Chapter 3. Alternatives

Crystal Springs overlook at Ash Meadows National Wildlife Refuge

Chapter 3. Alternatives

3.1 Introduction

This chapter describes the management actions identified for the alternatives for each refuge in the Desert National Wildlife Refuge Complex (Desert Complex). The alternatives described in this chapter comprise the U.S. Fish and Wildlife Service's (Service) actions for which potential impacts are analyzed in Chapter 5, Environmental Consequences. The chapter includes a description of the No Action Alternative, which consists of a continuation of the current management actions and is used as a baseline to compare the action alternatives.

Appendix F provides detailed descriptions of the goals, objectives, and management actions or strategies to achieve the preferred alternative for each refuge. It also provides rationales for each objective to explain the need for the management actions and identify how the objective meets the goals of the refuge.

In this chapter, the following topics are presented for each refuge:

- Features common to all alternatives;
- Description of alternatives considered;
- Comparison of alternatives; and
- Management actions considered but eliminated from detailed analysis as part of the alternatives

The Service proposes to develop and implement a CCP for the refuges in the Desert Complex that best achieves the purposes for which each refuge was established, helps fulfill the mission of the National Wildlife Refuge System (NWRS), is consistent with sound fish and wildlife management, and ensures that the biological integrity, diversity, and environmental health of the NWRS are maintained. The Final CCP will include proposals for wildlife and habitat management, habitat enhancement and—where appropriate—habitat restoration, and visitor services. The Service examined a wide range of management alternatives for each refuge. Of these, Alternative C represents the Service's preferred alternative for the Ash Meadows, Desert, and Moapa Valley National Wildlife Refuges (NWRs), and Alternative D represents the Service's preferred alternative for Pahranagat NWR. Of the alternatives evaluated, these alternatives appear to best achieve the purpose, vision, and goals for the Refuges while also appropriately addressing the major issues and relevant mandates identified for each Refuge during the CCP process.

3.2 Ash Meadows National Wildlife Refuge Alternatives

Ash Meadows NWR's alternatives consist of the No Action Alternative and two action alternatives. The No Action Alternative contains a variety of management actions that have recently been implemented on the Refuge or will be implemented before the CCP is approved. The two action alternatives contain management actions to improve Refuge conditions at varying levels. Alternative B would improve habitat for endemic species on portions of the Refuge and increase visitor services and facilities. Alternative C would improve habitat throughout the Refuge and provide increased visitor services, but visitor facilities would remain similar to current conditions.

3.2.1 Features Common to All Alternatives

A number of current management actions would be implemented for the Ash Meadows NWR under each of the alternatives. The two action alternatives propose additional management actions to improve Refuge conditions. Actions that are common to all alternatives are described below and are not repeated in each alternative description.

Species Management

To manage special-status plants and wildlife, the Service would continue to monitor species and conduct baseline inventories. Specifically, the Service would continue to inventory vegetation communities, small mammals, herpetofauna, and pollinators. The four-year baseline inventory and monitoring for endemic fish species, three-year refuge-wide survey of reptiles, and three-year baseline inventory and monitoring for the southwestern willow flycatcher would be completed. The Service would also monitor changes in the environment, such as changes in vegetation communities, wildlife trends, and surface and groundwater levels, to assess the effects of climate change on the Refuge, if any. These actions would allow the Service to gain valuable knowledge about Refuge resources and make informed decisions for species management.

The Refuge provides one refugium for the Devils Hole pupfish at Point of Rocks. Under each of the alternatives, the Service would close the refugium and establish a new refugium, possibly at the Amargosa Pupfish Station site, that would be regularly monitored, including conducting quarterly fish counts and periodic water quality measurements. The refugium would be designed with a fully automated monitoring and control system (independent power, battery backup, temperature control, pump backup, remote transmittal of data, and alarms). In addition, the Service would construct a separate refugium for Warm Springs pupfish and manage it similarly. Once these refugia are operating successfully, the Service would close the refugium at Point of Rocks and restore the spring outflow and channel.

The natural communities of the Refuge would continue to be managed and monitored with an emphasis on invasive species control and removal (vegetation and aquatic species), and monitoring, restoration, and other activities would occur as staffing and funding are available.

These communities include spring outflow habitat, streams and associated habitats, wetlands, mesquite and ash groves, and desert uplands. The Service would also improve the Refuge-wide vegetation map using ground surveys and updating the geographic information system data in order to initiate long-term annual vegetation monitoring and assess impacts to vegetation communities.

The Service would continue a variety of management actions relating to maintaining springs and protecting resources, including:

- Continue monitoring springs to maintain existing water flows (17,000 acre feet per year [afy]; Mayer 2006) and natural temperature range for the 30 known Refuge springs;
- Maintain existing spring outflow structures and stream channels at monitoring sites;
- Remove invasive plants and exotic aquatic species;
- Seed and plant native vegetation to restore habitats;
- Manipulate and enhance substrates;
- Remove hydrologic barriers;
- Continue current levels of enforcement measures to protect plants and wildlife;
- Continue current fuel breaks and fuel reduction projects to reduce risk of wildfire;
- Maintain the existing boundary fence to exclude wild horses; and
- Continue closing nonessential roads to control access.

As a part of water resources management, the Service would continue to monitor water parameters (flow, levels, and temperature) at springs and wells identified in the Water Monitoring Plan (Mayer 2003), compare water quality and quantity with past measurements on a biannual basis, and implement measures in coordination with the State Engineer to defend water rights and mitigate substantial changes in water flow or temperature and maintain constant water parameters.

The Service would continue to protect and manage habitat by repairing post and cable barriers, installing additional barriers where needed to protect resources, and replacing or adding gates and signs on service or fire roads to prevent unauthorized access. Wildland fires on the refuge would be managed using the appropriate management response (AMR). The response would consider resource values at risk and potential negative impacts of various fire suppression measures. Firefighter and public safety would be the highest priority for every incident.

Restoration

In order to enhance habitat on the Refuge for endemic species, the Service would complete and begin implementing Restoration Plans for five areas: Upper Point of Rocks, Jackrabbit Spring, the Warm Springs Management Units (North and South Indian Springs and School Springs), Crystal Springs Unit, and Carson Slough. These plans involve restoring and enhancing native habitat for endemic species. Nonnative or invasive plants would be replaced with native plants that

were historically present on the Refuge. In addition, approximately 30 acres of native upland habitat would be restored in the Warm Springs Complex and Jackrabbit/Big Springs Units.

Invasive plant and wildlife management would continue to occur on a project-by-project basis, with the greatest threats being prioritized. The Service would continue to remove invasive plant species at restoration sites and in burned areas using physical (cutting and extraction) and chemical (herbicides) means, as appropriate based on the Integrated Pest Management (IPM) Plan (Service 2006b). Mechanical methods would continue to be used around man-made reservoirs and other open water sources to control vegetation and improve open water habitat for fish and wildlife.

The Service would complete the pending land and mineral withdrawal with the U.S. Bureau of Land Management (BLM) in order to transfer the BLM-managed lands within the approved Refuge boundary to the Service. This would optimize the Service's ability to manage the Refuge for its intended purposes. Because Refuge staff already manages BLM lands and Refuge resources are being spent to create capital improvements on BLM lands, completing the land and mineral withdrawal would not require allocation of additional Refuge resources.

Private lands within the Refuge boundaries would also continue to be acquired from willing sellers. For private lands that are not acquired, the Service would continue to coordinate with the landowners to protect the resources.

Research

Research opportunities on the Refuge would vary by alternative. Research activities would continue to be allowed on a case-by-case basis using special use permits.

Visitor Services

To expand visitor knowledge of the Refuge and its resources, the Service would continue to develop environmental education and interpretive materials. The Interpretation Plan for the Refuge would be implemented to provide direction on preparing interpretive materials and constructing interpretive facilities (signs, trails, boardwalks, etc.). Specifically, Devils Hole and pupfish life history information would be included in Refuge brochures, fact sheets, and maps. Information on other endemic and special-status species would also be incorporated into environmental education and interpretive information, as appropriate. Current visitor services for wildlife-dependent recreation activities, such as pupfish viewing, bird watching, and hunting, would continue to be offered in accordance with the existing Public Use Management Plan (Service 1998a), and virtual geocaching (use of geographic positioning system units for treasure hunts) would continue to be allowed in accordance with Refuge policy.

Boardwalks are being designed to follow Kings Pool Stream from the parking lot to Kings Pool with a pool overlook. Specific interpretive materials are also being developed to educate visitors, including displays along the new boardwalks and panels for the new boardwalk and overlook at Longstreet Spring Pool. In addition, parking areas at Point of Rocks and Longstreet Cabin are being improved for visitor safety and access, and Refuge boundary signs would continue to be replaced as needed to control access. Spring Meadows Road would be maintained as a through road for non-commercial traffic. Other designated roads and visitor use areas would also be maintained.

Visitor education needs and opportunities would continue to be assessed through informal contact with visitors. A study would be conducted to determine the number of visitors using the Refuge and the purpose of their visits.

Hunting opportunities for upland game and waterfowl would continue to be offered in designated areas of the Refuge, consistent with Service and Refuge policies and goals. The hunt program would continue based on the interim Hunt Plan until a revised Hunt Plan is completed.

Cultural Resources

Cultural resources management and protection would vary by alternative.

3.2.2 Alternative A – No Action (Current Management)

Alternative A is the current management situation, or No Action Alternative, for the Refuge. It serves as a baseline with which the objectives and management actions of the two action alternatives, Alternatives B and C, can be compared and contrasted. Because this alternative reflects current management, it would not result in substantial changes to the way the Refuge would be managed in the future. Figure 3.2-1 graphically summarizes the actions that would continue under this alternative.

Species Management

The Service would continue to implement those management actions identified under "Features Common to All Alternatives." Species management on the Refuge is currently guided by the 2006 Geomorphic and Biological Assessment (Otis Bay and Stevens Ecological Consulting 2006). This document provides an overview of the resources on the Refuge and identifies recommendations for species management. Management actions identified in the document are evaluated and implemented as appropriate and as staffing and funding become available.

Restoration

The Service would continue to implement those management actions identified under "Features Common to All Alternatives." In addition to restoration of 30 acres of native upland habitat, the Service would restore 70 acres of alkali/wet meadow habitat and 30 acres of mesquite bosques/lowland riparian habitat. In addition, approximately 10 to 25

percent of the old agricultural fields would be rehabilitated by controlling invasive plants and planting native species.

Restoration activities would involve modifying or altering hydrology of streams and channels to more closely resemble historic conditions and planting native species in appropriate areas, such as where nonnative and invasive plants are removed, roads are closed, or hydrology is modified.

Research

The Service would continue to implement those management actions identified under "Features Common to All Alternatives."

Visitor Services

In addition to the management actions described under "Features Common to All Alternatives," the Service would continue to provide limited environmental education activities and off-Refuge outreach about the value of wildlife and the public's involvement on the Refuge. In addition, the Service would continue to allow boats to be used to access waterfowl hunting areas.

Cultural Resources

The Service would continue to inventory, manage, and protect cultural and historic resources on the Refuge on a project-by-project basis to comply with applicable laws and regulations. Appropriate educational information on cultural resources would continue to be provided to visitors at the visitor contact station through informal outreach.

3.2.3 Alternative B – Improve Habitat for Endemic Species on Portions of the Refuge and Increase Visitor Services

Alternative B provides for moderately increased management actions for all resource areas when compared to Alternative A (No Action). This alternative involves the objectives and management actions identified in the "Features Common to All Alternatives" section and additional management actions for more active management. Alternative B actions are portrayed in summary form in Figure 3.2-2.

Species Management

In order to obtain baseline population data on additional species, the Service would inventory listed endemic invertebrates, nonnative fish, and non-listed endemic invertebrates. Baseline data on 17 springs identified in the Geomorphic and Biological Assessment (Otis Bay and Stevens Ecological Consulting 2006) would also be collected within two years of approval of the CCP. Endemic species, nonnative species that adversely affect endemic species, and game species would be monitored to assess their population levels and effects on other species. The Service would establish long-term monitoring plots and transects to monitor vegetation annually.

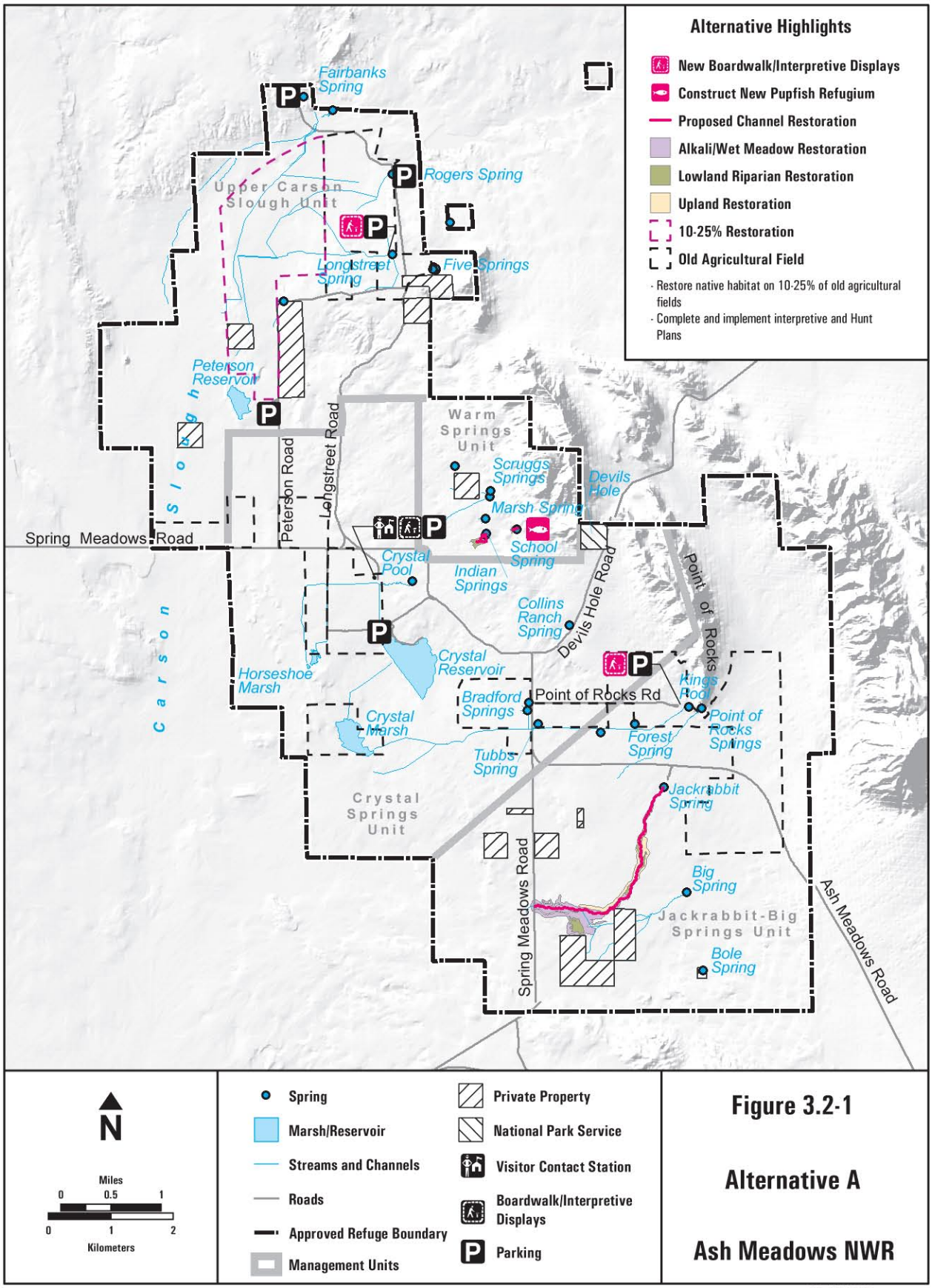

Figure 3.2-1

Alternative A

Ash Meadows NWR

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Figure 3.2-1-ashmeadows_alt_A.mxd

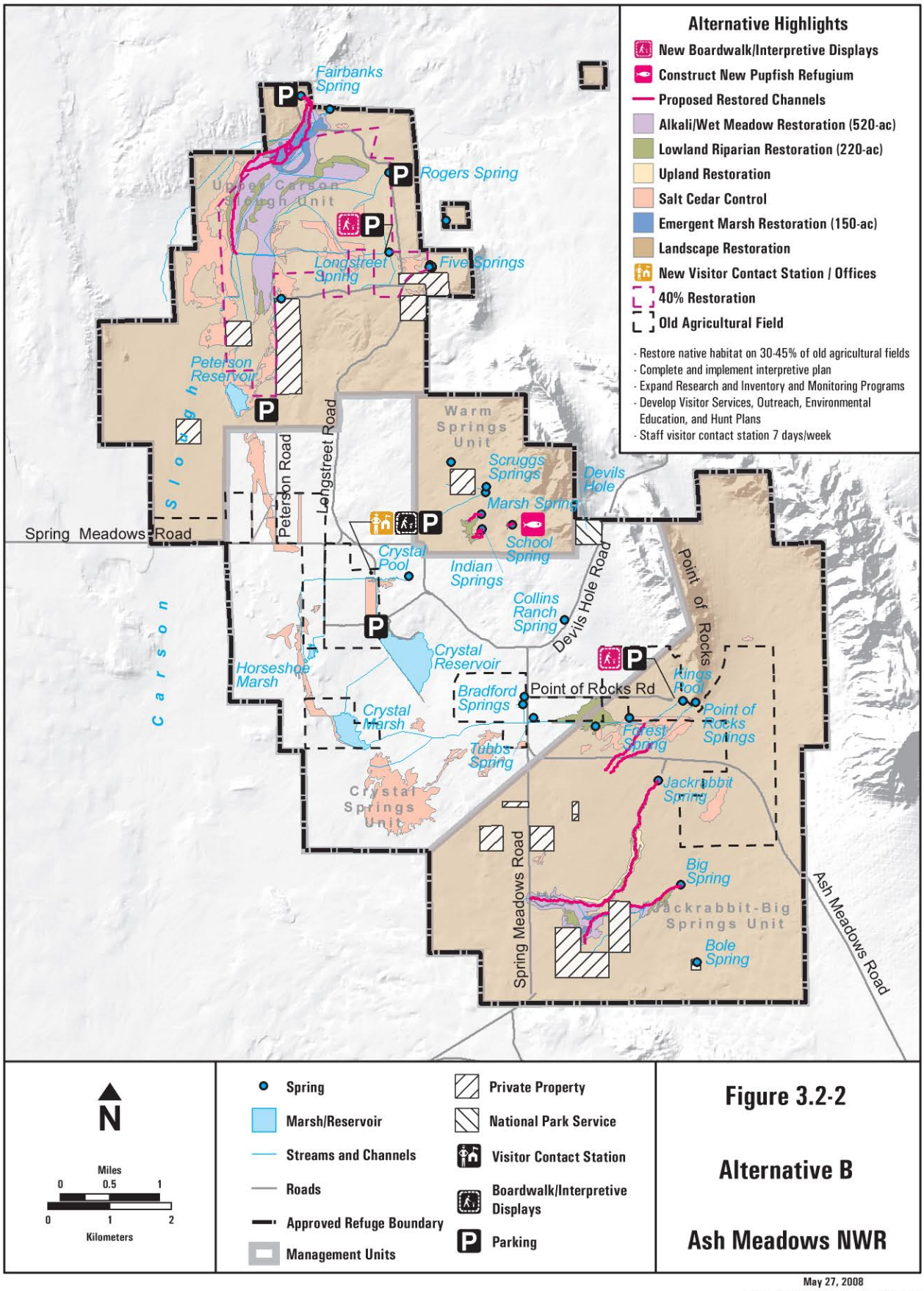

Figure 3.2-2

Alternative B

Ash Meadows NWR

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Figure 3.2-2-ashmeadows_alt_B.mxd

Specific management actions to benefit endemic and native species include the following:

- Restore population of Ash Meadows speckled dace to 5 to 25 percent of its historic range on the Refuge by restoring suitable habitat (flowing streams with riffles) and transplanting individuals between populations for genetic diversity;
- Double the current range of the Ash Meadows naucorid population to encompass a minimum area of 20 to 40 square meters by restoring the Point of Rocks spring outflow channel habitat to be suitable for the naucorid (flowing streams with substrate);
- Investigate the use of private aquaria as refugia for sensitive fish species;
- Identify suitable areas to expand endemic plant populations within 10 years;
- Begin transplanting endemic plants to suitable habitats on the Refuge within 15 years to expand their populations; and
- Prepare a feasibility study to evaluate the construction of an on-site greenhouse to supply native plants for restoration projects.

The Service would increase law enforcement patrols on the Refuge to control and prevent off-highway vehicles, fires, species collection, and other inappropriate activities. Additional road gates (up to 15) would be installed in appropriate locations to prevent unauthorized use of roads and damage to resources (i.e., habitat, species, cultural sites, and springs). Prescribed fire may be used where appropriate to create, improve, or maintain desired plant and animal communities, as well as to treat hazardous fuels.

Restoration

The Service would restore natural hydrology in the Warm Springs, Jackrabbit/Big Springs, and Upper Carson Slough Management Units to improve habitat conditions and biological integrity, diversity, and environmental health of the Refuge. Berms, ditches, dams, impoundments, and unnecessary roads would be removed, as appropriate, to allow flows to return to historic conditions. Fish barriers would be installed, as needed, along water courses to allow the Service to control invasive fish.

As part of the Refuge-wide landscape restoration efforts, the Service would implement Restoration Plans for Lower Point of Rocks, Lower Kings Pool, and Marsh, Big, and Fairbanks Springs. These plans would include restoring historic hydrology, removing nonnative and invasive plants, and restoring native habitat. Once restoration activities are complete, the Service would regularly maintain and monitor the habitats to ensure restoration success.

Specific objectives for restoring habitat in the Warm Springs Complex, Jackrabbit/Big Springs, Upper Carson Slough, and Crystal Springs Management Units include restoration of approximately:

- 520 acres of alkali wet meadow;
- 220 acres of mesquite bosque/lowland riparian; and
- 30 acres of native upland; and
- 150 acres of emergent marsh.

In addition, 30 to 45 percent of old agricultural fields would be rehabilitated by removing hydrologic barriers, controlling invasive plants, and planting native species.

The Service would also maintain the following communities in the Warm Springs Complex, Jackrabbit/Big Springs, Upper Carson Slough, and Crystal Springs units by restoring natural hydrology and actively revegetating appropriate areas:

- 3,935 acres of alkaline meadow/wet meadow;
- 5,500–5,750 acres of native upland desert; and
- 1,000 acres of mesquite bosque.

Modifications to the hydrology of these areas would allow the habitats to naturally return to historic conditions, and native vegetation would be planted in appropriate areas, such as where nonnative species are removed or areas become exposed due to changes in hydrology.

A large part of habitat restoration is the management of pest, or invasive, species. The Refuge has completed an IPM Plan that describes specific management actions to implement for management of nonnative fish, invasive and nonnative plants, and other pest species. Long-term management of the Refuge is dependent on the control and removal of pest species.

The Service would implement appropriate techniques from the IPM Plan to control nonnative fish and nonnative and invasive plants in the various habitats on the Refuge (alkaline meadow/wet meadow, mesquite bosques, marshes, and desert uplands). Open water habitat would be expanded for birds and fish through the control of cattails, a species that forms uniform stands in open water habitat.

Salt cedar and Russian knapweed are noxious weeds that have become well established on the Refuge and throughout Nevada. Management efforts to control and reduce these plant populations are important to restoring habitats on the Refuge. The Service would remove salt cedar and Russian knapweed over the next 10 years to reduce their extent by between 50 and 75 percent of their 2006 distribution on 4,000 acres of Refuge land, and work with BLM to control these species on the adjacent BLM Area of Critical Environmental Concern.

Habitats containing listed plant species would be prioritized for pest management, and these species' responses to the removal of invasive plants would be monitored. Adverse effects to listed plants would require the Service to adjust their methods for pest species management to minimize the effects on listed plants.

Crayfish are a predator of native, endemic fish and invertebrates. Crayfish populations would be managed to maintain or reduce current distributions through regular trap and removal activities in spring habitats. Target areas for pest management would include the 10 most infested and important Refuge aquatic systems, as determined by the Service's Ecological Services program and Refuge staff; these areas would be expanded as appropriate.

