WILDLAND FIRE MANAGEMENT PLAN

PAHRANAGAT NATIONAL WILDLIFE REFUGE

2001

SEPTEMBER 2001

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EXECUTIVE SUMMARY

When approved, this document will become Pahranagat's fire management plan. Major components include:

- updated policy for prescribed fires at Pahranagat.
- incorporates objectives from the Pahranagat Refuge Goals and Objectives Statement.
- format changes under the direction of Fire Management Handbook (Release Date 6/1/00).
- Continues a Prescribed Fire Program to manage critical habitat and reduce hazardous fuels.

This plan is written to provide guidelines for appropriate suppression and prescribed fire programs at Pahranagat. Prescribed fires may be used to reduce hazard fuels, restore the natural processes and vitality of ecosystems, improve wildlife habitat, remove or reduce non-native species, and/or conduct research.

INTRODUCTION

This plan will establish a Fire Management Plan for Pahranagat National Wildlife Refuge. This plan will meet the requirements of the National Environmental Protection Act (NEPA), the Endangered Species Act (ESA), and the National Historic Preservation Act (NHPA). An Environmental Assessment (EA) and Finding of No Significant Impact (FONSI) were completed for the Fire Management Plan and are located in Appendix I.

This plan is written as an operational guide for managing the refuge's wildland fire and prescribed fire programs. It defines levels of protection needed to ensure safety, protect facilities and resources, and restore and perpetuate natural processes, given current understanding of the complex relationships in natural ecosystems. It is written to comply with a Service-wide requirement that refuges with burnable vegetation develop a fire management plan (620 DM 1).

A Fire Management Plan for Pahranagat NWR was written and approved by the Regional Director in 1990. The 2001 Fire Management Plan has been written to comply with new National Fire Policy, and to help achieve management objectives outlined in the 1998 Draft Cropland and Grazing Management Plan for Pahranagat National Wildlife Refuge.

Overall management objectives include maintaining quality habitat for all migratory and native species , providing compatible and wildlife dependent public use opportunities, understanding and protecting cultural resources, and providing interpretative and educational information on the Refuge's habitat, wildlife, and cultural resources. The purpose of this plan is to help achieve these objectives.

Fires occurring under certain climatic conditions and season have adverse effects on Refuge habitats. The Refuge Manager at Pahranagat National Wildlife Refuge will meet with local fire department officials and the BLM of Land Management (BLM) to develop agreements and operating plans to provide fire protection for Service lands. The agreement(s) and operating plans will be incorporated into this plan as Appendices.

COMPLIANCE WITH USFWS POLICY

Pahranagat NWR was established on January 15, 1964 under authority of the Migratory Bird Conservation Act of 1929. The original purchase was for 3,915.6 acres. An additional 1,466.39 acres was withdrawn from public domain for the refuge by Public Land Order 3348 in March of 1964.

For lands acquired under the Migratory Bird Conservation Act, 16 U.S.C. subpart 715d, the purpose of the acquisition is "for use as an inviolate sanctuary, or for any other management purpose for migratory birds." For lands acquired by Public Land Order, the purpose remains the same as land acquired under the Migratory Bird Act.

The Department Manual, DM 910 (USDI 1997) states the following regarding wildland fires:

> AWildfires may result in loss of life; have detrimental impacts upon natural resources, and damage to or destruction of man-made developments. However, the use of fire under carefully defined conditions is to be a valuable tool in wildland management. Therefore, all wildfires within the Department will be classified either as wildfire or as prescribed fires.
>
> Wildfires, whether on lands administered by the Department or adjacent thereto, which threaten life, man-made structures, or are determined to be a threat to the natural resources or the facilities under the Department's jurisdiction, will be considered emergencies and their suppression given priority over normal Departmental programs.
>
> BLMs will give the highest priority to preventing the disaster fire - the situation in which a wildfire causes damage of such magnitude as to impact management objectives and/or socio-economic conditions of an area. However, no wildfire situation, with the possible exception of threat to human survival, requires the exposure of firefighters to life threatening situations. Within the framework of management objective and plans, overall wildfire damage will be held to the minimum possible giving full consideration to (1) an aggressive fire prevention program; (2) the least expenditure of public funds for effective suppression; (3) the methods of suppression least damaging to resources and the environment; and (4) the integration of cooperative suppression actions by agencies of the Department among themselves or with other qualified suppression organizations.
>
> Prescribed fires...may be used to achieve agency land or resource management objectives as defined in the fire management plans....Prescribed fires will be conducted only when the following conditions are met:
>
> a. Conducted by qualified personnel under written prescriptions.
> b. Monitored to assure they remain within prescription.
>
> Prescribed fires that exceed the limits of an approved prescribed fire plan will be reclassified as a wildfire. Once classified a wildfire, the fire will be suppressed and will not be returned to prescribed fire status.

