Draft Environmental Assessment
Proposed Upper Lake Dam Modernization and Water Management Improvements
Pahranagat National Wildlife Refuge

Prepared for:

U. S. Fish and Wildlife Service

Pahranagat National Wildlife Refuge

Alamo, Nevada

Prepared by:

Harris Environmental Group

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I. PURPOSE AND NEED

Introduction

This Draft Environmental Assessment (EA) has been prepared to assist the U.S. Fish and Wildlife Service (USFWS) in evaluating the alternatives and environmental impacts of modernizing the current, aged, infrastructure responsible for receiving and holding summer water rights that is used to maintain lacustrine (shallow open water wetlands) and palustrine (emergent vegetation wetlands) ecosystems on the Pahranagat National Wildlife Refuge (PNWR) in Lincoln County, Nevada. In 1963, 3,916 acres of lakes, marshes, meadows, and desert uplands were designated by the USFWS as the PNWR; this has since been expanded to 5,382 acres as a refuge and breeding ground for migratory birds and other wildlife (USFWS 2017a). This assessment is being used to determine whether implementing the Proposed Action will have a significant impact on the quality of the natural and human environments. The USFWS has conducted an analysis and evaluation of the environmental consequences of implementing the Proposed Action and the No Action Alternative on the PNWR. This impact evaluation has considered all aspects of the affected environment, including physical, biological, cultural, and socioeconomic resources that are relevant to the Proposed Action. It is part of the USFWS' decision-making process in accordance with the National Environment Policy Act (NEPA) of 1969, as amended.

This EA will assist the USFWS in deciding as to whether any "significant" impacts could result from the Proposed Action or the No Action Alternative. "Significance" is determined by the consideration of context and intensity of the impacts. Should a determination be made that implementation of the Proposed or Alternative actions would not result in "significant environmental impacts" or "significant environmental impacts beyond those already disclosed in the existing NEPA documents," a Finding of No Significant Impact (FONSI) will be prepared to document that determination.

Description of the Proposed Action

The USFWS proposes improving approximately 4,400 feet of an earthen water delivery ditch; rehabilitating approximately 1,200 feet of Upper Lake Dam; creating approximately 100 feet of new diversion channel into critical nesting habitat for the federally-endangered southwestern willow flycatcher (*Empidonax traillii extimus*); modernizing current water monitoring stations; and improving approximately 640 feet of the Pahranagat Ditch Drain (Figure 1).

Purpose and Need for Action

The USFWS is requesting approval of funds to implement these enhancements to improve the integrity of the Upper Lake Dam, North Marsh Inlet, and Upper Supply Ditch. Since 1963, PNWR has provided habitat for migratory birds, especially waterfowl by managing water through a series of culverts, dikes, ditches, water control structures, and the Upper Lake Dam. Most of the infrastructure at the Pahranagat Drain, Upper Lake, and Upper Supply Ditch have been in place for 30-80 years. PNWR has been targeting and completing infrastructure improvements to address the inefficiencies of the water and wetland

management systems through a variety of avenues, such as the USFWS deferred maintenance and Southern Nevada Public Land Management Act (SNPLMA) funding processes.

The purpose of the Proposed Action is to: modernize existing aged infrastructure; improve water delivery from the Upper Lake; and modernize the water monitoring system. The completion of the proposed action will: improve water delivery to each wetland unit; decrease water loss; eliminate water loss through permeable soils; reduce detrimental erosion; complete the PNWR water conservation plan and ensure that over 1,800 acres of rare wetland habitats in southern Nevada will persist for the next 50 years.

These improvements will result in significant habitat improvements for myriad bird species. Special attention will focus on providing optimal southwest willow flycatcher (SWFL) nesting habitat conditions; open water habitat is available for migrating and nesting waterbirds such as grebes (Podicipedidae), loons (*Gavia* spp.), and white pelicans (*Pelecanus erythrorhynchos*); and ensure the management of 1,800 acres of marsh habitats for nesting, migrating, wintering marsh birds, waterfowl, shorebirds, raptors, and wading birds. In addition to providing critical wetland habitat for migratory birds, the improvements will enhance the flood control holding capabilities of the Upper Lake for the Pahranagat Valley, and provide secure flood protection for Highway 93.

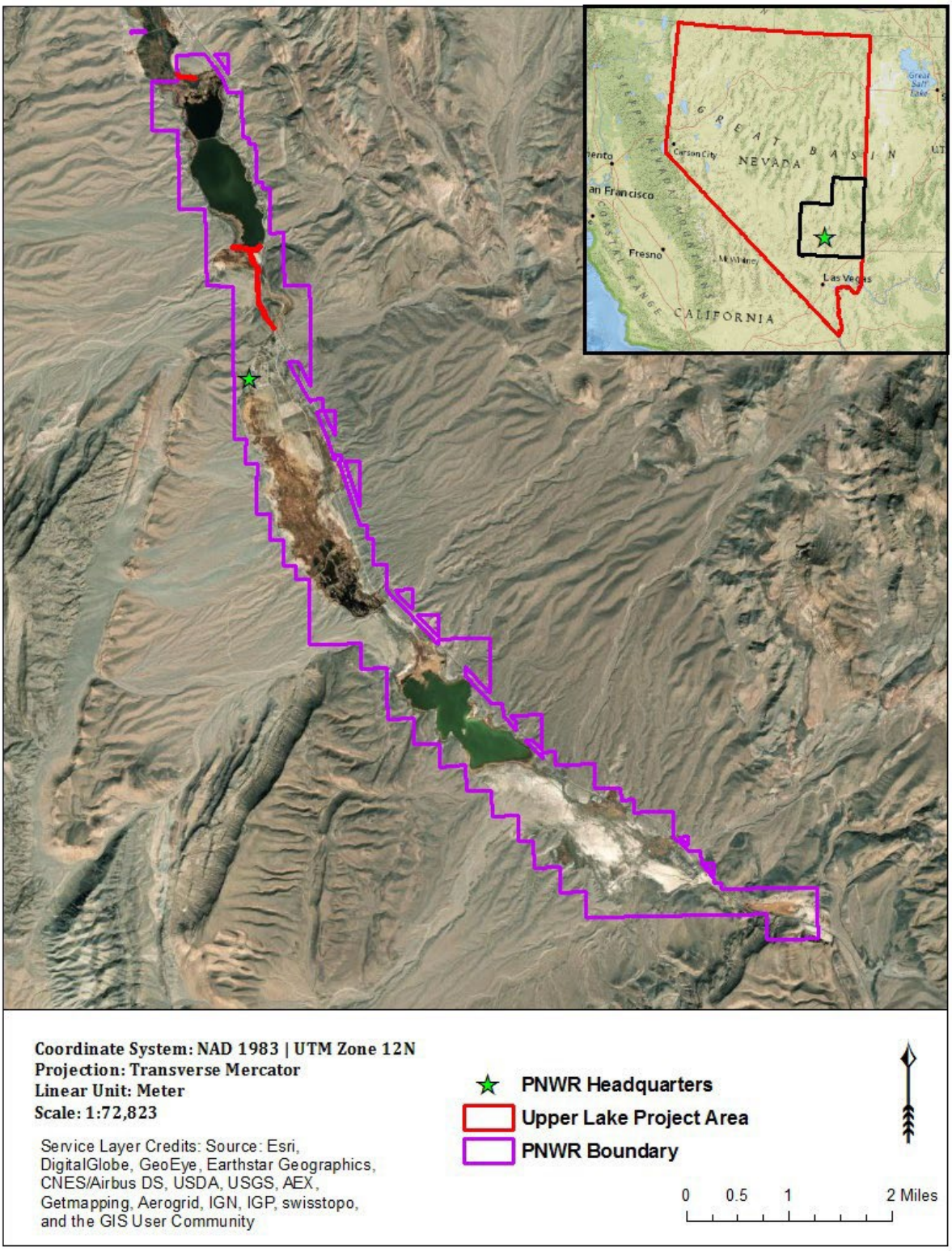

Figure 1: Pahranagat National Wildlife Refuge Study Region, Lincoln County, Nevada.

The Decision to be Made

As required by NEPA and its implementing regulations, preparation of an environmental document must precede final decisions regarding the proposed project and be available to inform decision-makers of the potential environmental impacts of selecting the action. The analysis in this EA evaluates the potential environmental consequences of the Proposed Action and the No Action Alternative. Upon completion of the EA process, the USFWS will then decide based on the analysis within this EA, which will conclude with a FONSI, a Notice of Intent (NOI) for an Environmental Impact Statement (EIS), or the No Action Alternative.

II. ALTERNATIVES

Alternative A – No Action Alternative

The No Action Alternative would maintain the status quo. Structures and improvements will not be installed and updated to modernize PNWR's water-holding capabilities through the Upper Lake. The water delivery system and dam would remain in their current form and continue to provide inefficient delivery and deteriorate.

Alternative B – Proposed Action

Modernize PNWR's water-holding capabilities through the Upper Lake (Figure 2).

Under this Alternative, the following would be implemented:

- A construction design to determine appropriate improvements, materials, construction sequencing, and best management practices (BMPs).
- Complete improvements on approximately 640 feet of the Pahranagat Drain Inlet access and water monitoring system.
- Rehabilitate approximately 1,200 feet of Upper Lake Dam into Nevada Department of Environmental Protection compliance.
- Improve emergency water conveyance from the Upper Lake Dam into nearby wetland units by replacing two existing non-functioning 24-inch culverts with two 36-inch structures that will direct water directly into surrounding wetlands.
- Improve and modernize approximately 4,400 feet of water delivery system from Upper Lake Dam to the pipeline inlet structure to decrease water loss through filtration to insignificant levels.
- Improve the water routing system in the Upper Supply Ditch by modernizing approximately seven water control/culvert structures.
- Create approximately 100 feet of new SWFL diversion channel into North Marsh, to allow Pahranagat Drain spring and summer flows to directly enter critical SWFL nesting habitat.
- Modernize water monitoring stations by installing two digital flow meters with data loggers (Pahranagat Drain and Upper Supply Ditch) to eliminate flow estimations and improve water budgeting and reporting of water rights.
- Restoration of approximately three acres of grassland habitat on the Upper Lake Dam, approximately six acres of riparian habitat, and approximately 7 acres of invasive species management on disturbed sites within the nomination Area of Interest (AOI).

The equipment used for the proposed action will likely be excavators and trucks with trailers moving along the construction zone. The staging area has not been determined, but will likely consist of up to three possible locations. The width of the corridor will likely be approximately 40 feet; however, this value is unconfirmed as this will be a design-build project. Access points will be the existing access points for refuge equipment, including Dove Dike, Wildlife Habitat Improvement of Nevada (WHIN) Marsh Dike, and the closed portion of old Highway 93 south of Middle Marsh Park. The estimated timeline to complete the construction of the project is approximately four months.

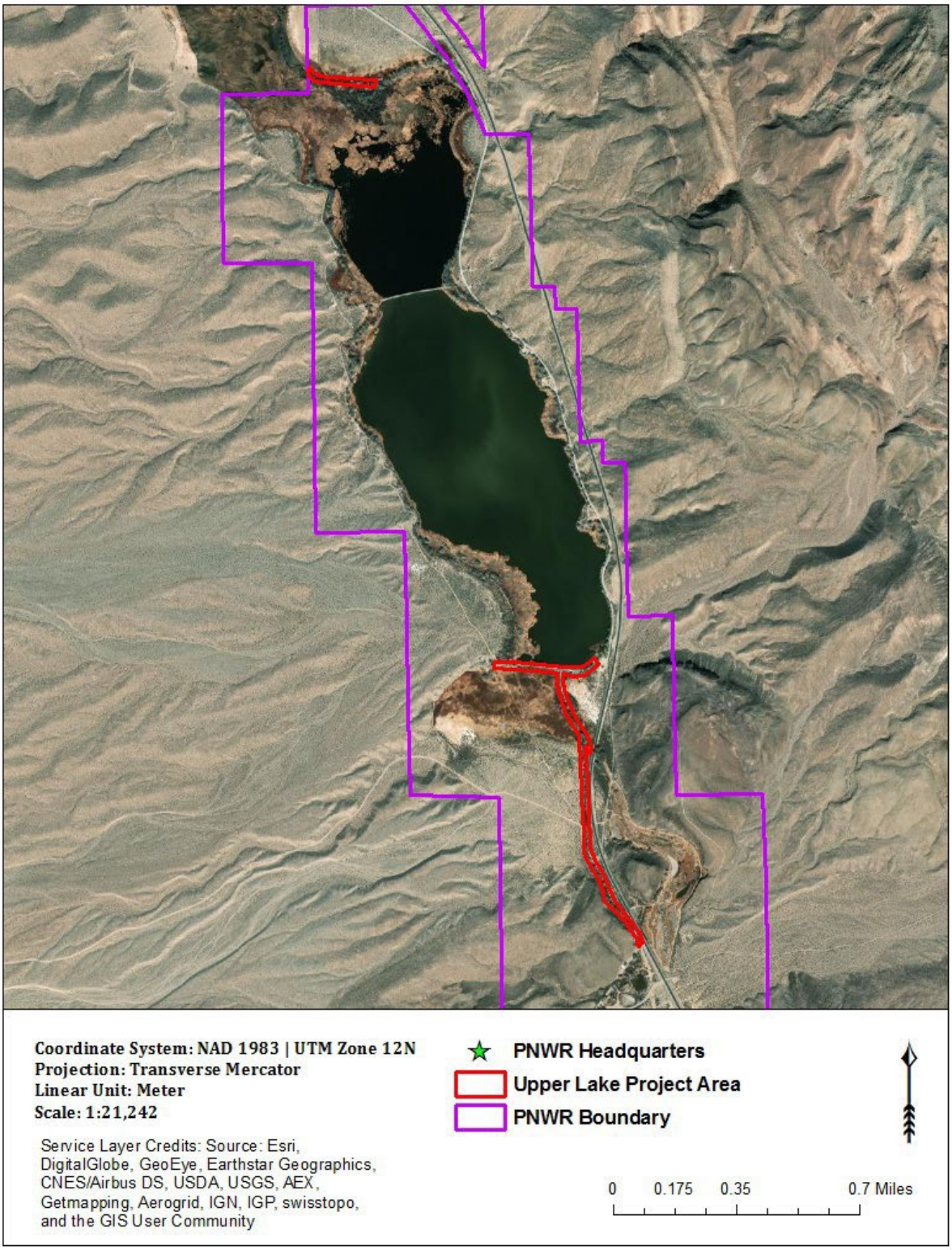

Figure 2: Pahranagat National Wildlife Refuge Study Area, Lincoln County, Nevada.

III. AFFECTED ENVIRONMENT

The Affected Environment includes the existing environment (i.e., the physical, biological, social, and economic values and resources) potentially affected by changes that would occur due to implementing the Proposed Action. Federal regulations (40 Code of Federal Regulations [CFR] §1500 et seq.) require certain topics to be addressed as part of a NEPA analysis. Resource areas that could be affected by the Proposed Action have been selected to allow for a comprehensive analysis of potential impacts. The baseline conditions presented in this chapter are described to the level of detail necessary to support the analysis of potential impacts presented in Chapter 4, Environmental Consequences.

General Site Information

The PNWR is managed by the USFWS under the Department of the Interior (DOI) and is a unit of the National Wildlife Refuge System (NWRS). The PNWR is part of the Desert National Wildlife Refuge (NWR) Complex, which consists of four refuges located in southern Nevada: Desert NWR, Pahranagat NWR, Ash Meadows NWR, and Moapa Valley NWR. The PNWR ("Refuge") was established on August 16, 1963, to provide habitat for migratory birds, especially waterfowl (USFWS 2017a). It spans just over 5,380 acres and is surrounded by the Mojave Desert, acting as an ecological oasis of lakes, marshes, wet meadows, and desert uplands (USFWS 2017a). The PNWR is located approximately 10 miles south of the town of Alamo, or 90 miles north of Las Vegas (Figure 2) in Lincoln County, Nevada. The PNWR borders the Pahranagat Valley to the north, the Delamar Valley and the Delamar Mountains to the east, the Sheep Range to the south, and the East Pahranagat Range to the west (USFWS 2009a).

The White River, an ancient perennial river that was formerly a tributary of the Colorado River, flowed through the Pahranagat Valley from the north, forming a distinct but relatively narrow floodplain. The riverbed is dry for many miles north and south of Pahranagat Valley, but large, thermal springs along the flood plain cause the emergence of perennial water in the valley. Sitting at slightly less than 4,000 feet above sea level, the Refuge is comprised of a ten-mile stretch of Pahranagat Valley and associated desert uplands. Perennial water is stored in the Refuge's Upper Lake and North Marsh and is released to create conditions that enhance the presence of plants used as food by wildlife and to supplement lakes, marshes, and grasslands south of the Refuge Headquarters (USFWS 2012b). The diversity of habitats found at the PNWR ranges from Mojave/Great Basin Desertscrub to marsh and open water, and provides excellent habitat for a stunning variety of wildlife species. Pahranagat NWR lies within the Mojave Desert bioregion and is characterized by a semi-arid climate. Rainfall is seasonal, occurring mainly between January to March with a spike in summer rains in July, averaging 6.6 inches per year. Temperatures typically range from 24 °F to 58 °F from December through February and 57 °F to 99 °F from June through August.

Located on the Pacific Flyway, the variety of lakes and wetlands of the PNWR provide essential fish and wildlife habitat in the arid southern Nevada climate. Designated by The Nature Conservancy (TNC) as one of the nation's prime biological "hotspots" and by the Audubon Society as an Important Bird Area (IBA), the Refuge is a critical stopover for hundreds of different species of waterfowl, raptors, and songbirds, as well as home to multiple fish and mammal species, including federally-listed endangered and threatened species. The Refuge's abundant water originates from large springs to the north and is managed to create

the greatest value for wildlife. Various types of wetland habitats support many plants favored as food by over 230 species of migratory birds and other resident wildlife (Nevada State Parks 2018).

Management of the Refuge focuses on migration and wintering habitat for waterfowl and other migratory birds as a priority, providing habitat for endangered and sensitive animal and plant species, maintaining biodiversity, and providing wildlife-dependent recreation to the public. The purpose of the PNWR derives from the Migratory Bird Conservation Act (MBCA) of 1929, as amended:

> "*…for use as an inviolate sanctuary, or any other management purpose, for migratory birds…"* (16 U.S. Code (U.S.C.) 715d).

The Refuge goals (USFWS 2009a) are as follows:

- Wetland Habitat (Goal 1): Restore and maintain wetland habitat for waterfowl and other migratory birds with an emphasis on spring and fall migration feeding and resting habitat requirements.
- Wildlife Diversity (Goal 2): Restore and maintain the ecological integrity of natural communities within Pahranagat NWR and contribute to the recovery of listed and other special-status species.
- Visitor Services (Goal 3): Provide visitors with compatible wildlife-dependent recreation, interpretation, and environmental education opportunities that foster an appreciation and understanding of Pahranagat NWR's wildlife and plant communities.
- Cultural Resources (Goal 4): Manage cultural resources for their educational, scientific, and traditional cultural values for the benefit of present and future generations of refuge users, communities, and culturally affiliated tribes.

The PNWR area is also a very important cultural landscape to many tribal people as it contains a diversity of prehistoric and historic resources, including the Black Canyon National Register District. Furthermore, the word "Pahranagat" originates from the Southern Paiute language and includes the term "pah" meaning water (Kelly 1934). The PNWR is an important tourist attraction, receiving more than 50,000 visitors per year. Activities include wildlife observation, photography, fishing, hunting, hiking, environmental education, interpretation, camping, non-motorized boating, and picnicking.

Resource Topics Eliminated from Detailed Analysis

The Proposed or Alternative Actions would not affect some resources. Resources that have been eliminated from further study in this document and the rationale for eliminating them are presented below.

- Land Use: The Proposed Action would be contained within the boundaries of PNWR. The land surrounding the PNWR consists of agricultural, open space, and Bureau of Land Management (BLM) property.

- Noise: Maintenance operations would involve automobile traffic to and from the site. The noise would be generated from the operation of heavy construction equipment; however, the Proposed Action area is not close to any sensitive noise receivers such as residential neighborhoods, schools, or parks.

Because construction would occur during the daytime on weekdays and far from sensitive noise receivers, no noise impacts associated with construction activities would occur.

- Prime and Unique Agricultural Lands: The Farmland Protection Policy Act (FPPA) (7 U.S.C. 4201 et seq, implementing regulations 7 CFR Part 658, of the Agriculture and Food Act of 1981, as amended) minimizes the effect of federal programs on the unnecessary and irreversible conversion of farmland to nonagricultural uses. Prime agricultural land is defined (7 U.S.C. 4202(a)) as land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is also available for these uses. No prime agricultural land occurs within the Proposed Action limits (NRCS 1997).

- Hazardous Materials: Hazardous material use and management at PNWR are regulated under the Toxic Substances Control Act (TSCA), the Occupational Safety and Health Administration (OSHA), and the Emergency Planning and Community Right-to-Know Act (EPCRA). Hazardous wastes are defined by the Solid Waste Disposal Act (SWDA) as amended by the Resource Conservation and Recovery Act (RCRA), which was further amended by the Hazardous and Solid Waste Amendments, RCRA Subtitle C (40 CFR, Parts 260 through 270). No known hazardous materials occur in the Proposed Action area. Within the location of the Proposed Action, asbestos is not present at aboveground or belowground locations. Therefore, no impacts related to lead-based paint would be anticipated under the Proposed Action, and lead-based paint was not considered for detailed analysis.

- Visual Resources: No impacts to visual resources would be anticipated under the Proposed Action. The Proposed Action would largely be in the existing dam and water delivery footprint. Therefore, the effects on visual resources would be similar to what currently exists and were not considered for detailed analysis.

Resource Topics Analyzed in Detail

Geology and Soils

The Proposed Action area lies within the Mojave Desert region of the greater Basin and Range physiographic province characterized by numerous long, narrow, and parallel mountain ranges with a north-to-south orientation separated by deep valleys. Many Great Basin rivers do not reach the sea, but instead find base-level in large lakes and dry-lake playas when evaporation rates are high. The arid conditions characterizing the region are created by east- and west-flanking mountain ranges. The Sierra Nevada to the west captures moisture from Pacific storms and the Rocky Mountains to the east intercept storms from the Gulf of Mexico. Elevations of PNWR range from approximately 3,020 feet above mean sea level at Lower Pahranagat Lake to approximately 3,900 feet above mean sea level along the valley walls formed by the Sheep Range at the extreme southeast corner of the Refuge (Heitmeyer 2011).

The Pahranagat Range lies within the Mesozoic and early Tertiary Sevier Fold-and-Thrust Belt and the Cenozoic Basin and Range Province (Jayko 2007a). The majority of the soils in the region are older alluvial gravels (Quaternary), generally unconsolidated, boulder- to sand-sized deposits in alluvial fans. These alluvial silts and gravels, washed down from the surrounding mountains, reach a thickness of 1,000 feet in many locations within the valley (Stewart and Carlson 1978). Deposits are usually dissected by washes,

forming an irregular surface commonly cemented by caliche. Additionally, the area contains regions of surficial deposits (Quaternary), sedimentary deposits (Quaternary and/or Tertiary), and volcanic ash-flow tuffs (Jayko 2007b). The East Pahranagat and Hiko mountain ranges that surround Pahranagat NWR consist of silicic ash-flow tuffs (Miocene).