In order to conserve the Refuge lands, the Service would establish conservation agreements with landowners or acquire inholdings from willing sellers. They would also evaluate the current land uses to ensure regulatory compliance.

Research

Research opportunities on the Refuge would be expanded to include projects such as:

- Ecology and management of invasive species;
- Taxonomy, ecology, and management of rare and endemic species;
- Ecosystem energetics and dynamics;
- Historic and current plant community diversity, composition, and structure and the role of natural processes (fire, flood, drought); and
- Wildlife-habitat relationships.

Visitor Services

To improve visitor services management, the Service would develop a comprehensive Visitor Services Plan, an Outreach Plan, and an Environmental Education Plan. The comprehensive Visitor Services Plan would evaluate and prescribe management actions to develop and manage compatible wildlife-dependent recreational opportunities, related infrastructure, and associated staffing and funding needs on the Refuge. The Outreach Plan would provide direction on communicating with the public about habitat restoration needs and efforts, with a focus on the Carson Slough Restoration Plan. The Environmental Education Plan would assess visitor education needs and opportunities and incorporate the environmental education goals of the Ash Meadows species recovery plan, the Southern Nevada Valley–wide Environmental Education Strategy, the Clark County Multiple Species Habitat Conservation Plan, and the Ramsar Convention. Implementation of the Visitor Services and Environmental Education Plans would begin by 2010. The Service would coordinate with local affiliated tribes to develop education interpretation information for Refuge visitors.

The Service would work with the public, non-government entities, and private partners to develop an off-site refugium for pupfish species to promote awareness of the endangered pupfish and other endemic species at the Refuge. The Service would also contact local schools and provide at least three to five on-site programs per year for school children. The Service would participate in two or three off-Refuge annual events, such as the Nye County Fair, Pahrump Harvest Day, and Earth Day. The Service would develop an educational video on the endemic fish and other wildlife of Ash Meadows.

The Service would develop multilingual interpretative materials and construct new interpretive facilities at Fairbanks Springs. A volunteer program would be created to staff the visitor contact station seven days a week and provide other services for visitors and support for Refuge staff.

The Service would also improve visitor facilities on the Refuge. A new Refuge headquarters and visitor contact station building would be constructed within five years of obtaining funding. Other interpretive facilities identified in the Interpretive Plan (in progress) would be constructed as well, such as trails, boardwalks, signs, and similar facilities. The Service would improve existing roadways and parking areas to good condition based on the Refuge Transportation Plan.

Refuge staff would obtain baseline information on hunting activities on the Refuge and create a hunting step-down plan to address opportunities and restrictions on waterfowl and upland game hunting on the Refuge. The Service would also monitor hunting use on the Refuge to ensure regulatory compliance and minimal effects on resources. The Service would restrict or eliminate boat use for waterfowl hunting to prevent the introduction of quagga mussels (*Dreissena polymorpha*), an invasive molusk that attaches itself to boats. Quagga mussels have been a growing concern in Lake Mead and other surface waters in southern Nevada (Benson et al. 2008); the mussels could outcompete with native and endemic special-status fish on the Refuge and affect their populations.

Cultural Resources

The Service would expand knowledge of cultural resources on the Refuge and develop educational materials for visitors about the Refuge's cultural resources. The Service would conduct a cultural resources inventory at all visitor facilities and areas that would be affected by Refuge projects. Eligible Traditional Cultural Properties and sacred sites would be nominated for listing on the National Register of Historic Places. A site stewardship volunteer program would be established to assist with site monitoring, education and interpretation, and promoting cultural resources conservation in neighboring communities.

Cultural resources would be protected from looting, vandalism, erosion, and deterioration through installation of barriers and signs to preserve the resources. Samples would also be preserved to provide research opportunities and mitigate adverse effects. Habitats would be protected and restored to provide harvesting opportunities for Native

Americans. Traditional plant uses would be studied to determine appropriate locations on the Refuge for harvesting and other traditional uses.

3.2.4 Alternative C – Improve Habitat for Endemic Species Throughout the Refuge and Increase Visitor Services

Alternative C is the preferred alternative. It is characterized by an increased emphasis on management actions for most of the resource areas, expanding upon those presented in Alternative B. This alternative includes the management actions identified in the "Features Common to All Alternatives" section and some management actions from Alternative B in addition to the activities discussed in this section. Activities that would not be implemented under this alternative are also noted; these actions would achieve different goals than those this alternative is targeting. Alternative C actions are summarized in Figure 3.2-3.

Species Management

In addition to the inventories and monitoring activities identified under Alternative B, the Service would complete inventories of nonnative and native species diversity and distribution and monitor all non-listed endemic and game species.

The Service would expand fish populations on the Refuge by expanding the management actions identified under Alternative B to restore endemic fish populations on 25 to 50 percent of their historic range on the Refuge. In addition, the Service would reestablish Ash Meadows speckled dace to historic habitats after restoration of springs and streams. Refugia may be useful for other endemic species; therefore, the Service would conduct a feasibility assessment to determine which additional species may benefit from refugia populations.

To protect habitat, the Service would implement management actions identified under Alternative B and "Features Common to All Alternatives" and develop a Resurfacing Plan for main roads. The plan would provide direction on roads to improve for public access and would consider changes in the Refuge due to habitat and hydrologic restoration projects. Road improvements are necessary to ensure visitors stay on designated roads and to protect habitat.

Restoration

In addition to Alternative B management actions, the Service would implement the following management actions to restore habitats and natural hydrology on the Refuge:

- Remove berms, ditches, dams, impoundments, and unnecessary roads within the Crystal Springs Management Unit, as necessary;
- Mitigate landscape disturbances from graded lands, mines, fences, and other activities by restoring native habitat;

- Implement the plan to modify or remove Crystal Reservoir to minimize adverse environmental effects on special-status species and alleviate potential concerns for visitor safety and Refuge management;
- Implement Restoration Plans for Tubbs, Bradford, Crystal, Forest, and North and South Scruggs Springs to restore and enhance native habitat; and
- Implement Restoration Plans to restore native habitat at Longstreet and Rogers Springs based on the Carson Slough Restoration Plan.

Specific objectives for restoring habitat in the Warm Springs Complex, Jackrabbit/Big Springs, Upper Carson Slough, and Crystal Springs Management Units include restoration of larger amounts of habitat than under Alternative B. These objectives include restoring approximately:

- 650 acres of alkali wet meadow;
- 550 acres of mesquite bosque/lowland riparian; and
- 30 acres of native upland; and
- 150 acres of emergent marsh.

The alkali wet meadow habitat would be restored so that alkali sacaton and salt grass become the dominant species along with other native vegetation, such as Hall's meadow hawksbeard, alkali cordgrass, Baltic rush, foxtail barley, saltbush, and associated native plant species. Several endemic species are predominately found in alkali wet meadow habitat, including the threatened spring loving century and Ash Meadows Ivesia (Otis Bay and Stevens Ecological Consulting 2006).

The mesquite bosque/lowland riparian habitat would be restored to contain native plant species, such as leather-leaf ash, narrow-leaved willow, Gooddings willow, mesquite, quailbrush, arrow weed, Emory's baccharis, and other associated native plant species. Lowland riparian habitat is important for many federally listed species; other special-status species, including the endangered southwestern willow flycatcher, peregrine falcon, vermillion flycatcher, Phainopepla, yellow-breasted chat, and long-eared myotis; and many other riparian-dependent landbird and migratory birds and resident animals (Clark County and Service 2000).

Native upland habitat would be managed to establish a range of native upland desert plant communities, including gradations between creosote bush–white bursage; dry ridgetop plant communities of predominately cotton top, beavertail cactus, and cholla; and shrub/scrub habitat with other native desert species. Two special-status species, chuckwalla and burrowing owls, use creosote-dominated upland habitat for burrowing sites and protection from predators (Nevada Department of Wildlife [NDOW] 2005c).

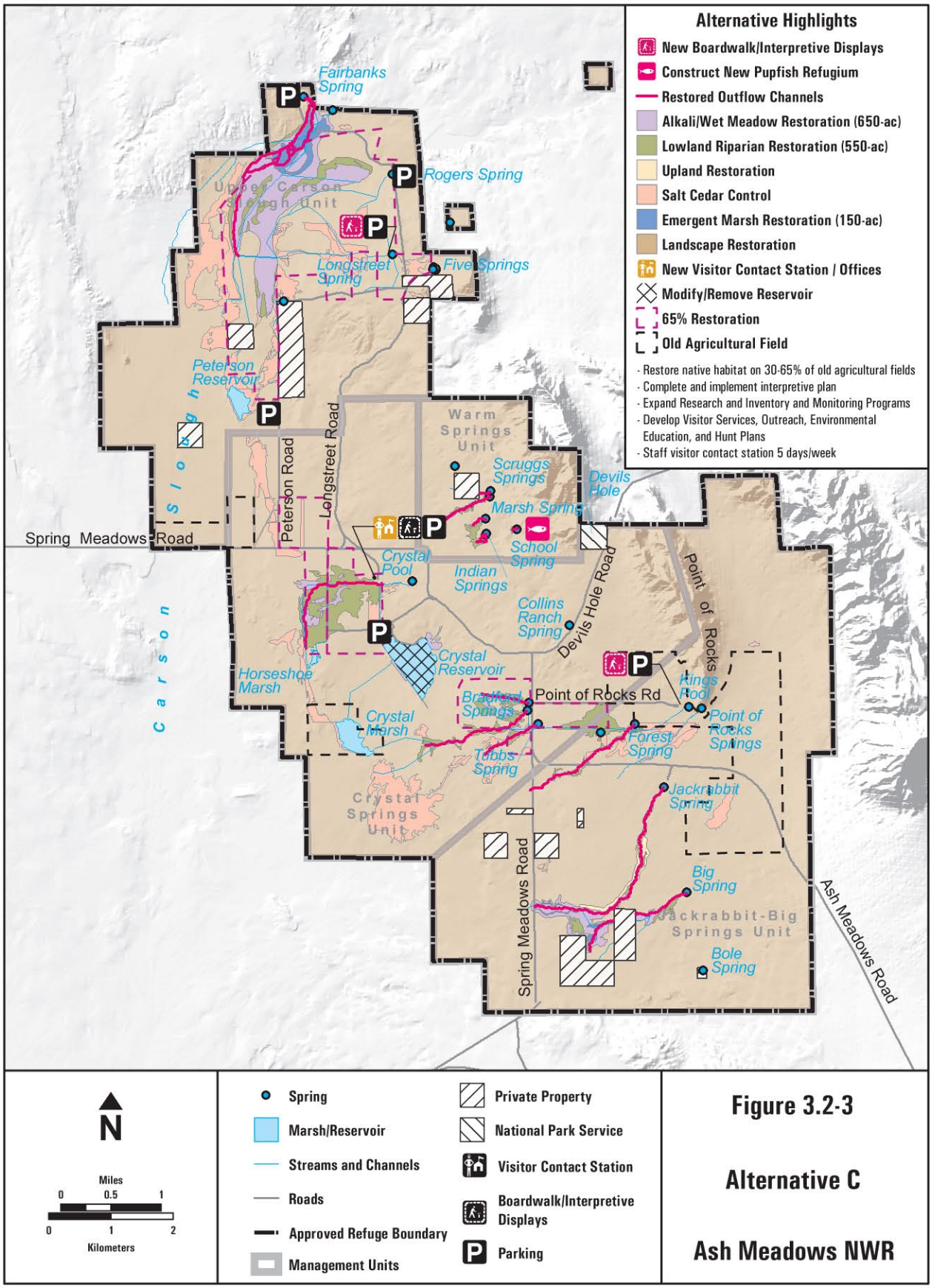

Figure 3.2-3

Alternative C

Ash Meadows NWR

May 27, 2008
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Figure 3.2-3-ashmeadows_alt_C.mxd

The emergent marsh habitat would be managed to establish plant communities dominated by bulrushes, saw-grass, and rushes with only minimal, sporadic patches of southern cattail. Refuge marshes provide rich habitat for native endemic fish, migratory birds, resident amphibians, and resident aquatic invertebrates (NDOW 2005a).

In addition, 40 to 65 percent of old agricultural fields would be rehabilitated by removing hydrologic barriers, controlling invasive plants, and planting native species.

The Service would also maintain the following communities in the Warm Springs Complex, Jackrabbit/Big Springs, Upper Carson Slough, and Crystal Springs units by restoring natural hydrology and actively revegetating appropriate areas:

- 7,850 acres of alkaline meadow/wet meadow;
- 11,000–11,500 acres of native upland desert; and
- 2,000 acres of mesquite bosque.

The Service would expand pest management in addition to the management actions under Alternative B by evaluating alternative pest control actions (sterilization and biological control) and expanding activities to cover all Refuge aquatic systems. The target for reducing salt cedar and Russian knapweed distribution would be higher than Alternative B at between 75 and 95 percent of the 2006 distribution on 4,000 acres of Refuge land. In addition, pest species in aquatic habitats would be managed and controlled, including implementation of an aggressive trap and removal program for crayfish in spring and channel habitats (targeting Marsh, North and South Indian, North and South Scrugg, Jackrabbit, Kings, Point of Rocks, Big and Crystal springs), installation of temporary fish barriers until nonnative fish eradication is complete at Big and Jackrabbit springs, and removal of cattails from outflow channels at Kings, Point of Rocks, and Crystal springs.

Research

The Service would prepare a feasibility study to evaluate the need for an on-site research facility. If appropriate, the facility would be constructed and operated to accommodate an increase in research opportunities.

Visitor Services

To improve visitor services on and off the Refuge, the Service would expand environmental education, interpretation, and outreach opportunities. The Environmental Education Plan would be fully implemented by 2010. The Service would provide 10 off-site programs to local public and home schools. Additional off-Refuge educational outreach would also be provided to educate the local public on the value of wildlife and the public for the Refuge.

The visitor contact station would be staffed five days a week. Unlike Alternative B, however, no roadway or parking area improvements would be implemented.

Cultural Resources

The Service would implement the management actions identified under Alternative B.

3.2.5 Comparison of Alternatives

A comparative summary of the alternatives for the Ash Meadows NWR is found in Table 3.6-1 at the end of this chapter.

3.2.6 Management Actions Considered but Eliminated from Detailed Analysis as Part of Alternatives

During the alternatives development process, the Service evaluated additional management actions as part of the current alternatives. These actions are identified below with their reasons for elimination:

- Continue allowing public use of Crystal Reservoir for swimming and fishing. (Not compatible with human safety, Refuge purposes, and biological integrity, diversity, and environmental health of the Refuge.)
- Pave all main roads through the Refuge. (Would increase high-speed, commercial and non-commercial through traffic to the detriment of terrestrial animals and human safety; would impact hydrology by increasing impermeable surfaces on Refuge, increasing disturbance of sensitive Refuge habitat.)
- Allow all-terrain vehicles by permit or during special events as a visitor service. (Not compatible with Refuge purposes and biological integrity, diversity, and environmental health of the Refuge.)

3.3 Desert National Wildlife Refuge Alternatives

Desert NWR's alternatives consist of the No Action Alternative and three action alternatives. The No Action Alternative contains a variety of management actions that have recently been implemented on the Refuge or are planned for implementation and are covered under another NEPA document. The three action alternatives contain management actions to improve Refuge conditions at varying levels. Alternative B would provide minimal increases in wildlife and habitat management with improved visitor services. Alternative C would provide moderate increases in wildlife and habitat management with only minor increases in visitor services. Alternative D would provide moderate increases in wildlife and habitat management with very limited increases in visitor services.

3.3.1 Features Common to All Alternatives

A number of current management actions would continue to be implemented for the Desert NWR under each of the alternatives. The three action alternatives propose additional management actions to improve Refuge conditions. Actions that are common to all alternatives are described below and are not repeated in each alternative description.

Bighorn Sheep Management

The Service would continue to manage the desert bighorn sheep population on Desert NWR through the following actions:

- Maintain existing water sources (springs and catchments);
- Install signs, fences, and barricades and use law enforcement patrols to prevent unauthorized uses and protect habitat;
- Prevent domestic livestock grazing to minimize the potential for disease transmission;
- Set the number of hunt permits based on population levels and herd health; and
- Conduct one fall helicopter survey per mountain range to estimate population size, adult sex ratio, ram age structure, and lamb survival/recruitment.

The Service would also continue to allow research on the Refuge by issuing special use permits for activities that involve the bighorn sheep.

Wildlife Diversity

Resources would be protected through maintenance of designated roads and visitor use areas and replacement of regulatory signs along boundaries and designated roadways. The Service would continue to promote awareness of and solicit support for efforts to combat trespassing along the southern boundary to protect resources. In addition, wildfires would be managed using an AMR that considers resource values at risk and potential negative impacts of various fire suppression measures. Response may range from monitoring high-elevation fires (above 5,000 feet) to full suppression where resource values at risk indicate that is the appropriate response. Firefighter and public safety would be the highest priority for every incident, regardless of other resources at risk. In addition, invasive weed surveys and treatments would continue.

The Pahrump poolfish population in the refugium at Corn Creek would continue to be monitored to ensure its survival. Baseline and monitoring surveys for wildlife species would continue to be conducted on a project-by-project basis and in coordination with others. During bighorn sheep helicopter surveys, the Service would continue to record observations of raptors. Wild horses or burros that occur on the Refuge would be removed as soon as possible to protect Refuge resources and minimize competition with wildlife. Well water use and discharge at Corn Creek would continue to be monitored, and the Service would work with the State Engineer to defend water rights and mitigate substantial changes in temperature or flow.

Volunteers would continue to be used for habitat restoration and maintenance efforts. The Service would also monitor changes in the environment, such as changes in vegetation communities, wildlife trends, and surface and groundwater levels, to assess the effects of climate change on the Refuge, if any.

The Service would participate in programmatic National Environmental Policy Act (NEPA) processes, as appropriate, to evaluate impacts to Refuge resources from future energy projects relating to the proposed energy corridor through the Refuge.

Specially Designated Areas

Under each of the alternatives, the Service would continue to protect and maintain the proposed wilderness areas until Congress acts on the proposal. Protection efforts would involve prohibiting motorized activities within the proposed wilderness, except where motorized activities are authorized by stipulations in the 1974 proposal or unless an approved minimum tool analysis documents that motorized activities would be acceptable. The Service would also prepare a revised wilderness proposal which includes technical corrections such as: correcting overlaps with the bombing range; allowing repair or relocation of hazardous sections of road; and allowing the use of helicopters to repair and maintain water developments and access remote areas for wildlife surveys.

Visitor Services

Although visitor services would be improved under the three action alternatives, most of the current visitor service actions would continue to be implemented to support public use of the Refuge. The Service is also constructing a visitor center and new office space at Corn Creek Field Station to improve visitor contact and services at the Refuge. The visitor center project is an ongoing, independent action that has been evaluated under a separate Environmental Assessment (Service 2007).

Public facilities and roads would continue to be maintained, including parking, camping, and picnic areas; Mormon Well Road; and Alamo Road. Regulatory, directional, and interpretive signs along roads, trails, and at the refugium would be replaced and updated, as needed, to provide guidance to visitors. Information about the closure of the Nevada Test and Training Range (NTTR) to the public due to safety and security reasons would be provided at the visitor center and on appropriate signs throughout the Refuge. Volunteers, including Get Outdoors Nevada (Southern Nevada Interagency Volunteer Program) volunteers, would continue to be used on the Refuge to provide interpretation, environmental education, and guidance for visitors.

The Service would continue to work with NDOW, which manages the hunting program for desert bighorn sheep. Tags would continue to be issued based on annual population estimates. Information on Refuge-specific and NDOW hunting guidelines and regulations would continue to be available to the public at Refuge headquarters.

Cultural Resources

Cultural resources management and protection would vary by alternative.

3.3.2 Alternative A – No Action (Current Management)

Alternative A is the current management situation, or No Action Alternative, for the Refuge. It serves as a baseline with which the objectives and management actions of the three action alternatives, Alternatives B, C, and D, can be compared and contrasted. Because this alternative reflects the current management, it would not result in substantial changes in the way the Refuge would be managed in the future. Figure 3.3-1 graphically summarizes the actions that would continue under this alternative.

Bighorn Sheep Management

The bighorn sheep management actions identified in the "Features Common to All Alternatives" section are current and ongoing management actions. No additional actions would occur under this alternative.

Wildlife Diversity

The wildlife diversity management actions identified in the "Features Common to All Alternatives" section are current and ongoing management actions. No additional actions would occur under this alternative.

Specially Designated Areas

The Air Force Overlay Area is currently managed through a Memorandum of Understanding (MOU) between the U.S. Air Force (USAF) and the Service. The current MOU would be renewed without changes.

The Service has not implemented an active research and monitoring program for the existing Research Natural Areas (RNAs) due to limited staffing and funding. RNAs are designed to provide baseline information for comparison with management actions. The RNAs on the Desert NWR include Basin, Hayford Peak, Deadhorse, Pinyon-Juniper, and Papoose Lake. No new research and monitoring activities would be implemented for the RNAs.

Visitor Services

In addition to the current and ongoing management actions identified in the "Features Common to All" section, the Service would continue to provide public outreach through participation in two major community events annually.

Cultural Resources

The Service would continue to manage and protect cultural resources on the Refuge on a project-by-project basis prior to land-disturbing projects to comply with applicable laws and regulations. Appropriate interpretive information on cultural resources would continue to be provided to visitors at the field station through informal outreach.

3.3.3 Alternative B – Minor Improvement in Wildlife and Habitat Management and Moderate Increase in Visitor Services

Alternative B provides for increased management actions for natural and cultural resources and for visitor services when compared to Alternative A (No Action). This alternative involves the objectives and management actions identified in the "Features Common to All Alternatives" section and additional actions. Alternative B actions are portrayed in summary form in Figure 3.3-2.

Bighorn Sheep Management

In addition to a fall helicopter survey, the Service would conduct yearly spring helicopter surveys to identify lambing and recruitment sites. They would also use historical records, sightings, and radio tracking data to determine the connectivity between subpopulations on the Refuge.

Sheep would be translocated between subpopulations on the Refuge and to populations outside of the Refuge with help from NDOW to maintain subpopulations on the Refuge and provide genetic diversity for the Nevada population of bighorn sheep.

Wildlife Diversity

The Service would conduct regular bird surveys at Corn Creek to monitor the effects of habitat restoration and management activities and gain a better understanding of the value of Corn Creek as a stop-over and breeding habitat for birds. Regular surveys would provide valuable information on the bird species that visit or use habitat on the Refuge throughout the year.

To protect resources on the Refuge from unauthorized uses, the Service would construct and maintain a southern boundary fence and increase law enforcement presence and patrols, with an emphasis on the southern boundary. The post-and-cable fence would be constructed to allow desert tortoise movement between the Refuge and adjacent habitats. The Service would monitor the Refuge using aerial photography, satellite imagery, or geographic positioning systems (GPSs) to identify damage caused by off-road vehicle trespassing, particularly along the southern boundary.

Monitoring efforts would allow the Service to determine if their actions are working to protect resources, and they would modify their actions, such as through increased law enforcement patrols or more signs, if additional measures are needed.

Staff and volunteers would be used to expand litter removal efforts throughout the Refuge and improve habitat conditions for wildlife.

Specially Designated Areas

The Service would update its current MOU with the USAF, which covers management and use of the western portion of the Refuge which is overlain by the NTTR.