The authority for funding (normal fire year programming) and all emergency fire accounts is found in the following authorities:

Section 102 of the General Provisions of the Department of Interior's annual Appropriations Bill provides the authority under which appropriated monies can be expended or transferred to fund expenditures arising from the emergency prevention and suppression of wildland fire.

P.L. 101-121, Department of the Interior and Related Agencies Appropriation Act of 1990, established the funding mechanism for normal year expenditures of funds for fire management purposes.

31 US Code 665(E)(1)(B) provides the authority to exceed appropriations due to wildland fire management activities involving the safety of human life and protection of property.

Authorities for procurement and administrative activities necessary to support wildland fire suppression missions are contained in the Interagency Fire Business Management Handbook.

The Reciprocal Fire Protection Act of May 27, 1955 (42 USC 815a; 69Stat 66) provides Authorities to enter into agreements with other Federal BLMs and agencies; with state, county, and municipal governments; and with private companies, groups, corporations, and individuals regarding fire activities. Authority for interagency agreements is found in AInteragency Agreement between the BLM of Land Management, BLM of Indian Affairs, National Park Service, US Fish and Wildlife Service of the United States Department of the Interior and the Forest Service of the United States Department of Agriculture@ (1996).

FIRE MANAGEMENT OBJECTIVES

The Refuge has not developed a Comprehensive Conservation Plan. The objectives identified in the chart below were taken from the Refuge Goals and Objectives Statement. The Fire Management Plan is a step-down plan from the draft Cropland and Grazing Management Plan.

Table 1. Refuge Objectives and Outputs, Pahranagat NWR

Refuge Objective #	Refuge Objective	Output	Current Levels	Objective Level	Deficit(-) Surplus(+)
Habitat 1	Enhance wildlife diversity through habitat management with special emphasis on endangered, threatened and candidate species and the maintenance of ungrazed riparian, wetland and upland habitat.	Montane Vole SW Willow Flycatcher Bald Eagle Peregrine Falcon Desert Tortoise	unknown ~20 acres 6 birds 2 birds ~1000 acres	none set ~80 acres 10 birds 6 birds ~2000 acres	N/A -60 acres -4 birds -4 birds -1000 acres
Habitat 2	Provide fall and spring migration habitat with special emphasis on the maintenance of duck and greater sandhill crane feeding and resting habitat.	Migratory waterfowl Sandhill crane	~1400 acres ~80 acres	~2000 acres ~160 acres	-600 acres -80 acres
Habitat 3	Increase habitat quantity and quality for native nesting aquatic and land birds	Native nesting birds	~3100 acres	~4800 acres	+1700
Cultural Resources 1	To maintain and protect archaeological and historic sites	Sites	7	7	N/A
Public Use 1	Provide quality public hunting and fishing opportunities consistent with the goal to provide adequate migration habitat	Waterfowl, Quail, Dove Hunting and Fishing	6,825 AH	none set	N/A
Public Use 2	Improve the quality of refuge related interpretation, wildlife and wetlands observation and environmental education	Interpretation , Outdoor Classrooms Wildlife Observation, Photography	0 unknown	none set none set	N/A N/A
Public Use 3	Respond to existing public demand for refuge ans resource related information	Refuge Information	unknown	none set	N/A

Public Use 4	Permit approved wildlife related recreation while discouraging non-conforming uses and non-wildlife oriented activities	Camping, Picnicking	unknown	none set	N/A

Management Strategies outlined in the Preferred Alternative of the Draft Cropland and Grazing Management Plan discuss the use of prescribed fire to achieve Refuge goals and objectives in the following:

> "Phase-out grazing..... Grazing of approximately 150-175 head of cattle would continue on approximately 300 acres of the Middle Marsh unit but would be phased out as a management tool on the Refuge before year 2003 and replaced with fire and mowing where appropriate. ..... Mowing and or burning would replace grazing as a management tool to remove decadent vegetation and promote new growth. Desirable forage species, both annuals and perennials, would become more abundant, reach a larger size, mature and thus produce seed."
>
> "Areas which were typically cropped short by grazing would provide a higher quality and quantity of cover and food for a wider variety of wildlife, thus increasing the bio-diversity of the Refuge. A phase-out of the grazing program would improve vegetative and structural (primarily burrowing habitat) habitat components essential to the desert tortoise (threatened Mojave population) which occurs on the Refuge."

