

1. Purpose of and Need for the Proposed Action

1.1 Introduction

This Environmental Assessment (EA) has been prepared by the US Department of the Interior (USDI), Bureau of Reclamation (Reclamation) and the USDI, Fish and Wildlife Service (Service) to evaluate the environmental, cultural, and socioeconomic impacts of Pecos River Channel Restoration within the Bitter Lake National Wildlife Refuge (NWR) in Chaves County, New Mexico. This analysis was carried out to meet requirements of the National Environmental Policy Act of 1969 (NEPA)¹ and the Endangered Species Act of 1973, as amended (ESA).

Reclamation’s mission is to manage, develop, and protect water and related resources in an environmentally and economically sound manner in the interest of the American public. In July 2006, Reclamation issued a Record of Decision (ROD) for the Carlsbad Project Water Operations and Water Supply Conservation Final Environmental Impact Statement (EIS) (Reclamation 2006a). The ROD mandated changes in water operations within the Pecos River in order to conserve the federally threatened Pecos bluntnose shiner (*Notropis simus pecosensis*) (shiner) and its designated critical habitat, while conserving the Carlsbad Project water supply. As part of the consultation process under the ESA, the Service issued a Biological Opinion (2006 – 2016) on the selected alternative from the EIS (US Fish and Wildlife Service 2006; Reclamation 2006a). Under Reasonable and Prudent Measure 1 (RPM #1) of the Biological Opinion, Reclamation agreed to “partner with Federal, state, and private entities to participate and assist in the completion of ongoing habitat improvement projects on the Pecos River and to restore 1-1.5 miles of quality habitat within the Farmlands reach by 2009 and another 1-1.5 miles by 2014.” Reclamation is proposing to conduct the first of these habitat improvement projects under RPM #1 with the Service at Bitter Lake NWR. These actions would be done in conjunction with other restoration activities within the wildlife refuge.

A reach is an extended portion of a stream or river usually between two defined points. The Farmlands reach is that section of the Pecos River between the Acme Gage and the Brantley Dam. Within the Bitter Lake NWR, the Pecos River is discussed in terms of five reaches, Reach 1 through Reach 5 (see Sections 1.1.1, 1.1.2, and 2.1.1 for more detail).

¹42 USC § 4321 et seq., the Council on Environmental Quality (CEQ) regulations for implementing NEPA, 40 CFR Parts 1500-1508, and the final revised procedures for implementing NEPA for actions by Reclamation (Chapter 14) and the Service (Chapter 8) in the Department of the Interior, Departmental Manual, 516 DM 6.

The Service is the principal agency responsible for conserving, protecting, and enhancing fish and wildlife and their habitats. As part of this responsibility, the Service manages a diverse network of more than 500 National Wildlife Refuges. The Bitter Lake NWR in Chaves County, New Mexico, is part of this network. Current management of the Bitter Lake NWR is guided by the Bitter Lake NWR Comprehensive Conservation Plan (CCP) (Research Management Consultants 1998). One of the goals of the CCP for the Bitter Lake NWR is the “maintenance and restoration of a hydrological system that mimics to the extent possible the natural processes along the Pecos River drainage (within the Refuge).” An objective under that goal is to “restore a more natural stream morphology and floodplain geometry to the reach of the Pecos River within the refuge in order to benefit native aquatic and riparian plant and animal communities.”

Reclamation and the Service are proposing to restore portions of the river channel at the Bitter Lake NWR in phases. Because the actions evaluated in this document would occur on federal property, would receive federal funding, and would require federal permits and approvals, environmental documentation under NEPA is required. In accordance with NEPA, Reclamation and the Service have prepared this EA to address the environmental effects of the proposed river channel restoration. The EA addresses direct, indirect, and cumulative effects of the proposed channel restoration and habitat enhancement activities.

Two habitat improvement projects within the refuge are discussed in greater detail, reflecting the current level of planning and proposed design. Actions on other river segments are analyzed more generically, commensurate with the level of available information.

Reclamation and the Service are joint lead federal agencies for this action. Reclamation is proposing to fund, design, and conduct channel habitat restoration only at Reach 4. The Service would be the responsible federal agency for other proposed restoration actions and any related refuge improvements. Reclamation is leading the team preparing the EA and is responsible for day-to-day NEPA project management. Reclamation is also responsible for ensuring compliance with the applicable federal environmental statutes and for maintaining the quality of the content of the EA. Reclamation will assist in developing and funding the monitoring program.

The Service is participating in all aspects of the NEPA process and analysis. The Service has prepared the internal Section 7 documentation and the 401/404 permit application and will facilitate access to the refuge. The Service, in collaboration with the World Wildlife Fund-Chihuahuan Desert Program (WWF) and the New Mexico Interstate Stream Commission (NMISC), is proposing to manage, fund, and conduct the Phase II restoration at Reaches 2 and 3. Additional restoration actions may be conducted by the Service at Reaches 1 through 4 as funding becomes available. A detailed description of the components of the Proposed Action is found in Section 2.2.

1.1.1 Location

The Bitter Lake NWR is approximately nine miles northeast of Roswell, New Mexico, in Chaves County (Figure 1-1, Location Map). The Bitter Lake NWR consists of 24,536 acres in three noncontiguous units along the Pecos River. The North Tract occupies approximately 12,160 acres and includes the 9,620-acre Salt Creek Wilderness. The Middle Tract is composed of approximately 11,000 acres and contains the refuge headquarters, auto-tour loop, Bitter Lake, several sinkholes and natural wetlands, desert uplands, riparian areas, and impoundments. The South Tract, or Farm Unit, consists of approximately 1,000 acres primarily used for agricultural croplands. The South Tract is closed to most public access, although special youth pheasant hunts are conducted. Access to the North Tract is limited to hikers and horseback riders. Hunting is permitted in accordance with state seasons and regulations. The Pecos River passes through all three of the refuge units.