Soils at the Proposed Action area are classified as Seaman sandy loam and Maynard Lake complex (USDA 2011) (Figure 3). Seaman sandy loam is a well-drained soil, capable of forming slopes of 0–2%, with moderate available water capacity. Maynard Lake complex soil is excessively drained, capable of forming slopes of 4–12%, with a low available water capacity (ATC 2011).

Three soil mapping units exist within the watershed: Alko loamy coarse sand on 0-8% slopes; Adaven loam; and the Boxspring-Theriot-Rock outcrop association (USGS 2016). Prime Farmlands are soils that when treated and managed in particular ways, and using proper farming methods, can favor economic production of crops. No Unique Farmlands exist in the State of Nevada. Livestock management on adjacent lands could influence hydrologic function (e.g., overland flow, water quality, groundwater recharge).

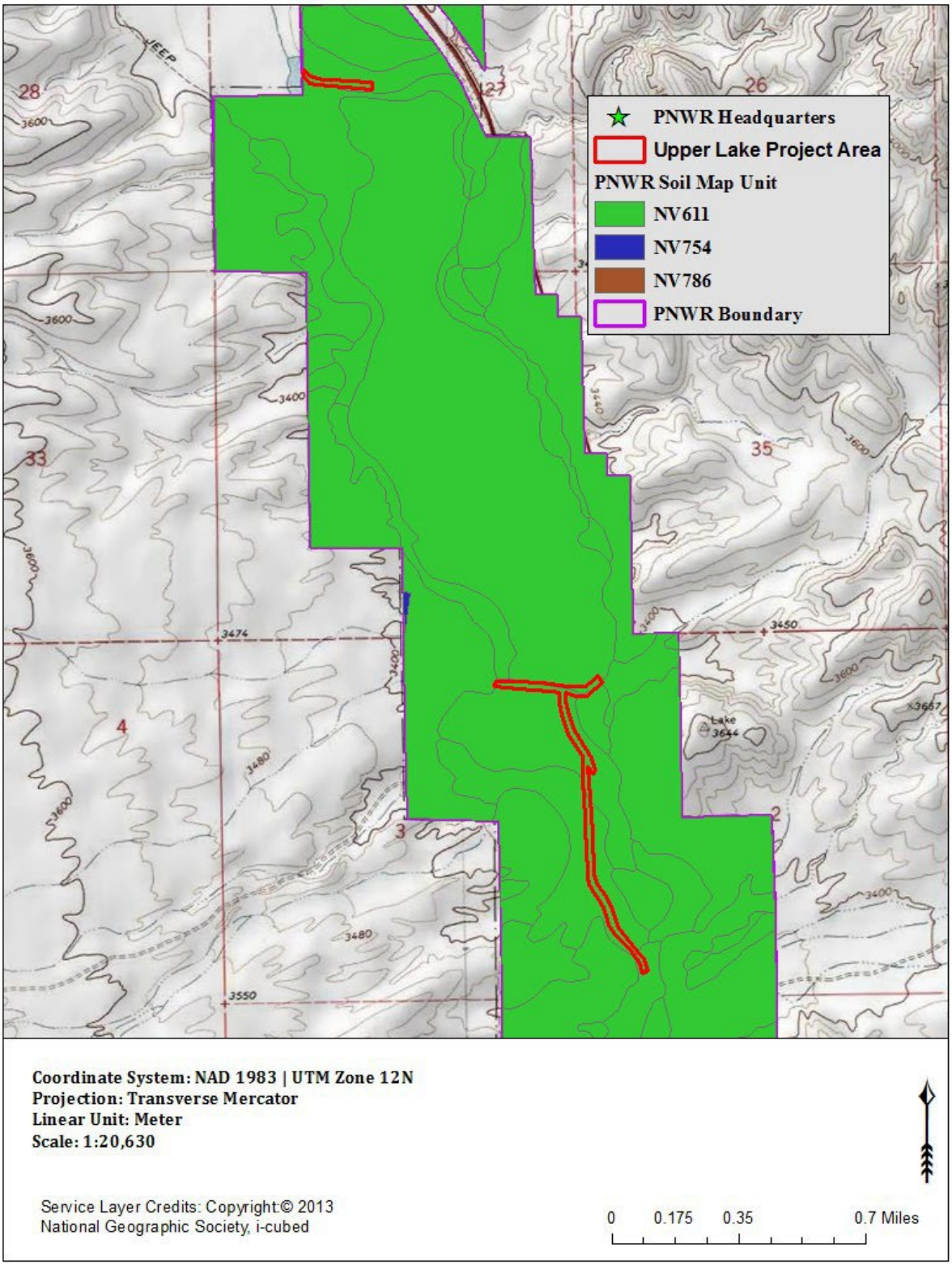

Figure 3: Pahranagat National Wildlife Refuge Soils, Lincoln County, Nevada.

Water Resources

The Refuge occurs within Pahranagat Valley in Lincoln County, Nevada; a fertile narrow river valley (approximately no more than 1 mile wide and 40 miles long) running north and south. The prehistoric (late Pleistocene-early Holocene wet periods) White River flowed south from its headwaters in the northern White River Valley, through the Pahranagat Valley into Kane Springs Wash, southeast through Arrow Canyon into Moapa Valley, where it joined the pluvial Carpenter River (now referred to as Meadow Valley Wash), and ultimately reached the Virgin River above the Colorado River confluence (Hubbs and Miller 1941; Williams and Wilde 1981; Courtenay et al. 1985; USFWS 1998; Wurster 2010; Heitmeyer 2011).

The Proposed Action area lies within the White Watershed (15010011) of the Pahranagat Valley Hydrophobic area of the Colorado River Basin (USFWS 1998). Currently, perennial flows are confined to the headwater tributaries of the White River; outflow streams from springs in White River, Pahranagat, and Moapa Valleys; and the Muddy (Moapa) River (Courtenay et al. 1985; USFWS 1998). Pahranagat Valley is principally watered by three large natural springs (Hiko Springs, Crystal Springs, and Ash Springs) and contains four lakes, two near the north end of the valley (Nesbitt Lake and Frenchie Lake) and two towards the south end (Upper Pahranagat Lake and Lower Pahranagat Lake at Pahranagat NWR) (Heitmeyer 2011); however, the low flow volumes, water chemistry, and seasonal fluctuations suggest refuge springs are supported by groundwater flow paths that are different from those supporting Ash and Crystal Springs (Wurster 2010). Additionally, water accumulates from precipitation and surface infiltration and discharges into several of the springs in the PNWR from a local alluvial aquifer (USFWS 2009a; Heitmeyer 2011).

Surface Water

The White River is the primary drainage for all runoff in the basin and ultimately flows into Upper Pahranagat Lake. This river is the only perennial stream that flows through the central portion of the Pahranagat Valley. Despite numerous tributaries, the remainder of the streams are intermittent or ephemeral systems, and flows into PNWR are now highly seasonal and intermittent (Heitmeyer 2011). Several surface water sources exist within the region when referencing the United States Geological Survey (USGS) 7.5-minute Hiko, Ash Springs, and Alamo topographic quadrangle maps, including Ash Springs, Crystal Springs, Brownie Springs, Grove Springs, and several unnamed springs.

Within the PNWR, there are four main water reservoirs consisting of the North Marsh, the Upper and Lower Pahranagat Lakes, and the Middle Marsh (Middle Marsh and WHIN Marsh) (USFWS 2009a). Approximately 1,970 acres of wetland habitat exist on the refuge (Wurster 2010). Upper Pahranagat Lake and North Marsh occupy approximately 450 acres and occur in the northern extent of the PNWR; Lower Pahranagat Lake occurs near the southern end of the Refuge and occupies approximately 365 acres (USFWS 2009a). Water management, control, and diversion have changed the hydrology within the Pahranagat NWR; spring-fed water flowing into Upper Pahranagat Lake begins later and ends sooner than in the 1960s (Wurster 2010; Heitmeyer 2011). Upper Pahranagat Lake and North Marsh only receive discharge from Pahranagat Creek in winter, when upstream irrigation is low (USFWS 2009a). Additionally,

PNWR contains several springs, including Cottonwood, Cottonwood Spring North, Lone Tree, "L", and Maynard Lake Upper and Lower Springs, which discharge small amounts of surface water (Heitmeyer 2011). Access to Pahranagat Creek water rights is limited to these months, which results in a severe lack of water to the entire PNWR site, especially during the summer months. Water from Middle Marsh can be released into the alkali Lower Pahranagat Lake; however, most years, very little water occurs there. Additionally, the PNWR is a closed system where no surface water flows out of it. Man-made ponds on Pahranagat NWR have increased by nine times since 1965, resulting in more open water areas and less wet meadows and seasonal wetland areas than historically present (Heitmeyer 2011). Since PNWR was established, water management has focused on maintaining a minimum pool in the Upper Lake, which has caused less water availability for wetlands south of the headquarters and likely contributed to drying conditions in the southern third of the refuge since 1965 (Wurster 2010).

Floodplains

Executive Order (EO) 11988 regulates Floodplain Management and requires that federal agencies provide leadership and take action to reduce the risk of flood loss; minimize the impacts of floods on human safety, health, and welfare; and restore and preserve the natural and beneficial values of floodplains when acquiring, managing, or disposing of federal lands. The PNWR is located within a 100-year floodplain and is designated by the Federal Emergency Management Agency (FEMA) as Zone D. Zone D refers to areas where there are possible but undetermined flood hazards; no analysis of flood hazards has been conducted in these areas. Zone D areas are often undeveloped and sparsely populated. Correspondingly, flood insurance is available but not federally required by lenders for loans on properties in these zones. Furthermore, on January 30, 2015, the President signed EO 13690 amending EO 11988, *Establishing a Federal Flood Risk Management Standard and a Process for Further Soliciting and Considering Stakeholder Input*. Under EO 13690 agencies are required to expand management from the base flood elevation (100-year flood) to a higher vertical flood elevation and corresponding horizontal floodplain for federally-funded projects. The most common approach to define the floodplain is an area that is 2 feet above the elevation of the 100-year flood.

Wetlands/Riparian Zones

Wetlands are protected from development under EO 11990, Protection of Wetlands. Guidance from the EO requires federally-funded activities associated with wetlands to minimize the destruction, loss, or degradation of wetlands, and to preserve and enhance the natural beneficial values of wetlands. A site must display evidence of all three wetland indicators: hydric soils, hydrophytic vegetation, and hydrology to be considered a wetland, or, in the case of a problem area, such as arid regions, hydric soil indicators are considered a constant factor during the drier times of the growing season. The USFWS National Wetlands Inventory (NWI) shows expansive areas of freshwater emergent wetlands interspersed with freshwater forested/shrub wetlands along the White River (Figures 4-9; Table 1). These wetlands are restricted to the valley floor where the availability of surface water and higher groundwater is maximized. Figures 4-9 depict the Proposed Action area intersecting through wetlands classified by the USFWS's NWI, while Table 1 summarizes the type and length of wetland that is intersected by the Proposed Action.

Table 1: Acreage of the Proposed Action area with respect to NWI wetland type.

NWI Code	Wetland Type	Acres
PEM1A	Freshwater Emergent Wetland	0.07
PEM1B	Freshwater Emergent Wetland	2.10
PEM1C	Freshwater Emergent Wetland	0.45
PEM1Fh	Freshwater Emergent Wetland	0.10
Freshwater Emergent Wetland Total		**2.72**
PFOA	Freshwater Forested/Shrub Wetland	0.06
PFOAh	Freshwater Forested/Shrub Wetland	0.18
PFOB	Freshwater Forested/Shrub Wetland	0.45
PFOC	Freshwater Forested/Shrub Wetland	4.72
PFOCh	Freshwater Forested/Shrub Wetland	0.03
PFOF	Freshwater Forested/Shrub Wetland	0.04
PSSA	Freshwater Forested/Shrub Wetland	0.04
PSSB	Freshwater Forested/Shrub Wetland	0.00
PSSC	Freshwater Forested/Shrub Wetland	0.16
Freshwater Forested/Shrub Wetland Total		**5.67**
L2UBHh	Lake	0.59
R2UBHx	Riverine	0.35
R4SBCx	Riverine	0.56
R5UBH	Riverine	0.97
Riverine Total		**1.87**
Grand Total		**10.85**

P = Palustrine, EM = Emergent, 1 = Persistent, AF = Temporary Flooded, B = Seasonally Saturated, C = Seasonally Flooded, H = Permanently Flooded, h = Diked/Impounded, F = Semi permanently Flooded, FO = Forested, UB = Unconsolidated Bottom, R = Riverine, 4 = Intermittent, SB = Streambed.

As this system is used recreationally and has a perennial surface water connection to the White River and Upper Pahranagat Lake, it would likely be considered jurisdictional under Section 404 of the Clean Water Act (CWA) by the U.S. Army Corps of Engineers (USACE). Section 404 of the CWA regulates the discharge of dredge and fill material into waters of the United States (WUS) (33 CFR 328). The USACE and United States Environmental Protection Agency (EPA) jointly determine the federal jurisdiction of WUS and permit activities that are subject to Section 404. According to the FEMA's Mapping Information Platform, there are no special flood hazard areas present within the immediate area of the Proposed Action site. The White River, and many of the intermittent streams in the area, likely maintain a narrow and contained hydrologic floodplain typically characteristic of the desert southwest. As this system has a perennial surface water connection to the White River and Upper Pahranagat Lake, it would likely be considered jurisdictional under Section 404 of the CWA by the USACE. The White River and many of the intermittent streams in the area likely maintain a narrow and contained hydrologic floodplain typically characteristic of the desert southwest. All of the potential locations of the Proposed Action may impact WUS.

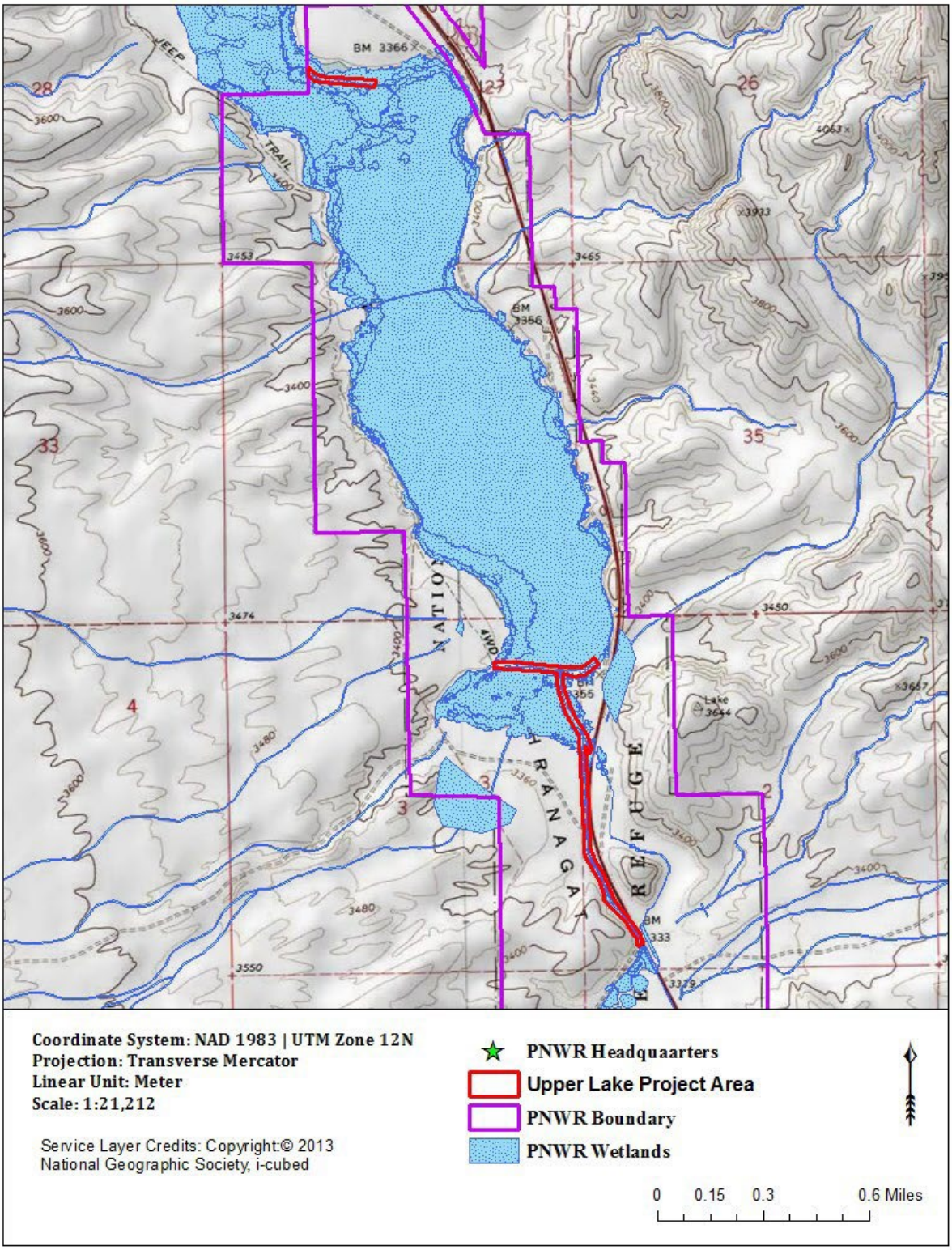

Figure 4: Pahranagat National Wildlife Refuge Study Area Wetlands, Lincoln County, Nevada.

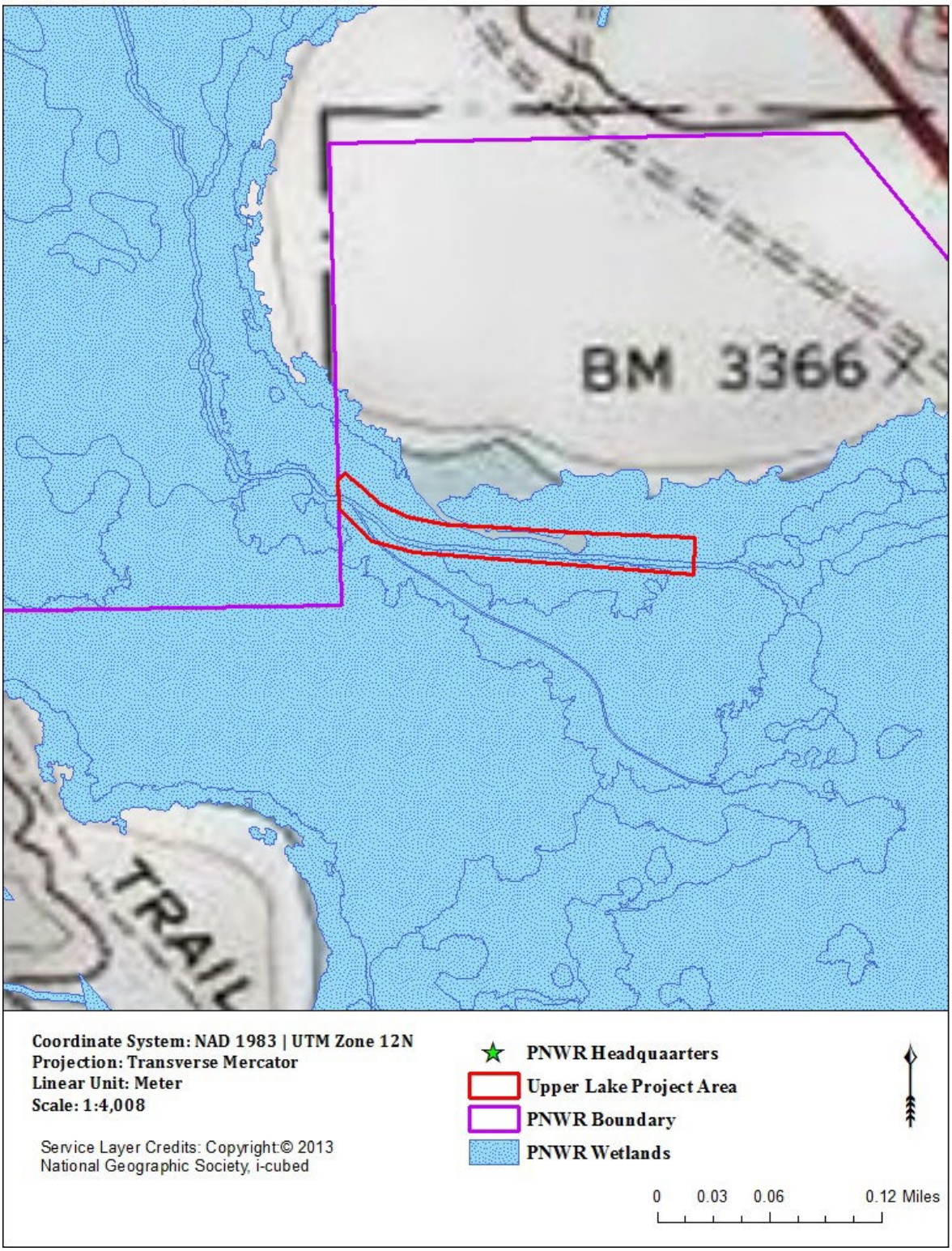

Figure 5: Northern extent of the proposed Upper Lake Dam with respect to wetlands.

