or create new turnaround areas for emergency vehicles
- Repair roads
- Improve parking areas
- Assist with erosion control measures (silt fencing support) during construction
- Spread within the floodplain away from wetted areas
- Level excavated areas after jetty jack removal
- Remain within the designated areas for the above future uses
- Promote better drainage

Selected spoil locations identified through agency coordination that are within the bosque would be seeded with native grasses and forbs to control erosion and promote the establishment of native vegetation. Details regarding reseeding and the use of spoil materials would be captured in the site-specific restoration plan(s) and would be coordinated with the MRGCD and the City of Albuquerque Open Space Division before construction (see Appendix C for restoration plan design feature Restore-1).

2.2.4 Construction Methods and Sequencing

In general, construction would be sequenced in the following manner: installation of temporary erosion control measures as needed, clearing/grubbing/vegetation removal, demolition (i.e., removal of jetty jacks), excavation and storage/off-site removal of sediment, nonnative plant species treatment and removal, and installation and establishment of permanent erosion control

measures, if necessary and authorized. Most of the work would be conducted within the active, 600-foot-wide, Rio Grande channel, including within floodplains and dryland areas, and on vegetated islands. In bankline areas, construction would proceed behind a permeable barrier left in place to minimize impacts to RGSM and water quality (see Appendix C for RGSM design features Fish-1 through Fish-8).

Standard highway vehicles and tracked equipment would be unloaded at established access points, including the North Diversion Channel, I-40 bridge, Central Avenue bridge, and South Diversion Channel, and driven to the project areas along designated access roads (see Section 2.2.2). Amphibious excavators would enter the river at designated access points and would travel in-stream for island destabilization.

2.3 Implementation Planning and Permitting

2.3.1 Licensing Agreements

Following the outcomes of the NEPA review process, and prior to the start of construction, the NMISC will be required to obtain a joint license agreement for authorization of proposed activities, issued by the MRGCD and reviewed and signed by Reclamation. To apply for the joint license agreement, the NMISC will submit an application and site-specific Restoration Plan to the agencies for review. The Restoration Plan will include construction specifications, a 100% design drawing/map package, any required resource field survey results reports, and updated site-specific project design features/environmental commitments including access routes and staging areas. The first joint license agreement and associated application package may be completed for a subset of the sites under review in this EA, or it may include all sites, depending on NMISC priorities and funding available at the time of application preparation, as well as the breadth of survey compliance requirements.

Any site-specific surveys for cultural resources, wetlands, or other issues would be completed during the license agreement review phase, and reports would be provided to the relevant agencies for review ahead of license agreement authorization.

2.3.2 Project Site Prioritization

The project areas are being prioritized for the implementation phase based upon the following considerations:

- Greatest potential for ecological lift, increased and improved suitable habitat, and associated benefits to RGSM
- Proximity to each project area from existing roads and trails for efficient mobilization and demobilization of construction equipment
- Results from hydrologic model outputs, including MIKE SHE and HEC-RAS
- Results from LiDAR data and sediment accumulation determinations
- Greatest potential for spawning and nursery habitat to be sustained at low to moderate spring runoff discharges

- Increased primary food production (algae, diatoms) for larval RGSM (including photosynthetic band along the shoreline)
- Greatest potential for recruitment of native riparian vegetation after construction occurs, where desirable
- Increased benefits for public and recreational use
- Seasonal timing and availability of funding

The NMISC and its contractors would prepare the initial license agreement application package and Restoration Plan for first priority sites starting in late 2025.

The project areas are expected to proceed into implementation under license agreement authorizations in batches as design plans mature and funding is available. Project construction, including excavation activities, if approved, would begin for project sites designated as Priority I in winter 2025. Construction activities would occur between September and April of the following year, thus avoiding the nesting season for southwestern willow flycatcher, yellow-billed cuckoo, and other migratory birds. If work is planned during the nesting season pre-construction nest clearance surveys would be conducted. If priority project areas are authorized, but not constructed during the winter season following approval,, they would be constructed during the following available construction time frame (such as the following winter after authorization is received). Available funding would also determine project construction implementation and necessary maintenance activities. The NMISC would notify Reclamation and the MRGCD and other partners each year prior to commencing construction activities for authorized sites. Priority group Restoration Plans will be updated as new design or funding information becomes available.

2.3.3 Permits and Authorizations

The following permits and/or authorizations would be required on a site-specific basis prior to project implementation:

- Authorization under CWA Section 404, using Nationwide Permit (NWP) 27, as administered by the USACE
- CWA Section 402 National Pollutant Discharge Elimination System (NPDES) permit for construction stormwater discharges from the U.S. Environmental Protection Agency (EPA)
    - EPA's 2022 Construction General Permit for stormwater discharges
- CWA Section 401 Water Quality Certification from the New Mexico Environment Department (NMED)
- ESA of 1973 as amended (16 United States Code [USC] 1531–1544, 87 Stat. 884) Section 7 concurrence from the USFWS
- Letter of Inclusion, including the RGSM surrogate take metric, under the 2016 BO (USFWS 2016) to the USFWS, or following any subsequent BO procedures
- National Historic Preservation Act of 1966 (16 USC 470 et seq.) Section 106 concurrence from the New Mexico Historic Preservation Department

- Temporary Construction Noise Permit from the City of Albuquerque Environmental Health Department
- Temporary Noise Permit from the Village of Corrales

Compliance with the following laws and executive orders is required before and during project implementation:

- Clean Air Act of 1963 (42 USC 7401)
- CWA of 1972 as amended (33 USC 1251 et seq.)
- Migratory Bird Treaty Act (MBTA) of 1918 (16 USC 703–712)
- Bald and Golden Eagle Protection Act (BGEPA) of 1940 (16 USC 668–68c)
- Archaeology and Historic Preservation; Secretary of the Interior's Standards and Guidelines (National Park Service 1983)

2.4 Maintenance and Monitoring

The total duration for project construction and follow-up adaptive management and maintenance activities is up to 25 years (life of the project). Future approval of maintenance activities is dependent on funding and agency approvals at the implementation level, as well as subsequent reviews of future maintenance proposals. After initial construction efforts are completed at project sites, conditions-based monitoring, maintenance, and adaptive management efforts are anticipated at some or all project sites. The NMISC, in cooperation with partners such as the MRGCD, the City of Albuquerque Open Space Division, the USACE, and other agencies, will conduct monitoring efforts to evaluate the effectiveness of the restoration techniques, as well as respond to future conditions such as drought, flood, or other restoration or water infrastructure activities that result in geomorphic changes or nonnative vegetation encroachment.

Ongoing maintenance activities, such as confluence maintenance, upkeep of social trail closures, sediment removal, and nonnative vegetation treatment, would be detailed within future monitoring plans or maintenance activity requests. Any maintenance actions would require coordination with the appropriate landowner, land management partner, or authorizing agency.

The Restoration Plans, created as part of each license agreement application, will include any available information regarding monitoring protocols and objectives, frequencies, and strategies. The monitoring protocols will identify restoration site success risks and possible corrective actions. The NMISC, along with partners like the MRGCD, the City of Albuquerque Open Space Division, or other agencies or community organizations, may participate in or collaborate on the monitoring protocols and data sharing.

2.5 Comparison of Alternatives

Table 2.5 provides a comparison of the alternatives analyzed in detail. Resource impacts are outlined for the No Action Alternative and the Proposed Action.

Table 2.5. Comparison of Alternatives and Summary of Effects for the No Action Alternative and Proposed Action

Issue	No Action Alternative	Proposed Action Alternative
Issue 1: Potential impacts to vegetation	The lack of connection between the floodplain and the MRG and the succession and encroachment of vegetation communities onto islands, banks, and bars would continue. Continued encroachment and succession of nonnative vegetation will continue to increase the potential for wildland fire risk, which in turn would impact establishment of native vegetation.	Short-term, adverse impacts to vegetation would occur from the Proposed Action as a result of soil compaction, trampling, and/or removal within the limits of construction disturbance. Design features Vegetation-1 and Vegetation-5 (Appendix C) would minimize impacts to vegetation that could result from the project. Long-term, beneficial impacts would occur from the Proposed Action. The removal of nonnative vegetation would create opportunities for native vegetation to flourish, generate a more resilient and intact bosque, and reduce wildfire fuel load. Additionally, floodplain inundation would occur at increased frequency, allowing for vegetation growth.
Issue 2: Potential impacts to aquatic resources	Surface disturbance to wetlands or waters of the United States would not occur. Increasing the connectivity between the river channel and floodplain and increasing the potential for natural bank erosion processes would not occur. Rio Grande tributaries would not be reconnected. Additional wetted areas conducive to riparian and wetland habitat development would not be created.	Approximately 345.6 acres of wetlands are present within the project area. Short-term, adverse impacts to wetlands include soil compaction, rutting, and vegetation removal. Following construction, an increased amount of substrate area would have the potential to be inundated and/or saturated periodically, which should lead to a net gain in both the area and function of wetlands.

Issue	No Action Alternative	Proposed Action Alternative
Issue 3: Potential impacts to water quality and water quantity	No change to current water quality or water quantity conditions would occur, as ground-disturbing activities related to sediment removal or spoiling and the resulting potential to increase sedimentation in the river would not occur.	Short-term, adverse impacts to water quality would occur from the Proposed Action as a result of soil disturbance, vegetation removal, and potential sediment runoff from the limits of construction disturbance to the MRG. Short-term and localized adverse effects on water quality may result but are not expected to exceed applicable standards. Design features Soil-1, Soil-3, Soil-4, Water-1 through Water-6, and Vegetation-5 (Appendix C) would minimize impacts to water quality that could result from the project. Following construction, beneficial impacts to water quality are expected to result from the Proposed Action as a result of riverbank stabilization and the corresponding reduction in sediment flow from unstable soils. The NMISC continues to coordinate with the New Mexico Office of the State Engineer regarding any potential need for depletion offsets. New depletions, if any, will be offset using the Strategic Water Reserve.
Issue 4: Potential impacts to federally listed threatened and endangered species, proposed species, and designated critical habitat	Possible adverse effects on threatened or endangered species. There would be no increase in suitable RGSM habitat in the ABQ Reach.	Short-term, adverse impacts to threatened and endangered, and proposed species and their habitats (RGSM, endangered; southwestern willow flycatcher, endangered; yellow-billed cuckoo, threatened; and monarch butterfly (*Danaus plexippus)*, proposed threatened) would result from construction activities. Long-term, beneficial impacts to species and their habitats (RGSM, southwestern willow flycatcher, yellow-billed cuckoo, and monarch butterfly) would result from the improved and restored habitat conditions. The project would comply with the terms and conditions contained within the 2016 BO (USFWS 2016).

Issue	No Action Alternative	Proposed Action Alternative
Issue 5: Potential impacts to land use and access	No adverse effects on recreation. Social trails would continue to be used in the bosque.	Short-term, adverse impacts to land use and access would occur from the Proposed Action as a result of restricted access around active construction sites. Short-term, adverse impacts to recreation would occur from the Proposed Action due to trail closures around restoration sites during construction. Long-term, adverse impacts to recreation would occur from the permanent closures of social trails. Long-term, beneficial impacts to recreation would occur due to the removal of jetty jacks and the maintenance of established trails.
Issue 6: Potential impacts to Indian Trust Assets (ITAs)	No ITAs have been identified within the project area; therefore, no impacts from the Proposed Action would occur. No potential downstream impacts to the Isleta Dam would occur.	No ITAs have been identified within the project area, therefore no impacts from the Proposed Action would occur. Short-term, adverse impacts to nearby, downstream ITAs including the Isleta Dam may occur from the Proposed Action due to potential sedimentation during construction periods.

CHAPTER 3 – AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

This chapter describes the existing conditions relevant to the issues presented in Table 1.2 and discloses the impacts of the Proposed Action and No Action Alternative on those issues. Impacts can be direct, indirect, or cumulative and are characterized as either long-term (permanent) or short-term (temporary). Short-term impacts are defined as those impacts expected to occur during the construction phases of the project. Long-term impacts are defined as those impacts expected to occur postconstruction and up to the full duration of project activities, estimated at 25 years. Impacts described in this programmatic document include assumptions and larger scale evaluation of impacts, which will be refined for individual projects once the specific project design is finalized and undergoes further review and permitting as outlined in this document.

3.1 Reasonably Foreseeable Trends and Planned Actions

Council on Environmental Quality NEPA implementing regulations, 40 CFR 1502.15, require that NEPA documents "succinctly describe the environment of the area(s) to be affected by the alternatives under consideration, including the reasonably foreseeable environmental trends and planned actions in the area(s)." This EA describes the impacts, or environmental consequences, of the Proposed Action and alternatives and the potential impact of the reasonably foreseeable future trends and planned actions combined with the Proposed Action and alternatives in the project area and/or analysis area following the requirements of 40 CFR 1502.15. The spatial analysis area is defined as the ABQ Reach of the MRG because this is the estimated extent of the direct and indirect impacts of the Proposed Action, and the resources impacted by the Proposed Action are the same as the resources impacted by the cumulative actions that are being identified (Table 3.1). The temporal analysis time frame for cumulative impacts is estimated at 25 years, which is the estimated duration of project activities.

Table 3.1 Cumulative Action Scenario for the Proposed Project

Project Name	Responsible Agency/ Organization	Project Description
Recreation and environmental education enhancements at the Valle del Oro National Wildlife Refuge (NWR)	USFWS	The 570-acre Valle de Oro NWR was designated in 2012, and it is the first urban wildlife refuge in the Southwest Region for the USFWS. Current plans for the NWR include expansion of the existing trail network and restoration of the former dairy farm into a mosaic of native habitats to enhance environmental education activities in the NWR and South Valley of Albuquerque (USFWS 2023a).

Project Name	Responsible Agency/ Organization	Project Description
Recreation activities and enhancements within the Rio Grande Valley State Park	City of Albuquerque Open Space Division	Within the Rio Grande Valley State Park, the City of Albuquerque performs routine vegetation management and recreation enhancement activities, including vegetation thinning, invasive species treatments, and trail creation improvements to benefit the community. Ongoing recreation activities within the Rio Grande bosque include trail running, cycling, hiking, and birdwatching along the trail network within the Rio Grande Valley State Park.
Rio Bravo/Poco Loco NE picnic area improvements	City of Albuquerque Open Space Division	This site, commonly known as Poco Loco, is accessed on the northeast side of Rio Bravo from Broadway. The area includes a fully accessible 0.25-mile loop trail that winds under a canopy of cottonwoods, passing by the quiet flow of the Rio Grande. This is an ideal site to provide better small watercraft access for boaters, as well as emergency river access for the Bernalillo County Fire Department. Previous restoration projects, including fuel reduction and invasive species management, have been completed in this area. There are a number of resprouting invasive plants including Siberian elms and tree of heaven (*Ailanthus* sp.). The City of Albuquerque is working with local organizations to treat this area by hand-removing smaller caliper trees. As of June 2024, it appeared some wildfire damage had occurred at this site.
New Mexico State Land Office (SLO) bosque adjacent to Valle de Oro NWR	City of Albuquerque Open Space Division; SLO	The Open Space Division is working closely with the NWR and SLO to collaborate on education and conservation activities within the 213-acre project area that is part of the larger Rio Grande Valley State Park. Proposed project activities include working with youth crews on restoration projects.

Project Name	Responsible Agency/ Organization	Project Description
Southwest Reclamation Plant (SWRP) Outfall Restoration Project	Albuquerque Bernalillo County Water Utility Authority (ABCWUA)	The SWRP Outfall Restoration Project is a floodplain habitat restoration and recreation enhancement project intended to benefit surface water quality and federally listed species that occur along the MRG and in the South Valley community. The proposed project area is approximately 15 acres and occurs on the east side of the MRG, north and south of the SWRP outfall. The proposed project is a partnership with the ABCWUA and the New Mexico Office of Natural Resources Trustee (Reclamation 2023).
Westside Water Reuse Project	ABCWUA	The purpose of the Westside Water Reuse Project is to provide non-potable water to ABCWUA customers in the Westside service area for turf irrigation and limited industrial use. The project also provides capacity relief for the collection system due to anticipated future limitations. The main goals of the Westside Water Reuse Project are to treat wastewater to reuse/reclaimed water standards for beneficial use purposes to conserve limited groundwater resources and provide drought resiliency, reduce downstream interceptor flows, and provide education and community involvement.
Rio Grande Bosque Habitat Restoration Action Plan	City of Albuquerque Open Space Division; MRGCD	The City of Albuquerque Open Space Division Rio Grande Bosque Habitat Restoration Action Plan is focused on short-term actions that can be implemented over 6 months following completion of the Rio Grande Bosque Wildfire Mitigation Project (completed in April 2023) along with recommendations for a longer Restoration Action Plan over a 2-year period at specific locations identified as Units in the Rio Grande Valley State Park. The plan will focus on planting native grasses, forbs, and woody plant species to promote a diversity of wildlife habitats. The Open Space Division is working with staff, partners, and volunteers on post-treatment restoration, which includes reestablishing trails, managing annual weeds in disturbed areas, managing resprouts of invasive plants, and planting native vegetation (City of Albuquerque 2023).

Project Name	Responsible Agency/ Organization	Project Description
Bosque Ecosystem Monitoring Program (BEMP)	University of New Mexico and Bosque School	BEMP combines long-term ecological research with community outreach by involving K–12 teachers and their students in monitoring key indicators of structural and functional change in the MRG riparian forest, or bosque. During the 2021 reporting period, BEMP had 33 sites along 250 miles of the Rio Grande. Through the strategic location of these sites, BEMP studies the ecological drivers and effects of fire, flooding, climate change, and human alteration on the bosque ecosystem. Five groundwater wells are monitored during a monthly week-long monitoring effort, along with the nearby ditch or drain (BEMP 2022).
Urban development within the South Valley of the City of Albuquerque	Private	Urban development activities include clearing land to construct buildings for residential and commercial areas, road and bridge maintenance projects, and similar activities associated with the City of Albuquerque's urban environment that surrounds the portion of the bosque that would be treated by the Proposed Action.
SWRP outfall maintenance	ABCWUA	The ABCWUA conducts maintenance, as needed, at the existing SWRP outfall flumes to ensure functionality, public safety, and adherence to state and federal permits. Water quality samples are taken daily to comply with the ABCWUA's NPDES permit.
Replacement of the Rio Bravo Bridge	New Mexico Department of Transportation and Federal Highway Administration	The proposed project involves replacing the eastbound and westbound bridges on New Mexico State Road (NM) 500 (Rio Bravo Boulevard) spanning the Rio Grande. The project area is on NM 500 between NM 314 (Isleta Boulevard SW) and NM 303 (2nd Street SW) and includes the two bridges crossing the Rio Grande and the MRGCD Albuquerque Riverside Drain. The bridge replacement is scheduled for 2025 (New Mexico Department of Transportation 2023).

Project Name	Responsible Agency/ Organization	Project Description
Habitat restoration activities	Members of the MRG Endangered Species Collaborative Program (Collaborative Program)	Members of the Collaborative Program have funded multiple habitat restoration projects in the Angostura/Albuquerque Reach. RGSM augmentation funded by members of the Collaborative Program would provide positive synergistic interactions with the habitat that would be created by this project.
Rio Grande flood control levee maintenance	USACE	The USACE routinely conducts maintenance on the levees on an ad-hoc basis for the purpose of flood control. When work is conducted, disturbances such as noise and increases in fugitive dust occur in and around the bosque. No levee work is currently proposed within the project area.
Ecosystem restoration projects within the MRG	USACE	The USACE has some planned ecosystem restoration projects within some of the same project areas (between Sandia and Isleta Pueblos) within the MRG. When work is conducted, disturbances such as noise and increases in fugitive dust occur in and around the bosque.
MRGCD maintenance projects	MRGCD	The MRGCD routinely performs maintenance on irrigation canals and ditches throughout the MRG.
Climate change	Not applicable	Climate change is a global process that is affected by the sum total of greenhouse gases (primarily carbon dioxide) in the Earth's atmosphere. The incremental contribution to global greenhouse gases from land management actions cannot be accurately translated into effects on climate change globally or in the area of any site-specific or regional action. Currently, global climate models are unable to forecast local or regional effects on resources. The United States and the Southwest continue to face concerns about social and environmental impacts from climate change.

3.2 Issue 1: Potential Impacts to Vegetation

3.2.1 Affected Environment

The project area is within the Arizona/New Mexico Plateau: Rio Grande Floodplain Level IV

ecoregion (Griffith et al. 2006). The project area contains a mosaic of different vegetation cover types, including native and nonnative woodlands, shrublands, herbaceous vegetation, and miscellaneous cover types related to development and disturbances (Muldavin et al. 2023).
A list of plant species known or expected to occur in the project area (Appendix F) was based on species observed during SWCA's general biological survey of a sample set of restoration sites, completed on September 18, 19 and October 23–27, 2023 (SWCA 2024b), and on the NMRipMap Level 2 descriptions (Muldavin et al. 2023). Of the plant species known or expected to occur in the project area, 81% are native, 17% are nonnative, and 2% are identified to the genus level and cannot be determined as native or nonnative species.

During the September and October 2023 field surveys of the I-40 subreach, five New Mexico Department of Agriculture (NMDA)–listed noxious weed species (NMDA 2020) were identified within the project area (Table 3.2) (SWCA 2024b). Ravenna grass is listed as a Class A noxious weed that is not considered widespread in New Mexico but has been increasing in prevalence in the MRG bosque, particularly around the Albuquerque area. Ravenna grass was detected in the I-40 subreach and mapped throughout the MRG (GSA 2024b). Russian olive, tamarisk, Siberian elm, and tree of heaven are all categorized as Class C noxious species, which are considered widespread in the state. The four Class C species were noted as being present throughout the I-40 subreach area during the September and October 2023 field surveys (SWCA 2024b). The NMDA suggests that "management decisions for these species should be determined at the local level, based on feasibility of control and level of infestation" (NMDA 2020). Additional nonnative plant species known or expected in the project area are listed in Appendix F.

Table 3.2 New Mexico Designated Noxious Weeds in the Project Area

Common Name	Scientific Name	Noxious Weed Class
Ravenna grass	*Saccharum ravennae*	A
Russian olive	*Elaeagnus angustifolia*	C
Siberian elm	*Ulmus pumila*	C
Tamarisk	*Tamarix* spp.	C
Tree of heaven	*Ailanthus altissima*	C

According to the user guide, the NMRipMap is a publicly available map resource that provides a comprehensive, fine-scale spatial view of the composition, cover, and structure of riparian and wetland vegetation along New Mexico's perennial streams and rivers (Muldavin et al. 2023). NMRiPMap has three hierarchical levels. Level 2 is the mid-level between the broader Level 1 and finer Level 3 and categorizes vegetation communities by elevation ranges, native versus nonnative woody species, natural and semi-natural vegetation, riparian versus upland vegetation, and specific elements of miscellaneous land types such as roads, water, and agriculture. Table 3.3 summarizes the percentages of NMRipMap Level 2 vegetation types present in the project area.