1.1.2 Background

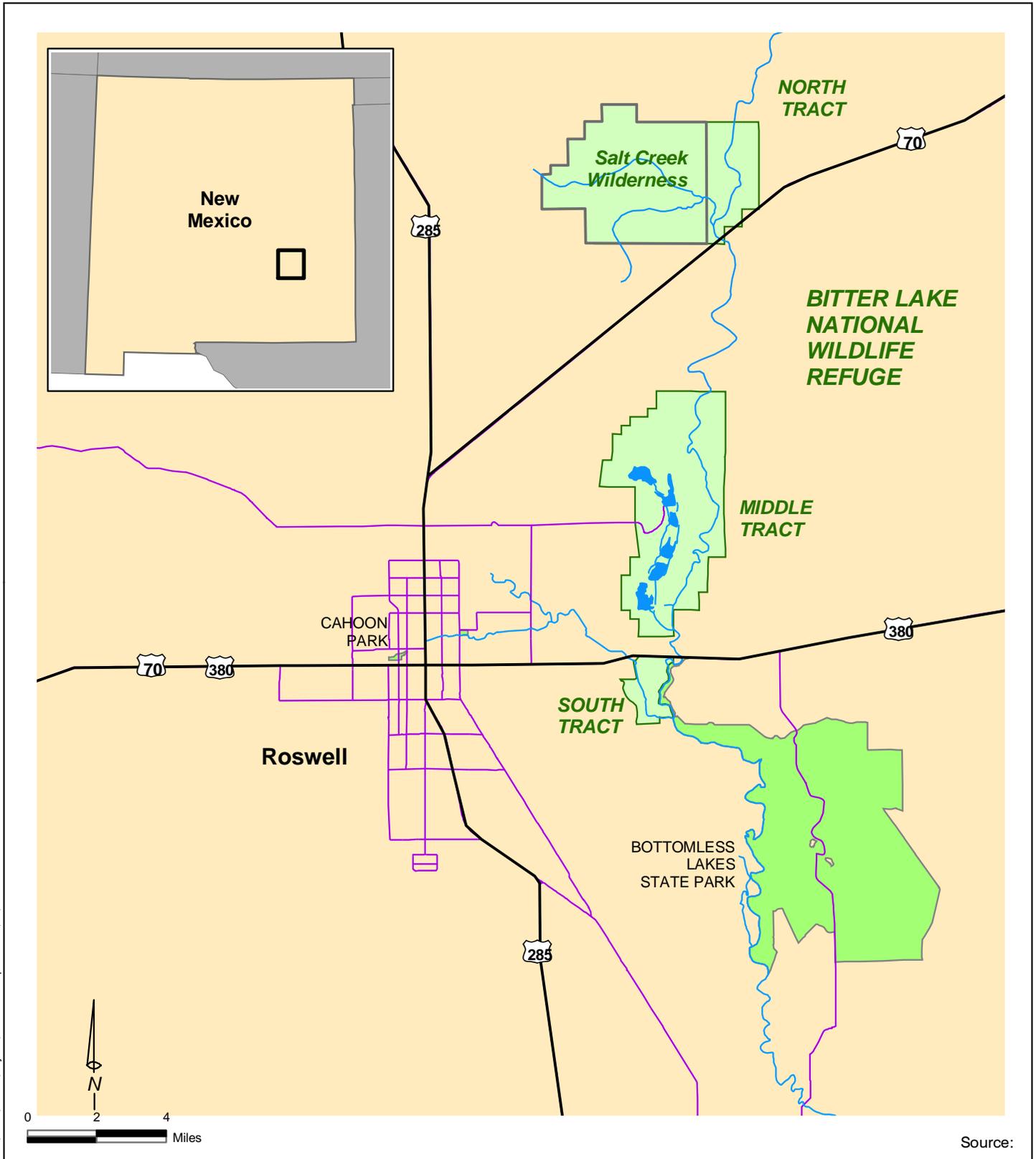
Historic Changes to the Pecos River and Riparian Habitat

The Pecos River spans roughly 920 river miles, from its headwaters in the Sangre de Cristo Mountains of northern New Mexico to its confluence with the Rio Grande near Langtry, Texas. Under the natural river regime, periodic flooding changes the river course within the floodplain. Various species, especially fish, adapted to this type of dynamic river channel and the variety of habitat that it provided. Water development and reclamation projects, including channelization, dam and levee construction, bank protection, diversions, and stream flow regulation, have altered the riparian system and contributed to vegetation loss. Native riparian vegetation along the Pecos River and its tributaries has been greatly reduced in the last 100 to 120 years. Riparian habitat is critically important for various threatened and endangered species, migratory birds, fish, native wildlife, and plants.

Important resources for both humans and wildlife in the semiarid western United States are connected with river systems and their associated wetland and riparian communities. The diversion of water and use of water management features along the Pecos River preceded Euroamerican settlement of the region. Beginning in the nineteenth century and continuing through the twentieth century, an extensive system of water retention and conveyance infrastructure, including diversion structures, dams, levees, drains, and ditches, was constructed for irrigation, flood, and sediment control. Supplemented by wells, this system allowed the growth of an agricultural-based economy and the expansion of cities along the river.

Middle Pecos River

The Middle Pecos River is the reach from Sumner Reservoir to Brantley Reservoir. It consists of 220 river miles of range and farmland on the plains of eastern New Mexico along with Bitter Lake NWR. Historically the Middle Pecos River was a wide, sediment-laden, braided river with a diversity of habitats, ranging from low-velocity backwaters to swift main channel settings. These habitats were maintained by flooding, which moved



Location Map Bitter Lake National Wildlife Refuge

Chaves County, New Mexico

sediments between the channel and the floodplain. This dynamic relationship sculpted a wide channel, moved sediment from the floodplain back into the channel, and formed new floodplains with channel sediment (FLO Engineering 1999).