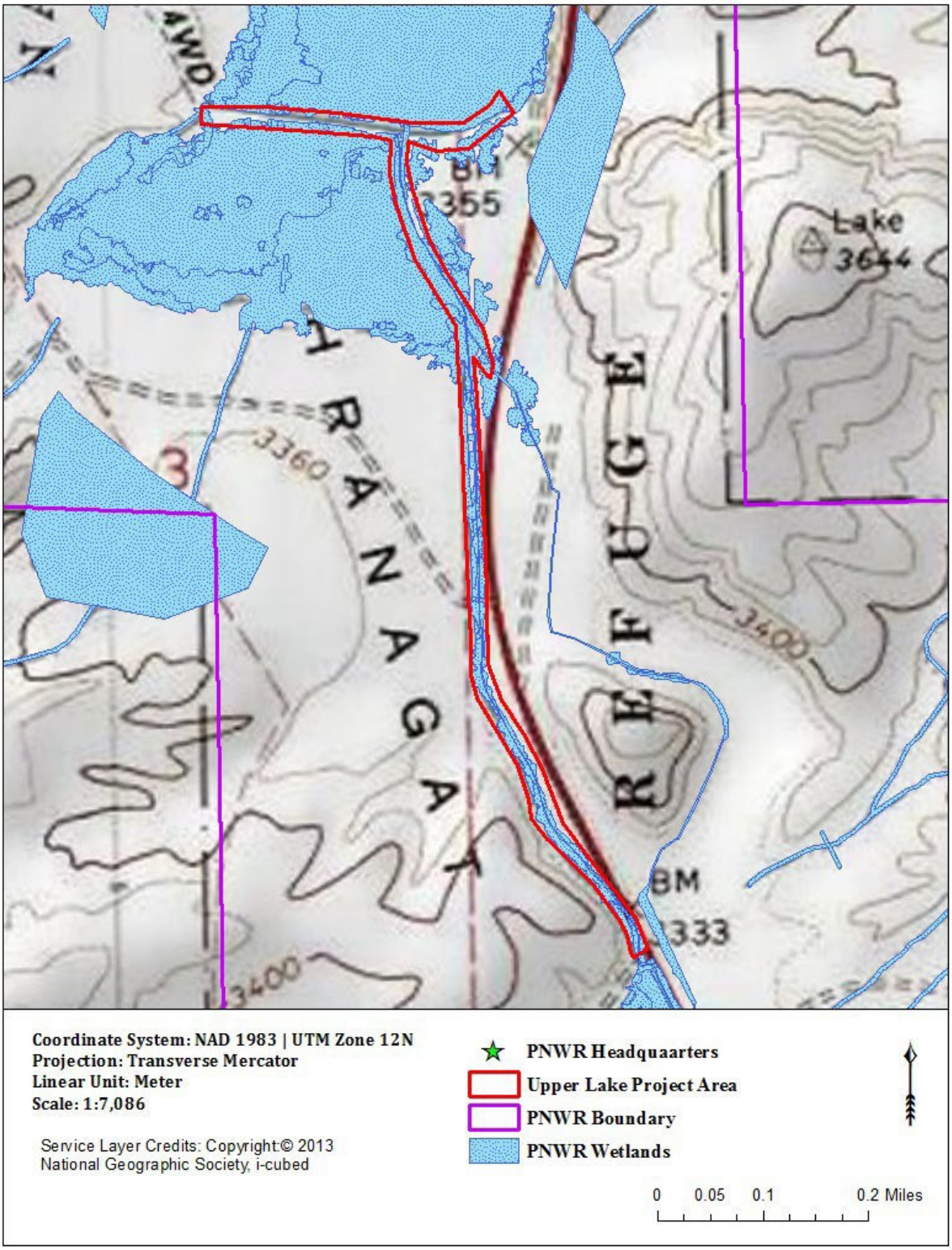

Figure 6: Southern extent of the proposed Upper Lake Dam with respect to wetlands.

Water Quality

Under Section 303(d) of the CWA, states are required to develop lists of impaired waters. These waters do not meet federal or state water quality standards. There are no 303(d)-listed waters in the immediate vicinity of the Proposed Action area (NDEP 2022).

According to the executive summary of the Hydrologic Analysis Report of the PNWR, generated by the USFWS (2010):

"Water in spring pools tends to be cooler, fresher, and has a lower pH than water in irrigation ditches and lakes on the refuge. Water chemistry analyses confirm that springs on the refuge have a different source than springs fed by the regional carbonate rock aquifer. The source of the spring water is probably alluvial groundwater that is recharged locally by precipitation inside the boundaries of the Pahranagat Valley. Surface water entering the refuge is a 70:20:10 mix of Crystal Springs, Ash Springs, and groundwater with a chemical signature similar to Cottonwood and Maynard Springs. Water collected from refuge wetlands is a mixture of surface water released from Upper Pahranagat Lake and groundwater with a chemical signature similar to Cottonwood and Maynard Springs. Spring pools have lower concentrations of dissolved oxygen than surface water in the ditch system, presumably due to high rates of biological activity, less surface area, and little oxygen-entraining turbulence."

In summary, the state of water quality on the PNWR is good and stable, but current water distribution and detrimental erosion may negatively affect long term water quality.

Ground Water

The Pahranagat Valley basin covers approximately 790 square miles, beneath which exists a large regional carbonate aquifer and a local, basin-fill alluvial aquifer (Heitmeyer 2011; King 2014). Hiko, Crystal, and Ash Springs are the three main sources of groundwater discharge in the valley. The magnitude of the combined discharge of Hiko, Crystal, and Ash Springs in the valley is 25,000 acre-feet per year and greatly exceeds the volume expected by recharge from precipitation alone (estimated at 1,800 acre-feet per year); thus, much of the groundwater discharged by the springs is likely derived from outside of the valley (Eakin 1963).

Water Rights

In Nevada, the first person or entity who uses water beneficially establishes priority for the ongoing legal use of that water resulting in the state doctrine of prior appropriation in granting water rights. Nevada water law limits the issuance of water rights in any given hydrographic basin to the amount of water available. The Pahranagat Valley Hydrographic Basin (Basin 209) is fully appropriated, as established under the Pahranagat Lake Decree of 1929 and reaffirmed by court decisions and by the Nevada State Engineer's Office under the Nevada Division of Water Resources (NDWR).

Nevada State Engineer's Ruling #5940

Nevada State Engineer's Ruling #5940 (2009) was issued on February 10, 2009, in response to an application for a change of use for water rights held by the USFWS on the water in Pahranagat Lake. The lake is on property managed by the USFWS and is the terminus of flow from Ash and Crystal Springs. There is no surface outlet from the lake and there are no other holders of water rights from Pahranagat Lake. The USFWS was granted its Application No. 20234 for 30.0 cubic feet per second, not to exceed 3,500 annual acre-feet on the condition that it be the most junior right in the basin; the right can only be exercised after all other users in the basin have exercised their rights. Streamflow data supporting the application showed a "positive inflow" to Upper Pahranagat Lake between October and March in 12 of 14 years between 1963 and 2003, and three of four years from 1991 to 1994.

The withdrawals for irrigation accounted for approximately 97.07% of water use in the county (Table 2). Water use and water withdrawals are equivalent terms but are not the same as consumptive use and do not account for return flows. Domestic, commercial, industrial, and thermoelectric water withdrawals include both public and self-supplied water.

Table 2: Lincoln County Water Withdrawals, Estimated by Type in 1995. Source: Nevada Division of Water Planning 1997.

Water Use by Major Category	1995 Water Use (Acre-Feet/Year)	Percent of 1995 Total Water Use
Domestic	1,355	2.01%
Commercial	364	0.54%
Industrial	0	0.00%

Water Use by Major Category	1995 Water Use (Acre-Feet/Year)	Percent of 1995 Total Water Use
Thermoelectric	0	0.00%
Mining	0	0.00%
Livestock	123	0.18%
Irrigation	65,537	97.07%
Public Use and Losses	138	0.20%
Total Water Withdrawals/Use	67,516	n/a

Riparian System

The Refuge is located in the northeastern Mojave Desert and is dominated by low-growing vegetation adapted to harsh environments. It is unique because it differs from the surrounding area in that it provides a perennial water source for wildlife and riparian habitat in the form of cover, breeding, and foraging habitat types. The National Vegetation Classification System (i.e., Warm Southwest Riparian Forest) classifies the riparian area as the Interior Warm and Cool Desert Riparian Forest Macro group. This macro group includes warm and cold climate riparian and wetland forested vegetation of the western interior U.S., including the southwestern deserts and the Tamaulipas area of southern Texas (USGS 2016). This is a lowland riparian forest association typically found within elevations ranging from 1,200 to 1,550 meters, and sites are typically rocky or sandy banks of low gradient (1.5%) stream systems that are frequently flooded (NatureServe 2016). Soils are typically coarse-loamy over fragmental Typic Torrifluvents and as cobbly riverwash (NatureServe 2016). Fremont's cottonwood (*Populus fremontii*) and velvet ash (*Fraxinus velutina*) co-dominate moderate to dense canopies (>50% cover); undergrowth is moderately diverse with low cover (NatureServe 2016).

Air Quality

Air Quality Standards and Regulations

The EPA has established primary and secondary National Ambient Air Quality Standards (NAAQS) under the Clean Air Act Amendments (CAAA) of 1990. The CAAA also set emission limits for certain air pollutants from specific sources, set new source performance standards based on best demonstrated technologies, and established national emission standards for hazardous air pollutants.

The CAAA specifies two sets of standards – primary and secondary – for each regulated air pollutant. Primary standards define levels of air quality necessary to protect public health, including the health of sensitive populations such as people with asthma, children, and the elderly. Secondary standards define levels of air quality necessary to protect against decreased visibility and damage to animals, crops, vegetation, and buildings. Federal air quality standards are currently established for six pollutants (known as criteria pollutants), including carbon monoxide (CO), nitrogen dioxide (NO_2), ozone (O_3), sulfur oxides (SO_x, commonly measured as sulfur dioxide – SO_2), lead (Pb), particulate matter equal to or less than 10 micrometers in aerodynamic diameter (PM_{10}) and particulate matter equal to or less than 2.5 micrometers

in aerodynamic diameter ($PM_{2.5}$). Although O_3 is considered a criteria pollutant and is measurable in the atmosphere, it is often not considered as a pollutant when reporting emissions from specific sources, because O_3 is not typically emitted directly from most emission sources. Ozone is formed in the atmosphere from its precursors – nitrogen oxides (NO_x) and volatile organic compounds (VOC's) – that are directly emitted from various sources. Thus, emissions of NO_x and VOC's are commonly reported instead of O_3.

The NAAQS for the six criteria pollutants is shown in Table 3. Units of measure for the standards shown in this table are micrograms per cubic meter of air ($\mu g/m^3$), except for ozone, SO_2, and CO which are in parts per million (ppm), and NO_2 which is in parts per billion (ppb).

The EPA classifies the air quality within an Air Quality Control Region (AQCR) according to whether the region meets federal primary and secondary air quality standards. An AQCR, or portion of an AQCR, may be classified as attainment, non-attainment, or unclassified concerning the air quality standards for each of the criteria pollutants. "Attainment" describes a condition in which standards for one or more of the six pollutants are being met in an area. The area is considered an attainment area for only those criteria pollutants for which the NAAQS are being met. "Non-attainment" describes a condition in which standards for one or more of the six pollutants are not being met in an area. "Unclassified" indicates that air quality in the area cannot be classified and the area is treated as attainment. An area may have all three classifications for different criteria pollutants. The Proposed Action area is situated in Lincoln County, which is classified as an "attainment area" (USEPA 2011) because it meets ambient air quality standards for pollutants according to the NAAQS.

Table 3: National Ambient Air Quality Standards (EPA 2021a).

Pollutant	Primary/ Secondary	Averaging Time	Level	Form
Carbon Monoxide (CO)	primary	8 hours	9 ppm	Not to be exceeded more than once per year
		1 hour	35 ppm	
Lead (Pb)	primary and	Rolling 3 month average	0.15 $\mu g/m^3$ (1)	Not to be exceeded
	secondary			
Nitrogen Dioxide (NO_2)	primary	1 hour	100 ppb	98th percentile of 1-hour daily maximum concentrations averaged over 3 years
	primary and	1 year	53 ppb (2)	Annual Mean
	secondary			

Pollutant		Primary/ Secondary	Averaging Time	Level	Form
Ozone (O_3)		primary and	8 hours	0.070 ppm (3)	Annual fourth-highest daily maximum 8-hour concentration averaged over 3 years
		secondary			
Particulate Matter (PM) Particle Pollution	$PM_{2.5}$	primary	1 year	12.0 µg/m^3	annual mean averaged over 3 years
		secondary	1 year	15.0 µg/m^3	annual mean averaged over 3 years
		primary and secondary	24 hours	35 µg/m^3	98th percentile averaged over 3 years
	PM_{10}	primary and secondary	24 hours	150 µg/m^3	Not to be exceeded more than once per year on average over 3 years
Sulfur Dioxide (SO_2)		primary	1 hour	75 ppb (4)	99th percentile of 1-hour daily maximum concentrations averaged over 3 years
		secondary	3 hours	0.5 ppm	Not to be exceeded more than once per year

(1) In areas designated non-attainment for the Pb standards before the promulgation of the current (2008) standards, and for which implementation plans to attain or maintain the current (2008) standards have not been submitted and approved, the previous standards (1.5 µg/m^3 as a calendar quarter average) also remain in effect.
(2) The level of the annual NO_2 standard is 0.053 ppm. It is shown here in terms of ppb for the purposes of clearer comparison to the 1-hour standard level.

(3) Final rule signed October 1, 2015, and effective December 28, 2015. The previous (2008) O_3 standards additionally remain in effect in some areas. Revocation of the previous (2008) O_3 standards and transitioning to the current (2015) standards will be addressed in the implementation rule for the current standards.

(4) The previous SO_2 standards (0.14 ppm 24-hour and 0.03 ppm annual) would additionally remain in effect in certain areas: (1) any area for which it is not yet 1 year since the effective date of designation under the current (2010) standards, and (2) any area for which an implementation plan providing for attainment of the current (2010) standard has not been submitted and approved and which is designated non-attainment under the previous SO_2 standards or is not meeting the requirements of a State Implementation Plan (SIP) call under the previous SO_2 standards (40 CFR 50.4(3)). A SIP call is an

Pollutant	Primary/ Secondary	Averaging Time	Level	Form
EPA action requiring a state to resubmit all or part of its SIP to demonstrate attainment of the required NAAQS.				

Regional Air Quality

The Proposed Action area is located within Lincoln County in the Nevada Intrastate Air Quality Control Region. Lincoln County is classified as an "attainment area" (USEPA 2011) because it meets ambient air quality standards for pollutants according to the NAAQS. Therefore, air quality within the Proposed Action area is of better quality than the NAAQS.

Greenhouse Gases

There are six primary Greenhouse Gases (GHGs) of concern: carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF_6). The emissions of each GHG are measured based on their global warming potential (GWP); the universal unit of measurement to express how much a given mass of greenhouse gas is estimated to contribute to climate change. Table 4 lists the GWP (USEPA 2013) of the six primary GHGs.

Table 4: Global Warming Potential of GHGs.

Gas	Chemical Formula	GWP
Carbon dioxide	CO_2	1
Methane	CH_4	25
Nitrous oxide	N_2O	298
Hydrofluorocarbons	HFCs	various
Perfluorocarbons	PFCs	various
Sulfur hexafluoride	SF_6	22,800

CH_4 = methane
CO_2 = carbon dioxide
GWP = global warming potential
HFCs = hydrofluorocarbons
N_2O = nitrous oxide
PFCs = perfluorocarbons
SF_6 = sulfur hexafluoride

The three GHGs; CO_2, CH_4, and N_2O, represent the majority of carbon dioxide equivalent (CO_{2eq}) emitted to the atmosphere from typical stationary sources. The other GHGs are emitted by specific industries: HFCs are most commonly used in refrigeration and air conditioning systems; PFCs and SF_6 are predominantly emitted from various industrial processes including aluminum smelting, semiconductor manufacturing, and magnesium casting. Direct emissions of CO_2, CH_4, and N_2O occur naturally in the atmosphere, but human activities have increased global GHG atmospheric concentrations. The largest source of GHG emissions from human activities in the U.S. is from burning fossil fuels for electricity, heat, and transportation. The EPA tracks total U.S. emissions by publishing the Inventory of U.S. GHG Emissions and Sinks and publishes an annual report that includes estimates of the total GHG emissions and removals associated with human activities across the U.S. The primary sources of GHG emissions in the U.S. are (EPA 2021c):

- Transportation (nearly 27% of 2020 GHG emissions) – Sources are from burning fossil fuel for cars, trucks, ships, trains, and planes.
- Electricity production (25% of 2020 GHG emissions) – Approximately 68% of U.S. electricity comes from burning fossil fuels; mostly coal and natural gas.
- Industry (24% of 2020 GHG emissions) – Sources are from burning fossil fuels for energy, as well as GHG emissions from certain chemical reactions to produce goods from raw materials.
- Commercial and Residential (13% of 2020 GHG emissions) – Sources from businesses and homes arise primarily from fossil fuels burned for heat, the use of certain products that contain GHGs, and the handling of waste.
- Agriculture (11% of 2020 GHG emissions) – Sources are from livestock such as cows, agricultural soils, and rice production.
- Land Use and Forestry (offset of 13% of 2020 GHG emissions) – Land areas can act as a sink (absorbing CO_2 from the atmosphere) or a source of GHG emissions. In the U.S., since 1990, managed forests and other lands have absorbed more CO_2 from the atmosphere than they emit.

Biological Resources

Managed by the USFWS, the PNWR is "a living heritage, conserving wildlife and habitats for people today and generations to come" (USFWS 2012b). In 1999, the American Bird Conservancy designated the PNWR as a state Important Bird Area (IBA), and three sections of the western side of the Refuge have been designated as wilderness study areas (USFWS 2009a). Numerous wildlife and plant species occur in the refugee desert, lake, spring, wetland, meadow, and riparian habitats.

The Proposed Action area is mostly comprised of former agricultural fields and levees/ponds, saltbush (*Atriplex* spp.) upland, cottonwood (*Populus fremontii*) woodland, creosote (*Larrea tridentata*) upland and bare/playa areas, and contains a non-linear irrigation channel. The former agricultural fields contain a mixture of plants from the adjacent vegetation areas but also contain a high concentration of noxious and invasive weed species (SWCA 2011). The saltbush upland consists of mainly fourwing saltbush (*Atriplex canescens*). Riparian areas within the Refuge consist of approximately 100 acres and contain a mixture of multi-aged stands of riparian tree species, such as Goodding's willow (*Salix gooddingii*), Fremont cottonwood (*Populus fremontii*), red willow (*Salix laevigata*) and coyote willow (*Salix exigua*) (USFWS 2009a). Non-native shrubs, such as tamarisk (*Tamarix* spp.) and Russian olive (*Elaeagnus angustifolia*), are

also present (Otis Bay 2012). Pockets of both mature and early seral cottonwood woodlands, containing cottonwood over-stories and a mixed shrub and grass understory, are present within the site. Pockets of both barren playa and creosote uplands are also present within the eastern extent of the Proposed Action area. The remaining vegetation types within the site consist of invasive herbs, Mormon tea (*Ephedra viridis*) and foxtail brome (*Bromus rubens*), alkaline meadow, and greasewood upland.

Numerous migratory bird, reptile, and amphibian species occur within the varied habitats at the Proposed Action area (SWCA 2011). The abundance and diversity of bird species peak during spring and fall migrations when waterfowl, shorebirds, songbirds, and raptors are all present in great numbers. Great blue herons (*Ardea herodias*) can be found near lakes, while black-necked stilts (*Himantopus mexicanus*) and American avocets (*Recurvirostra americana*) are often found feeding in shallow water (Audubon 2018). The Canada goose (*Branta canadensis*) and several common ducks use the Refuge, including pintail (*Anas acuta*), teal (*Anas crecca*), mallards (*Anas platyrhynchos*), and redhead (*Aythya americana*). Greater sandhill cranes (*Grus canadensis tabida*) can be seen in spring and fall as they migrate between nesting and wintering areas. Warblers (*Parulidae* spp.), orioles (*Icterus* spp.), flycatchers (*Empidonax* spp.), and finches (*Carpodacus* spp.) use the Refuge's cottonwood-willow habitat for nesting, while open fields draw shrikes (*Lanius* spp.), meadowlarks (*Sturnella* spp.), blackbirds/thrushes (*Turdus* spp.), and mourning doves (*Zenaida macroura*) (Audubon 2018). Red-tailed hawks (*Buteo jamaicensis*), northern harriers (*Circus hudsonius*), Cooper's hawks (*Accipiter cooperii*), American kestrels (*Falco sparverius*), bald eagles (*Haliaeetus leucocephalus*), and golden eagles (*Aquila chrysaetos*) are mostly present during winter months. The uplands provide a habitat for Gambel's quail (*Callipepla gambelii*), roadrunners (*Geococcyx californianus*), and numerous sparrow (*Passeridae* spp.) species. Coyotes (*Canis latrans*) and kit foxes (*Vulpes macrotis*) prey year-round on the many rodent species, which are prevalent throughout all habitats, while mountain lions (*Puma concolor*) prey on mule deer (*Odocoileus hemionus*), which are most abundant on the Refuge during winter months (Audubon 2018).

A refuge-wide inventory for reptile and amphibian species on the PNWR detected 18 species of reptiles and three species of amphibians (SWCA 2011). Reptiles were comprised of nine snake species [e.g., desert glossy snake (*Arizona elegans*), sidewinder (*Crotalus cerastes*), and ground snake (*Sonora semiannulata*)], eight lizard species, and one turtle [i.e., pond slider (*Trachemys scripta*)]; amphibians included two frog species and one toad species.

Various large mammal species have the potential to occur on the Refuge, including mule deer, coyote, gray fox (*Urocyon cinereoargenteus*), American badger (*Taxidea taxus*), bobcat (*Lynx rufus*), and mountain lion (Krausman and Bucci 2011).

Upper Pahranagat Lake contains habitat for numerous fish species. Historically, it contained native species such as the White River sucker (*Catostomus clarkii intermedius*), Pahranagat spinedace (*Lepidomeda altivelis*), Pahranagat round tail chub (*Gila robusta jordani*), and White River speckled dace (*Rhinichthys osculus* ssp.). Currently, carp (*Cyprinus carpio*), black bullhead (*Ameiurus melas*), white crappie (*Pomoxis annularis*), mosquitofish (*Gambusia affinis*), and largemouth bass (*Micropterus salmoides*) primarily

comprise the fish species occurrence (Otis Bay 2012), and which are non-native to the lake. According to the Refuge's site manager, increases in carp populations have been linked to decreases, and likely the extirpation or extinction, of many native aquatic species within the area (Vinson, pers. comm. 2016).

The wet/alkali meadows on the Refuge consist of approximately 621 acres and provide valuable habitat for macroinvertebrates, small mammals, and other wildlife (Otis Bay 2012). The Pahranagat Valley montane vole (*Microtus montanus* ssp.) is an endemic species that relies on these wet meadow ecosystems. The wet meadow areas are dominated by dense stands of forbs such as yerba mansa (*Anemopsis californica*), Indian hemp (*Apocynum cannabinum*), Baltic rush (*Juncus balticus*), cattails (*Typha* spp.), spikerush (*Eleocharis palustris*), and various sedges (*Cyperaceae* spp.) (Otis Bay 2012).

Within the Refuge, five important wet meadow habitats are:

- Below (southwest) Upper Pahranagat Lake consists of wet meadow and small areas of alkali meadow and emergent wetland;
- From PNWR Headquarters downstream to Dove Dike consists of wet and alkali meadows, pasture grasses, and emergent wetland;
- From Dove Dike downstream to WHIN Dike consists of wet and alkali meadow and emergent wetland and pasture grasses;
- From WHIN Dike downstream to Middle Marsh Dike consists of open water marsh and emergent wetland bordered by wet and alkali meadow;
- From Middle Marsh Dike downstream to the northern part of Lower Lake consists of mostly alkali meadow, wet meadow, and emergent wetland.

Infrastructure such as support facilities, Refuge headquarters, Highway 93, and various roads exist within a close proximity to the Proposed Action area. These roads and facilities have and continue to allow for high levels of human use on the site.