Table 3.3. New Mexico Riparian Habitat Level 2 Vegetation Types Present in the Project Area

New Mexico Riparian Habitat – Level 2 Vegetation Types	Percentage of Total Project Area
Lowland Riparian Shrubland	45%
Lowland Riparian Forest and Woodlands	14%
Lowland Dry Meadow and Grassland	7%
Lowland Introduced Riparian Woodland and Scrub	6%
Lowland Marshes and Wet Meadows	3%
Semi-Natural Riparian Woodland and Scrub	2%
Agriculture	<1%
Total Vegetation Cover Percent of Project Area	**77%**
Unvegetated: Water/Channel, Bare Unvegetated, Roads, Urban/Built-Up Areas	23%
Total Project Area	100%

Source: Muldavin et al. (2023).

The vegetation types present are briefly described below.

- Lowland Riparian Shrubland category is riparian shrubland of lowland valleys and canyons, consists of shrubs, and may also contain grasses. This type of vegetation is the single largest (45%) vegetation category in the project area. Example dominant species in this type include Russian olive, tamarisk, narrowleaf willow (*Salix exigua*), Emory's baccharis (*Baccharis emoryi*), and mule-fat (*Baccharis salicifolia*).

- Lowland Riparian Forest and Woodlands is described as a gallery forest of lowland valley floodplains. Example dominant species in this type include cottonwood, Russian olive, Goodding's willow (*Salix gooddingii*), and boxelder (*Acer negundo*).

- Lowland Dry Meadow and Grassland consists of dry grasslands and meadows of lowland river valleys, dominated by grasses. Example dominant species in this type include saltgrass (*Distichlis spicata*), alkali sacaton (*Sporobolus airoides*), and foxtail barley (*Hordeum jubatum*).

- Lowland Introduced Riparian Woodland and Scrub consists of woodlands and shrublands of lowland valley floodplains dominated by non-native woody species. Example dominant species in this type include Russian olive, tamarisk, Siberian elm, and tree of heaven.

- Lowland Marshes and Wet Meadows consists of wetlands and wet meadows of lowland river valleys, typically dominated by wetland herbaceous species like grasses and forbs. Example dominant species in this type include common threesquare (*Schoenoplectus pungens*), common spikerush (*Eleocharis palustris*), cattail (*Typha* spp.), and woolly sedge (*Carex pellita*).

- Semi-Natural Riparian Woodland and Scrub consists of relict and non-native woodland and shrublands disconnected from the natural riparian corridor and may include stands of trees along irrigation ditches. Example dominant species in this type include cottonwood, Siberian elm, and coyote willow (*Salix exigua*).

- Agriculture is either developed agricultural fields of cultivated crops (active and fallow fields, orchards, or vineyards) or grassy pasture areas with livestock use but without regular tilling.

A significant portion (23%) of the project area is categorized as "Water/Channel," "Bare Unvegetated," "Roads," and "Urban/Built-Up Areas." These Level 2 types are miscellaneous land types that do not consist of vegetation and contain bare ground in and outside of river channels, water within river channels, roads, bridges, and human development.

GSA developed an estimate of tree density within restoration sites (vegetated islands, bank attached bars, and floodplain terraces) using a combination of available data models (GSA 2024c). Data reviewed included Hink and Ohmart vegetation mapping (Collaborative Program 2024a), RipMap (Muldavin et al. 2023), aerial photography captured by Unmanned Aerial Vehicle drones including the photographs from the Ravenna grass drone mapping (GSA 2024b), and field verification. Initial site identification and selection avoided areas dominated by mature Rio Grande cottonwood (*Populus deltoides* var. *wislizenii*) or Goodding's willow. Additional tree preservation areas will be further identified during site-specific design at the implementation level, including avoidance of healthy seed-bearing aged trees. Overall mature trees made up of primarily Russian olive or saltcedar will be removed during construction and restoration implementation, estimated as a ratio of approximately 25 per acre. Dense bands of willows occur along banklines within some restoration sites, these would also be removed as part of restoration activities. These species are expected to regenerate naturally as the depth of excavation would preserve the seed bank (GSA 2024c).

Historically, the annual hydrologic regime for the project area was characteristic of southwestern rivers with high flows in the spring driven by snowmelt followed by long periods of low flows in the midsummer, fall, and winter. Occasional summer thunderstorms could produce short-duration increases in flows in the Rio Grande. The river has changed drastically over the years from irrigated agriculture and climatic variations. Levees were built in the 1920s and 1930s to cope with floods and to constrain the river's floodway. Agriculture has been the primary driver controlling the river flow. Upstream water storage reservoirs, diversion dams, and valley drainage of shallow groundwater have altered the original patterns of water and sediment distribution within the river and floodplain (Crawford et al. 1993). These measures have an impact to the vegetation distribution as well. Smaller peaks and longer duration low flows in the river have led to changes from a braided and anastomosing channel to a narrow, single-threaded less sinuous one, with vegetation encroachment filling in the gaps of the patchy mosaic vegetation pattern that once stood.

The bosque's vegetation has previously been impacted by naturally occurring overbank floods and long dry periods. The last 50 years have seen wildfires begin to replace flooding as a major force of disturbance in the bosque. The lack of spring flooding combined with increasing wildfires has influenced the bosque's vegetation organization and appearance. The effects from these fires have also been intensified by the spread of woody invasive species and the accumulation of deadwood, in addition to the increase in river regulation (Crawford et al. 2005).

NEPA analysis was performed in 2005 and 2007 (SWCA 2005, 2007) for subreaches that overlap or partially overlap all five of the subreaches identified for the Proposed Action. Both EAs describe the typical ecosystem found directly along the main channel of the MRG where the work was occurring. Both EAs also document the increase in nonnative vegetation including tamarisk, Russian olive, and Siberian elm. Lastly, both EAs reference that little was known about the ecology and biodiversity of in-channel bars that had become common and permanent due to the change in flow regime that limits peak flows and the processes that could periodically remove island vegetation and/or entire islands.

3.2.2 Effects from the No Action Alternative

Under the No Action Alternative, no vegetation removal or controls would occur because the project would not proceed into construction, and planned maintenance of previous restoration sites would not occur. Removal of approximately 25 mature trees per acre, primarily Russian olive, Siberian elm, and saltcedar, would not occur. Vegetation would continue to establish itself based on current and existing soil and water flow conditions. Therefore, the lack of connection between the floodplain and the MRG and the succession and encroachment of vegetation communities onto islands, banks, and bars would continue. Continued encroachment and succession of nonnative vegetation would continue to increase the potential for wildland fire risk, which in turn would also impact establishment of native vegetation.

3.2.3 Effects from the Proposed Action

The Proposed Action includes surface disturbance from restoration activities (see Table 2.1). Short-term, adverse impacts would occur from surface disturbance resulting in both native and nonnative vegetation removal. The NMRIPMap Level 2 vegetation types affected by surface disturbance are summarized in Table 3.4 below. Design features Soil-1 through Soil-5 and Vegetation-1 through Vegetation-6 would minimize impacts to vegetation that could result from the proposed project (see Appendix C).

Table 3.4 Impacts to New Mexico Riparian Habitat Vegetation Type Areas from Proposed Action

New Mexico Riparian Habitat – Level 2 Vegetation Types	Area (Acres)
Lowland Riparian Shrubland	219.6
Lowland Riparian Forest and Woodlands	68.3
Lowland Dry Meadow and Grassland	34.2
Lowland Introduced Riparian Woodland and Scrub	29.3
Lowland Marshes and Wet Meadows	14.6
Semi-Natural Riparian Woodland and Scrub	9.8
Agriculture	0.4
Total	**376.2**

According to the analysis of tree density conducted by GSA (GSA 2024c), approximately 25 trees

per acre, defined as mature trees primarily consisting of Russian olive, Siberian elm, and saltcedar, would be removed as part of the proposed restoration activities. Dense bands of willows occur along banklines within some restoration sites, these would also be removed as part of restoration activities. This species is expected to repopulate naturally as the depth of excavation would preserve the seed bank. Initial site identification and selection avoided areas dominated by mature Rio Grande cottonwood or Goodding's willow. Additional tree preservation areas will be further identified during site-specific design at the implementation level, including avoidance of healthy seed-bearing aged trees.

In total, 89.28 acres of ravenna grass, the nonnative plant species targeted for treatment via mechanical methods (see Section 2.2.1.8), would be removed under the Proposed Action. The existing locations of this species were mapped (GSA 2024b). Table 3.5 summarizes the ravenna grass areas that would be removed by restoration activities.

Table 3.5 Ravenna Grass Acreage Removed by Proposed Action

Subreach	Acres
NDC	2.01
PDN	39.11
I-40	18.59
ACC	5.15
SDC	24.42
Total	**89.28**

Long-term, beneficial impacts would occur from the Proposed Action. Floodplain inundation would occur at increased frequency. It is anticipated that native riparian and wetland vegetation would increase due to increased inundation in the floodplain. The proposed project area would be revegetated with native trees, shrubs, and forbs, and the stabilized riverbank would be more conducive to natural reestablishment of native riparian vegetation. Removal of jetty jacks would improve ecological uplift by creating space for native vegetation to establish where structures previously existed and improve wildland fire mitigation in the project area. Reestablishment of native vegetation and ongoing treatment of non-native vegetation is planned for success monitoring at the implementation level according to Restore-1 in Appendix C. The removal of invasive species in the project area would aid in decreasing the spread of these species throughout the bosque. In addition, thinning the bosque vegetation for the Proposed Action would decrease the amount of fuel available when fires do occur.

3.2.4 Cumulative Effects

The reasonably foreseeable trends and planned actions associated with projects listed in Table 3.1 would have similar impacts to vegetation as described above for the Proposed Action. Specifically, the recreation enhancements within the Rio Grande Valley State Park, Rio Bravo/Poco Loco NE picnic area improvements, and other MRG habitat restoration projects are likely to target removal of nonnative vegetation and beneficially impact success of native vegetation. All these projects involve construction activities, which require surface disturbance and vegetation removal. Short-

term, adverse impacts to some native vegetation would include soil compaction, vegetation trampling, and vegetation removal. For those projects involving recreation enhancements and habitat restoration, it is expected that long-term, beneficial impacts to vegetation would occur as a result of native revegetation of the disturbed area and the removal of noxious and nonnative species, including a reduction in their seedbank in the restoration area. For infrastructure projects, such as the Rio Bravo bridge replacement project, removal of some vegetation may be permanent if the footprint of the bridge expands into current vegetated areas. It is expected that permanent vegetation impacts would be mitigated, thus reducing long-term effects. Therefore, cumulative impacts to vegetation would be both short- and long-term and both adverse and beneficial.

3.3 Issue 2: Potential Impacts to Aquatic Resources

3.3.1 Affected Environment

The project area is adjacent to and contains wetlands connected to the main channel of the Rio Grande, a jurisdictional waters of the United States (WOTUS). WOTUS is a threshold term in the CWA and, in general, includes traditional navigable waters, wetlands adjacent to traditional navigable waters, and relatively permanent waters defined as tributaries and wetlands adjacent to navigable waters that have a continuous surface connection and standing or continuously flowing bodies of water (EPA 2024b). Jurisdictional wetlands are defined by the USACE as "areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions" (USACE 1987:9). According to the USACE (1987), for an area to be considered a wetland, it must contain the following three parameters under normal circumstances: 1) the presence of wetland hydrology showing regular inundation, 2) a predominance of hydrophytic (water-loving) vegetation, and 3) soils characteristic of frequent saturation (i.e., hydric soils).

The USFWS National Wetlands Inventory (NWI) identifies and characterizes wetlands, including freshwater emergent wetlands, freshwater forested/shrub wetlands, freshwater ponds, riverine, and others (USFWS 2024a). Table 3.6 summarizes the NWI-designated wetland types within the project area by subreach (USFWS 2024a).

Table 3.6. NWI Wetland Types in Project Area by Subreach

NWI Wetland Type	Area (acres)
Freshwater Forested/Shrub Wetland	17.9
Riverine	1.8
Subtotal	*19.7*
PDN Subreach	
Freshwater Emergent Wetland	5.3
Freshwater Forested/Shrub Wetland	91.6
Riverine	39.6

NWI Wetland Type	Area (acres)
Subtotal	*136.5*
I-40 Subreach	
Freshwater Emergent Wetland	1.7
Freshwater Forested/Shrub Wetland	55.6
Riverine	10.1
Subtotal	*67.4*
ACC Subreach	
Freshwater Emergent Wetland	1.0
Freshwater Forested/Shrub Wetland	25.1
Riverine	10.5
Subtotal	*36.6*
SDC Subreach	
Freshwater Forested/Shrub Wetland	51.0
Riverine	34.6
Subtotal	*85.6*
Totals	
Total Freshwater Emergent Wetland	8.0
Total Freshwater Forested/Shrub Wetland	241.2
Total Riverine	96.6
All NWI Wetland Types	**345.8**

3.3.2 Effects from the No Action Alternative

Under the No Action Alternative, ground-disturbing activities associated with the Proposed Action such as access road construction, lowering of banks and banklines, vegetation removal and treatment, and large woody debris placement would not occur, and the resulting surface disturbance to wetlands or WOTUS would not occur. Areas of overbank flow during a wider range of river flow levels resulting from lowering banks and removing jetty jacks, effectively increasing the connectivity between the river channel and floodplain and increasing the potential for natural bank erosion processes, would not occur under the No Action Alternative. Sediment removal that would reconnect tributaries to the Rio Grande would not take place. Additional wetted areas inducive to riparian and wetland habitat development would not be created. Expected increases of riparian and wetland habitat within the proposed project areas over the long term would not occur in areas where there are no overlapping restoration activities from other projects.

3.3.3 Effects from the Proposed Action

The Proposed Action includes surface disturbance from restoration activities (see Table 2.1). Short-term, adverse impacts to aquatic resources include soil disturbance, soil compaction, vegetation removal, and potential sediment runoff from the limits of construction disturbance to the MRG. Impacts from sediment runoff into aquatic resources are described in greater detail in Section 3.4. Restoration activities affecting aquatic resources are summarized in Table 3.7.

Approved Jurisdictional Determinations have not been issued by the USACE for the wetlands in all subreaches; however, due to the wetlands' adjacency and potential connectivity to the Rio Grande, they are likely jurisdictional. Per design feature Water-3, the NMISC will obtain the necessary CWA Sections 404 permits for dredge and fill activities within WOTUS and 401 water quality certification prior to construction and will comply with the requirements of the permit and certification, including required reporting to the USACE and appropriate authorities as needed. Up to 344.3 acres of restoration activities overlap with NWI wetland areas within all subreaches.

Table 3.7. Impacts to NWI Wetland Areas from Proposed Action

Restoration Activity	NWI Wetland Type	Area (acres)
Earthwork and Grading	Freshwater Emergent Wetland	6.0
	Freshwater Forested/Shrub Wetland	237.0
	Riverine	96.3
Access Roads	Freshwater Emergent Wetland	0.9
	Freshwater Forested/Shrub Wetland	3.8
	Riverine	0.3
Total		344.3

Although construction of the proposed project would result in temporary impacts to potentially jurisdictional wetlands (WOTUS), the amount of riparian and wetland habitat within the proposed project areas is expected to increase over the long term as a result of restoration activities (see Section 2.2). The Proposed Action would create more areas of overbank flow during a wider range of river flow levels by lowering banks and removing jetty jacks, effectively increasing the connectivity between the river channel and floodplain and increasing the potential for natural bank erosion processes. The Proposed Action would also reconnect tributaries to the river by removing sediment. Initially, wetland areas may decrease from surface disturbance but, over the long term, the restoration activities would provide more wetted areas conducive to riparian and wetland habitat development.

A USACE Department of the Army permit pursuant to CWA Section 404 is required for the discharge of dredged or fill material into WOTUS, unless an exemption applies.

It is anticipated that impacts to WOTUS from the Proposed Action would be permitted with the USACE for compliance with CWA Section 404 under NWP 27 (Aquatic Habitat Restoration, Enhancement, and Establishment Activities) provided the activities result in net increases in aquatic resource functions and services (USACE 2022). The Proposed Action would meet the

requirement of the NWP that aquatic resources, such as wetlands, benefit from the activities. The project would comply with the conditions of the NWP, including the implementation of best management practices. If the USACE determines that an Individual Permit is required, the implementation-level project may be redesigned to reduce impacts to thresholds covered under the NWP program.

3.3.4 Cumulative Effects

The reasonably foreseeable trends and planned actions associated with current and future projects listed in Table 3.1 would share many similar impacts to the Proposed Action, with some disturbance to aquatic features and an overall beneficial impact to the riverine wetlands and associated aquatic ecosystem. Specifically, the replacement of the Rio Bravo bridge, as well as Rio Bravo/Poco Loco NE picnic area improvements, might potentially have adverse impacts to wetlands and the MRG. The replacement of the Rio Bravo bridge would create soil disturbance that could create sedimentation with downstream adverse impacts to soil and water. The reasonably foreseeable increased recreational use of the Rio Bravo/Poco Loco NE picnic area and potential maintenance activities as a result of wildfire damage could also increase sedimentation associated with erosion. Short- and long-term adverse impacts to the MRG and adjacent wetlands would be expected due to the removal of bank vegetation and the potential for sediment movement via erosion by wind or stormwater. However, while impacts to the MRG and adjacent wetlands are expected, the reasonably foreseeable habitat and ecosystem restoration projects conducted by the USACE and members of the MRG Endangered Species Collaborative Program would be beneficial to the river and associated wetlands because they might mitigate soil erosion and improve flows. Therefore, cumulative impacts to the Rio Grande and adjacent wetlands would be mostly intermittent, and ongoing restoration activities would be expected to mitigate these impacts.

3.4 Issue 3: Potential Impacts to Water Quantity and Water Quality

3.4.1 Affected Environment

3.4.1.1 Water Quality

The project area is adjacent to and within the main channel of the Rio Grande, a jurisdictional WOTUS. Current water quality data for the Rio Grande are available from four U.S. Geological Survey (USGS) gages within the project area from 2014 to 2024. Water quality data are collected under a range of flow conditions at varying temporal scales (e.g., daily, monthly) depending on the site and parameter (Table 3.8).

Table 3.8 Average Water Quality Data in the Project Area, by Constituent, for Four USGS Stream Gages (2014–2024)

USGS Stream Gage	Mean Water Temperature (°C)	Mean Specific Conductance	Mean Dissolved Oxygen (mg/L)	Mean Suspended Sediment (mg/L)	Mean Fecal Coliform (col/100mL)	Mean Nitrate (mg/L)	Mean Total Phosphorus (mg/L)
08329918, Rio Grande at Alameda Bridge	15.5	315.6	8.6	508.5	201.3	0.1	0.2
08330000, Rio Grande at Albuquerque, NM	16.2	333.9	7.0	861.6	n/d	n/d	n/d
08330830, Rio Grande at Valle De Oro, NM	21.8	455.0	7.5	272.4	n/d	n/d	n/d
08330875, Rio Grande at Isleta Lakes NR Isleta, NM	24.0	423.2	6.8	n/d	n/d	n/d	n/d

Source: National Water Quality Monitoring Council (2024).

Notes: mg/L = milligrams per liter; °C = degrees Celsius; col/100mL = coliform per 100 milliliters; n/d = no data. Specific conductance is measured in microsiemens per centimeter at 25°C.

The NMED assigns designated uses and associated water quality standards for all stream and river reaches throughout New Mexico. Waters from the headwaters of Elephant Butte Reservoir upstream to the Angostura diversion works, excluding waters on Isleta Pueblo or Santa Ana Pueblo, and intermittent water in the Jemez River below the Jemez Pueblo boundary, excluding waters on Santa Ana and Zia Pueblos, that enter the main stem of the Rio Grande have designated uses of irrigation, marginal warmwater aquatic life, livestock watering, public water supply, wildlife habitat, and primary contact (20.6.4.105 and 20.6.4.106 New Mexico Administrative Code [NMAC]).

Every 2 years, New Mexico assesses the status of surface waters in the state and reports the results in a biannual Clean Water Act 303(d)/305(b) Integrated Report (NMED 2024). According to the 2024-2026 EPA-approved report, the NMED has identified the MRG between Tijeras Arroyo and Alameda bridge as impaired due to *E. coli,* dissolved oxygen, and a fish consumption advisory for mercury and polychlorinated biphenyls (PCBs) (NMED 2024). Additionally, the MRG between the non-pueblo Alameda bridge to the U.S. Highway 550 bridge is impaired due to alpha particles and *E. coli,* and a fish consumption advisory for mercury and PCBs has been issued (NMED 2024). Sources of these water quality pollutants are varied, with mercury and PCBs contamination in fish likely due to the long-term persistence of these toxins in riverine sediments and subsequent bioaccumulation in organisms through the aquatic food chain (EPA 2023). *E. coli* impairments, particularly in urban environments, are often sourced from leaking sewer systems, stormwater

runoff, and pet waste, whereas alpha particles are associated with uranium deposits and historic mining activities in the surrounding watershed.

3.4.1.2 Water Quantity

The Rio Grande Compact (1939) limits the amount of surface water that can be depleted annually in the MRG based on the natural flow of the river as measured at the Otowi gage near Los Alamos (gage number 08313000). In addition, the New Mexico Office of the State Engineer (NMOSE) has determined that the MRG is fully appropriated (NMOSE 2024). Therefore, any increase in water use in one sector must be offset by a reduction in use in another sector to ensure that neither existing water rights nor New Mexico's ability to meet its compact delivery obligations are impaired.

NMOSE policy requires that parties intending to construct habitat restoration projects in the MRG submit their project plans to the NMOSE for review. The NMOSE will determine whether a permit is needed and whether the project is likely to result in increased depletions and need for any offset.

3.4.2 Effects from the No Action Alternative

The No Action Alternative would result in no change to current water quality or water quantity conditions, as ground-disturbing activities related to sediment removal or spoiling and the resulting potential to increase sedimentation in the river would not occur.

3.4.3 Effects from the Proposed Action

3.4.3.1 Water Quality

Short-term, adverse impacts to water quality would occur from the Proposed Action as a result of soil disturbance, vegetation removal, and potential sediment runoff from the limits of construction disturbance to the MRG. The Proposed Action would result in temporary and localized changes in the concentrations of water quality constituents, particularly for turbidity, total dissolved solids, and suspended solids associated with sediment excavation and vegetation removal within the channel of the MRG. Excavated soils may be placed in the river and allowed to move downstream, or soils (spoils) may be transported off-site. It will be verified that there is no negative hydrologic effect of spoiling prior to location selection for excavated soils. There is the potential for increased sediment retention in modified sections of the river after the Proposed Action is complete. Because the Rio Grande was historically a sediment-rich river, this impact is not considered significant to the project area or the river as a whole. The increase would produce a relatively small contribution compared to the typical sediment load the river carries. Short-term and localized adverse effects on water quality may result but are not expected to exceed applicable state water quality standards as presented in NMAC 20.6.4.