Under present day circumstances, fire will play a role in the management of resources on Pahranagat NWR. The Fire Management Plan for Pahranagat NWR provides a detailed plan of action to implement fire management goals for the Refuge for the purpose of achieving management objectives. An example of this includes one of the Refuges guiding principles as identified in the draft Cropland and Grazing Management Plan, Preferred Alternative: "Mowing and or burning would replace grazing as a management tool, as to the benefit of the refuge manager, to remove decadent vegetation and promote new growth." The use of prescribed fire as a management tool will contribute in meeting this goal.

Fire specific goals and objectives are.

A. General Fire Management Goals
   1. Firefighter and public safety is the priority objective of the program. All Fire Management activities will reflect this commitment.
   2. Protect life, property, and other resources from unplanned fire.
   3. Use fire as a tool where appropriate to accomplish resource management objectives.
   4. Use fire as a tool where appropriate to accomplish Refuge maintenance objectives.

B. Fire Management Objectives

1. Protect from fire all important scientific, cultural, historic, prehistoric, visitor facilities, administrative sites, and refuge housing.
2. Restore and perpetuate habitat important to migratory and native wildlife species, by maintaining a diversity of plant communities in various successional stages.
3. Employ prescribed fire as a management tool to simulate natural ecological processes.
4. Use fire as a tool to limit the spread and/or facilitate the elimination of noxious weeds.

5. Use fire to facilitate and augment the cropland and water management programs.
6. Prevent human-caused wildland fires.
7. Educate the public regarding the role of prescribed fire within the Refuge.

DESCRIPTION OF REFUGE

Pahranagat NWR was established in January of 1964 when 3,722 acres were purchased from the Buckhorn Land and Cattle Company with Duck Stamp Funds. An additional 1,311 acres were withdrawn from public domain by Public Land Order 3348 in March of 1964, and a 347 acre lake bottom aquisition was completed in June of 1966.

The 5,380 acre refuge is located at the southern end of the Pahranagat Valley, six miles south of the town of Alamo, Lincoln County, Nevada. The valley is 44 miles long and part of an ancient, well preserved river course approximately 1/4 to ½ mile wide, broad on bordered on both sides by rocky terraces and upland desert. Pahranagat itself is about 10 miles long with an average width of about ½ mile. The topography varies from open water and cattail marshes to cliffs and rocky outcrops on the adjacent upland deserts. Elevations range from 3,300 feet in the valley bottom to 3,800 feet on the desert slopes and rock outcrops.

CULTURAL RESOURCES

Archeological, cultural, and historic resources have been identified through surveys conducted on the Refuge. Information gained from surveys will be utilized in developing prescribed fire plans and wildland fire suppression tactics. Wildland fires present a threat to sites located on the Refuge. Appropriate measures will be taken to protect sites during wildland fire suppression efforts. Black Canyon, located within ½ mile of the refuge headquarters, is listed in the National Register of Historic Places and contains significant Native American cultural resources. The site contains large and unique rock art, rock shelters, and hunting camps/blinds.

WILDLIFE

The diversity of habitats found at Pahranagat National Wildlife Refuge (NWR), ranging from Mojave/Great Basin Desert Scrub to marsh and open water, provides excellent habitat for a variety of wildlife species.

Over 230 different species of birds utilize refuge habitats. A bird list is available online or copies may be obtained at the refuge office and at information centers located throughout the refuge. Bird abundance and diversity is highest during spring and fall migrations when large numbers of songbirds, waterfowl, shorebirds, and raptors are present. Common ducks are pintail, teal, mallards, and redhead. Great blue herons are found near lakes while black-necked stilts and American avocets are found feeding in shallow water. Greater sandhill cranes can be seen in February - March and again in October - November as they migrate between nesting and wintering areas. Red-tailed hawks, Northern harriers, Cooper's hawks, and American kestrels are most abundant during winter months and both bald eagles and golden eagles are also winter visitors. Cottonwood-willow habitat provides nesting habitat for warblers, orioles, flycatchers, and finches. The open fields attract shrikes, meadowlarks, blackbirds, and mourning doves. The uplands are home to Gambel's quail, roadrunners, and various sparrow species.

Kit foxes and coyotes prey year-round on the many rodent species which inhabit all refuge habitats. Mule deer, the primary prey of the refuge's mountain lions, are most abundant during winter months.

THREATENED AND ENDANGERED SPECIES

Table 2 lists threatened and endangered species. Section 7 Consultation was conducted with the Las Vegas Office of Ecological Services as part of this FMP (Appendix I).