Federal- and State-Listed Species

The USFWS has the authority to list species of plants and animals as endangered or threatened for protection under the Endangered Species Act (ESA) of 1973. Species that are proposed for listing as endangered or threatened are also protected by the ESA. All federal agencies are required to consult with the USFWS if actions they propose may affect a listed species. Under Section 7 of the ESA, if the USFWS determines that an action may affect a threatened or endangered species, consultation with the USFWS is required to ensure that any action is not likely to jeopardize the continued existence of any federal-listed threatened or endangered species or result in the destruction or adverse modification of said species' critical habitat.

Special status species are species of plants and animals that, because of their scarcity or documented declining population numbers in the state or nation, have been placed on lists of endangered, threatened, proposed, candidate, or otherwise sensitive species. The USFWS and Nevada Department of Wildlife (NDOW) maintain such lists, which are summarized in Table 5 for the region of the Proposed Action area.

The Species of Conservation Priority (SOCP) in Nevada list identifies wildlife of concern to the NDOW because their occurrence in Nevada is, or might be, in jeopardy. Its focus is the degree to which habitats or populations have been impacted, and each species' probability of extirpation from Nevada. Known threats and documented population declines are now more important factors than a limited distribution. The list reflects the best information available and we used the Nevada online Crucial Habitat Assessment tool to determine whether any special status species or special management areas have been documented as occurring within three miles of the Proposed Action limits.

A list of 13 threatened, endangered, proposed, and candidate flora and fauna species (Table 5), as well as SPOC and state-protected species, was generated by the USFWS Information, Planning, and Conservation System (IPaC), NDOW database, and previous assessments and reports to generate and review an official species and critical habitat list occurring within one or more delineated USGS 7.5-minute quadrangles intersecting the Proposed Action area.The USFWS IPaC list is presented in Appendix 2. The Refuge provides habitat for several federal- and state-listed wildlife species. No federal-listed plant species are known to occur on the Refuge; however, the Nye milkvetch (*Astragalus nyensis*) is a sensitive species with the potential to occur in the vicinity of the Proposed Action area (USFWS 2009a).

Table 5: USFWS and NDOW Priority Species.

Common name	Scientific name	Federal Status	NDOW Status	Distribution/Habitat Association
Great Plains Toad	*Anaxyrus cognatus*	Not listed	SOCP	Occurs throughout the Great Plains and along the southern states west to the east edge of California. In Nevada, this species occurs in the Pahranagat Valley and along the Colorado River. Breeds after summer rains in quiet water from spring to fall.
Mojave Desert tortoise	*Gopherus agassizii*	FT	ST	Typically found in desert shrubland in the Mojave Desert about 1,000 to 4,000 feet in elevation. Spends much of its life burrowed underground to escape the summer heat or hibernate during winter. Will use multiple burrows during the summer, while winter burrows are often communal and experience annual site fidelity.
Northern leopard frog	*Lithobates pipiens*	Not listed	SOCP	Occupies multiple aquatic habitats from heavily vegetated freshwater to brackish marshes and moist fields. Often can be found from deserts to mountain meadow habitats at 10,000 feet elevation.
Nye milkvetch	*Astragalus nyensis*	Not listed	SS	Often grows in desert flats with high mud content at elevations ranging from 1,100 to 5,600 feet in elevation.
Pahranagat roundtail chub	*Gila robusta jordani*	FE	SE	Typically inhabits cool to warm water rivers and streams across a wide range of elevations throughout the Colorado River Basin. Often associated with areas of natural cover within streams, such as boulders, overhanging cliffs, undercut banks, or vegetation.

Common name	Scientific name	Federal Status	NDOW Status	Distribution/Habitat Association
White River springfish	*Crenichthys baileyi*	FE	SE	Prefers calm pools of moderate depth with slow-flowing inflow and outflow. Adults typically inhabit deeper (up to 5.6 feet) pools than juveniles (approximately 2.1 feet).
White River spinedace	*Lepidomeda albivallis*	FE	SE	White River spinedace occupies springs and spring outflow streams with clear, cool water and swift to moderate flows. They prefer substrates of primarily sand and gravel, with mud interspersed, and often dense algae cover.
Hiko White River springfish	*Crenichthys baileyi grandis*	FE	SE	Typically inhabits calm streams and pools of moderate depth, often with sand and gravel substrate and moderate algae cover.
Pahranagat speckled dace	*Rhinichthys osculus velifer*	Not listed	SOCP	This dace typically inhabits warm, permanent rivers and streams, outflows of desert springs, riffles runs, and pools of cool-flowing headwaters. Usually found in shallow water, especially along edges of larger rivers, as well as quiet water where overhanging cover is present.
Pahranagat Valley montane vole	*Microtus montanus fucosus*	Not listed	SOCP	Typically inhabit high-elevation alpine meadows, but are also found in lower-elevation wet meadows and croplands surrounded by deserts, and often burrow in shallow depths within dense pastures of grass along streams and lakes.
Ridgway's rail	*Rallus obsoletus*	FE	SE	Typically occupies saltwater and freshwater marshes, as well as mangrove swamps, in California, Arizona, Nevada, and coastal Mexico.
Southwestern willow flycatcher	*Empidonax traillii extimus*	FE	SE	The SWFL breeds in a habitat dominated by high to mid-story canopy cover with dense small-diameter twigs and foliage. The Refuge's nesting population of SWFL is one of the largest nesting populations in the Colorado River Basin.
Yellow-billed cuckoo	*Coccyzus americanus*	FT	ST	Inhabits forested stream-sides, cottonwoods, and willows with dense, low vegetation. More specifically, the cuckoo may occupy tropical habitat in Central America during the winter, and riparian wetland areas during the summer.
Banded Gila monster	*Heloderma suspectum*	Not listed	Protected	Typically found below 5,000 feet in elevation, this reptile inhabits rocky upland desert scrub, interspersed with desert washes, springs, and riparian areas. It spends much of its time (>95%) underground hibernating.

FE = Federal Endangered,
FT = Federal Threatened
FC = Federal Candidate
PFT = Proposed for Federal Threatened status
SOC = Species of Concern
SS = Special Status
SM = State Monitor
SC = State Candidate
ST = State Threatened

SE = State Endangered
SOCP = Species of Conservation Priority

The following species have been discussed in more detailed analysis due to their potential to occur in the Proposed Action area.

Great Plains toad (*Anaxyrus cognatus*)

Several species of sensitive herpetofauna were documented during surveys during an inventory conducted on the Refuge in 2010. The Great Plains toad (*Anaxyrus cognatus*) is listed as a SOCP in the Nevada Wildlife Action Plan (Wildlife Action Plan Team [WAP] 2006), and were common throughout wetland areas around Middle Marsh and Upper Lake.

Mojave Desert tortoise (*Gopherus agassizii*)

Desert tortoise populations range from southern Nevada and southwestern Utah to northern Sinaloa, Mexico and east from California to southeastern Arizona. Populations of desert tortoise that inhabit areas north and west of the Colorado River are referred to as the Mojave Desert tortoise (MDT). The MDT occur in four U.S. states including Arizona, Utah, Nevada, and California (USFWS 1990; 2011). A recovery plan for the MDT was published in 1994 and designated areas of critical habitat were established within each of the four states supporting populations of the species (USFWS 1994).

The MDT inhabits desert valley floors and bajadas with rocky slopes from below sea level to 7,300 feet in elevation (Germano et al. 1994). MDT habitat within the Mojave Desert generally receives 2–8 inches of annual rainfall and is dominated by creosote bush, low-growing shrubs, and a high diversity of perennial and annual forbs. This terrain is generally dominated by sandy-gravel soils and/or exposed boulders that can be used for burrowing. Density of MDT's in the Mojave Desert is positively correlated to the number of available shelter sites within an area. The MDT utilizes rocks and boulders, areas beneath vegetation, rocky crevices, and the sidewalls of washes for burrowing (Barrett 1990; Averill-Murray et al. 2002). MDT's are generally herbivorous and consume a wide variety of fresh, residual, and dried perennial and annual plants.

Desert tortoises breed from spring to early fall and are generally inactive and in burrows or crevices from mid-October to February or March. Threats to the species include illegal take and collection, encroachment of non-native invasive plant species, habitat fragmentation from urban development, agricultural activities, infrastructure development, as well as off-road vehicle use, and disease (USFWS 1990; 2011).

The Refuge uplands are dominated by Mojave Desert-scrub plant species and fall within the geographic and elevational range necessary to support MDT populations. Mojave Desert tortoise densities within the Proposed Action area are estimated to be 11.8 adult and sub-adult individuals per square mile (BLM 2012). Desert tortoise populations likely inhabit the uplands near the Proposed Action area.

While no official occurrence records of desert tortoises on the Refuge exist, there is anecdotal information of sightings by staff and tortoises being hit on Highway 93 within the Refuge (Lowden 2010). Desert tortoise habitat on the Refuge was modeled by Nussear et al. (2009) taking into account several environmental factors. The prediction model found that a majority of the desert upland habitat on the Refuge ranks as high quality. Two habitat types, creosote scrub and rocky slopes with white bursage (*Ambosia dumosa*) and cacti (*Opuntia* spp.), were identified as high-quality habitats; marginal-quality habitats were identified as saltbush scrub and greasewood upland. Given that these habitats occur throughout the length of the Refuge, primarily in the areas immediately surrounding the central riparian/wetland/wet meadow zones, there is potential for the desert tortoise to occur throughout the Refuge. No desert tortoises have been documented on the Proposed Action site, and any potential habitat for this species in the Proposed Action study area is very limited or does not exist, as the upland habitat is insufficient in size and non-contiguous with adjacent upland areas to support populations of this species. Additionally, no critical habitat for the MDT has been designated on the Refuge.

Northern leopard frog (*Lithobates pipiens*)

Northern leopard frogs were documented at Big Springs, Hoyt Springs, "L" Springs, Lone Tree Springs, and South Maynard Springs (SWCA 2011) (Figure 10). Due to previous sightings and the existence of wetland and marsh habitat, this species is likely to occur on and/or adjacent to the Proposed Action area.

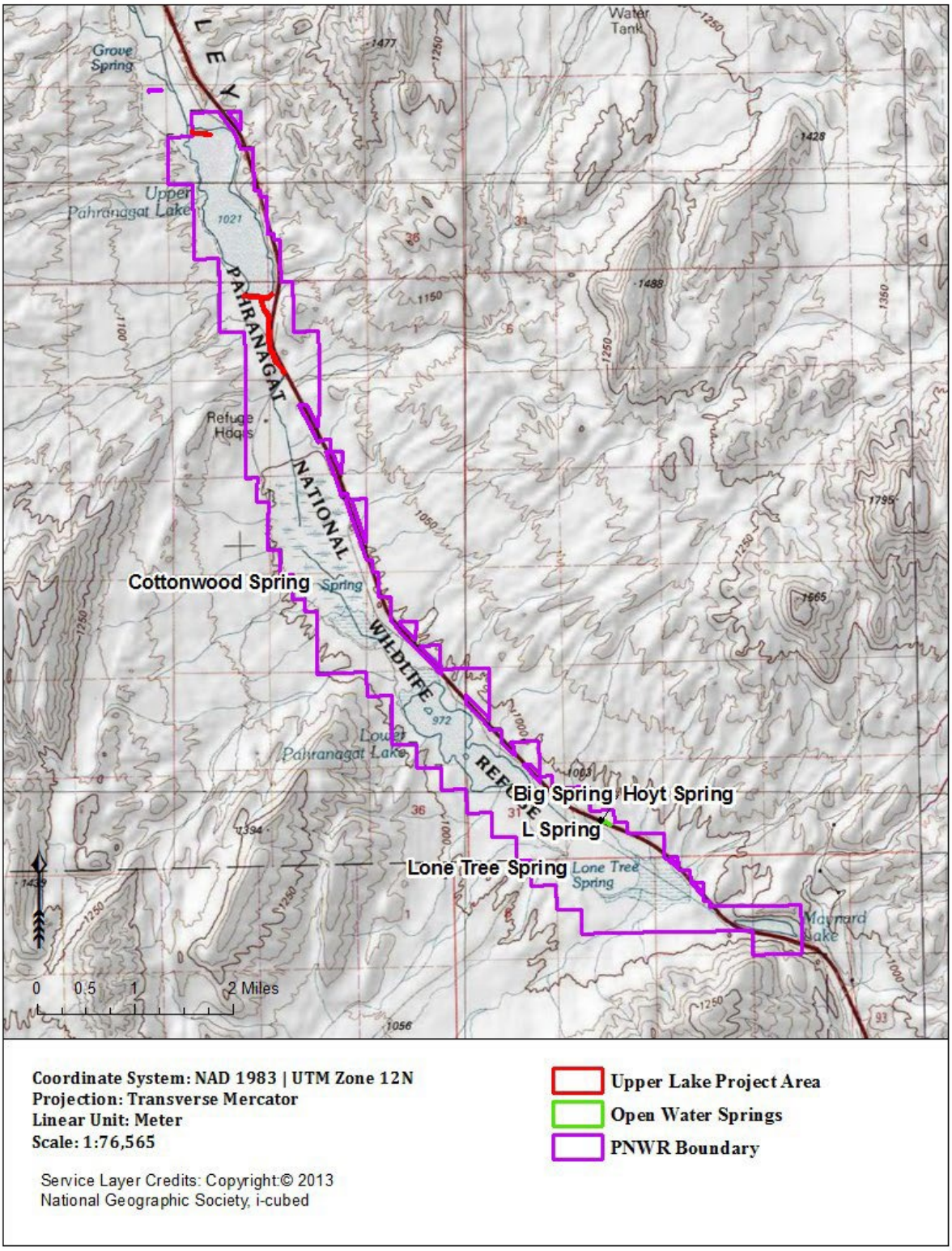

Figure 7: Location of open water springs on the PNWR.

Nye milkvetch (*Astragalus nyensis*)

This plant species' habitat typically includes desert flats with high mud content, and it has been determined to have the potential to occur on the Refuge (USFWS 2009a). Since the area adjacent to the Proposed Action site contains desert flats similar to this species' preferred habitat, there is potential for it to occur. However, no recent documentation exists regarding its occurrence on or adjacent to the Proposed Action area.

Pahranagat Roundtail chub (*Gila robusta jordani*)

Populations of this species may often experience isolation during specific time periods due to intermittent desert streamflow. Cottonwood Springs is the largest spring at the Refuge, and is a refugium for the endangered Pahranagat Roundtail chub. On April 5, 2016, 34 Pahranagat Roundtail chub from Key Pittman Wildlife Management Area (WMA) were translocated to Cottonwood Spring by the NDOW (USFWS 2016). Therefore, there is potential for this species to occur on or adjacent to the Proposed Action area.

White River springfish (*Crenichthys baileyi baileyi*)

This fish species has been historically endemic to the White River system in eastern Nevada, including the Pahranagat Valley (USFWS 1998; 2007a; 2014a). Ash Springs contains the only known population of the White River Springfish. More specifically, populations inhabit the Ash Springs source pool and outflow system with rare occurrences in the outflow stream known as the Pahranagat River or Pahranagat Ditch (USFWS 1998; 2007a; 2014a). Previous surveys have estimated several hundred individuals in the Ash Springs source pool (USFWS 2007a). Therefore, there is high potential for this species to occur near to the Proposed Action area.

White River spinedace (*Lepidomeda albivallis*)

This species has been extirpated from all historic habitats except the Flag Springs complex on the Wayne E. Kirch WMA, and continued efforts to reintroduce a population on private land in northern White River Valley have taken place with inconclusive results (USFWS 2014b). No recent data of occurrence on the Refuge exists for this species, and since the remaining population exists on a WMA that is not adjacent to, nor downstream or upstream, from the Refuge there is very little potential for this species to occur in the Proposed Action area.

Hiko White River Springfish (*Crenichthys baileyi grandis*)

The Hiko White River Springfish has comparable habitat needs as the White River Springfish and occurs in Hiko, Crystal, and Blue Link Springs (USFWS 2007a; 2014c). The Blue Link Springs population refugia was established by the NDOW in 1984 and descend from individuals taken from the Hiko Springs population (USFWS 2014c). Outside of the aforementioned springs, there is little potential for this species to occur on or adjacent to the Proposed Action area.

Pahranagat speckled dace (*Rhinichthys osculus velifer*)

Several dace species occur across Nevada, with the Pahranagat speckled dace being fairly well distributed across the state. While habitat exists on the Refuge for this species, little information exists on current

occurrences of this species. Therefore, there is moderate potential for this species to occur on the Proposed Action area.

Pahranagat Valley montane vole (*Microtus montanus fucosus*)

The Pahranagat Valley montane vole (PVMV) typically occupies marshy mesic habitats, near springs, meadows, and irrigated fields that are highly restricted in distribution throughout the Great Basin region. It depends on these vulnerable habitats, therefore making PVMV abundance susceptible to grazing-induced habitat degradation, predation in areas of low cover, weed management practices (e.g., burning and mowing), and high fragmentation. Additionally, altered hydrological function, non-native, invasive, noxious weed encroachment, and refuge vegetation management have all likely advanced fragmentation of PVMV habitats. Its habitat has been identified throughout the Refuge, including within the Proposed Action site; however, most of the modeled habitat consisted of a low probability of occurrence (BIOWEST 2011). Probability of occurrence of the PVMV was correlated with the level of vegetative "stubble cover", with the highest probability of occurrence near the Refuge headquarters (BIOWEST 2011). Outside of the Refuge headquarters, there is moderate potential for this species to occur on or near the Proposed Action area.

Ridgway's rail (*Rallus obsoletus*)

Though Ridgway's rails have historically been documented in refuge marshes, none were documented during recent marshbird surveys (USFWS 2017b). At Middle Marsh within the Refuge, a prescribed burn was implemented in the fall of 2016 to possibly enhance rail habitat. And though new vegetation was rapidly establishing in the spring of 2017, it was not tall or dense enough to serve as habitat for rails. Since this habitat management strategy did not successfully create available rail habitat, it was presumed rails likely occupied the northern portion of the Refuge (where they were not detected) or Key Pittman WMA (where they were detected during marshbird surveys for the first time) (USFWS 2017b). Despite recent non-detections of individuals, there is potential for this species to occur in the Proposed Action area.

Southwestern willow flycatcher (*Empidonax traillii extimus*)

The SWFL is a mid-sized migratory bird that was federally-listed as endangered in 1995 (USFWS 1995), due to losses of riparian habitat throughout the southwestern U.S. (USFWS 1995; 1997; 2002; 2005). Breeding habitat for the species is dominated by high to mid-story canopy cover with dense small-diameter twigs and foliage (Allison et al. 2003). Breeding habitats are used from May through August, with the majority of winter migrations taking place mid-August (Paxton et al. 2007).

The SWFL breeds in relatively dense riparian tree and shrub communities associated with rivers, swamps, and other wetlands, including lakes (e.g., reservoirs) (USFWS 2002). Common tree and shrub species comprising nesting habitat include willows (*Salix* spp.), seepwillow (a.k.a. mulefat; *Baccharis* spp.), boxelder (*Acer negundo*), stinging nettle (*Urtica* spp.), blackberry (*Rubus* spp.), cottonwood (*Populus* spp.), arrowweed (*Tessaria sericea*), tamarisk (a.k.a. saltcedar; *Tamarix ramosissima*), and Russian olive (*Eleagnus angustifolia*). Regardless of the plant species composition or height, occupied sites usually consist of dense vegetation in the patch interior, or an aggregate of dense patches interspersed with

openings. In most cases this dense vegetation occurs within the first 3–4 meters (10–13 feet) aboveground (USFWS 2002). These dense patches are often interspersed with small openings, open water, or shorter or sparser vegetation, creating a mosaic that is not uniformly dense. In almost all cases, slow-moving or still surface water and/or saturated soil is present at or near breeding sites during wet or non-drought years (USFWS 2002).

This species requires a dense riparian habitat with microclimatic conditions dictated by the local surroundings. The Refuge's nesting population of SWFL is one of the largest nesting populations in the Colorado River Basin (USFWS 2009a). Thus, it is important that the riparian habitat is protected and restored for the flycatcher and other SOCP's. This species is known to utilize the Refuge for breeding from May through the end of August, with most adults and young usually departing by mid-August (McLeod and Koronkiewicz 2010). Annual surveys for SWFL have identified populations of the species that use the Refuge for breeding (McLeod and Pellegrini 2015). Breeding populations have also been detected in adjacent areas such as the Key Pittman WMA (approximately 21 miles north of the Refuge), and on tracts of private property within the Pahranagat Valley. Surveys of breeding flycatchers conducted annually from 1997-2008, and presence/absence surveys conducted in 2009, have consistently found populations of breeding flycatchers in an area known as North Marsh, more specifically at a stand of Goodding's willow at the inflow of Upper Pahranagat Lake (McLeod and Koronkiewicz 2010). Additionally, breeding flycatchers have been detected inconsistently at Pahranagat South, within a relatively small stringer of Goodding's willow, coyote willow, and cottonwood lining a human-made channel that carries outflow from Upper Pahranagat Lake. Critical habitat is currently proposed for the SWFL in the North Marsh area and around the perimeter of the Upper Pahranagat Lake on the Refuge. The areas documented with breeding pairs and proposed for designated critical habitat are outside of the Proposed Action area. However, depending on when construction takes place, there is potential for this species to occur on or adjacent to the Proposed Action area.

Yellow-billed cuckoo (*Coccyzus americanus*)

The Western Distinct Population Segment (DPS) of yellow-billed cuckoo was designated as threatened under the ESA on October 3, 2014 (USFWS 2014d; 79:59991–60038). Threats to yellow-billed cuckoo include habitat loss from dams and alteration of hydrology; habitat loss and degradation from agricultural activities; habitat loss and degradation due to conversion to non-native vegetation; wildfire; environmental impacts of cross-border foot traffic in the Southwest U.S.; climate change; predation; small and widely separated habitat patches; and pesticides (USFWS 2014e; 79:48547-48652).

These birds utilize large, multi-story cottonwood woodland habitats for breeding habitat. Pahranagat North is the only riparian area on the Refuge where yellow-billed cuckoos have been detected (Lowden 2010) and is described by Johnson et al. (2007) as the only existing site on the Refuge with appropriate yellow-billed cuckoo habitat. Therefore, the occurrence of this species in the Proposed Action area is unlikely, but possible.

Banded Gila monster (*Heloderma suspectum*)

Banded Gila monsters are large venomous lizards native to arid regions within the U.S.; populations within Nevada can be found throughout Clark County, and parts of Lincoln and Nye Counties (Coyote Springs 2007). They are considered a "Protected" reptile by the state of Nevada (NDOW 2012). Desert grassland and Mohave Desert-scrub vegetation communities containing sub-surface burrows, rock crevices, and boulder fields comprise the habitat of this species. Banded Gila monster populations are known to occur within the Refuge region and may be found occasionally near the Proposed Action area.