For purposes of fish surveys and habitat considerations, the Middle Pecos River has been divided into three reaches (Hoagstrom 2003). The first is the Tailwater reach, which extends from Sumner Dam to near the confluence of the Pecos River and Taiban Creek. The second is the Rangelands reach, which extends from Taiban Creek to the Middle Tract of the Bitter Lake NWR. The third reach, the Farmlands, extends from the project area in the Bitter Lake NWR to Brantley Reservoir. The “stronghold” for the shiner occurs in the Rangelands reach (Hoagstrom 2003). Habitat availability and suitability are the best within this reach of the river, all size classes of shiner are found, and population numbers are relatively stable (Hoagstrom 2003).

The encroachment of saltcedar in the region has resulted in the growth of thick stands of these trees that stabilize river banks and induce sediment deposit, resulting in the formation of natural levees. The stable banks decrease the ability of the river to rework the floodplain, while the natural levees reduce the occurrence of overbank flows. Both of these conditions result in a more channelized river (FLO Engineering 1999).

The construction of Sumner Dam in 1937 allowed greater control of natural upstream flows to meet agricultural storage and irrigation delivery needs and to prevent flooding. Since that time, water has been typically released into the Pecos River from Sumner Dam in large block releases to minimize losses due to evaporation. Reservoir operations have dramatically altered flows in this reach of the Pecos River by reducing both the base flows and flood peak flows. The control of the natural flows alters the physical channel shape, the amount of sediment in the river and floodplain, and the associated riparian habitat (FLO Engineering 1999).

Today the most intact remaining riparian habitat on the river exists in the Rangelands reach above the Acme Gauge, where the channel is wide and relatively dynamic. This stretch of the river is hydrologically characterized as a losing reach. Surface water is lost primarily through seepage and evaporation, but can additionally be affected by climatic conditions such as wind, low humidity, high temperatures, and lack of storm inflows; transpiration by vegetation; river and ground water pumping; and the geomorphology (river slope) of the area. Thus, this area has been subject to drying and flow intermittence during the summer months. Downstream of Acme in the Farmlands reach, the river gains water from artesian aquifer inflows and irrigation returns in the Roswell Basin (FLO Engineering 1999; US Fish and Wildlife Service 2006).

The good quality habitat of the Rangelands reach contains some of the most diverse native fish communities within the southwestern United States. The Rangelands reach has been the focus of detailed fish community and habitat studies as part of a research and management program for the shiner. Investigations of the native fishery within the Rangelands reach show that the native fishes prefer a wide, sand substrate and an active channel bed that creates a variety of favorable small instream features (Hoagstrom 1999;

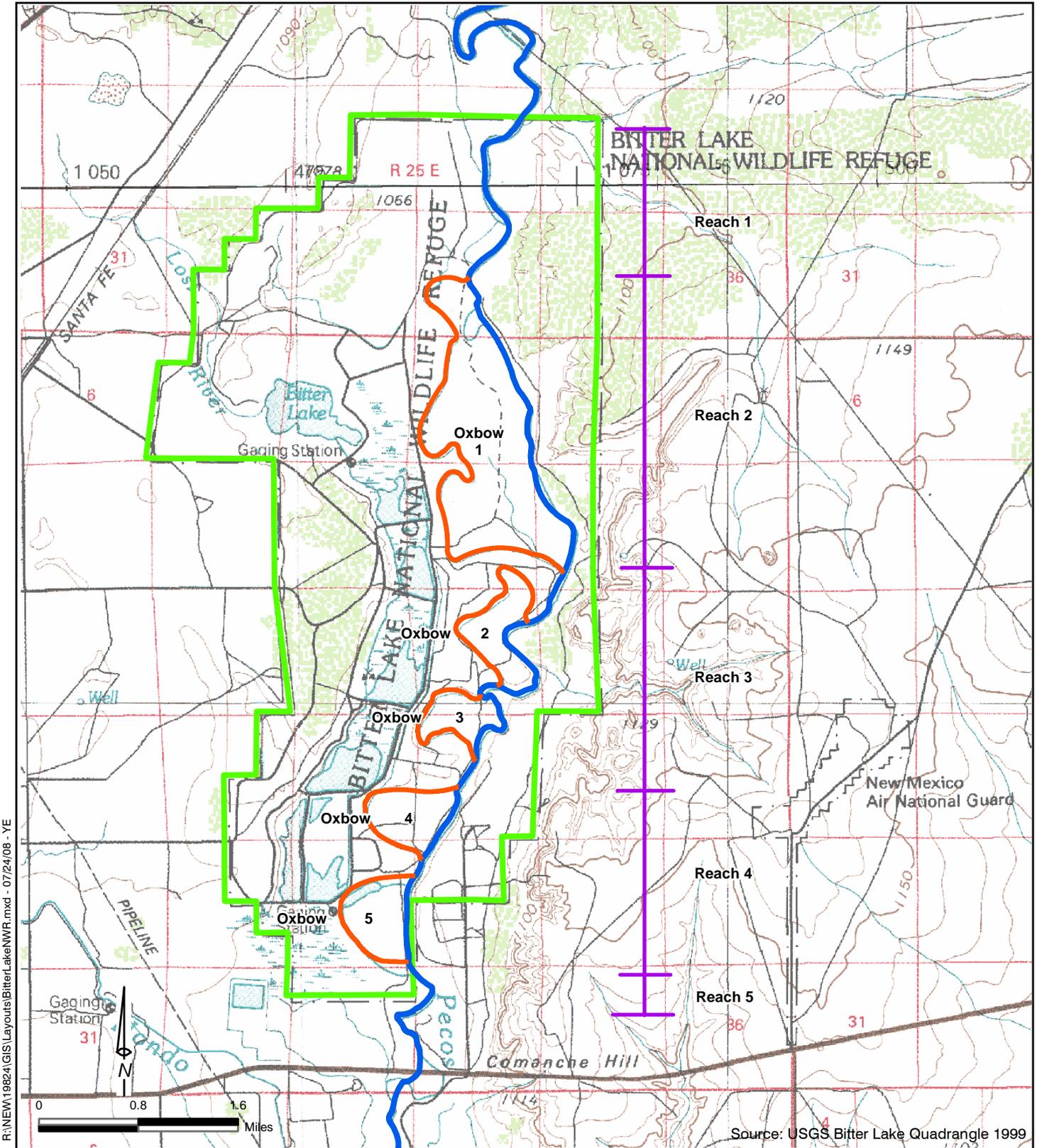
Kehmeier et al. 2004a; Tashjian 1997). Such habitats are common north of the Bitter Lake NWR but are rare south of the refuge, where the river is generally incised and channelized. The investigations strongly suggest the restoration of poor quality habitats back into quality habitats is critical to the long-term survivability of these native fishes.