Table 2. Endangered, Threatened, or Sensitive Species at Pahranagat NWR

Common Name	USFWS	BLM	Nevada (State)
Pahranagat Valley montane vole	SC	SS	--
Townsend's big-eared bat	SC	SS	--
Spotted bat	SC	PSS	SP
Western small-footed myotis	SC	SS	--
Southwestern willow flycatcher	FE	SS	SP
Phainopepla	--	SS	SP
American peregrine falcon	FE	SS	SP
Southern Bald Eagle	FT	SS	SP
Golden Eagle	--	PSS	SP
Ferruginous Hawk	SC	PSS	SP
Swainson's Hawk	--	PSS	SP
Osprey	--	PSS	SP
White-faced Ibis	SC	PSS	SP
American White Pelican	--	PSS	SP
Western Yellow-billed cuckoo	--	PSS	SP
Bell's vireo	--	PSS	SP
Wilson's Warbler	--	PSS	SP
Yellow Warbler	--	PSS	SP
Common Yellowthroat	--	PSS	SP
Orange-crowned Warbler	--	PSS	SP
Western Burrowing Owl	--	PSS	SP
Short-eared Owl	--	PSS	SP
Desert tortoise (Mojave population)	FT	SS	SP

FE=Federally endangered SP=protected by the state of Nevada
SC= species of concern (Nevada State Office, USFWS, Nevada National Heritage Program)
FT=Federally threatened SS=BLM special status
PSS=proposed BLM special status

Endangered, Threatened, and Species of Concern
Continued biological evaluation of the Pahranagat NWR may at a future date identify other Federally-listed species, at which time amendments to this plan may be necessary. Only those species known to currently exist within the present Refuge boundary will be considered in this present plan.

Unknown numbers of American peregrine falcons are known to use the Refuge for foraging and probably nest among the adjacent cliffs. They were last observed in summer 1998 attempting to capture ducks on the Middle marsh.

Small numbers of bald eagles use the Refuge for foraging and roosting during winter migration. Eagles find rich foraging grounds (fish/waterfowl) on the North Marsh. Cottonwood trees are used for roosting and foraging perches.

Federally threatened desert tortoise occur on the desert uplands of the Refuge at unknown densities (a juvenile was observed in Black Canyon in 1998 and active burrows are also present) and populations have undoubtedly been impacted by grazing on the desert uplands of the Refuge. Due to the relatively small, linear shred of suitable tortoise habitat on the Refuge, it is unlikely that tortoise populations could increase significantly without coinciding habitat improvements on the adjacent BLM of Land Management (BLM) lands. Adjacent habitat on Desert NWR are at the elevational upper limit of most known tortoise populations and therefore marginally suitable.

Approximately 2,000 of the Lower Colorado River population of greater sandhill cranes (almost 25% of this declining population which is the smallest population) have used the Refuge for the past several years as one of only two known migrational staging areas. The cranes forage and roost in grain fields and near small impoundments just south of the headquarters.

The Pahranagat Valley montane vole is endemic to the Pahranagat Valley, and according to refuge records has been captured as recently as 1995 and is known to be reproducing on the Refuge. Very little is known about this small, herbivorous mammal which inhabits moist meadow habitats. Trapping efforts have captured voles in several areas of the Refuge, all with good grass cover. These areas include: east and north of the North Marsh, the northern portion of the Middle Marsh unit, and just north and west of the Middle Marsh Pond. Refuge management study proposals have been drafted for the vole which focuses on determining distribution and density. This information is critical to establishing baseline population and habitat data necessary to implement appropriate protection/management measures. Because of its limited distribution and the paucity of data on this subspecies, the vole was listed as a Category 2 candidate for the Endangered Species list (November 21, 1991). The vole is considered a protected species by the state of Nevada and a special status species by the BLM.

Species of Management Concern
Swainson's Hawk (*Buteo swainsoni*), Ferruginous Hawk (*Buteo regalis*), prefer open foraging habitat. Both utilize grasslands and the shrub uplands. These species utilize trees and thickets along riparian areas for roosting and nesting.

Short-eared owls occupy a variety of open habitats to include; marshes, wet meadows, grasslands, and shrublands. Short-eared owls nest on dry ground in open areas with dense herbaceous cover. Even in wetlands, dry microsites are selected for nesting. Roosting sites are usually on the ground or on grass tussocks, occasionally low brush, fenceposts, and poles.