Bald eagle (*Haliaeetus leucocephalus*) and golden eagle (*Aquila chrysaetos*)

Bald eagle ESA protections ended in 2007 and the species was removed from the threatened and endangered list that same year (FR 72:37345). Protections remain for both bald and golden eagle species under the Bald and Golden Eagle Protection Act of 1940 (16 U.S.C. 668-668c). These protections restrict the taking, possession, and commercial sale of the species. Bald eagles from the northern U.S. and Canada, and golden eagles, are known to winter in Nevada. Bald eagles are known to winter in the Pahranagat Valley. No evidence of bald eagles, such as nests, roosts, or breeding pairs, have been documented within the Refuge region; however, eagle activity would likely be greatest during the winter. Golden eagles are known to breed and live permanently within the Refuge region (Audubon 2018).

Birds of Conservation Concern

All agencies are required to consider in planning documents, including NEPA documents, all Birds of Conservation Concern (BCC) by EO 13186. The USFWS identifies BCCs by rankings that incorporate: population size, breeding distribution, non-breeding distribution, threats in the breeding and non-breeding seasons, and population trends (USFWS 2008). The Refuge is in the Great Basin Bird Conservation Region (BCR) (USFWS 2008). Birds of Conservation Concern occurring within the Proposed Action area are typically found in the BCR.

Areas of disproportionate importance have been mapped through Audubon's IBA program that: contain a significant number of one or more globally threatened species; hold a suite of restricted range species; or have exceptionally large numbers of migratory or congregating species. The Refuge is in the Pahranagat Valley Complex IBA. This IBA also encompasses the Key-Pittman WMA to the north.

Migratory Birds

The Migratory Bird Treaty Act (MBTA) of 1918 makes it unlawful to pursue, hunt, kill, capture, possess, buy, sell, purchase, or barter any migratory bird, including the feathers or other parts, nests, eggs, or migratory bird products. In addition, this act serves to protect environmental conditions for migratory birds from pollution or other ecosystem degradations.

Nearly all bird species occurring on the Refuge are protected under the MBTA (USFWS 2013), except non-native species such as the house sparrow (*Passer domesticus*) and European starling (*Sturnus vulgaris*).

Cultural Resources

Section 106 of the National Historic Preservation Act (NHPA) of 1966, as amended (16 U.S.C. 470f) requires that all federal agencies assess the effects of any agency-sponsored undertaking on historic properties. Cultural resources that are listed in or eligible for listing in the National Register of Historic Places (NRHP; 36 CFR 60.4) are called historic properties.

Nuwuvi inhabited the region and named the valley's lakes and marshes "Pahranagat", which have varied interpretations of the word's meaning: "feet sticking in water" or "a valley of shining waters" (USFWS 2012b; Mountain Institute 2011).

Tribal consultation has commenced with all interested tribal governments. These tribal governments, represented by the Nuwuvi Working Group, and in collaboration with the USFWS, provided input on the Proposed Actions in late 2018.

The Request for Cultural Resource Compliance (RCRC) form was used to inform the Desert Refuge Complex Archaeologist of the Proposed Action, meeting the regulations and directions governing the protection of cultural resources as outlined in Departmental Manual Part 519, NHPA, Code of Federal Regulations (36 CFR 800), the Archaeological Resources Protection Act (ARPA), as amended, and the Archeological and Historic Preservation Act (AHPA).

Thirty-one previous surveys have been conducted in the vicinity of the Refuge. The surveys were completed for various reasons, including road improvements, dike repair, inventories, and construction, and most were small compliance projects. The surveys took place between 1975 and 2012. Seventy-two previously recorded sites are located near the Proposed Action area. Fifty-two sites are prehistoric, 11 are historic, three are mixed components, and six are unknown. The prehistoric sites are generally small, low-to-moderate-density scatters of flaked and ground stone artifacts. The historical period sites are roads, structures, and artifact scatters. Many of the existing sites are part of the Black Canyon National Register Site, situated immediately north of the Refuge headquarters survey area. Portions of Black Canyon were recorded and listed as an archaeological site on the NRHP in 1975. The Nuwuvi view Black Canyon as an important Traditional Cultural Property (TCP), and it contains numerous unique and sacred petroglyph sites (Gilreath et al. 2011).

Human use of the southwestern Great Basin began as elsewhere in North America with the so-called big-game hunters of the Clovis, Folsom, and related Paleoindian traditions around 11,500 years ago. Evidence of early occupation consists mostly of isolated surface finds lacking context. Grayson (2011:89) observed that virtually all fluted points have been found in shallow-water settings and adjacent environments, writing "fluted point occupations may have been confined to valley bottoms because these marsh-rich settings provided environments that were not only highly productive, but were also separated from one another by mountains. . . covered by relatively unproductive subalpine woodlands."

Stemmed points are found in more diverse environmental settings than fluted points. Certainly, their discovery at sites along the margins of pluvial lakes indicates exploitation of marshy environments with various plant, mammal, bird, and fish species. According to Gilreath et al. (2011:9), no Clovis or stemmed points have been recovered along the White River drainage or on lands around Pahranagat Lake. No sites that could be classified as Early Archaic have been found.

The end of the Pleistocene was marked by a shift to a warmer and drier environment than that prevailing in previous times. Jennings (1957) coined the term Desert Culture to refer to the generalized economic strategy based on ethnographically described peoples of the Great Basin. Sites of the Archaic Period have been found at or near active and fossil springs in numerous locations, suggesting the importance of permanent water in a drying environment. Grayson (2011:246–248) observed that middle Holocene sites are open sites, not caves or rock shelters. He believed that when springs or lakes near caves dried up, the occupants fled for places where they could find water, explaining unoccupied levels dated to the Middle Archaic period at cave sites. Rusco and Kuffner (1981a; 1981b) identified several lithic scatters that dated to the Middle Archaic period, and Seymour (1997:210) reported a complex of sites situated on the ridges on the western side of Pahranagat Wash that included rock shelters, roasting pits, and geoglyphs, along with Middle and Late Archaic period projectile points.

There is considerably more evidence for the Late Archaic period occupation of the Great Basin in comparison to the Middle Archaic period (Grayson 2011:256). Excavated sites indicate increased residential stability and larger populations; changes in subsistence may have been correlated with a shift to more mesic conditions than had prevailed during the Middle Archaic period (Kelly 1997:10). All environmental zones were occupied, and the first significant use of upland settings took place. Grayson (2011:256) observed that not only did the intensive use of a broad variety of environments parallel the lifeways of Great Basin native peoples at the time of European contact; even the house forms were similar. In the Surprise Valley, there were two architectural forms: a dome-shaped “wickiup” woven of willow or aspen poles and simple, unroofed brush windscreens. These dwellings were considerably smaller, and less substantial than earlier structures at the sites (O’Connell 1971; 1975; Grayson 2011:257;). In southern Nevada, Late Archaic Elko points have been identified at sites in the Pahranagat Valley, although the parameters of occupation intensity and duration are unknown.

Traditionally, archaeologists have recognized two (post-Archaic) ceramic-period cultures in the Great Basin: Virgin Anasazi and the Fremont. The Virgin Anasazi (Colton 1952; Shutler 1961; Aikens 1966) represent a branch of the Western Anasazi who occupied the region along the Muddy and Virgin Rivers, the Moapa Valley, and adjacent drainages north of Las Vegas, eastward into the Arizona Strip, and into Utah as far as Glen Canyon. Pahranagat Valley lies outside the core Virgin Anasazi region, the nearest settlements being to the southeast near Mesquite (Larson 1996). Gilreath et al. (2011:11) suggested that the absence of Virgin Anasazi settlements in the Pahranagat region stemmed from its harsh climate, which would have put crops at risk in all of but the best of years. Nevertheless, low frequencies of grayware pottery in the Proposed Action study areas suggest travel through or short-term habitation in the area by Virgin Anasazi groups.

A second ceramic period culture of the Great Basin is the Fremont. As with the Virgin Anasazi, the Pahranagat Valley lies outside the major distribution of Fremont sites, which are centered in the eastern Great Basin and the Colorado Plateau north and west of the Colorado River. Like the Virgin Anasazi and other Anasazi peoples, the Fremont produced gray ware pottery; it is well made, thin-walled, and contains igneous temper. Irrigation ditches found at Fremont sites were indisputably associated with horticulture. The discovery of marsh-edge sites with a rich record of riparian plants such as *Typha* spp. (cattail), waterfowl, and fish, and sparse in maize (Madsen and Lindsay 1977; Madsen 1979; 1982), has led archaeologists to argue for so-called adaptive diversity among the Fremont (Simms 1986). Whereas some groups relied heavily on maize, others were substantially less invested in farming, and still others lived almost entirely on wild foods, especially in wetland locales rich in wild resources. Marshland exploitation, whether as a basis for permanent habitation or for seasonal purposes, would certainly have been feasible in the Pahranagat Valley.

By around 800 years ago, evidence for Fremont and Virgin Anasazi all but disappeared from the archaeological record. Instead, assemblages are characterized by small Desert Side-notched and Cottonwood projectile points, brown ware pottery, small steatite and shell beads, and large, unshaped milling equipment. These assemblages have been associated with Numic-speaking groups; ancestors of the modern-day Nuwuvi and Western Shoshone.

The indigenous people of the southern Great Basin were known to Euro-Americans as the Southern Paiute and Chemehuevi, but they call themselves the Nuwuvi. They speak a Numic language belonging to the Shoshoenean family of the Uto-Aztecan language stock, and historically were foragers who farmed in varying degrees (Miller 1986:98–112; Madsen and Rhode 1994). Although most bands were highly mobile, they nevertheless recognized home territories (including those of other bands), and returned to farm sites and other important resource areas year after year. In describing the Las Vegas band, E. Warren and Eskenazi (2007:95) followed C. Warren (1981) in labeling the Nuwuvi subsistence-and-settlement round "the double-loop subsistence strategy." It took them from the valley with its abundant water and arable soil to the mountains where such high-elevation resources as piñon and agave grew. Most Nuwuvi bands likely followed a similar lowland-upland seasonal round, using well-watered lower-elevation locales in the spring and summer and then moving into higher elevations in the fall.

The people farmed wherever arable land and water were available and stayed at their farm sites throughout the planting and harvesting season. Nineteenth-century accounts indicate farming along the Muddy River, in the Las Vegas Valley, and elsewhere in Nevada. According to Carroll et al. (2006:66), Pahranagat Valley was one of the "principal areas within the Southern Paiute lands where indigenous agriculture was being practiced before Southern Paiutes lost access to key riverine lands."

Nuwuvi cultural landscapes are alive with meaning (Zedeño et al. 1999; Stoffle et al. 2002; Stoffle et al. 2004), and Pahranagat Valley is no exception. Gilreath et al. (2011) documented such places in Black Canyon, immediately north of the Refuge headquarters survey area, where ancient petroglyphs and

pictographs, volcanic outcrops, and a narrow canyon that restricts stream flow, water, and other resources converge. Another important place is the Red-tailed Hawk Origin site, located at Maynard Lake in Pahranagat Valley southeast of Lower Pahranagat Lake.

Euro-American miners moved into the Pahranagat Valley and Moapa area in the mid-1860s. At about the same time, Latter-day Saints (LDS) pioneers and other settlers moved into the area. According to McCracken (n.d.a:5), some immigrants took a route through Pahranagat Valley toward Tonopah and Bishop, ending up south of Sacramento. Pahranagat Valley drew outlaws as well as legitimate ranchers. In the 1860s, the lush pasture and abundant water lured horse thieves who stole stock in Utah and Arizona. The isolated valley secured them from the reach of the law. It was reported that there were more than 350 different brands of livestock present in the valley at one time. The historical cabin near the current Refuge headquarters (the Walden Cabin) may have been built and used by a horse thief (Gilreath et al. 2011:24).

In June 1931, an extension of U.S. Highway 93 created the old roadbed that runs through the Refuge. The third and final leg of the highway connecting Glendale south to Boulder City was completed in 1936. A portion of the highway in the Refuge was rerouted in 1966. The original 1930s highway along the east side of Pahranagat Wash, running east between the Meadow Valley Mountains and the Arrow Canyon Range and then heading to Glendale, is now identified as Nevada State Route 168. The segment of today's U.S. Highway 93 that continues south into Coyote Springs Valley and Clark County to connect with Interstate 15 just northeast of Apex is the 1966 alignment (Gilreath et al. 2011:24).

Public Use

The Refuge is a rare and extremely important ecosystem of wetlands in the otherwise arid landscape of the region, providing crucial habitat for migratory birds and waterfowl and serving as a significant local tourist attraction. The Refuge is open to the public for wildlife-dependent uses, averaging over 30,000 visits each year. Visitors take advantage of excellent wildlife viewing and photography of vast numbers of waterfowl, resident and migrant songbirds, and other resident species. Waterfowl hunters also use the Refuge. Local educators are also increasingly taking advantage of the educational opportunities provided by the Refuge setting and its staff. In 2007, the USFWS declared that "connecting people with nature" is among the agency's highest national priorities (USFWS 2007b). A connection with nature, whether it is hiking, fishing, camping, hunting, or simply playing outside, helps children develop positive attitudes and behaviors towards the environment. Positive interactions with the environment can lead to a life-long interest in enjoying and preserving nature. People's interest in nature is crucial to the USFWS's mission of conserving, protecting, and enhancing fish, wildlife, plants, and their habitats.

Recreation trends in the U.S. are found in "Outdoor Recreation in American Life: A National Assessment of Demand and Supply Trends" (Cordell et al. 1999). Projections were made nationally for four U.S. regions, with Nevada included in the Rocky Mountain region. Trends for the Rocky Mountain region indicate wildlife viewing and nature study are expected to experience an increase of 89% by the year 2040, and the number of days per year per person taking part in these activities is expected to increase by 84%

in the same time period. Additionally, fishing participation in the Rocky Mountain region is expected to increase by 48% and hunting participation is expected to increase by 16% by 2040.

The 2011 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation – Nevada (Survey) (USDOI et al. 2011) is a comprehensive publication that provides information about the numbers of U.S. anglers, hunters, and wildlife-watchers for the state of Nevada (state-level data was not collected in the 2016 survey). The 2011 Survey found that 833,000 Nevada residents and nonresidents 16 years and older fished, hunted, or watched wildlife in Nevada. Of the total participants, 147,000 fished, 43,000 hunted, and 643,000 participated in wildlife-watching activities, spending a total of $1,024,965,000 on wildlife recreation in Nevada. When compared to the 2006 Survey (USDOI et al. 2006), the number of anglers did not differ from zero (at the 10% level of significance), hunting decreased by 32%, wildlife watching (away-from-home) decreased by 31%, and wildlife-watching (around-the-home) increased by 25% (USDOI et al. 2011).

The outdoor recreation around the Upper Lake includes a diversity of activities. The Upper Lake area provides biking/hiking trails with interpretive panels, campgrounds, day-use locations, fishing, wildlife viewing, wildlife photography locations, and areas for environmental education. These sites are designed to connect nature with public visitors. The average annual visitation is 60,000 visitors, and Upper Lake supports over 80% of the public use that the Refuge receives. With the diversity of outdoor recreational opportunities, the Refuge receives visitors of all ages, genders, and ethnicities who come to explore the natural world.

Socioeconomics

EO 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, was issued by the President on February 11, 1994. In the EO, the President instructed each federal agency to make "achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations. Adverse is defined by the Federal Interagency Working Group on Environmental Justice (EJ IWG) as "having a deleterious effect on human health or the environment that is significant, unacceptable, or above generally accepted norms."

Local Economy

Inhabited areas in Pahranagat Valley include Hiko, Ash Springs, Richardville, and Alamo; Alamo is the largest town with a population of over 1,000 residents and contains all of the schools for the valley. Caliente is the closest town to Pahranagat Valley and is over 50 miles (80 kilometers) to the east. Pahranagat Valley is primarily an agricultural and ranching community. The report "Banking on Nature 2006: The Economic Benefits to Local Communities of National Wildlife Refuge Visitation" (Caudill and Carver 2019) detailed the findings of economic impacts from 80 NWRs. The study considered money spent for food, lodging, transportation, and other expenses when it calculated the economic activity related to refuge recreational use. While the report did not include the PNWR as one of the sample refuges in the

study, the study was designed as a model for all wildlife refuges in the U.S. and is therefore relevant to the PNWR and associated local economies. From the USFWS website describing the study:

> "Recreational use on national wildlife refuges generated almost $1.7 billion in total economic activity during fiscal year 2006…According to the study, nearly 35 million people visited national wildlife refuges in 2006, supporting almost 27,000 private sector jobs and producing about $543 million in employment income. In addition, recreational spending on refuges generated nearly $185.3 million in tax revenue at the local, county, state, and federal levels. The economic benefit is almost four times the amount appropriated to the Refuge System in Fiscal Year 2006. About 87% of refuge visitors travel from outside the local area" (USFWS 2009b).

Using these statistics, each refuge visitor generates an average of $49 in economic activity and $5 in tax revenue annually; however, formal modeling predictions for the PNWR have not been conducted.

Environmental Justice

The total 2021 population of Lincoln County was 4,525, accounting for only 0.001% of the total state population of 3,143,991. The majority population in Lincoln County is of Caucasian or white descent. The racial mix of the county is as follows: 90.5% Caucasian or white (not of Hispanic origin), 7.8% Hispanic, 3.1% African American or black, 2.4% American Indian, 0.9% Asian, and 2.7% persons reporting two or more races (U.S. Census Bureau 2021). The unemployment rate in Lincoln County was 4.0% as of August 2022, according to the U.S. Federal Reserve. The percent of people living in poverty in 2021 in Lincoln County was 13.2% of the total county's population, compared to 14.0% for the state (U.S. Census Bureau 2021). Lincoln County's 2021 median household income was $56,537, compared to the 2021 state median household income of $62,043 (U.S. Census Bureau 2021).

IV. ENVIRONMENTAL CONSEQUENCES

This section describes the direct, indirect, and cumulative impacts of each alternative. Cumulative impacts on the environment result from incremental impacts of an action when added to other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes such other actions. Cumulative impacts can result from individually minor, but collectively substantial, actions taking place over some time.

Alternative A – No Action Alternative

The No Action Alternative would maintain the status quo. The proposed water delivery and dam improvements would not be developed.

Geology and Soils

No soil disturbance would occur from the Proposed Action under the No Action Alternative. Periodic disturbance for habitat management purposes, such as mowing and invasive weed control, would continue as part of normal Refuge operations. Additionally, erosion would continue, contributing to water degradation in Lower Pahranagat Lake through tons of high sediment deposits.

Water Resources

Surface Water

No impacts to surface water associated with construction would occur under this Alternative. However, surface water among wetlands downstream from Upper Pahranagat Lake may continue to experience limited availability throughout the year with reduced supplementation of water from upstream.

Flood Plains

No impacts to flood plains associated with construction would occur under the No Action Alternative. Existing flood plains would experience similar flood events as in the past.

Water Quality

Contamination from spills or leaks of fuels, lubricants, or coolant from construction equipment would not affect water quality, as no construction would occur under the No Action Alternative. Water quality would remain at baseline conditions. Sedimentation would continue to affect water quality in refuge water bodies. Impairments to existing bodies of water in the Proposed Action area are unlikely to occur under the No Action Alternative because impairment factors such as iron, phosphorus, temperature, mercury, and turbidity are unlikely to reach levels of impairment under current conditions.

Wetlands/Riparian Zones

No impacts to wetlands or riparian zones associated with construction would occur under the No Action Alternative. However, the total acreage of wetlands and riparian zones downstream of Upper Pahranagat Lake may continue to experience limited wetland/riparian availability due to less water entering their

areas. Thus, limiting available habitat for species that inhabit these areas, as well as leaving these areas more susceptible to damage from catastrophic weather events (e.g., floods).

Air Quality

No impacts to air quality associated with construction would occur under the No Action Alternative. Current NAAQS pollutants would remain at current levels of attainment.

Biological Resources

No soil or vegetation disturbance associated with construction would occur in the Proposed Action site under the No Action Alternative. Periodic disturbance, such as habitat mowing and invasive weed control would continue to occur as part of normal Refuge operations done independently of this project. A continued lack of sufficient water to supply wetlands downstream of Upper Pahranagat Lake would continue. Thus, associated negative impacts would continue to occur for biological resources. The current inefficient water system and decreased ability to flood wetlands would continue to occur. Ongoing refuge operations and public use would continue independently of this Alternative.

Federal- and State-listed Species

No impacts to federal- or state-listed threatened and endangered species, special status species, or SOCP's would occur under this Alternative. However, a continued lack of sufficient water to supply wetlands downstream of Upper Pahranagat Lake would continue. Thus, associated negative impacts such as habitat loss (i.e., reduced duration and aerial extent of wetlands) would occur and thereby continue to negatively affect various plant and animal species that depend on those habitats. Ongoing Refuge operations and public use would continue independently of this alternative.

Cultural Resources

No impacts to cultural resources would occur because no earth-moving activities would take place under the No Action Alternative.

Public Use

Refuge visitation would remain near current levels. The current constraints on public use would remain, as less available wetland habitat would result in fewer hunt and wildlife-viewing opportunities and potentially reduced quality of opportunities that remain for visitors to experience the Refuge.

Socioeconomics

The No Action Alternative would not provide economic benefits to the local community associated with spending for food, lodging, transportation, and other expenses originating from the construction of the water delivery system and dam improvements. Furthermore, reduced availability of wetlands would constrain current economic growth brought about by hunters, wildlife-viewers, and other outdoor recreationists.

Environmental Justice

No one group or Tribe represented in the community would be disproportionately impacted by the No Action Alternative.

Cumulative Impacts

Under the No Action Alternative, the USFWS would not rehabilitate the dam or make water delivery system improvements; thus, there would be no cumulative impacts on the environment.

Alternative B – Proposed Action

Geology and Soils

Construction activities under the Proposed Action would require grading and site preparation, which could result in short-term soil erosion at the Proposed Action site. Additionally, impacts to soil resources may result from exposure to wind or water erosion as well as from the chemical constituents resulting from the implementation of an action. Because the Proposed Action site is relatively flat, it is not anticipated that construction activities would result in substantial soil erosion. Appropriate BMPs to temporarily stabilize soils would be implemented during the construction period to limit soil erosion.

The grading and site preparation work is anticipated to last approximately 2-4 years; following construction, disturbed areas would be compacted as appropriate, or planted with native species to deter any long-term soil erosion at the site.

Water Resources

Surface Water

Impacts on hydrology can result from land clearing activities, disruption of the soil profile, loss of vegetation, introduction of pollutants, new impervious surfaces, and an increased rate or volume of runoff after major storm events. Without proper management controls, these actions can adversely impact the quality and/or quantity of water resources.

Criteria for evaluating impacts related to water resources associated with the alternatives are 1) water availability, 2) water quality, and 3) adherence to applicable regulations. Impacts are measured by the potential to reduce water availability to existing users, endanger public health or safety by creating or worsening health hazards or safety conditions, or violate laws or regulations adopted to protect or manage water resources.

An impact to water resources would be significant if it would: 1) reduce water availability to, or interfere with the supply of, existing users; 2) create or contribute the overdraft of groundwater basins or exceed safe annual yield of water supply sources; 3) adversely affect water quality or endanger public health by creating or worsening adverse health hazard conditions; 4) threaten or damage unique hydrologic

characteristics; or 5) violate established laws or regulations that have been adopted to protect or manage water resources of an area.

