ENVIRONMENTAL ASSESSMENT FOR FAIRBANKS SPRING AND SODA SPRING RESTORATION

EA #84550-10-01

Submitted to:

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1.0 PURPOSE AND NEED FOR ACTION

1.1 Refuge Background

Ash Meadows is a unit of the National Wildlife Refuge System. Unlike most Fish and Wildlife Service Refuges, Ash Meadows was created to "conserve and recover listed endangered, proposed endangered, and candidate plant and animal species found in the area" (USFWS 1984). Ash Meadows National Wildlife Refuge is a unit of the Desert National Wildlife Refuge Complex (the Refuge). The Refuge encompasses more than 23,000 acres (9,308 hectares) and provides habitat for at least 27 plant and animal species found nowhere else in the world. This distinguishes Ash Meadows as having the greatest concentration of endemic species of any area in the United States. Both a recovery plan (USFWS 1990) and conservation plan (USFWS 2009) have been developed to aid in the recovery of listed species and their habitats.

1.2 Purpose for Taking Action

The purpose of the Proposed Action is to allow Ash Meadows National Wildlife Refuge to comply with the National Wildlife Refuge System Improvement Act of 1997 "to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans."

More specifically, the 2009 Desert Wildlife Refuge Complex Comprehensive Conservation Plan and Environmental Impact Statement (CCP EIS) (USFWS 2009) calls for the implementation of a variety of management decisions that are intended to improve habitat for endemic species throughout the Refuge and increase visitor services (proposed project). These management decisions include restoring and maintaining viable populations of endemic and threatened and endangered species, and restoring and maintaining the ecological integrity of natural communities within the Refuge.

This environmental assessment (EA) is intended to tier to the CCP EIS and provide additional detail and analysis for specific management activities. The management activity addressed in this EA is the restoration of Fairbanks Spring, Soda Spring, and associated stream channels. Because implementation of the proposed project would directly meet the goals 1 and 2 of the Vision Statement of the CCP EIS for the Refuge (USFWS 2009), it achieves compliance with planning on local and national levels, and would ultimately allow for more complete protection of endemic, endangered, and rare organisms.

1.3 Need for Taking Action

Restoration and maintenance of viable wildlife populations, coupled with restoration and maintenance of ecological integrity for natural communities, were identified in the CCP EIS as management goals. However, these goals have not yet been met and specific actions have not yet

been taken. Specific actions identified in the CCP EIS include managing, monitoring, and restoring Refuge habitats (USFWS 2009).

Springs at the Refuge have been severely impacted by historic anthropogenic activity. Restoration of spring habitats is a critical component in restoration efforts, particularly for endemic fish and invertebrate populations (USFWS 1984, 1990, 2009). The Recovery Plan for Endangered and Threatened Species of Ash Meadows lists habitat alteration and exotic species as major threats to listed species (USFWS 1990). The primary objective of the Refuge and its Recovery Plan is to recover the listed species and their habitats through an ecosystem approach focusing on habitat restoration and the removal of threats. Restoration of springs and historic stream flows is identified as a key element in the recovery of Ash Meadows species.

Fairbanks Spring and Soda Spring (the springs) lie at the north end of the Refuge and are the first springs to feed into the Carson Slough. Currently, the water from the springs is diverted into a series of ditches that terminate at Peterson Reservoir. Additional unused ditches are also present in the area. As a result of these anthropogenic alterations, the entire wetland ecosystem has been altered and the area has become infested with noxious weeds and aquatic invasive species (AIS). These noxious weeds and AIS decrease the viability for endemic species recovery and provide habitat inconsistent with the needs of the species the Refuge was created to protect (Figure 1).

The proposed restoration actions for the springs would preserve the remaining peatland and protect intact and healthy habitats by mitigating for previous alterations to aquatic habitat and spring/stream flows. Connectivity of the springs' outflows with the extensive wetland in the Carson Slough would be restored and the amount of suitable stream channel and wetland habitat for native fish (as well as other native wildlife species and endemic, threatened and endangered plants) would be increased. The removal of physical barriers (e.g., impoundments) and the installation of culverts passable by native fish would improve connectivity between the upper and lower Fairbanks Spring and Soda Spring stream reaches. Removable fish barriers would be installed. These barriers could be deployed when needed to contain invasions by nonnative fishes, and removed when not needed to maintain genetic exchange and increase genetic fitness of native fishes.

1.4 Decision to be Made by the Responsible Official

The decision to be made by the responsible official, the Region 8 Manager, will be to authorize the restoration and improvements in the project area as proposed, vary the design and still meet the purpose and need, or to defer any action at this time. Authorization of this project would require that designs meet all U.S. Fish and Wildlife Service (USFWS) standards and applicable laws, and that necessary permits are obtained.

1.5 Scoping

The CCP EIS outlined the goals, objectives, and strategies anticipated to be employed by the Refuge over the next 15 years, including future restoration efforts. Public meetings to obtain comments on the final draft plan and environmental impact statement (EIS) were held in Las

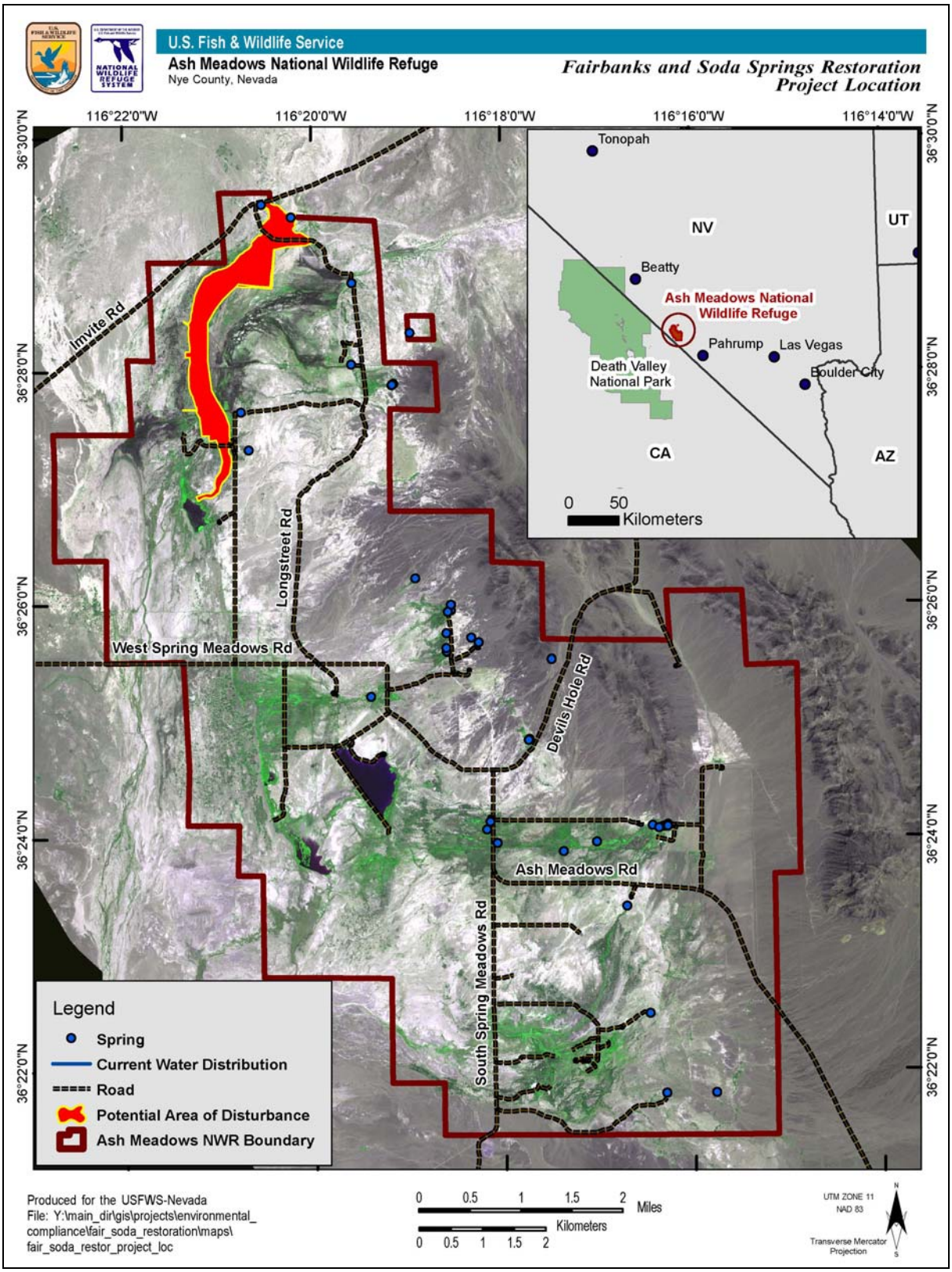


Figure 1. Map showing Fairbanks Spring and Soda Spring restoration project location.

Vegas, Amargosa Valley, Pahrump, Alamo, and Moapa (Nevada) on August 4-6, 2008.
In an effort to coordinate with agencies and other stakeholders, a Symposium on Ecological Investigations and Restoration Planning took place in February 2008 and February 2009. Each year, more than100 researchers, multi-agency staff, governmental partners, and local community members were in attendance. The springs restoration plan and design was open to the group for comment and discussion, with plan and design changes implemented on a collaborative basis.

In addition, "Ash Meadows Currents," a quarterly Refuge newsletter, featured the springs restoration project in fall 2009. Approximately 100 copies were distributed to private landowners with land adjacent to the refuge, local government officials, and other interested parties.

As part of a Refuge-wide cultural resource survey completed in 2008, several newly discovered prehistoric sites were located and the affiliated tribes were contacted by letter for consultation and eligibility recommendations. This effort included testing results from the prehistoric site in the Fairbanks Springs restoration area. On April 16, 2008, a presentation was made to the Southern Paiute language group at the Las Vegas Tribal Hall. The group subsequently made a field visit to the Refuge where they visited Fairbanks Spring and other Refuge sites. A site visit was also made by two members of the Death Valley Timbisha-Shoshone tribe on April 28, 2008, in response to the scoping.