It is expected that turbidity, total dissolved solids, and suspended solids concentrations would return to preconstruction levels shortly after completion of excavation work. Design features Soil-1, Soil-3, and Soil-4; Water-1 through Water-6; and Vegetation-5 will minimize impacts to water quality that could result from the proposed project. The project will minimize impacts to existing habitat restoration projects by implementing the above design features. Additionally, long-term, beneficial impacts to water quality are expected to result from the Proposed Action as a result of

the alterations made to the river channel and confluence maintenance. The restoration components would reduce overall sediment input to the MRG channel, thereby reducing sediment loads.

No adverse impact to surface water quality occurred in the previous EAs completed for a portion of the proposed project area (SWCA 2005, 2007), although it was noted that temporary changes in measures of sediment such as turbidity and total dissolved solids would occur but would not exceed applicable state water quality standards. All mitigation measures proposed in the previous EAs that include adherence to CWA compliance and water quality monitoring for sediment parameters and dissolved oxygen will be implemented. In-channel sediment control devices would be installed before any equipment crosses the channel to reduce downstream dispersal of disturbed sediments. In-channel sediment control devices will be removed only after water quality returns to within 10% of preconstruction levels.

3.4.3.2 Water Quantity

Under the Proposed Action, most of the proposed restoration work would occur inside the nominal 600-foot width of the channel. Evaluation of the net depletion effects of each proposed technique would be conducted for implementation of the project activities; however, net depletions are expected to be low. Any expected depletions would be coordinated with the NMOSE.

3.4.4 Cumulative Effects

The reasonably foreseeable trends and planned actions associated with projects listed in Table 3.1 would have similar impacts to water quality and water quantity as described above for the Proposed Action. Specifically, the recreation enhancements within the Rio Grande Valley State Park, Rio Bravo/Poco Loco NE picnic area improvements, replacement of the Rio Bravo bridge, and other MRG habitat restoration projects are likely to have adverse impacts to water quality. All these projects involve construction activities that have the potential for short-term, adverse impacts to water quality as a result of soil disturbance, vegetation removal, and potential sediment deposition into the MRG from erosion of disturbed soils. The adverse impacts to water quality are expected to be short-term, lasting the duration of construction and until permanent erosion control measures are installed. Therefore, cumulative impacts to water quality would be short-term and adverse and possibly contributed by multiple projects if they are occurring at approximately the same time as the sediment-producing activities associated with the Proposed Action. None of the projects listed in Table 3.1 would result in or propose depletions or reallocations of water; therefore, no cumulative impacts to water quantity would be expected to occur.

3.5 Issue 4: Potential Impacts to Federally Listed Threatened and Endangered Species, Proposed Species, and Designated Critical Habitat

3.5.1 Affected Environment

In accordance with ESA Section 7(a)(2), federally funded, constructed, permitted, or licensed projects must take into consideration impacts to federally threatened and endangered species. Three federally listed species or their suitable habitat have been recorded within or near the project area: RGSM, southwestern willow flycatcher, and yellow-billed cuckoo. One proposed threatened

species, monarch butterfly, is also likely to occur within the project area and is considered in this EA. Table 3.9 summarizes the federally listed and proposed species with potential to occur in the ABQ Reach (analysis area). Designated critical habitat for RGSM is also present in the project area (USFWS 2003). The project area does not currently contain suitable habitat for NMMJM; however, the proposed project would likely improve habitat conditions for the species. Therefore, NMMJM is addressed in this analysis.

As indicated in Chapter 1, this Proposed Action is a part of the larger Middle Rio Grande Water Operations project, which had a complete ESA compliance process, including a biological assessment (BA) and BO (see Section 1.2 for additional details). Therefore, this Proposed Action falls under that previous ESA compliance process. All the species analyzed in this EA were covered under the BO except monarch butterfly, as monarch was not a proposed threatened species at the time of writing. This analysis uses standard NEPA terminology, but ESA effects determinations are also included to incorporate previous ESA compliance analysis. In addition, the previous ESA analysis is incorporated into this analysis by reference. Descriptions of affected environments applicable to each federally listed species analyzed in detail are discussed in subsections 3.5.1.1–3.5.1.5.

Table 3.9. Federally Listed and Proposed Species with Potential to Occur in the Analysis Area

Species	Federal Status	Designated Critical Habitat	Modeled Suitable Habitat
Fishes			
Rio Grande silvery minnow (*Hybognathus amarus*)	Endangered	389.2 acres of designated critical habitat in the analysis area (USFWS 2003)*	389.2 acres (USFWS 2003)
Birds			
Southwestern willow flycatcher (*Empidonax traillii extimus*)	Endangered	Not present within the analysis area.	166.3 acres (USGS 2020)
Yellow-billed cuckoo (*Coccyzus americanus*)	Threatened	Not present within the analysis area.	106.5 acres (USGS 2020)
Mammals			
New Mexico meadow jumping mouse (*Zapus hudsonius luteus*)	Endangered	Not present within the analysis area.	0 acres
Invertebrates			
Monarch butterfly (*Danaus plexippus*)	Proposed Threatened	Not present within the analysis area.	368.4 acres

* The 389.2 acres of designated RGSM critical habitat will be used as a surrogate take metric for the species (see section 3.5.3.1.1).

3.5.1.1 Rio Grande Silvery Minnow

On August 19, 1994, the USFWS listed RGSM as endangered (USFWS 1994). RGSM occurs in the Rio Grande from Cochiti Dam to the headwaters of Elephant Butte Reservoir. RGSM's current distribution is limited to a 174-mile stretch of the MRG (USFWS 2023b), which is approximately 5% of its historical 3,000-mile range (USFWS 1994). This extent coincides with the federally designated critical habitat for the species, which was designated on March 21, 2003 (USFWS 2003).

Within the analysis area, RGSM habitat is equivalent to the extent of designated critical habitat adjacent to the proposed project sites within the five subreaches of the MRG as discussed in Section 2.2 (approximately 389.2 acres). This encompasses all habitable areas that may support the species lifecycle within both the primary river channel and applicable floodplain as described further below. Due to the temporal length of the proposed project activities, it is assumed that the extent of this suitable habitat has the potential to be occupied.

Life History and Habitat Requirements

RGSM prefers large streams with slow to moderate current flowing over silt or silt/sand substrate (USFWS 2023b). RGSM typically occupies stream habitats where water depths are less than 15.75 inches and velocities are low to moderate (USFWS 2023b). Such habitats include eddies formed by debris piles, pools, backwaters, embayments, shoreline, and submerged vegetation. These habitat preferences have been reflected in the mesohabitats in which RGSM could be found (Dudley and Platania 1997). The most frequently occupied habitats in which researchers found RGSM were debris piles, pools, and backwaters. Pools are defined as portions of the river that are deep and with relatively low velocity compared to the rest of the channel, while backwaters are described as bodies of water connected to the main channel with no appreciable flow and often created by a drop in flow, which partially isolates the former channel (Dudley and Platania 1997). While RGSM is almost exclusively found in habitats that maintain a velocity below 40 centimeters per second, mesohabitat preferences can vary based on stage of life and time of year (USFWS 2010). When larvae transition from vertical to horizontal swimming and leave the water column in search of food, they typically occupy shallow, very low or zero velocity habitats with silt substrates and warmer temperatures from 20 to 24 degrees Celsius (°C) (USFWS 2010; Valdez et al. 2019).

Critical Habitat

Designated RGSM critical habitat in the Rio Grande extends from Cochiti Dam, Sandoval County, New Mexico, downstream to the utility line crossing the Rio Grande, a permanent, identified landmark in Socorro County, New Mexico—a total of approximately 157 miles, referred to as the Middle Rio Grande (USFWS 2003). The designation also includes the tributary Jemez River from Jemez Canyon Dam to the upstream boundary of Santa Ana Pueblo. The critical habitat designation defines the lateral extent (width) as those areas bounded by existing levees or, in areas without levees, 300 feet of riparian zone adjacent to each side of the bankfull stage of the MRG (USFWS 2003).

The primary constituent elements of critical habitat for RGSM based on studies of its habitat and population biology are as follows (USFWS 2003):

1. A hydrologic regime that provides sufficient flowing water with low to moderate currents capable of forming and maintaining a diversity of aquatic habitats, such as, but

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

2. The presence of low-velocity habitat (including eddies created by debris piles, pools, or backwaters, or other refuge habitat [e.g., connected oxbows or braided channels]) within un-impounded stretches of flowing water of sufficient length (i.e., river miles) that provide a variety of habitats with a wide range of depth and velocities.
3. Substrates of predominantly sand or silt.
4. Water of sufficient quality to maintain natural, daily, and seasonally variable water temperatures in the approximate range of greater than 1°C and less than 30°C and reduce degraded water quality conditions (decreased dissolved oxygen, increased pH, etc.).

The USFWS has determined that these primary constituent elements of critical habitat provide for the physiological, behavioral, and ecological requirements of RGSM. The first primary constituent element is presence of water of sufficient flows to reduce the formation of isolated pools. The USFWS has concluded that this element is essential to the conservation of RGSM because the species cannot withstand permanent drying (loss of surface flow) of long stretches of river (USFWS 2003). Water is a necessary component for all RGSM life history stages and provides hydrologic connectivity to facilitate fish movement. The second primary constituent element is habitat necessary for development and hatching of eggs and the survival of the RGSM from larvae to adult. Low-velocity habitat provides food, shelter, and sites for reproduction, which are essential for the survival and reproduction of RGSM (USFWS 2003). The third primary constituent element is appropriate silt and sand substrates (Dudley and Platania 1997; Remshardt 2001), which the USFWS and other scientists conclude are important in creating and maintaining appropriate habitat and life requisites such as food and cover. The final primary constituent element is protection from degraded water quality conditions. The USFWS has concluded that when water quality conditions degrade (e.g., water temperatures are too high, pH levels are too low, and dissolved oxygen concentrations are too low), RGSM will likely be injured or die (USFWS 2003).

Current Conditions:

While the analysis area does contain designated critical habitat, current conditions include areas of river channelization, incised cut banks, lack of geomorphic areas that allow for regular inundation, lack of pooling/low velocity conditions, and channel drying (Dudley et al. 2024; McKenna 2023; Valdez et al. 2023). All the primary constituent elements of critical habitat currently exist within the analysis area but in insufficient quantities.

In its current condition, the MRG in the analysis area does not regularly inundate the existing floodplain due to entrenchment and undercutting of the riverbed and bank (SWCA 2022). Because

the riverbank is too high to allow for inundation during seasonal high flows, little to no nursery or low-velocity habitat is available. Additionally, the river conditions in this area are most often characterized as runs with high flow rates and few pools (Valdez et al. 2023).

Cottonwood and Russian olive are the most prominent plant species in areas that inundate with lower frequency, while willow dominates areas that inundate with higher frequency (McKenna 2024). A New Mexico Class A noxious weed (ravenna grass) has also aggressively invaded islands, wetlands, and bank-attached bars throughout the Angostura Reach and is now common along channel margins in many of the previous restoration sites along the MRG (GSA personal communication, September 6, 2024).

Overall, natural sedimentation is concentrated along the edge of the active channel, with sedimentation on islands concentrated along the banks of the channel. In backwaters and high flow channels, sediment has accumulated in inlets with typical sedimentation depth in these areas being approximately 2 feet (GSA personal communication, September 6, 2024). This sediment accumulation further restricts lower elevation areas to inundate only during time of higher flows, reducing availability of low-velocity habitat essential to the RGSM life cycle.

High to moderate spring flows in 2016, 2017, 2019, and 2023 inundated many of the restored and natural floodplains for sufficient duration to evaluate their use by the various life stages of RGSM and other fish species. Conversely, low flows in 2018, 2020, and 2021 resulted in little or no overbank inundation at various sites within the analysis area (Valdez et al. 2023). As recently as 2022, an average of 4.87 river miles within the ABQ Reach was documented as being dry over a 5-day (July 22–26) period (McKenna 2023). In 2023, flows were notably high throughout the study area, and there was an extended period of spring runoff, with river flows peaking in May but rapidly declining to low levels by early July. Flows were persistently low from July through October because of a pronounced and prolonged summer drought event in 2023 (Dudley et al. 2024). Contemporary channel morphology provides minimal shallow, low-velocity habitat across low to moderate flows, and exceptionally high flows (e.g., 2023 spring runoff) have produced only marginal increases in shallow, low-velocity habitat availability relative to historical reference information (Mortensen et al. 2024). The decrease in low-velocity habitat availability corresponds with the shift from a relatively wide and braided planform waterbody to a largely single-threaded, incised channel. In addition to downstream dispersal beyond diversion dams, river incision, habitat degradation, abandonment of the floodplain, and reductions in suspended sediments are likely limiting the number and size of appropriate habitats available for the successful retention and recruitment of early RGSM life phases within the Angostura/Albuquerque reach of the MRG (Mortensen et al. 2024; Dudley et al. 2024).

There has been extensive morphological manipulation and river engineering activity in the MRG to ensure efficient water delivery and to minimize flood damages (USFWS 2018). River engineering included 1) confining the floodway between spoil banks, levees, or high ground; 2) channel stabilization using jetty jacks; and 3) construction of drains, water diversion dams and facilities, and flood control facilities. Operations of dams and reservoirs have decreased annual fluctuations in flow, which contributed to the simplification of the channel system; reduced the size and number of sandbars, side channels, or flooded areas; and reduced or simplified riparian vegetation (USFWS 2018). The resulting channel incision is the dominant impact limiting floodplain connectivity in the upper portion of the MRG (USFWS 2018). Once flood control and erosion control measures (i.e., jetty jacks) were implemented in the 1950s, the river channel

narrowed, and, during low flows, vegetation anchored onto bars, banks, and islands that are no longer scoured by peak floods (USFWS 2018).

The preference for a narrower range of physical habitat conditions by RGSM means that individuals often persist in a smaller subset of areas within the river system, often at the river edges, with researchers documenting reductions of the active channel habitat by approximately 40 acres per year (USFWS 2018).

3.5.1.2 Southwestern Willow Flycatcher

The USFWS listed southwestern willow flycatcher as endangered on February 27, 1995 (USFWS 1995). A final recovery plan was released which included details on management issues, the reasons for endangerment, the current status of southwestern willow flycatcher, important recovery actions, and recovery goals (USFWS 2002).

Southwestern willow flycatchers breed in riparian forests in Arizona, New Mexico, and southern California, as well as portions of southern Nevada, southern Utah, and southwestern Colorado (USFWS 2013a). Southwestern willow flycatchers begin arriving in New Mexico in early May, and the breeding season extends to September (New Mexico Avian Conservation Partnership 2017; Sogge et al. 2010) when southwestern willow flycatchers return to their wintering grounds in Central America and northern South America. Breeding southwestern willow flycatchers are riparian obligates, typically nesting in dense riparian vegetation where surface water is present (Sogge et al. 2010), including dense tree and shrub vegetation closely tied to riparian areas such as rivers, swamps, and associated wetlands (USFWS 2014a). These habitats primarily contain willow species, including coyote willow and Goodding's willow, but typically also contain boxelder (*Acer negundo*), saltcedar, Russian olive, live oak (*Quercus agrifolia*), buttonbush (*Cephalanthus* sp.), cottonwood, alder (*Alnus* spp.), blackberry (*Rubus ursinus*), and stinging nettle (*Urtica* spp.) (Sogge et al. 2010). Southwestern willow flycatchers have nested in riparian patches as small as 2 acres or as large as several hundred acres (Sogge et al. 2010). They have only rarely been found nesting in isolated, narrow, linear riparian habitats that are less than 30 feet wide, although they will use such linear habitats during migration (Sogge et al. 2010) for foraging and stopovers. In migration, southwestern willow flycatchers may be associated with willows along ditches, cottonwood woodlands, and saltcedar stands.

In New Mexico, southwestern willow flycatchers are known to breed only within riparian habitats along the Gila River and the Rio Grande. The southwestern willow flycatcher's range overlaps the analysis area (USFWS 2024b). Extensive reductions in suitable riparian habitat within the southwestern willow flycatcher's range have resulted in declining population levels. Riparian habitat loss has been the result of groundwater pumping, modified hydrological regimes due to dams and stream channelization, removal or alteration of vegetation communities, and invasion of nonnative plants (USFWS 2014a). The decline of southwestern willow flycatcher has also been attributed to fragmentation of riparian breeding habitat, including the loss of wintering habitat (Sogge et al. 2010). Other threats to southwestern willow flycatcher include the tamarisk leaf beetle (*Diorhabda elongata* and *D. carinulata*) and an increase in the frequency of droughts due to climate change that could reduce riparian habitat availability (USFWS 2014a).

Critical habitat for southwestern willow flycatcher was designated in 1997 and 2013 and includes sections of Arizona, California, Colorado, New Mexico, Nevada, and Utah (USFWS 1997, 2013a).

However, designated critical habitat for southwestern willow flycatcher is not present within the analysis area. The nearest critical habitat for this species is approximately 8 miles south-southwest of the analysis area.

Habitat suitability for southwestern willow flycatcher was assessed using the USGS Southwestern Willow Flycatcher Habitat Viewer model (USGS 2020). The model uses Landsat 8 imagery and cloud-based mapping techniques to identify riparian and floodplain characteristics suitable for southwestern willow flycatcher breeding habitat. The model identifies predicted habitat based on the amount of green vegetation within a 120-meter radius of each imagery cell and the size of floodplain within a 360-meter radius of each imagery cell (USGS 2020). This includes moderately suitable and suitable habitat determinations. Using 2023 imagery, an estimated 166.3 acres of modeled moderately suitable and suitable habitat was found to be present throughout the analysis area.

Data shared by the USFWS on August 19, 2024, indicates southwestern willow flycatcher occurrences in all subreaches of the analysis area as recently as 2023 (Davis 2024). These data are from species-specific standardized protocol-level surveys conducted between 2004 and 2023 and include 74 southwestern willow flycatcher sightings within 0.5 mile of the analysis area. Data shared by the USACE on September 17, 2024, indicates southwestern willow flycatcher occurrences in all subreaches of the analysis area as recently as 2024 (USACE 2024).[2] These data are from species-specific standardized protocol-level surveys conducted within the USACE's Bosque Ecosystem Restoration Sites between 2004 and 2024 and include 137 detections of southwestern willow flycatchers within the analysis area. Data from the USACE also indicate possible southwestern willow flycatcher breeding sites at two locations and confirmed southwestern willow flycatcher breeding over multiple years at two sites within the analysis area (USACE 2024). Based on this data and the presence of modeled suitable habitat within the analysis area, it is assumed that southwestern willow flycatchers use habitat within the area for breeding, foraging, and stopover habitat during migration.

3.5.1.3 Yellow-billed Cuckoo

The USFWS listed the western distinct population segment (DPS) of the yellow-billed cuckoo as threatened on October 3, 2014 (USFWS 2014b). The western DPS of the yellow-billed cuckoo is a neotropical migrant population, arriving from its wintering grounds in South America in late May to mid-June (Halterman et al. 2016) and breeding in 12 states west of the Rocky Mountains. Nesting typically occurs between late June and late July but may occasionally begin as early as late May and continue into September (Halterman et al. 2015). The western DPS of the yellow-billed cuckoo breeds in large blocks of riparian habitats, at least 50 acres or greater in area, particularly woodlands with cottonwoods and willows (Ehrlich et al. 1988). In the arid Southwest, yellow-billed cuckoos are primarily restricted to dense, multi-structured native riparian woodlands along rivers and streams and damp thickets with high humidity at elevations less than 6,600 feet above mean sea level (Arizona Game and Fish Department 2011; Corman 2005). Suitable habitat in the southwest is limited to narrow, often widely separated patches. The species is also known to prefer patches of habitat at least 30 acres in size and greater than 100 feet wide that support both suitable nesting and foraging habitat; smaller patches are unlikely to be used for nesting habitat (USFWS 2023c).

[2] Two sets of data were received; however, there is likely overlap in the data and some detections may be duplicates.

Within Mexico and parts of southern Arizona and southwestern New Mexico, yellow-billed cuckoo habitat can be more variable than within other parts of the range of the western DPS. In the revised critical habitat designation proposed rule, USFWS (2014c) refers specifically to southwestern breeding habitat as distinct from range-wide breeding habitat. In addition to the range-wide habitat described above, southwestern breeding habitat often includes xeroriparian habitat, such as mesquite bosque and/or riparian corridors narrower than 328 feet and smaller than 37 acres in size (USFWS 2014c).

In the Southwest, the yellow-billed cuckoo's range extends from western New Mexico to western Arizona and north through Utah and some parts of western Colorado. Habitat in portions of these areas may be suitable for migratory and stopover activities, while a smaller number of areas meet the species' requirements for breeding habitat. The yellow-billed cuckoo's range overlaps the analysis area. The USFWS considers habitat patches on the Rio Grande that are wider than 100 feet and larger than 12 acres to be suitable habitat for yellow-billed cuckoo breeding.

The loss, degradation, and fragmentation of riparian habitat have been identified as the primary causes of yellow-billed cuckoo declines in the western United States (USFWS 2014c). Estimates of riparian habitat losses are 90% to 95% for Arizona, 90% for New Mexico, and more than 70% nationwide. Habitat for yellow-billed cuckoo has been modified and curtailed, resulting in only remnants of formerly large tracts of native riparian forests, many of which are no longer occupied by yellow-billed cuckoos. Habitat loss and degradation results from several interrelated factors, including alteration of flows in rivers and streams, mining, encroachment into suitable habitat from agricultural and other development activities on breeding and wintering grounds, stream channelization and stabilization, diversion of surface and groundwater for agricultural and municipal purposes, livestock grazing, wildfire, establishment of nonnative vegetation, drought, and prey scarcity due to pesticides (USFWS 2014b). The ongoing threats, including those to small, isolated populations, cause the remaining populations to be increasingly susceptible to further declines and local extirpations through natural and anthropogenic disturbance such as barriers to dispersal by juvenile and adult yellow-billed cuckoos and collisions with tall vertical structures during migration (USFWS 2014b).

The USFWS designated critical habitat for the western DPS of the yellow-billed cuckoo in May 2021 within the states of Arizona, California, Colorado, Idaho, New Mexico, Texas, and Utah (USFWS 2021). However, designated critical habitat for yellow-billed cuckoo is not present within the analysis area. The nearest critical habitat is approximately 8 miles south-southwest of the analysis area.

Habitat suitability for yellow-billed cuckoo was assessed using the USGS Southwestern Willow Flycatcher Habitat Viewer model (USGS 2020). The model uses Landsat 8 imagery and cloud-based mapping techniques to identify riparian and floodplain characteristics suitable for southwestern willow flycatcher breeding habitat, and also includes a layer identifying suitable habitat for yellow-billed cuckoo. The model identifies predicted habitat based on the amount of green vegetation within a 120-meter radius of each imagery cell and the size of floodplain within a 360-meter radius of each imagery cell (USGS 2020). This includes moderately suitable and suitable habitat determinations. Using 2023 imagery, an estimated 106.5 acres of modeled moderately suitable and suitable habitat was found to be present throughout the analysis area.