Implementation of the Proposed Action would have short-term, less-than-significant adverse impacts, and long-term beneficial impacts to surface water. Adverse impacts to surface water quality would occur from construction activities such as clearing, grading, trench excavation, backfilling, and the movement of construction equipment employed during execution of project elements. Additionally, benefits would include long-term surface water delivery and availability to deficient areas.

Flood Plains

The Proposed Action may cause long-term alterations to existing floodplains. Adverse impacts may be the potential short-term damage to existing floodplains, but long-term benefits may include a more robust floodplain that is able to handle catastrophic weather events. In a flood model that was completed and reported in a Safety Evaluation of Existing Dams report, a failure from the Upper Lake Dam would cause water to overtop and wash through U.S. Highway 93. U.S. Highway 93 is a major supply route ranging from the Canadian border to Arizona. The loss of this route due to flooding failure from a lake dam that's over 80 years old would be catastrophic. This project would bring the Upper Lake Dam into Nevada Department of Environmental Protection and DOI dam compliance. These improvements would reduce the likelihood of dam infrastructure failure, and protect state and federal public assets for the foreseeable future. Refurbishing the Upper Lake Dam will also provide improved flood protection to the Pahranagat Valley during large storm events, and provide the only flood protection mechanism in place for Highway 93.

Water Quality

Contamination from spills or leaks of fuels, lubricants, or coolant from construction equipment could adversely affect water quality; however, the effects of contamination will likely be negligible because of the low frequency and volumes of spills, and leaks and effects will be minimized by immediate implementation of spill prevention and BMPs. Water quality would quickly return to baseline conditions after construction activities are completed and site conditions are restored. Additionally, a reduction in sedimentation to various water bodies on the Refuge, such as Lower Pahranagat Lake, may take place under the Proposed Action.

Construction activities will be temporary and may impact water quality through increased sediment loads in streams until project-specific erosion control efforts are complete and successful. The proposed improvements will stop the movement of sediment in the Upper Supply Ditch caused by high water velocities. Staff will measure silt deposits in the Lower Pipeline delivery pool to determine the reduction of the sediment load from the Upper Supply Ditch. An overall reduction in siltation will improve water quality and decrease siltation in the wetland units.

The Proposed Action would most likely not cause water bodies on the Refuge to become impaired because it would not increase the levels of impairment factors such as iron, phosphorus, temperature, mercury, and turbidity.

Mitigation measures are not required to reduce adverse impacts from the Proposed Action to a designation of less-than-significant; however, the following mitigation measures related to surface water resource protection should be considered for any of the actions in the interest of enhanced environmental stewardship:

- Minimize construction-related impacts by developing and implementing BMPs (e.g., reducing dust generation on dirt roads, installing silt fences per a stormwater pollution prevention plan (SWPPP), and following spill prevention control and countermeasure plans).

Wetlands/Riparian Zones

The Upper Supply Ditch will clean blockages from years of aquatic plant growth and downed tree debris will improve water flow. Using the digital water flow monitoring stations, staff will be able to monitor exact water flows down the Upper Supply Ditch. With removal of water dams in the existing ditch caused by dense emergent vegetation, and down trees, water flow will increase. As a result of improved water delivery, wetland management effectiveness will increase due to the reduced timing it normally takes to delivery water from the Upper Lake to the individual wetland units.

Long-term beneficial impacts to surface water quality would result from project completion and maintenance due to the increased efficacy of water delivery to habitat units. Thus, wetlands and riparian zones would have supplemental water that would improve habitat in these zones and potentially increase acreage of wetlands. Additionally, the Proposed Action would result in a more reliable water delivery to habitat units and decrease water loss when compared to the current system of open and deteriorated cannels.

It is anticipated that a wetland delineation will be required prior to project construction to determine the extent and type of wetlands that may be impacted by the Proposed Action. In addition, a Preliminary jurisdictional determination (PJD) may be required to determine the extent of Potential Waters of the United States (PWUS) occurring within the Proposed Action area. After the delineation receives USACE concurrence, the amount of disturbed area to PWUS is calculated. If the amount of impact is within the guidelines for a Nationwide Permit (NWP) there will either be no further action required, or a submittal of a Pre-construction Notice (PCN). The need for a PCN would be determined by the type and acreage of impact and other factors, including the presence of an endangered species or a cultural site. Impacts that do not exceed the threshold of 0.01-acre of permanent loss for any single crossing may not require a notification to the USACE for authorization. If impacts exceed 0.5-acre at any single crossing, an Individual Permit would be required, which requires more documentation and has a longer schedule to complete. Impacts associated with trenching and backfilling typically require the authorization of a CWA Section 404 permit from the USACE and are usually authorized under an NWP 12 (*Utility Line Activities*).

Air Quality

The following factors were considered in evaluating air quality: (1) the short- and long-term air emissions generated from the Proposed Action; (2) the type of emissions generated; and (3) the potential for emissions to result in ambient air concentrations that exceed one of the NAAQS or SIP requirements.

Construction activities under the Proposed Action would temporarily increase dust and other emissions. The appropriate BMPs would be implemented during construction as developed in coordination with the Nevada Intrastate Air Quality Control Region, such as dust suppression methods to minimize fugitive dust. These may include activities such as covering trucks hauling soil, sand, and other loose materials, limiting traffic speeds on unpaved roads to 15 miles per hour, utilizing a water truck, and replanting vegetation in disturbed areas as quickly as possible. During the construction of the Proposed Action, proper and routine maintenance of all vehicles and other construction equipment would be implemented to ensure that emissions are within the design standards of all construction equipment. By using these BMPs, air emissions from constructing the Proposed Action would be temporary, and potential effects on air quality in Lincoln County would be minimal.

The Proposed Action would involve driving and heavy equipment operation, which would increase the production of GHGs. However, the production would be minor compared to other sources of GHGs and would not contribute significantly to climate change. Vehicular traffic contributes to the emissions of “criteria” pollutants through the burning of fossil fuels. However, these emissions do not contribute to the exceedances of NAAQS. The Proposed Action's potential net long-term annual emissions of CO_{2eq} per year would be insignificant. Climate change in the form of drought could lessen the effectiveness of the water delivery system via increased drought conditions.

Biological Resources

Evaluation of impacts is based upon 1) the importance (legal, commercial, recreational, ecological, or scientific) of the resource, 2) the rarity of a species or habitat regionally, 3) the sensitivity of the resource to proposed activities, and 4) the duration of the impact. Impacts on biological resources would be considered significant if priority species or habitats are adversely affected over relatively large areas and/or disturbances cause reductions in the population size or distribution of a priority species.

Short-term impacts on wildlife are expected via loss of habitat and disturbance due to construction activities. The estimated Proposed Action area footprint would potentially impact the habitat by wetland type as summarized in Table 9. Trenching and earthmoving would require the use of construction equipment whose presence and noise may temporarily displace some species at the site. Additionally, short-term impacts may include small-scale reduction in water quality due to increased sedimentation at some pond sites, which may affect the habitat quality of certain aquatic species, or other species inhabiting those specific ecosystems. Potential impacts to wildlife include the loss of some bird habitat; however, nesting birds or other nesting wildlife would not be affected since mitigation will likely restrict work to the fall or winter seasons (i.e., outside of the breeding season).Mitigation may include timing construction, at a broad sense, during a season that will have the least amount of effects on wildlife

species occupying the Proposed Project site. Mitigation may also include the use of noise-reduction tools or machinery for construction, to limit audial disturbance to wildlife populations. Furthermore, aforementioned BMPs outlined to mitigate short-term effects on water quality would reduce the short-term impacts on wildlife.

Procedures outlined in the MBTA should be followed for the protection of migratory birds, as applicable. To reduce potential injury to other protected birds or their nests, the following mitigation measures should be implemented to minimize any potential impacts to migratory bird species.

- If vegetation clearing occurs during the migratory bird breeding season (March 1 - August 31), the contractor shall avoid any active bird nests. If the active nest cannot be avoided, the contractor shall notify the engineer to evaluate the situation. During the non-breeding season (September 1 - February 28) vegetation removal is not subject to this restriction.

Table 6: Amount of habitat potentially affected by wetland type.

Wetland Type	Acres
Freshwater Emergent Wetland	2.72
Freshwater Forested/Shrub Wetland	5.67
Lake	0.59
Riverine	1.87

Long-term positive effects include improved habitat for wetland dependent species. Namely, increases in habitat availability for birds via the creation of more wetland habitats. Additionally, any short-term habitat damage may recover several years post-project, especially once vegetation recolonizes the area, and through potential ecosystem restoration efforts by the Refuge.

The Proposed Action would result in small changes to existing habitat. The NDOW and USFWS lists for the Proposed Action area indicated the lack of any critical habitat or sites of significant ecological value in the project area or in the surrounding vicinity.

Wildlife species utilizing the site would be disturbed and temporarily displaced, possibly relocating to other nearby areas of the Refuge during construction but should return to adjacent habitats when construction is completed. The disturbed state of the Proposed Action site, in conjunction with the amount of surrounding suitable habitat for wildlife that may utilize the site as habitat, makes any impacts from the Proposed Action negligible, and as such no impacts to biological resources are anticipated. Once implemented, the proposed action would provide a more efficient method of water delivery than the current system. The new water delivery system improvements would substantially reduce water lost to evaporation and leakage, and deliver more water consistently. This would provide a net overall benefit to wildlife and habitat. Acreage in wetland and riparian habitats would increase through the Proposed Action.

Water quality may improve with less sedimentation downstream of Upper Pahranagat Lake, mitigating habitat loss and degradation from extreme weather events. Many species of migratory birds, reptiles, amphibians, and fish would benefit from the implementation of the Proposed Action via increased habitat availability, water quality, and strengthened habitat integrity. Big-game species would also benefit from increased water availability and habitat throughout the Refuge. Lastly, native plant species would experience long-term benefits with increased water availability and the return of historical wetland habitat conditions in the Proposed Action area.

The Proposed Action would potentially facilitate invasive and noxious weed proliferation through the construction process by creating disturbed areas and potentially dispersing seeds or propagules on personnel or equipment. However, since the area is already disturbed, the threat of invasive and noxious weed proliferation is minimized. The following mitigation measures should be implemented to minimize the impact on species and to prevent the introduction and spread of noxious and invasive species:

- Before the start of ground-disturbing activities, the contractor should arrange for and perform the control of noxious and invasive species in the Proposed Action area.
- To prevent the introduction of invasive species seeds, the contractor should inspect all earthmoving and hauling equipment at the equipment storage facility and the equipment should be washed before entering the construction site.
- To prevent invasive species seeds from leaving the site, the contractor should inspect all construction equipment and remove all attached plant/vegetation and soil/mud debris before leaving the construction site.
- All disturbed soils not paved that would not be landscaped or otherwise permanently stabilized by construction would be seeded using species native to the project vicinity.

Federal- and State-Listed Species

Reptiles, amphibians, fish, and riparian-dependent birds, such as those listed in Table 5, would benefit from more habitat availability, whether they use the habitat seasonally or year-round.

The Proposed Action would have no adverse impacts on the SWFL or yellow-billed cuckoo as there is no suitable habitat for either species within the Proposed Action site. Furthermore, the construction of the Proposed Action would likely be outside of the breeding window for these two species. The Proposed Action will improve direct flows from the Pahranagat Drain to enter critical nesting habitat for SWFL. These improvements will allow the Refuge to better manage nesting Critical Habitat, as the outline by the Southwestern Willow Flycatcher Recovery Plan.

There is no current documentation of occurrence of Ridgway's rail at the Proposed Action area, so no adverse impacts are expected to occur from the Proposed Action. Conversely, the Proposed Action may benefit the rail through increased availability of wetland habitat.

While there are small pockets of potential desert tortoise habitat on the Proposed Action site, the habitat is insufficient in size and non-contiguous with adjacent upland areas to support the desert tortoise. There

have been no documented occurrences of desert tortoise in the Proposed Action site. Therefore, there are no expected adverse impacts to the desert tortoise.

Northern leopard frogs are only known to occur in the open water springs on the Refuge, which are not adjacent to the Proposed Action. Similarly, the Pahranagat Roundtail chub only occurs at Cottonwood Springs, nearly two miles from the nearest area of proposed action. Additionally, the White River Springfish, White River spinedace, Pahranagat speckled dace, and Hiko White River Springfish currently occupy areas well outside of the Proposed Action area. Thus, no adverse impacts on the northern leopard frog or aforementioned fish species are expected, and the Proposed Action would provide a long-term positive benefit by facilitating potential habitat expansion.

Although habitat has been predicted for the Pahranagat Valley montane vole in the area of the Proposed Action, the likelihood of occurrence is small as this species has been documented infrequently outside of wet meadow and wetland habitat. Thus, there are no adverse impacts expected to occur for this species and the Proposed Action would provide a long-term positive benefit by facilitating potential habitat expansion.

Banded Gila monsters may occupy the surrounding rocky bajadas and hills of the Proposed Action area, but no adverse impacts are expected from the Proposed Action; habitat for prey species of the Gila monster may increase by implementing the Proposed Action.

While there is potential for the Nye milkvetch to occur near the Proposed Action area, no documentation of occurrence exists. Therefore, no adverse impacts are expected to occur, and instead increased habitat availability for this species may take place through the Proposed Action.

Many federal- and state-listed, SOCPs and other special status species, migratory birds, and BCCs are dependent upon or associated with aquatic and riparian areas. These species are likely to benefit from improved aquatic habitat and potentially improved riparian conditions due to the maintenance of flowing water. Most common native invertebrates, fish, and amphibians also would benefit from maintenance of flowing streams with suitable water quality.

Cultural Resources

A review of previous archaeological work indicated a high density of prehistoric and historical-period archaeological sites at the Refuge, particularly in the Black Canyon area immediately to the north of the Refuge headquarters. Previous impacts include construction of roads and buildings, infrastructure, and bermfields that impounded water into ponds. Considerable earth moving was required to build these ponds, and any intact subsurface deposits that may have been in these areas likely are gone. The likelihood of human remains or funerary objects being present is very low. Neither of the sites maintains an acceptable level of integrity necessary to answer any of the questions discussed in Chapter 2 of Whittlesey et al. (2011). Consultation with the Nevada State Historic Preservation Office (SHPO) also

resulted in the agencies determination that the Proposed Action will not adversely affect any historic properties.

The Desert Refuge Complex Archaeologist responded on August 29, 2018 and indicated that the terms of the USFWS Programmatic Agreement (PA) with the state of Nevada applied:

> "*Based on the location and nature of the activities, "Appendix B" applies to the Proposed Action. Accordingly, a record search and field survey for cultural resources was conducted. As a result of those efforts, a determination has been made that the project will have no effect on historic properties. An archaeological survey report has been prepared under the terms of the PA. This document will be included in the Cultural Resources Team's annual report to the SHPO.*
> *It is our recommendation that the project should proceed as planned. However, it is important to note that the presence of archaeological deposits can never be predicted with certainty. If cultural materials are encountered during any phase of the project, all excavation activities should halt and the Regional Archaeologist should be contacted.*"

The Nevada SHPO concurred in a letter, dated September 18, 2023, stating that:

> "*The SHPO concurs with FWS's [USFWS] finding of No Adverse Effect for this project.*"

The Deputy Regional Archaeologist responded on September 19, 2023 and stated that:

> *"Based on the scope of activities, the land use history, tribal consultation, and the results of research, NRHP evaluations, and the field investigation, the U.S. Fish and Wildlife Service has determined that the Pahranagat Dam and Water Conservation Improvement SNPLMA [*Southern Nevada Public Land Management Act of 1998*] project is a "no adverse effect" outcome under 36CFR800.5.b, the implementing regulations of NHPA Section 106, because while there will be temporary effects during implementation of the project, these effects will not alter the character-defining features of the historic properties located within or adjacent to the project APEs [Area of Potential Effects]."*

One stipulation applies:

> *"Due to the sensitivity of the Black Canyon Archaeological District, Tribal monitoring will occur during project implementation. If cultural resources are discovered during project implementation, work will cease in the vicinity of the find until the FWS regional archaeologist is notified and an assessment is conducted."*

If this stipulation is met, the project, as described above, can be considered in compliance with Section 106 (See Appendix 3, Cultural Resources Correspondence).

Public Use

This alternative would not impact environmental education, interpretation, and outreach opportunities for the public. The Proposed Action would enhance the creation of habitat that would in turn benefit public use experiences such as environmental education, interpretation, outreach, hunting, and wildlife viewing. Improvements made to the Upper Lake Dam will also entail improvements to the existing earthen trail that crosses it. The proposed improvement and modernization will bring the Upper Lake Dam up to 21st century standards, and ensure the diversity of recreational opportunities will persist well into the future.

Socioeconomics

The completion of this project will improve the overall water holding and delivery infrastructure, resulting in numerous, beneficial impacts to the USFWS national, regional, and local budgets. Reconstruction of the Upper Lake Dam will decrease the USFWS nationwide maintenance request by millions of dollars. Improvements made to the Refuge's infrastructure and water monitoring systems will reduce the workload and budgetary expenditures for USFWS regional office hydrologists by reducing the need for frequent visits to the Refuge for water inflow and usage data collection and calculations. A modernized water monitoring system will equate to millions of dollars in budgetary savings. The Refuge will also see a reduction of maintenance costs by 20%-30% by reducing the need for emergency repairs and maintenance of outdated infrastructure along the Upper Supply Ditch area.

A large portion of winter visitation is from hunters, which uses the local town of Alamo's facilities, such as motels, restaurants, gas stations, etc. The small town of Alamo depends on tourism dollars as a major income source. The Refuge provides that draw for tourism.

The Proposed Actions could provide a construction project that could employ local contractors and construction workers and benefit local vendors and other businesses. The Proposed Action would also result in economic benefits to the local community associated with spending for food, lodging, transportation, and other expenses related to the increased construction activities.

Environmental Justice

No one group or Tribe represented in the community would be disproportionately impacted by the Proposed Action. The temporary boost to the local economy from construction projects would constitute a positive impact for local communities.

Cumulative Impacts

Cumulative impacts result when the effects of an action are added to or interact with other impacts in a particular place and within a particular time period. Given the mission of the NWRS and management goals of the Refuge, the presence of a greatly improved water delivery system would enhance water availability and habitat restoration efforts into the foreseeable future.

There are no known developments or impacts planned or known to occur in the immediate future within the town of Alamo that would add to or interact with the impacts proposed as part of the Proposed Action. Clark County, directly south of Lincoln County and the Refuge, and Las Vegas in particular, has experienced a period of explosive growth and development. Consequently, the threats and impacts to what remains of the surrounding area's wetlands, marshes, lakes, grasslands, and riparian habitats have increased. The need for increased public awareness, appreciation, and education regarding Nevada's precious natural resources has never been greater. Enhancing restoration efforts and expanding wetland and riparian habitat will provide an opportunity to expand environmental education, interpretation, and outreach opportunities for the public. This expanded Refuge program would also contribute to other environmental education and outreach currently being conducted by local state resource agencies and private organizations. The cumulative impact would be to increase environmental awareness and support for the resource values of the Refuge and the surrounding environment for the public.

V. COORDINATION WITH OTHERS AND ENVIRONMENTAL COMPLIANCE

Tribal and Agency Consultation

Tribal Consultation has commenced with all interested tribal governments. These tribal governments, represented by the Nuwuvi Working Group, and in collaboration with the USFWS, provided input on the Proposed Actions in late 2018.

The Desert Refuge Complex Archaeologist responded on August 29, 2018, and indicated that the terms of the USFWS Programmatic Agreement (PA) with the state of Nevada applied:

> "*Based on the location and nature of the activities, "Appendix B" applies to the Proposed Action. Accordingly, a record search and field survey for cultural resources was conducted. As a result of those efforts, a determination has been made that the project will not affect historic properties. An archaeological survey report has been prepared under the terms of the PA. This document will be included in the Cultural Resources Team's annual report to the SHPO.*
>
> *We recommend that the project should proceed as planned. However, it is important to note that the presence of archaeological deposits can never be predicted with certainty. If cultural materials are encountered during any phase of the project, all excavation activities should halt and the Regional Archaeologist should be contacted.*"

Public/Stakeholder Availability

Public notices detailing the documents availability for review on the Refuge website and Interagency Office in Las Vegas, Nevada are available.

The public comment period was from May 1, 2019, to June 1, 2019; no comments were received.

Environmental Compliance

Relationship to Statutes, Regulations, or other Plans

The Proposed Action is consistent with the Lincoln County Public Land and Natural Resource Management Plan (2007), which states, "public lands will be managed for the benefit [of] its citizenry while welcoming the constructive development of recreational activities and beneficial use of other natural resources" (page 12, paragraph 9).

Federal Laws, Authorizations, and Plans

National Environmental Policy Act (NEPA)

This Draft EA was prepared pursuant to regulations implementing the NEPA (42 U.S.C. 4321 et seq.). The NEPA provides a commitment that federal agencies would consider the environmental impacts of their actions. This EA provides information regarding the No Action Alternative and the Proposed Action, and environmental impacts associated with each alternative. Following public review, the USFWS will use the

EA as a basis for determining whether the Proposed Action would constitute a major federal action significantly affecting the human environment or would result in a Finding of No Significant Impact (FONSI).

Archaeological Resources Protection Act (ARPA) of 1979

Compliance with the ARPA (16 U.S.C. 470aa e*t seq.*) is necessary for the Proposed Action and the process of ARPA compliance is currently underway. A surface cultural resources survey was completed by Harris Environmental Group, Inc. (Harris Environmental) in coordination with the USFWS Regional Office Division of Cultural Resources. Consultation also took place with the SHPO for the region. No impacts to archaeological resources are anticipated.

Protection of Wetlands – Executive Order (EO) 11990

EO 11990 requires federal agencies to follow avoidance, mitigation, and preservation procedures with public input before proposing new construction in wetlands. As the Proposed Action will fall within wetlands, the necessary permits will be required; however, the short-term impacts caused by the implementation of the Proposed Action will be negligible, especially when compared to the long-term positive benefits of a new and efficient water delivery system to habitat units.

Clean Water Act (CWA) Section 404

Section 404 of the CWA regulates the discharge of dredge and fill material into WUS (33 CFR 328). The USACE and EPA jointly determine the federal jurisdiction of WUS and permit activities that are subject to Section 404. Regulatory Guidance Letter 08-02 allows a project applicant to request a "preliminary delineation" in lieu of an “approved” delineation. A preliminary delineation is an agreement between the USACE and the applicant (landowner), that waters of the U.S. "may" exist on the property and the delineation identifies those PWUS. This delineation can then be used to move a project forward through permitting regardless of whether it is an NWP or an Individual Permit without the need for an approved delineation. For most discharges that will have only minimal adverse effects, a general permit may be suitable. General permits are issued on a NWP, regional, or state basis for particular categories of activities. The general permit process eliminates individual review and allows certain activities to proceed with little or no delay, provided that the general or specific conditions for the general permit are met.