Issues raised during scoping were primarily limited to state and governmental agency comments regarding the Refuge (USFWS 2009). Other potential issues were raised by the refuge staff, consultants, and other agency personnel. These issues included questions and comments regarding threatened and endangered species, air quality, cultural resources, recreation, migratory birds, and wetlands. These issues are analyzed in this EA to determine if significant impacts would occur to these resources resulting from the proposed project and to compare them to a baseline condition of No Action.

2.0 ALTERNATIVES

2.1 Alternative A (No Action)

Under the No Action Alternative, no hydrological restoration would take place, barriers to flow (berms, ditches, roads) would not be removed, the Fairbanks Spring outflow would not be returned to its historic path feeding the west side of the Carson Slough, and Soda Springs outflow would not be reconnected to the Carson Slough. Fairbanks Springs outflow would continue to flow into deteriorating irrigation ditches. The Refuge would continue to manage threatened and endangered species and habitat as they have in the recent past. Cattails would be removed, and AIS would be trapped as time and staffing allowed. Ash Meadows speckled dace (*Rhinichthys osculus nevadensis*) would not be translocated to Fairbanks Spring because of unsuitable habitat and viable populations of this species would continue to exist in only two spring systems in the southern half of the Refuge.

2.2 Alternative B (Preferred Alternative)

This project proposes to restore the natural hydrology of the springs by excavating new stream channels in the vicinity of the historic channels. Historically, these channels were dynamic, especially in the slough, and meandered over time in response to flood events. The primary goal of aquatic habitat enhancement and restoration is to restore hydrologic processes that will sustain and maintain aquatic habitat. The springs outflow channels have remained in an altered condition for several decades beginning with the development of the water source for irrigation purposes.

Aquatic habitat enhancement and restoration activities include spring source re-shaping/modification, stream channel excavation and construction, installation of fish barriers for future invasive fish species control, and the installation of stream crossing structures (culverts and Texas crossings) along Longstreet Road (also known as the North Road). Additional actions will include berm and impoundment removal (Figures 2, 3, 4, and 5).

As part of the overall restoration, obstructions to natural flow within the springs historic channels such as dams and old irrigation channels would be removed or filled in. The road to Fairbanks Spring (Longstreet Road) is currently built on a dam and would be modified to allow flow passage from the springs and flood events (Figure 6).

The USFWS produced a general outline and summary of aquatic habitat enhancement and restoration actions for the proposed project as detailed below (Otis Bay 2009):

1. Road Modification and Stream Crossing Construction Sequencing (see Figure 6).

- Modification of the North Road and stream crossing construction would be completed prior to stream channel construction.

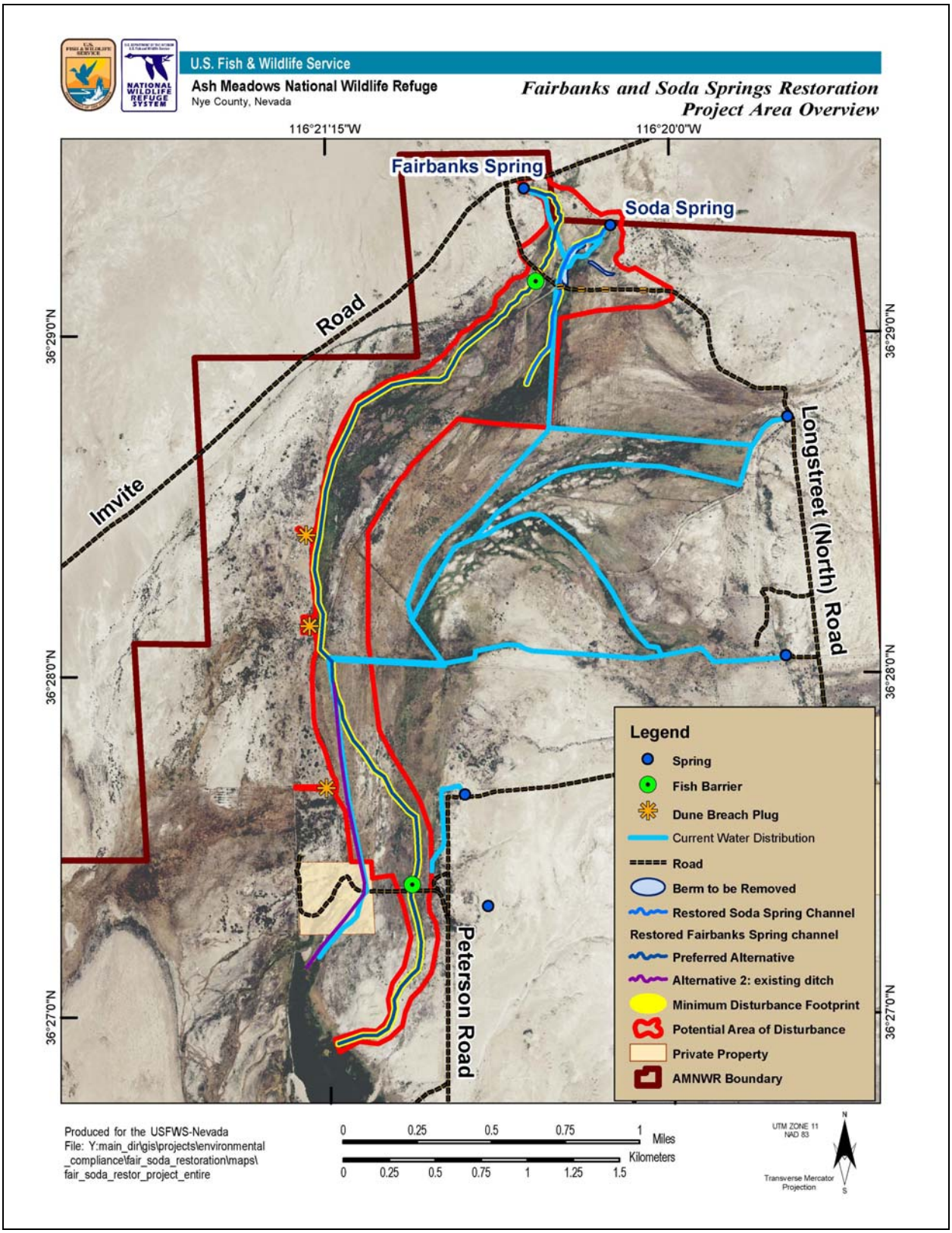


Figure 2. Map showing Fairbanks Spring and Soda Spring restoration project area overview.

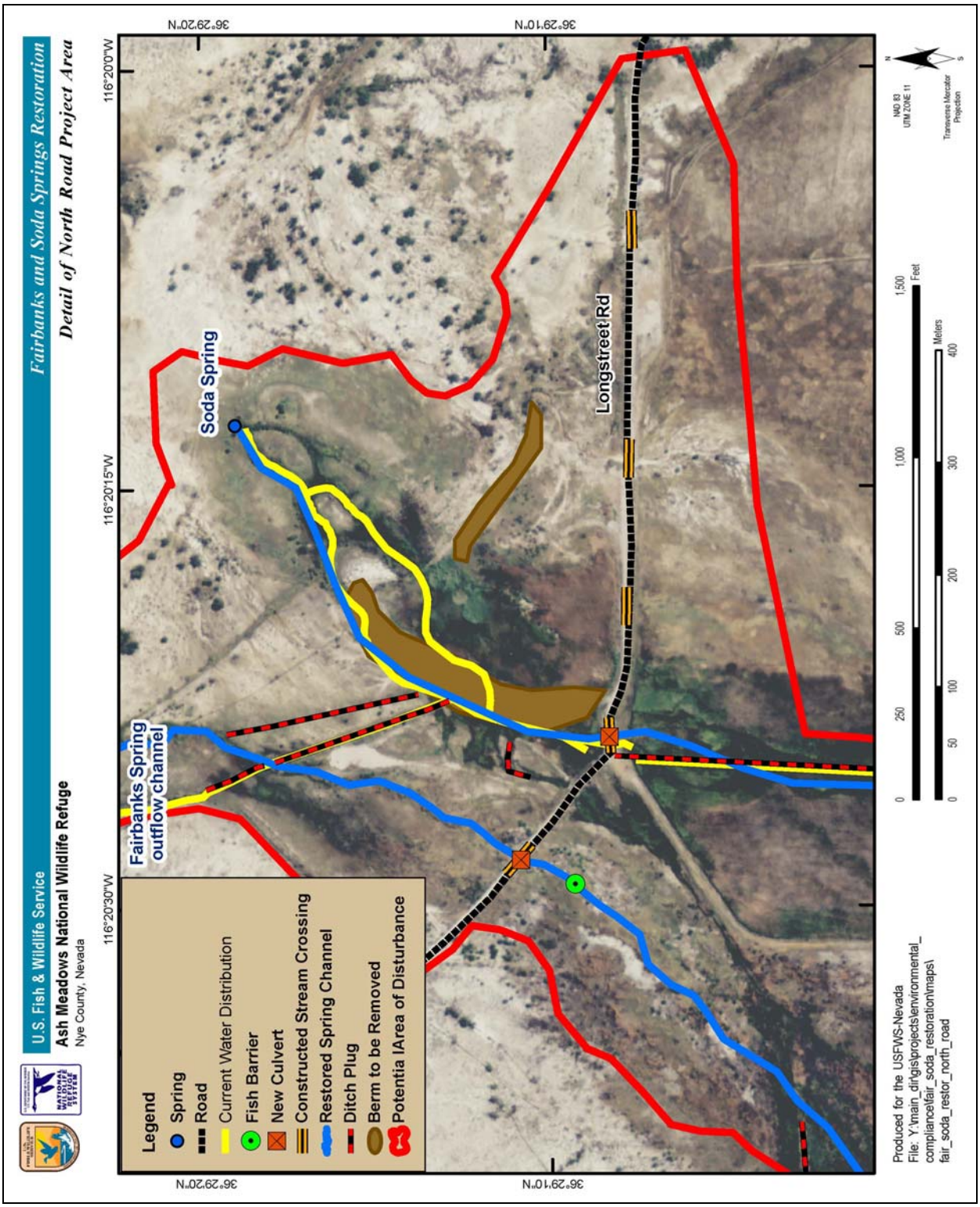
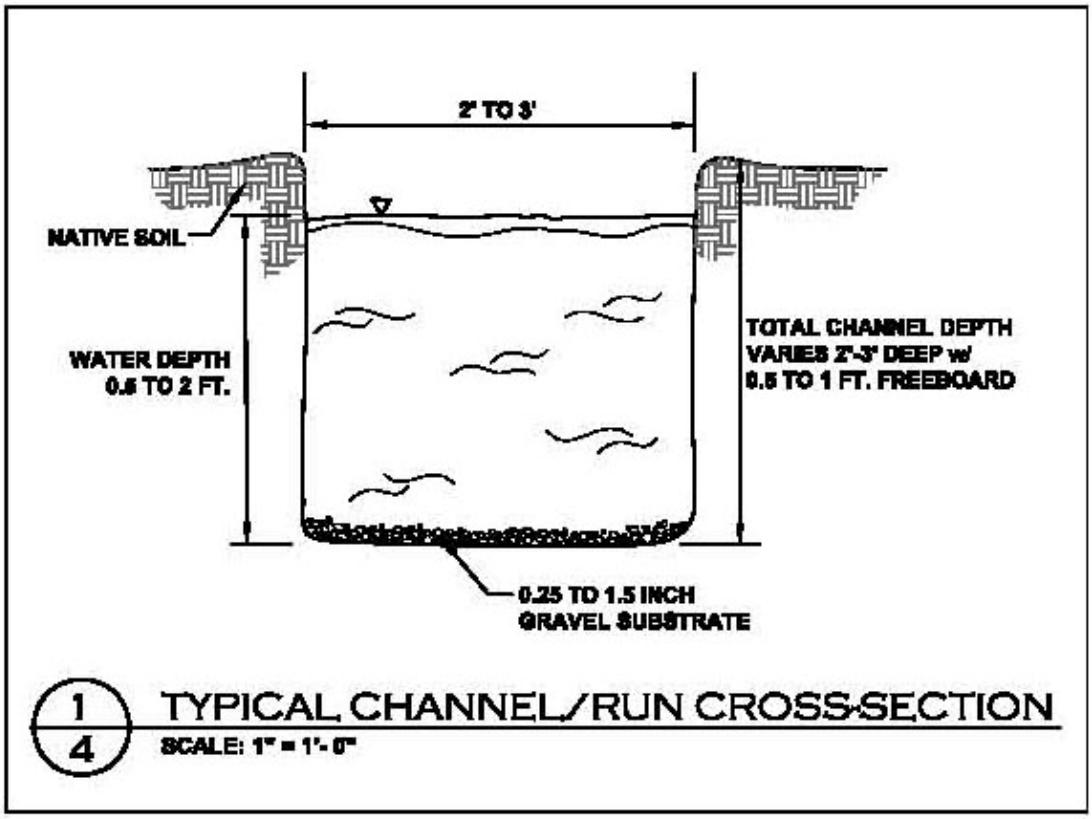