Pecos River in the Bitter Lake NWR

The Bitter Lake NWR occupies the central portion of the Middle Pecos River, much of it within the historic floodplain. Before 1942, the Pecos River in the Middle Tract of the Bitter Lake NWR was a dynamic river, with large oxbows that were constantly eroding banks and changing course. Two channels were excavated to straighten the river to decrease damage to the bordering agricultural lands from flooding and bank erosion (Figure 1-2, Project Area). The following is a history of the channel alterations, compiled by John Magera, former Assistant Refuge Manager:

“The river diversion project began in 1940 with initial design and surveying, and was planned in two segments, north and south of the current Scout camp. The south segment design was approved in November of 1941, and became the highest priority on the refuge. Work actually began on the southernmost point of the south segment just two days before the September, 1941 flood and resulted in several pieces of stranded equipment. Between September, 1941 and September, 1943, bulldozers were used to excavate a channel from the outlet of Oxbow 5 to somewhere along the reach of Oxbow 2. It is not clear when, but Oxbow 2 was apparently cut off by the river around 1942 with little or no help from the refuge staff. Following the dozers were draglines, since it had become too soft to operate within the channel. The south diversion channel was completed to plan in 1947, and afterward tripod strings (water control structures) were placed at the entrance to each of the four south oxbows. Considerable effort was required to maintain these tripod strings, as they were replaced in part or in full after each flood event. The north segment design was approved in March of 1941, and was eventually completed in January of 1957. This segment was much less involved than the south segment, as the river was diverted into an ancient river channel after only 3500 feet of excavation.

Since the completion of the river diversion, several sinuous bends have developed between the inlet to Oxbow 2 and the outlet to Oxbow 3. These naturally occurring modern oxbows have increased the length of the river to nearly its pre-channel length and provide some of the finest shiner habitat on the refuge. Here the channelization was cut into Pecos River deposits and is quite erosive in nature. In fact, another oxbow cut-off has recently been created and was probably cut off during the May, 1999 “flood.” Also, the river bend at the inlet to Oxbow 4 continues to cut into the old oxbow channel, and is very close to creating a natural connection to the historical oxbow. Despite the natural changes upstream, the reach of the Pecos between Oxbow 4 and 5 remains a deeply incised, straight channel, almost completely unchanged since 1947. Here the channel was excavated into sedimentary bedrock, which is immobile and hard to erode (Magera 2002).”



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Source: USGS Bitter Lake Quadrangle 1999

**Bitter Lake NWR
Middle Tract**

Chaves County, New Mexico

-  Pecos River
-  Oxbows

The south channel cut off Oxbows 4 and 5, while the north channel bypassed Oxbow 1, cutting off the natural oxbows from the main stream of the Pecos River. The ecological functioning of the river through this section has been degraded by the excavation of these channels, the reduced magnitude of peak flows since the construction of Summer Dam, and the encroachment by saltcedar (see Section 2.1.1 for correlation between defined reaches and historic oxbows). The river channel is deeply incised and capable of containing very large flood flows.

The Pecos River is currently functioning within a physical context that is different from the pre-reservoir conditions that formed the now disassociated oxbow lakes of the Bitter Lake NWR. The Middle Tract of the Bitter Lake NWR is an optimal location for restoration because it is on land that has water rights administered by the Service (see Section 3.5.3 for details). The action is consistent with the mission of the Service and the refuge system. The restoration is proposed to be entirely on federal land and is not next to downstream infrastructure or private lands. The location is a “gaining reach,” where inflows to the river exceed losses to evaporation. The proposed restoration would extend the reach of connected good quality habitat into these historic channels and would partially compensate for past actions that contributed to the degraded ecological function of this portion of the river.

1.2 Proposed Action

This EA addresses phased proposals over the next ten years to improve the riparian and in-channel habitat along approximately seven river miles of the Pecos River in the Middle Tract of the Bitter Lake NWR by restoring the river flows to dynamic conditions. The Proposed Action is a combination of restoration techniques that include removing vegetation, lowering banks, changing the channel morphology, restoring flow into historic oxbows, and revegetation. These techniques would be designed to work within the changed physical context of the river that includes lower peak flood flows, irrigation withdrawals, channelized river segments, nonnative plant incursions, and protection of farmland and floodplain infrastructure.

At this time, Reclamation is proposing to fund, plan, design, and conduct channel habitat restoration only at Reach 4. The Service, in collaboration with the WWF and the NMISC, is proposing to manage, fund, and conduct work at Reaches 2 and 3. Additional restoration actions may be conducted at Reaches 1 through 4 as funding becomes available. A detailed description of the components of the Proposed Action is found in Section 2.2.