Data shared by the USFWS on August 19, 2024, indicate yellow-billed cuckoo occurrences in all

subreaches of the analysis area, aside from the I-40 subreach, as recently as 2023 (Davis 2024). These data are from species-specific standardized protocol-level surveys conducted between 2019 and 2023 and include 19 yellow-billed cuckoo sightings within 0.5 mile of the analysis area. Data shared by the USACE on September 17, 2024, indicates yellow-billed cuckoo occurrences in all subreaches of the analysis area, aside from the I-40 subreach, as recently as 2024 (USACE 2024).[3] These data are from species-specific standardized protocol-level surveys conducted within the USACE's Bosque Ecosystem Restoration Sites between 2017 and 2024 and include 17 detections of yellow-billed cuckoos within the analysis area. Data from the USACE also indicate possible yellow-billed cuckoo breeding sites at two locations within the analysis area (USACE 2024). Additionally, according to eBird, there have been five recorded sightings of yellow-billed cuckoos in the analysis area between 2000 and 2024 (eBird 2024). Based on this data and the presence of modeled suitable habitat within the analysis area, it is assumed that yellow-billed cuckoos use habitat within the area for breeding, foraging, and stopover habitat during migration.

3.5.1.4 New Mexico Meadow Jumping Mouse

The NMMJM, a subspecies of the meadow jumping mouse, is listed as endangered by the USFWS (2013b) and by the State of New Mexico. It is a habitat specialist that nests in dry soils but uses moist streamside and dense riparian or wetland vegetation.

Major range reductions have not been recorded, but habitat destruction and isolation have resulted in significant loss of populations and reductions in total numbers of individuals. These losses are ongoing, as at least 11 of the 29 known populations, including known locations south of Albuquerque along the Isleta Marsh and further south in the Bosque del Apache National Wildlife Refuge, have been significantly compromised since 2011. Based on habitat reductions and fragmentation, NMMJM has experienced significant reductions in population numbers, is especially vulnerable to impacts due to its life history and ecology, and is subject to significant ongoing threats (USFWS 2013b).

This species appears to only use two riparian community types: persistent emergent herbaceous wetlands characterized by presence of primarily forbs and sedges, and scrub-shrub riparian areas that are composed of willows or alders (*Alnus* spp.) with an understory primarily of forbs including pale spikerush (*Eleocharis macrostachya)*, beaked sedge (*Carex rostrata*), rushes (*Juncus* spp. and *Scirpus* spp.) and sedges (*Carex* spp. or *Schoenoplectus pungens*) (USFWS 2020a). The species' habitat requirements include tall (average stubble height of herbaceous vegetation of at least 24 inches) and dense riparian herbaceous vegetation that may only be met when herbaceous vegetation achieves its full potential growth (USFWS 2020a). This habitat should contain sufficient seasonally available or perennial flowing waters to support the growth of tall, dense, riparian herbaceous plants that provide a wide variety of food and cover for nesting, movement, and predator avoidance (USFWS 2020a). Although the subspecies may use microhabitats that include stands of regenerating willows or areas around the margins of riparian shrubs, NMMJM appears to avoid stands of uniformly dense patches of woody vegetation or monotypic stands of sedges and cattail that lack an herbaceous understory (USFWS 2020a). In addition, the species requires a sufficient area (5 to 15 miles) along a stream, ditch, or canal that contains suitable or restorable habitat to support species movements into adjacent floodplain and upland areas extending approximately 330 feet outward from the active water channel and the floodplain (USFWS 2020a).

[3] Two sets of data were received; however, there is likely overlap in the data and some detections may be duplicates.

Suitable habitat for NMMJM is unlikely within the analysis area due to a lack of persistent emergent herbaceous wetlands and lack of alders and dense understory in the scrub-shrub wetlands. However, habitat suitability for this species may change along with variable flows in the MRG. Emergent herbaceous wetland habitat may be present or absent depending on the impacts of river flows in areas where the river maintains some connectivity to the floodplain.

3.5.1.5 Monarch Butterfly

Monarch butterfly is a proposed threatened species for listing under the ESA as of December 12, 2024 (USFWS 2024c). The final listing for the monarch butterfly by the USFWS is likely to occur in late 2025. The species is globally distributed throughout 90 countries, islands, and island groups, with the two largest migratory populations located east and west of the Rocky Mountain chain in North America (USFWS 2020b).

In both the eastern and western North American populations, monarchs begin migrating in fall to their respective overwintering sites, flying south to the mountainous regions of central Mexico or to groves along the California coast and northern Baja California (USFWS 2020b). In early spring (February to March), monarchs begin the breeding season by mating at the overwintering sites and beginning the generational migration northward over the course of three to five generations (USFWS 2020b). Monarch butterfly is important ecologically for plant population stability as it is an opportunistic pollinator. Adult monarch butterflies require a diversity of blooming nectar resources on which they feed throughout their migration routes and in breeding grounds from spring to fall (USFWS 2020b). Monarchs require milkweed (family Asclepiadaceae) embedded within diverse nectary habitat for egg laying and larval feeding (USFWS 2020b). The correct phenology of monarchs, nectar plants, and milkweeds, as well as the position of these resources on the landscape, are important to monarch survival (USFWS 2020b). Primary threats to the species and its habitat include "the ongoing impacts from loss and degradation of breeding, migratory, and overwintering habitat (from past conversion of grasslands and shrublands to agriculture and widespread use of herbicides; logging/thinning at overwintering sites in Mexico; urban development, senescence, and incompatible management of overwintering sites in California; and drought); exposure to insecticides ; and effects of climate change (USFWS 2024b:100679).

This species is known to occur throughout New Mexico during seasonal migration and the breeding season during the warmer months of April to October but is rarely seen in winter months within the state (Cary and Toliver 2023). Monarchs and milkweed, in addition to evidence of monarch breeding, have been documented in the analysis area and along other reaches of the Rio Grande (Western Monarch Milkweed Mapper 2024).

Native horsetail milkweed (*Asclepias subverticillata*) plants have been observed in the I-40 subreach (SWCA 2024b); therefore, it is assumed that the entire analysis area where conditions are similar (368.4 acres) is suitable habitat for supporting both migratory and reproductive life stages of monarch butterflies. Monarch butterflies are known to occur in riparian and wet vegetation communities. Because of that, continuous riparian corridors are likely important for continuity of suitable habitat to support the multi-generational journey from Canada to Mexico through New Mexico.

3.5.2 Effects from the No Action Alternative

Under the No Action Alternative, the beneficial impacts to the quantity and quality of listed species habitat as a result of the proposed restoration activities would not occur. Beneficial impacts relevant to each listed species are described in detail in subsequent sections (3.5.3.1–3.5.3.5). There would be no short-term impacts to water quality from the construction of the bankline features.

EAs published in 2005 and 2007 for a portion of the proposed restoration sites (see Table B.1 in Appendix B) stated: "The No Action Alternative would continue the trends of population decline for this species [RSGM] in the Albuquerque Reach. The channel in the Albuquerque Reach is incised, and degradation is expected to continue" (SWCA 2007:47). More recent assessments including the *Rio Grande Silvery Minnow Recovery Plan (*Hybognathus amarus*), First Revision* (USFWS 2010), 2016 BO, and the 5-year status reviews (USFWS 2018, 2023b) have determined that trends in habitat degradation have continued under current conditions. Under the No Action Alternative, restoration of approximately 354.4 acres of RGSM habitat would not occur. The No Action is therefore unfavorable for RGSM because of the decreased presence of quality mesohabitat resulting in decreased capacity for egg retention or larval success. Increasing the amount and quality of suitable riverine habitat is supportive of rescue and recovery efforts associated with successful RGSM population management.

Under the No Action Alternative, the temporary degradation and reduction of approximately 155.8 acres of suitable southwestern willow flycatcher habitat would not occur. Additionally, the beneficial impact of a potential increase of 75.2 acres of suitable southwestern willow flycatcher habitat would not occur. Please see full effects analysis from the Proposed Action in Section 3.5.3.2 for rationale for these conclusions.

Under the No Action Alternative, the temporary degradation and reduction of approximately 97.8 acres of suitable yellow-billed cuckoo habitat would not occur. Additionally, the beneficial impact of a potential increase of 133.2 acres of suitable yellow-billed cuckoo habitat would not occur. Please see full effects analysis from the Proposed Action in Section 3.5.3.3 for rationale for these conclusions.

Under the No Action Alternative, the long-term potential increase in NMMJM habitat would not occur as 33 floodplain terraces would not be built within the analysis area to increase the potential for overbank flooding, which would result in improved conditions for the reestablishment of dense riparian herbaceous vegetation. In addition, increased connectivity between the river channel and floodplain via removal of jetty jacks and 35 acres of nonnative vegetation and reestablishment of native riparian vegetation would not occur. Therefore, long-term, beneficial impacts of a potential increase of 231 acres of suitable NMMJM habitat would not occur.

Under the No Action Alternative, temporary degradation of monarch habitat would not occur. Additionally, the long-term potential increase of 368.4 acres of suitable monarch habitat would not occur. The beneficial impact of the reestablishment of native riparian vegetation, including milkweed to support monarch breeding, would not occur under the No Action Alternative.

3.5.3 Effects from the Proposed Action

Table 3.10 summarizes the effects determinations for federally listed species that have the potential to occur in the analysis area.

Table 3.10. Summary of Species ESA Effects Determinations for the Proposed Action

Species	Effect Determination	Critical Habitat Determination
Rio Grande silvery minnow	Likely to adversely affect	May affect, but is not likely to adversely affect
Southwestern willow flycatcher	May affect, but is not likely to adversely affect	Not present
Yellow-billed cuckoo	May affect, but is not likely to adversely affect	Not present
Monarch butterfly	May affect, but is not likely to jeopardize the continued existence of the species	Not present
New Mexico meadow jumping mouse	May affect, but is not likely to adversely affect	Not present

3.5.3.1 Rio Grande Silvery Minnow, Including Critical Habitat

In 2005 and 2007, the EAs completed for the previously restored sites within a portion of the Proposed Action sites stated: "The short-term construction activities and the deposition of sediment in shallow water (current habitat areas) of the Proposed Action may adversely affect silvery minnow and lead to take. The Biological Opinion (USFWS 2005) determined that short-term, direct effects are likely to occur from operation of heavy equipment in the channel where silvery minnow are known to occur, but that these effects will be minimal and not likely jeopardize the continued existence of the species" (SWCA 2007:48). The design features described in Appendix C will be implemented to reduce take to the greatest extent possible to minimize the project's direct effects on the species.

In accordance with design feature Fish-1 (see Appendix C), any active RGSM monitoring and compliance during construction and maintenance activities will be submitted within a Letter of Delegation that will include a List of Authorized Individuals as qualified and permitted individuals, per the USFWS, as a compliance action in accordance with the 2016 BO (USFWS 2016). Take will be minimized to the greatest extent possible by having equipment enter the water slowly to give fish time to flee the area (Fish-2, Appendix C). Take will also be minimized by placing a permeable barrier (similar to a turbidity curtain or block nets) along the perimeter of the wetted river channel, adjacent to the active bankline construction zone to exclude fish from active work areas and thus avoid trapping, injuring, or causing mortality to RGSM or any other fish. Any fish within the interior of the barrier will be removed immediately following installation (Fish-8, Appendix C). Direct effects of construction activities and incidental mortality would be avoided through these design features; however, equipment operation may cause harassment and behavioral changes to any RGSM that are present. Additionally, if construction occurs within spawning season, eggs may also be disturbed by equipment operation. These adverse impacts are temporary as they will occur intermittently during construction and maintenance phases of the project.

The Proposed Action would be constructed to benefit the riparian and aquatic ecosystems of the MRG and is anticipated to increase the quantity and quality of RGSM habitat by up to 354.4 acres within the MRG corridor. Reestablishment of native riparian vegetation would occur within the extent of the project area and includes designated critical habitat for RGSM that would benefit the local populations. The creation of floodplain terraces and inundation areas would result in low-velocity spawning and rearing habitat that improves the species' recruitment. Increased quality and quantity of habitat within the project area also increases connectivity of habitat within the MRG. This is considered a long-term, direct benefit to the species and its designated critical habitat. Aquatic habitat for RGSM has the potential to be temporarily impacted by construction activities near the active river channel. Adverse impacts include direct impacts to the river channel such as the increased erosion and related temporary increase in sedimentation in areas of surface disturbance proximal to habitat.

Construction impacts to RGSM and designated critical habitat include increased turbidity, noise and vibrational disturbance, decreased water quality, and temporary increase to water temperature; these impacts are unlikely to affect populations of RGSM, as described below. Any fish moving through the area could be subject to these conditions. These adverse impacts are indirect and temporary.

Vegetation removal would occur before other project activities can commence. Removal of vegetation may cause an increase in soil erosion, which subsequently causes increased sedimentation and thereby increased turbidity and may affect fish populations. Erosion, sedimentation, and increased turbidity have the potential to negatively affect the survivability and fecundity of RGSM as they induce changes in water quality such as temperature, pH, dissolved oxygen, hardness, alkalinity, or salinity outside species-specific parameters for survival. The contribution of increased erosion and associated impacts is correlated to the distance of surface disturbance from aquatic habitat, as well as volume of soil disturbed and erosion control techniques used during construction activities (EPA 2007). Removal of large cottonwood trees and tall woody shrubs such as saltcedar along the bank of the river may also remove shade, which would temporarily increase the direct sun and increase the water temperature in shallow water near the riverbank where RGSM individuals are most likely to occur. Vegetation removal and use of machinery would also cause increase in noise and vibrational disturbance within the adjacent river channel, which would result in temporary harassment of present RGSM and potential for behavioral avoidance of otherwise suitable habitat. Additionally, vegetation removal would reduce the suitability and value of designated critical habitat for the duration of construction activities and until successful revegetation is achieved. All these impacts would be temporary in nature and would only last for the duration of earthwork and vegetation establishment. The temporary impact of vegetation removal to designated critical habitat would ultimately result in a net benefit, as invasive and nonnative vegetation would be replaced by native vegetation through the completion of the project, and site restoration would ultimately contribute to increased value of critical habitat in the riparian corridor.

Excavation of native soils during the creation of terraces, removal of jetty jacks, and other earthwork is required for restoration. Earthwork may cause temporarily unstable soils during construction that could lead to increased sedimentation and turbidity that would have a similar effect on water quality as listed above. Excavation of soils and resulting lowered water quality would temporarily decrease the suitability of designated critical habitat during construction.

Although there would be temporary vegetation removal and earthwork, the completion of this project would restore riparian habitat and contribute to the ecological uplift of the designated critical habitat. Excavation with large equipment may also cause ground vibrations that are known to permeate aquatic systems. Any RGSM in the vicinity of the project area during construction activities, even outside the exclusion area, may feel the vibrations through the water. Fish would likely respond to this by leaving the area, which may require energy expenditure to flee, resulting in harassment. With appropriate erosion control measures (e.g., silt fencing, wattles) in place, substantial sediment associated with increased surface disturbance is not anticipated to reach the river channel. Therefore, risk of impacts to RGSM populations related to increased sedimentation are expected to be indirect and temporary.

Reestablishment of native riparian vegetation would occur within the extent of the project area. The re-establishment of vegetation would improve shade and therefore reduce the water temperature and improve suitability for RGSM. Additionally, vegetated soils are more stable and less prone to erosion, which would reduce the turbidity and other negative impacts to water quality by erosion as described in detail above. This is considered a long-term, direct benefit to both RGSM and designated critical habitat.

Re-establishment of previous floodplain terraces that have degraded or eroded over time would increase the inundation of overbank areas and create suitable spawning habitat for RGSM. The ABQ Reach of the MRG does not currently have low-velocity spawning habitat, and generating that habitat through this project's successful completion would improve egg retention and larval fish development. Improving egg retention and larval fish development would ultimately support population growth and provide a long-term, direct benefit to RGSM population resiliency. Additionally, engineering restored floodplain terraces (inundation areas) to meet the primary constituent elements of low-velocity water and spawning areas would drastically increase the functionality and quality of RGSM designated critical habitat.

Riverbank stabilization would be used to reduce erosion rates of the riverbank by grading the toe of the slope and incorporating erosion control features such as coir matting or selective revegetation to stabilize spoil piles. Reducing erosion would ensure that low-velocity, inundated rearing habitat is protected and maintained in the long term. It would also contribute to low-velocity habitat for fish at river levels of 900 cfs and above. This would contribute to creating and improving primary constituent elements of designated critical habitat where they previously were not present. It is also known that RGSM reside mainly in low-velocity bank areas; therefore, creating gradual slopes would contribute to shallow-water habitat where fish can rest and reside. This would ultimately provide suitable habitat for RGSM and may result in increased occupancy in the restored areas. This would be a long-term benefit to the RGSM population and designated critical habitat.

Invasive species removal would be concentrated within the riparian corridor outside the aquatic system; therefore, it would not have a direct or indirect effect on RGSM. Removal of invasive vegetation and the restoration of native vegetation would improve the ecological character of RGSM designated critical habitat. Similarly, the removal of jetty jacks would occur outside the aquatic environment within the riparian corridor and would not directly or indirectly affect RGSM. Removal of jetty jacks would improve ecological uplift by creating space for native vegetation to establish where structures previously existed and would improve wildland fire mitigation in the project area. Removal of nonnative species and structures from the riparian corridor would be a

direct benefit as it would contribute to improved conditions within the designated critical habitat for RGSM.

The primary constituent elements of designated critical habitat for RGSM could be affected by the Proposed Action as follows:

1) The Proposed Action would not alter a hydrologic regime that provides sufficient flowing water with low to moderate currents capable of forming and maintaining a diversity of aquatic habitats.
2) The Proposed Action would not alter the presence of existing low-velocity habitat within un-impounded stretches of flowing water of sufficient length (i.e., river miles) of river that provides a variety of habitats with a wide range of depth and velocities. The Proposed Action would increase the availability of suitable, low-velocity habitats by lowering banklines and allowing increased opportunities for inundation.
3) The Proposed Action would not alter availability of substrates of predominantly sand or silt.
4) The Proposed Action would not alter water quality, would maintain natural, daily, and seasonally variable water temperatures in the approximate range of greater than 1°C and less than 30°C and is not likely to increase degraded water quality conditions (decreased dissolved oxygen, increased pH, etc.).

3.5.3.1.1. Rio Grande Silvery Minnow Surrogate Take Using Critical Habitat

The precise number of individuals that would be taken by the Proposed Action cannot be determined due to lack of sufficient data. In such circumstances, surrogate metrics may be used to approximate and track the expected and estimated amount or extent of take. This approach would be similar to that used in the 2016 BO where a surrogate take metric was developed with density being used for estimating take.

The use of a surrogate metric to track incidental take must meet the three conditions established in the USFWS Surrogate Rule (50 CFR 402.14). There is ample USFWS precedent for the use of surrogate metrics in Section 7 consultations. Federal courts have upheld the USFWS's use of habitat as a proxy for take under Section 7 of the ESA, subject to requirements set out in the USFWS's Section 7 implementing regulations (50 CFR 402.14(i)(1)(i)).

The surrogate take metric criteria include the following: 1) it is impractical to track individuals; 2) there is a rational link to individuals; and 3) the surrogate metric is measurable. Using a surrogate take metric using critical habitat in this instance is appropriate for the following reasons:

- No data are currently available on the population size of RGSM within the analysis area.
- Although long-term data of RGSM per acre is available through the Collaborative Program, none of this data is site-specific. Additionally, Reclamation has moved away from using individual fish captures as a surrogate and has recently been utilizing a metric-based take calculation using critical habitat acres within the analysis area to represent a surrogate for the number of individual RGSM that occupy the analysis area.

- RGSM populations within the analysis area are likely to change over time during the implementation of the programmatic action. Not only is the precise number of individuals occupying the analysis area at any given time unknown (although, presence of the species is expected based on prior data) and impractical to ascertain, but also abundance can be expected to change over time.

- Given the practical difficulties in determining with reasonable certainty the precise number of RGSM individuals that would be taken by the Proposed Action, a surrogate metric is appropriate.

- Using critical habitat acres within the analysis area represents a surrogate for the number of individual RGSM that occupy the analysis area.

- While it is unlikely that the relationship between habitat acres and individual RGSM is a simple linear relationship, it is reasonable to expect that the amount of RGSM critical habitat positively correlates with the number of RGSM that are or may be present, such that the availability of more habitat supports (at least conceptually) a larger population of RGSM. This relationship is likely influenced by many factors, including habitat quality, biological factors (such as demographic rates or territorial or dispersal patterns), and status (such as distribution and abundance patterns at a species level).

Thus, approximately 389.2 acres of designated critical habitat would be used as a surrogate take metric for individual RGSMs that may be taken in the analysis area (80 sites proposed for restoration activities within five subreaches) during implementation of the Proposed Action for up to 30 weeks of construction within a 5-year period. Since not all construction will occur in wetted habitat or adjacent to wetted habitat, the 389.2 acres would be the maximum potential impact to RGSM. Impacts to RGSM will likely be lower than the 389.2 acres and amounts of total impact to the species will be accurately calculated for each project phase.

3.5.3.2 Southwestern Willow Flycatcher

An estimated 170.8 acres of modeled moderately suitable and suitable habitat for southwestern willow flycatcher was found to be present throughout the analysis area (USGS 2020). The Proposed Action would be constructed to benefit the riparian and aquatic ecosystems of the MRG and is anticipated to increase the quantity and quality of southwestern willow flycatcher habitat within the MRG corridor. However, areas within proposed restoration sites dominated by mature Rio Grande cottonwood or Goodding's willow trees or healthy seed-bearing aged trees would be flagged and avoided during vegetation removal activities. In addition, the narrow, dense bankline coyote willow bands along banklines in some proposed restoration sites will be removed, but they are expected to resprout following excavation because the sites where excavation will be relatively shallow (e.g., 6 to 12 inches), and not affecting the seed banks for this species. Removal of 35 acres of nonnative vegetation and reestablishment of native riparian vegetation would occur within the analysis area and would result in conditions suitable for southwestern willow flycatcher nesting, breeding, and stopover activities. The creation of floodplain terraces and inundation areas would result in more water reaching vegetation and an improvement in quantity and quality of dense willow habitat and nesting microclimate conditions relied on by this species.

Since southwestern willow flycatchers are known to use habitat within the analysis area (Davis 2024; USACE 2024), project construction would occur outside the breeding season (May 1–September 30) to reduce direct impacts to the species (design feature Bird-1 in Appendix C). Additional environmental commitments that will minimize negative effects include working with agency partners to monitor and collect data on the species' activities within and outside restoration sites (design feature Bird-2 in Appendix C) (USFWS 2016).