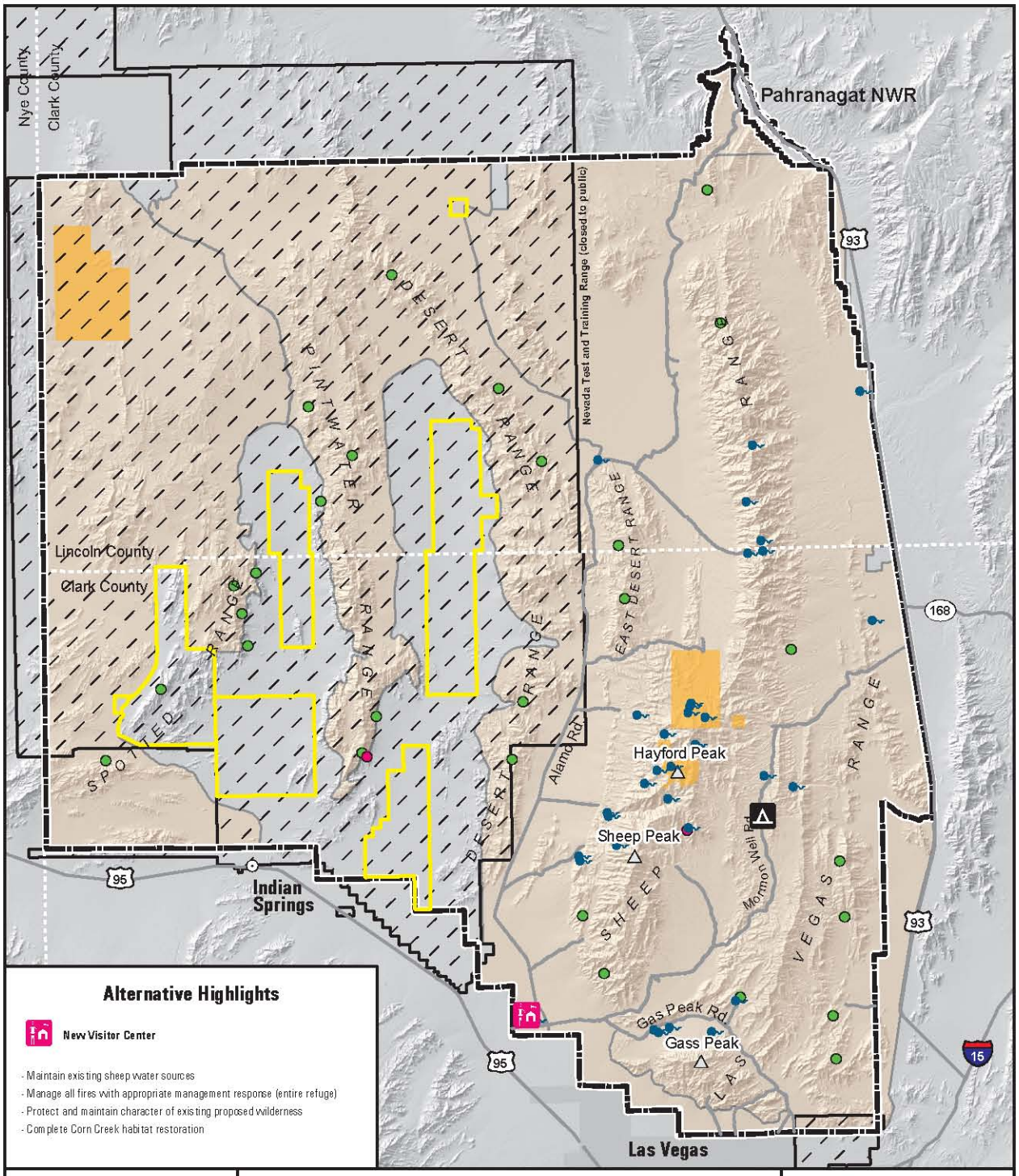

Figure 3.3-1

Alternative A

Desert NWR

May 19, 2008
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Figure 3.3-1-desert_alt_A.mxd

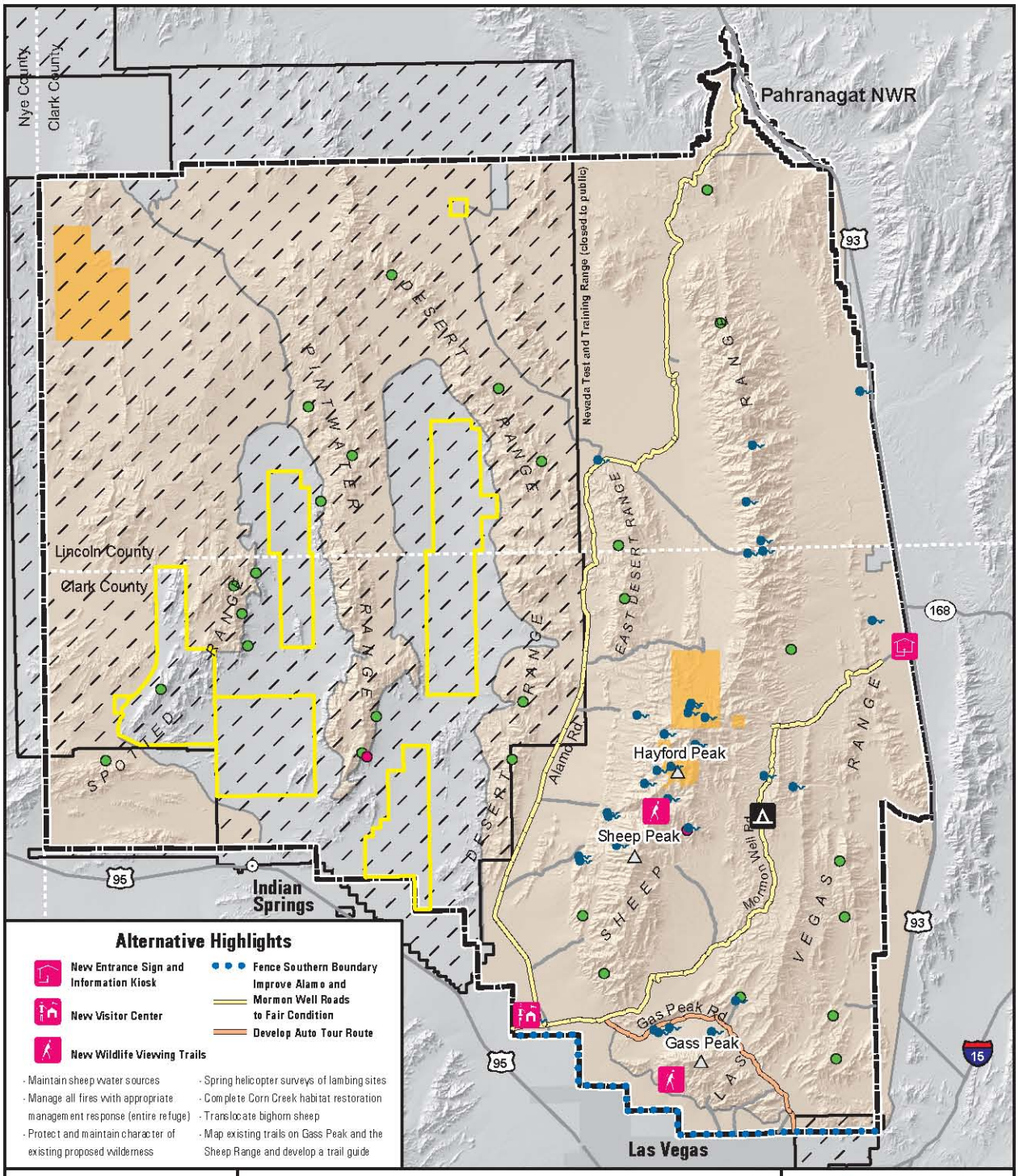

Figure 3.3-2

Alternative B

Desert NWR

May 19, 2008
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Figure 3.3-2-desert_alt_B.mxd

The Service would improve its use of RNAs by surveying and marking RNA boundaries, conducting photographic reconnaissance and documentation of all RNAs, and using the RNAs as control for monitoring the effects of habitat management on other areas of the Refuge.

Visitor Services

The Service would create a Refuge environmental education program using funding from the Southern Nevada Public Lands Management Act. The volunteer program would also be expanded to allow the visitor contact station (or new visitor center) to be staffed full-time during peak use seasons and for four hours per day during other seasons. The Service would also establish a seasonal volunteer resident host/docent at the Desert Pass campground to monitor visitor activities.

As part of the environmental education and interpretation program, interpretive panels and signs would be installed at the designated entry points, including an entrance sign and information kiosk at the east end of Mormon Well Road. Interpretation and educational efforts would be expanded through the development of cultural resources materials in coordination with local affiliated Native American tribes. The Service would also develop a live "sheep cam" at water sources to educate the public on the bighorn sheep. The video would be streamed through the Web site and at the new visitor center for viewing by the public.

The Service would improve Mormon Well Road and Alamo Road to "fair" condition for public access based on the Road Inventory for the Refuge (Federal Highway Administration 2000). They would also create new wildlife viewing trails in the Gass Peak and Sheep Range Units, construct photography blinds at key wildlife viewing spots, and designate parking turnouts along Alamo, Mormon Well, and Gass Peak roads using post-and-cable fencing. New trails developed on the Refuge would be designed and located to minimize impacts to desert bighorn sheep and minimize maintenance costs. An auto tour route would also be designed to allow Refuge visitors to drive along Gass Peak Road from Corn Creek to State Route (SR) 215 and view the Refuge.

To improve visitor services, the Service would develop a trail guide using geographic information system (GIS) software to map existing trails and show new trails in Gass Peak and the Sheep Range. The existing and new trails would be managed to minimize visitor impacts on desert bighorn sheep, which could result in controlled public access during portions of the year along some trails. Also, the Service would evaluate the management benefits of establishing a recreation-fee program.

The Service would expand the Refuge outreach program by participating in three major community events annually and conducting an annual open house for the public. They would install a permanent environmental education/interpretive display at a public venue in the Las Vegas area. To inform the public about the Refuge, the Service would create and distribute a video to the community that

highlights the Refuge, develop a quarterly Refuge newsletter, and prepare and distribute an annual Congressional briefing. To monitor the program's effectiveness, the Service would conduct annual surveys of the public's knowledge of the Refuge and its opportunities.

The Service would begin monitoring the hunting program in coordination with NDOW. Populations of game species would be surveyed annually, and the results would be discussed in an annual report. The number of hunters and species harvested would also be inventoried to record information on the program each year. Signs would also be posted and maintained to inform visitors of the designated hunt areas.

Cultural Resources

Background information on the cultural resources on the Refuge would be compiled to create databases and digital, GIS, and hard copy maps for retention in administratively confidential Refuge files. As part of the data collection effort, the Service would identify potential critical/priority critical cultural sites on the non-military overlay of the Refuge and develop a cooperative program and solicit funding to survey and record the sites. The gathered data on site locations, information, and survey areas would be used for planning, monitoring, and interpretation efforts related to cultural resources. Additional data collection efforts would be implemented to identify and evaluate resources that may be subject to looting, vandalism, erosion, or deterioration and allow the Service to implement measures, such as restricting or controlling access, to reduce threats, provide stabilization, or conduct data recovery on significant sites.

Other management actions implemented on the Refuge, such as wildlife management, habitat restoration, fire management, and trail construction, would incorporate cultural resource values, issues, and requirements into their designs and implementation procedures. The educational, interpretive, and outreach programs would also incorporate cultural resources information in their materials. The Service would use a site stewardship volunteer program to assist in site monitoring, creating and delivering educational and interpretive literature and programs, and promoting cultural resources conservation through various public outreach methods.

In addition, the Service would identify and evaluate cultural resources that could educate visitors on how humans have interacted with wildlife and habitats in the past, and they would consult with affiliated tribes and other stakeholders on ways to use these resources to achieve educational, scientific, and traditional cultural needs. The Service would also work with affiliated Native American tribes on projects to restore native habitat and harvest native plants (for traditional non-commercial purposes). To educate the public, the Service would work with affiliated tribes and other stakeholders to design and implement educational materials, programs, and activities that would address traditional or sacred resources and increase awareness on- and off-Refuge about the sensitivity of cultural resources to visitor impacts and the penalties for vandalism.

3.3.4 Alternative C – Moderate Improvement in Wildlife and Habitat Management and Minor Increase in Visitor Services

Alternative C is the preferred alternative. It involves the actions identified in the "Features Common to All Alternatives" section, some of the activities discussed in Alternative B, and some additional activities to improve Refuge management as well as reductions in activities. Activities that would not be implemented under this alternative are also noted; these actions would achieve different goals than those this alternative is targeting. The actions for this alternative are summarized in Figure 3.3-3.

Bighorn Sheep Management

To protect bighorn sheep habitat from wildfires, the Service would remove highly flammable vegetation around catchments as needed.

As with Alternative B, the Service would translocate sheep between subpopulations on the Refuge and to outside the Refuge to maintain subpopulations as needed. The Service would also develop and implement a Sheep Management Plan as well as a formal agreement with NDOW regarding sheep management on the Refuge. As part of bighorn sheep management, predator populations (mountain lions) on the Refuge would be monitored. As necessary, the Service would construct additional rainwater catchments if existing sources are determined to be inadequate based on the Sheep Management Plan. Data collection efforts would involve conducting at least one annual fall helicopter survey to estimate adult bighorn sheep population parameters; conducting radio telemetry studies to assess bighorn sheep mortality factors, home ranges, and habitat usage; and collecting blood and fecal samples to determine the general health status of the herd, diet composition, nutrient uptake, and genetic diversity.

Wildlife Diversity

In order to track long-term trends in vegetation communities on the Refuge, the Service would establish and inventory permanent plots below 5,000 feet. Sample design would ultimately be decided by a pilot study and subsequent analysis, but may include 20 900-square-meter plots (after Webb et al. 2000) per distinct ecosystem type (up to 100 plots total) and would use field techniques for measuring vegetation as described in Elzinga et al. (2005). Inventories would be conducted every five years to monitor natural changes in plant and wildlife composition and abundance.

In order to obtain information on special-status species on the Refuge, the Service would implement an Inventory and Monitoring Plan for these species. Implementation of the plan would involve conducting surveys for special-status species in combination with vegetation surveys and establishing monitoring protocols for each species to obtain additional information on their populations, health, diversity, range, and habitat requirements. Depending on suitable habitat characteristics at Corn Creek and management objectives, the Service

would consider reestablishing Pahrump poolfish in the streams, ponds, or springs at Corn Creek.

The Service would use prescribed burns and naturally ignited fires above 5,000 feet to restore vegetation characteristics representative of a natural fire regime. Some naturally ignited fires above 5,000 feet would be allowed to burn under prescribed fire conditions, and such events would be managed as fire use events with appropriate staffing to reflect the complexity of the incident. As part of fuels management, the Service would consider the habitat needs of special-status species, such as Gilbert's skink (NDOW Species of Conservation Priority) and Partners in Flight priority bird species (pinyon jay and gray vireo), and modify management actions appropriately to maintain or improve habitat for these species. Once restoration activities are complete, the Service would regularly maintain and monitor the habitats to ensure restoration success.

The Service would implement additional resource protection measures, including fencing the eastern boundary (post and cable) where necessary; posting boundary signs along the entire southern, eastern, and northern boundaries; and expanding law enforcement presence and patrols throughout the Refuge with additional emphasis along the eastern boundary. Trespassing and Endangered Species Act violations would be enforced through increased awareness and support from other agencies. A second entrance point would be designated at the southeast end of the Refuge in addition to the existing entrance at Corn Creek Field Station.

The Service would coordinate with local jurisdictions along the southern boundary to ensure compatible development occurs adjacent to the Refuge. Possible measures to ensure compatibility include establishment of a greenbelt or construction of walls along the north side of developments. To rehabilitate and protect habitat along the southern boundary, the Service would develop and implement a plan to close illegal trails and rehabilitate damaged resources (i.e., habitat). Native upland vegetation would be planted to restore damaged habitat.

Specially Designated Areas

In addition to the management actions described for Alternative B, the Service would submit a request to the Service Director to de-designate the Papoose Lake RNA due to its inaccessibility because of the military overlay. In addition to monitoring activities in RNAs, academic and agency scientists would be encouraged to conduct non-manipulative research and obtain information on the RNAs.

Visitor Services

In addition to the management actions described for Alternative B, the Service would distribute educational materials to the public to inform them about the use of fire for habitat management. Two management actions would not be implemented under Alternative C: the auto tour route and wildlife viewing trails at Gass Peak and Sheep Range.

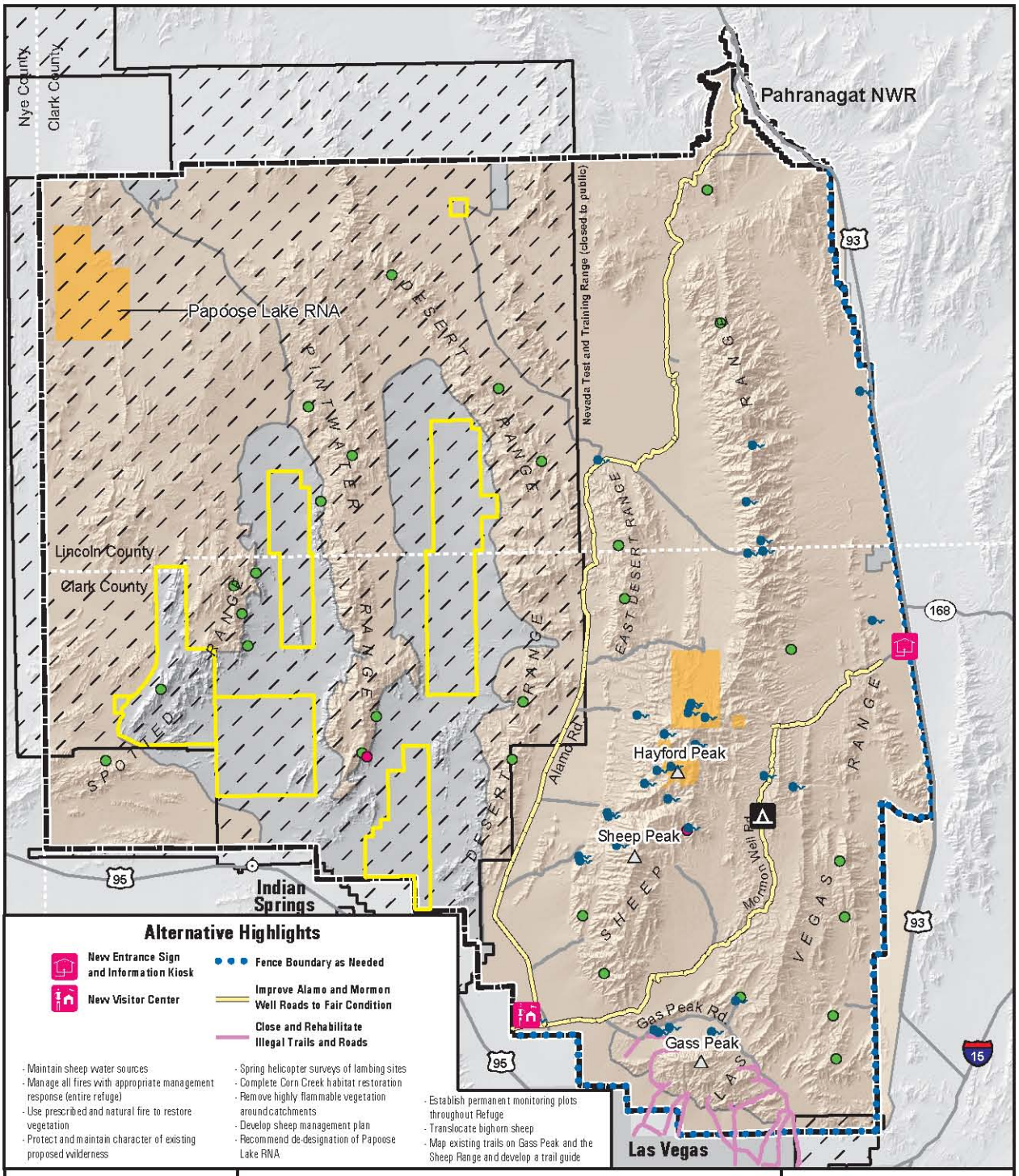

Figure 3.3-3

Alternative C

Desert NWR

May 19, 2008
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Figure 3.3-3-desert_alt_C.mxd

Cultural Resources

To improve cultural resources management on the Refuge, the Service would implement the following actions:

- Prepare evaluation criteria and conduct a cultural resources inventory at all public use areas, roads, affected areas, and other "destinations" on the Desert NWR;
- Inventory, evaluate, and nominate eligible Traditional Cultural Properties and sacred sites to the NRHP, in consultation with affiliated tribes;
- Inventory, evaluate, and mitigate adverse effects and stabilize samples of cultural resources on Desert NWR using a research design prepared in consultation with affiliated tribes and the scientific community; and
- Conduct studies of ethnobotany and traditional plant use on the Refuge.

3.3.5 Alternative D – Moderate Improvement in Wildlife and Habitat Management and Limited Increase in Visitor Services

Alternative D involves the actions identified in the "Features Common to All Alternatives" section, some of the activities discussed in Alternatives B and C, and minimal additional activities to improve wildlife management on the Refuge with several reductions in visitor services. Activities that would not be implemented under this alternative are also noted; these actions would achieve different goals than those this alternative is targeting. The actions for this alternative are summarized in Figure 3.3-4.

Bighorn Sheep Management

Instead of transplanting sheep between subpopulations within the Refuge, as identified under Alternatives B and C, the Service would translocate sheep from outside sources onto the Refuge to maintain and increase Refuge subpopulations and improve genetic diversity. The Service would also implement a Sheep Management Plan and improve sheep management similar to Alternative C.

Wildlife Diversity

In addition to the establishment of permanent plots below 5,000 feet, as identified under Alternative C, the Service would establish permanent plots for monitoring plant communities above 5,000 feet using the same techniques discussed under Alternative C.

To improve resource protection efforts, the Service would construct a post-and-cable fence along the northwest boundary of the East Pahranagat Range Unit as well as the boundary fences along the southern and eastern boundaries.

Specially Designated Areas

The Service would submit a request to the Service Director to de-designate Papoose Lake RNA, but non-manipulative research in the RNAs would be discouraged to minimize the staffing needed to oversee research projects.

Visitor Services

Environmental education and interpretation would be improved for the most part as described under Alternative B, except for the following:

- A seasonal volunteer/docent would not be used at Desert Pass campground; and
- The volunteer program would be expanded to staff the visitor contact station full-time during peak use, but only for four hours per day on weekends during the rest of the year.

Public outreach would be minimal and would include participation in two major community events annually, conducting an annual public open house, and preparing and distributing an annual Congressional briefing. Other actions described under Alternative B would not be implemented due to the need for increased staffing and funding to support an increase in outreach activities.

Additional visitor services related to wildlife observation and photography would be expanded as under Alternatives B; however, the Service would not improve Mormon Well and Alamo Roads, construct an auto tour route or wildlife viewing trails in Gass Peak and Sheep Range Units, or map trails at Gass Peak and Sheep Range. The Service would not evaluate implementation of a recreation-fee program. These activities would not be implemented due to the need for increased staffing and funding to support such projects.

Cultural Resources

The Service would implement the management actions described under Alternatives B and C, except education and outreach would be the same as Alternative A (current management). No additional actions are proposed under Alternative D.

3.3.6 Comparison of Alternatives

A comparative summary of the alternatives for the Desert NWR is provided in Table 3.6-2.