Figure 3. Map showing detail of Longstreet Road (North Road) project area.



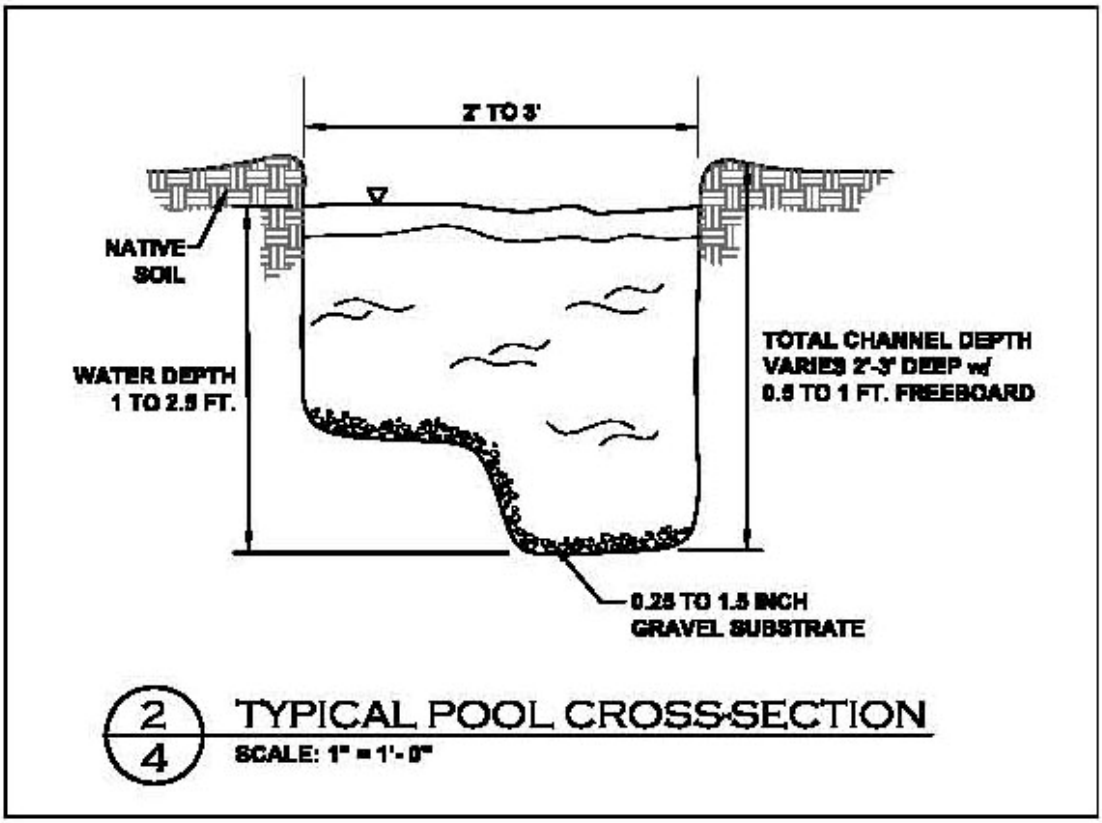


Figure 4. Illustration showing how the restored channel will be excavated in native soil with an undersized bucket to prevent over-excavation (Otis Bay 2009).

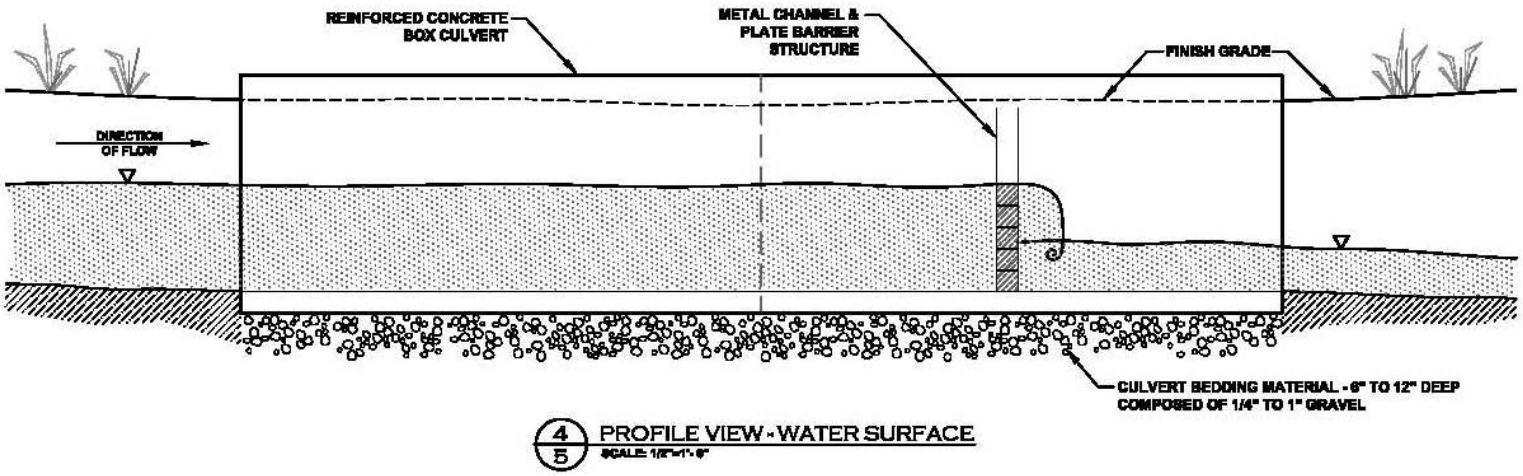


Figure 5. **Illustration showing fish barrier design. An adjustable flash board will allow for the use or removal of a vertical barrier, depending on management needs (Otis Bay 2009).**