With the application of environmental commitments, short-term effects of the action are limited to a temporary degradation and reduction of approximately 155.8 acres of suitable habitat as a result of vegetation removal and ground-disturbing activities until successful vegetation planting and habitat restoration is achieved. Approximately 148.4 acres of suitable habitat will be temporarily impacted in restoration areas, and 7.4 acres of suitable habitat will be temporarily removed for spoil piles. Approximately 15.0 acres of suitable habitat will be permanently removed for access roads, or temporarily impacted through vegetation removal along selected access roads only. Suitable habitat is expected to be reestablished within 5 years of project implementation when dense willow stands will be restored (Dreesen and Fenchel 2010).

Indirect impacts within the analysis area related to noise, increased vehicular traffic, and general increased activity during construction. Construction would occur outside the breeding season when southwestern willow flycatchers are not likely to be present; therefore, these are discountable effects.

Ground disturbance associated with restoration activities including bankline modifications, island destabilization, modification of flow-through channels, and excavation of backwater channels is expected to temporarily degrade the suitability of habitat for the southwestern willow flycatcher by disturbing native soils and vegetative cover. While potential effects associated with the removal of vegetative cover may occur, these impacts would be offset by revegetation and restoration of habitat conditions that will allow for inundation at a range of river flows, thus enhancing nesting habitat for southwestern willow flycatcher within the analysis area.

Additionally, there will be indirect effects on southwestern willow flycatcher through habitat alterations resulting from geomorphic changes in the river as a result of restoration activities (Reclamation 2015:3–152). In 2015, the BA completed for previously restored sites along the entire MRG corridor stated:

> Local indirect effects at river maintenance project sites may have positive and negative impacts to southwestern willow flycatchers depending on the river maintenance methods used. River maintenance methods that modify the river channel tend to change overbank flooding occurrences, frequency or locations, and also vegetation composition over time. These effects can occur upstream of or downstream from the site as well. Implementing these methods can be positive or negative depending on characteristics at the specific location. In general, river maintenance methods that reduce channel incision, promote floodplain connectivity, and provide a greater potential for overbank flooding are more beneficial for southwestern willow flycatchers than river maintenance methods that would increase the flood-flow capacity within the channel and lower the water table. (Reclamation 2015:3–152)

The creation of 33 floodplain terraces (inundation areas) across 231 acres within the analysis area would increase the potential for overbank flooding and result in improved conditions for the reestablishment of willow stands that would benefit the species in the long term. The creation of

floodplain terraces would involve lowering the bank through the removal of vegetation and the excavation of native soils and would reduce the quantity of available southwestern willow flycatcher habitat in the short term. However, revegetation within the terraces and increased inundation is expected to increase the quantity and quality of southwestern willow flycatcher habitat within the analysis area, specifically the microclimatic conditions required for suitable nesting habitat. Increased quantity and quality of habitat within the analysis area increases connectivity of habitat within the MRG corridor. This is considered a long-term, indirect benefit to southwestern willow flycatcher.

To increase connectivity between the river channel and floodplain, jetty jacks will be removed from the riparian corridor. This would be an indirect benefit to southwestern willow flycatcher because jetty jacks constrain sediment and water movement and can be counterproductive to floodplain habitat creation. With the removal of jetty jacks, more diverse floodplain features will be created, including conditions for the reestablishment of willow stands that would benefit the species. Approximately 50 jetty jacks will be removed along the I-40 subreach, which will require excavation and temporary disturbance of 0.7 acre of soil and vegetation. This will be offset by the long-term restoration of habitat and increase in habitat quantity and quality.

Equipment used for construction and maintenance of the project has the potential to introduce and spread invasive and noxious weeds to the analysis area. Invasive and noxious weeds have the potential to outcompete native vegetation that is preferred by the species and to degrade suitable habitats for native flora and fauna. Environmental commitments will prevent the introduction and spread of invasive and noxious weeds (Soil-2 and Vegetation-4 design features, Appendix C). Additionally, in consideration of the native vegetation restoration and nonnative/invasive species removal design components of the Proposed Action, establishment of nonnative vegetation is highly unlikely. Therefore, potential adverse impacts to southwestern willow flycatcher habitat related to invasive and noxious weeds are expected to be discountable. Removal of 35 acres of invasive vegetation and the restoration of native vegetation would improve the ecological character of southwestern willow flycatcher habitat within the analysis area and is considered a long-term, indirect, beneficial impact.

In summary, the Proposed Action is expected to result in long-term, beneficial impacts to southwestern willow flycatcher habitat within the analysis area by increasing both quantity and quality of habitat. Currently, there is an estimated 170.8 acres of moderately suitable and suitable habitat for the southwestern willow flycatcher within the analysis area, and the project is anticipated to permanently remove 15.0 acres of suitable habitat. However, the project will restore 231 acres of southwestern willow flycatcher habitat, which will result in an increase (net gain) of 75.2 acres of suitable southwestern willow flycatcher habitat within the analysis area. As southwestern willow flycatchers are known to use habitat within the analysis area (Davis 2024; USACE 2024), project implementation will occur outside the species' breeding season (May 1–September 30), and additional environmental commitments detailed in Appendix C will be implemented. Adverse impacts to southwestern willow flycatcher would be insignificant, and no take is anticipated to occur. This is supported by the analysis in the 2016 BO (USFWS 2016:83), which states that suitable or moderately suitable habitat used for southwestern willow flycatcher nesting activity may be negatively impacted by river maintenance activities; however, the negative effects on this habitat are anticipated to be offset by the reestablishment of lost native vegetation and habitat restoration features such as terrace lowering which provides more favorable conditions for overbanking and natural regeneration of vegetation.

3.5.3.3 Yellow-billed Cuckoo

An estimated 110.8 acres of modeled moderately suitable and suitable habitat for yellow-billed cuckoo was found to be present throughout the analysis area. The Proposed Action would be constructed to benefit the riparian and aquatic ecosystems of the MRG and is anticipated to increase the quantity and quality of yellow-billed cuckoo habitat within the MRG corridor. However, areas within proposed restoration sites dominated by mature Rio Grande cottonwood or Goodding's willow trees or healthy seed-bearing aged trees would be flagged and avoided during vegetation removal activities. In addition, the narrow, dense bankline coyote willow bands along banklines in some proposed restoration sites will be removed, but they are expected to resprout following excavation because the sites where excavation will occur are relatively shallow (e.g., 6 to 12 inches) and not affecting the seed banks for this species. Removal of 35 acres of nonnative vegetation and the reestablishment of native riparian vegetation would occur within the extent of the analysis area and would result in conditions suitable for yellow-billed cuckoo nesting, breeding, and stopover activities.

Since yellow-billed cuckoos are known to occur and use habitat within the analysis area (Davis 2024; USACE 2024; eBird 2024), project construction would occur outside the breeding season (May 1–September 30) to reduce direct impacts to the species (design feature Bird-1 in Appendix C). Additional environmental commitments that will minimize negative effects include working with agency partners to monitor and collect data on the species' activities within and outside restoration sites (design feature Bird-2 in Appendix C) (USFWS 2016).

With the application of environmental commitments, short-term effects of the action are limited to a temporary degradation and reduction of approximately 97.8 acres of suitable habitat as a result of vegetation removal and ground-disturbing activities until successful vegetation planting and habitat restoration is achieved. In total, 92.8 acres of suitable habitat will be temporarily impacted in restoration areas, and 5.0 acres of suitable habitat will be temporarily removed for spoil piles. An estimated 13.0 acres of suitable habitat will be permanently removed for access roads. Suitable habitat is expected to be reestablished within 5 to 13 years of project implementation when dense willow stands and large cottonwoods will be restored (Dreesen and Fenchel 2010).

Indirect impacts within the analysis area related to noise, increased vehicular traffic, and general increased activity during construction. Construction would occur outside the breeding season when yellow-billed cuckoos are not likely to be present; therefore, these are discountable effects.

Ground disturbance associated with restoration activities including bankline modifications, island destabilization, modification of flow-through channels, and excavation of backwater channels is expected to temporarily degrade the suitability of habitat for the yellow-billed cuckoo by disturbing native soils, mid-story vegetative cover, and large nonnative trees. While potential effects associated with the removal of vegetative cover may occur, these impacts would be offset by revegetation and restoration of habitat conditions that will allow for inundation at a range of river flows, which will enhance the midstory component of nesting habitat for the yellow-billed cuckoo within the analysis area and allow for reestablishment of native trees.

Additionally, there will be indirect effects on yellow-billed cuckoo through habitat alterations resulting from geomorphic changes in the river as a result of restoration activities (Reclamation 2015:3–152). In 2015, the BA completed for previously restored sites along the entire MRG

corridor stated:

> Local indirect effects at river maintenance project sites may have positive and negative impacts to yellow-billed cuckoos depending on the river maintenance methods used. River maintenance methods that modify the river channel tend to change overbank flooding occurrences, frequency or locations, and also vegetation composition over time. These effects can occur upstream of or downstream from the site as well. Implementing these methods can be positive or negative depending on characteristics at the specific location. In general, river maintenance methods that reduce channel incision, promote floodplain connectivity, and provide a greater potential for overbank flooding are more beneficial for yellow-billed cuckoos than river maintenance methods that would increase the flood-flow capacity within the channel and lower the water table. (Reclamation 2015:3–152)

The creation of 33 floodplain terraces (inundation areas) across 231 acres within the analysis area would increase the potential for overbank flooding and would contribute to improving conditions for native riparian vegetation, in turn benefiting yellow-billed cuckoo by improving potential suitable habitat. The creation of floodplain terraces would involve lowering the bank through the removal of vegetation and the excavation of native soils and would reduce the quantity of available yellow-billed cuckoo habitat in the short term. However, revegetation within the terraces and increased inundation is expected to increase the quantity and quality of yellow-billed cuckoo habitat within the analysis area, specifically the midstory component required for suitable nesting habitat, as well as enhance conditions for native tree establishment. Increased quantity and quality of habitat within the analysis area increases connectivity of habitat within the MRG corridor. This is considered a long-term, indirect benefit to yellow-billed cuckoo.

Removal of 35 acres of invasive species and the reestablishment of native riparian vegetation would be beneficial for yellow-billed cuckoo as planted species establish and contribute to increasing habitat availability and suitability. While yellow-billed cuckoo may nest and forage in saltcedar, they typically require a native vegetation component (USFWS 2021). In the long term, revegetation of willow as part of the proposed project would provide a more densely vegetated midstory composed of native vegetation species contributing to the multi-structured riparian habitat that is preferred by yellow-billed cuckoo. Increased quality and quantity of habitat within the analysis area increases connectivity of habitat within the MRG corridor. This is considered a long-term, indirect, beneficial impact to yellow-billed cuckoo.

To increase connectivity between the river channel and floodplain, jetty jacks will be removed from the riparian corridor. This would be an indirect benefit to yellow-billed cuckoo because jetty jacks constrain sediment and water movement and can be counterproductive to floodplain habitat creation. With the removal of jetty jacks, more diverse floodplain features will be created, including conditions for the reestablishment of willow stands and native trees that would benefit the species. Approximately 50 jetty jacks will be removed along the I-40 subreach, which will require excavation and temporary disturbance of 0.7 acre of soil and vegetation. This will be offset by the long-term restoration of habitat and increase in habitat quantity and quality.

Equipment used for construction and maintenance of the project has the potential to introduce and spread invasive and noxious weeds to the analysis area. Invasive and noxious weeds have the potential to outcompete native vegetation that is preferred by the species and to degrade suitable

habitats for native flora and fauna. Environmental commitments will prevent the introduction and spread of invasive and noxious weeds (Soil-2 and Vegetation-4 design features, Appendix C). Additionally, in consideration of the native vegetation restoration and nonnative/invasive species removal design components of the Proposed Action, establishment of nonnative vegetation is highly unlikely. Therefore, potential adverse impacts to yellow-billed cuckoo habitat related to invasive and noxious weeds are expected to be discountable.

In summary, the Proposed Action is expected to result in long-term, beneficial impacts to yellow-billed cuckoo habitat within the analysis area by increasing both quantity and quality of habitat. Currently, there is an estimated 110.8 acres of moderately suitable and suitable habitat for the yellow-billed cuckoo within the analysis area, and the project is anticipated to permanently remove 13.0 acres of suitable habitat. However, the project will restore 231 acres of yellow-billed cuckoo habitat, which will result in an increase (net gain) of 133.2 acres of suitable yellow-billed cuckoo habitat within the analysis area. As yellow-billed cuckoos are known to use habitat within the analysis area (Davis 2024; USACE 2024; eBird 2024), project implementation will occur outside the species' breeding season (May 1–September 30), and additional environmental commitments detailed in Appendix C will be implemented. Adverse impacts to the yellow-billed cuckoo would be insignificant, and no take is anticipated. This is supported by the analysis in the 2016 BO (USFWS 2016:91), which states that effects of river maintenance activities and habitat restoration have localized effects on yellow-billed cuckoo and would impact yellow-billed cuckoos the same way as described for southwestern willow flycatcher; however, proposed design features will minimize or mitigate these impacts.

3.5.3.4 New Mexico Meadow Jumping Mouse

No suitable habitat for NMMJM occurs in or near the MRG corridor. The Proposed Action would improve the habitat for this species by reestablishing native riparian vegetation. Removal of 35 acres of nonnative vegetation and re-establishment of native riparian vegetation would occur within the extent of the analysis area and would result in conditions suitable for NMMJM nesting, movement, and predator avoidance. The creation of floodplain terraces and inundation areas would result in more water reaching vegetation and an improvement in quantity and quality of dense riparian herbaceous vegetation conditions relied on by this species. Increased quality and quantity of habitat within the project area increases potential connectivity of habitat within the MRG corridor. This is considered a long-term, indirect benefit to NMMJM.

With the application of environmental commitments, potential short-term effects of the action are limited to a temporary degradation and reduction of available emergent herbaceous wetland habitat. Ground disturbance associated with restoration activities, including bankline modifications, island destabilization, modification of flow-through channels, and excavation of backwater channels, is expected to temporarily degrade the suitability of available habitat for NMMJM by disturbing native soils and vegetative cover. While potential effects associated with the removal of vegetative cover may occur, these impacts would be offset by revegetation and restoration of habitat conditions that will allow for inundation at a range of river flows, which will enhance nesting and cover habitat for NMMJM within the analysis area.

The creation of 33 floodplain terraces (inundation areas) across 231 acres within the analysis area would increase the potential for overbank flooding and result in improved conditions for the reestablishment of dense riparian herbaceous vegetation that would benefit the species in the long

term. The creation of floodplain terraces would involve lowering the bank through the removal of vegetation and the excavation of native soils and would reduce the quantity of available NMMJM habitat in the short term. However, revegetation within the terraces and increased inundation is expected to increase the quantity and quality of NMMJM habitat within the analysis area. Increased quantity and quality of habitat within the analysis area increases connectivity of habitat within the MRG corridor. This is considered a long-term, indirect benefit to NMMJM.

To increase connectivity between the river channel and floodplain, jetty jacks will be removed from the riparian corridor. This would be a direct benefit to NMMJM as jetty jacks constrain sediment and water movement and can be counterproductive to floodplain habitat creation. With the removal of jetty jacks, more diverse floodplain features will be created, including conditions for the reestablishment of the forbs and sedges that would benefit the species. Approximately 50–100 jetty jacks will be removed along the I-40 subreach, which will require excavation and temporary disturbance of 0.7 acre of soil and vegetation. This will be offset by the long-term restoration of habitat and increase in habitat quantity and quality.

Equipment used for construction and maintenance of the project has the potential to introduce and spread invasive and noxious weeds to the analysis area. Invasive and noxious weeds have the potential to outcompete native vegetation that is preferred by the species and to degrade suitable habitats for native flora and fauna. Environmental commitments will prevent the introduction and spread of invasive and noxious weeds (Soil-2 and Vegetation-4 design features, Appendix C). Additionally, in consideration of the native vegetation restoration and nonnative/invasive species removal design components of the Proposed Action, establishment of nonnative vegetation is highly unlikely. Therefore, potential adverse impacts to NMMJM habitat related to invasive and noxious weeds are expected to be discountable. Removal of 35 acres of invasive vegetation and the restoration of native vegetation would improve the ecological character of NMMJM habitat within the analysis area and is considered a long-term, indirect, beneficial impact.

In summary, there is currently no suitable habitat for NMMJM within the analysis area. However, with the removal of jetty jacks, development of inundation areas, and execution of restoration activities, the Proposed Action will result in an increase of potentially suitable NMMJM habitat within the analysis area, resulting in long-term, beneficial impacts to NMMJM by increasing both quantity and quality of habitat.

3.5.3.5 Monarch Butterfly

The Proposed Action would benefit the riparian and aquatic ecosystems of the MRG and is anticipated to increase the quantity and quality of monarch butterfly habitat within the MRG corridor. Reestablishment of native riparian vegetation would occur within the extent of the project area and would include planting milkweed that would benefit the local populations of migratory and breeding monarchs. This is considered a long-term, direct benefit to the species.

The entire 368.4-acre project area could provide habitat for monarch butterfly, and the entire project area would be subject to surface disturbance as described below. Vegetation removal and ground disturbance necessary to construct the project would remove known breeding and migratory habitat for monarch butterflies. Removal of milkweed has the potential to remove breeding refugia for monarch butterflies, as well as destroy any eggs that have already been laid on milkweed plants prior to removal. Removal of riparian trees may result in reduced shade and

higher ambient temperatures throughout the analysis area. Removal of vegetation would also result in the reduction of general migratory and nectary habitat for monarch butterflies that may not be breeding but could still be traveling through the area. The removal of native nectary plants will be avoided to the greatest extent possible (Vegetation-3 design feature, Appendix C) to reduce impacts to the species. The project is expected to be constructed after August 15 and before April 15 of the following year, impacting both migratory and breeding seasons for the species. Design feature Monarch-1 (see Appendix C) includes measures to avoid removing milkweed habitat during the breeding and migratory season in New Mexico. Implementation of this design feature will fully mitigate any direct impacts to monarch butterflies (Monarch-1, Appendix C).

Because the project would encourage the establishment of native plants, including milkweed and other nectar-producing species that can mature within one growing season, in disturbed areas, the impact of vegetation removal would be insignificant and discountable. Because the project would act to restore riparian habitat and improve the composition of vegetation communities to include more diverse native species, this project would have a net benefit to the species.

Although unlikely due to slow speeds, heavy equipment used during construction could directly collide with butterflies during construction activities; however, the USFWS noted in their proposed rule that vehicle strikes are not a primary threat to the species. Therefore, the Proposed Rule provided an exception to this potential effect (USFWS 2024c). Equipment could also cause a visual disturbance that indirectly dissuades butterflies from traveling through the area, which could generate an energetic cost for butterflies that have to change course or move across the open MRG to avoid the project area.

Additionally, ground-disturbing activities during construction increase the potential for the introduction of invasive and noxious weeds that can outcompete native vegetation, especially milkweed species, leading to increased habitat degradation. Passive competition for milkweeds and other native vegetation could be considered an indirect impact to the species. The project would implement noxious weed design features to reduce the potential for introduction of invasive species to the site, which would ultimately discount any potential impact to monarch caused by competition from nonnative species (Vegetation-3 and Vegetation-4 design features, Appendix C). Additionally, the project goal is to restore the project area to better than pre-project conditions by improving native vegetation including milkweed. If monarch butterflies are navigating through the analysis area, it is likely they would be able to avoid construction equipment, which would be moving at a slow pace while carefully removing soils and creating physical bank features. Therefore, direct mortality or disturbance from excavation of soils is likely discountable.

Lastly, the use of heavy equipment for vegetation removal, excavation of soils, earthwork, and revegetation could contribute to fugitive dust. Dust arises from mechanical disturbance of granular material exposed to the air and would likely come from vehicles and heavy equipment driving on disturbed soils. Fugitive dust has the potential to affect photosynthetic rates, decrease plant productivity, and interfere with pollen-stigma interactions, which may result in alterations to plant-wildlife interactions or reductions in the quantity or quality of milkweed and other nectar plants available to monarchs (McGranahan and Poling 2021). The overall impact to vegetation from fugitive dust would be localized along access roads and areas of ground disturbance and would be reduced once construction activities were completed, occurring only occasionally during operation and maintenance activities.

Invasive species removal and reestablishment of native riparian vegetation would occur within the extent of the project area. The reestablishment of vegetation using live stakes, plugs, and seed mixes that include nectary plant and native milkweed species would support monarch butterfly. In the USFWS's proposed rule, they provided an exemption for effects to monarchs during the implementation of "Activities that may maintain, enhance, remove, or establish milkweed and nectar plants within the breeding and migratory range that do not result in conversion of native or naturalized grassland, shrubland, or forested habitats" (USFWS 2024c:100685). Additionally, native trees planted to support the restoration would provide shade and refugia to traveling monarchs. This is considered a long-term, direct benefit to the species.

Creation of floodplain terraces would increase the inundation of overbank areas and create a seasonally inundated wetland that supports vegetation such as milkweed and flowering annuals and perennials. This would increase the area of potential breeding and egg-laying habitat for monarch butterflies, which could contribute to a more robust population. This is considered a long-term, indirect benefit to the species.

Riverbank stabilization would be used to reduce erosion rates of the riverbank by grading the toe of the slope and incorporating erosion control features such as coir matting and planting native vegetation. The replanting of vegetation on a gradual slope would restore and improve native riparian plants that support monarch. Additionally, bank stabilization would ensure this native vegetation is not lost to bank erosion over time. This would be a long-term, indirect benefit to monarch butterfly.

In summary, the Proposed Action is expected to result in long-term, beneficial impacts to monarch butterfly habitat within the analysis area by increasing the quality of habitat. As the primary threat to monarch butterfly is degradation of habitat and loss of milkweed populations (USFWS 2020b, 2020c), the Proposed Action is in compliance with the ESA's protection of monarch butterfly by potentially increasing the native riparian vegetation and milkweed species within the analysis area.

3.5.4 Cumulative Effects

The reasonably foreseeable trends and planned actions associated with projects listed in Table 3.1 would have impacts to federally listed species similar to those that would result from the Proposed Action. Reasonably foreseeable projects in the area include the Rio Bravo bridge replacement project, known residential improvements in the South Valley, and several maintenance or restoration activities planned by various agencies with jurisdiction in the MRG watershed, as well as long-term ecological monitoring through the BEMP project by Bosque School. The bridge replacement and residential development may have an adverse impact to federally listed species, but it is anticipated that these projects will analyze their potential impacts to the species and critical habitat individually and will offset any potential adverse effects through project-specific mitigation. Further, ongoing maintenance and planned restoration projects for the watershed by the USACE and other local agencies would have a net benefit to the analysis area through improvement of water quality and riparian habitat in the MRG. The successful completion of this project would be a long-term benefit to the MRG riparian corridor. There would be no long-term, adverse effects on federally listed species that would contribute to a potential cumulative impact. The outcome of this project would contribute to ecological uplift within the whole of the MRG riparian corridor including an increase in riparian vegetation to support the listed species analyzed in this EA.