Burrowing owls (*Speotyto cunicularia*) occur in the open, dry shrub/grassland. They inhabit abandoned rodent burrows. Nesting occurs from late March through early May.

The White Faced Ibis (*Pleyadis chihi*), inhabit freshwater marshes and riparian zones. They nest in reed beds, thickets, or in trees in or immediately adjacent to water. They forage in shallow marshes, emergent wetlands, along shorelines and in adjacent meadows.

The Yellow Warbler (*Dendroica petechia*) breeds and lives in wet deciduous thickets of early sucessional habitats, and shrubby thickets of the riparian forest. Nesting occurs in spring.

Surveys conducted in spring/summer 1998 by biological staff from the San Bernardino County Museum concluded that the Federally endangered Southwestern Willow Flycatcher utilize a stand of large cottonwoods and willows at the north end of the Refuge for nesting. This concentration of nesting flycatchers could very well be the largest and most significant nesting population in Nevada. This

vulnerable species depends on dense thickets of riparian vegetation for its survival. The small size of this isolated habitat island with little or no real core and the subsequent edge effect may explain the high level of predation, but the coinciding absence of cowbird parasitism is puzzling.

Yellow-billed cuckoos and Bell's vireo occupy similar habitat, and while they have been observed and probably nest on the Refuge, surveys have not been conducted.

A number of bats, including Long-eared Myotis (*Myotis evotis*), Fringed Myotis (*Myotis thysanodes*), Long-legged Myotis (*Myotis volans*), Yuma Myotis (*Myotis yumanensis*), Pale Townsend's Big-eared Bat (*Plecotus townsendii pallescens*), and Pacific Townsend's Big-eared Bat (*Plecotus townsendii townsendii*), are observed on the Pahranagat NWR. Nocturnal, all of these bats feed upon insects above riparian areas. Individuals or groups of these species may nest under the bark of dead trees.

VEGETATION

Habitat which supports burnable vegetation on the Refuge can be separated into five broad types: Mojave/Great Basin Shrub, wet meadow/grassland, marsh, riparian forest, and cropland. Appendix G gives a summary of fire effects by species in the five habitat types.

Marsh

Cattail	*Typha latifolia*
Spike Rushes	*Elocharis* spp.
Rushes	*Juncus* spp.
Sedges	*Cyperus* and *Carex* spp.
Bulrushes	*Scirpus* spp.
Pennywort	*Hydrocotyle verticellata*
pondweed	*Potamogeton* spp.
Algae	*Chara* spp., *Spirogyra* spp., and *Compsopogon* spp.
Yerba mansa	*Anemopis californica*
watermilfoil	*Myriophyllum* spp.

Table 3: Habitat Types

HABITAT TYPE	ACRES	% of TOTAL ACRES	ASSOCIATED PRIORITY SPECIES
Mojave/Great Basin Desert Shrub	2,780	52	Desert Tortoise
Alkali Flat/Play	600	11	none identified
Wet Meadow /Grasslands	510	9.4	Sandhill Crane, Pahranagat Valley MontaneVole
Marsh	420	7.8	Sandhill Crane, migratory waterfowl, shorebirds
Open Water	410	7.6	Migratory waterfowl, shorebirds
Playa (seasonably flooded)	400	7.4	Migratory waterfowl, shorebirds
Croplands	180	3.3	Sandhill Crane, migratory waterfowl, shorebirds
Riparian Forest	80	1.5	Southwestern willow flycatcher, yellow billed cuckoo
Springs	<1	<1	Paranagat Valley Montane Vole (possible)
TOTAL	5,380		

Riparian Forest

Cottonwood	*Populus fremontii*
Willow	*Salix nigra*
Coyote willow	*Salix exigua*
Salt cedar	*Tamarix ramosissima*

Desert Shrub

Desert shrub plant communities typically are made up of plants that can tolerate moderate to highly alkaline soils and can survive on minimal precipitation (about 7 inches per year).

Two different upland desert shrub communities have been identified on the Pahranagat NWR Complex: Mojave Desert and Great Basin Desert.

Great Basin Desert

Drier sites in alkaline soils:

shadscale	*Atriplex confertifolia*
hopsage	*Grayia spinosa*
winterfat	*Ceratoides lanata*
greasewood	*Sarcobatus vermiculatus*

Less alkaline:

Desert teas	*Ephedra* spp.
Sagebrushes	*Artemesia* spp.

Rabbitbrushes	*Chrythamnus* spp.
Prickly Pear	*Opuntia* spp.