A preliminary delineation of waters of the U.S. within the Proposed Action area is required for the projects that cross PWUS and wetlands. The preliminary delineation widths are prepared based on the Ordinary High Water Mark (OHWM) present in the Jurisdictional Delineation (JD). Location of the OHWM would be based on the USACE 2001 Final Summary Report: *Guidelines for Jurisdictional Determinations for Waters of the United States in the Arid Southwest* (USACE 2001). In addition, an aerial map showing the project boundaries and a larger aerial photo showing OHWM limits and stream connectivity are required. The preliminary delineation report is required to be adequate for USACE to revise and finalize as a JD of the Proposed Action area.

Floodplain Management – Executive Order (EO) 11988

EO 11988 requires that all federal agencies take action to reduce the risk of flood loss, to restore and preserve the natural and beneficial values served by floodplains, and to minimize the impact of floods on human safety, health, and welfare. The Refuge is located within a 100-year floodplain and is designated by the FEMA as Zone D, referring to areas where there are possible but undetermined flood hazards. Zone D areas are often undeveloped and sparsely populated and the Proposed Action supports the preservation and enhancement of the natural and beneficial values of floodplains, and is in compliance with EO 11988.

Endangered Species Act (ESA)

The USFWS has the authority to list plant and animal species as endangered or threatened and afford protection under the ESA (16 U.S.C. 1531 et seq.) of 1973, as amended. Species that are proposed for listing as endangered or threatened are also protected by the ESA. Listing provides the opportunity for conservation and protection under Sections 6, 7, 9, and 10 of the ESA. These sections include cooperative actions with States (Section 6), consultation with Federal agencies for actions that may affect the species (Section 7(a)(2)), protection against "take" (i.e., to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect or attempt to engage in any such conduct) of the species (Section 9), cooperative actions with other entities and landowners for the purpose of scientific or enhancement of survival activities involving take (Section 10(a)(l)(A) permit); and lastly, habitat conservation planning under Section 10(a)(l)(B). While candidate species receive no statutory protection under the ESA, inclusion on the candidate list promotes cooperative conservation efforts for these species.

The Refuge is part of the NWRS, and provides a critical sanctuary for numerous state- or federally threatened, endangered, or candidate species. Section 7(a) of the ESA requires federal agencies to evaluate their actions with respect to any species that is proposed or listed as endangered or threatened and with respect to its critical habitat, if any is designated.

Clean Water Act (CWA)

Congress passed the Federal Water Pollution Control Act Amendments, commonly known as the CWA, of 1972 to provide for the restoration and maintenance of the chemical, physical, and biological integrity of the nation's lakes, streams, and coastal waters. Primary authority for the implementation and enforcement of the CWA now rests with the EPA and the USACE. In addition to the measures authorized before 1972, the CWA implements a variety of programs, including federal effluent limitations and state water quality standards, permits for the discharge of pollutants and dredged and fill materials into navigable waters, and enforcement mechanisms.

Section 404 of the CWA is the principal federal program that regulates activities affecting the integrity of wetlands. Section 404 prohibits the discharge of dredged or fill material in jurisdictional waters of the U.S., unless permitted by the USACE under § 404(a) (individual permits), 404(e) (general permits), or unless the discharge is exempt from regulation as designated in § 404(f).

The limits of jurisdictional waters of the U.S. (the area covered under § 404) are determined by: 1) in the absence of adjacent wetlands, jurisdiction extends to the OHWM; or 2) when adjacent wetlands are

present, jurisdiction extends beyond the OHWM to the limit of the adjacent wetlands; or 3) when the water of the U. S. consists only of wetlands, jurisdiction extends to the limit of the wetland.

Section 402 of the CWA is the principal federal program that regulates activities affecting water quality. One of the most significant features of the 1972 CWA is the creation of a National Pollutant Discharge Elimination System (NPDES). Except as otherwise provided in the CWA, industrial sources and publicly owned treatment works may not discharge pollutants into navigable waters without a permit. The EPA or state-authorized programs may issue a permit for discharge upon condition that the discharge meets applicable requirements, which are outlined extensively in the CWA and which reflect, among other things, the need to meet federal effluent limitations and state water quality standards.

The USACE regulates the discharge of fill material to waters of the U.S. pursuant to Section 404 of the CWA, and issues permits for actions proposed within such waters. Jurisdictional, nontidal waters of the U.S. regulated by the USACE are defined in 33 CFR 328.4(c) as those that comprise the area of a water course that extends up to the OHWM.

Since the Proposed Action has the potential to affect the integrity of the Refuge wetlands, and is dealing with the discharge of water from one body (Upper Pahranagat Lake) to the rest of the wetlands, Sections 404 and 402 are pertinent to the investigations of this EA.

Related Environmental Documents

The documents listed below provided supporting information for the development of this EA:

- Desert National Wildlife Refuge Complex Comprehensive Conservation Plan (CCP) and Environmental Impact Statement (EIS) (USFWS 2009a). The CCP identified the following changes as priorities for the PNWR: acquiring more water rights, increasing monitoring of plants and animals, climate change modeling, restoration of habitat near Lower Pahranagat Lake, installing fences on the eastern boundary, improved visitor services, and a coordinated cultural resource management/education program with local affiliated tribes (USFWS 2009a).
- In 2012, the USFWS and Otis Bay Environmental Consultants developed a habitat analysis focused on conservation priority species of the PNWR. The analysis proposed recommendations for conservation objectives and management actions for the PNWR (Otis Bay 2012). They included:
  - Riparian restoration for the southwestern willow flycatcher and other neotropical birds.
  - Design of water management strategies and continued treatment of weeds to enhance water and marsh habitats for the sandhill crane and other water and shorebirds.
  - Research and management of unique spring habitats in Pahranagat Valley.
- Lincoln County Public Land and Natural Resource Management Plan (2007).
- Recovery Plan for the Aquatic and Riparian Species of Pahranagat Valley (USFWS 1998).
- Biological Opinion for the proposed Clark, Lincoln, and White Pine counties groundwater development project (USFWS 2012a).

The Proposed Action is in compliance with the following laws, regulations, and executive EOs presented in Table 10.

Table 7: Laws and regulations.

LAWS AND REGULATIONS	REFERENCE	RELATION TO THE EA
Archaeological Resources Protection Act (ARPA) of 1979, as amended	16 U.S.C. §§ 470aa–470mm	To identify and protect any cultural and archaeological resources known to occur or found to occur in the Proposed Action area.
Clean Air Act (CAA) of 1970	42 U.S.C. § 7401 et seq.	To determine potential GHG and particulate matter emissions from implementation of the Proposed Action.
Clean Water Act (CWA) of 1972	33 U.S.C. § 1251 et seq.	To analyze potential impacts to water resources via ground disturbance and water redistribution, and implementing BMPs to mitigate potential negative impacts while improving water delivery throughout Refuge wetlands.
Consultation and Coordination with Indian Tribal Governments	Executive Order 13084 (1998) Executive Order 13175 (2000)	To initiate government-to-government consultation with tribes where tribal cultural resources may be affected by the Proposed Action.
Council on Environmental Quality (CEQ) general regulations implementing National Environmental Policy Act (NEPA)	40 CFR Parts 1500-1508	To ensure the Proposed Action follows the most up-to-date NEPA protocols outlined by the CEQ.
Department of the Interior's (DOI) implementing procedures and proposed revisions	65 FR 52211-52241	To ensure the Proposed Action follows the most up-to-date NEPA

		protocols outlined by the DOI.
Departmental Responsibilities for Indian Trust Resources	512 DM 2.1	To carry forth assistance in the management, development, and protection of Native American trust land natural resource assets.
Endangered Species Act (ESA) of 1973	16 U.S.C. § 1531 et seq.	To carry out Section 7 consultation to investigate potential effects on federally-listed species from implementation of the Proposed Action.
Environmental Justice	Executive Order 12898	To investigate if the Proposed Action will have a disproportionately high and adverse human health or environmental effect on minority or low-income populations.
Federal Compliance with Pollution Control Standards	Executive Order 12088	To ensure necessary actions are taken for the prevention, control, and abatement of environmental pollution by the Proposed Action.
Floodplain Management	Executive Order 11988	To investigate the potential effects on floodplain management by the Proposed Action, including the protection of natural and beneficial values of the floodplain.
Indian Sacred Sites	Executive Order 13007	To initiate contact with the tribes to obtain information on the protection of sacred sites and other resources, and uphold the integrity of those sites.

Invasive Species	Executive Order 13112	To investigate the potential introduction or spread of invasive species on the Refuge by the Proposed Action.
Lincoln County Land Act (LCLA) of 2000	Public Law 106-298	To allow for the inventory and development of conservation plans for biological and archaeological resources within the Proposed Action area as outlined under this Act.
Lincoln County Conservation, Recreation, and Development Act of 2004	Public Law 108-424	To allow for the high quality development of habitat within the Proposed Action area for the benefit of conservation and recreation as outlined under this Act.
Memorandum on Government-to-Government Relations with Native American Tribal Governments of 1994	Signed by President Clinton on April 29, 1994	To ensure government-to-government consultation with tribes where tribal cultural resources may be affected by the Proposed Action.
Migratory Bird Treaty Act (MBTA) of 1918	16 U.S.C. §§ 703–711	To implement protection and management of habitat to support migratory birds on the Refuge, as well as investigating potential impacts to those species by the Proposed Action.
National Environmental Policy Act (NEPA) of 1969	42 U.S.C. § 4321 et seq.	This Environmental Assessment (EA) is being created in compliance with the NEPA process.
National Historic Preservation	Executive Order 11593	To identify and carry out BMPs to protect and avoid

		inadvertent impacts to subsurface historical and cultural deposits that have yet to be identified.
National Historic Preservation Act (NHPA) of 1966 and regulations implementing NHPA	16 U.S.C. § 470 et seq.	To ensure that no adverse effects to historical properties occur during implementation of the Proposed Action.
National Wildlife Refuge System (NWRS) Administration Act of 1966	16 U.S.C. § 668dd. et seq.	To provide overall guidelines in compliance with the NWRS, and to manage, protect, and enhance Refuge resources.
Native American Graves Protection and Repatriation Act (NAGPRA) of 1990	25 U.S.C. 3001-30013 et seq.	To initiate discussion with Native American tribes regarding aMemorandum of Understanding (MOU) surrounding the inadvertent discovery of graves, human remains, funeral objects, sacred objects, and other objects of cultural significance through implementation of the Proposed Action.
NEPA, Protection and Enhancement of Environmental Quality	Executive Order 11514	To make sure the NEPA process is carried out in a way to enhance the environmental quality within the Proposed Action area.
Nevada Critically Endangered Flora Law	NRS 5.27-5.33	To ensure protection of state-listed endangered plant species from the Proposed Action.
Noise Control Act (NCA) of 1972, as amended	42 U.S.C. § 4901 et seq.	To minimize noise pollution to the public in the general area of the Proposed Action.

Pollution Prevention Act (PPA) of 1990	42 U.S.C. § 13101 et seq.	To prevent and minimize pollution created by the Proposed Action, including potential spills.
Preservation of Endangered and Threatened Wildlife in Certain Rural Counties Act	Chapter 349, Statutes of Nevada 1999 https://www.leg.state.nv.us/SpecialActs/19-PreservationWildlife.html	To ensure the protection of flora and fauna species deemed endangered and threatened in certain counties of the state.
Protection of Historic and Cultural Properties	36 CFR 800 et seq.	To initiate consultation with tribes where tribal cultural resources may be affected by the Proposed Action.
Protection of Wetlands	Executive Order 11990	To carry out strategies to protect, restore, and enhance wetlands that occur within the Refuge, more specifically those within the Proposed Action area.
Responsibilities, and the Endangered Species Act (ESA), Secretarial Order 3206	June 5, 1997	To implement coordination with tribes as to the goals and actions of the ESA as it pertains to species protection and conservation.
Safe Drinking Water Act (SDWA) of 1974	42 U.S.C. § 300f et seq.	To prevent and mitigate any threats to public drinking water quality, including toxic spills and water diversion.

VI. ACRONYMS & ABBREVIATIONS

ac-ft./year	acre-feet per year
AOI	Area of Interest
ARPA	Archaeological Resources Protection Act
AZ	Arizona
BCC	Birds of Conservation Concern
BCR	Bird Conservation Region
BLM	Bureau of Land Management
BMPs	Best Management Practices
CA	California
CAA	Clean Air Act
CAAA	Clean Act Air Amendments
CCP	Comprehensive Conservation Plan
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CO	carbon monoxide
CO_2	carbon dioxoide
CO_{2eq}	carbon dioxide equivalent
CH_4	methane
CWA	Clean Water Act
D.C.	District of Columbia
DM	Departmental Manual
DOI	US Department of the Interior
DPS	Distinct Population Segment
EA	Environmental Assessment
EIS	Environmental Impact Statement
EJ IWG	Interagency Working Group on Environmental Justice
EO	Executive Order
EPA	Environmental Protection Agency
EPCRA	Emergency Planning and Community Right-to-Know Act
ESA	Endangered Species Act
FEMA	Federal Emergency Management Agency
FONSI	Finding of No Significant Impact
FPPA	Farmland Protection Policy Act
FR	Federal Register
ft	feet
GHGs	Global Warming Potential
HEG	Harris Environmental Group, Inc.
HFCs	hydrofluorocarbons
IBA	Important Bird Area
IPAC	Information, Planning, and Conservation System
JD	Jurisdictional Delineation

LCLA	Lincoln County Land Act
LDS	Latter Day Saints
MBCA	Migratory Bird Conservation Act
MBTA	Migratory Bird Treaty Act
MDT	Mojave Desert tortoise
mi	miles
MI	Michigan
mi^2	square miles
NAAQS	National Ambient Air Quality Standards
NAGPRA	Native American Graves Protection and Repatriation Act
NCA	Noise Control Act
NDEP	Nevada Division of Environmental Protection
NDOW	Nevada Department of Wildlife
NDWR	Nevada Division of Water Resources
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NO_2	nitrogen dioxide
NO_x	nitrogen oxides
NOI	Notice of Intent
N_2O	nitrous oxide
NPDES	National Pollutant Discharge Elimination System
NRHP	National Register of Historic Places
NRS	Nevada
NV	National Wetlands Inventory
NWI	Nationwide Permit
NWP	Nationwide Permit
NWRS	National Wildlife Refuge System
O_3	Ozone
OHWM	Ordinary High Water Mark
OR	Oregon
OSHA	Occupational Safety and Health Administration
Pb	Lead
PCN	Pre-construction Notice
PFCs	perfluorocarbons
PJD	Preliminary jurisdictional determination
PM	particulate matter
$PM_{2.5}$	particulate matter ≤ 2.5 micrometers in diameter
PM_{10}	particulate matter ≤ 10 micrometers in diameter
PNWR	Pahranagat National Wildlife Refuge
PPA	Pollution Prevention Act
ppb	parts per billion
ppm	parts per million
PVMV	Pahranagat Valley montane vole
PWUS	Potential Waters of the United States

RCRA	Resource Conservation and Recovery Act
SDWA	Safe Drinking Water Act
SF_6	sulfur hexafluoride
SHPO	State Historic Preservation Office
SIP	State Implementation Plan
SNPLMA	Southern Nevada Public Land Management Act
SO_2	sulfur dioxide
SO_x	sulfur oxides
SOCP	Species of Conservation Priority
SWDA	Solid Waste Disposal Act
SWFL	southwestern willow flycatcher
TCP	Traditional Cultural Property
TNC	The Nature Conservancy
TSCA	Toxic Substances Control Act
U.S.	United States
USACE	U.S. Army Corps of Engineers
USBLS	U.S. Bureau of Labor Statistics
U.S.C.	United States Code
USDA	U. S. Department of Agriculture
USDOI	U.S. Department of the Interior
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
UT	Utah
VA	Virginia
VOC	Volatile Organic Compound
WAP	Wildlife Action Plan
WMA	Wildlife Management Area
WUS	Waters of the United States
$\mu g/m^3$	micrograms per cubic meter of air

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APPENDIX 1. BEST MANAGEMENT PRACTICES

Best Management Practices (BMPs) are designed to reduce adverse effects to wildlife and plants and their habitats on lands owned by the U.S. Fish and Wildlife Service (Service). BMPs shall be implemented on Service-owned lands by all project coordinators.

General BMPs

1. All trash and construction debris shall be disposed of at disposal areas approved in writing by the Service.
2. Standard measures shall be implemented to minimize construction impacts on fish and wildlife, including avoiding unnecessary disturbance to habitats by driving on existing roads, working only in the required area, and minimizing direct disturbance to streams and open water sources.
3. All terms, conditions, and stipulations in regulatory permits and other project authorizations to eliminate or reduce adverse effects to endangered, threatened, and sensitive species and their critical habitats from actions described in the Comprehensive Conservation Plan (CCP), shall be adhered to.
4. Complete restoration activities at individual project sites in a timely manner to reduce disturbance and/or displacement of wildlife in the immediate project area.
5. Use existing roadways or travel paths for access to project sites.
6. Avoid the use of heavy equipment and techniques that will result in excessive soil disturbances or compaction of soils, especially on steep or unstable slopes, except as required for dike maintenance as approved by the refuge manager.
7. Streams, riparian zones, and wetlands shall not be used as staging or refueling areas. Equipment shall be stored, serviced, and fueled a minimum of 150 feet from aquatic habitats and other sensitive areas.
8. A written contingency plan shall be developed for all project sites where hazardous materials (e.g., pesticides, herbicides, petroleum products) will be used or stored. Appropriate materials/supplies (e.g., shovel, disposal containers, absorbent materials, first aid supplies, clean water) shall be available on site to clean up small scale accidental hazardous spill. Hazardous spills shall be reported. Emergency response, removal, transport, and disposal of hazardous materials shall be done in accordance with the U.S. Environmental Protection Agency. Hazardous materials and petroleum products shall be stored in approved containers or chemical sheds and be located at least 150 feet from surface water and in an area protected from runoff.
9. The evaluation of herbicide, pesticide, and fertilizer use shall include the accuracy of applications, effects on target and non-target species, and the potential impacts to aquatic and terrestrial ecosystems. Treatments for the control or removal of invasive plants in riparian/wetland areas shall be limited to hand or wick applications by qualified personnel. Chemicals shall be applied during calm, dry weather and unsprayed buffer areas shall be maintained near aquatic habitats and other sensitive areas. Chemical applications are prohibited where seasonal precipitation or excess irrigation water is likely to wash residual toxic substances into waterways. All chemicals shall be handled in strict accordance with label specifications. Proper personal protection (e.g., gloves, masks, protective clothing) shall be used by all applicators. The material safety data sheet (MSDS) from the chemical manufacturer shall be readily available to the project coordinators for detailed information on each chemical to be used, in

accordance with applicable Federal and State regulations concerning the use of chemicals. Chemicals shall only be considered when other treatments are ineffective or cannot be applied.
10. Project coordinators shall ensure that all waste resulting from the completion of a project is removed and disposed of properly before work crews vacate the project site.
11. Structures containing concrete, or wood preservatives shall be cured or dried a minimum of 36 hours before being placed in streams, riparian zones, or wetlands. No wet concrete or runoff from cleaning tools that have wet concrete slurry or lye dust shall enter aquatic habitats. Runoff control measures shall be employed, such as hay bales and silt fences, until the risk of aquatic contamination has ended.
12. Monitoring is required during restoration project implementation and for at least one year following project completion to ensure that restoration activities implemented at individual project sites are functioning as intended and do not create unintended consequences to fish, wildlife, and plant species and their critical habitats or adversely impact human health and safety. Corrective actions, as appropriate, shall be taken to address potential and existing adverse effects to fish, wildlife, and plants.
13. Prior to equipment use, special status plants and habitats shall be well-marked and communicated to equipment operators to avoid direct and indirect adverse effects.
14. An environmental awareness training program shall be presented to all construction personnel to brief them on the status of the special status species and the required avoidance measures.
15. To protect special status species, the Service will conduct the following activities:
(a) trails, roads, and/or areas will be closed to ensure that human access does not disturb special status species.
(b) prior to habitat and ground disturbing activities, potential habitat for special status species will be evaluated and, if appropriate, presence/absence surveys and additional mitigation measures taken (e.g., avoid location, change timing of action), if necessary, to ensure that planned activities do not affect special status species; and
(c) the Service will comply with all terms and conditions resulting from section 7, Endangered Species Act consultation when specific projects are undertaken.
16. Bank stabilizing vegetation removed or altered because of restoration activities shall be replanted with native vegetation and protected from further disturbance until new growth is well established. Native shrubs, trees, and erosion control seed mixes from only local ecotypes shall be included in the reclamation and restoration of disturbed sites.
17. Sedimentation and erosion controls shall be implemented, when and where appropriate, during wetland restoration or creation activities to maintain the water quality of adjacent water sources.
18. Restoration activities that require prescribed burning shall be planned in coordination with the refuge manager and in accordance with the approved Fire Management Plan.
19. Slash materials shall be gathered by hand or with light machinery to reduce soil disturbances and compaction. Avoid accumulating or spreading slash in upland draws, depressions, intermittent streams, and springs. Slash control and disposal activities shall be conducted in a way that reduces the occurrence of debris in streams. These practices will eliminate or reduce debris torrents, avalanches, flows, and slides.
20. Snags shall be retained on project sites for cavity dependent wildlife species whenever possible.
21. Seedlings, cuttings, and other plant propagules for restoration shall be sourced from local ecotypes.

22. When necessary for invasive plant removal or habitat restoration, trees shall be felled away from streams, riparian zones, and wetlands whenever possible.
23. Livestock crossings and off-channel livestock watering facilities shall not be located in areas where compaction and/or damage may occur to sensitive soils, slopes, or vegetation due to congregating livestock. If livestock fords across streams are rocked to stabilize soils/slopes and prevent erosion, material and location shall be subject to the approval of the refuge manager.
24. Crushed rock is prohibited for use to stabilize fords. Fords shall be placed on bedrock or stable substrates whenever possible.
25. Implement the Integrated Pest Management (IPM) approach and the best management practices required as part of the IPM Program to reduce potentially adverse effects to refuge resources.
26. Construction and habitat management activities shall be implemented during the nonbreeding/nesting season for waterfowl to the extent feasible. Disturbance during the breeding/nesting season requires pre-construction surveys to locate active nests and establish buffers around the nest site until a wildlife biologist designated by the Service determines the nest site is abandoned. These and other mitigation measures shall be addressed in site-specific NEPA compliance once the locations of the project areas are identified. New facilities shall be sited in previously disturbed areas, to the extent feasible, and shall be designed to avoid sensitive habitats and affect the least amount of native vegetation.
27. Prior to construction and ground-disturbing activities, project sites and staging areas shall receive pre-watering and other preparations maintaining surface soils in stabilized conditions where support vehicles and equipment will operate.
28. During ground-disturbing activities including clearing, grubbing and earth moving activities, water or an approved dust palliative shall be applied to keep soils moist throughout the process and immediately after completion.
29. Sloping surfaces equal to or steeper than 10% shall be stabilized using soil binders approved in writing by the Service until vegetation can effectively stabilize the slope.
30. Stipulations defined in the Compatibility Determinations shall be implemented in the course of refuge management activities and for refuge use activities conducted under special use permits.