3.6 Issue 5: Potential Impacts to Land Use and Land Access

3.6.1 Affected Environment

The project area comprises up to 19.6 linear miles of the east and west banks of the MRG. Land ownership comprises private lands, state lands, and lands jointly managed by Reclamation and the MRGCD (see Figure A.2 in Appendix A). Of the proposed project area, all but four islands are included within the Rio Grande Valley State Park (RGVSP) (City of Albuquerque 2024a). One island within the NDC subreach is just outside the RGVSP in the Corrales Bosque Preserve, within the Village of Corrales in Sandoval County (Village of Corrales 2024a). One island in the PDN subreach and two islands in the I-40 subreach are just outside the RGVSP along the western portion of the river, within the City of Albuquerque.

The 4,300-acre RGSVP extends from Sandia Pueblo in the north through Albuquerque and south to Isleta Pueblo and is on both the east and west sides of the Rio Grande. The RGVSP is surrounded by the City of Albuquerque, Village de Los Ranchos de Albuquerque, Village of Corrales, and unincorporated areas of Bernalillo County including Atrisco and South Valley (Village of Los Ranchos de Albuquerque 2024). Although officially named "State Park", the RGSVP is managed cooperatively by the City of Albuquerque Open Space Division and the MRGCD. The Corrales Bosque Preserve (CBP) is approximately 662.4 acres and comprises of an area within the territorial limits of the Village of Corrales extending from the Corrales siphon at its north end to the Alameda Boulevard bridge at its south end, bounded on the east by the western low water line of the Rio Grande and on the west by the Sandoval lateral ditch and Corrales riverside drain (Village of Corrales 2024b:Section 11-3). The RGVSP, Corrales Bosque Preserve, and the river are therefore used as the analysis area for the assessment of land use and access impacts because it represents a contiguous area of similar management and use in which impacts would be contained.

The entire RGVSP and the islands in the PDN and I-40 subreaches are within the city of Albuquerque and zoned as Non-Residential Park and Open Space Zone District (NR-PO-C) (City of Albuquerque 2024b). Non-residential areas include the San Antonio Oxbow and Rio Grande Nature Center (City of Albuquerque 2024c). According to the City of Albuquerque Integrated Development Code, this zone district is identified to protect the natural character of designated private and public parks and open space for public recreation, use, and enjoyment. Primary uses are open space and related recreation facilities, picnic and other shelters, and service/maintenance facilities (City of Albuquerque 2024d:Section 2-5(F)).

Land use policies for the RGSVP and areas zoned as NR-PO-C are contained in the Major Public Open Space Facility Plan (City of Albuquerque 1999). They include policies related to development of facilities and special areas, compatible land use, vegetation management, monitoring and mitigation, and other elements of potential use for the area.

The RGVSP is used for recreational and conservation purposes (City of Albuquerque 2024a). Access roads in the RGVSP include two-track ungraded dirt roads and well-defined off-highway roads that are graded dirt or cemented road. Existing multiple-use trails are used for walking, running, biking, and horseback riding as well as to provide access to the river for hot air ballooning (on river islands), canoeing, paddle boarding, fishing, and kayaking. The existing trails include bare earth, asphalt, and gravel trail systems. There are two trails within the RGVSP that exist on both sides of the river. One of the trails, known as the Paseo del Bosque Trail, is a 16-mile-long

paved trail on the east side of the river (City of Albuquerque 2024e). Formal trails within the RGVSP are maintained by the City of Albuquerque Open Space Division (City of Albuquerque 2024e). Other pedestrian trails in the RGVSP are informal; that is, they are unauthorized pedestrian trails spontaneously created and consecutively used by the public carving their own paths and are not maintained. There are several access points to the RGVSP throughout Albuquerque that offer parking, designated picnic areas, vault toilets, and trash receptacles. Portions of the RGVSP have been previously disturbed for development of wastewater and water control infrastructure, jetty jacks, and power lines. Nonnative vegetation has accumulated throughout the analysis area and include species such as ravenna grass and Russian olive. The City of Albuquerque performs routine vegetation management and recreation enhancement activities, including vegetation thinning, invasive species treatments, and trail creation improvements to benefit the community.

The CBP is zoned as Open Space and is identified to preserve and protect the natural and native conditions, habitat, and wildlife in the CBP in order to ensure that an increasing human population does not adversely affect or otherwise change the Rio Grande Bosque within the village, leaving areas preserved and protected in their natural condition (Village of Corrales 2024b:Section 11-1). The CBP access roads include two-track ungraded dirt roads that run along the western right-of-way line for the Sandoval lateral ditch and the Corrales riverside drain. Existing access trails in the CBP are used for recreational and preservation purposes. The CBP was designated as an Important Bird Area in 2013 and is an important stopover habitat for many migrant birds (Village of Corrales 2024c). There are no amenities in the CBP, and access points that offer parking are at the south end (Alameda Bridge) and north end (Siphon Road) (Village of Corrales 2024c).

In 2005 and 2007, EAs were completed for a portion of the proposed restoration sites (SWCA 2007:1). The documents stated that land uses included visible use of the bosque and river to the public from many bridge crossings, such as the U.S. Highway 550, Alameda, Montaño, Central Avenue, César Chavez, and Rio Bravo bridges (SWCA 2005:42). These bridge vistas of the river and bosque provide thousands of urban residents with a regular and important visual aesthetic experience. The bosque and river are also visible and enjoyed for their aesthetic value from many foot and horse trails (SWCA 2007:42). No motorized vehicles except maintenance and emergency vehicles are allowed in the bosque, making the aesthetic experience of the recreating public one of a forest and riverside that is full of the sounds and sights of water and forest (SWCA 2007:42).

3.6.2 Effects from the No Action Alternative

Under the No Action Alternative, current uses of the bosque area would remain unchanged by the proposed restoration activities. The City of Albuquerque Open Space Division would continue to perform routine vegetation management. The unofficial trails would not be removed and may continue to proliferate. Jetty jacks would remain and could continue to be a health and safety concern for recreationists and firefighters.

3.6.3 Effects from the Proposed Action

The Proposed Action would result in surface disturbance from restoration activities and road and trail development (see Table 2.1 and Table 2.2). The Proposed Action would also include activities that do not involve earthwork or grading actions, including nonnative vegetation removal, placement of LWD, and closure of unauthorized pedestrian trails (see Section 2.2.1). The Proposed

Action would be planned for construction or implementation across multiple years covering various sections along the river. These phases would not always occur concurrently.

Project Compatibility with Area Zoning

Activities that would occur within the RGVSP are within the NR-PO-C (City of Albuquerque 2024b). The Proposed Action meets and supports land use policies contained in the Major Public Open Space Facility Plan related to watershed management (Policy C.1), vegetation management (Policies C.13, D.4, and D.6), and trail management (Policies D.14 and D.15) (City of Albuquerque 1999). Activities that would occur within the CBP support the Corrales Bosque Preserve Management Guidelines (Village of Corrales 2024d). The CBP Management Guidelines encourage protecting a variety of habitats, prioritizing bank-lowering, and backwater creation projects to maintain current backwater channel functionality, fire risk mitigation, research, and coordination of plans and activities with the MRGCD (Village of Corrales 2024d). The three islands within the PDN and I-40 subreaches are outside the RGVSP and are zoned as NR-PO-C. There would be no incompatibility with area zoning for any restoration activities or maintenance. All appropriate construction and noise permits would be acquired.

Project Impacts to Access and Use of the RGVSP

Road and Trail Use and Access

The Proposed Action would require use of existing access roads with no modifications, modified existing access roads and trails, and proposed new access roads and trails (see Table 2.3). New and modified access roads and trails would be widened up to 14 feet for one-way traffic, with some roads requiring up to 11 feet of additional vegetation removal. No new access roads are proposed to be built in the CBP.

Use of existing access roads for equipment transportation during restoration and maintenance, as well as construction of the new access roads, may result in transportation delays or temporary closures to public use. Traffic impacts from restoration activities, modification of existing access roads, and construction of new access roads would be temporary and would not be expected to measurably impede traffic or increase daily traffic volumes. Access to and use of trails for recreational activities could be temporarily restricted as construction equipment is moved, trails are modified, and restoration activities are conducted along or near trails. The project would be conducted in phases, and therefore not all roads and trails would be restricted at the same time. Short-term, indirect impacts from surface disturbance activities on land use and access include noise, dust, and impairment to the visual aesthetic of the RGVSP, CBP, and river.

The Proposed Action would not have long-term adverse impacts on established trails managed by the City of Albuquerque Open Space Division and the Village of Corrales. Short sections of established trails may be permanently rerouted around restoration activities. Unauthorized pedestrian trails could be proposed for permanent closure. Any closures would be discussed and determined with the City of Albuquerque Open Space Trail System and would be made using signage and debris placement over trail spurs. These permanent impacts are not considered adverse and would enhance the ecosystem health of the project area and focus recreation on existing and designated trails in the City of Albuquerque Open Space Trail System.

Best management practices include placing educational and construction signage throughout the project area to inform recreational users of any temporary closures and redirect access as needed. Recreational land users would be able to access other paths throughout the RGVSP and CBP. Once constructed, the new and modified access roads and trails would create easier access for recreational users to enter and use the RGVSP for recreational purposes. In addition, new access roads would provide easier land access to the RGVSP for firefighters, if needed (SWCA 2005, 2007). Construction of new roads and trails would be permanent and would be compatible with the Major Public Open Space Facility Plan and RGVSP's goal of recreational and conservation purposes as well as the Corrales Bosque Preserve Management Guidelines (City of Albuquerque 1999, 2024a; Village of Corrales 2024d).

River Access and Use

Restoration activities would include excavating and removing soil and grading along various banklines, islands, channels, and confluences to provide more habitat for RGSM. The Proposed Action would also include placing LWD along the riverbank throughout various locations along the subreaches that will be identified during the implementation phase design process.

Excavation and removal of soil would result in increases to riverine area, permanently impacting the river use and access. Channel morphology would change, potentially supporting water-based recreational activities such as canoeing, kayaking, and fishing. Hot air ballooning may be impacted if restoration activities minimize islands used temporarily during takeoff and landing. Although hot air ballooners may not be able to use as many islands in the river to temporarily land, the visual aesthetic of the RGSVP, CBP, and river would increase once restoration is complete (see Table 1.3), providing a more enjoyable hot air balloon experience.

Temporary impacts to river access and use include avoidance of restoration equipment placed in or near the water during the restoration activity and maintenance. Areas where restoration and maintenance take place may be temporarily closed to water users in those areas. Kayakers or canoers who access and use the river in different areas may have to navigate around the equipment using alternative routes in the river system. Recreational users using the river would still be able to access the river via the existing roads and access trails managed and maintained by the City of Albuquerque Open Space Division. To minimize impacts to the river access and use, notifications to the public and signs would be placed informing recreational users of when and where the closures occur and where they can access and use the river. The LWD would be unanchored and would be transported downriver naturally as river flow increases. This may temporarily limit access to the banklines along the river.

Short-term, indirect impacts to river use from surface disturbance activities include noise, dust, and visual aesthetic impairment from restoration and maintenance. See Table 1.3 for further information.

Conditions-based maintenance actions would occur up to 15 years after initial construction and would be managed with restoration plans coordinated by appropriate landowners and authorizing agencies. No adverse permanent impacts to river access and use are expected from these activities.

Other Recreation Uses

The Proposed Action would include a spoils plan to place excavated soil and materials within and outside the restoration sites during construction (see Table 2.4). Some spoil material may be placed

into the river for movement downstream (pending approval from Reclamation and USACE); other spoil material may be used in assisting the City of Albuquerque revegetation and weed control efforts, improving or creating new turnaround areas for emergency vehicles, repairing roads, or leveling areas excavated during jetty jack removal. No permanent adverse impacts are anticipated from the spoils plan; however, recreational users of the RGVSP, CBP, and river may see these areas from existing trails or would need to alter off-trail activities to avoid spoils until work is completed.

The Proposed Action would also include removing approximately 50 jetty jacks in the I-40 subreach (see Table 2.2). Removing the jetty jacks would occur within 0.7 acre of the project area. Permanent impacts to land use and land access are considered non-adverse, creating and supporting the habitat restoration design, increasing accessibility to the bosque for firefighting actions, and reducing risks of injury to recreationists (SWCA 2005, 2007). Firefighters and recreational users would be able to access and use the land more efficiently and safely in accordance with the intended use of the RGVSP.

3.6.4 Cumulative Effects

The reasonably foreseeable trends and planned actions associated with projects listed in Table 3.1 would have impacts to land use and land access similar to those of the Proposed Action. Reasonably foreseeable projects in the area include the Rio Bravo bridge replacement project, known residential improvements in the South Valley, and several maintenance or restoration activities planned by various agencies with jurisdiction in the MRG watershed, as well as long-term ecological monitoring through the BEMP project by Bosque School. The potential maintenance activities of the Rio Bravo/Poco Loco NE picnic area as a result of wildfire damage may temporarily impact land access for recreational users; additionally, the bridge replacement and residential development may contribute to the reduction of access in the short or long term. Further, ongoing maintenance and planned restoration projects for the watershed by the USACE, MRGCD, and other local agencies would have a net benefit to recreational uses of the analysis area through improvement of riparian habitat in the MRG. The successful completion of this project, together with similar other projects, would be a long-term benefit to recreational users through enhanced access in the MRG. The outcome of this project, together with other restoration projects, would contribute to ecological uplift within the whole of the ABQ Reach, including a more dynamic and scenically pleasing viewshed for recreational users to enjoy as a result of restoring native vegetation and natural flow regimes.

3.7 Issue 6: Potential Impacts to Indian Trust Assets

3.7.1 Affected Environment

Indian trust assets (ITAs) are legal interest in property held in trust by the United States for Native American tribes or individuals. Examples of ITAs are lands, minerals, water rights, other natural resources, money, or claims. Secretarial Order 3175 and Reclamation's Indian Policy require the assessment of effects of the agency's projects on ITAs.

Meetings have been held with Reclamation, MRGCD, the City of Albuquerque, and other agencies to discuss the proposed project. No ITAs have been identified through these discussions. Additionally, the 2005 EA (SWCA 2005:52) and 2007 EA (SWCA 2007:51) confirmed that no

ITAs were identified within the project area and impacts to ITAs were not anticipated to occur. Therefore, no ITAs are known to occur in the project area.

3.7.2 Effects from the No Action Alternative

There would be no impacts to ITAs because the project would not be constructed, and no ITAs have been identified in the proposed project area.

3.7.3 Effects from the Proposed Action

No ITAs have been identified within the proposed project area. However, Reclamation has identified that the Isleta Diversion Dam located approximately 3.2 river miles downstream of the project area is an ITA of the Pueblo of Isleta. The Proposed Action could contribute to increased sedimentation released into the river during temporary phased construction events only occurring in late fall or winter. This impact from sediment release is expected to be minimal in comparison with the sediment loads already occurring in the river at any given time from natural and unnatural causes and uses.

3.7.4 Cumulative Effects

No ITAs have been identified within the proposed project area; therefore, there are no cumulative effects from the reasonably foreseeable trends and planned actions associated with projects listed in Table 3.1.

Consideration of the reasonably foreseeable trends and planned actions associated with projects listed in Table 3.1 would also contribute to sediment loads in the river, potentially cumulatively impacting the Isleta Diversion Dam (Dam). Reasonably foreseeable projects in the area include the Rio Bravo bridge replacement project, known residential improvements in the South Valley, and several maintenance or restoration activities planned by various agencies with jurisdiction in the MRG watershed. Many of these projects involve construction activities, which require surface disturbance and vegetation removal. Short-term, adverse impacts to the Dam, such as potential sediment deposition into the MRG, may occur as a result of disturbed soils and vegetation removal. Any adverse impacts to the Dam are expected to be short-term, lasting the duration of construction of any specific project. Ongoing maintenance and planned restoration projects for the watershed by the USACE and other local agencies would have a net benefit to the Dam through improvement of water quality in the MRG. The successful completion of this project would contribute to a long-term benefit to the MRG riparian corridor and may benefit the Dam and any other nearby downstream ITAs.

3.8 Summary of Environmental Effects Thresholds

The following table (Table 3.11) summarizes the total expected impacts across multiple primary issues related to the project. This summary assumes that the full development of all sites is achieved, through availability of funding, and the future approval of proposed design and permits are achievable at implementation-level review. Each future implementation action would be reviewed to compare expected impacts with those disclosed in this EA.

Table 3.11. Summary of Impacts to Resources Analyzed in Detail

Resource	Summary of Impacts	Threshold
Vegetation	• Short-term, adverse impacts would occur from surface disturbance and maintenance resulting in both native and nonnative vegetation removal. • Ravenna grass and other nonnative species would be targeted for removal. • Long-term, beneficial impacts to native vegetation would occur primarily due to increased floodplain inundation and the removal of nonnative species.	• Up to 336.2 acres of native and nonnative vegetation could be impacted. • Up to 89.3 acres of ravenna grass could be removed. • Up to 25 mature trees per acre of various species could be removed.
Aquatic Resources	• Short-term, adverse impacts would occur from surface disturbance and maintenance resulting in soil disturbance and compaction, vegetation removal, and sediment runoff. • Long-term, beneficial impacts to riparian and wetland habitat would occur primarily due to increased floodplain inundation and connectivity.	• Up to 344.3 acres of NWI wetlands could be impacted.

Resource	Summary of Impacts	Threshold
Water Quantity and Water Quality	• Short-term, adverse impacts to water quality would occur from surface disturbance, maintenance, and vegetation removal resulting in changes in turbidity, total dissolved solids, and suspended solids. • Long-term, beneficial impacts to water quality would occur due to reduced overall sediment input as a result of alterations to the channel and confluence maintenance. • Adverse impacts to water quantity are not expected or will be minimal due to most of the construction and maintenance occurring inside the 600-foot channel width.	• Would not exceed applicable state water quality standards as presented in NMAC 20.6.4. • Net depletions would be low.
Federally Listed Threatened and Endangered Species, Proposed Species, and Designated Critical Habitat	• The Proposed Action is likely to adversely affect one species (RGSM) and may affect but is not likely to adversely affect three species (southwestern willow flycatcher, yellow-billed cuckoo, and monarch butterfly). • Long-term, beneficial impacts to these species would occur from improvements made to the riparian and aquatic ecosystems.	• 354.4 acres of RGSM habitat would be improved. • 389.2 acres of designated RGSM critical habitat would be used as a surrogate take metric. • 15.0 acres of moderately suitable and suitable southwestern willow flycatcher habitat and 13.0 acres of moderately suitable and suitable yellow-billed cuckoo habitat would be permanently removed. • There would be a net gain of 75.2 acres of new moderately suitable and suitable southwestern willow flycatcher habitat and 133.2 acres of new moderately suitable and suitable yellow-billed cuckoo habitat.

Resource	Summary of Impacts	Threshold
Land Use and Land Access	• Short-term, adverse impacts to land use and access (including river use and access) would occur from construction and maintenance resulting in temporary traffic impacts, road/trail closures to the public, noise, dust, and visual aesthetic impairment. • Long-term, beneficial impacts to land use and access (including river use and access) would occur from the creation and widening of roads/trails for firefighting and recreational access, visual aesthetic improvement, and removal of jetty jacks.	No impacts threshold has been identified for land use and access.
Indian Trust Assets	• No ITAs have been identified within the proposed project area. • Short-term, adverse impacts to the Isleta Dam ITA, located 3.2 river miles downstream of the project area, may occur during construction and maintenance resulting in increased sedimentation.	No threshold has been identified for ITAs. No threshold is expected to be exceeded.

CHAPTER 4 CONSULTATION AND COORDINATION

Reclamation's public involvement process presents the public with opportunities to obtain information about a given project and allows interested parties to participate in the project through written comments. This chapter discusses public involvement activities taken to date for the Proposed Action.

4.1 Public Involvement

The Programmatic EA is published on Reclamation's website[4] and the NMISC's website[5]. The publication of the Programmatic EA will initiate a 30-day public review and comment period. Substantive public comments received during the public review and comment period will be evaluated and, if appropriate, may result in revisions to the Final Programmatic EA. Additionally, public comments will be reviewed and resolved and included in an appendix to the EA. The Programmatic EA will meet the technical standards of Section 508 of the Rehabilitation Act of 1973 so that the documents can be accessed by people with disabilities using accessibility software tools.

4.2 Agency Coordination and Consultation

The NMISC and Reclamation have coordinated and consulted with the agencies and entities listed in Table 4.1 during the development of this EA. Coordination with agencies will be ongoing through public and agency review of the EA, as well as future review of implementation projects. The NMISC conducted site visits with representatives from the City of Albuquerque Open Space Division on September 19, 2023, and with the City of Albuquerque Open Space Division and MRGCD on September 12, 2024, to provide opportunities for input on site selection and project design.

Table 4.1. Summary of Agency Coordination and Consultation

Agency/Entity	Type of Coordination/Consultation
City of Albuquerque Open Space Division	The NMISC coordinated with the City of Albuquerque Open Space Division regarding project design and future project maintenance.
Middle Rio Grande Conservancy District	The NMISC coordinated with the MRGCD regarding project design, future project maintenance, jetty jack removal, and joint license agreements.
U.S. Fish and Wildlife Service	The NMISC coordinated with the USFWS on the Letter of Delegation per the List of Authorized Individuals and using yellow-billed cuckoo and southwestern willow flycatcher sightings data.

[4] Reclamation's website: (https://www.usbr.gov/uc/DocLibrary/ea.html).
[5] NMISC's website: (www.ose.nm.gov/ISC/).

Agency/Entity	Type of Coordination/Consultation
U.S. Army Corps of Engineers	The NMISC coordinated with the USACE regarding compliance with the CWA, jetty jack removal, project design, and using yellow-billed cuckoo and southwestern willow flycatcher sightings data.
New Mexico Environment Department	The NMISC will coordinate with NMED regarding compliance with the CWA.
New Mexico Historic Preservation Division	Reclamation will initiate National Historic Preservation Act Section 106 consultation with the New Mexico Historic Preservation Division.
Rio Grande Nature Center State Park	The NMISC will coordinate with the Rio Grande Nature State Park regarding project design and future project maintenance for sites located within the PDN subreach.
Valle de Oro National Wildlife Refuge	The NMISC will coordinate with the Valle de Oro National Wildlife Refuge regarding project design and future project maintenance for sites located within the SDC subreach.
Village of Corrales	The NMISC will coordinate with the Village of Corrales regarding project design and future project maintenance for sites located within the NDC subreach (specifically sites that are located within the Corrales Bosque Preserve).

CHAPTER 5 – PREPARERS

The following list contains the specialists who participated in preparing this EA.