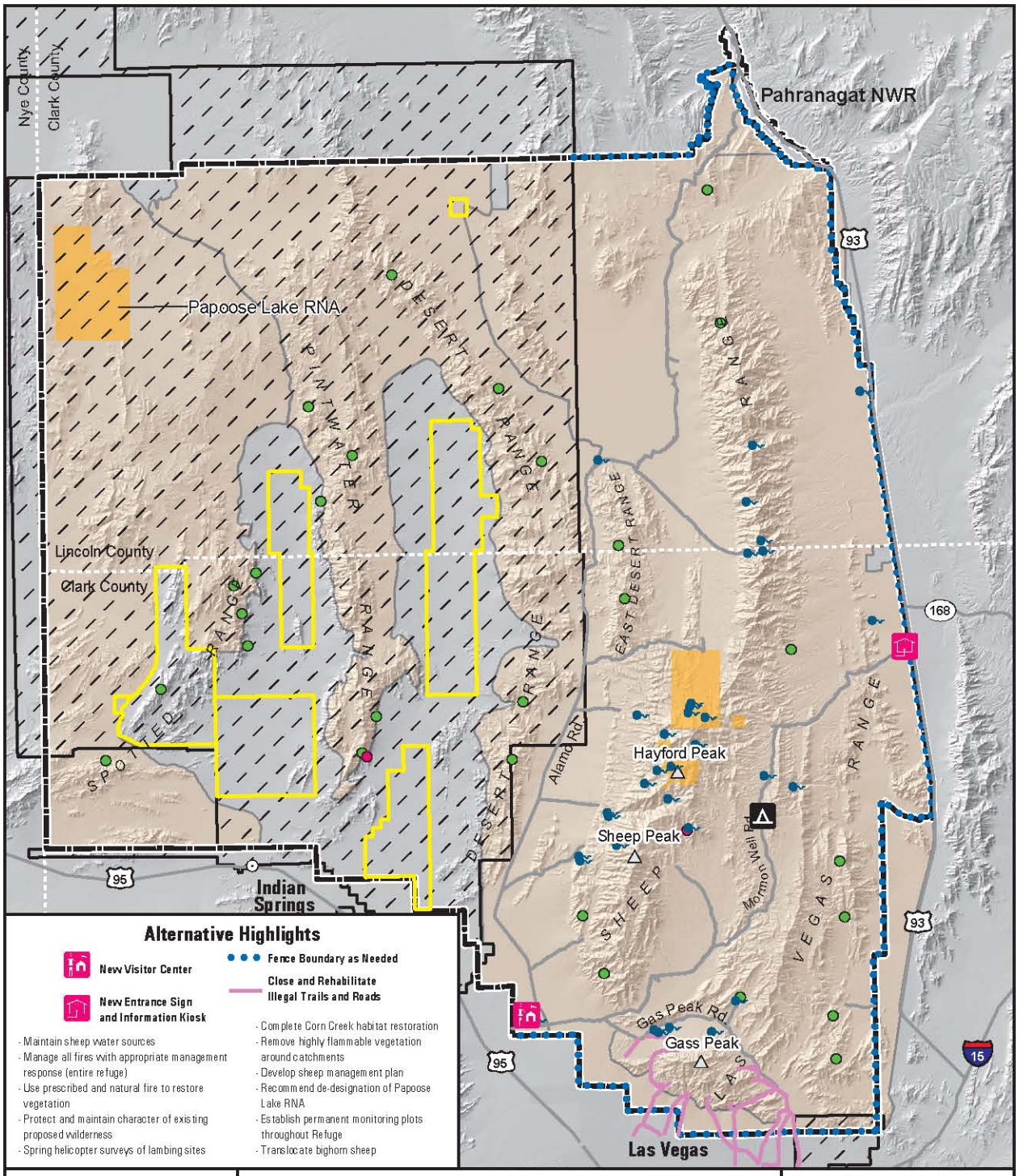

Figure 3.3-4

Alternative D

Desert NWR

May 19, 2008
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Figure 3.3-4-desert_alt_D.mxd

3.3.7 Management Actions Considered but Eliminated from Detailed Analysis as Part of Alternatives

During the alternatives development process, Desert NWR staff evaluated additional management actions as part of the current alternatives. These actions are identified below with their reasons for elimination:

- Allow off-highway or all-terrain vehicle use. (Not appropriate use of Refuge.)
- Develop a museum at Corn Creek. (Not feasible.)
- Develop a visitor center along the southern boundary near Gass Peak. (Not feasible.)

3.4 Moapa Valley National Wildlife Refuge Alternatives

Moapa Valley NWR's alternatives consist of the No Action Alternative and two action alternatives. The No Action Alternative contains a variety of management actions that have recently been implemented on the Refuge or will be implemented before the CCP is approved. The two action alternatives contain management actions to improve Refuge conditions at varying levels. Alternative B would improve habitat and wildlife management for two spring systems on the Refuge with an increase in visitor services. Alternative C would improve habitat and wildlife management for three spring systems on the Refuge and expand visitor services more than in Alternative B.

3.4.1 Features Common to All Alternatives

A number of current management actions would continue to be implemented for the Moapa Valley NWR under each of the alternatives. The two action alternatives propose additional management actions to improve Refuge conditions. Actions that are common to all alternatives are described below and are not repeated in each alternative description.

Endemic and Special-Status Species

The Service would continue ongoing restoration and revegetation efforts on the Plummer Unit. As part of restoration project design and implementation, the Service would consider habitat needs of special-status fish and invertebrates in addition to the Moapa dace, including Moapa White River springfish, Moapa pebblesnail, grated tryonia, Moapa Warm Spring riffle beetle, Amargosa naucorid, and Moapa naucorid. Restoration activities involve restoring native overstory, mid-level, and understory vegetation (using local seed and seedlings) along riparian corridors, in transitional upland sites, and in any disturbed or newly exposed areas on the Plummer Unit. Volunteers would also continue to be used for restoration efforts.

In addition, to improve habitat conditions for endemic species, the Service would develop management actions to remove nonnative fish species, including mollies and mosquitofish, from Refuge waters. Other nonnative aquatic species would also continue to be periodically removed.

As part of the restoration activities on the Plummer Unit, the Service would remove palm trees associated with riparian areas to restore habitat for the endangered Moapa dace. In addition, periodic palm tree maintenance would be required to reduce the wildfire risk. Unwanted fires would be extinguished as fast as safely possible to minimize potential adverse impacts on Moapa dace. These efforts would allow the Service to protect and maintain natural habitat, including water quality and quantity in the Refuge springs and channels, at suitable levels for Moapa dace survival, reproduction, and recruitment.

The Service would continue collecting data on Moapa dace and Moapa White River springfish through annual surveys and monitoring. This information would be used for management of the species during and following restoration activities. The Service would monitor the Moapa dace population before and after restoration activities to identify beneficial or adverse effects on its population.

The Service would continue to track monitoring of water flow and temperature of Pedersen and Pedersen East Springs and the Warm Springs West flume by the U.S. Geological Survey (USGS). They would also continue to participate in local and regional water resources management efforts to assess impacts to water resources and protect water resources on the Refuge. Participation in the Muddy River Regional water monitoring planning process is a key aspect of water resources management for the Muddy River area. The Service would also monitor changes in the environment, such as changes in vegetation communities, wildlife trends, and surface and groundwater levels, to assess the effects of climate change on the Refuge, if any.

Additional protection measures for the Refuge would include maintaining the existing boundary fence and gates and maintaining regulatory signs in good condition. Signs, fencing, and gates would be replaced as staffing and funding allow.

Visitor Services

The Service would continue to use volunteers for habitat restoration projects on the Refuge. Outreach staff would continue to attend the Moapa Day community event or other local community events, and information on Refuge resources would be provided upon request to the local community. At a minimum, the current entrance signs for the Refuge would be maintained. The Service would continue to work on establishing an accessible trail for visitors.

The Service would explore opportunities for partnerships to develop environmental education programs and for community-based outreach during on-Refuge activities. An annual open house would be held for volunteers that help on the Refuge. The Service would continue informal education of Refuge visitors on cultural resources of the area.

To comply with applicable laws and regulations, the Service would continue to inventory, manage, and protect any cultural resources on the Refuge on a project-by-project basis.

3.4.2 Alternative A – No Action (Current Management)

Alternative A is the current management situation, or No Action Alternative, for the Refuge. It serves as a baseline with which the objectives and management actions of the two action alternatives, Alternatives B and C, can be compared and contrasted. Because this alternative reflects the current management, it would not result in substantial changes in the way the Refuge would be managed in the future. Figure 3.4-1 graphically summarizes the actions that would continue under this alternative.

Endemic and Special-Status Species

The Service would continue to implement the management actions identified in the "Features Common to All Alternatives" section.

Visitor Services

The Refuge would remain closed to the general public, and the Service would continue limited participation in local community events. Existing parking facilities would be maintained for visitor safety, and the current Refuge entrance signs would be maintained. The current interpretive and environmental education materials would be periodically updated to maintain accuracy. Information about Refuge resources would be provided to visitors and the public upon request.

3.4.3 Alternative B – Improve Habitat and Wildlife Management on Portions of the Refuge and Increase Visitor Services

Alternative B provides for moderately increased management actions for all resource areas when compared to Alternative A (No Action). This alternative involves the objectives and management actions identified in the "Features Common to All Alternatives" section, some modifications of actions identified in Alternative A, and additional actions for more active management. Alternative B actions are portrayed in summary form in Figure 3.4-2.

Endemic and Special-Status Species

In addition to restoration of the Plummer Unit, the Service would continue channel restoration on the Pedersen Unit to benefit Moapa dace by planting native species, such as coyotebrush, Sporabolis, spikerushes, saltgrass, and bushy bluestem, in and surrounding spring sources. Restoration would involve maintaining water temperatures between 30 and 32 degrees Celsius (86 to 89.6 degrees Fahrenheit), establishing and maintaining flows between 0.3 and 1.0 meters per second, and planting native plant species, such as waternymph, watercress, spikerush, sedges, and grasses, in and surrounding spring sources. Riparian habitat near larger channels would be restored to contain herbaceous and woody species, such as velvet ash, cottonwood, willow, screwbean mesquite, and understory sedges. Once restoration activities are complete, the Service would regularly maintain and monitor the habitats to ensure restoration success.

The Service would also monitor streams for endemic fish and invertebrate populations before and after restoration activities to identify potential impacts and changes in their populations.

The Service would collect baseline data for fish and wildlife species to improve management of the Refuge. For federally listed and other special-status fish species, the Service would develop and implement an Inventory and Monitoring Plan within five years of CCP approval to establish strategies and protocol for monitoring and inventories, consistent with the Clark County Multiple Species Habitat Conservation Plan (Clark County and Service 2000). Surveys would be conducted for special-status species (federally listed, proposed, candidate, and other status) throughout the Refuge and for invertebrates and amphibians in aquatic habitat to determine species composition and abundance.

Once implemented, the Service would repeat inventories every five years to track long-term trends in populations. By 2009, the Service would complete an inventory of existing upland habitat to record information on migratory birds, mammals, and reptiles that use the Refuge. Restored stream habitat would be monitored consistent with the Muddy River Aquatic Species Recovery Plan (Service 1996).

The Service would develop a long-term Water Resources Management Plan for the Refuge and implement additional actions to improve monitoring of the springs and streams. These actions could include identifying appropriate protocols for monitoring (locations, timing, parameters, and equipment), installing equipment, and monitoring specific parameters (flow, temperature, and quality) at some springs and streams on the Plummer and Pedersen Units. The Service would collect monthly monitoring data for water flow and temperature of Pedersen East and Pedersen East Springs and Warm Springs West flume and for water quality parameters (temperature, flow, dissolved oxygen, pH, and total dissolved solids) at other Refuge springs as needed.

To protect native habitats, wildlife, and fish on the Refuge, the Service would implement an IPM Plan that would involve controlling and eradicating invasive species encroachment using an early detection/early response approach. The Service would participate in community-based fire safe planning on and off the Refuge and use prescribed fire where appropriate to reduce hazardous fuels and treat unwanted vegetation. These planning efforts would allow the Service to explore other options for protecting the Refuge and its habitats from fire.

To protect habitats and control public access, the Service would install additional entrance signs, as appropriate, and install directional, regulatory, and interpretive signs on and off the Refuge. Additional interpretive, regulatory, and directional materials would be developed to guide and enhance the visitor experience.

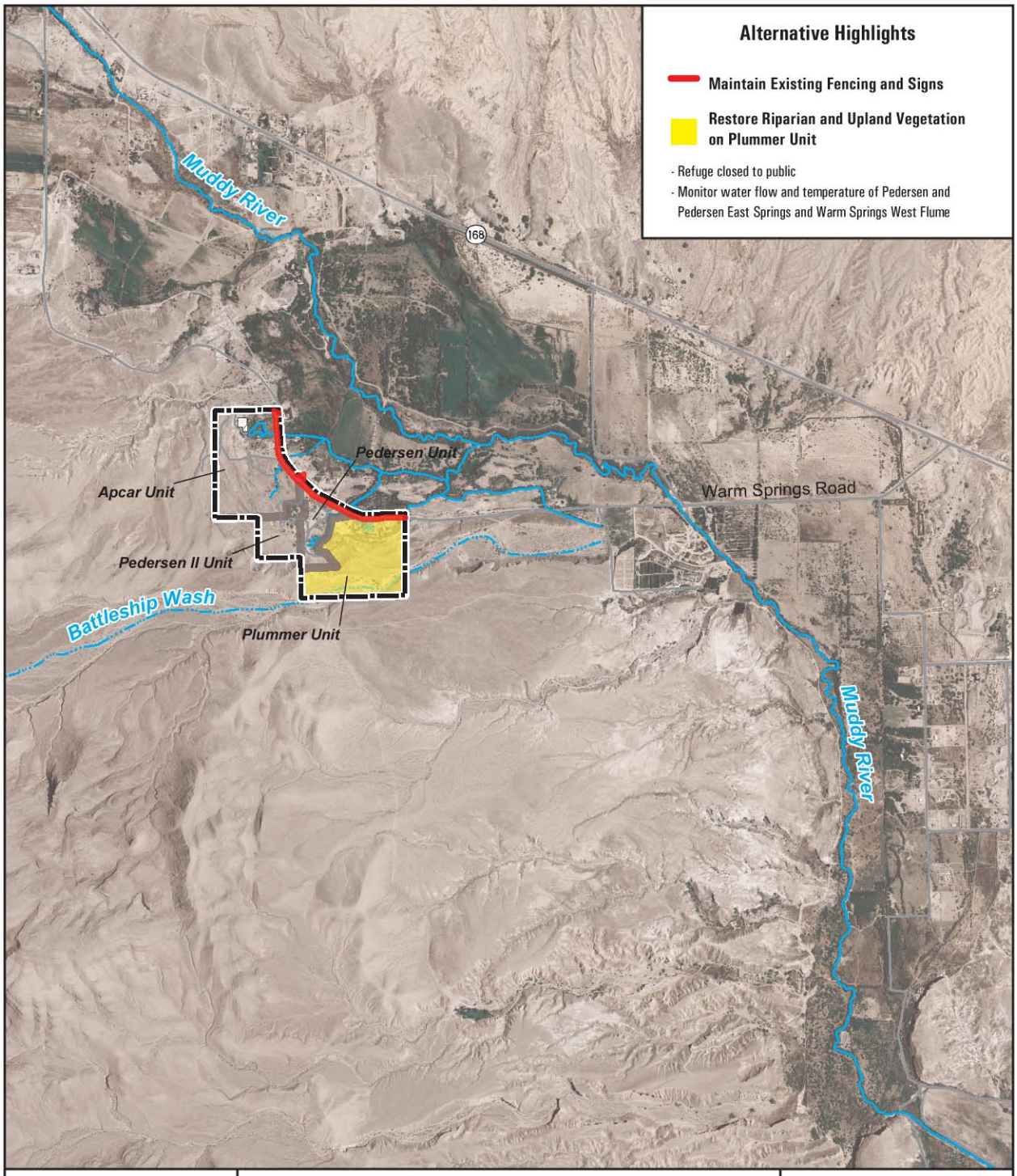

Figure 3.4-1

Alternative A

Moapa Valley NWR

May 27, 2008
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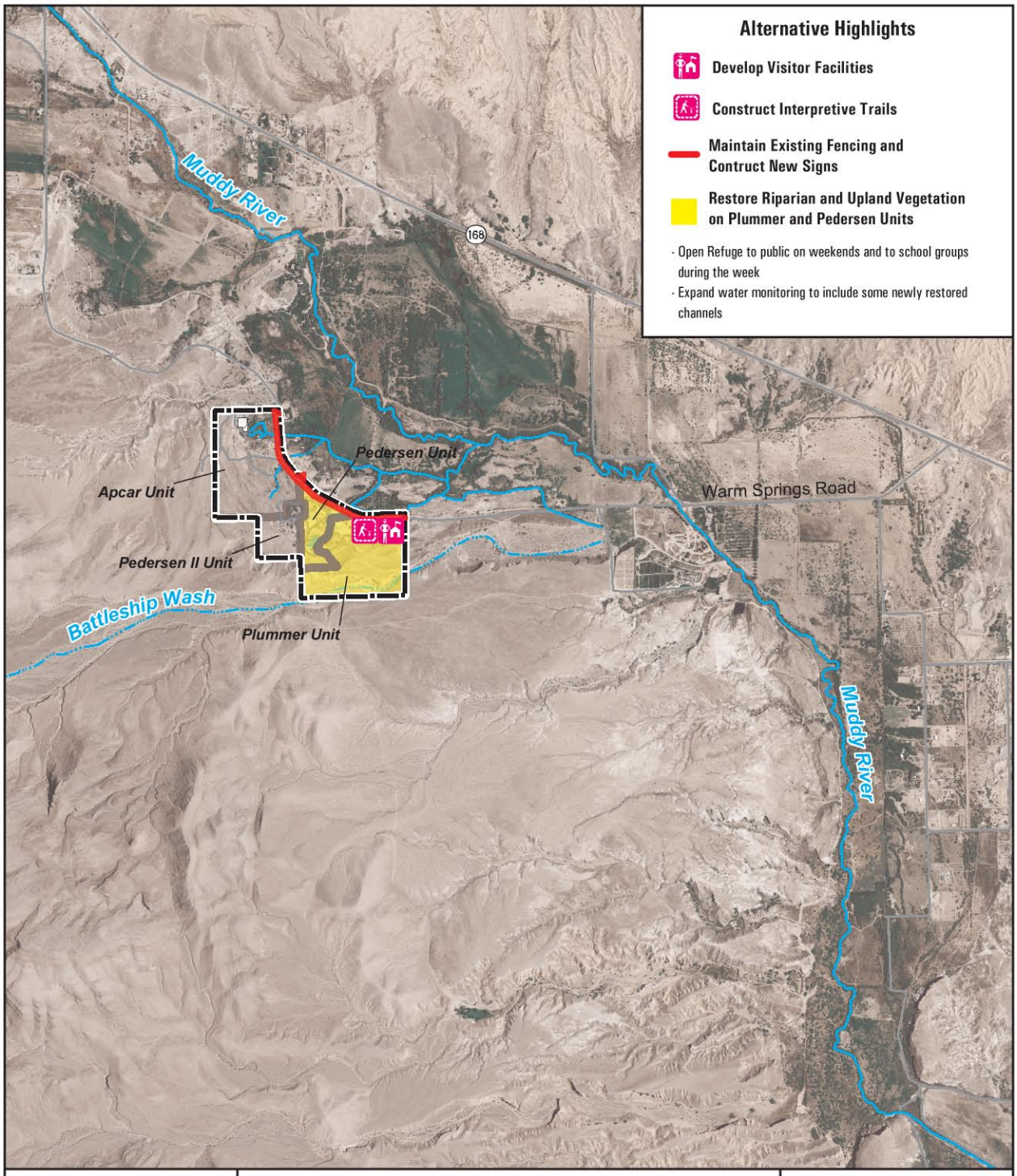
Figure 3.4-1_moapa_alt_A.mxd



N

Miles
0 0.25 0.5
0 0.5 1
Kilometers

Approved Refuge Boundary
Private Land
Management Unit
Stream
Intermittent Stream

Figure 3.4-2

Alternative B

Moapa Valley NWR

May 27, 2008
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Figure 3.4-2_moapa_alt_B.mxd

Visitor Services

The Service would open the Refuge to the public on a limited basis. The Refuge would be open to the general public on weekends and to school groups during the week through prior arrangement. Signs would be installed along Interstate 15 (I-15) and U.S. Highway 93 and at the entrance to the Refuge at Warm Springs Road to promote and direct the public to the Refuge. The Service would work with the Nevada Department of Transportation (NDOT) on sign installation.

Additional facilities would be constructed on the Refuge to accommodate the visitors. The Service would expand and improve parking and access roads, as necessary, to accommodate the increase in visitors. Specifically, interpretive panels would be installed along a trail system of the Plummer and Pedersen Units, and a basic trail would be constructed along the riparian corridor on the Plummer Unit.

The Service would develop an environmental education program by 2012 and create interpretive and environmental educational materials for distribution to the public, as staff or funding becomes available. Refuge education materials would be offered to local school contacts upon request. Interpretive materials, such as brochures and fact sheets, would be developed to guide and enhance visitor experience and provide information on the benefits of stream habitat restoration for the enhancement of Moapa dace habitat and human safety. To inform visitors of cultural resources in the area, the Service would develop regionally focused environmental education and interpretation materials for self-guided tours. Information would be developed in coordination with culturally affiliated tribes to incorporate their history and knowledge of native plant and animal species.

To improve outreach for the Refuge, the Service would conduct a public open house every two to three years to encourage interactions and foster relationships between Refuge staff and local constituents, as well as seek opportunities for community-based outreach, such as participation in off-Refuge activities. The Service would provide outreach at the Moapa Valley Community Center by invitation and as the staff is available. Docents would be recruited to staff the Refuge on weekends and facilitate tours, and the Service would collect data on the number of visitors using sign-in sheets to modify their visitor services accordingly.

3.4.4 Alternative C – Improve Habitat and Wildlife Management Throughout the Refuge and Expand Visitor Services

Alternative C is the preferred alternative. It involves the actions identified in the “Features Common to All Alternatives” section, the activities discussed in Alternative B, and some additional activities. Some activities from Alternative B are expanded under this alternative to improve Refuge management. The actions are summarized for this alternative in Figure 3.4-3.

Endemic and Special-Status Species

In addition to restoring the springs and streams on the Plummer and Pedersen Units, the Service would complete restoration of the spring heads and channels on the Apcar Unit by 2015. Native plants would be planted where nonnative and invasive species are removed and in other disturbed areas within the Apcar Unit.

The Service would collect additional data on migratory birds, mammals, and reptiles in the upland habitat by 2009 and prepare a Monitoring Plan for those species. The long-term Inventory and Monitoring Plan identified under Alternative B would be expanded to include all federally listed, proposed, candidate, and other special-status species. The Service would also coordinate with NDOW to conduct surveys of palm tree habitat for use by bats.

Springs on the Apcar Unit would also be monitored for water quality parameters based on current and past monitoring protocols. In addition, the Service would monitor habitat changes, maintain and continue improvements for restoration efforts and other landscape improvements, and provide adequate levels of monitoring and maintenance for invasive species control and fire management.

The Service would also expand the Refuge acquisition boundary by 1,503 acres and work with partners to protect habitat within the expanded boundary through purchase, transfer, and/or agreement (see Land Protection Plan in Appendix L). Step-down habitat management plans would also be prepared for habitats within the expanded boundary.

Visitor Services

The Refuge would be open daily to the public for self-guided or staff-guided tours. Additional parking areas, a school bus turnout, and an overlook trail with interpretive panels and shade structure would be constructed or improved to accommodate the increase in visitors. The overlook trail with interpretive panels and shade structure would be located on top of the hill on the Plummer Unit for viewing the Refuge and the Moapa Valley. A self-guided trail system would be constructed along the spring head, pools, and riparian corridor on the Plummer Unit to accommodate visitors.

The Service would develop an environmental education program at the Refuge and develop interpretive and environmental education materials for distribution to the public. A public open house would be conducted annually to encourage interactions and foster relationships between Refuge staff and local constituents.