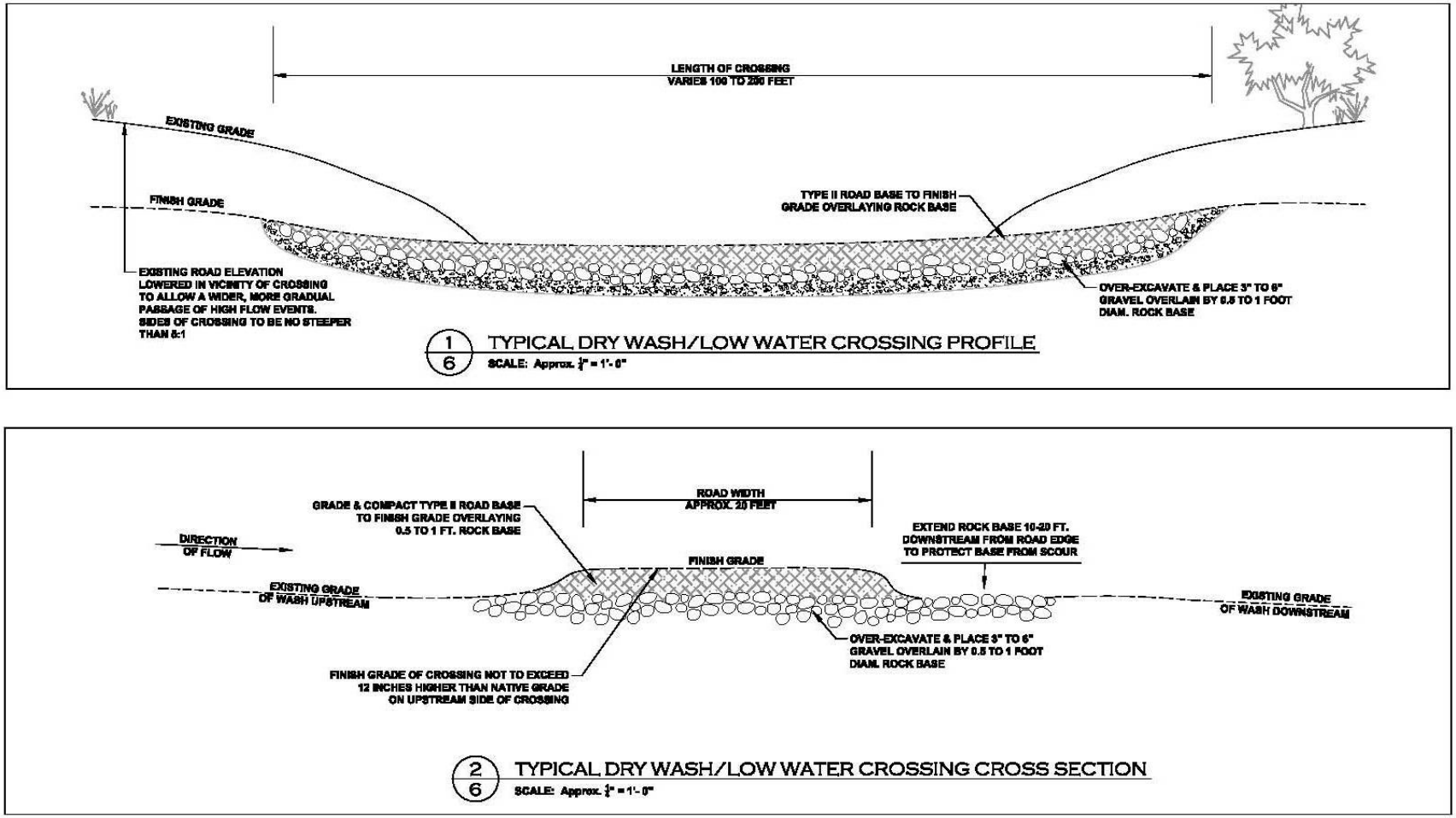


Figure 6. **Illustration showing that the North Road (dike) will be lowered approximately 2–3 feet (0.6–0.9 meters) to reduce impoundment of high-flow events (Otis Bay 2009).**

- The high point in the road at the junction of the North Road and Cable Road would be lowered to within 2 feet (0.6 meter) of the existing grade.

- Removal of Soda Spring berm would be completed simultaneously with the road modification and stream crossing construction if necessary.

2. Stream Crossing and Road Construction

- Construction of low water crossings in four locations along the North Road would allow high-flow events to pass into the upper Carson Slough between the constructed stream channels at Fairbanks Spring and Soda Spring. The installation of stream crossings would prevent impoundment of water on the upstream side of North Road and would spread out the erosive power of flood events that are now concentrated in a single, narrow crossing near the Soda Spring impoundment. Constructing multiple crossings with wide and gradually sloping road surfaces into the crossings would allow water to pass through a wider portion of the upper Carson Slough during high-flow events. The road and stream crossing width would be approximately 20 feet (6.0 meters), similar to the existing condition.

- The downstream edge of the stream crossing material would taper to a gradual slope into the downstream channel to prevent drop off on the downstream edge and reduce the potential for wash-out of the crossing during moderate or high-flow events from scour on the downstream edge of the crossing.

- Stream crossings would be constructed of riprap base of 3–6 inches (7.5–15.0 centimeters) overlain by cobble riprap of 6–10 inches (15.0–25.0 centimeters) with a Type II road base of 2 inches (5.0 centimeters) minus gravel.

- The Fairbanks Spring and Soda Spring crossings would be constructed with reinforced concrete box culverts.

3. Fairbanks Stream Channel Construction

- The stream channel would be excavated in vicinity of the historic channel location.

- The Fairbanks stream crossing, culvert, and fish barrier would be constructed and installed prior to discharge of water into new channel. The culvert at the Fairbanks Spring stream crossing would be a 4 feet wide and 3 feet high (1.2 meters wide and 0.9 meter high) reinforced concrete box culvert.

- The stream channel would be excavated in a dry condition, leaving flow in the existing ditch until final stage of construction.

- In general, the desired stream channel dimensions would be 2–3 feet (0.6–1.0 meter) wide and deep. The desired hydraulic conditions include a minor amount of variation in water depth within the constructed channel. The desired water depth is 1–3 feet (0.3–1.0 meter). Rock riffles would be added to the channel only if they are necessary to serve as hydraulic controls and to raise the water surface within the constructed channel.

- The constructed channel would be an earthen channel with a very limited use of rock. A small amount of 1-inch (2.54-centimeter) gravel would be added to the stream bottom. Large rock structures and riffles would not be constructed unless absolutely necessary to prevent and control incision and erosion of the constructed stream channel.

- Stream channel excavation would be initiated approximately 30 feet (9 meters) downstream from the Fairbanks Spring flume. The excavation of the upper 30 feet (9 meters) of stream channel would be completed when the water is diverted into the newly constructed stream channel.

- The alignment of the new stream channel would be located such that the new stream channel would cross the existing stream channel. Excavation of the new channel would terminate at the point where excavation would cross the existing channel. The excavation of this short section of new channel would be completed during the final stage of construction prior to turning water into the newly excavated channel. The approach to completion of this step during construction may require modification depending on the desired approach to invasive species eradication and exclusion from the new channel.

- Water would be shifted over to the new channel slowly (over the course of 1 month), allowing the channel to develop algae and an invertebrate prey base.

- Standard best management practices would be employed for erosion and sediment control. In addition, water entering Peterson Reservoir following reconstruction would be expected to be naturally filtered by nearly 0.25 mile (0.40 kilometer) of wetlands upstream of the reservoir, reducing turbidity and improving water quality.

- Prior to diverting the last of the water to the new channel, earthen plugs would be placed in the existing stream/irrigation channel at key locations. These would maintain pools of water to facilitate the final fish and invertebrate salvage efforts.

- Following the construction of the new Fairbanks Spring stream channel, diversion of water to the new channel, and fish and invertebrate salvage, the abandoned Fairbanks Spring channel would be filled with existing ditch spoils adjacent to the former channel.

4. Fairbanks Channel Design Parameters (see Figure 4)

- Channel excavation depth would be 2.0–3.0 feet (0.6–0.9 meter).

- Channel width would be 1.5–3.0 feet (0.5–0.9 meter).

- Channel water depth:
  - Pools would be 1.0–1.5 feet (0.3–0.5 meter) deep.
  - Riffles would be 0.5–0.75 foot (0.2–0.3 meter) deep.
  - Runs would be 1.0–2.0 feet (0.3–0.6 meter) deep.

- Flow velocity would be 0.5–1.5 feet per second (0.2–0.5 meters per second) based on hydraulic modeling of design channel.

- Channel freeboard would be 0.5–1 foot (0.2–0.3 meter).

- Average channel slope would be approximately 0.003 to 0.01.

- Overall, the channel would have a low degree of sinuosity in order to minimize vegetation from obstructing the flow. Minor and localized variations in channel alignment over a channel length of 10 to 30 feet (3 to 9 meters) would include meanders with a radius of approximately 8 to 10 feet (2.4 to 3.0 meters). These local variations would be constructed sparingly and only as necessary to create the desired hydraulic conditions and upstream water depth.

5. Soda Spring Stream Channel Construction (see Figure 4)

- Road crossings and road lowering in vicinity of Soda Spring would be completed, but the excavation of a new Soda Spring stream channel would be completed after Fairbanks Spring construction is complete.

- The culvert for the Soda Spring stream crossing would be a reinforced concrete box culvert 4 feet wide by 3 feet high (1.2 meters by 0.9 meter).

- The stream channel would be excavated in the vicinity of the historical channel location. It would be necessary to route the restored stream channel along the western margin of the Soda Spring berm in order to fill the Soda Spring impoundment and excavate the restored stream channel in native and more erosion-resistant soils.

- Soda Spring would be connected to or isolated from Fairbanks Spring depending upon the decision of the Ash Meadows Recovery Implementation Team (AMRIT). The consensus at this point is to leave them separated.

6. Berm, Impoundment, and Ditch Removal (see Figures 2 and 3)

- The Soda Spring impoundment would be filled with Soda Spring berm material and other soils created during road lowering and stream crossing construction.

- The upstream end of the current ditch leading to the double culverts would be filled to prevent high-flow events from diverting the constructed Fairbanks Spring channel toward

the double culverts, and also to reduce the potential for washout of the road at the double culverts. The double culverts would be left in place to facilitate drainage across the North Road. The double culverts can be removed in the future pending complete restoration of the upper Carson Slough and depending on future management decisions regarding the North Road.

- It would be necessary to fill numerous minor ditches between the constructed Fairbanks Spring and Soda Spring channels to prevent either channel from drifting or diverting during high-flow events, and to prevent the growth of saltcedar (*Tamarix* spp.) along these abandoned ditches.

- In order to prevent water in the constructed Fairbanks Spring channel from draining into a former ditch, it would be necessary to plug approximately 100 feet (30 meters) of ditch where the constructed Fairbanks stream channel passes through a former Fairbanks Spring diversion ditch.

7. Fish Barrier Design and Construction (see Figure 5)

- Two removable fish barriers would be installed to help control the upstream movement of nonnative fishes. Currently, Fairbanks Spring is free of nonnative fish because of a rotenone project completed in 2008. However, the gambusia (*Gambusia affinis*) that inhabit the downstream section and the connection with Peterson Reservoir (a high-risk site for human introduction of nonnative fishes) pose a threat. Installing removable barriers provides Refuge management with the choice of limiting nonnative movement or opening the system to encourage native fish gene flow when nonnatives are not a concern.

- The selected fish barrier sites would be the best locations based on existing grade. The upper barrier site is approximately 100 feet (30 meters) downstream from where the constructed stream channel would cross the North Road. The lower barrier is approximately 0.7 mile (1.1 kilometers) above Peterson Reservoir. Two more barriers may be placed between these to prevent the movement of sailfin mollies (*Poecilia latipinnainto*) into the Fairbanks Spring system.

- The selected fish barrier design includes two 12-foot (3.7-meter) sections of reinforced, open-top, concrete box culverts. The culverts would be installed in line with the constructed stream channel. The culvert sections would be installed end-to-end with a flash board system installed in the downstream-most culvert section. Stream flow would pass through the culverts and over a locking, tamper-proof flash board fish barrier. The installation of a flash board system would allow adjustment of vertical water surface drop over the barrier and would allow the barrier to be permanently or temporarily removed in the future. The inside dimensions of the culvert would be 5 feet high and 3 feet wide (1.5 meters by 0.9 meter). The flashboard would allow a range of vertical water surface drop over the structure from 0 to 3 feet (0.9 meter).