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CHAPTER 6 – LITERATURE CITED

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Appendix A

Project Maps

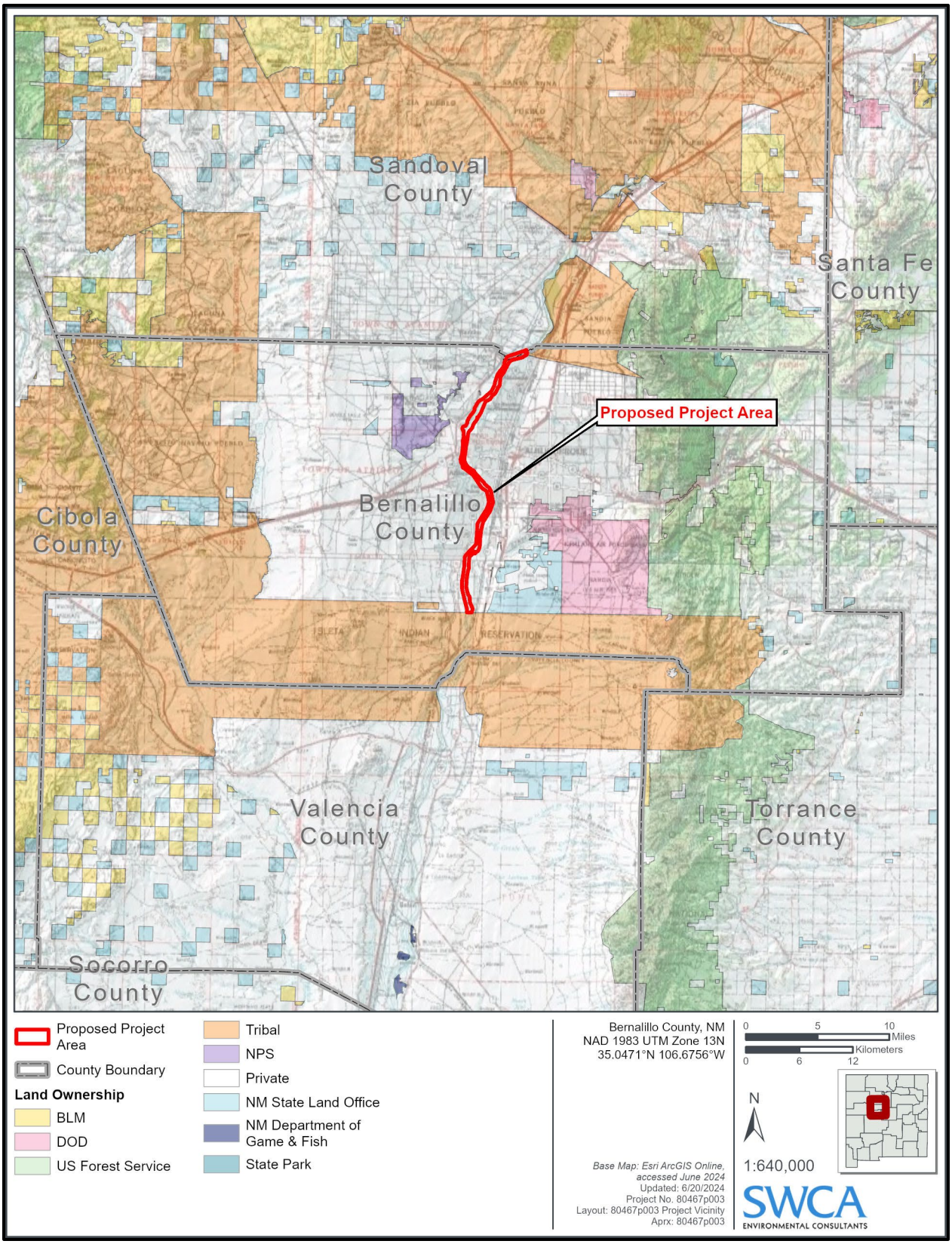

Figure A.1. Project vicinity map.

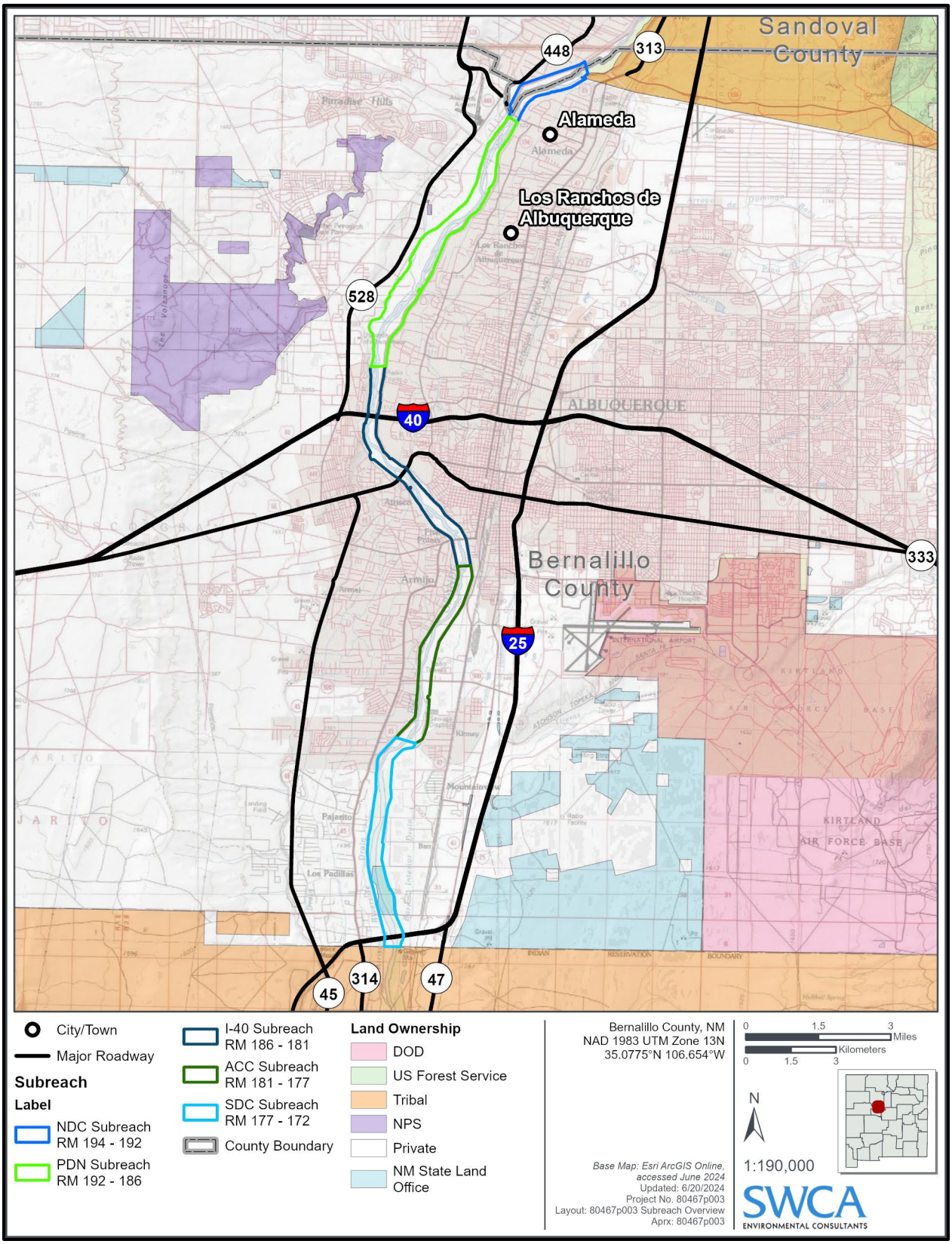

Figure A.2. Project subreaches map.

APPENDIX B

Proposed Action Overlap with Existing Restoration Project Areas and Previous NEPA Analysis

Table B.1. Proposed Action Overlap with Existing Project Areas and Previous NEPA Analysis

Project Area Name*	Proposed Action (restoration component)	Overlap with Existing Sites/Previous NEPA Analysis (yes or no)
192p9_I_1	Backwater, island destabilization	Yes
192p9_W_1	Bankline modification	No
190p5_W_1	Bankline modification	Yes
190p3_I_1	Island destabilization	No
190p2_I_1	Island destabilization	No
190p1_E_1	Bankline modification, flow-through channel	Yes
189p9_I_1	Island destabilization	No
189p7_I_1	Island destabilization	No
189p6_I_1	Island destabilization	No
189p3_W_1	Bankline modification	Yes
189p2_I_1	Island destabilization	No
189p1_W_1	Flow-through channel, bankline modification	No
188p7_I_1	Backwater, island destabilization, flow-through channel	Yes
188p6_I_1	Island destabilization	No
188p5_W_1	Backwater, bankline modification	Yes
187p9_I_1	Backwater, island destabilization	Yes
187p6_W_1	Bankline modification	No
187p5_E_1	Bankline modification	No
187p3_I_1	Island destabilization	No
187p2_I_1	Island destabilization	No
187p0_E_1	Bankline modification	No
186p1_I_1	Island destabilization	No
186p1_I_2	Island destabilization	No
185p5_E_1	Backwater	Yes
185p4_E_1	Backwater, bankline modification	Yes
185p4_E_2	Jetty jack removal	No
185p1_E_1	Backwater	No
185p1_I_1	Island destabilization	No

Project Area Name*	Proposed Action (restoration component)	Overlap with Existing Sites/Previous NEPA Analysis (yes or no)
184p7_E_1	Backwater, bankline modification	Yes
184p5_E_1	Backwater	Yes
184p5_I_1	Island destabilization	Yes
184p3_E_1	Bankline modification	Yes
183p9_W_1	Bankline modification	Yes
183p7_W_1	Confluence maintenance (mouth cleanout)	No
183p7_E_2	Bankline modification	Yes
183p7_E_1	Flow-through channel, bankline modification	Yes
183p5_I_1	Island destabilization	No
183p5_W_1	Confluence maintenance (mouth cleanout)	No
183p3_W_1	Confluence maintenance (mouth cleanout)	Yes
183p0_W_1	Confluence maintenance (mouth cleanout)	Yes
182p9_E_2	Jetty jack removal	Yes
182p9_E_1	Backwater, bankline modification	Yes
182p4_I_1	Island destabilization, backwater	No
182p3_W_1	Confluence maintenance (mouth cleanout)	No
182p2_I_1	Island destabilization	No
182p0_E_1	Bankline modification, backwater	No
181p7_W_1	Confluence maintenance (mouth cleanout)	No
180p5_I_1	Island destabilization	No
180p3_E_1	Backwater	No
180p3_I_1	Island destabilization	No
180p0_W_1	Bankline modification	No
179p5_I_1	Island destabilization	No
179p2_I_1	Island destabilization	No
178p0_E_1	Bankline modification, flow-through channel	Yes
177p9_I_1	Island destabilization	No
177p8_I_1	Island destabilization	Yes
177p5_W_1	Backwater, bankline modification	No
177p3_W_1	Backwater	No
176p7_W_1	Backwater, bankline modification	Yes

Project Area Name*	Proposed Action (restoration component)	Overlap with Existing Sites/Previous NEPA Analysis (yes or no)
176p2_W_1	Backwater	Yes
175p9_E_1	Backwater, bankline modification	Yes
175p6_I_1	Flow-through channel, island destabilization	No
175p6_W_1	Bankline modification	Yes
175p2_W_1	Bankline modification	Yes
174p9_W_1	Backwater, bankline modification, confluence maintenance (mouth cleanout)	No
174p8_I_1	Island destabilization	Yes
174p7_I_1	Island destabilization	No
174p3_E_1	Backwater, bankline modification	Yes
174p2_I_1	Island destabilization	No
174p0_I_1	Island destabilization, backwater	Yes
173p9_E_1	Bankline modification	No
173p4_W_1	Backwater	No
173p3_W_1	Backwater, bankline modification	Yes
173p0_E_1	Backwater, bankline modification	Yes
172p9_W_1	Bankline modification	Yes
172p8_I_1	Island destabilization	No
172p8_W_1	Bankline modification	Yes
172p7_E_1	Backwater	No
172p6_W_1	Bankline modification	No
172p5_W_1	Bankline modification	No

*Site names were created using the standard naming convention in RioRestore, a comprehensive MRG habitat restoration geodatabase that consolidates information from prior geospatial datasets and develops a standard nomenclature and attribution structure for describing specific implementation activities and goals (Collaborative Program 2024a). The naming schematic is: RiverMile_Location_Number. "River Mile" includes the tenth of a mile, with "p" as a decimal point. "Location" includes E (east bank), W (west bank), and I (island). "Number" starts at 1 for each unique combination of "River Mile" and "Location" and is used to differentiate sites with the same combination; for example, 182p9_E_2 is in the same area as 182p9_E_1.

APPENDIX C

Project Design Features and Environmental Commitments

Project Design Features and Environmental Commitments

This appendix discusses the proposed design features and environmental commitments developed to protect resources and reduce unavoidable adverse impacts to a non-significant level.

Reclamation will implement the environmental commitments if the Proposed Action is approved and constructed. The environmental commitments will be included in the contractor bid specifications.

General Design Features and Public Safety

Gen-1: Habitat restoration activities involving flow, elevation, sediment, habitat, surface water, and groundwater management planning have been incorporated into the project engineering design within Appendix D.

Gen-2: All necessary permits for access points, staging areas, and study sites will be acquired prior to construction activity.

Gen-3: All work projects will have a contract in place for the rental of portable restroom facilities, with secondary containment, during the duration of the project.

Gen-4: Each individual operator will be briefed on local environmental considerations specific to the project tasks.

Gen-5: The NMISC and its contractors will have an on-site environmental monitor during all work activities that have the potential for adverse impacts in order to ensure compliance. Also, an environmental monitor will regularly assess other activities to ensure compliance.

Gen-6: The use of chemical herbicides or pesticides may be necessary to control undesirable plant species around stockpile sites and storage yards and also to prevent the spread of invasive species in areas cleared for maintenance activities. The NMISC will follow all state and federal laws and regulations applicable to the application of herbicides, including guidelines described by White (2007).

- Herbicides or pesticides will not be directly applied to or near water unless they are labeled for aquatic use and appropriate buffers will be observed. Communication with the USFWS would occur prior to any application to sites with threatened or endangered wildlife species. The NMISC will follow the Albuquerque Area Office Integrated Pest Management Plan and Pesticide General Permit (Reclamation 2015) when applying herbicides or pesticides. The non-Reclamation project partners will follow their agency's herbicide/pesticide guidance, if applicable.
- Herbicides or pesticides may be applied using low-pressure spray rigs mounted to off-highway vehicles, trucks and trailers with spray bars, or backpack sprayers (for spot applications). Treatments will be conducted by trained and approved personnel observing appropriate buffer distances and label directions.

- Treatment will not take place when winds exceed 10 miles per hour or when rain is forecasted for the local area within 48 hours of application. Care will be taken when mixing or applying any herbicide to avoid runoff onto the ground or into the water. Surfactants may also be added to certain herbicides to maximize herbicide/pesticide performance and minimize retreatments.

Gen-7: All project spoils and waste will be either disposed of off-site at approved locations or will be used on-site as appropriate to the project purpose, consistent with applicable environmental requirements.

Gen-8: Select restoration sites will be monitored for up to 15 years following initial construction to determine the effectiveness of the methods implemented and identify project-related hydrologic and geomorphic alterations. The monitoring will consist of biological, vegetation, geomorphic, and hydrologic monitoring, as appropriate to the project design and purpose.

Public-1: The public will be notified of project construction through informational flyers, signs posted in the area, letters to nearby residences, and/or posts to the NMISC's website.

Public-2: Temporary signage and site protection from public use, press releases, and online public notices will be used to notify the public of project area closures during construction.

Public-3: Unauthorized encampments that are located in areas that could harm individuals or construction workers will be reported to the authorities for removal prior to work.

Public-4: All waste material associated with the project will be disposed of properly and not placed in identified floodway or wetland areas or in habitat for species listed under the ESA.

Public-5: To minimize noise disturbance impacts, implementation activities will be limited to the hours of 7 a.m. to 6 p.m., and all equipment and machinery used will meet all applicable local, state, and federal noise control regulations.

Public-6: All Occupational Safety and Health Administration and local municipality noise control ordinance requirements will be adhered to.

Restore-1: Comprehensive Restoration Plan(s) for each priority group will be developed prior to construction to meet permitting and compliance (CWA Section 404 and ESA) requirements for proposed habitat restoration project areas. Details on LWD placement, nonnative vegetation treatment, jetty jack removal, pedestrian access trail closure, and spoils will be captured within the implementation phase Restoration Plan and coordinated with the proper agency prior to construction. The Restoration Plan will provide a single document that contains performance standards, the monitoring methods, recommended maintenance, and adaptive management processes that can be implemented.

Wildlife

Bird-1: The Proposed Action will minimize impacts to birds protected under the MBTA (16 USC 703), including the federally listed endangered southwestern willow flycatcher and the threatened

yellow-billed cuckoo, by conducting work activities outside the normal breeding and nesting season (April 15 to September 30 for migratory birds, and May 1 to September 30 for work in suitable southwestern willow flycatcher or yellow-billed cuckoo habitat).

- The Restoration Plan (Restore-1) will be developed and detail the vegetation plan. If reseeding or revegetation occurs, it may be accomplished by hand or by mechanized means. Planting via mechanized means includes using a handheld or tractor-mounted auger. If mechanized means are used for either reseeding or replanting in the April 15 to September 30 time frame, migratory nesting bird surveys will be conducted within 2 weeks prior to the work to determine if any breeding birds are present.

Bird-2: The Proposed Action will minimize impacts to the federally listed endangered southwestern willow flycatcher and the threatened yellow-billed cuckoo by working with agency partners to assess and monitor restoration activities and habitat suitability.

Bird-3: The Proposed Action would maintain compliance with the BGEPA and MBTA, by conducting preconstruction surveys for all migratory birds and to adhere to nest avoidance for raptors (including eagles), if project activities were to occur during raptor nesting and breeding season (March–May).

- Per the BGEPA, all project activities would occur at least 660 feet away from any known bald eagle nest and 1 mile from any golden eagle nest within the project footprint.

- The Proposed Action would minimize impacts to raptors (including eagles) by avoiding large mature trees that support perching habitat during construction activities when feasible.

Fish-1: Any active RGSM monitoring and compliance during construction and maintenance activities will be submitted within a Letter of Delegation that will include a List of Authorized Individuals as qualified and permitted individuals, per the USFWS, as a compliance action in accordance with the 2016 BO (USFWS 2016).

Fish-2: To allow fish time to leave the area before in-water work begins, equipment will initially enter the water slowly. In-water work will be fairly continuous during workdays, so that fish are less likely to return to the area once work has begun**.**

Fish-3: The NMISC will excavate an active bankline work area as few times as possible to minimize disturbance of sediment. When excavating along the wetted river channel, the following practices will be used to minimize disturbance of sediment:

- Minimize movement of excavator tracks
- Minimize excavator bucket contact with riverbed when not excavating

Fish-4: Whenever possible, airboats will be operated through the center of the channel to minimize disturbance to aquatic species, including RGSM.

Fish-5: The EA partners will monitor flows for 2 years following construction of side channels and, if flows at the nearest gage exceed the target inundation flows, will monitor the side channel for RGSM entrapment in accordance with the appropriate protocol. After 2 years, it may be determined in coordination with the USFWS that further monitoring is unnecessary.

Fish-6: If water is needed for dust abatement or to facilitate road grading, water may be pumped from the Rio Grande, irrigation drains, sumps, or secondary channels adjacent to the river. During irrigation season (March 1 to October 31), water will not be pumped from the river but will be pumped from the irrigation drains if possible. Outside the irrigation season, an amount not to exceed 5% of river flows at the time of pumping may be drawn from the Rio Grande. Pumping is short duration (minutes) for filling whatever water transport equipment is used. Sumps or secondary channels adjacent to the river will be used, whenever feasible. Pump intake pipes will use a 0.25-inch mesh screen at the opening of the intake hose to minimize entrainment of aquatic organisms.

Fish-7: The Proposed Action will minimize impacts to RGSM at restricted life stages (eggs and larvae) and their habitat by conducting work activities outside the spawning spring flows from May through June.

Fish-8: A permeable barrier consisting of fine mesh (similar to a turbidity curtain or block nets) will be placed along the perimeter of the wetted river channel, adjacent to the active bankline construction zone to exclude fish from active work areas and thus avoid trapping, injuring, or causing mortality to RGSM or any other fish. Any fish within the interior of the barrier will be removed immediately following installation. The permeable barrier will be installed approximately 10 feet into the river.

- Fish sampling will occur when the fish exclusion area is established, relocating fish outside of the area, and then any time the exclusion area is disturbed or breached during construction activities. This process will be repeated at each active bankline construction zone.

Monarch-1: The Proposed Action will avoid impacts to monarch butterfly, a federal proposed threatened species, by conducting vegetation removal activities outside the normal breeding and migratory season in New Mexico (March 1 to November 30) to the greatest extent practicable.

- If work is necessary between March 1 and November 30, suitable/occupied stands of milkweed will be avoided during the construction activities as much as possible. Coordination and consultation with the USFWS will occur prior to such work activities.
- The NMISC will conduct surveys to determine the presence of breeding monarchs before removal of any milkweed during March 1 through November 30. The NMISC and Reclamation will coordinate monitoring and work activities with the USFWS, as appropriate, if eggs, caterpillars, or monarchs are found.
- Stands of milkweed occupied by monarch butterflies within the project area will be fully avoided by construction activities within a 10-foot buffer erected with flagging and stakes. This avoidance area will be maintained either for the duration of

construction or until all monarch eggs and caterpillars have developed into monarch butterflies and voluntarily left the stand of milkweed.

- The postconstruction vegetation plan, including any potential revegetation actions of the project area, will be incorporated into the Restoration Plan (Restore-1). Vegetation actions will be coordinated with the City of Albuquerque Open Space Division, the Village of Corrales, and the MRGCD. See Restore-1 above for additional information.
- The Restoration Plan (Restore-1) will be developed and detail the vegetation plan. If reseeding or revegetation occurs, it may be accomplished by hand or by mechanized means. Planting via mechanized means includes using a handheld or tractor-mounted auger. If mechanized means are used for either reseeding or replanting in the April 15 to August 15 time frame, migratory nesting bird surveys will be conducted within 2 weeks prior to the work to determine if any breeding birds are present. If birds are detected, the NMISC will coordinate with Reclamation and the USFWS to determine appropriate next steps.
- Native milkweed seeds and plants will be included in the revegetation plans to improve monarch butterfly habitat.

Mouse-1: The Proposed Action will avoid impacts to NMMJM by not conducting work activities from August 15 to October 31 if suitable NMMJM habitat is found during habitat surveys conducted prior to work.