1.2.1 Decisions to be Made

This EA is an evaluation of the environmental impacts of the Proposed Action and the No Action Alternative and provides information to help Reclamation and the Service fully consider environmental impacts and any proposed mitigations. Using the analysis in this EA, Reclamation and the Service will decide whether there would be any significant

impacts associated with the Proposed Action that would require the preparation of an environmental impact statement or whether the Proposed Action can proceed when funding is secured and other requirements are met. Reclamation and the Service are anticipated to record their decisions on the federal actions they control in separate or joint decision documents.

1.3 Need for the Action

The need for restoration action at this time is to satisfy federal requirements under the Biological Opinion to restore quality habitat on the Pecos River and to participate and assist in the completion of ongoing habitat improvement projects (US Fish and Wildlife Service 2006). Under RPM #1, Reclamation agreed to “assist in the completion of ongoing habitat improvement projects on the Pecos River and to restore 1-1.5 miles of quality habitat within the Farmlands reach by 2009 and another 1-1.5 miles by 2014.” The project would also support the need of the Service to implement the Bitter Lake NWR Comprehensive Conservation Plan goals and objectives and would support broad Service mandates to restore, preserve, and enhance riparian habitat and the overall mission of the National Wildlife Refuge System.

1.4 Purpose of the Action

The ecological conditions within the Bitter Lake NWR section of the Pecos River have been degraded by excavating straight channels, encroaching nonnative vegetation, and reservoir control of flows. The purpose of the proposed restoration is to correct or improve these degraded ecological conditions by improving riparian and in-channel habitat and by extending the reach of connected good quality habitat for the benefit of native aquatic and riparian plant and animal communities. The restoration would improve habitat by restoring parts of the river to more natural flow conditions within the context of the modern hydrologic regime, including reconnecting the river to the floodplain. According to the Biological Opinion, activities that restore and optimize the interaction of river channel and floodplain habitats with available flows will be most successful in mitigating the observed displacement of shiner eggs and in providing a variety of channel conditions favorable to the shiner. The reach that would provide the most benefit for the shiner is from the Bitter Lake NWR south to Hagerman where flows are perennial due to inflow from the Roswell Basin and habitat is degraded (US Fish and Wildlife Service 2006). Improving riparian and in-channel habitat and removing invasive species would also provide benefits for the diverse plant, animal, and fish species that use the refuge and would enhance visitor experience.

1.5 Relevant Statutes, Regulations, and Relationship to Other Projects, Plans, Agreements, and Agency Actions

In addition to NEPA, actions of Reclamation and the Service on the Pecos River are guided by a number of statutes, regulations, and agreements. These are described in detail in the Carlsbad Project Water Operations and Water Supply Conservation EIS (Reclamation 2006a). The most relevant regulatory requirements and plans to the Proposed Action are summarized here.

1.5.1 Required Compliance Actions and Permits

The following compliance actions and permits are expected to be required for the Proposed Action. Mitigation measures and best management practices will be incorporated into the Proposed Action or detailed in Chapter 5, Environmental Commitments. Additional permitting and consultation prior to implementation may be required as actions become better defined.

Consultation under Section 7 of the ESA is required to determine if the project will adversely affect threatened or endangered species or designated critical habitat. The Service conducted an Intra-Service Section 7 consultation for the proposed restoration projects at the Bitter Lake NWR.

Compliance and permitting under Section 404 of the Clean Water Act (CWA) is required, in consultation with US Army Corps of Engineers (USACE) and Surface Water Quality Bureau (SWQB) of the New Mexico Environment Department (NMED). The reason for this is because much of the work would be within aquatic areas. Section 401 of the CWA requires anyone applying for a federal license or permit for any activity that could discharge a pollutant into waters of the United States to obtain a certification from the state. A National Pollutant Discharge Elimination System Section 402 permit may be required if it is determined that construction or discharge of material into wetlands and other waters of the US would occur. The Service is coordinating efforts with the USACE and the NMED SWQB for these requirements.

Reclamation and the Service are required to consult with the State Historic Preservation Office regarding the effects of the project on historic properties (sites eligible for listing on the National Register of Historic Places) and to mitigate any adverse effects on these sites. The Section 106 process also requires the agency to provide the Advisory Council on Historic Preservation the opportunity to comment on any adverse effects on historic properties.

1.5.2 Relationship to Other Projects, Plans, Agreements, and Agency Actions

National Wildlife Refuge System. The Proposed Action would be implemented within a nationwide system of federal refuges and in accordance with the overall mission of the National Wildlife Refuge System. The broad goals of the refuge system are as follows:

- Conserve a diversity of fish, wildlife, and plants and their habitats, including species that are endangered or threatened with becoming endangered;
- Develop and maintain a network of habitats for migratory birds, anadromous and interjurisdictional fish, and marine mammal populations that is strategically distributed and carefully managed to meet important life history needs of these species across their ranges;
- Conserve those ecosystems, plant communities, wetlands of national or international significance, and landscapes and seascapes that are unique, rare, declining, or underrepresented in existing protection efforts;
- Provide and enhance opportunities to participate in compatible wildlife-dependent recreation (hunting, fishing, wildlife observation and photography, and environmental education and interpretation); and
- Foster understanding and instill appreciation of the diversity and interconnectedness of fish, wildlife, and plants and their habitats (601 FW 1).

Bitter Lake NWR Comprehensive Conservation Plan. Under the National Wildlife Refuge System Improvement Act of 1997, the Service is required to prepare a CCP for each refuge. The CCP outlines the desired future conditions and provides long-range guidance and management direction to achieve the purposes of the refuge. As stated in the Bitter Lake NWR Comprehensive Conservation Plan, one of the major goals for the Bitter Lake NWR is as follows:

“To restore and maintain a hydrological system that mimics the natural processes along the Pecos River drainage by: (1) restoration of the channel, as well as restoration of threatened, endangered, and special concern species; and (2) control of exotic species and manage trust responsibilities for maintenance of plant communities and to satisfy traditional recreational demands.”