Mojave Desert

Upper bajadas:

Joshua tree	*Yucca brevifolia*
Desert teas	*Ephedra* spp.
Wolfberries	*Lycium* spp.
Saltbushes	*Atriplex* spp.

Lower bajadas:

Bur sage	*Ambrosia dumosa*
Mojave yucca	*Yucca schidigera*
Banana Yucca	*Yucca baccata*
beaver tail cactus	*Opuntia basilaris*
chollas	*Opuntia* spp.
goldenhead	*Acamptopappus schockleyi*
cheese bush	*Hymenoclea salsola*
saltbushes	*Atriplex* spp.

Wet Meadow/Grassland

wheatgrass	*Agropyron* spp.
Bentgrass	*Agrostis* spp.
foxtail	*Alopecurus* spp.
Saltgrass	*Distichlis* spp.
Basin wildrye	*Elymus* spp.
Meadow Barley	*Hordeum* spp.
Alkali Muhly	*Muhlenbergia* spp.
Alkali Sacaton	*Sporobulus* spp.

Cropland

The following are management actions proposed in the preferred alternative of the draft Cropland and Grazing Management Plan.

The short term continuation of the grazing program and the redirection of the farming program are justified but contingent and must: 1) focus on the protection of existing habitats and species known to occupy those habitats; 2) not preclude the natural recovery or restoration of degraded upland, riparian, marsh or grassland habitats; 3) otherwise prove demonstrably compatible with the revised goals and objectives established in this plan.

Grain crops will be rotated every three years with cover crops such as perennial grasses and legumes which are suitable for the area and its soils. Lower headquarters field will be divided and rotated every other year to provide grain to migrating cranes and ducks in juxtaposition to the roosting pond. This rotation will ensure that at least one field is in grain production each year. These cover crops are expected to improve soil structure, provide protective cover and contribute to soil organic matter and to the biological processes occurring within the soil. To the greatest extent possible, wildlife compatible legumes will be planted due to their ability to fix atmospheric nitrogen and therefore reduce dependency on chemical fertilizers. Depending on the location of the field and desired wildlife use, these crops may be mowed to stimulate new growth and reduce predator cover near sandhill crane feeding and roosting

areas. These crops will be tilled into the soil at the end of the rotation. Since all farming on the Refuge will be force-account, 100% of the crop will be used for wildlife. Grain and cover crop acreage as well as the associated non-target plant species acreage will be utilized for forage, cover and nesting by a wide variety of resident and migratory wildlife. The Refuge will continue to consult with the NRCS in the selection of cover and grain crops and seed selection for upland and riparian restoration.

Exotic Species

The primary invasive exotic species of concern on the Refuge are Salt Cedar (*Tamarisk* spp.), a woody phreatophyte, and Russian knapweed (*Aeruptilon repens*), a rhizomatous, perennial weed. Also present on the Refuge, but of lesser concern, are Russian thistle (*Salsola iberica*) and five-hook bassia *(Bassia hyssopifolia*). Areas currently infested with knapweed total approximately 45 acres, which are currently fallow croplands and grazed pasture. Roadsides and irrigation ditch banks are infested. Thirty acres contain Russian thistle, bassia or both but are not infested to the same degree as are the fields which contain knapweed. Tamarisk and knapweed are listed as noxious weed by the state of Nevada.

Even though knapweed infestations need attention, the significance of saltcedar infestations along refuge irrigation canals, springs and lake and marsh margins (which total approximately 200 acres) and the potential for proliferation cannot be underestimated or ignored. Unlike knapweed, saltcedar has the ability to drastically impact the geomorphology and hydrology of aquatic systems, seriously alter the structure and stability of native plant communities and negatively impact the abundance and diversity of birds and mammals. Saltcedar is an aggressive proliforator, can reproduce vegetatively and is resilient to a wide range of disturbance factors (fire, drought, flood and high salinity). Saltcedar has the ability to decrease riparian flow rates, alter soil chemistry by increasing soil salinity and significantly lower water tables. The longer saltcedar occupies an area the more saline and xeric it becomes, a dire consequence in desert riparian habitats. Pahranagat NWR was created with the preservation/maintenance of aquatic ecosystems “for use as an inviolate sanctuary, or for any other management purpose for migratory birds.” Therefore, the preservation/ maintenance of these systems will be the highest priority to refuge management. Presently, the most significant threat to these systems for integrated pest management (IPM) purposes is saltcedar.

CLIMATE

The Refuge has a semiarid, continental climate. Annual precipitation is low (7 inches), sunshine is abundant, the rate of evaporation is high. Temperatures are highly variable, ranging from 110 degrees in mid summer to 10 degrees in January. Rainfall is irregular but generally occurs in winter and late summer. Prevalent northwesterly winds are common during the spring months. The average annual temperature is 65 degrees. Average annual precipitation ranges from 7-8 inches.