8. Native Fish and Snail Salvage

- There are currently few or no native fish in the Soda Spring system; however, Ash Meadows pupfish (*Cyprinodon nevadensis mionectes*) inhabit the Fairbanks Spring and its outflow. Excavation of the restored Fairbanks stream channel would be performed during dry conditions. The final step of channel restoration would be to divert water to the restored stream channel. The entire flow would not be diverted all at once, allowing time to salvage as many pupfish as possible. The water may be allowed to flow in both channels (old and restored) for approximately 1 month to allow time for algae and invertebrates to become established in the new channel. If deemed appropriate by the AMRIT, some fish may be salvaged prior to diverting water into the new channel and held in aquariums and fish-holding tanks at Refuge headquarters. This would reduce the competition for food and habitat in the reduced flow until a food base can become established in the restored channel. Holding facilities available for use include a 400-gallon Mini Fish Farm™, three 460-gallon fish tanks, and aquariums of various sizes (i.e., 110, 90, and 60 gallons).

- All species of native snails may also be collected and housed in aquariums at the Refuge headquarters because of the potential difficulties associated with salvaging the snails after the water has been diverted from the former channel to the restored channel. Potential concerns regarding snail salvage immediately following diversion of water into the constructed channel include time and staff limitations, desiccation, turbidity, and movement of snails upon initiation of water diversion. Diverting only half of the water for 1 month may alleviate some of these concerns.

9. Ash Meadows Speckled Dace Reintroduction

- Ash Meadows speckled dace (*Rhinichthys osculus nevadensis*) would be translocated from Bradford Spring and/or Jackrabbit Spring to the new Fairbanks Spring outflow channel. Preferably, this would occur as breeding season approaches, which is late February to early March. The entire project timeline has been developed with dace reintroduction in mind.

- This proposed restoration project is expected to begin in November 2009 with modification of the North Road and Soda Spring berm and impoundment removal. Diversion of water into the new Fairbanks Spring channel should begin in January or February 2010, and would be completed in February or March 2010.

Implementation of the Preferred Alternative would accomplish the purposes of the proposed project to conform with both local and national planning for the Refuge and meet the objectives for restoration outlined in the CCP EIS. In addition, the Preferred Alternative would meet the needs of the proposed project by mitigating the anthropogenic alterations that have resulted in sub-optimal habitat for endemic species.

3.0 AFFECTED ENVIRONMENT

This section describes the area in which the proposed project would occur and focuses on those resources that could be affected through implementation of the proposed project. This section does not provide a detailed description of the environment at large, but supplies the needed information for the reader to understand the discussion in Section 4 pertaining to the anticipated changes in the affected environment resulting from implementation of the proposed project.

The project area is within the Refuge, within the Amargosa Valley, of southwestern Nevada (Figure 1). The arid conditions of the surrounding valley floor and steep, uplifted mountain ranges provide a stark contrast to the lush environment of Ash Meadows. The Fairbanks Spring and Soda Spring restoration project occurs within Sections 9,10,16,21, and 28 Township 17 South, Range 50 East, Mt. Diablo Meridian.

The project area ranges in elevation from approximately 2,176 to 2,295 feet (663–700 meters) within the Mojave Desert. The predominant vegetation community in the project area is saltgrass (*Distichlis spicata*), baccharis (*Baccharis emoryi*), and mesquite (*Prosopis julifera* and *Prosopis pubescens*). Fairbanks Spring has a discharge of about 1,700 gallons per minute that maintains soil moisture in the project area. Uplands in the vicinity of the project area receive water only from rainfall, which averages less than 2.75 inches (6.98 centimeters) annually. The Refuge is the sole owner of surface water rights from both Soda Spring (65.2 acre-feet) and Fairbanks Spring (2,903.1 acre-feet).

As noted, this EA is tiered to the CCP EIS. The affected environment section of the CCP EIS describes the general physical and biological environment, cultural resources, visitor services, and socioeconomic conditions of the Refuge. As such, resource descriptions in the CCP EIS are incorporated by reference.

3.1 Air Quality

The Air Quality section of Section 4.2.1: Physical Environment of the Final Desert National Wildlife Refuge Complex Comprehensive Conservation Plan and Environmental Impact Statement (2009) (Final CCP EIS) is hereby incorporated into this EA by reference.

Ambient air quality is not currently measured at the Refuge. It is expected that low ambient concentrations of criteria pollutants would occur in this area based on nearby uses. Fugitive dust may occasionally produce high amounts of pollutants from nearby activities related to the American Borate facility closure, as well as traffic on nearby dirt roads. The nearest development source of emissions approximately is 22 miles (35 kilometers) to the southeast in Pahrump, Nevada, and the Las Vegas area approximately 80 miles (128 kilometers) to the southeast. Because of synoptic wind patterns and the overall distance from these cities, these sources are not expected to have an impact on the project area.

3.2 Threatened and Endangered Species and their Critical Habitat

The Sensitive Plants and Sensitive Wildlife sections of Section 4.2.2: Biological Resources of the Final CCP EIS are hereby incorporated into this EA by reference.

Seven species that are listed as threatened or endangered under the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq.) may occur within the project area or may be affected by the proposed project. These species include the Ash Meadows Amargosa pupfish, southwestern willow flycatcher (*Empidonax traillii extimus*), Ash Meadows speckled dace, Devils Hole pupfish (*Cyprinodon diabolis*), spring-loving centaury (*Centaurium namophilum*), Yuma clapper rail (*Rallus longirostris yumanensis*), and Amargosa niterwort (*Nitrophila mohavensis*).

3.2.1 Ash Meadows Amargosa Pupfish

The Ash Meadows Amargosa pupfish occupies numerous springs and outflow channels within Ash Meadows. Populations also exist in Crystal Reservoir, Lower Crystal Marsh, and Peterson Reservoir, but these populations can vary by several orders of magnitude. Because the habitats of the Ash Meadows Amargosa pupfish comprise most of the surface water in the area, they were the most altered during agricultural development. The entire habitat of this species has been affected by diversion into earthen or concrete channels, impoundments, drying caused by groundwater pumping, or elimination of riparian vegetation (USDI 2000); however, populations within most of the major springs appear to be faring well.

Soda Spring is not a major spring and is believed to have few, if any, pupfish. Salvaging efforts prior to rotenone treatments in January 2008, turned up only a single male and a single female that reproduced while being held in an aquarium. Because the quality of habitat at Soda Spring is poor, these two fish and their offspring were moved to Fairbanks Spring stream channel after treatments concluded.

Fairbanks Spring (springpool only) has averaged approximately 1,200 pupfish during fall surveys over the last 14 years. The estimated population in fall 2008 was 1,422. The springpool is not part of the project area. Native fish surveys have not included the outflow channel of Fairbanks Spring, but prior to the 2008 rotenone project, 4,831 pupfish were salvaged from the spring and more than 1 mile (1.6 kilometers) of outflow channel.

3.2.2 Ash Meadows Speckled Dace

Collection records show that the Ash Meadows speckled dace once shared many of the same springs and outflows that the Ash Meadows Amargosa pupfish inhabits (U.S. Dept of the Interior 2000), but they are now only found in two springs (Bradford Spring and Jackrabbit Spring) in stable populations. Several hundred speckled dace were introduced into the combined outflow of the Point of Rocks springs in 2004 and 2005, and into Forest Spring in 2006. Current status of these populations is not known, but from recent surveys by the U.S. Geological Survey, their numbers appear to be minimal. Loss of faster-flowing, cool water because of habitat alteration, along with introduced aquatic species has prevented the reintroduction of the Ash Meadows speckled dace into most of its historic habitat.

There are no Ash Meadows speckled dace in the vicinity of Fairbanks Spring, Soda Spring, and the upper Carson Slough. However, reintroduction of speckled dace to this area is planned as part of the proposed project. These fish would come from Bradford Spring and/or Jackrabbit Spring.

3.2.3 Devils Hole Pupfish

The Devils Hole pupfish occurs naturally in only one limestone cave on land managed by the National Park Service, just within the Refuge boundary. The large amount of acreage designated essential habitat surrounding Devils Hole represents the area in which groundwater pumping is most likely to adversely affect the water level in Devils Hole (USDI 2000). Declining water level is still a major threat to this pupfish, although the reason(s) for its declining population is still not understood.

3.2.4 Southwestern Willow Flycatcher

One breeding pair of flycatchers occupied habitat in Carson Slough near the springs until a lightning-caused wildfire burned the habitat in 2004. The habitat was marginally suitable, consisting of dense mesquite and tamarisk with no permanent water source within 1,300 feet (400 meters). The southwestern willow flycatchers had already left the area after fledging a brown-headed cowbird. They had not had a successful nest in the previous two years (2003–2004) (Furtek and Tomlinson 2005). Although migrant flycatchers have been observed within the potential area of disturbance for the proposed project, none have nested within the project area since 2004.

3.2.5 Yuma Clapper Rail

The Yuma clapper rail is a marsh bird that inhabits freshwater or brackish stream-sides and marshes with dense cattails, bulrushes, and other aquatic vegetation. The Refuge lies at the northern most edge of its range. Prior to 2007 the species had been documented only once on the Refuge in 1999 near Crystal Reservoir and was detected by call only (Garnett et al. 2004, Micone and Tomlinson 2000). In 2007 a single auditory detection was reported at Peterson Reservoir. The species was observed and detected by call on two occasions during marsh bird surveys in 2008 at Peterson Reservoir, and the presence of 2 or 3 individuals was suspected. This suggests that the Yuma clapper rail may be breeding in the project area (Lundblad 2008). The species was detected again during marsh bird surveys in 2009. No designated critical habitat occurs within the Refuge. Historically, the Yuma clapper rail is not believed to have occurred on the Refuge, though its range appears to be extending northward.