Actions proposed in this EA implement many of the strategies designed to meet this goal and its supporting objectives, as described in the CCP (Research Management Consultants 1998). The planning direction of the CCP was evaluated in an EA that resulted in a signed finding of no significant impact (FONSI) (Federal Register 1998; US Fish and Wildlife Service 1998).

Biological Opinion. In May of 2006, the Service issued a final Biological Opinion on the effects on the Interior least tern, and on the shiner and its designated critical habitat² of

²In accordance with Section 7 of the Endangered Species Act of 1973, as amended (16 USC 1531 et seq.)

Reclamation's Proposed Carlsbad Project water operations, 2006-2016. Among the reasonable and prudent measures specified is the requirement that:

“Reclamation will partner with Federal, state, and private entities to participate and assist in the completion of ongoing habitat improvement projects on the Pecos River and to restore 1-1.5 miles of quality habitat within the Farmlands reach by 2009 and another 1-1.5 miles by 2014.”

The following implements RPM #1:

1.1) Reclamation will attend meetings and work with federal, state, and private entities as a cooperating agency to support and enhance shiner habitat restoration at the Bitter Lake National Wildlife Refuge.

1.2) Reclamation will attend meetings and work with federal, state, and private entities as a cooperating agency to support and enhance related hydrogeomorphic process improvements to the reach of the Pecos River north of Dexter Bridge and adjacent to the Bureau of Land Management waterfowl area.

1.3) Reclamation will partner with federal, state, and private entities to complete habitat improvement projects totaling two oxbow sequences 0.5-1 mile in length between Dexter and Hagerman. (Note: This refers to a suggested option and location for conducting the second required restoration project in two noncontiguous reaches.)

1.4) Reclamation will partner with federal, state, and private entities to monitor the success of habitat restoration projects in terms of winter and summer habitat conditions through the use of color infrared videography, at least 4 cross sections within the site, and fish population and habitat use data. Videography should be used to map riparian habitat within each restoration site, including in-channel and riparian habitats (US Fish and Wildlife Service 2006).

Carlsbad Project Water Operations and Water Supply Conservation Project EIS. In July of 2006, Reclamation signed a Record of Decision implementing the preferred alternative identified in the Carlsbad Project Water Operations and Water Supply Conservation EIS and the 10-year Biological Opinion on Carlsbad Project operations. The goal of the preferred alternative is to conserve the shiner and its designated critical habitat, while conserving the Carlsbad Project water supply. The EIS addressed changes in the operation of Sumner Dam, target flows at the Taiban gage, and implementation of a water acquisition program. The preferred alternative includes conservation actions such as removing nonnative riparian vegetation and implementing channel restoration projects (US Bureau of Reclamation 2006a). The restoration actions considered in this EA are consistent with the EIS purpose and need to conserve the shiner. The changes in operations may change the frequency and timing of block releases and base flows, which could affect long-term channel formation processes at the Bitter Lake NWR.

EA for Pecos River Supplemental Water. Reclamation is assessing the potential impacts of obtaining supplemental water so it will have the operational ability to release

approximately 2,500 acre-feet of water out of Sumner Lake per year. This would keep the Pecos River flow continuous in order to conserve the federally protected Pecos bluntnose shiner, while ensuring that there would be enough water at Brantley Reservoir to meet the contracted irrigation needs of the Carlsbad Project. The project is needed to comply with the 2006-2016 Biological Opinion for the Carlsbad Project Water Operations and Water Supply Conservation EIS, June 2006. Potential supplemental water sources evaluated in the EA include the following:

- Transfer any unused water rights from Reclamation's river pumper offset program to Seven Rivers to be pumped into Brantley Reservoir in exchange for storing and withdrawing water from Santa Rosa Reservoir or Sumner Lake;
- Commit up to 360 acres of groundwater rights owned by Reclamation at the Seven Rivers Farm to be pumped into Brantley Reservoir in exchange for storing and withdrawing up to 1,000 acre-feet of water from Sumner Lake. This exchange would maintain the currently permitted 1,000 acre-foot fish conservation pool at Sumner Lake;
- Transfer any available water rights at Karr Farms near Artesia to Seven Rivers, to be pumped into Brantley Reservoir in exchange for storing and withdrawing water from Santa Rosa Reservoir or Sumner Lake, or to directly use these rights for habitat improvement projects; and
- Pursue any other lease or water transfer opportunities from willing sellers.

EA For Biological Control of the Invasive Tree Saltcedar (*Tamarix chinensis*) on Bitter Lake NWR. In July of 2007, the Service released an EA that assessed the potential impacts of the release of saltcedar leaf beetles (*Diorhabda elongata*) on selected areas of the refuge as a biological control for Saltcedar. The EA is tiered from a programmatic EA prepared by the US Department of Agriculture, Animal and Plant Health Inspection Service (USDA-APHIS). The programmatic EA resulted in a FONSI, and the USDA-APHIS has issued a permit to New Mexico State University to release beetles along the entire Pecos River.

The Service has prepared its own EA to address the specific release at Bitter Lake NWR. While the use of biological controls is not part of the Proposed Action of this EA, the removal of saltcedar is one of the goals. Use of biological controls is complementary to the proposed channel restoration and would allow saltcedar control in areas where mechanical methods would be difficult. The initial release would take place near the edge of a high-density patch of saltcedar on the west side of the Pecos River, near the south boundary of the refuge's north tract. If the release is successful, this population should travel across the river and downstream from the release site into the proposed restoration project area. A decision on the proposed action is pending.