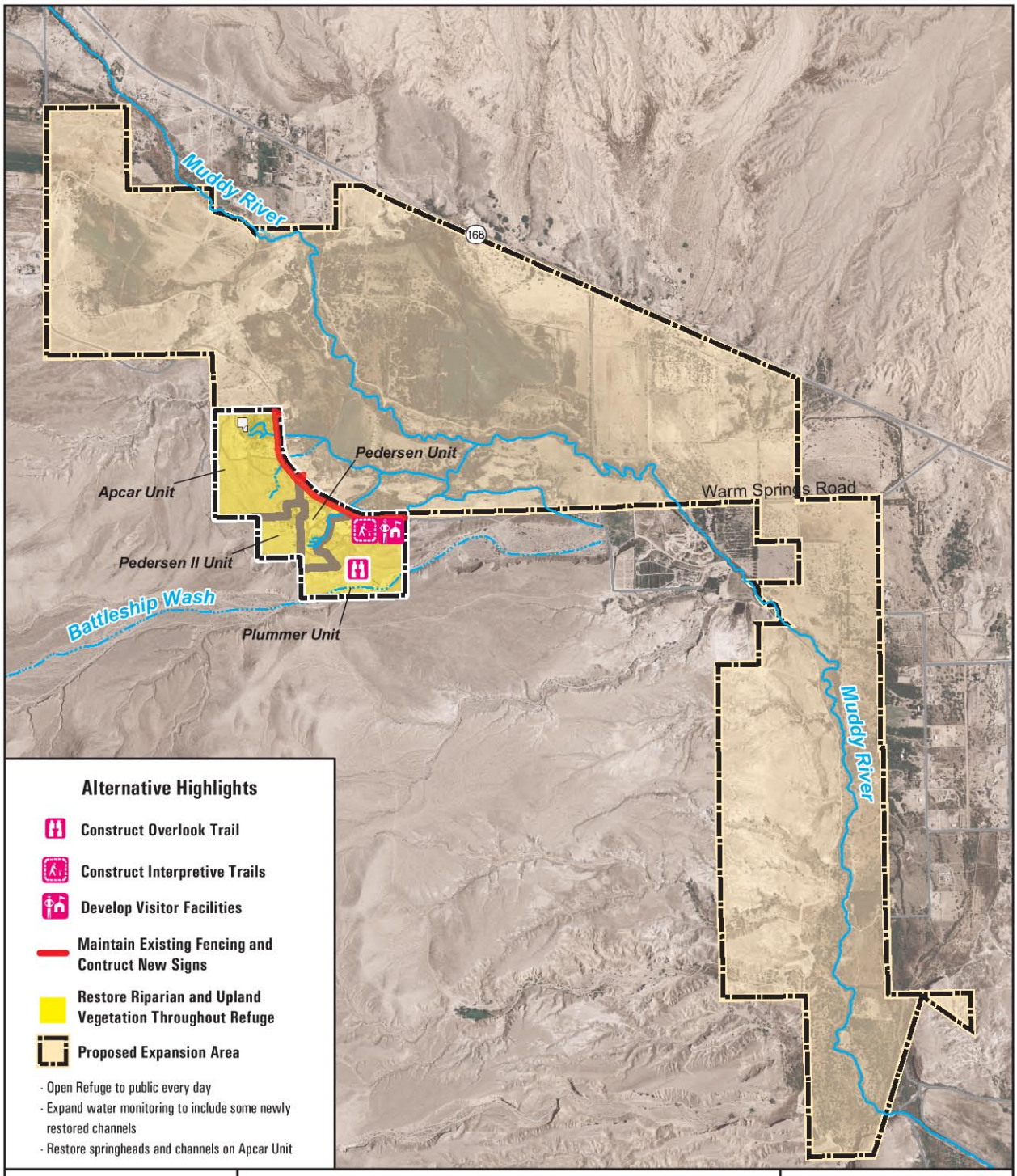

Figure 3.4-3

Alternative C

Moapa Valley NWR

May 27, 2008
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Figure 3.4-3_moapa_alt_C.mxd

The Service would expand outreach through construction of a permanent environmental education display at the Moapa Valley Community Center or other local public venue. To encourage schools to visit the Refuge, the Service would organize local school contacts and generate enthusiasm for visiting the Refuge and experiencing its endemic species. In addition, the Service would seek opportunities for community-based outreach, such as participation in off-Refuge activities.

Moreover, the Service would conduct a cultural resources inventory of the entire Refuge to assist in future planning efforts and improve management and protection of significant sites from inadvertent public visitation impacts.

3.4.5 Comparison of Alternatives

A comparative summary of the alternatives for the Moapa Valley NWR is provided in Table 3.6-3.

3.4.6 Management Actions Considered but Eliminated from Detailed Analysis as Part of Alternatives

During the alternatives development process, Refuge staff evaluated additional management actions as part of the current alternatives. These actions are identified below with their reasons for elimination:

- Open pools to public for swimming. (Not compatible with Refuge vision, purpose, or goals.)
- Remove all palm trees from the Refuge. (Not appropriate since they provide habitat for some bats, other mammals, and birds.)

3.5 Pahranagat National Wildlife Refuge Alternatives

Pahranagat NWR's alternatives consist of the No Action Alternative and three action alternatives. The No Action Alternative contains a variety of management actions that have recently been implemented on the Refuge or will be implemented before the CCP is approved. The three action alternatives contain management actions to improve Refuge conditions at varying levels. Alternative B would provide limited improvements in water resource and habitat management with some improvements to visitor services. Alternative C would provide minor improvements in water resource and habitat management with an increase in visitor services. Alternative D would provide moderate improvements in water resource and habitat management with an increase in visitor services.

3.5.1 Features Common to All Alternatives

A number of current management actions would continue to be implemented for the Pahranagat NWR under each of the alternatives. The three action alternatives propose additional management actions to improve Refuge conditions. Actions that are common to all alternatives are described below and are not repeated in each alternative description.

Wetland Habitat

The Service would continue to maintain the current amounts of open water (640 acres), wet meadow (700 acres), and alkali flat (350 acres) habitats on Pahranagat NWR. For the open water habitat, the Service would complete and implement a wetland restoration plan to improve the quality of the existing habitat for waterfowl, waterbirds, shorebirds, and other migratory birds. As part of this planning effort, the amount of open water habitat would be evaluated and may be modified appropriately to provide suitable habitat for migratory birds. Current management would be continued until the plan is complete, including the following:

- Maintaining the water level of Upper Pahranagat Lake within a range of 4 to 11 feet between October and April to maintain the sport fishery and monitor inflow to the lake;
- Discharging water into Middle Marsh and Lower Pahranagat Lake to provide migratory waterfowl habitat;
- Clearing vegetation in irrigation ditches annually as staffing allows; and
- Maintaining current maintenance, repair, and improvement efforts on North Marsh and Upper Pahranagat Lake.

Marsh habitat would be maintained with 30 percent open water and 70 percent emergent vegetation. Supplemental flows from pumped well water into Middle Marsh would be used as needed to maintain water levels. Water would continue to be supplied to the wet meadow habitat at Middle Marsh from October to March to maintain the habitat. The alkali flats habitat in the Lower Pahranagat Lake area would continue to be flooded from December to June for breeding and migrating waterfowl, waterbirds, and shorebirds. Once restoration activities are complete, the Service would regularly maintain and monitor the habitats to ensure restoration success.

Water resources management would continue under existing conditions to maintain these habitats between October and April of each year, with a primary goal of providing waterfowl and migratory bird habitat throughout the Refuge. Additional water resource management would include:

- Pursuing the 1996 application for year-round water discharges;
- Surveying existing groundwater wells and repairing or capping as appropriate;
- Monitoring inflow to Upper Pahranagat Lake;
- Installing a flume or weir at the outflow of Lower Pahranagat Lake;
- Installing and monitoring flow meters and data loggers on each of the three groundwater wells;
- Completing the update of the Water Management Plan by 2012; and
- Completing a Refuge-wide water budget.

To improve wetland habitat for waterfowl, carp populations in the open water habitat would be studied and may be controlled through electro-shocking and netting. Nonnative carp uproot aquatic vegetation when spawning and feeding and suspend benthic sediments, resulting in limited light for plant growth. A reduction in carp populations would allow emergent and submergent vegetation to establish along the edges of Upper Pahranagat Lake and North Marsh.

The Service would continue to use prescribed burns as needed in wet meadow and marsh habitats to control vegetation. Noxious weed surveys would be coordinated with county, state, and federal agencies to map the extent of weeds on the Refuge. Weed removal efforts would occur as staffing and funding become available. The Service would also continue to implement limited IPM efforts within the existing 112-acre grassland habitat to contain knapweed and reduce its extent.

To monitor waterfowl response to habitat management, the Service would continue conducting spring waterfowl surveys using volunteers and Refuge staff, as available, and would coordinate with NDOW to conduct fall and winter waterfowl surveys. Information on the Pahranagat Valley montane vole on the Refuge would continue to be collected to determine its population status, distribution, and demography.

Wildlife Diversity

The existing 100 acres of cottonwood-willow riparian habitat would be maintained around North Marsh to provide habitat for the southwestern willow flycatcher and other migratory birds. The endangered flycatcher has been documented nesting in this habitat during annual surveys over the past several years (Koronkiewicz et al. 2006). The Service would also implement additional surveys of the Refuge to collect information on riparian habitat (percentage of cover, density, age, and structure), southwestern willow flycatcher (presence or absence), and vegetation (as directed by project objectives and efforts).

To protect upland habitat, the Service would continue to enforce prohibitions of off-road vehicles and maintain Refuge fences to reduce encroachment of cattle from adjacent lands. The Service would also prepare a wilderness study report and NEPA document to evaluate options for preserving wilderness values of the three small wilderness study areas along the western boundary of the Refuge adjacent to the proposed wilderness on Desert NWR. Wildland fires on the Refuge would be managed using the AMR, which considers resource values at risk and potential negative impacts of various fire suppression measures. Firefighter and public safety would be the highest priority on every incident.

Habitat around springs and channels on the Refuge would be improved through implementation of site Restoration Plans. These plans would include restoring native habitats, restoring springs to conditions similar to those before development, and improving hydrology and water quality to benefit native fish species. Six of the springs are currently degraded or have been modified, including three spring

outflows (Cottonwood Spring, Cottonwood Spring North, and Lone Tree Spring) that have been dredged or trenched to varying degrees. To obtain information on the vegetation and wildlife that use the spring and channel habitats, the Service would conduct inventories and monitoring of the habitats.

The Service would also monitor changes in the environment, such as changes in vegetation communities, wildlife trends, and surface and groundwater levels, to assess the effects of climate change on the Refuge, if any.

Visitor Services

The Refuge provides visitor services and facilities for a variety of recreational opportunities, including hunting for upland game, waterfowl, and rabbits; sport fishing; wildlife observation; walking trails; and photography. Visitor facilities would be maintained with help from volunteers and as staff is available to ensure visitor safety, and visitor numbers would continue to be monitored to ensure the facilities are adequate to accommodate the number of visitors. The observation deck on Upper Pahranagat Lake and established trails throughout the Refuge would also be maintained for visitor use.

As part of the hunting program, the Service would continue to provide Refuge-specific and NDOW hunting guidelines, regulations, and other information at Refuge headquarters and post and maintain designated hunting area signs on the Refuge. Wildlife lists would also be available at Refuge headquarters to support wildlife observation and similar activities.

The Refuge policy to prohibit swimming at all open water locations would be enforced, and regulatory signs at the open water areas would be maintained. Swimming poses a public health and safety concern and can adversely affect fish, wildlife, and their habitats.

Cultural Resources

Cultural resources management and protection would vary by alternative.

3.5.2 Alternative A – No Action (Current Management)

Alternative A is the current management situation, or No Action Alternative, for the Refuge. It serves as a baseline with which the objectives and management actions of the three action alternatives, Alternatives B, C, and D, can be compared and contrasted. Because this alternative reflects the current management, it would not result in substantial changes in the way the Refuge would be managed in the future. Figure 3.5-1 graphically summarizes the actions that would continue under this alternative.

Wetland Habitat

The Service would continue to implement the management actions identified in the “Features Common to All Alternatives” section.

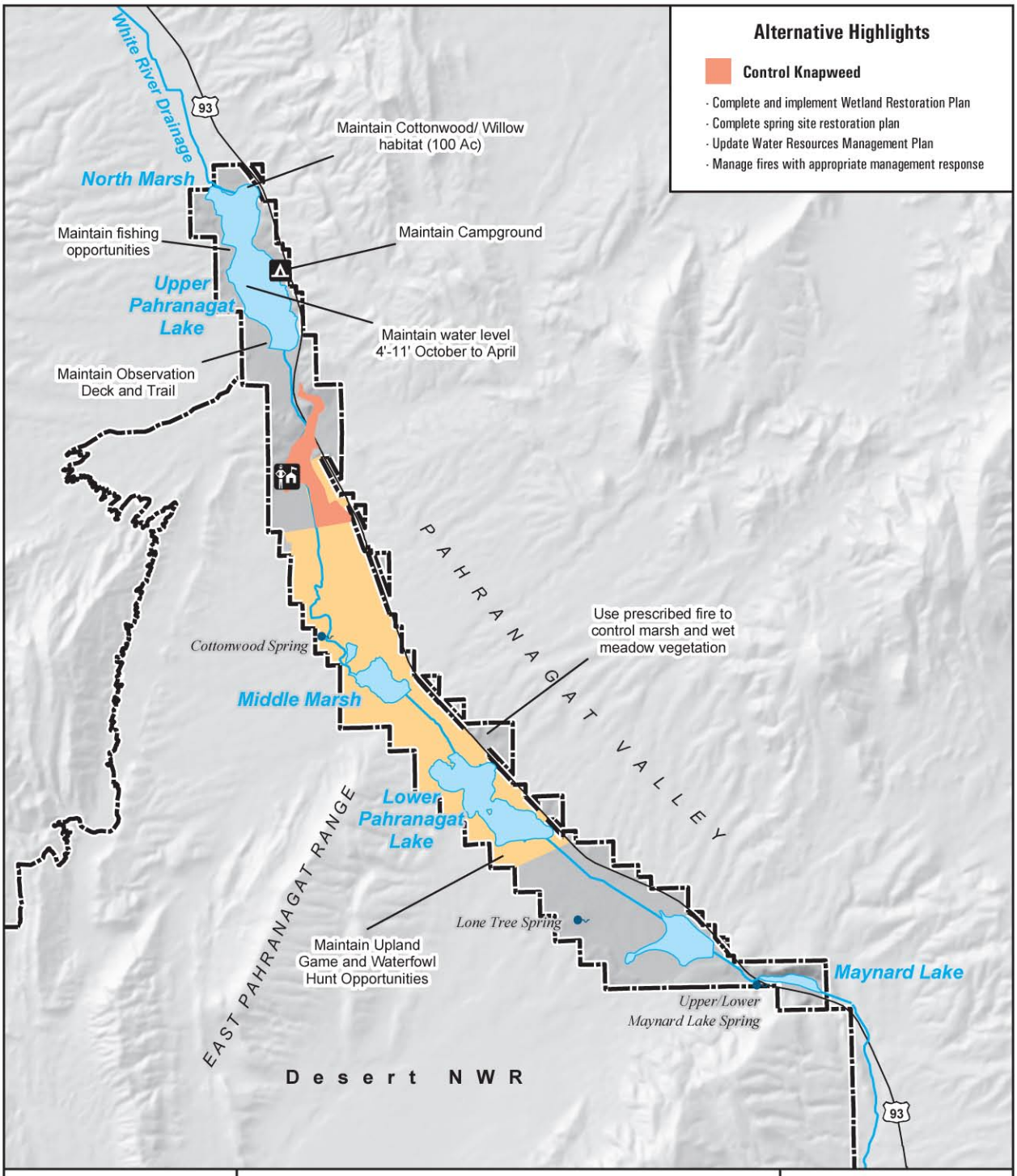

Figure 3.5-1

Alternative A

Pahranagat NWR

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Wildlife Diversity

The Service would continue to implement the management actions identified in the "Features Common to All Alternatives" section.

Visitor Services

The Service would maintain the campground in its current state.

The Service would continue to implement limited interpretation, environmental education, and outreach activities as needed and as staff is available. The Service would continue to participate in up to three outreach events per year, such as International Migratory Bird Day, National Wildlife Refuge Week, and Earth Day, as staff is available.

Cultural Resources

The Service currently implements minimal cultural resources management activities. The Service would continue to provide appropriate interpretive information on cultural resources to visitors at the visitor contact station through informal outreach and protect cultural resources on a case-by-case basis. Cultural resources would be managed on a project-by-project basis.

3.5.3 Alternative B – Limited Improvements in Water Resource and Habitat Management and Minor Increase in Visitor Services

Alternative B provides for limited increased management actions for all resource areas when compared to Alternative A (No Action). This alternative involves the objectives and management actions identified in the "Features Common to All Alternatives" section and additional actions for more active management. Alternative B actions are graphically summarized in Figure 3.5-2.

Wetland Habitat

The Service would install a new pump for Well 3 and monitor outflow.

The Service would also expand current invasive plant removal efforts by developing an IPM Plan. Expanded efforts would include controlling knapweed in the grassland habitat and at Black Canyon (with appropriate tribal consultations) and using prescribed burning, mowing, spraying, and planting, as needed, to achieve the targeted plant cover throughout the year.

The Refuge is not currently managed to provide foraging habitat for sandhill cranes. To increase wildlife diversity, the Service would plant and irrigate 40 acres of grain crops between Upper Pahranagat Lake and Middle Marsh. The grain crops would provide forage for migrating sandhill cranes, waterbirds, and waterfowl and would help control invasive species.

Wildlife Diversity

To protect upland habitat, the Service would close unused roads as necessary and in coordination with the BLM. Salt cedar and Russian olive trees would be removed in riparian habitat to allow native species, such as willow and cottonwood, to establish.

Although the Pahranagat roundtail chub is not currently present on the Refuge, it has been documented there historically. Habitat conditions on the Refuge are also not currently suitable for reintroducing the chub. The Service would plan and develop, if feasible, a refugium on the Refuge for the chub and associated native fish based on their habitat requirements.

The Service would continue to obtain information on the species that use the Refuge, and they would expand their surveys to include participation in the annual Christmas bird count. To monitor waterfowl and bird responses to Refuge management actions, the Service would obtain data collected by other agencies on a seasonal basis, conduct additional surveys in the fall and spring, and include breeding pair and brood counts during current fall and winter surveys coordinated with NDOW.

Visitor Services

The Service would monitor the number of visitors using the Refuge each day. The hunt program would continue on the Refuge, but the designated hunting area would be modified to redirect upland game hunting to areas of the Refuge south of Dove Dike (away from the Refuge headquarters and Middle Marsh). A Fisheries Management Plan would be prepared within three years of CCP implementation. The campground would be maintained, and the Service would begin collecting fees and limit the length of stays to seven days. Generators would be prohibited between the hours of 10 p.m. and 8 a.m.

Visitor services on the Refuge would be improved and expanded to accommodate visitors and ensure visitor safety. The visitor contact station would be expanded to accommodate the growing number of visitors; new interpretive panels would replace old panels at the kiosk; environmental education and interpretive materials would be developed, including “least-wanted” posters for invasive plant species; and a wildlife observation trail system would be constructed throughout the Refuge, possibly along the historic farming and ranching roads. The Service would also construct new offices at the Refuge headquarters to accommodate additional staff and the public visiting the Refuge.

Cultural Resources

Background information on the cultural resources on and near the Refuge would be collected and compiled to create digital, GIS, and hard copy maps, databases, and a library for the Refuge. Additional data collection efforts would be implemented to identify and evaluate resources subject to looting, vandalism, erosion, or deterioration and allow the Service to implement measures to reduce threats and preserve the resources.

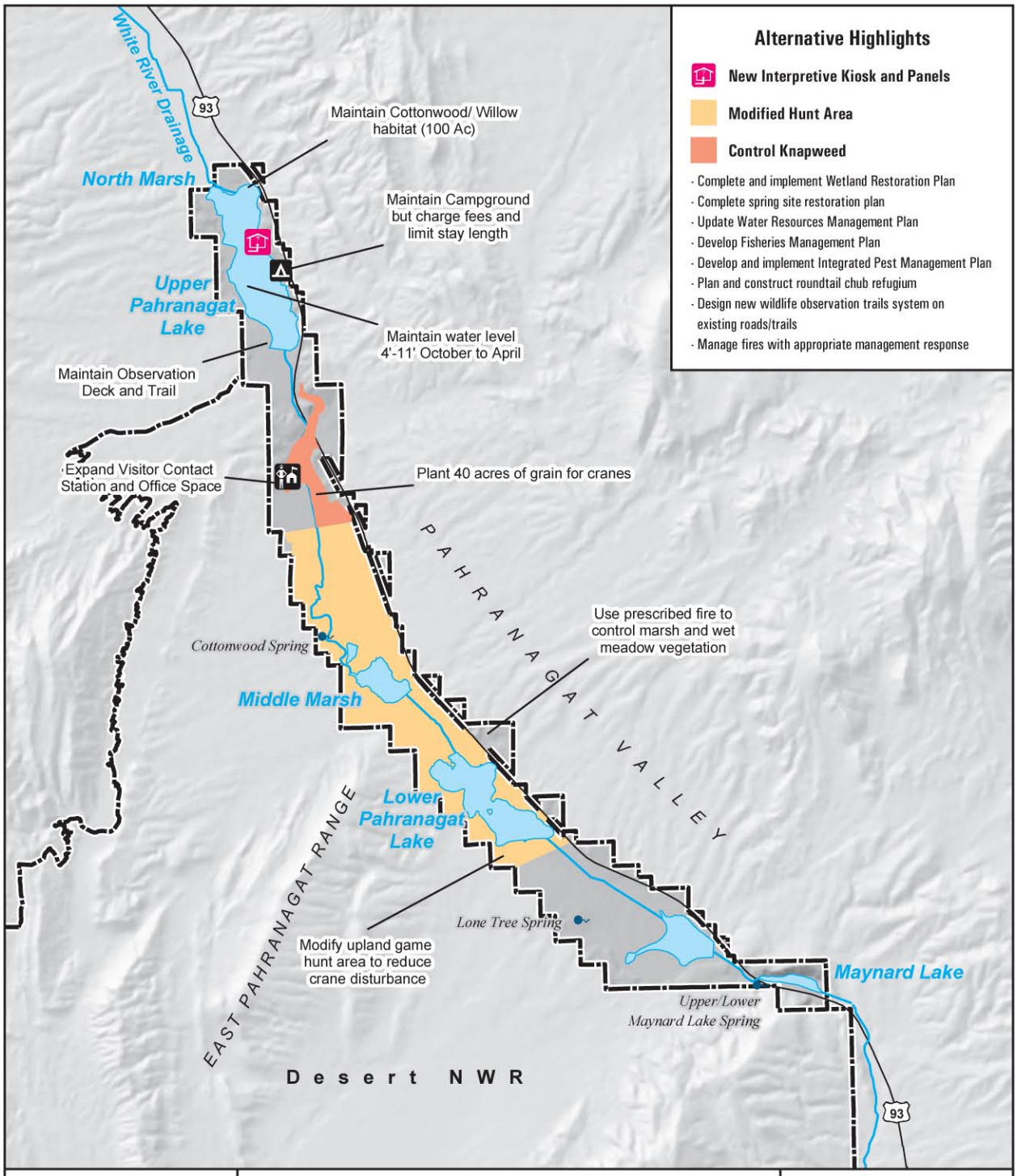

Figure 3.5-2

Alternative B

Pahranagat NWR

May 27, 2008
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Figure 3.5-2-pahranagat_alt_B.mxd

Other management actions implemented on the Refuge, such as wildlife management, habitat restoration, fire management, and trail construction, would incorporate cultural resource values, issues, and requirements into their designs and implementation procedures.

The educational, interpretive, and outreach programs would incorporate cultural resources information in their materials. To educate the public, the Service would work with affiliated tribes and other stakeholders to design and implement educational materials, programs, and activities that would describe traditional or sacred resources and increase awareness on- and off-Refuge about the sensitivity of cultural resources to visitor impacts and the penalties for vandalism. The Service would implement site clearance protocols for all visitation by the general public, volunteers, and researchers.

3.5.4 Alternative C – Minor Improvements in Water Resource and Habitat Management and Minor Increase in Visitor Services

Alternative C would include the management actions identified in the "Features Common to All Alternatives" section, actions identified under Alternatives A and/or B, and some additional actions for Refuge management. Activities that would not be implemented under this alternative are also noted; these actions would achieve different goals than those this alternative is targeting. The actions are summarized for this alternative in Figure 3.5-3.

Wetland Habitat

In addition to the management actions identified previously for open water habitat, the Service would identify actions to encourage carp management on private and state-managed lands upstream of the Refuge.

In addition to the vegetation control methods identified under Alternative B, the Service would expand invasive species management efforts to control salt cedar and other species in the Lower Pahranagat Lake area and replant with native riparian shrubs where appropriate. Additional IPM efforts would involve determining techniques for a Refuge-wide inventory of invasive species, identifying techniques for eradication and removal, and using appropriate methods to control bulrush, salt cedar, Russian olive, Russian knapweed, Scotch thistle, and other species (mechanical, chemical, cultural, and biological). Implementation of invasive species would continue to be a priority for the Refuge. IPM efforts would be coordinated with upstream property owners to reduce the extent of invasive plants and noxious weeds and minimize their potential to return to the Refuge.

The Service would implement a species Inventory and Monitoring Plan for marsh birds, waterfowl, and shorebirds to gather more information on the species that use the Refuge. In addition, the Service would conduct surveys every three years of birds and bats using the marsh habitat and add spring and fall surveys and breeding pair and brood counts to current fall and winter surveys coordinated with NDOW.