Pesticide Application and Integrated Pest Management

31. To protect the health of workers, pesticide applicators shall wear appropriate personal protective gear (e.g., clothing, gloves, and masks) in accordance with state applicators' licensing requirements when applying, mixing, or otherwise handling pesticides on the refuge. Detailed, refuge- and site-specific BMPs are included and implemented through the Service's Pesticide Use Proposal process to protect refuge resources. BMPs for mixing, handling, and applying pesticides for all ground-based pesticide treatments are specified in the IPM Program.

Water/Riparian

32. Ground-disturbing activities shall incorporate the use of sediment barriers or other erosion control devices downstream of the activities.

33. Ground-disturbing activities, vehicles, and machinery are prohibited in water bodies and prohibited within a 150-feet buffer zone surrounding water bodies.
34. Stream crossings will be limited to designated and existing locations.

Air and Noise

35. Operation of equipment, machinery, and large vehicles is restricted to daylight hours, between the hours of 8:00 a.m. and 5:00 p.m. unless otherwise specified in writing within the construction contract, special use permit, or by the refuge manager.
36. When hauling operations are being conducted, unpaved access routes shall be wetted each day by the contractor to reduce fugitive dust.
37. To reduce dust, effective cover shall be maintained by the contractor over stockpiled fill or debris materials.
38. Vehicle speeds shall be limited to 15 miles per hour or less in staging areas and on all unpaved access routes; and to 25 miles per hour on paved refuge access roads.
39. Applicable recommendations from the local air quality district shall be implemented to minimize vehicle and equipment emissions during construction and habitat management activities.

Hunt-related

40. During movement of hunting blinds and other portable structures, measures shall be taken to minimize generation of dust and erosion. Refuge-specific stipulations are included in the compatibility determinations for hunting for each refuge.
41. Except for spot maintenance by Service staff to remove obstructions, no improvements shall be made to intermittent waterways and no clearing shall be done in forested areas.

Cultural Resources

42. Potentially adverse effects to cultural resources shall be minimized through cultural resource reviews, surveys, and compliance with section 106 of the National Historic Preservation Act (NHPA). All sites discovered in the future shall be treated as eligible for listing on the National Register of Historic Places (NRHP) until listed or formally evaluated as ineligible in consultation with the State Historic Preservation Officer (SHPO).
43. Under federal ownership, archaeological and historical resources within a refuge receive protection under federal laws mandating the management of cultural resources, including, but not limited to, Archaeological Resources Protection Act (ARPA), AHPA, Native American Graves Protection and Repatriation Act of 1990 (NAGPRA), and National Historic Preservation Act (NHPA). Should any cultural resources be discovered on the refuges, ground-disturbing activities shall be stopped immediately and not resumed until authorized in writing by the Service to do so. The Service will take all necessary steps to comply with section 106 of the NHPA, in consultation with the SHPO and pertinent tribes.
44. Sites identified in the future could be found to contain human remains, funerary items, sacred objects, or items of cultural patrimony and may therefore require consideration under the NAGPRA). The Service will comply with the NAGPRA consultation process and other applicable laws and guidance required for consideration of human remains.

45. Under federal ownership, paleontological resources within a refuge receive protection under federal laws mandating the management of paleontological resources, including, but not limited to, Paleontological Resources Preservation Act (Public Law 111-011) (Omnibus Public Land Management Act of 2009). Collection of paleontological resources is prohibited on the Refuges. Under the provisions of the Act, the Service may restrict access or close areas to further protect paleontological resources or for public safety.

Public Use

46. Areas under construction or being restored would be temporarily closed to public use for public safety. These areas will be adequately marked and information on other recreational areas will be provided to the public.

47. Construction will be scheduled during the week or during slower seasons when feasible, to minimize the impacts of construction traffic on public access.

APPENDIX 2. USFWS IPAC CONSULTATION

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Southern Nevada Fish And Wildlife Office
4701 N. Torrey Pines Drive
Las Vegas, NV 89130-2301
Phone: (702) 515-5230 Fax: (702) 515-5231

In Reply Refer To:
Project Code: 2023-0051383
Project Name: PNWR Upper Lake Dam

March 02, 2023

Subject: List of threatened and endangered species that may occur in your proposed project location or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the ECOS-IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a biological

evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:

http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF

Migratory Birds: In addition to responsibilities to protect threatened and endangered species under the Endangered Species Act (ESA), there are additional responsibilities under the Migratory Bird Treaty Act (MBTA) and the Bald and Golden Eagle Protection Act (BGEPA) to protect native birds from project-related impacts. Any activity, intentional or unintentional, resulting in take of migratory birds, including eagles, is prohibited unless otherwise permitted by the U.S. Fish and Wildlife Service (50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)). For more information regarding these Acts see https://www.fws.gov/birds/policies-and-regulations.php.

The MBTA has no provision for allowing take of migratory birds that may be unintentionally killed or injured by otherwise lawful activities. It is the responsibility of the project proponent to comply with these Acts by identifying potential impacts to migratory birds and eagles within applicable NEPA documents (when there is a federal nexus) or a Bird/Eagle Conservation Plan (when there is no federal nexus). Proponents should implement conservation measures to avoid or minimize the production of project-related stressors or minimize the exposure of birds and their resources to the project-related stressors. For more information on avian stressors and recommended conservation measures see https://www.fws.gov/birds/bird-enthusiasts/threats-to-birds.php.

In addition to MBTA and BGEPA, Executive Order 13186: *Responsibilities of Federal Agencies to Protect Migratory Birds*, obligates all Federal agencies that engage in or authorize activities that might affect migratory birds, to minimize those effects and encourage conservation measures that will improve bird populations. Executive Order 13186 provides for the protection of both migratory birds and migratory bird habitat. For information regarding the implementation of Executive Order 13186, please visit https://www.fws.gov/birds/policies-and-regulations/executive-orders/e0-13186.php.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Code in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment(s):

- Official Species List
- USFWS National Wildlife Refuges and Fish Hatcheries
- Migratory Birds
- Wetlands

OFFICIAL SPECIES LIST

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

Southern Nevada Fish And Wildlife Office
4701 N. Torrey Pines Drive
Las Vegas, NV 89130-2301
(702) 515-5230

PROJECT SUMMARY

Project Code: 2023-0051383
Project Name: PNWR Upper Lake Dam
Project Type: Dam - Maintenance/Modification
Project Description: The USFWS proposes improving approximately 4,400 feet of earthen water delivery ditch; rehabilitating approximately 1,200 feet of Upper Lake Dam; creating approximately 100 feet of new diversion channel

Project Location:

The approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@37.31135355,-115.13261496584416,14z

Counties: Lincoln County, Nevada

ENDANGERED SPECIES ACT SPECIES

There is a total of 9 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

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1. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

BIRDS

NAME	STATUS
Southwestern Willow Flycatcher *Empidonax traillii extimus* There is **final** critical habitat for this species. Your location overlaps the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/6749	Endangered
Yellow-billed Cuckoo *Coccyzus americanus* Population: Western U.S. DPS There is **final** critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/3911	Threatened
Yuma Ridgway"s Rail *Rallus obsoletus yumanensis* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/3505	Endangered

REPTILES

NAME	STATUS
Desert Tortoise *Gopherus agassizii* Population: Wherever found, except AZ south and east of Colorado R., and Mexico There is **final** critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/4481	Threatened

FISHES

NAME	STATUS
Hiko White River Springfish *Crenichthys baileyi grandis* There is **final** critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/7004	Endangered
Pahranagat Roundtail Chub *Gila robusta jordani* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/782	Endangered
White River Spinedace *Lepidomeda albivallis* There is **final** critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/6900	Endangered
White River Springfish *Crenichthys baileyi baileyi* There is **final** critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/5633	Endangered

INSECTS

NAME	STATUS
Monarch Butterfly *Danaus plexippus* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9743	Candidate

CRITICAL HABITATS

There is 1 critical habitat wholly or partially within your project area under this office's jurisdiction.

NAME	STATUS
Southwestern Willow Flycatcher *Empidonax traillii extimus* https://ecos.fws.gov/ecp/species/6749#crithab	Final

USFWS NATIONAL WILDLIFE REFUGE LANDS AND FISH HATCHERIES

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

The following FWS National Wildlife Refuge Lands and Fish Hatcheries lie fully or partially within your project area:

FACILITY NAME	ACRES
PAHRANAGAT NATIONAL WILDLIFE REFUGE https://www.fws.gov/refuges/profiles/index.cfm?id=84551	4,649.379

MIGRATORY BIRDS

Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

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1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.
3. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

The birds listed below are birds of particular concern either because they occur on the USFWS Birds of Conservation Concern (BCC) list or warrant special attention in your project location. To learn more about the levels of concern for birds on your list and how this list is generated, see the FAQ below. This is not a list of every bird you may find in this location, nor a guarantee that every bird on this list will be found in your project area. To see exact locations of where birders and the general public have sighted birds in and around your project area, visit the E-bird data mapping tool (Tip: enter your location, desired date range and a species on your list). For projects that occur off the Atlantic Coast, additional maps and models detailing the relative occurrence and abundance of bird species on your list are available. Links to additional information about Atlantic Coast birds, and other important information about your migratory bird list, including how to properly interpret and use your migratory bird report, can be found below.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON
American White Pelican *pelecanus erythrorhynchos* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/6886	Breeds Apr 1 to Aug 31
Bald Eagle *Haliaeetus leucocephalus* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.	Breeds Dec 1 to Aug 31

NAME	BREEDING SEASON
Black Tern *Chlidonias niger* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/3093	Breeds May 15 to Aug 20
California Gull *Larus californicus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds Mar 1 to Jul 31
Cassin's Finch *Carpodacus cassinii* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9462	Breeds May 15 to Jul 15
Clark's Grebe *Aechmophorus clarkii* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds Jun 1 to Aug 31
Evening Grosbeak *Coccothraustes vespertinus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 15 to Aug 10
Franklin's Gull *Leucophaeus pipixcan* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 1 to Jul 31
Lesser Yellowlegs *Tringa flavipes* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9679	Breeds elsewhere
Lewis's Woodpecker *Melanerpes lewis* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9408	Breeds Apr 20 to Sep 30
Long-eared Owl *asio otus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/3631	Breeds Mar 1 to Jul 15
Marbled Godwit *Limosa fedoa* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9481	Breeds elsewhere
Olive-sided Flycatcher *Contopus cooperi* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/3914	Breeds May 20 to Aug 31

NAME	BREEDING SEASON
Rufous Hummingbird *selasphorus rufus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/8002	Breeds Apr 15 to Jul 15
Sage Thrasher *Oreoscoptes montanus* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/9433	Breeds Apr 15 to Aug 10
Virginia's Warbler *Vermivora virginiae* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9441	Breeds May 1 to Jul 31
Western Grebe *aechmophorus occidentalis* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/6743	Breeds Jun 1 to Aug 31
Willet *Tringa semipalmata* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds Apr 20 to Aug 5

PROBABILITY OF PRESENCE SUMMARY

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read and understand the FAQ "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.

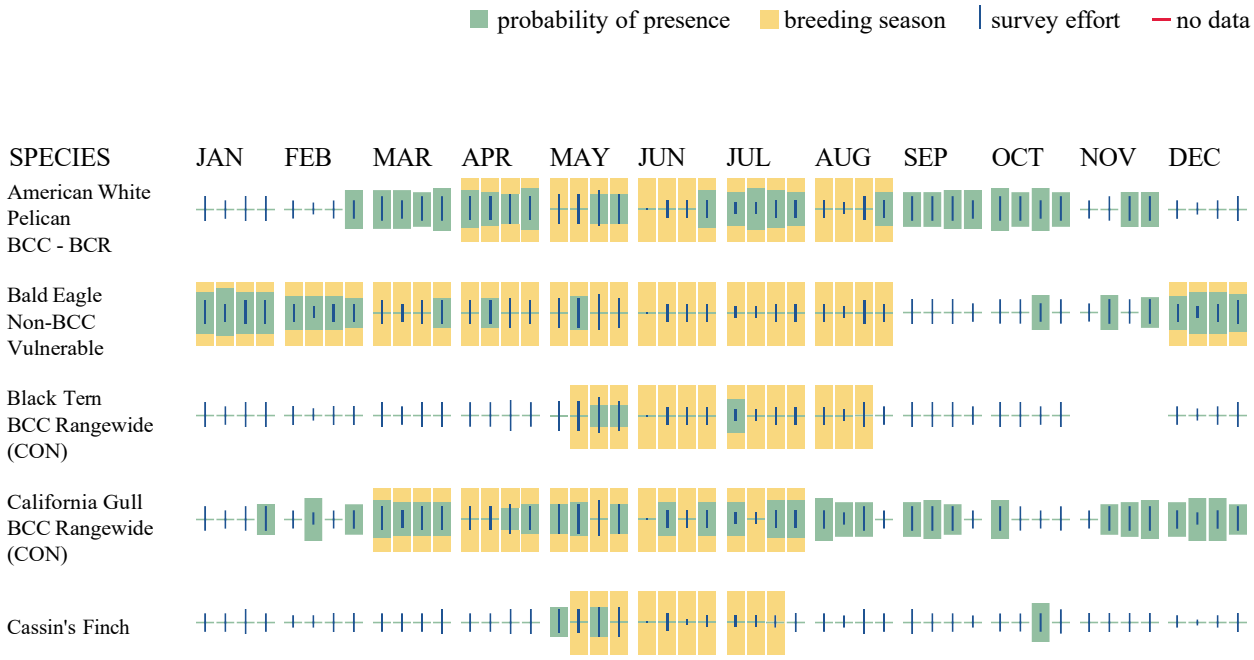
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

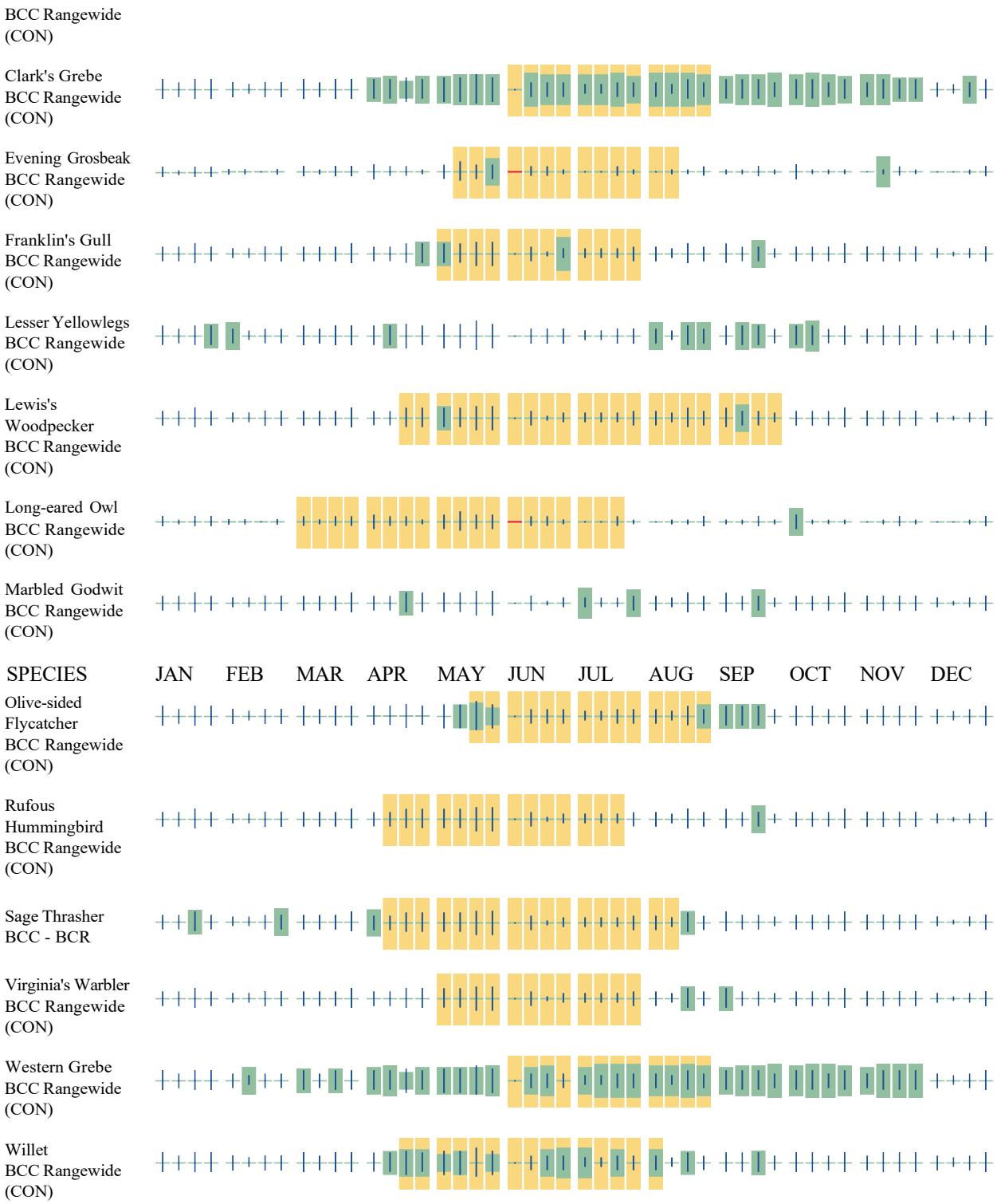
Breeding Season (■)
Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort (|)
Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

No Data (–)
A week is marked as having no data if there were no survey events for that week.

Survey Timeframe
Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.





Additional information can be found using the following links:

- Birds of Conservation Concern https://www.fws.gov/program/migratory-birds/species

- Measures for avoiding and minimizing impacts to birds https://www.fws.gov/library/collections/avoiding-and-minimizing-incidental-take-migratory-birds
- Nationwide conservation measures for birds https://www.fws.gov/sites/default/files/documents/nationwide-standard-conservation-measures.pdf

MIGRATORY BIRDS FAQ

Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.

Nationwide Conservation Measures describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. Additional measures or permits may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the list of migratory birds that potentially occur in my specified location?

The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the Rapid Avian Information Locator (RAIL) Tool.

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?

The probability of presence graphs associated with your migratory bird list are based on data provided by the Avian Knowledge Network (AKN). This data is derived from a growing collection of survey, banding, and citizen science datasets.

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering or migrating in my area?

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may query your location using the RAIL Tool and look at the range maps provided for birds in your area at the bottom of the profiles provided for each bird in your results. If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?
Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are Birds of Conservation Concern (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the Eagle Act requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

Details about birds that are potentially affected by offshore projects
For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the Northeast Ocean Data Portal. The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the Diving Bird Study and the nanotag studies or contact Caleb Spiegel or Pam Loring.

What if I have eagles on my list?
If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur.

Proper Interpretation and Use of Your Migratory Bird Report

The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ "What does IPaC use to generate the migratory birds potentially occurring in my specified location". Please be aware this report provides the "probability of presence" of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the "no data" indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ "Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds" at the bottom of your migratory bird trust resources page.

WETLANDS

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

LAKE

- L2UBHh

FRESHWATER FORESTED/SHRUB WETLAND

- PFOF
- PFOAh
- PFOC
- PFOA
- PFOCh
- PFOB
- PSSC
- PSSB
- PSSA

FRESHWATER EMERGENT WETLAND

- PEM1B
- PEM1Fh
- PEM1A
- PEM1C

RIVERINE

- R4SBCx
- R2UBHx
- R5UBH

IPAC USER CONTACT INFORMATION

Agency: Harris Environmental Group, Inc.
Name: Scott Blackman
Address: 650 N. 6th Avenue
City: Tucson
State: AZ
Zip: 85705
Email sblackman@heg-inc.com
Phone: 5206287648

LEAD AGENCY CONTACT INFORMATION

Lead Agency: Department of Interior

APPENDIX 3. CULTURAL RESOURCES CORRESPONDENCE

NEVADA
STATE HISTORIC
PRESERVATION OFFICE

STATE OF NEVADA
Department of Conservation and Natural Resources

Joe Lombardo, *Governor*
James A. Settelmeyer, *Director*
Rebecca L. Palmer, *Administrator*

September 18, 2023

Virginia Parks
Acting Regional Historic Preservation Officer
U.S. Fish and Wildlife Service
20555 Gerda Lane
Sherwood, OR 97140

RE: Section 106 consultation for Pahranagat Dam and Water Conservation Improvements for Pahranagat National Wildlife Refuge, Lincoln County, Nevada
SH.PO UT 2023-7761; 34642

Dear Ms. Parks:

The Nevada State Historic Preservation Office (SHPO) has initiated its review of the subject documents received August 18, 2023, in accordance with Section 106 of the National Historic Preservation Act (NHPA) of 1966, as amended.

Please see the SHPO's letter dated August 11, 2023 for our office's previous comments on this undertaking.

Area of Potential Effect (APE)
The FWS has defined the APE to be three project areas depicted in Figures 1 and 2 (on pages 4 and 5) of the Historic Properties Identification Report. Based on the additional narrative added to the revised report dated August 16, 2023, the SHPO **agrees** with the APE as defined.

Identification and Evaluation of Historic Properties
The FWS conducted a cultural resource investigation for this project that included background research and a visual investigation of the APE. As part of this effort, **Upper Pahranagat Dam (S3494)** was documented on a NARA form and assessed for National Register of Historic Places (NRHP) eligibility. The SHPO **concurs** with FWS's determination that **S3494** and its two appurtenant resources, the North Marsh Diversion Ditch and Black Canyon Irrigation Ditch, are **not eligible** for NRHP-listing.

One National Register-listed resource, the Black Canyon Petroglyph Archaeological District **(NR#75001113),** was identified within the APE.

In response to prior SHPO comments, the FWS has amended their report to note the presence of three unevaluated resources, **S2912,** a segment of U.S. Highway 93 in Lincoln County, **26LN6781,** an unnamed archaeological site, and **26LN5690,** a prehistoric petroglyph site. The FWS intends to treat these resources as NRHP-eligible for the purposes of this undertaking.

For inclusion into NVCRJS, please note our office has hand corrected archaeological site 26LN4296 on page 17 of our copy of the revised report to read **26LN4269.**

Consultation with Tribes and Interested Parties
The SHPO acknowledges that consultation with Native American tribes has been initiated per 36 CFR § 800.3(f)(2). ff this consultation results in the identification of properties of religious and/or cultural significance that could be affected by this undertaking, the USFWS must consult with our office concerning the National Register eligibility of historic properties and possible effects of the undertaking per 36 CFR § 800.4(c) and 36 CFR § 800.4(d).

Finding of Effect
The SHPO **concurs** with FWS's finding of **No Adverse Effect** for this undertaking.

Unanticipated Discovery
If any buried and/or previously unidentified resources are located during the project activities, the SHPO recommends that all work in the vicinity of the find cease and this office be contacted for additional consultation per 36 CFR §800.13(b)(3).

Sincerely,

JL
Robin K. Reed
Deputy State Historic Preservation Officer

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