Restoration of Wetland Habitat at Bottomless Lakes State Park. The US Army Corps of Engineers, Albuquerque District, in cooperation with the New Mexico Energy, Minerals, and Natural Resources Department - State Parks Division (State Parks) is restoring approximately 43 acres of wetland habitat at Bottomless Lakes

State Park, just south of the Bitter Lake NWR in Chaves County. The restoration consists of increasing the Lea Lake outlet channel capacity, removing all saltcedar and solid waste debris from the project area, constructing three open water habitats, planting supplemental wetland vegetation, and constructing a gravel parking lot, gravel loop trail, a 517-foot raised boardwalk trail, and four wildlife viewing blinds. An EA and FONSI were completed in December of 2006 and construction started in January of 2009 (USACE 2006). The proposed restoration actions in this EA complement the efforts by the USACE and the State Parks to restore wetland habitat and provide wildlife-based recreational amenities in Chaves County.

New Mexico Saltcedar Control Project. The New Mexico Department of Agriculture (NMDA) coordinates state-funded nonnative phreatophyte control programs through local soil and water conservation districts along the Pecos River. This project primarily has used aerial spraying to kill saltcedar along the river banks in the hope of reducing the water loss associated with this invasive species through transpiration. The New Mexico Non-Native Phreatophyte/Watershed Management Plan (NMDA 2005) includes recommendations for saltcedar control, revegetation, rehabilitation, monitoring, and long-term maintenance throughout the state and specifically in the Pecos River Basin. The proposed restoration actions in this EA are compatible with the management plan and past efforts by the state to remove nonnative riparian species.

Pecos River Basin Water Salvage Project is a Reclamation-funded project to control saltcedar growth from the Sumner Dam area to the New Mexico-Texas state line. Reclamation began clearing saltcedar in 1967 and continued until 1971, during which time about 53,950 acres were cleared at various locations between Sumner Lake, New Mexico, and Pecos, Texas, a distance of about 370 miles. The clearing program began again in 1995 without the participation of Texas, and since then, the program has been limited to maintaining 33,000 cleared acres in New Mexico in cooperation with the Carlsbad Irrigation District (CID).

Lower Pecos Valley Regional Water Plan. There are ongoing regional planning efforts overseen by the NMISC to develop information, analysis, and documentation to address the region's available water supply and its means of meeting future demand. This planning is done at the regional level, bringing together such stakeholders as elected officials, public agencies, private citizens, and representatives of private industry. A part of the regional water planning effort is to compile and analyze information on water quantity and quality in their regions and to project population growth for 40 years. The objectives of the regional water plans are to answer questions about the water supply and the projected water requirements and to present a plan for meeting regional water requirements. Regional planning is intended to reflect the water-related goals and the knowledge of the public and the governing bodies of the region. The Lower Pecos Valley Water Planning Region includes Chaves County, Eddy County, and portions of De Baca, Lincoln, and Otero Counties. The plan encourages the study and implementation of riparian management, watershed management, and conservation programs in the Pecos River Basin.

Pecos River Compact. Interstate compacts are agreements developed and ratified by states and Congress and signed by the President that apportion surface waters of selected streams that cross state borders. Interstate compacts are governed by both state and federal requirements. The Pecos River Compact (entered into by New Mexico and Texas on December 3, 1948, and approved by Congress, effective June 9, 1949) requires delivery of water from the Pecos River into Texas. Compacts both protect each state's use of its waters and prescribe the amount of water that New Mexico must pass downstream to Texas. Compliance with the Pecos River Compact and the 1988 Supreme Court Amended Decree to the Pecos River Compact prohibits New Mexico from allowing a net shortfall in its deliveries to Texas. The NMISC has legal authority and a strong interest in ensuring that restoration actions do not reduce compact deliveries to Texas.

Settlement Agreement. The NMISC, CID, Reclamation, and the Pecos Valley Artesian Conservancy District (PVACD) executed a settlement agreement on March 25, 2003. Among other provisions, the settlement agreement is designed to ensure that New Mexico meets its interstate delivery obligation to Texas under the Pecos River Compact. The settlement agreement includes an acquisition program that authorizes the NMISC to purchase up to 6,000 acres of land and water rights in the CID and up to 12,000 acres of land and water rights upstream of Brantley Dam, which includes the PVACD and the Fort Sumner Irrigation District (FSID). Land retirement is anticipated to increase base flows in the river (and through the refuge) to help state line deliveries to Texas.

1.6 Issues Identification

1.6.1 Stakeholder Involvement

Reclamation and the Service are providing opportunities for the public and agencies to participate in the NEPA process to promote open communication and better decision making. All persons, agencies, and organizations having a potential interest in the Proposed Action and the No Action Alternative, including minority, low-income, and Native American groups, are urged to participate in the NEPA environmental analysis process.

Reclamation and the Service have been considering plans for Pecos River restoration at Bitter Lake NWR for at least a decade. In 1999, FLO Engineering (now Tetra Tech Surface Water Group), under contract to Reclamation, prepared a conceptual restoration plan and screened restoration alternatives for five reaches of the river (FLO Engineering 1999). At that time and in several subsequent meetings continuing through 2008, the Service, Reclamation, and the WWF have met, discussed, and presented information to potential stakeholders. Participants have included several units of the Service, including Fishery Resources, Water Resources, Bitter Lake NWR, and Ecological Services, the NMISC, the New Mexico Department of Game and Fish, Reclamation, Chavez County, Chaves County Flood Control District, USACE, and the Carlsbad Irrigation District.

Formal project scoping was conducted from late June through July of 2007. Letters were sent to agencies, Native American Tribes, and other stakeholders (see Chapter 6, Consultation and Coordination). Additional opportunities to comment are the 30-day period for public review of the draft EA and a second public review period for the final EA. If Reclamation and the Service determine that significant adverse impacts would not result from the Proposed Action, they would issue and publish separate or joint FONSI.