To increase wildlife diversity, the Service would plant and irrigate 65 acres of grain crops (instead of the 40 acres identified under Alternative B) between Upper Pahranagat Lake and Middle Marsh for sandhill cranes, waterfowl, and waterbirds. Once the crops are in place, the Service would monitor their effectiveness by collecting information on the presence of sandhill cranes and their use of Refuge habitats.

To improve water resources management, the Service would determine the status of groundwater wells on record and repair or abandon them as appropriate. As necessary, the Service would apply for changes in point of use with the Nevada Division of Water Resources. Water infrastructure on the Refuge would also be repaired as staffing and funding allow. Gauges and data-logging equipment would also be installed at springs adjacent to Middle Marsh.

Wildlife Diversity

To improve habitat for the southwestern willow flycatcher, the Service would plant and establish 200 additional acres of willow habitat between Upper Pahranagat Lake and Middle Marsh. They would also monitor the response of birds to wetland restoration activities by surveying the habitats after restoration.

The site Restoration Plans for spring pools and channels would be implemented to restore habitat in those areas and increase species diversity.

Bird responses to fishing activities would also be monitored, and sensitive areas would be closed as necessary during appropriate seasons. Upland habitat would also be inventoried and monitored on a regular basis, and physical barriers would be installed to prevent vehicle traffic in closed areas and protect sensitive resources, such as wildlife, plants, and cultural resources.

Visitor Services

The Service would improve visitor services on the Refuge and implement an Interpretive Plan. The campground would be converted to a day use area, and vehicle access would be provided. Visitor facilities would be improved and maintained for visitor safety, including constructing an interpretive walking trail that connects Upper Pahranagat Lake with the Headquarters Unit, constructing a new visitor contact station and office space at the Headquarters Unit, constructing additional parking at the Headquarters Unit, and constructing photography and observation blinds along the trail route.

Visitor use would be monitored to assess visitor experience and numbers. For the hunt program, the Service would conduct annual surveys and reporting of game species population numbers and the numbers of hunters and species harvested, and a registration box would be installed at the Refuge entrances to obtain information on the number of hunters using the Refuge.

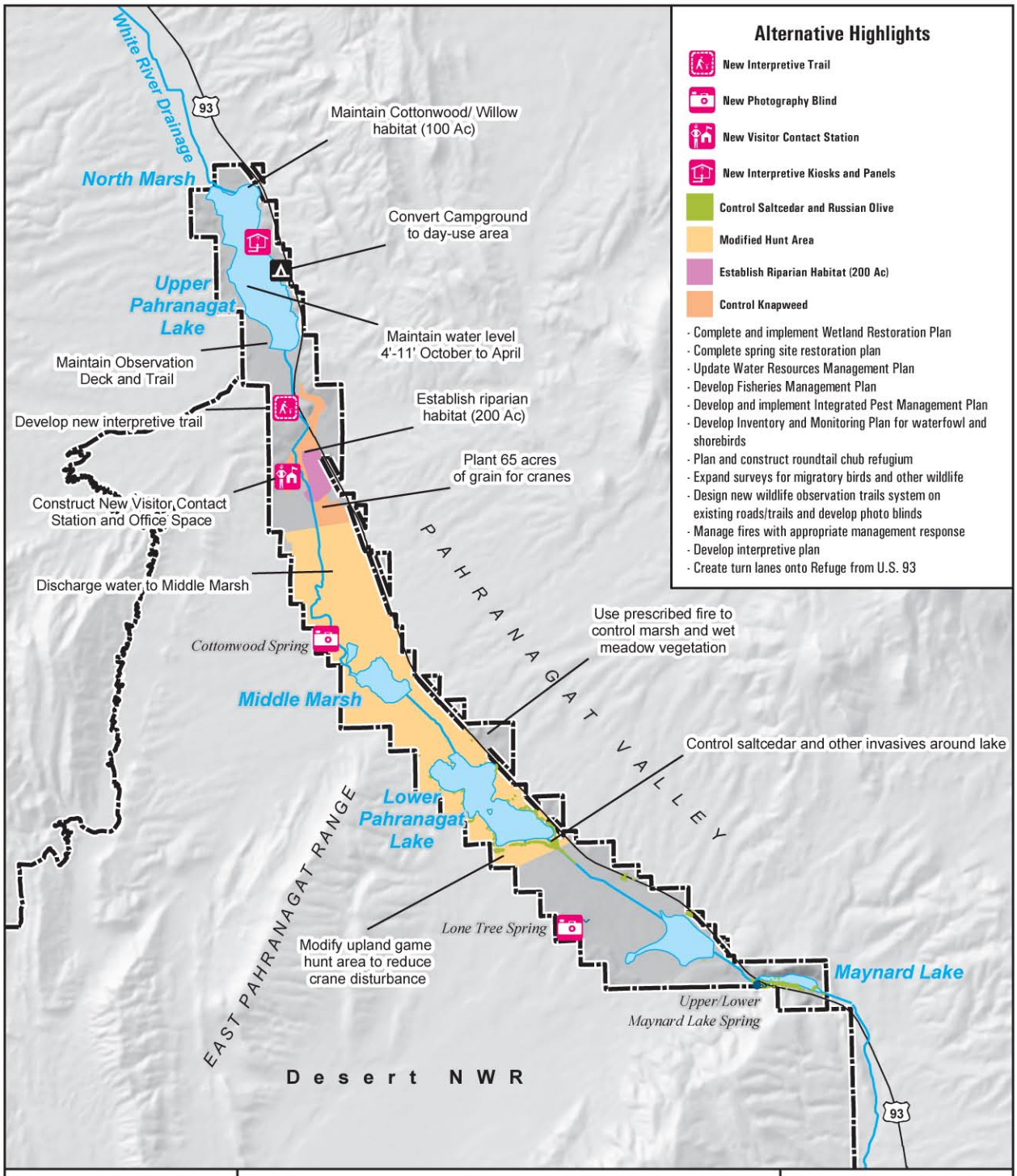

Figure 3.5-3

Alternative C

Pahranagat NWR

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Figure 3.5-3-pahranagat_alt_C.mxd

To improve public access and awareness of the Refuge, the Service would install directional signs along U.S. Highway 93 and I-15 with assistance from the NDOT. Also, turn lanes would be created along the highway in coordination with NDOT to allow visitors to safely turn onto the Refuge.

The Service would increase public outreach through participation in a minimum of six activities throughout the year.

Cultural Resources

To improve cultural resources management on the Refuge, the Service would inventory cultural resources and evaluate their historic or prehistoric significance.

The Service would implement the following actions:

- Conduct cultural resource inventories at all public use areas, roads, affected areas, and other destinations on the Refuge and evaluate any discovered sites' eligibility for listing on the NRHP;
- Develop historic contexts for classes of cultural resources;
- Inventory, evaluate, and nominate Traditional Cultural Properties and sacred sites to the National Register, in consultation with affiliated tribes;
- Identify, evaluate, and mitigate adverse effects and stabilize selected cultural resource sites on the Refuge using a Cultural Resources Management Plan prepared in consultation with affiliated tribes; and
- Use data collected on site locations and information for planning, monitoring, and interpretation efforts related to cultural resources.

The Service would continue to work with affiliated Native American tribes on projects to restore native habitat and allow harvesting of native plants (for traditional non-commercial purposes).

The Service would create a site stewardship volunteer program to assist in site monitoring, conservation efforts, development and delivery of educational and interpretive literature and programs, and to promote cultural resources conservation in neighboring communities.

3.5.5 Alternative D – Moderate Improvements in Water Resource and Habitat Management and Moderate Increase in Visitor Services

Alternative D is the preferred alternative. It involves the actions identified in the "Features Common to All Alternatives" section, some management actions from the other two action alternatives, and additional actions not discussed previously. Some activities from Alternatives B and C are expanded under this alternative to improve Refuge management, while others are reduced. Activities that would not be implemented under this alternative are also noted; these actions

would achieve different goals than those this alternative is targeting. The actions are summarized for this alternative in Figure 3.5-4.

Wetland Habitat

In addition to the actions identified in the "Features Common to All Alternatives" section and unlike Alternatives B and C, the Service would restore and manage 40 acres of native forage for migrating sandhill cranes between the Headquarters Unit and Lower Pahranagat Lake. Sandhill crane usage of the Refuge would be monitored. The Service would acquire additional water rights from willing sellers and explore opportunities for additional water supplies through coordination with the Alamo, Richardville, and Hiko Water Boards, Lincoln County, and the U.S. Bureau of Reclamation.

The Service would monitor vegetation and wildlife responses to habitat management actions and modify their actions appropriately to minimize adverse effects. In addition to monitoring responses to habitat management, the Service would seek funding to monitor avian species abundance in wet meadow habitat and elsewhere to determine their responses to habitat manipulation during the fall and spring migration periods. Surveys of nesting colonial waterbirds would also be conducted every three years.

Wildlife Diversity

In addition to the management actions identified under the "Features Common to All Alternatives" section and Alternative B, the Service would restore the historic stream channel and riparian corridor (5–10 acres) through Black Canyon. After salt cedar is controlled around Lower Pahranagat Lake, native upland habitat would be restored. To protect the Refuge's habitats and resources and prevent encroachment, a fence would be installed along the eastern boundary.

Visitor Services

The Service would not improve visitor services beyond those management actions identified under the other alternatives; however, the campground area would be converted to a day use area, as identified under Alternative C, but vehicles would not be allowed. A gate would be installed to prevent vehicular access. In addition, the boat ramps in the campground area would be closed, and a new car-top boat launch would be designated. With vehicular access being restricted in the day use area, the existing boat ramps could not be used. Use of boat ramps also poses a concern with the introduction of quagga mussels, an invasive molusk known to be present at Lake Mead and other major water bodies in southern Nevada (Benson et al. 2008). Use of car-top boat launches would reduce the risk of introducing quagga mussels by eliminating the types of boats that typically carry the mussels.

The Service would develop and implement an annual road maintenance program to improve roads for public access, safety, and use. Public outreach would be slightly expanded beyond Alternative C's actions through participation in a minimum of nine outreach activities each year.

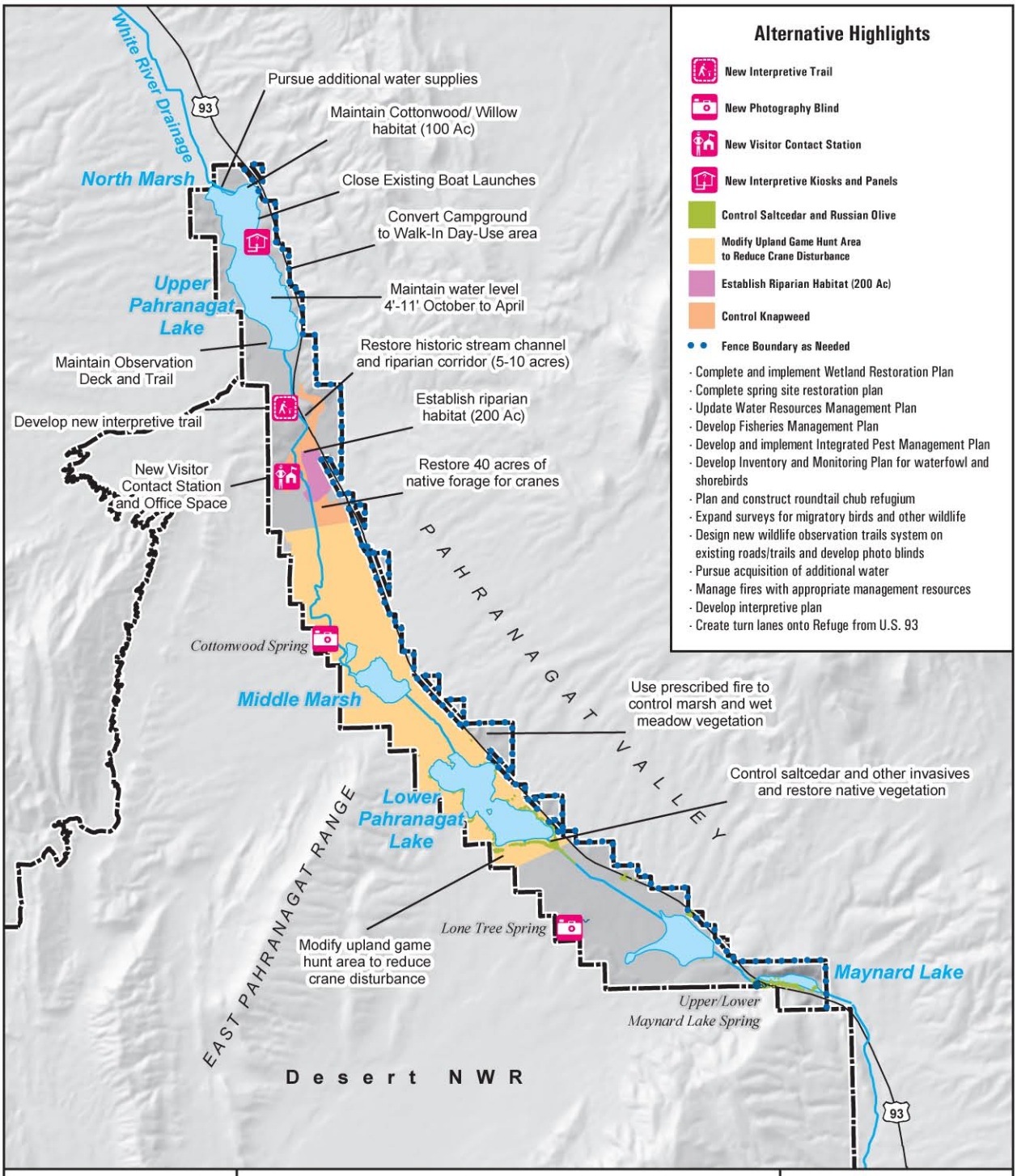

Figure 3.5-4

Alternative D

Pahranagat NWR

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Cultural Resources

In addition to management actions identified under the other alternatives, the Service would identify and evaluate cultural resources that could educate visitors on how humans have interacted with wildlife and habitats in the past, and they would consult with affiliated tribes and other stakeholders on ways to use these resources to achieve educational, scientific, and traditional cultural needs. The Service would also conduct a study of ethnobotany and traditional plant use on Pahranagat NWR through assistance and consultation with the affiliated Native American tribes.

3.5.6 Comparison of Alternatives

A comparative summary of the alternatives for the Pahranagat NWR is found in Table 3.6-4.

3.5.7 Management Actions Considered but Eliminated from Detailed Analysis as Part of Alternatives

During the alternatives development process, Refuge staff evaluated additional management actions as part of the current alternatives. These actions are identified below with their reasons for elimination:

- Develop additional areas for camping to expand the allowable limit. (Not feasible.)
- Plant and maintain riparian vegetation around Lower Pahranagat Lake. (Soils not suitable.)

3.6 Comparison of Alternatives

The following tables provide a comparison of each of the alternatives for each refuge in the Desert Complex. Additional details on the preferred alternatives, including rationale explaining management actions and additional information on cooperation with other agencies, are provided in Appendix F.

Table 3.6-1. Ash Meadows NWR: CCP Alternatives

Issue Area	*Management Actions*		
	Alternative A (No Action)	*Alternative B*	*Alternative C (Preferred Alternative)*
Species Management			
Gather Baseline Population Data	▪ Conduct baseline inventories on vegetation communities, small mammals, herpetofauna, and pollinators ▪ Complete a four-year baseline inventory and monitoring for endemic fish species, a three-year baseline inventory and monitoring for the southwestern willow flycatcher, and a three-year refuge-wide reptile survey	Same as Alternative A and: ▪ Complete baseline inventory on listed invertebrates, nonnative fish, and non-listed endemic invertebrates ▪ Implement monitoring for all listed endemic species, nonnative species that adversely affect endemic species, and game species	Same as Alternative B and: ▪ Complete inventory of nonnative and native species diversity and distribution ▪ Implement monitoring for all non-listed endemic and game species
Special-Status Species Management	▪ Continue current monitoring strategies for special-status plants and wildlife ▪ Monitor changes in the environment that may be a result of climate change	Same as Alternative A and: ▪ Restore Ash Meadows speckled dace to 5%–25% of historic Refuge range through habitat restoration and translocation ▪ Double the current range of the Ash Meadows naucorid population to minimum of 20–40 square meters ▪ Restore Point of Rocks spring outflow channel habitat to known suitability for Ash Meadows naucorid and monitor parameters ▪ Identify suitable areas for range expansion of endemic plant populations within 10 years ▪ Within 15 years begin out planting endemic plants to suitable habitats ▪ Complete a feasibility study for construction of an on-site greenhouse	Same as Alternative B, except: ▪ Restore endemic fish populations to 25%–50% of historic Refuge range

Table 3.6-1. Ash Meadows NWR: CCP Alternatives

Issue Area	*Management Actions*		
	Alternative A (No Action)	*Alternative B*	*Alternative C (Preferred Alternative)*
Endemic Fish Refugia	■ Construct refugia for both Devils Hole pupfish and Warm Springs pupfish ■ Maintain and monitor the newly established pupfish refugia ■ Conduct quarterly fish counts and periodic water quality measurements	Same as Alternative A and: ■ Investigate the use of private aquaria as refugia ■ Update MOU with NDOW, Ecological Services, and NPS on management responsibilities under the Ash Meadows Recovery Plan	Same as Alternative B and: ■ Reestablish Ash Meadows speckled dace to historic habitats after restoration of springs and streams is complete ■ Complete a feasibility assessment of refugia for all other Ash Meadows NWR endemic species
Habitat Protection	■ For the 30 known Refuge springs, protect and maintain existing water flows (17,000 acre feet per year) and natural temperature range ■ Continue to monitor and assess water flows, levels, and temperatures at springs and wells identified in the current Water Monitoring Plan ■ Analyze water quality and quantity biannually, and implement measures in coordination with the State Engineer to defend water rights and mitigate substantial changes in temperature or flow ■ Maintain the existing spring outflow structures and stream channels at monitoring sites ■ Maintain current level of enforcement measures to protect plants and wildlife ■ Maintain existing boundary fence as a wild horse exclosure ■ Repair post-and-cable barriers and install other barriers where needed to protect resources	Same as Alternative A and: ■ Establish permanent, long-term vegetation monitoring plots/transects ■ Within 10 years of CCP approval, obtain baseline data for 17 springs identified in the Refuge Geomorphic and Biological Assessment ■ Increase law enforcement to prevent off-highway vehicles, fires, collecting of species, and other inappropriate activities ■ Add 11–15 road gates to prevent unauthorized use of roads and resource damage ■ Use prescribed fire where appropriate to create, improve, or maintain desired plant and animal communities, as well as to treat hazardous fuels	Same as Alternative B and: ■ Develop a Resurfacing Plan for main roads through and on the Refuge that considers the restoration of slough hydrology

Table 3.6-1. Ash Meadows NWR: CCP Alternatives

Issue Area	*Management Actions*		
	Alternative A (No Action)	*Alternative B*	*Alternative C (Preferred Alternative)*
	▪ Replace or add gates on service or fire roads and post signs on them ▪ Maintain closure of nonessential roads ▪ Continue fuel reduction projects and maintain current fuel breaks ▪ Manage wildland fires on the Refuge using the AMR, which considers resource values at risk and potential negative impacts of various fire suppression measures; firefighter and public safety will be the highest priority on every incident ▪ Improve Refuge-wide vegetation map through ground surveys and updating of GIS layers and initiate long-term, annual vegetation monitoring		
Restoration			
Landscape/Hydrologic Restoration	None	▪ Assess and initiate removal of berms, ditches, dams, impoundments, and unnecessary roads within the Warm Springs, Jackrabbit/Big Springs, and Upper Carson Slough Management Units to restore natural hydrology on a landscape scale ▪ Design and construct fish barriers to control movement of invasive fish	Same as Alternative B and: ▪ Assess and initiate removal of berms, ditches, dams, impoundments, and unnecessary roads within the Crystal Springs Unit to restore natural hydrology on a landscape scale ▪ Inventory, assess, and mitigate landscape disturbances including graded lands, mines, fences, and other disturbances ▪ Implement the plan for the modification or removal of Crystal Reservoir that minimizes adverse environmental impacts

Table 3.6-1. Ash Meadows NWR: CCP Alternatives

Issue Area	*Management Actions*		
	Alternative A (No Action)	*Alternative B*	*Alternative C (Preferred Alternative)*
Spring/Channel Restoration	▪ Complete and implement Restoration Plans for Upper Point of Rocks, Jackrabbit Spring, and the Warm Springs Unit (North and South Indian Springs and School Springs) ▪ Develop a restoration plan for Crystal Spring Unit by 2011 ▪ Remove invasive plants and exotic aquatic species ▪ Seed and plant native vegetation ▪ Manipulate and enhance substrate ▪ Remove hydrologic barriers	Same as Alternative A and: ▪ Manage and monitor previously restored springs ▪ Complete and implement the Restoration Plans for Lower Point of Rocks, Lower Kings Pool, Marsh, Big, and Fairbanks Springs	Same as Alternative B and: ▪ Develop and implement restoration plans for Tubbs, Bradford, Crystal, Forest, and North and South Scruggs Springs ▪ Based on outcome of Carson Slough Restoration Plan, develop and implement Restoration Plans for Longstreet and Rogers Springs
Native Plant Community Restoration	▪ Maintain existing man-made reservoirs and other open water sources using mechanical methods to control vegetation ▪ Continue to control invasive plant species at restoration sites and in burned areas ▪ Restore and maintain approximately 70 acres of alkali/wet meadow, 30 acres of mesquite bosque/lowland riparian, and 30 acres of native upland in the Warm Springs Complex and Jackrabbit/Big Springs Units by restoring natural hydrology and actively revegetating appropriate areas ▪ Rehabilitate 10%–25% of old agricultural fields by controlling invasive species and planting native plants	Same as Alternative A, except: ▪ Restore approximately 520 acres of alkali/wet meadow, 220 acres of mesquite bosque/lowland riparian, 30 acres of native upland, and 150 acres of emergent marsh in the Warm Springs Complex, Jackrabbit/Big Springs, Upper Carson Slough, and Crystal Springs Units by restoring natural hydrology and actively revegetate appropriate areas based on outcome of Transportation Plan, cultural investigations, and linear disturbance assessment ▪ Rehabilitate 30%–45% of old agricultural fields by removing hydrologic barriers, controlling invasive species, and planting native plants	Same as Alternative B, except: ▪ Restore approximately 650 acres of alkali/wet meadow, 550 acres of mesquite bosque/lowland riparian, 30 acres of native upland, and 150 acres of emergent marsh in the Warm Springs Complex, Jackrabbit/Big Springs, Upper Carson Slough, and Crystal Springs Units by restoring natural hydrology and actively revegetate appropriate areas based on outcome of Transportation Plan, cultural investigations, and linear disturbance assessment ▪ Rehabilitate 40%–65% of old agricultural fields by removing hydrologic barriers, controlling invasives species, and planting native plants

Table 3.6-1. Ash Meadows NWR: CCP Alternatives

Issue Area	*Management Actions*		
	Alternative A (No Action)	*Alternative B*	*Alternative C (Preferred Alternative)*
	▪ Develop restoration plan for Carson Slough	▪ Maintain 3,935 acres of alkaline meadow/wet meadow habitat, 5,500–5,750 acres of native upland desert plant communities, and 1,000 acres of mesquite bosque habitat in the Warm Springs Complex, Jackrabbit/Big Springs, Upper Carson Slough, and Crystal Springs Units by restoring natural hydrology and actively revegetate appropriate areas ▪ Maintain and monitor habitats on a regular basis after restoration activities are complete	▪ Maintain 7,850 acres of alkaline meadow/wet meadow habitat, 11,000-11,500 acres of native upland desert plant communities, and 2,000 acres of mesquite bosque habitat in the Warm Springs Complex, Jackrabbit/Big Springs, Upper Carson Slough, and Crystal Springs Units by restoring natural hydrology and actively revegetate appropriate areas
Pest Management	▪ Maintain current management for invasive plant and wildlife, responding to greatest threats on a project-by-project basis	Same as Alternative A and: ▪ Use IPM techniques for long-term nonnative fish management ▪ Control nonnative invasive plants, prioritizing areas with listed plant species, and monitor the response of listed plant species ▪ Minimize and control impacts on aquatic habitat due to cattail growth ▪ Within 10 years, reduce salt cedar and Russian knapweed distribution by between 50% and 75% of the 2006 distribution on 4,000 acres of Refuge land and work with BLM to control salt cedar and Russian knapweed on adjacent BLM land ▪ Implement nonnative plant species control as outlined in the IPM Plan for all habitat types	Same as Alternative B, except: ▪ Evaluate alternative pest control strategies (sterilization, biological control) in cooperation with other agencies ▪ Within 10 years, reduce salt cedar and Russian knapweed distribution by between 75% and 95% of the 2006 distribution on 4,000 acres of Refuge land and work with BLM to control salt cedar and Russian knapweed on adjacent BLM land ▪ Aggressively trap and remove crayfish from spring and channel habitat from 10 spring systems (Marsh, N & S Indian, N & S Scruggs, Jackrabbit, Kings, Point of Rocks, Big, Crystal, and Bradford springs) ▪ Install temporary fish barriers until bass eradication is complete at Big and Jackrabbit springs