- NMMJM habitat surveys will occur in early summer (June or July) or when vegetation that characterizes NMMJM habitat is most likely to be at its peak growth. If suitable NMMJM habitat is found, the NMISC will coordinate with Reclamation and the USFWS prior to work.
- Road maintenance such as grading and washout repair may be performed throughout the year to maintain safe access to and from the river, but vegetation control will not occur between April 15 and August 15 (or September 1 for work in suitable yellow-billed cuckoo habitat), as per Bird-1 above.

Soils, Water, and Vegetation Resources

Soil-1: Off-road use of wheeled equipment will occur only when soils are not saturated to minimize soil compaction, soil displacement, and rutting and erosion. Equipment will be operated in an area as little as possible to minimize disturbance of sediments. When operating equipment within the wetted channel, the following practices will be used to minimize disturbance of sediments:

- Minimize movement of equipment
- Minimize contact with the riverbed when not operating equipment

Soil-2: Vehicles and equipment will be cleaned of soil and debris capable of transporting weed seed prior to beginning work in the bosque to prevent the spread of noxious weeds.

Soil-3: Excavated material will be stored in designated and approved spoil areas that were sited within upland locations to prevent sediment from entering the Rio Grande.

Soil-4: Sediment placement and quantity will be approved by the USACE.

Soil-5: Designated construction ingress and egress and access road(s) will be outfitted with rock pads or similar design features to reduce tracking of sediment off-site.

Water-1: The NMISC will comply with all the requirements of the CWA and permits associated with the project, including reporting to the appropriate authorities as needed, and will not begin work until all required permits are obtained.

Water-2: The NMISC will comply with the requirements of Section 402 of the CWA and will obtain permits from the EPA for construction stormwater discharges.

- The NMISC will ensure the construction contractor develops and implements a Stormwater Pollution Prevention Plan and complies with the EPA's construction general permit for compliance with CWA Section 402, NPDES Stormwater Program.
- Appropriate erosion controls, such as silt fences or straw wattles, will be installed and maintained around the project site to manage stormwater runoff in accordance with the Stormwater Pollution Prevention Plan and construction general permit requirements.

Water-3: The NMISC will obtain the necessary CWA Sections 404/401 permits prior to construction and will comply with the requirements of the permits, including required reporting to the USACE and appropriate authorities as needed.

Water-4: Minimize impact of hydrocarbons: To minimize potential for spills into or contamination of aquatic habitat:

- Hydraulic lines will be checked for leaks each morning and periodically throughout each workday. Any leaky or damaged hydraulic hoses will be replaced.
- All fueling will take place outside the active floodplain, where possible. All fueling will occur with a spill kit ready. If amphibious excavators are used, fueling will occur at the Rio Grande using airboats equipped with lined fuel containment. Whenever possible, airboats will be operated through the center of the channel to minimize disturbance to aquatic species, including RGSM.
- Fuel, hydraulic fluids, and other hazardous materials may be stored on-site overnight in a secured area but outside the normal floodplain, not near the river or any location where a spill could affect the river.
- All equipment will undergo high-pressure spray cleaning and inspection off-site prior to initial operation in the project area.
- Equipment will be parked on pre-determined locations on high ground away from the river overnight and on weekends and holidays.
- Spill protection kits will be on-site, and operators will be trained in the correct

deployment of the kits.

- External hydraulic lines will be composed of braided steel covered with rubber. When there is increased risk of puncture such as during mastication while removing vegetation, external hydraulic lines will be covered with additional puncture-resistant material, such as steel-mesh guards, Kevlar, etc., to offer additional protection.

Water-5: The NMISC and its contractors will visually monitor for water quality in the areas below areas of river work before and during the workday. Water quality will be monitored during construction and after equipment operates in the river channel. Monitoring will include visual observations and may include direct sampling, as appropriate.

- If direct sampling is needed, water-quality parameters to be tested include pH, temperature, dissolved oxygen, and turbidity. Parameters will be measured both upstream and downstream of the work area.
- Responses to changes in water-quality measures exceeding the applicable standards would include reporting the measurements to the New Mexico Environment Department Surface Water Quality Bureau and moving construction activities away from the shore.

Water-6: Equipment will be removed from the channel in the event of high storm surges.

Vegetation-1: Impacts to terrestrial and riparian habitats will be minimized by using existing roads whenever possible. In general, equipment operation will take place in the most open area available, and all efforts will be made to minimize damage to native vegetation and wetlands.

Vegetation-2: Vegetation control may consist of mechanical removal, herbicide, or mowing. Herbicides will be used when non-chemical methods are unsuccessful or are not economically feasible.

Vegetation-3: Native vegetation will be avoided to the extent possible. Native vegetation may be finely mulched and scattered selectively across the project area. If used, mulch will not be placed within 2 feet of the drip line of native cottonwood or willow trees and will be scattered at a depth not to exceed 3 inches. Native vegetation may be temporarily stockpiled and used to create dead tree snags or brush piles in the project area upon project completion.

Vegetation-4: Nonnative vegetation that is removed at work sites will be mulched or removed off-site to an approved location.

Vegetation-5: The postconstruction vegetation plan, including any potential revegetation actions in the project area, will be incorporated into the Restoration Plan (Restore-1). Vegetation actions will be coordinated with the City of Albuquerque Open Space Division, the Village of Corrales, and the MRGCD. See Restore-1 above for additional information.

Vegetation-6: Ravenna grass will be targeted for treatment within the proposed habitat restoration project areas, including on islands.

Air Quality

Air-1: Vehicle speed on levee roads will be limited to 15 miles per hour, which will minimize dust.

Air-2: If windy conditions exist, excavated sediment may be wetted during spreading and loading.

Air-3: All vehicles involved in implementation will be required to have passed a current New Mexico emissions test and have required emission control equipment.

Air-4: Vehicle and equipment running times will be minimized, and engines will be properly maintained.

Cultural Resources

Cultural-1: If intact, buried cultural deposits are discovered during project construction activities, the following requirements will apply:

- Upon notification by a recipient of an unexpected discovery, or if it appears that an undertaking has affected a previously unidentified property or affected a known historic property in an unanticipated manner, the NMISC will immediately notify Reclamation and will:
    - Stop construction activities in the vicinity of the discovery.
    - Take all reasonable measures to avoid or minimize harm to the property until the NMISC has completed consultation with the State Historic Preservation Office, appropriate Tribe(s), and any other consulting parties. Upon notification by the recipient of a discovery, the NMISC must immediately notify Reclamation, the State Historic Preservation Office, appropriate Tribe(s), and other consulting parties that may have an interest in the discovery, previously unidentified property, or unexpected effects, and consult to evaluate the discovery for National Register of Historic Places eligibility and/or the effects of the undertaking on historic properties.

APPENDIX D

Technical Memo and Preliminary Design Package

APPENDIX E

Proposed Action Surface Disturbance Table

Table E.1. Proposed Action Surface Disturbance Table

Project Area Identification (site ID)*	Associated River Mile	Restoration Activity Type(s)	Surface Disturbance (acres)	Maximum Sedimentation Quantity (cubic yards)
NDC Subreach – NDC to Alameda Boulevard (State Road 528) – River Miles 194 to 192				
192p9_I_1	192.9	Backwater, island destabilization	18.5	26,695.3
192p9_W_1	192.9	Bankline modification	1.8	3,198.2
Subtotal			**20.3**	**29,893.5**
PDN Subreach – Paseo Del Norte (State Road 423) to Montano Road Northwest Subreach – River Miles 192 to 186				
190p5_W_1	190.5	Bankline modification	22.6	29,898.7
190p3_I_1	190.3	Island destabilization	1.2	2,485.2
190p2_I_1	190.2	Island destabilization	1.3	910.8
190p1_E_1	190.1	Bankline modification, flow-through channel	9.3	14,489.8
189p9_I_1	189.9	Island destabilization	1.6	531.7
189p7_I_1	189.7	Island destabilization	2.1	251.2
189p6_I_1	189.6	Island destabilization	1.5	4.8
189p3_W_1	189.3	Bankline modification	9.3	7,211.4
189p2_I_1	189.2	Island destabilization	1.1	551.7

Project Area Identification (site ID)*	Associated River Mile	Restoration Activity Type(s)	Surface Disturbance (acres)	Maximum Sedimentation Quantity (cubic yards)
189p1_W_1	189.1	Flow-through channel, bankline modification	7.5	5,282.0
188p7_I_1	188.7	Backwater, island destabilization, flow-through channel	17.6	12,916.9
188p6_I_1	188.6	Island destabilization	0.7	765.7
188p5_W_1	188.5	Backwater, bankline modification	16.2	13,830.6
187p9_I_1	187.9	Backwater, island destabilization	19.4	14,920.1
187p6_W_1	187.6	Bankline modification	4.6	1,058.4
187p5_E_1	187.5	Bankline modification	1.4	1,751.5
187p3_I_1	187.3	Island destabilization	3.0	586.9
187p2_I_1	187.2	Island destabilization	5.3	3,104.1
187p0_E_1	187	Bankline modification	6.4	3,942.7
186p1_I_1	186.1	Island destabilization	0.2	659.7
186p1_I_2	186.1	Island destabilization	2.9	6,456.2
Subtotal			**135.2**	**121,610.1**
Interstate (I-40) Subreach – I-40 and Central Avenue – River Miles 186 to 181				
185p5_E_1	185.5	Backwater	0.5	1,776.3
185p4_E_1	185.4	Backwater, bankline modification	5.3	5,840.8
185p4_E_2	185.4	Jetty jack removal	0.4	-
185p1_E_1	185.1	Backwater	0.1	630.0

Project Area Identification (site ID)*	Associated River Mile	Restoration Activity Type(s)	Surface Disturbance (acres)	Maximum Sedimentation Quantity (cubic yards)
185p1_I_1	185.1	Island destabilization	5.5	10,673.1
184p7_E_1	184.7	Backwater, bankline modification	13.9	20,349
184p5_E_1	184.5	Backwater	3.0	11,633.2
184p5_I_1	184.5	Island destabilization	1.5	2,570.9
184p3_E_1	184.3	Bankline modification	2.9	8,101.4
183p9_W_1	183.9	Vegetation removal	6.2	-
183p7_W_1	183.7	Confluence maintenance (mouth cleanout)	0.1	174.2
183p7_E_2	183.7	Bankline modification	0.7	2,172.6
183p7_E_1	183.7	Flow-through channel, bankline modification	2.6	8,003.5
183p5_I_1	183.5	Island destabilization	0.4	966.7
183p5_W_1	183.5	Confluence maintenance (mouth cleanout)	0.1	165.8
183p3_W_1	183.3	Confluence maintenance (mouth cleanout)	0.1	188.5
183p0_W_1	183.0	Confluence maintenance (mouth cleanout)	0.1	77.2
182p9_E_2	182.9	Jetty jack removal	0.3	–
182p9_E_1	182.9	Backwater, bankline modification	18.0	25,505.4
182p4_I_1	182.4	Island destabilization, backwater	10.0	10,513.7

Project Area Identification (site ID)*	Associated River Mile	Restoration Activity Type(s)	Surface Disturbance (acres)	Maximum Sedimentation Quantity (cubic yards)
182p3_W_1	182.3	Confluence maintenance (mouth cleanout)	0.1	156.0
182p2_I_1	182.2	Island destabilization	2.8	4,048.9
182p0_E_1	182.0	Bankline modification, backwater	4.2	5,048.9
181p7_W_1	181.7	Confluence maintenance (mouth cleanout)	0.1	101.4
Subtotal			**78.9**	**118,697.5**
ACC Subreach – Avenida Dolores Huerta Bridge (ACC Road) to SDC – River Miles 181 to 177				
180p5_I_1	180.5	Island destabilization	0.2	50.3
180p3_E_1	180.3	Backwater	1.8	2,146.5
180p3_I_1	180.3	Island destabilization	1.5	2,331.6
180p0_W_1	180	Bankline modification	2.8	6,083.5
179p5_I_1	179.5	Island destabilization	10.2	8,062.0
179p2_I_1	179.2	Island destabilization	1.0	1,700.4
178p0_E_1	178	Bankline modification, flow-through channel	6.8	6,887.6
177p9_I_1	177.9	Island destabilization	1.0	2,004.6
177p8_I_1	177.8	Island destabilization	1.2	2,194.1
177p5_W_1	177.5	Backwater, bankline modification	8.9	11,599.4
177p3_W_1	177.3	Backwater	2.6	182.4

Project Area Identification (site ID)*	Associated River Mile	Restoration Activity Type(s)	Surface Disturbance (acres)	Maximum Sedimentation Quantity (cubic yards)
Subtotal			**38.0**	**43,242.4**
SDC Subreach – SDC to I-25 – River Miles 177 to 172.5				
176p7_W_1	176.7	Backwater, bankline modification	9.2	12,468.4
176p2_W_1	176.2	Backwater	1.1	1,374.1
175p9_E_1	175.9	Backwater, bankline modification	9.6	10,288.4
175p6_I_1	175.6	Flow-through channel, island destabilization	1.9	1,174.0
175p6_W_1	175.6	Bankline modification	5.2	7,137.7
175p2_W_1	175.2	Bankline modification	8.1	17,237.6
174p9_W_1	174.9	Backwater, bankline modification, confluence maintenance (mouth cleanout)	6.6	3,630.1
174p8_I_1	174.8	Island destabilization	2.1	3,376.3
174p7_I_1	174.7	Island destabilization	1.4	1,616.1
174p3_E_1	174.3	Backwater, bankline modification	14.2	14,925.1
174p2_I_1	174.2	Island destabilization	0.7	7.1
174p0_I_1	174	Island destabilization, backwater	6.7	4,789.6
173p9_E_1	173.9	Bankline modification	1.8	2,511.6
173p4_W_1	173.4	Backwater	0.3	805.9
173p3_W_1	173.3	Backwater, bankline modification	5.9	5,064.7
173p0_E_1	173	Backwater, bankline modification	16.2	20,870.1

Project Area Identification (site ID)*	Associated River Mile	Restoration Activity Type(s)	Surface Disturbance (acres)	Maximum Sedimentation Quantity (cubic yards)
172p9_W_1	172.9	Bankline modification	1.0	1,923.6
172p8_I_1	172.8	Island destabilization	2.3	2,380.6
172p8_W_1	172.8	Bankline modification	0.5	699.1
172p7_E_1	172.7	Backwater	0.5	985.9
172p6_W_1	172.6	Bankline modification	0.7	1,624.2
172p5_W_1	172.5	Bankline modification	1.0	244.5
Subtotal			**97.0**	**115,134.7**
Total			**369.0**	**428,578.2**

*Site names were created using the standard naming convention in RioRestore, a comprehensive MRG habitat restoration geodatabase that consolidates information from prior geospatial datasets, develops a standard nomenclature and attribution structure for describing specific implementation activities and goals (Collaborative Program 2024a). The naming schematic is: RiverMile_Location_Number. "River Mile" includes the tenth of a mile, with "p" as a decimal point. "Location" describes if the site is located on the river's east bank (E) or west bank (W), or if it is an island (I). "Number" is used to distinguish sites with the exact same "River Mile" and "Location".

APPENDIX F

Plant Species Known or Expected to Occur in Project Area

Table F.1. Plant Species Known or Expected to Occur in Analysis Area

Common Name	Scientific Name	Native Status†
Alkali muhly*	*Muhlenbergia asperifolia*	Native
Alkali sacaton*	*Sporobolus airoides*	Native
Apache plume	*Fallugia paradoxa*	Native
Arctic rush	*Juncus arcticus*	Native
Arizona walnut	*Juglans major*	Native
Asparagus*	*Asparagus officinalis*	Nonnative
Baltic rush*	*Juncus balticus*	Native
Barbed bristlegrass	*Setaria viridis*	Nonnative
Bermudagrass*	*Cynodon dactylon*	Nonnative
Big sacaton*	*Sporobolus wrightii*	Native
Big sagebrush	*Artemisia tridentata*	Native
Bigelow's false tansyaster*	*Dieteria bigelovii*	Native
Blue grama*	*Bouteloua gracilis*	Native
Box elder	*Acer negundo*	Native
Broom snakeweed*	*Gutierrezia sarothrae*	Native
Burningbush*	*Bassia scoparia*	Nonnative
Cactus apple*	*Opuntia engelmannii*	Native
California brickellbush	*Brickellia californica*	Native
Canada wildrye*	*Elymus canadensis*	Native
Carpet vervain*	*Verbena bracteata*	Native
Cattail	*Typha spp.*	
Chairmaker's bulrush	*Schoenoplectus american*	Native
Coastal sandbur*	*Cenchrus spinifex*	Native
Common spikerush	*Eleocharis palustris*	Native
Common sunflower*	*Helianthus annuus*	Native
Common threesquare*	*Schoenoplectus pungens*	Native
Coyote willow*	*Salix exigua*	Native
Desert olive*	*Forestiera shrevei*	Native

Common Name	**Scientific Name**	**Native Status†**
Desert willow	*Chilopsis linearis*	Native
Devils beggartick*	*Bidens frondosa*	Native
Eastern cottonwood*	*Populus deltoides*	Native
Emory's baccharis	*Baccharis emoryi*	Native
Emory's sedge	*Carex emoryi*	Native
English plantain*	*Plantago lanceolata*	Nonnative
False indigo bush*	*Amorpha fruticosa*	Native
Feather fingergrass*	*Chloris virgata*	Native
Field bindweed*	*Convolvulus arvensis*	Nonnative
Flatsedge	*Cyperus* spp.	
Fourwing saltbush*	*Atriplex canescens*	Native
Foxtail barley*	*Hordeum jubatum*	Native
Fragrant flatsedge*	*Cyperus odoratus*	Native
Fragrant sumac*	*Rhus aromatica*	Native
Fremont cottonwood	*Populus fremontii*	Native
Golden currant*	*Ribes aureum*	Native
Goodding's willow*	*Salix gooddingii*	Native
Gray globemallow*	*Sphaeralcea incana*	Native
Greasewood	*Sarcobatus vermiculatus*	Native
Great mullein*	*Verbascum thapsus*	Nonnative
Great Plains false willow*	*Baccharis salicina*	Native
Honey mesquite	*Prosopis glandulosa*	Native
Honeylocust*	*Gleditsia triacanthos*	Nonnative
Hooker's evening primrose*	*Oenothera elata*	Native
Horehound	*Marrubium vulgare*	Nonnative
Horsetail	*Equisetum* spp.	Native
Horsetail milkweed*	*Asclepias subverticillata*	Native
Indiangrass*	*Sorghastrum nutans*	Native
Indian ricegrass*	*Achnatherum hymenoides*	Native

Common Name	Scientific Name	Native Status†
Indianhemp*	*Apocynum cannabinum*	Native
Iodinebush	*Allenrolfea occidentalis*	Native
James' galleta*	*Pleuraphis jamesii*	Native
Jimsonweed*	*Datura stramonium*	Nonnative
Johnsongrass*	*Sorghum halepense*	Nonnative
Large barnyard grass*	*Echinochloa crus-galli*	Native
Little false bluestem*	*Schizachyrium scoparium*	Native
Little walnut	*Juglans microcarpa*	Native
Littleleaf sumac	*Rhus microphylla*	Native
Mojave seablite	*Suaeda moquinii*	Native
Monkeyflower	*Mimulus* spp.	Native
Mule-fat	*Baccharis salicifolia*	Native
Nebraska sedge	*Carex nebrascensis*	Native
Oneseed juniper*	*Juniperus monosperma*	Native
Peachleaf willow*	*Salix amygdaloides*	Native
Perennial ragweed*	*Ambrosia psilostachya*	Native
Pickleweed	*Salicornia* spp.	Native
Ponderosa pine	*Pinus ponderosa*	Native
Prickly lettuce*	*Lactuca serriola*	Nonnative
Prickly Russian thistle*	*Salsola tragus*	Nonnative
Prostrate sandmat*	*Euphorbia prostrata*	Native
Ravenna grass*	*Saccharum ravennae*	Nonnative
Rice cutgrass*	*Leersia oryzoides*	Native
Rocky Mountain juniper	*Juniperus scopulorum*	Native
Rough cocklebur*	*Xanthium strumarium*	Native
Rubber rabbitbrush	*Ericameria nauseosa*	Native
Russian olive*	*Elaeagnus angustifolia*	Nonnative
Saltbush	*Atriplex* spp.	Native
Saltgrass	*Distichlis spicata*	Native

Common Name	Scientific Name	Native Status†
Tamarisk*	*Tamarix* spp.	Nonnative
Sand dropseed*	*Sporobolus cryptandrus*	Native
Scarlet beeblossom*	*Oenothera suffrutescens*	Native
Scarlet globemallow*	*Sphaeralcea coccinea*	Native
Scouringrush horsetail*	*Equisetum hyemale*	Native
Siberian elm*	*Ulmus pumila*	Nonnative
Sideoats grama	*Bouteloua curtipendula*	Native
Silver buffaloberry	*Shepherdia argentea*	Native
Silverleaf nightshade*	*Solanum elaeagnifolium*	Native
Singlewhorl burrobrush	*Hymenoclea monogyra*	Native
Skunkbush sumac	*Rhus trilobata*	Native
Slender wheatgrass*	*Elymus trachycaulus*	Native
Smooth horsetail*	*Equisetum laevigatum*	Native
Spike dropseed*	*Sporobolus contractus*	Native
Splitleaf brickellbush	*Brickellia laciniata*	Native
Squirreltail*	*Elymus elymoides*	Native
Streambed bristlegrass*	*Setaria leucopila*	Native
Stretchberry*	*Forestiera pubescens*	Native
Sugarberry	*Celtis laevigata*	Native
Sweetclover*	*Melilotus officinalis*	Nonnative
Switchgrass*	*Panicum virgatum*	Native
Tall fescue	*Festuca arundinacea*	Nonnative
Tanseyleaf tansyaster*	*Machaeranthera tanacetifolia*	Native
Touristplant*	*Dimorphocarpa wislizeni*	Native
Tree of heaven*	*Ailanthus altissima*	Nonnative
Twoneedle pinyon	*Pinus edulis*	Native
Velvet ash*	*Fraxinus velutina*	Native
Velvetweed*	*Oenothera curtiflora*	Native
Vine mesquite*	*Hopia obtusa*	Native

Common Name	Scientific Name	Native Status†
Virginia creeper*	*Parthenocissus quinquefolia*	Nonnative
Western goldentop*	*Euthamia occidentalis*	Native
Western wheatgrass*	*Pascopyrum smithii*	Native
White heath aster*	*Symphyotrichum ericoides*	Native
White mulberry*	*Morus alba*	Nonnative
Witchgrass*	*Panicum capillare*	Native
Woolly sedge	*Carex pellita*	Native
Yerba mansa	*Anemopsis californica*	Native

Note: Nomenclature follows the PLANTS database (Natural Resources Conservation Service 2024).

*Identified during an SWCA aquatics resources delineation survey and general biological survey of the I-40 subreach (I-40 and Central Avenue - River Miles 186–181) during September and October 2023 (SWCA 2024b, 2024c).

†Source: Allred and Jercinovic (2020).