1.6.2 Issues Raised During Project Planning

The issues and questions presented below were raised during scoping, agency planning, and previous reviews of the potential restoration actions. These are addressed in the appropriate sections of the EA.

Water Budget and River Flows:

- Questions were raised about the water consumption budget of the existing channel and riparian system and what effects restoration would have on this budget.
- Concerns were expressed that new water costs or losses may be incurred.
- The Pecos River experiences periods of intermittent flow during the summer. The EA preparers should discuss the effect of the action on the intermittent flows, their duration, and requirements for supplemental water releases.
- Although the removal of saltcedar is generally believed to reduce some water loss, restoration would increase open water surface area and may increase water losses at the Bitter Lake NWR. What impact will restoring oxbows have on water loss?
- The EA should carefully examine the effects of the project on water supply and the potential for depletions to downstream users and state line water delivery.

Flood Control and Sediments:

- Concerns were expressed about the effects of the proposed restoration on flood control for the Pecos River, downstream of the Bitter Lake NWR. Would flood control be improved or hindered by restoration?
- Will this project impact private property downstream through sedimentation and bank sloughing?
- Would restoration affect the integrity of the Highway 380 Bridge?
- In areas south of the Bitter Lake NWR, the river is establishing floodplain, and there is a considerable amount of erosion and widening in key places. There may also be changes in flood wave attenuation on the floodplain. The EA should examine flood control issues both within the Bitter Lake NWR and downstream.
- What impact would flash floods have on the restoration?

- The EA preparers should discuss how the changes to the Pecos River in the project area could destabilize the river banks downstream of the project area and cause potential environmental and habitat impacts.
- The EA preparers should discuss the effect on sediment transport within the project area and downstream. Sediment transport is an important factor in restoring and degrading river systems.

Extent of Channel Work:

- The EA preparers should consider the extent of channel work that would be needed. Would work on Oxbows 4 and 5 require the sculpting of a new channel that reflects the modern hydrology better or would we simply reflood existing oxbows and expect that a new channel would establish new geometry within the old configuration?
- Should there be an attempt to reflood the small modern oxbow associated with the north end of Oxbow 1, or would this action encourage erosion and potential damage to refuge infrastructure?
- Is there a large elevation difference between the modern Pecos River and the Oxbow 1 inlet?
- The EA should address the potential for changes in groundwater gradient resulting from the restoration of Oxbow 4 and whether these changes would have an effect on the ability to manage Impoundment 7.
- How would the river be reconnected to the floodplain?
- Would the goal be to connect the river to the hydrologic floodplain or the topographic floodplain?
- How would banks be lowered? Would they be bulldozed into the river?
- What is a modern hydrologic regime?

Monitoring Program:

- There should be a program to monitor effects on fish populations prior to, during, and after restoration to determine impacts on shiner populations.
- Are there ongoing fish population studies on the Pecos River that include sites within the Bitter Lake NWR?
- A detailed description of the proposed monitoring program should be included in the EA. The monitoring program should include water quality, quantity, and sediment transport.

Impacts on Existing Habitats:

- The EA preparers should address the benefits of the existing oxbow habitats that developed after the Pecos River was diverted and whether restoration would have a significant impact on these habitats or on the species that use them.
- Numerous species inhabit the Bitter Lake NWR, and the EA should include a discussion of the effect of the proposed restoration on these species.
- The proposed removal of nonnative vegetation along the banks would change the balance of plants and cover along the banks. The EA preparers should discuss the impacts on nesting and refuge habitat as a result of these changes.
- How will this work impact shiner habitat down to Hagerman?

Stakeholder Outreach:

- The EA should inform and involve the stakeholders in this process.
- The EA preparers should address other permits needed for this type of project, such as those associated with the USACE's (404), Section 7, and New Mexico Environment Department requirements.
- Tribes need to be notified if cultural surveys identify any prehistoric cultural resources that would be affected by this project and provided with documentation for review and comment.

Appropriate Data:

- There is substantial data on habitat, water flow, and water budget for this area of the Pecos River. The EA preparers should use these data instead of generic models and generalized data.

1.7 Scope of the Document

This EA identifies, evaluates, and documents the environmental effects of the Proposed Action and the No Action Alternative. Chapter 1 is a description of the purpose of and need for the proposed federal action, project background, applicable law and regulations, related plans, and issues raised by stakeholders.

Chapter 2 is a description of the Proposed Action and the No Action Alternative. The proposed types of restoration actions and their locations are also described in detail.

Chapter 3 is a description of the current condition of resources within the project area that would be affected by the Proposed Action if implemented. Along with information presented for the No Action Alternative, these conditions constitute the baseline for analyzing the effects of the Proposed Action and No Action Alternative. Only those

resources that could be affected by the Proposed Action or the No Action Alternative are addressed in detail.

Chapter 4 is a description and analysis of the environmental impacts of each alternative on the natural, physical, and human environment. Direct impacts (those caused by an action and occurring at the same time and place) and indirect impacts (those caused by an action but occurring later or farther away but at a reasonably foreseeable time or place) are considered. The cumulative impacts of the Proposed Action are also addressed. These are the impacts of an action when added to other past, present, and reasonably foreseeable future actions, regardless of whether the actions are federal or nonfederal. Actions or mitigations that could reduce identified impacts are discussed, where appropriate.

Chapter 5 details the environmental commitments. Chapter 6 is a description of the stakeholder consultation and coordination that was conducted. Chapter 7 is a list of preparers, and Chapter 8 is the references used in preparing this EA. Appendices include relevant supporting information, copies of correspondence, the water budget, and monitoring plan.