3.2.6 Amargosa Niterwort

The only known populations of the Amargosa niterwort at the time of listing were located in the southern portion of Carson Slough in Nevada and California, but outside the authorized boundary of the Refuge. Although there is no designated critical habitat within the Refuge, populations have been found near Crystal Reservoir and another near Soda Spring. The total population within the Refuge has been estimated at 78,406 ramets (BIO-WEST 2008). This species is found in highly alkaline, moist, salt-encrusted clay soils. In many locations no other plant species occupy this habitat, but saltgrass is often found on the periphery, or occasionally intermixed within Amargosa niterwort populations (USFWS 1990). Currently, the major threats

to the Amargosa niterwort are lack of life history information and plant habitat requirements, and the reliability of the Crystal Reservoir dam (below which lies the major portion of the Refuge population). There is some evidence that the species is highly dependent on surface or near-surface water.

The closest population to the project area consists of a little less than 4,000 ramets and lies approximately 375 feet (114 meters) outside the maximum area of disturbance.

3.2.7 Spring-loving Centaury

The spring-loving centaury is an annual that is found on moist to wet clay soils along the banks of streams or in seepage areas (Mozingo and Williams 1980). Populations of this species have rebounded since listing because of the removal of livestock from the area. Recent surveys have identified a total estimate of 4,468,571 individual plants (BIO-WEST 2008). There are ten populations that fall within the potential area of disturbance. Three populations containing a total of 3,116 plants lie near areas of channel construction or ditch and berm removal. Four populations containing a total of 866 plants lie near the access road and stream crossing construction area. One population lies on the edge of the potential area of disturbance and contains about 8,400 individual plants covering 3,200 square feet (297 square meters).

3.3 Cultural and Historic Resources

Section 4.2.3: Cultural Resources of the Final CCP EIS is hereby incorporated into this EA by reference.

Cultural and historic resources have been documented throughout the Refuge and within the project area (HRA 2008). This detailed survey identified more than 250 archeological sites and 40 historic sites on the Refuge, some of them within the project area. The area surrounding Fairbanks Spring is particularly rich in cultural and historic resources and several sites are in the vicinity of the project area shown in.

3.3.1 Fairbanks Spring Site 26NY1729

Cultural and historic investigations (HRA 2008, Speulda et al. 2002) have demonstrated that there are buried deposits in the project area. As noted in the 2008 HRA report:

> Although the artifacts have been impacted by erosion, the information potential of the site is still excellent. HRA identified three midden areas on site which are likely to contain buried deposits. The prehistoric component has been assigned to Type 5, Seasonal or Long-term Habitation. Sites of this kind have the potential to contribute to all of the major research themes that can be applied to prehistoric sites, including the Themes of Chronology, Technology and Subsistence, and Contacts (Travel, Trade, and Cultural Affiliation), as well as the integrative Theme of Settlement. Evidence of thermal features, including ash- or charcoal-stained soil, at sites of this kind is a good indicator that charred specimens suitable for radiocarbon dating and indicative of subsistence pursuits are likely to be found there. The site appears to be sufficiently intact to produce this and/or other kinds of evidence relevant to the research themes.

3.3.1 Soda Spring Site 26NY11504

Cultural and historic investigations (HRA 2008) note that Soda Spring is associated with a historic site that consists of a burned house structure with two out-buildings or features. As noted in the 2008 HRA report:

> It has no architectural integrity, nor is it associated with a significant individual or historic period. It has deteriorated further since it was originally recorded. As a result, the site no longer retains information regarding homesteading activities at Ash Meadows.

3.4 Recreation

Section 4.2.4: Public Access and Recreation of the Final CCP EIS is hereby incorporated into this EA by reference.

The Refuge was established primarily to conserve threatened and endangered plant and animal species. In addition, the refuge is managed to promote all native species of wildlife and to provide wildlife-oriented recreational opportunities that are compatible with its primary purpose. These opportunities include wildlife observation, wildlife photography, interpretation, education, and hunting. At Fairbanks Spring there is a parking lot for recreational users and the area is designated as a hunting area during appropriate times of the year.

3.5 Invasive and Nonnative Plants and Animals

The Noxious Weeds and Wildlife sections of Section 4.2.2: Biological Resources of the Final CCP EIS is hereby incorporated into this EA by reference.

According to the UFWS, invasive species have become the single greatest threat to the Refuge System. This threat is clearly visible throughout Ash Meadows, where close to 100 species of nonnative plants and animals have been introduced. The invasive nature of some of these species threatens the listed and endemic species of Ash Meadows, alters ecosystem processes, degrades wildlife habitat, reduces the quality of wildlife-dependent recreation, and prevents habitat restoration, public access, and construction of public facilities in infested areas.

The Refuge is mandated through policy to control or eradicate nonnative species. An estimated 4,460 acres (1,805 hectares) within Ash Meadows were used for agricultural production and livestock grazing, including the project area. Many of these abandoned fields now contain monocultures of nonnative species, including: Russian knapweed (*Acroptilon repens*), hoary cress (*Cardaria draba*), five hook bassia (*Bassia hyssopifolia*), Malta starthistle (*Centaurea melitensis*), yellow starthistle (*Centaurea solstitialis*), sorghum and Johnson grass (*Sorghum bicolor* and *S. halepense*) and red brome (*Bromus rubens*). In many parts of the Refuge, these monocultures appear to be expanding beyond the historic field into surrounding areas. The extent of this expansion and its threat are just beginning to be understood through preliminary vegetation mapping and research investigations funded by the Refuge. Weed expansion beyond the existing agricultural fields is a concern because of the potential threat posed to listed plants

including the Ash Meadows gumplant (*Grindelia fraxino-pratensis*), spring-loving centaury (*Centaurium namophilum*) and Ash Meadows ivesia (*Ivesia eremica*).

In 2002 and 2005, lightening ignited large fires in the thick saltcedar stands of the upper Carson Slough in and near the project area. Currently, a refuge-wide effort is underway to remove saltcedar mechanically. The historic outflow of Fairbanks Spring is now clear of saltcedar stands, but maintenance will be required in the future. In addition, AIS including convict cichlid, sailfin molly, gambusia, and crayfish have been found within the project area stream channels. These invasive species threaten endemic and native species including the Armargosa pupfish and the speckled dace reintroduction efforts.

3.6 Wetlands

The Vegetation section of Section 4.2.2: Biological Resources of the Final CCP EIS is hereby incorporated into this EA by reference.

The project area was historically the largest wetland in southern Nevada. However, peat mining in the 1960s destroyed the majority of the wetlands and decreased wetland function dramatically. The project area contains alkali shrub habitat, some riparian woodlands dominated by the nonnative tamarisk, and some alkali meadows. There are approximately 40 acres (16 hectares) of wetlands in the project area.

3.7 Migratory Birds

The Birds section of Section 4.2.2: Biological Resources of the Final CCP EIS is hereby incorporated into this EA by reference.

Executive Order issued January 11, 2001, further defines the responsibilities of the Federal agencies to protect migratory birds; the Migratory Bird Treaty Act of 1918 and subsequent amendments (16 U.S.C. 703-711) state that it is unlawful to take, kill, or possess migratory birds. A list of those protected birds are found in 50 C.F.R. 10.13.

Plant communities within the project area are generally representative of those found across the Refuge as a whole. The project area lacks mature overstory trees such as leather-leaf ash (*Fraxinus velutina var. coriacea*) and Fremont cottonwood (*Populus fremontii*), which are often associated with other springs located on the Refuge. Because habitat within the project area is generally representative of habitat found across the Refuge as a whole, bird species found in the vicinity Carson Slough, such as northern flicker (*Colaptes auratus*), verdin (*Auriparus flaviceps*), Bewick's wren (*Thryomanes bewickii*), loggerhead shrike (*Lanius ludovicianus*), common raven (*Corvus corax*), western kingbird (*Tyrannus verticalis*), northern mockingbird (*Mimus polyglottos*), Bullock's oriole (*Icterus bullockii*), Gambel's quail (*Callipepla gambelii*), western meadowlark (*Sturnella neglecta*), blue grosbeak (*Passerina caerulea*), and mourning dove (*Zenaida macroura*) are representative of bird communities within the Refuge.

4.0 ENVIRONMENTAL CONSEQUENCES

Only critical elements of the environment that would potentially be affected by the proposed project are considered in this EA. In this section those elements are evaluated for potential effects and analyzed using criteria that disclose the intensity of an impact.

4.1 Alternative A (No Action)

This section discloses the impacts and benefits associated with taking no action and serves as a baseline for comparison with the proposed project.

4.1.1 Air Quality

Air Quality at the Refuge and within the project area would remain unaffected under the No Action Alternative.

4.1.2 Threatened and Endangered Species and their Critical Habitat

Threatened and endangered species would continue to be managed as they have in the recent past. No habitat modification from restoration activities would occur, and no effects from the proposed project would be realized. Habitat for endemic species would not improve and habitat modification in the form of increased invasive species would continue. Over time, habitat for endangered species would degrade and the viability of some species may come into question.

4.1.3 Cultural and Historic Resources

Cultural and historic resources in the vicinity of the project area would remain unaffected under the No Action Alternative because no ground disturbance would occur.

4.1.4 Recreation

Recreational opportunities around the springs would remain as they have in the recent past under the No Action Alternative. Recreational opportunities would not be enhanced over time as a result of the spring restoration. There would be no potential for minor or temporary impacts to wildlife or hunting opportunities.

4.1.5 Invasive and Nonnative Plants and Animals

Invasive plants and animal management would continue in the project area as it has in the recent past. Noxious weed infestations and the proliferation of AIS that potentially prey upon endemic species and compete for resources would likely continue or expand. Re-vegetation with native plants in the project area would not occur, and exotic plants would expand their range in the project area over time. Unnaturally severe wildfires associated with nonnative vegetation, which are particularly damaging to native aquatic life, would continue. Invasive species such as convict cichlid, sailfin molly, gambusia, and crayfish would continue to compete for resources and prey upon endemic species.

4.1.6 Wetlands

Wetlands in the project area would not be restored but would remain in a similar condition to present.

4.1.7 Migratory Birds

Migratory birds would continue to utilize the project area to the extent that suitable habitat is available. No short-term construction impacts would occur and the habitat would not be enhanced for endemic species. Under this scenario, it is not likely that habitat conditions would improve or bird populations increase.

4.2 Alternative B (Proposed Action)

This section discloses the impacts and benefits associated with implementation of the proposed project.