Table 3.6-1. Ash Meadows NWR: CCP Alternatives

Issue Area	*Alternative A (No Action)*	*Management Actions* *Alternative B*	*Alternative C (Preferred Alternative)*
		▪ Reduce or contain crayfish populations Refuge-wide such that current distributions are not exceeded ▪ Regularly trap and remove crayfish from spring habitat ▪ Focus on 10 most infested and important Refuge aquatic systems and expand program as necessary ▪ Implement other crayfish control strategies identified during development of the IPM Plan ▪ Evaluate current land uses such as utility corridors and ensure regulatory compliance	▪ Remove cattails from outflow channels at Kings, Point of Rocks and Crystal springs
Land Conservation	▪ Complete the pending land and mineral withdrawal with the BLM ▪ Continue ongoing efforts to acquire remaining lands within the authorized Refuge boundary from willing sellers ▪ Continue coordination with private landowners to protect Refuge resources	Same as Alternative A and: ▪ Establish conservation agreements or acquire in-holdings from willing sellers	Same as Alternative B
Research			
Research	▪ Continue to allow research activities by others on a case-by-case basis using special use permits	Same as Alternative A and: ▪ Expand research on Refuge to include: ecology and management of invasive species; taxonomy, ecology, and management of rare and endemic species; ecosystems; historic and current plant community diversity, composition, and structure and role of natural processes (fire, flood, drought); wildlife-habitat relationships	Same as Alternative B and: ▪ Substantially expand research on the topics listed under Alternative B ▪ Within 15 years of CCP approval, complete a feasibility study of the need for an on-site research facility; if appropriate, construct the facility

Table 3.6-1. Ash Meadows NWR: CCP Alternatives

Issue Area	*Management Actions*		
	Alternative A (No Action)	*Alternative B*	*Alternative C (Preferred Alternative)*
Visitor Services			
Environmental Education and Outreach	■ Continue existing, limited environmental education activities ■ Develop environmental education materials with assistance of Desert Complex staff on a project-by-project basis ■ Assess visitor education needs and opportunities through informal contact with visitors ■ Provide off-Refuge educational outreach to the local public on the value of Ash Meadows NWR for wildlife and the public, as requested and depending on staff availability	Same as Alternative A, except: ■ Develop and begin implementing an Environmental Education Plan by 2010 ■ Incorporate environmental education goals of relevant plans ■ Contact local schools and provide at least 3–5 on-site programs a year ■ Work with partners to develop off-site refugium for pupfish to promote awareness of the endangered pupfish and other endemic species at the Refuge ■ Provide off-Refuge educational outreach in 2–3 local community events annually ■ Develop an Outreach Plan to support the Carson Slough Restoration Plan ■ Develop an educational video on the endemic fish and other wildlife of Ash Meadows ■ Develop education and interpretation materials with affiliated tribes ■ Provide 10 off-site programs to local public and home schools	Same as Alternative B, except: ■ Develop and implement an Environmental Education Plan by 2010 ■ Develop cooperative agreements with public, non-government entities and private partners to provide off-Refuge educational outreach to the local public on the value of the Refuge for wildlife and the public ■ Provide no off-site programs
Wildlife Observation and Interpretation	■ Develop interpretive materials with the assistance of the Regional Office and Desert Complex on a project-by-project basis	Same as Alternative A and: ■ Develop multilingual interpretative materials and construct new interpretive facilities at Fairbanks Springs	Same as Alternative B, except: ■ Staff visitor contact station five days per week ■ No roadway or parking area improvements

Table 3.6-1. Ash Meadows NWR: CCP Alternatives

Issue Area	*Management Actions*		
	Alternative A (No Action)	*Alternative B*	*Alternative C (Preferred Alternative)*
	■ Design and construct boardwalks to follow Kings Pool Stream from parking lot to Kings Pool, with a pool overlook ■ Design and construct interpretative displays for new boardwalks to be installed at Point of Rocks ■ Design and construct interpretative panels for the new boardwalk and overlook at Longstreet Spring pool ■ Maintain designated roads and visitor use areas ■ Maintain Spring Meadows Road and allow non-commercial through traffic ■ Improve Point of Rocks and Longstreet Cabin parking areas ■ Begin implementing the Ash Meadows NWR Interpretation Plan ■ Maintain current visitor services for wildlife-dependent recreational activities in accordance with existing Public Use Management Plan ■ Conduct a study of Refuge visitation to determine the number and purpose of visits ■ Improve signs on Refuge boundary ■ Include location of Devils Hole and pupfish life history information in Refuge brochures, fact sheets, and maps	■ Within five years of funding, complete design and construction of a new Refuge headquarters/visitor contact station building ■ Design and construct interpretive facilities identified in the Interpretive Plan ■ Staff visitor contact station seven days per week ■ Develop and begin implementing a comprehensive Visitor Services Plan by 2010 ■ Improve existing roadways and parking areas to good condition as described in the Ash Meadows Refuge Roads Inventory (2004), based on Geomorphic and Biological Assessment	

Table 3.6-1. Ash Meadows NWR: CCP Alternatives

Issue Area	*Management Actions*		
	Alternative A (No Action)	*Alternative B*	*Alternative C (Preferred Alternative)*
Hunting	■ Continue hunt program under the interim Hunt Plan until a revised Hunt Plan is completed ■ Allow access by boat for waterfowl hunting ■ Provide opportunities for waterfowl and upland game hunting on the entire Refuge	Same as Alternative A, and: ■ Obtain baseline information on Refuge hunting and within three years create a hunting step-down plan that addresses waterfowl and upland game hunting ■ Monitor hunting use on the Refuge ■ Restrict or eliminate boat use on the Refuge	Same as Alternative B
Cultural Resources			
Management and Protection	■ Continue informal outreach on cultural resources to visitors that stop at the visitors contact station ■ Collect cultural resources background information on a project-by-project basis ■ Continue to inventory, manage, and protect cultural resources on a case-by-case basis	■ Prepare evaluation criteria and conduct a cultural resource inventory at all visitor facilities and areas that would be affected by Refuge projects ■ Inventory, evaluate, and mitigate adverse effects, and stabilize samples of cultural resources on the Refuge using a research design prepared in consultation with culturally affiliated tribes and the scientific community ■ Identify and evaluate cultural resources subject to looting/vandalism, erosion, or deterioration, and implement steps, including barriers and signs, to reduce these threats and preserve the resources ■ Implement projects to restore habitats associated with important native plants and to harvest native plant foods (for traditional, non-commercial purposes) in coordination with culturally affiliated tribes	Same as Alternative B

Table 3.6-1. Ash Meadows NWR: CCP Alternatives

Issue Area	*Alternative A (No Action)*	*Management Actions* — *Alternative B*	*Alternative C (Preferred Alternative)*
		▪ Inventory, evaluate, and nominate Traditional Cultural Properties and sacred sites to the NRHP in consultation with tribes ▪ Conduct a study of ethnobotany and traditional plant use on Ash Meadows NWR in consultation with tribes ▪ Create and implement a site stewardship volunteer program to assist in site monitoring, educational and interpretive programs, and to promote cultural resources conservation in neighboring communities	

Table 3.6-2. Desert NWR: CCP Alternatives

	Management Actions			
Issue Area	*Alternative A (No Action)*	*Alternative B*	*Alternative C (Preferred Alternative)*	*Alternative D*
Bighorn Sheep				
Habitat Management	▪ Maintain existing water sources (springs and catchments)	Same as Alternative A	Same as Alternative A, except: ▪ Remove highly flammable vegetation around catchments as needed to protect from wildfires ▪ Construct additional rainwater catchments if existing sources are inadequate	Same as Alternative C
Habitat Protection	▪ Install signs, barricading, and fencing ▪ Conduct law enforcement patrols to prevent unauthorized uses (e.g., off-road vehicles)	Same as Alternative A	Same as Alternative A	Same as Alternative A
Population Management	▪ Prevent domestic livestock grazing on the Refuge to minimize potential for disease transmission ▪ Set hunt permit limits based on population levels and herd health	Same as Alternative A and: ▪ Translocate sheep to the Refuge from outside sources to maintain and restore sub-populations	Same as Alternative B and: ▪ Develop and implement a Sheep Management Plan ▪ Develop a formal agreement with NDOW covering sheep management on the Refuge	Same as Alternative C and: ▪ Translocate sheep to and from the Refuge as needed to maintain desert bighorn sheep subpopulations and genetic diversity
Surveys	▪ Conduct one fall helicopter survey per mountain range to estimate adult sex ratio, ram age structure, lamb survival/recruitment, and population size	Same as Alternative A and: ▪ Conduct yearly spring helicopter survey to identify bighorn sheep lambing and recruitment sites	Same as Alternative B	Same as Alternative B

Table 3.6-2. Desert NWR: CCP Alternatives

	Management Actions			
Issue Area	*Alternative A (No Action)*	*Alternative B*	*Alternative C (Preferred Alternative)*	*Alternative D*
Research and Monitoring	■ Continue to allow research on the Refuge through special use permits	Same as Alternative A and: ■ Determine connectivity between sheep subpopulations using historical records, sightings, and radio tracking data	Same as Alternative B and: ■ Conduct radio telemetry study to assess bighorn sheep mortality factors, home ranges, and habitat utilization ■ Collect blood and fecal samples to determine general health status of herd, diet composition, nutrient uptake, and genetic diversity ■ Monitor vegetation response to burns on the Refuge	Same as Alternative C
Wildlife Diversity				
Baseline Inventories and Monitoring	■ Conduct surveys for special-status species on a project-by-project basis ■ Continue monitoring the health of the Pahrump poolfish population in the refugium ■ Maintain a record of raptors observed during helicopter surveys for bighorn sheep ■ Continue invasive weed surveys and treatments ■ Monitor changes in the environment that may be a result of climate change	Same as Alternative A and: ■ Conduct regular bird surveys at Corn Creek Field Station	Same as Alternative B and: ■ Establish permanent plots in plant communities throughout the Refuge and inventory plant and animal species composition and abundance every five years in those plots ■ Conduct surveys for special-status species on the Refuge ■ Develop and implement an Inventory and Monitoring Plan for special-status species	Same as Alternative C and: ■ Establish permanent plots in plant communities above 5,000 feet and inventory plant and animal species composition and abundance every five years in those plots

Table 3.6-2. Desert NWR: CCP Alternatives

	Management Actions			
Issue Area	*Alternative A (No Action)*	*Alternative B*	*Alternative C (Preferred Alternative)*	*Alternative D*
Resource Protection	■ Maintain designated roads and visitor use areas ■ Maintain and replace regulatory signs along boundaries and designated roadways ■ Promote awareness of and solicit support for efforts to combat trespassing and resulting impacts along the southern boundary ■ Manage wildland fires on the refuge using an AMR that considers resource values at risk and potential negative impacts of various fire suppression measures. Response may range from monitoring high elevation fires (above 5,000 feet) to full suppression. Firefighter and public safety will be the highest priority for every incident, regardless of other resources at risk ■ Continue utilization of volunteers for habitat restoration and maintenance efforts ■ Continue monitoring well water use and spring discharge at Corn Creek	Same as Alternative A and: ■ Use aerial photography, satellite imagery, and/or GPS to monitor damage caused by off-road vehicle trespass ■ Construct and maintain post-and-cable fencing along the southern boundary, with consideration for desert tortoise movement ■ Expand litter removal efforts using staff and volunteers ■ Increase law enforcement presence and patrols with an emphasis on the southern boundary	Same as Alternative B and: ■ Fence and maintain the eastern boundary where necessary ■ Increase law enforcement patrols throughout the Refuge with an emphasis on the eastern boundary ■ Develop and implement a plan to close illegal roads and rehabilitate damaged habitat along the southern boundary ■ Designate one point of entry on the southeast boundary of the Refuge in addition to the entrance at Corn Creek Field Station ■ Coordinate with local jurisdictions to ensure development adjacent to boundary is compatible (greenbelt, walled residential) ■ Promote awareness of and solicit support to combat Endangered Species Act violations along the boundaries ■ Install boundary signs at regular intervals along the entire southern, eastern, and northern boundaries	Same as Alternative C and: ■ Construct and maintain fence along northwest boundary of East Pahranagat Range Unit

Table 3.6-2. Desert NWR: CCP Alternatives

	Management Actions			
Issue Area	*Alternative A (No Action)*	*Alternative B*	*Alternative C (Preferred Alternative)*	*Alternative D*
	▪ Work with the State Engineer to defend water rights and mitigate substantial changes in temperature or flow ▪ Pursue renewal of mineral withdrawal ▪ Participate in programmatic EIS development process relating to proposed energy corridor to evaluate impacts to Refuge resources			
Wildlife and Habitat Management	▪ No current pinyon-juniper habitat management ▪ Remove any wild horses or burros that occur on the Refuge as soon as possible ▪ Restore wetland and spring habitats at Corn Creek	Same as Alternative A	▪ Use prescribed fire and naturally ignited fires to restore vegetation characteristics representative of a natural fire regime ▪ Allow some naturally ignited fires to burn under prescribed conditions above a 5,000-foot elevation; these incidents would be managed as Fire Use Events, with appropriate staffing to reflect the complexity of the incident ▪ Consider habitat needs of special-status species, such as Gilbert's skink and pinyon jay and gray vireo, when doing prescribed burns in pinyon-juniper habitat	Same as Alternative C

Table 3.6-2. Desert NWR: CCP Alternatives

Issue Area	*Management Actions*			
	Alternative A (No Action)	*Alternative B*	*Alternative C (Preferred Alternative)*	*Alternative D*
			▪ Consider reestablishing Pahrump poolfish at Corn Creek if suitable habitat is available and is compatible with management objectives ▪ Maintain and monitor habitats on a regular basis after restoration activities are complete	
Specially Designated Areas				
Air Force Overlay	▪ Work with USAF to update the existing MOU	Same as Alternative A	Same as Alternative A	Same as Alternative A
RNAs	No research or monitoring in RNAs	Develop research and management program for RNAs: ▪ Survey and mark all RNA boundaries ▪ Conduct photographic reconnaissance and documentation of all RNAs ▪ Use RNAs as control for monitoring effects of habitat management in other areas of Refuge	Same as Alternative B and: ▪ Submit request to Service Director to de-designate Papoose Lake RNA ▪ Encourage academic and agency scientists to conduct non-manipulative research in the RNAs	Same as Alternative B and: ▪ Submit request to Service Director to de-designate Papoose Lake RNA
Wilderness	Protect and maintain the wilderness character of the proposed 1.37 million–acre Desert Wilderness Area until Congress acts on proposal: ▪ Prohibit all motorized activities within the proposed wilderness unless authorized by stipulations	Same as Alternative A	Same as Alternative A	Same as Alternative A

Table 3.6-2. Desert NWR: CCP Alternatives

Issue Area	Management Actions: Alternative A (No Action)	Alternative B	Alternative C (Preferred Alternative)	Alternative D
	in 1974 proposal or an approved minimum tool analysis ■ Submit recommendation to technically correct the wilderness proposal to correct overlap with bombing range, allow repair/relocation of hazardous sections of roads, and allow use of helicopters to repair/maintain water developments and access remote areas for wildlife surveys			
Visitor Services				
Environmental Education and Interpretation	Provide opportunities to support up to 100,000 visits per year: ■ Maintain and replace interpretive signs (visitor contact station, trails, and refugium) and update sign content as needed ■ Continue using Southern Nevada Interpretive Association volunteers to provide interpretation and environmental education programs for visitors ■ Use volunteers as available to provide interpretation and guidance to visitors at Corn Creek Field Station	Same as Alternative A and: ■ Expand volunteer program on Refuge with a target of staffing visitor center full-time during peak use and 4 hours/day during other seasons ■ Create environmental education program using funding from Southern Nevada Public Lands Management Act ■ Establish seasonal volunteer resident host/docent at Desert Pass campground ■ Develop and install interpretive panels and signs at designated entry points	Same as Alternative B and: ■ Provide educational materials to the public about the use of fire in habitat management	Same as Alternative B, except: ■ Expand volunteer program to staff visitor contact station/visitor center full-time during peak use periods and four hours/day on weekends during other seasons ■ No docent at campground

Table 3.6-2. Desert NWR: CCP Alternatives

	Management Actions			
Issue Area	*Alternative A (No Action)*	*Alternative B*	*Alternative C (Preferred Alternative)*	*Alternative D*
	▪ Complete planning, design, and construction of a visitor center and office space at Corn Creek Field Station	▪ Develop live "sheep cam" at water development and stream video through Web site and to visitor contact station/visitor center ▪ Develop cultural resources interpretive and environmental education materials in coordination with affiliated Native American tribes		
Outreach	▪ Participate in two major community events annually ▪ Provide information at the visitor center and appropriate signs regarding the closure of the portion of Refuge within the NTTR due to safety and security reasons	Same as Alternative A and: ▪ Participate in three major community events annually ▪ Develop and install a permanent environmental education/interpretive display at a prominent public venue ▪ Conduct an annual public open house ▪ Develop and distribute a Refuge video ▪ Prepare and distribute an annual Congressional briefing ▪ Develop a quarterly Refuge newsletter ▪ Conduct annual surveys to measure program effectiveness	Same as Alternative B	Same as Alternative A and: ▪ Conduct an annual public open house ▪ Prepare and distribute an annual Congressional briefing
Wildlife Observation and Photography	▪ Maintain visitor facilities (Mormon Well and Alamo Roads, parking areas, camping/picnic area)	Same as Alternative A and: ▪ Improve and maintain Mormon Well and Alamo Road to "fair" condition	Same as Alternative B, except: ▪ No auto tour route or wildlife viewing trails in Gass Peak or Sheep Range Units	Same as Alternative C, except: ▪ No road improvements ▪ No mapping of trails and no recreation-fee program

Table 3.6-2. Desert NWR: CCP Alternatives

	Management Actions			
Issue Area	*Alternative A (No Action)*	*Alternative B*	*Alternative C (Preferred Alternative)*	*Alternative D*
	▪ Maintain and replace regulatory, directional, and interpretive signs as needed	▪ Use post-and-cable fencing to designate parking turnouts along Alamo, Mormon Well, and Gass Peak Roads ▪ Construct an entrance sign and information kiosk at the east end of Mormon Well Road ▪ Plan, design, and develop site-specific NEPA documentation for an auto tour route on Gass Peak Road from Corn Creek to SR 215 ▪ Map existing trails in Gass Peak and Sheep Range Units using GPS, develop guide for visitors, and manage trails to minimize impacts to sheep ▪ Evaluate and develop new wildlife viewing trails in the Gass Peak and Sheep Range Units; design and site trails to minimize maintenance costs and impacts to sheep ▪ Plan and construct photography blinds ▪ Evaluate the management benefits resulting from a recreation-fee program		

Table 3.6-2. Desert NWR: CCP Alternatives

	Management Actions			
Issue Area	*Alternative A (No Action)*	*Alternative B*	*Alternative C (Preferred Alternative)*	*Alternative D*
Hunting	Provide safe opportunities for hunting bighorn sheep on the Refuge: ■ Continue current NDOW-managed hunt program based on annual population surveys ■ Provide Refuge-specific and NDOW hunting guidelines and regulation materials to the public at the Refuge headquarters	Same as Alternative A and: ■ Conduct annual surveys and reporting of game species population numbers and the number of hunters and species harvested in coordination with NDOW ■ Post and maintain designated hunting area signs on Refuge	Same as Alternative B	Same as Alternative B
Cultural Resources				
Cultural Resources Management	■ Continue to manage and protect cultural resources on the Refuge on a project-by-project basis prior to land-disturbing projects to comply with applicable laws and regulations ■ Continue to provide appropriate interpretive information on cultural resources to visitors at the field station through informal outreach	Manage cultural resources in compliance with federal regulations: ■ Compile all existing baseline data on cultural resources sites, surveys, and reports within and near the Refuge, and create secure digital, GIS, and hard copy databases, maps, and a library ■ Incorporate cultural resource values, issues, and requirements into design and implementation of the other habitat, wildlife, and visitor service activities and strategies conducted by the Desert Complex	Same as Alternative B and: ■ Prepare evaluation criteria and conduct a cultural resource inventory at all visitor facilities and areas that would be affected by Refuge projects ■ Inventory, evaluate, and mitigate adverse effects, and stabilize samples of cultural resources on the Refuge using a research design prepared in consultation with culturally affiliated tribes and the scientific community ■ Inventory, evaluate, and nominate Traditional Cultural Properties and sacred sites to the NRHP in consultation with tribes	Same as Alternative C

Table 3.6-2. Desert NWR: CCP Alternatives

	Management Actions			
Issue Area	*Alternative A (No Action)*	*Alternative B*	*Alternative C (Preferred Alternative)*	*Alternative D*
		■ Create a cultural resource layer in the Desert Complex GIS database that aids in the identification, planning, monitoring, and interpretation of cultural sites	■ Conduct a study of ethnobotany and traditional plant use on Ash Meadows NWR in consultation with tribes	
Education and Outreach	Provide minimal public outreach: ■ Continue informal outreach on cultural resources to visitors that stop at the visitor center	Manage cultural resources and cultural resource information for research, education, and interpretation: ■ Incorporate cultural resources information into education and interpretive programs and media ■ Identify and evaluate cultural resources that can educate Refuge users on how humans have interacted with wildlife and habitats in the past ■ Use appropriate cultural resources to achieve educational, scientific, and traditional cultural needs ■ Identify potential priority cultural sites on the non-military overlay of the Refuge and survey and record the sites ■ Implement projects to restore habitats of important native plants and to harvest (for traditional, non-commercial purposes) native plant foods in coordination with the tribes	Same as Alternative B	Same as Alternative A

Table 3.6-2. Desert NWR: CCP Alternatives

	Management Actions			
Issue Area	*Alternative A (No Action)*	*Alternative B*	*Alternative C (Preferred Alternative)*	*Alternative D*
		▪ Design and implement educational materials, programs, and activities that would address traditional or sacred resources to increase awareness on- and off-Refuge about the sensitivity of cultural resources to visitor impacts and the penalties for vandalism		
Protection	▪ Continue to protect any cultural and historic resources on the Refuge on a project-by-project basis to comply with applicable laws and regulations	Implement measures to protect cultural resources: ▪ Identify and evaluate cultural resources subject to looting/vandalism, erosion, or deterioration, and implement steps, including barriers and signs, to reduce these threats and preserve the resources ▪ Implement cultural resources monitoring and enforcement activities to decrease impacts on cultural resources ▪ Create and implement a site stewardship volunteer program to assist in site monitoring, educational and interpretive programs, and to promote cultural resources conservation in neighboring communities	Same as Alternative B	Same as Alternative B