4.2.1 Air Quality

Construction activities associated with the proposed project would cause a short-term degradation of air quality within the project area. An increase in pollutant emissions is expected as a result of heavy equipment activity. This increase in construction-related emissions would be temporary and localized, with emission levels not anticipated to exceed the National Ambient Air Quality Standards (NAAQS). Emissions would be further reduced through use of equipment in good working order and by minimizing unnecessary idling of vehicles.

Generation of fugitive dust is expected in the project area as a result of earth excavation, vegetation removal, and heavy equipment operation. Fugitive dust emissions would vary depending on the level of activity, specific construction techniques, soil characteristics, and weather conditions. Fugitive dust is composed of relatively large particles that settle out quickly, thus localizing the effect to air quality. Construction techniques such as utilizing water, mulching, and/or applying surfactants may be used where appropriate to minimize dust emissions. In general, these impacts would be localized and temporary. No significant impacts are likely to occur.

4.2.2 Threatened and Endangered Species and their Critical Habitat

A Biological Assessment was prepared in July 2009 for the seven species that occur in the project area and could be affected by implementation of the proposed project. Three of the seven potential affected species that were evaluated had a “no affect” determination. These species included; the southwestern willow flycatcher, Devils Hole pupfish, and Amargosa niterwort. These species were also determined to have “no adverse modification” to their critical or essential habitats.

One species and its critical habitat were found to have a “may affect, not likely to adversely affect” determinations including Yuma clapper rail.

The Biological Assessment concluded that adverse effects may occur to three species. Formal consultation was initiated for the Ash Meadows Amargosa pupfish and the Ash Meadows speckled dace and spring-loving centaury. A Biological Opinion, file #84320-2010-F-0011 (Ash

Meadows 2009) was issued for the proposed project on October 16, 2009. Specific potential impacts to individual species are included below.

4.2.2.1 Ash Meadows Amargosa Pupfish

Potential adverse effects to Ash Meadows Amargosa pupfish from the proposed project may include: harassment and direct loss of pupfish during capture and relocation activities (salvage operations) or while being held in aquariums or holding tanks, direct loss of pupfish remaining within the irrigation ditches after water is diverted to restored channels, and direct loss of fish from a temporarily reduced food supply in the new channel. However, the effects of the proposed project would be the result of restoring and enhancing aquatic habitat resulting in long-term benefits to the Ash Meadows Amargosa pupfish and other endemic species.

The food supply is one of the biological environmental elements identified as necessary for survival and recovery of the Ash Meadows Amargosa pupfish. The newly constructed channel would, at first, be devoid of the needed food supply, but algae and organisms would be flushed downstream from the springpool, and algal growth and repopulation by invertebrates should occur quickly. (Algae beds developed in three weeks after the School Springs restoration.) Natural repopulation would be supplemented by inoculating the system with salvaged invertebrates. Therefore, the temporary loss of invertebrates or algae would not destroy or adversely modify habitat to the extent that the constituent elements are appreciably diminished and the habitat no longer serves its role in the survival and recovery of this species. There would actually be an increase in the amount of habitat, and as natural hydrological processes return, an increase in higher quality habitat.

Adverse effects would be minimized by capture and relocation of native fish prior to, and/or during restoration activities. These operations would consist of seining or trapping, and would involve handling fish. While fish may be harassed or killed during capture and relocation, capture and handling of these fish would be performed by qualified biologists, minimizing these effects. Other measures shall be taken to minimize effects, such as the use of Stress Coat® in temporary transportation containers, acclimatizing fish to local conditions (e.g., water temperature and chemistry), and minimizing the length of time fish are held in the transportation containers.

Ash Meadows Amargosa pupfish were held in tanks and aquariums for more than 3 weeks during the rotenone treatments in 2008. Approximately 50 percent of the pupfish survived and were returned to the Fairbanks Spring system. Refuge staff learned much about maintaining fish in captivity during this time. Several months later, Warm Springs pupfish (*Cyprinodon nevadensis pectoralis*) were held in tanks for more than 8 weeks during the restoration of School Springs. These fish successfully reproduced and 127 more pupfish were returned to the restored spring than were salvaged prior to the start of restoration. The number of fish salvaged during the proposed project and the length of time they must be held would affect the mortality rate. Mortality can be minimized if some fish can be kept in the old ditches until sufficient algae and invertebrates become established in the new channel by dividing the water between the new and old stream channels.

Because of the nature of the habitat, some individuals may evade all capture techniques during salvage and relocation efforts. The majority of these individuals would most likely be juvenile or larval pupfish, but the numbers cannot be determined.
Therefore, the proposed project may affect and is likely to adversely affect the Ash Meadows Amargosa pupfish, and would temporarily adversely modify the habitat. These effects would be minor and temporary.

Because the proposed project is likely to result in net long-term benefits to habitat and populations of pupfish in the project area, no significant adverse impacts would occur.

4.2.2.2 Ash Meadows Speckled Dace

The restored channels would provide the required faster-flowing water, and the length of the Fairbanks Spring channel would produce the desired cooler temperatures. Soda Spring is also a source of cooler water. The number of dace translocated at any one time would depend on the results of population surveys at Bradford Spring and Jackrabbit Spring, and recommendations of the AMRIT. The restoration would result in almost 4.0 miles (6.4 kilometers) of potential new dace habitat if the entire project is completed; and approximately 2.5 miles (4.0 kilometers) if there is only enough money to complete the upper half.

Potential adverse effects to the Ash Meadow speckled dace from this action may include harassment and direct loss of dace during capture and relocation activities. Therefore, the proposed project may affect and is likely to adversely affect the Ash Meadows speckled dace. There would be no adverse modification of habitat, and in fact, this action would result in doubling the available habitat for the Ash Meadows speckled dace.

Because the proposed project is likely to result in net long-term benefits to habitat and populations of speckled dace in the project area, impacts would be minor and temporary. No significant adverse impacts would occur to speckled dace.

4.2.2.3 Devils Hole Pupfish

The proposed actions would occur 4–5 miles (6–8 kilometers) from Devils Hole; distant enough to prevent exposure to the pupfish from any impacts. Although 123 acres (50 hectares) of the potential area of disturbance and 1.3 miles (2 kilometers) of channel construction would occur within the 21,000-acre (8,500-hectare) “watershed” designated as essential habitat, the proposed project would not impact the groundwater or the water level at Devils Hole.

There would be no effect on the Devils Hole pupfish, and no adverse modification of essential habitat. As a result, there would be no significant impacts to Devils Hole Pupfish.

4.2.2.4 Southwestern Willow Flycatcher

The restoration of the springs would not adversely modify habitat because there is no longer habitat present in the project area. In addition, there is no designated critical habitat for the flycatcher within the Refuge. Restoration would likely provide better opportunities for establishment of riparian habitat that is conducive for flycatcher breeding and nesting. There would be no significant impacts to the Southwestern willow flycatcher.

4.2.2.5 Yuma Clapper Rail

Peterson Reservoir is at the southern end of the project area and it is possible that the presence of machinery and humans could disturb nesting rails. Impacts could be avoided by completing this section of the restoration outside of the breeding season. Therefore, any potential impacts are expected to be insignificant or minor in nature. The Yuma clapper rail may be affected, but is not likely to be adversely affected by the proposed actions. There would be no significant impacts to the Yuma clapper rail.

4.2.2.5 Amargosa Niterwort

The closest population to the project area consists of a little less than 4,000 ramets. This population lies approximately 375 feet (114 meters) outside the maximum area of disturbance. Although no equipment or disturbance should approach anywhere near this population, it would be flagged prior to the start of the project to insure its protection. There would be no effect on the niterwort and no adverse modification of critical habitat. There would be no significant impacts to the Amargosa niterwort.

4.2.2.6 Spring-loving Centaury

Approximately 77 acres (31 hectares) of designated critical habitat north of Peterson Reservoir lies within the potential area of disturbance, but no plants were found there during surveys in 2008. The proposed channel alignment would be constructed through critical habitat, initially impacting between 0.23 and 0.35 acres (between 0.09 and 0.14 hectares) of critical habitat (depending on constructed channel width). However, an increase in wetted soils following channel construction will provide more appropriate habitat conditions for the species than currently exists. This action will create additional spring-loving centaury habitat and future population expansion within critical habitat.

The total number of plants within the potential area of disturbance that could be impacted is 12,382. As such, less than 0.3 percent of the total population of spring-loving centaury has the potential to be impacted. Removal of the berms and cattail-infested impoundments below the confluence of Soda Spring and Fairbanks Spring is expected to benefit the species since heavy cattail growth excludes spring-loving centaury. Since spring-loving centaury is often found along stream banks, the increased length of the new channel also has the potential to benefit spring-loving centaury as cattail encroachment is eliminated or minimized.

Although no plants were observed in the project area during past surveys, the area would be re-surveyed prior to construction. If plants are present, populations that can be avoided would be flagged and seed would be collected for use in revegetation following channel restoration.

The overall effect on this species by the restoration of the hydrology is expected to be beneficial. Impacts are expected to be temporary and minor. As a result, there would be no significant impact to the spring-loving centaury.

4.2.3 Mitigation Measures to Reduce Effects on Threatened and Endangered Species

The following mitigation measures will be undertaken to reduce the effects of the proposed project.

1. A USFWS biologist would monitor all activities in the project area.

2. Equipment and human access zones would be delineated by fencing and flagging.

3. Prior to or during restoration activities, fish would be salvaged to the greatest extent possible in coordination with Nevada Department of Wildlife and/or Ecological Services biologists, using standard techniques to capture, hold, acclimatize, and release pupfish.
4. All buckets used as short-term salvage containers for transportation of fish to the holding tanks would contain Stress Coat® (a conditioner that replaces a fish's slime coat and reduces electrolyte loss). Additionally, all fish would be acclimated to respective holding locations as quickly as possible.

5. Rare plant populations occurring in or near the potential area of disturbance would be flagged and avoided to the extent feasible. Plants that cannot be avoided (if any), would be transplanted or their seed collected for use in re-vegetation after channel restoration is completed.

6. Prior to implementation of habitat improvement activities, all work equipment would be washed and inspected for nonnative seeds and reproductive parts of nonnative plants (or earthen material that may contain them). Nonnative materials would be removed and disposed of appropriately. All equipment to be used for implementation would be thoroughly cleaned prior to mobilization to and from the project area.

7. The Refuge would provide to the Las Vegas Ecological Services office and Nevada Department of Wildlife reports on the success of plant transplantation efforts, pupfish salvaging, and dace reintroduction. Refuge staff would also work cooperatively with these agencies and the U.S. Geological Survey-Biological Resources Division to ensure all activities are carried out to minimize adverse effects.

4.2.4 Cultural and Historic Resources

A cultural resource assessment has been conducted for the proposed project that meets the Section 106 guidelines of the National Historic Preservation Act. A testing plan to investigate the possibility of the proposed project impacting site 26NY1729 was completed by the Refuge. The Nevada State Historic Preservation Office (SHPO) concurred that the plan would assist in the determination of the potential effect of the proposed project on the historic property (SHPO 2008a). As part of the testing plan, the following tasks were completed: surface inventory and mapping, hand excavation of test excavation units, excavation of a strip trench, mechanical excavation of backhoe trenches, and collection of artifacts and samples.

The testing plan concluded that restoration activities at Fairbanks Spring would not impact cultural resources within the Fairbanks Spring Site 26NY1729 boundary. The SHPO concurred with this determination in a letter dated July 14, 2009, which states that the proposed project would "not pose adverse effect to the contributing elements of this historic property" (SHPO 2008b).

Although located in Proximity to the proposed project, Soda Spring Site 26NY11504 is not within the area of potential impact and would not be affected.

As a result, no significant impacts to cultural or historic resources are likely to occur.

4.2.5 Recreation

Restoration activities are expected to benefit habitat for plants and wildlife within the project area. As a result, recreation activities associated with plants and animals are expected to be enhanced over time. These activities include wildlife observation, wildlife photography, interpretation, education, hiking, and hunting. Some restoration activities may take place during hunting season. These activities have the potential to displace wildlife and/or hunting opportunities. These impacts would be minor and temporary because other areas on the Refuge would still be available for hunting and because wildlife is expected to return upon completion of the proposed project. No significant impacts are likely to occur to recreational resources.

4.2.6 Invasive and Nonnative Plants and Animals

The restoration of the springs was proposed, in part, to decrease the prevalence of invasive plants and animals within this area of the refuge. As such, it is likely that invasive plants and animals, particularly fish and noxious weeds, would decrease throughout the area and be replaced over time by endemic species.

However, the scope of the proposed project increases the likelihood that invasive plants and animals, particularly noxious weeds, could be transported by machinery, equipment, or people to portions of the project area and become established. The use of best management practices and continued monitoring would decrease the likelihood of noxious weeds becoming established. Best management practices include the washing of construction equipment before and after project use, educating construction crews, and following a re-vegetation plan focused on planting native vegetation. The use of mechanical controls and herbicides as appropriate may also be used.

The installation of fish barriers is part of the proposed project, intended to reduce predation of invasive fish such as convict cichlid, sailfin molly, and gambusia on endemic fishes. Although extirpation of exotic fishes has proven difficult, it is expected that use of fish barriers and continued maintenance would increase the quality for endemic species over time.

As a result, no significant impacts are likely to occur.

4.2.7 Wetlands

The restoration of the springs was proposed, in part, to restore the wetlands and riparian areas below the springs themselves. As such, it is likely that wetlands and functions they support through vegetation and habitat would be increased over time within the project area. Following restoration, it is expected that wetlands in the project area would increase from 40 acres (16 hectares) to 200 acres (81 hectares), creating a beneficial impact. This increase would result from water being restored to natural channels and removed from earthen and concrete waterways. In addition, standard construction best management practices would be used to protect water quality and minimize erosion and sedimentation during and following construction. These include protecting existing stream channels, as appropriate, with sediment barriers such as silt fence or straw waddle, the use of soil-stabilization techniques, and re-vegetation efforts immediately after construction.

4.2.8 Migratory Birds

Restoration of the springs is anticipated to alter both the hydrological regime and habitat structure and composition in the project area. Anticipated changes in habitat structure and composition may have minor impacts on bird populations, but the species impacted would likely be those that are relatively common on the Refuge. Long-term effects resulting from restoration of the historical hydrologic regime would likely result in changes in habitat structure and composition favorable to both migrant and resident bird communities.

Two less common species that may be impacted by the restoration of Fairbanks and Soda Springs include white-faced ibis (*Plegadis chihi*) (a Refuge recovery plan species) and American bittern (*Botarus lentiginosus*). Both species are known to use emergent marsh habitat in or near the project area, and are not abundant on the refuge. Restoration of the historical hydrological regime will likely have positive long-term impacts on both species. Short-term impacts to both species will likely include disturbance of habitat and temporary displacement associated with construction activities.

In general, heavy equipment that would be used in the restoration activities has the potential to disturb nesting or breeding migratory birds. However, heavy equipment operations are anticipated to be completed prior to breeding bird season (March 15 through August 15). Because of construction scheduling, it may be necessary to conduct some work within this time-frame. In such a case, nest surveys would be completed prior to ground disturbance. Work would not proceed if an active nest is found until birds have fledged. Migratory birds would not be taken, killed, or possessed. Impacts to migratory birds could result from disturbance or displacement and would be minor and temporary. As a result, no significant impacts are likely to occur to migratory birds.

4.3 Cumulative Impacts

Cumulative impacts are those impacts resulting from the incremental impact of an action when added to other past, present, or reasonably foreseeable actions regardless of what agency or person undertakes such other actions.

The reasonably foreseeable action scenario has been determined to be the Refuge within a time frame of 20 years into the future. Within this spatial area and timeframe, a variety of other projects and actions are planned and proposed. Past actions to which the proposed project would incrementally add would include past restoration activities such as those at Point of Rocks Spring, Jackrabbit Spring, and School Spring. Future actions to which the proposed project's impacts would add incrementally include the planned restorations of Rogers Spring, Longstreet Spring, Five Springs, Kings Spring, Bradford Spring, and the hydrologic barrier removal in both the upper Carson Slough and Crystal Management Units.

Although the majority of cumulative impacts from these past and future actions are beneficial to the Refuge and its resources, implementation of the proposed project would incrementally add to the minor and temporary impacts to air quality, threatened and endangered species, recreational opportunities, invasive species, wetlands, and migratory birds. These impacts are individually minor but are not expected to be collectively major or significant because the actions are separated in both space and time. The majority of the actions have not and would not happen simultaneously and are separated by considerable distance so as to buffer the effects. The impacts of the proposed project would be added to these past actions and planned future actions.

Table 1. Summary of Impacts by Alternative.

IMPACT TOPICS	NO ACTION ALTERNATIVE	PROPOSED PROJECT (PREFERRED ALTERNATIVE)
Air Quality	No affect.	Construction activity would temporarily increase particulate matter and localized emissions. Temporary and minor impact. No significant impact.
Threatened and Endangered Species	Continued habitat degradation and likely increase in invasive species over time, ultimately impacting the viability of threatened and endangered species.	General beneficial impacts to threatened and endangered species and habitat over the long run. Short-term, temporary, and minor potential impacts to Ash Meadows Amargosa pupfish, speckled dace, Yuma clapper rail, and spring-loving centaury would likely occur. Populations of these threatened and endangered species are not likely to be adversely affected. No significant impact.
Cultural and Historical Resources	No adverse affect.	No adverse affect and no significant impact.
Recreation	Recreational resource degradation as invasive species continue to modify habitat for endemic species.	Temporary and minor impacts to wildlife through displacement and possible local loss of hunting opportunities if construction occurs during hunting season. Long-term beneficial impact resulting from anticipated habitat improvements. No significant impact.
Invasive and Nonnative plants and animals	Noxious weed infestations and the proliferation of aquatic invasive species that prey upon endemic species and compete for resources would likely continue and/or expand.	Decrease in noxious weeds and aquatic invasive species in the project area as endemic species become re-established. Improved habitat for native species. No significant impact.
Wetlands	Wetland resource degradation as invasive species continue to modify habitat for endemic species.	Beneficial impact of an estimated 160-acre (65-hectare) increase in wetlands dominated by endemic species. Increased wetland function and improved habitat quality over time. No significant impact.
Migratory Birds	Minor disturbance by continued visitation. Continued habitat degradation as invasive species modify habitat.	Minor disturbance by continued visitation. Minor, temporary disturbance if impact to vegetation occurs during breeding season. No significant impact.

5.0 CONSULTATION AND COORDINATION

5.1 List of Preparers

The following USFWS personnel were consulted during the development of this EA:

Sharon McKelvey	USFWS Ash Meadows National Wildlife Refuge Manager
Cristi Baldino	USFWS Ash Meadows National Wildlife Refuge Biologist
Darrick Weissenfluh	USFWS Ash Meadows National Wildlife Refuge Biologist
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The following consultant personnel from BIO-WEST, Inc., were consulted during the development of this EA:

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Jeremy Eyre, J.D.	Environmental Analyst
Craig Fosdick	Wildlife Biologist
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5.2 Pertinent Laws, Executive Orders, and Regulations

National Environmental Policy Act of 1969, as amended: The National Environmental Policy Act (NEPA) requires federal agencies to integrate environmental values into their decision making processes by considering the environmental impacts of their proposed actions and reasonable alternatives to those actions

Endangered Species Act of 1973: Provides for the conservation of the ecosystems upon which endangered species and threatened species depend and provides a program for the conservation of such endangered species and threatened species

Fish and Wildlife Act of 1956: Under this act, the Secretary of Interior is authorized to take such steps required for the development, management, conservation and protection of fish and wildlife resources including but not limited to research, development or existing facilities, and acquisition by purchase of exchange of land and water.

National Wildlife Refuge Administrative Act of 1966: Defines the National Wildlife Refuge System, and authorizes the Secretary of Interior to permit any use of an area provided such use is compatible with the major purpose for which the refuge was established.

National Wildlife Refuge Improvement Act of 1997: Expands on NWRS Administration Act of 1966 by providing organic legislation for the National Wildlife Refuge System, and significant additional guidance on management and public use of the Refuge System.

Archeological Resource Protection Act of 1979: Protects irreplaceable archeological resources on Federal lands which are 100 years or older.

National Historic Preservation Act: Authorizes the National Register of Historic Places, establishes the Advisory Council on Historic Preservation, and grants power to the Council to review Federal undertakings that affect historic properties.

Title 50 of the Code of Federal Regulations: Implements numerous laws and executive orders concerning wildlife, including administration of National Wildlife Refuges.

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