Table 3.6-3. Moapa Valley NWR: CCP Alternatives

Issue Area	*Alternative A (No Action)*	*Management Actions* *Alternative B*	*Alternative C (Preferred Alternative)*
Endemic and Special-Status Species			
Habitat Restoration	Implement measures to restore habitat on the Refuge: ▪ Restore native overstory, mid-level, and understory vegetation (using local seed and/or seedlings) in riparian corridors, transitional upland sites, and any disturbed or newly exposed areas on the Pedersen Unit ▪ Consider habitat needs of other special-status fish and invertebrates when designing and implementing restoration projects (Moapa White River springfish, Moapa pebblesnail, grated tryonia, Moapa warm spring riffle beetle, Amargosa naucorid, and Moapa naucorid) ▪ Develop and implement strategies to remove nonnative fish species, including mollies and mosquitofish, from Refuge ▪ Monitor streams before and after rehabilitation to determine benefits or detriments to Moapa dace ▪ Continue to use volunteers for restoration efforts	Same as Alternative A and: ▪ Continue channel restoration on the Plummer Unit by planting native species ▪ Monitor streams before and after rehabilitation to determine impacts on endemic fish and invertebrate populations ▪ Maintain and monitor habitats on a regular basis after restoration activities are complete	Same as Alternative B and: ▪ By 2015, complete restoration of the spring heads and channels on Apcar Unit
Inventory Wildlife	▪ Continue to conduct annual surveys and monitoring of Moapa dace and surveys of Moapa White River springfish	Same as Alternative A and: ▪ Within five years of the CCP's approval, conduct baseline inventories of federally listed, proposed, candidate, and species of concern on the Refuge and of aquatic habitat for invertebrates and amphibians to determine species composition and abundance	Same as Alternative B and: ▪ Inventory existing upland habitat for migratory birds, mammals, and reptiles by 2009 and prepare and implement a Monitoring Plan for these groups ▪ Coordinate with NDOW to conduct surveys for the presence and use of fan palm habitat by bats

Table 3.6-3. Moapa Valley NWR: CCP Alternatives

Issue Area	*Alternative A (No Action)*	*Management Actions* *Alternative B*	*Alternative C (Preferred Alternative)*
		▪ By 2009, inventory existing upland habitat for migratory birds, mammals, and reptiles ▪ Repeat inventories every five years to monitor trends in community composition ▪ Monitor restored stream habitat consistent with the Muddy River Aquatic Species Recovery Plan ▪ Develop and implement an Inventory and Monitoring Plan for federally listed and special-status fish species	▪ Develop a long-term Inventory and Monitoring Plan for all federally listed, proposed, candidate, and special-status species on the Refuge
Water Resources Monitoring	▪ Work with partners to continue monitoring water flow and temperature of Pedersen and Pedersen East Springs and Warm Springs West flume ▪ Participate in local and regional water resources management efforts to assess impacts and protect water resources on the Refuge ▪ Participate in the Muddy River regional water monitoring planning process	Same as Alternative A and: ▪ Collect monthly monitoring data for water flow and temperature of Pedersen and Pedersen East springs and Warm Springs West flume and collect monthly monitoring data for water quality parameters, including temperature, flow, dissolved oxygen, pH, and total dissolved solids at other Refuge springs as needed ▪ Develop a long-term Water Resources Management Plan for the Refuge ▪ Determine appropriate monitoring site locations, frequency, parameters, and equipment ▪ Purchase and install equipment	Same as Alternative B and: ▪ Include monitoring at Apcar by 2009

Table 3.6-3. Moapa Valley NWR: CCP Alternatives

Issue Area	*Alternative A (No Action)*	*Management Actions* *Alternative B*	*Alternative C (Preferred Alternative)*
Habitat Protection	Protect and maintain natural habitat, including water quality and quantity in the Refuge springs and channels suitable for Moapa dace survival, reproduction, and recruitment: ▪ Maintain existing boundary fencing and gates and replace as staffing and funding allow ▪ Maintain regulatory signs on the Refuge in good condition and replace as staffing and funding allow ▪ Remove dead fan palm fronds and thin the underbrush and overgrowth as needed to reduce risk of fire ▪ Unwanted fires would be extinguished as fast as safely possible to minimize potential negative impacts to Moapa dace. ▪ Continue periodic removal of nonnative aquatic species ▪ Monitor changes in the environment that may be a result of climate change	Same as Alternative A and: ▪ Develop and implement an IPM Plan to control and eradicate invasive species encroachment using an early detection/early response approach ▪ Install directional, regulatory, and interpretive signs both on- and off-Refuge ▪ Erect entrance signs as appropriate ▪ Participate in community-based fire safe planning both on- and off-Refuge and explore other options for protecting the Refuge from fire ▪ Use prescribed fire where appropriate to reduce hazardous fuels and treat unwanted vegetation ▪ Develop regulatory, directional, and interpretative signs and materials, such as brochures and fact sheets, to guide and enhance visitor experience	Same as Alternative B and: ▪ Monitor habitat changes, maintain and continue improvements for restoration efforts and other landscape improvements, and provide adequate level of monitoring and maintenance for invasive species control and fire management ▪ Expand Refuge Acquisition Boundary by 1,503 acres and work with partners to protect habitat within the expanded boundary through purchase, transfer, and/or agreement (see Land Protection Plan in Appendix L) ▪ Prepare step-down habitat management plan for lands acquired within the expansion area
Visitor Services			
Visitor Services	Provide public outreach and visitor service opportunities: ▪ Maintain Refuge as closed to the general public ▪ Continue participation in local community events (e.g., Clark County Fair, Moapa Day Celebration, Earth Day) as staffing and funding allow	Same as Alternative A, except: ▪ Open Refuge to the general public on weekends and to school groups during the week through prior arrangement ▪ Recruit docents to staff the Refuge on weekends and facilitate tours ▪ Construct adequate parking and public access to accommodate 500 Refuge visits annually	Same as Alternative B, except: ▪ Open Refuge every day to the general public for self-guided or Refuge staff-guided tours ▪ Recruit docents to staff the Refuge and facilitate tours ▪ Construct adequate parking, including school bus turnouts, and public access to accommodate 1,000 Refuge visits annually

Table 3.6-3. Moapa Valley NWR: CCP Alternatives

Issue Area	*Alternative A (No Action)*	*Management Actions* *Alternative B*	*Alternative C (Preferred Alternative)*
	■ Maintain current parking facilities for visitor safety ■ Provide information about Refuge resources upon request ■ Explore opportunities for development of environmental education programs with potential partners ■ Revise current interpretive and environmental education materials periodically to maintain accuracy ■ Maintain current Refuge entrance signs ■ Continue providing opportunities for volunteers to assist in habitat restoration projects ■ Continue work on an accessible trail ■ Conduct an annual open house for volunteers that assist in restoration ■ Explore opportunities for community-based outreach during on-Refuge activities	■ Provide outreach, by invitation and as staff is available, at the Moapa Valley Community Center ■ Create a basic trail along the riparian corridor on the Plummer Unit ■ Design and install interpretive panels along trail system of Plummer and Pedersen Units ■ Develop an environmental education program at the Refuge by 2012 ■ Develop interpretive and environmental education materials ■ Offer refuge educational materials to school contacts upon request ■ Work with NDOT to erect signs on I-15 and U.S. Highway 93 promoting and directing the public to the Refuge ■ Erect a Refuge entrance sign near Warm Springs Road ■ Conduct a public open house every two to three years to encourage interactions and foster relationships between Refuge staff and local constituents ■ Seek opportunities for community-based outreach, such as participation in off-Refuge activities ■ Monitor number of Refuge visitors through sign-in sheets at the visitor contact station	■ Coordinate the installation of a permanent environmental education display at the Moapa Valley Community Center or other public venue ■ Construct an overlook trail with interpretive panels and shade structure on top of the hill on the Plummer Unit for viewing the Refuge and the Moapa Valley ■ Plan and construct a self-guided trail system along the spring head, pools and riparian corridor on the Plummer Unit ■ Organize local school contacts to generate enthusiasm for the Refuge and its endemic species ■ Develop one environmental education program at the Refuge by 2009 ■ Develop interpretive and environmental education materials ■ Conduct an annual public open house to encourage interactions and foster relationships between Refuge staff and local constituents

Table 3.6-3. Moapa Valley NWR: CCP Alternatives

	Management Actions		
Issue Area	*Alternative A (No Action)*	*Alternative B*	*Alternative C (Preferred Alternative)*
Cultural Resources	■ Continue to inventory, manage, and protect any cultural resources on the Refuge on a project-by-project basis to comply with applicable laws and regulations ■ Continue with informal cultural resources education of Refuge visitors	Same as Alternative A, and: ■ Develop regionally focused cultural resources environmental education and interpretation materials for self-guided tours ■ Confer with culturally affiliated tribes to incorporate their history and native plant and animal species knowledge as part of the interpretive program at the Refuge	Same as Alternative B, and: ■ Conduct cultural resource inventory of the entire Moapa Valley NWR to assist in any future planning efforts and to improve management and protection of any significant site from inadvertent public visitation impacts

Table 3.6-4. Pahranagat NWR: CCP Alternatives

	Management Actions			
Issue Area	*Alternative A (No Action)*	*Alternative B*	*Alternative C*	*Alternative D (Preferred Alternative)*
Wetland Habitat				
Open Water Habitat (640 acres)	▪ Complete and implement wetland restoration plan to improve quality of existing open water habitat for waterfowl, waterbirds, shorebirds, and other migratory birds Continue current management until wetland restoration plan completed: ▪ Maintain Upper Pahranagat Lake water level between 4 and 11 feet from October to April ▪ Discharge water into Middle Marsh and Lower Pahranagat Lake to provide migratory waterfowl habitat ▪ Use electro-shock and netting to control carp populations ▪ Clear vegetation in irrigation ditches annually ▪ Maintain current maintenance, repair, and improvement efforts on North Marsh and Upper Pahranagat Lake	Same as Alternative A	Same as Alternative A and: ▪ Encourage reduction of carp populations on private and state-managed lands in coordination with upstream water resources management entities and users	Same as Alternative C and: ▪ Every three years, conduct surveys of nesting colonial waterbirds

Table 3.6-4. Pahranagat NWR: CCP Alternatives

	Management Actions			
Issue Area	*Alternative A (No Action)*	*Alternative B*	*Alternative C*	*Alternative D (Preferred Alternative)*
Marsh Habitat (400 acres)	▪ Maintain marsh with 30% open water and 70% emergent vegetation ▪ Use prescribed fire as needed to control vegetation ▪ Supplement flows into Middle Marsh with pumped well water to help maintain water levels	Same as Alternative A	Same as Alternative A and: ▪ Every three years, conduct surveys of birds and bats using the marsh habitat	Same as Alternative C and: ▪ Monitor vegetation and wildlife response to habitat management
Wet Meadow Habitat (700 acres)	▪ Manage 700 acres of wet meadow habitat by applying water from October to March ▪ Use prescribed fire on a three- to five-year cycle to control vegetation ▪ Continue conducting spring waterfowl surveys using volunteers and Refuge staff as limited resources allow ▪ Continue to coordinate fall and winter waterfowl surveys with NDOW ▪ Continue project to determine population status, distribution, and demography of Pahranagat Valley montane vole on the Refuge	Same as Alternative A and: ▪ Obtain waterfowl data collected by other agencies on a seasonal basis	Same as Alternative B and: ▪ Add spring and fall surveys and breeding pair and brood counts to current fall and winter surveys coordinated with NDOW	Same as Alternative C and: ▪ Monitor avian species abundance during fall and spring migration for response to habitat manipulation
Alkali Flat Habitat (350 acres)	▪ Maintain 350 acres of flooded alkali flat habitat in the Lower Pahranagat Lake area from December to June	Same as Alternative A	Same as Alternative A and: ▪ Control salt cedar and other invasive species in the Lower Pahranagat Lake area	Same as Alternative C

Table 3.6-4. Pahranagat NWR: CCP Alternatives

	Management Actions			
Issue Area	*Alternative A (No Action)*	*Alternative B*	*Alternative C*	*Alternative D (Preferred Alternative)*
			▪ Develop and implement a Species Inventory and Monitoring Plan for waterfowl and shorebirds	
Foraging Habitat for Sandhill Cranes	▪ No current habitat management for cranes	▪ Plant and irrigate 40 acres of grain between Upper Pahranagat Lake and Middle Marsh to provide forage for sandhill cranes, waterfowl, and geese	▪ Plant and irrigate 65 acres of grain crops between Upper Pahranagat Lake and Middle Marsh to control invasives and to provide forage for migrating sandhill cranes ▪ Monitor sandhill crane usage of the Refuge	▪ Restore and manage 40 acres of native forage for migrating sandhill cranes between the Headquarters unit and Lower Pahranagat Lake ▪ Monitor sandhill crane usage of the Refuge
Water Resources Management	▪ Maintain current water resources management ▪ Monitor inflow to Upper Pahranagat Lake ▪ Pursue 1996 application to Nevada Division of Water Resources for year-round water discharges ▪ Survey existing groundwater wells and repair or cap as appropriate ▪ Install a flume or weir at the outflow of Lower Pahranagat Lake ▪ Install and monitor flow meters and data loggers on each of the three groundwater wells on the Refuge	Same as Alternative A and: ▪ Install new pump for Well 3 and monitor flow	Same as Alternative B and: ▪ Determine the status of groundwater wells of record, and repair and/or abandon as appropriate, and apply for change(s) in point of use with Nevada Division of Water Resources ▪ Install gauges and data-logging equipment at springs adjacent to Middle Marsh ▪ Repair existing water infrastructure as staffing and funding allow	Same as Alternative C and: ▪ Acquire additional water rights from willing sellers ▪ Coordinate with the Alamo, Richardville, and Hiko Water Boards, Lincoln County, and the U.S. Bureau of Reclamation to explore opportunities for additional water supplies

Table 3.6-4. Pahranagat NWR: CCP Alternatives

	Management Actions			
Issue Area	*Alternative A (No Action)*	*Alternative B*	*Alternative C*	*Alternative D (Preferred Alternative)*
	▪ Complete update of Water Management Plan by 2012 ▪ Complete Refuge-wide water budget ▪ Monitor changes in the environment that may be a result of climate change			
Integrated Pest Management	▪ Continue integrated pest management efforts in existing 112-acre grassland habitat to contain spreading of knapweed and reduce its extent ▪ Continue to coordinate noxious weed surveys and mapping efforts with county, state, and federal agencies	Same as Alternative A and: ▪ Complete and implement IPM Plan within five years of CCP completion ▪ Expand invasive plant control efforts to control knapweed in the grassland habitat and Black Canyon (with appropriate tribal consultations) ▪ Continue to use prescribed burning, mowing, spraying, and planting, as needed, to achieve the targeted plant cover throughout the year	Same as Alternative B and: ▪ Control salt cedar, Russian olive, Russian knapweed, Scotch thistle, and other invasive species using appropriate methods (mechanical, chemical, cultural or biological) ▪ Coordinate IPM Plan projects with upstream property owners	Same as Alternative C
Wildlife Diversity				
Southwestern Willow Flycatcher/Wetland Habitat	▪ Maintain existing 100 acres of cottonwood-willow riparian habitat around the North Marsh for southwestern willow flycatcher and other migratory birds	Same as Alternative A and: ▪ Participate in the annual Christmas bird count ▪ Control salt cedar and Russian olive in riparian habitat	Same as Alternative A and: ▪ Establish 200 new acres of willow habitat between Upper Pahranagat Lake and Middle Marsh ▪ Monitor impacts of fishing on bird use of habitats and adopt seasonal closure of sensitive areas as necessary	Same as Alternative B and: ▪ Restore historic stream channel and riparian corridor (5–10 acres) through Black Canyon

Table 3.6-4. Pahranagat NWR: CCP Alternatives

	Management Actions			
Issue Area	*Alternative A (No Action)*	*Alternative B*	*Alternative C*	*Alternative D (Preferred Alternative)*
	▪ Continue to cooperate with U.S. Bureau of Reclamation on limited presence-absence surveys for the southwestern willow flycatcher ▪ Continue to coordinate vegetation surveys with other governmental agencies as directed by project objectives and efforts ▪ Conduct riparian habitat vegetation surveys that include percent cover, density, age, and structure		▪ Monitor response of birds to wetland establishment	
Spring Habitat	▪ Complete inventory and monitoring of vegetation and wildlife in spring habitat ▪ Complete site Restoration Plans to restore six degraded/modified spring pools and channels on the Refuge	Same as Alternative A	Same as Alternative A and: ▪ Implement spring head and channel restoration	Same as Alternative C
Upland Habitat (1,000 acres)	▪ Continue to enforce prohibitions for off-road vehicles ▪ Maintain Refuge fences to reduce encroachment from cattle on adjacent lands ▪ Manage wildland fires on the refuge using the fitting AMR that considers resource values at risk and potential negative impacts of various fire suppression measures;	Same as Alternative A and: ▪ Close unused roads as necessary ▪ Coordinate road closures with BLM	Same as Alternative B and: ▪ Inventory and monitor upland habitat on a regular basis ▪ Install physical barriers to prevent vehicle traffic in closed areas	Same as Alternative C and: ▪ After salt cedar is controlled, restore native upland habitat adjacent to Lower Pahranagat Lake ▪ Fence eastern boundary to prevent encroachment

Table 3.6-4. Pahranagat NWR: CCP Alternatives

	Management Actions			
Issue Area	*Alternative A (No Action)*	*Alternative B*	*Alternative C*	*Alternative D (Preferred Alternative)*
	firefighter and public safety will be the highest priority for every incident ▪ Prepare wilderness study report and NEPA document to evaluate options for preserving wilderness values of three wilderness study areas along the western boundary			
Pahranagat Roundtail Chub/Aquatic Refugium	▪ Roundtail chub not present at the Refuge	▪ Plan and, if feasible, design and construct a refugium for roundtail chub and associated native fish species by 2010	Same as Alternative B	Same as Alternative B
Visitor Services				
Hunting	▪ Maintain current hunting opportunities for upland game, waterfowl, and rabbits ▪ Provide Refuge-specific and NDOW hunting guidelines and regulations to the public at Refuge headquarters ▪ Post and maintain designated hunting area signs on Refuge	Same as Alternative A, except: ▪ Redirect upland game hunting to areas of the Refuge that are south of Dove dike or WHIN dike	Same as Alternative B and: ▪ Conduct annual surveys and reporting of game species population numbers and the number of hunters and species harvested in coordination with NDOW ▪ Monitor the number of hunters using the Refuge by establishing a registration box at multiple Refuge entry points	Same as Alternative C
Fishing	▪ Continue to provide sport fishing opportunities ▪ Continue to maintain visitor facilities	Same as Alternative A and: ▪ Prepare a fisheries management plan within three years	Same as Alternative B	Same as Alternative B, except: ▪ Close existing boat ramps and provide alternative car-top boat launch

Table 3.6-4. Pahranagat NWR: CCP Alternatives

		Management Actions		
Issue Area	*Alternative A (No Action)*	*Alternative B*	*Alternative C*	*Alternative D (Preferred Alternative)*
	▪ Maintain swimming prohibitions at all open water locations and maintain regulatory signs at those locations			
Camping	▪ Maintain campground in its current state	Same as Alternative A, except: ▪ Begin collecting fees ▪ Limit length of stays to seven days ▪ Prohibit use of generators between 10 p.m. and 8 a.m.	▪ Convert campground to day use area (vehicles still allowed)	▪ Convert campground to walk-in day use area ▪ Install gate to prevent vehicular access to former campground area
Wildlife Observation/ Photography	▪ Maintain existing visitor facilities with help from volunteers ▪ Continue to offer wildlife lists at the Refuge headquarters ▪ Maintain the observation deck on Upper Pahranagat Lake and trails throughout the Refuge	Same as Alternative A and: ▪ Monitor the number of visitors using the Refuge each day ▪ Design and construct a wildlife observation trail system, possibly on historic farming and ranching roads	Same as Alternative B and: ▪ Construct photography/observation blinds along trail route	Same as Alternative C and: ▪ Develop and implement an annual road maintenance program
Interpretation/ Environmental Education	▪ Maintain existing level of interpretation, environmental education, and outreach ▪ Monitor Refuge visitation	Same as Alternative A, except: ▪ Expand the existing visitor contact station to accommodate growing numbers of visitors ▪ Develop new interpretive panels and replace panels ▪ Develop environmental education materials and “least-wanted” posters for invasive plant species	Same as Alternative B and: ▪ Construct interpretive walking trail that connects Upper Pahranagat Lake with the Headquarters Unit ▪ Construct a new visitor contact station and office space at headquarters unit ▪ Construct additional parking to accommodate visitors at the Headquarters Unit	Same as Alternative C

Table 3.6-4. Pahranagat NWR: CCP Alternatives

	Management Actions			
Issue Area	*Alternative A (No Action)*	*Alternative B*	*Alternative C*	*Alternative D (Preferred Alternative)*
		▪ Construct office space to accommodate additional staff	▪ Coordinate with NDOT to create turn lanes so visitors can safely exit highway to visit the Refuge ▪ Develop and implement an Interpretative Plan for the Refuge	
Outreach	▪ Continue participating in up to three outreach events per year	Same as Alternative A	▪ Participate in a minimum of six outreach activities each year within three years ▪ Coordinate with NDOT to install directional signage for I-15 and US Highway 93 to promote Refuge visitation	Same as Alternative C, except: ▪ Participate in a minimum of nine outreach activities each year within three years
Cultural Resources				
Cultural Resources Management	▪ Continue to manage cultural resources on a project-by-project basis ▪ Continue to provide to Refuge visitors with appropriate interpretive information on cultural resources through informal outreach	▪ Incorporate cultural resource values, issues, and requirements into design and implementation of the other habitat, wildlife, and visitor service activities and strategies conducted by the Desert Complex ▪ Compile all existing baseline data on cultural resources sites, surveys, and reports within and near the Refuge, and create digital, GIS, and hard copy databases, maps, and a library	Same as Alternative B and: ▪ Conduct cultural resource inventories at all public use areas, roads, affected areas, and other "destinations" on the Refuge and evaluate the discovered sites' eligibility to the NRHP. ▪ Develop historic contexts for classes of cultural resources ▪ Inventory, evaluate, and nominate Traditional Cultural Properties and sacred sites to the NRHP in consultation with tribes	Same as Alternative C and: ▪ Identify and evaluate cultural resources that could educate visitors on how humans have interacted with wildlife and habitats in the past. ▪ Consult with affiliated tribes and other stakeholders on ways to use these resources to achieve educational, scientific, and traditional cultural needs.

Table 3.6-4. Pahranagat NWR: CCP Alternatives

		Management Actions		
Issue Area	*Alternative A (No Action)*	*Alternative B*	*Alternative C*	*Alternative D (Preferred Alternative)*
		▪ Develop educational, scientific, and traditional cultural needs for cultural resources management in coordination with the Consolidated Group of Tribes and Organizations ▪ Create a GIS-enabled element in the Cultural Resources Management Plan that aids in the identification, planning, monitoring, and interpretation of cultural sites	▪ Identify, evaluate, and mitigate adverse effects and stabilize selected cultural resource sites on Pahranagat NWR using a Cultural Resources Management Plan prepared in consultation with affiliated tribes and the scientific community, and use the above data on site locations and information for planning, monitoring, and interpretation efforts related to cultural resources ▪ Secure Refuge System and non-Refuge System funding to develop and implement a mitigation, stabilization, or research project ▪ Implement projects to restore habitats of important native plants and to harvest (for traditional, non-commercial purposes) native plant foods in coordination with affiliated Native American tribes	▪ Conduct a study of ethnobotany and traditional plant use on Pahranagat NWR through assistance and consultation with affiliated tribal representatives.
Cultural Resources Protection	▪ Continue to attempt to protect cultural resources on a case-by-case basis	▪ Identify and evaluate cultural resources subject to looting/vandalism or deterioration; implement steps to reduce these threats and preserve the resources	Same as Alternative B	Same as Alternative B

Table 3.6-4. Pahranagat NWR: CCP Alternatives

	Management Actions			
Issue Area	*Alternative A (No Action)*	*Alternative B*	*Alternative C*	*Alternative D (Preferred Alternative)*
		▪ Implement cultural resources monitoring and enforcement activities to decrease impacts to cultural resources		
Education and Outreach	▪ Continue informal outreach on cultural resources to visitors that stop at the visitor contact station	▪ Design and implement educational materials, programs, and activities that would be used to address traditional or sacred resources to increase awareness on- and off-Refuge about the sensitivity of cultural resources to visitor impacts and the penalties for vandalism ▪ Incorporate cultural resources information into education and interpretive programs and media	Same as Alternative B and: ▪ Create and implement a site stewardship volunteer program to assist in site monitoring, delivery of educational and interpretive literature and programs, and to promote cultural resources conservation in neighboring communities ▪ Develop educational, scientific, and traditional cultural needs for cultural resources management	Same as Alternative C