SOILS

Table 4. Soil Type and Associated Vegetation

Soil Type	Vegetation	Percent of Farm and Grazing Acreage
Geer fine sandy loam	desert scrub, irrigated crops	54
Ash Springs silt loam-somewhat poorly drained	irrigated crops or pasture	17
Pahranagat silt loam-drained	irrigated crops or pasture	11
Seaman sandy loam	desert scrub	12
Ash Springs silt loam-reclaimed	irrigated crops or pasture	6

		100% farm units
Pahranagat-Ash Springs complex, seeped	wetland, wet meadow	70
Pahranagat-Ash Springs complex	wetland, wet meadow	15
Peat	wetland, wet meadow	15
		100% grazing units

STRUCTURES AND FACILITIES

There are no private structures directly adjacent to the Refuge boundaries. The structures within the refuge include two residences, a shop office, a storage unit, and two small historic out buildings. (See structure protection plan)

Figure 1: Vicinity Maps/ Unit 1

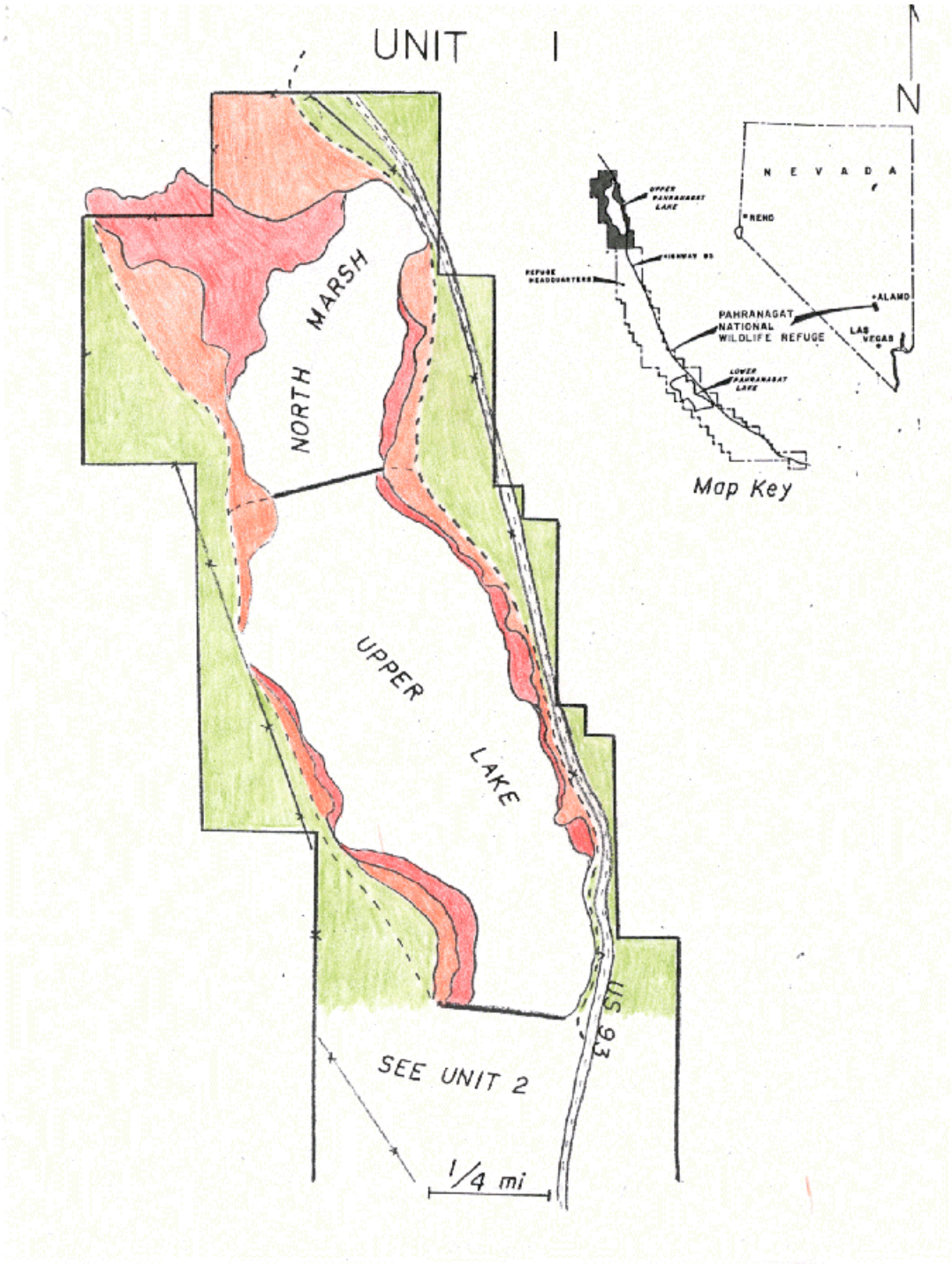


Figure 2: Unit 2

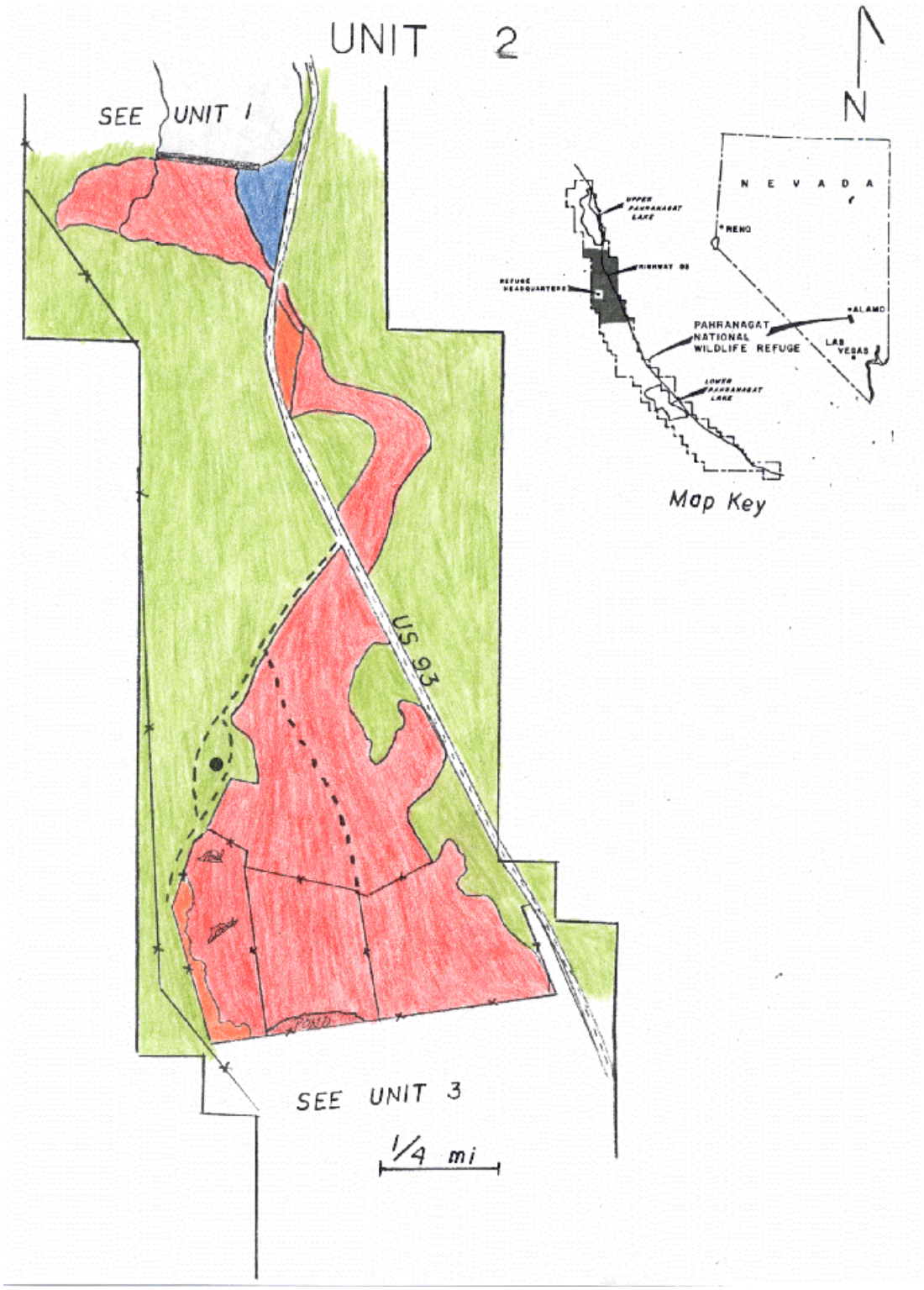


Figure 3: Unit 3,4

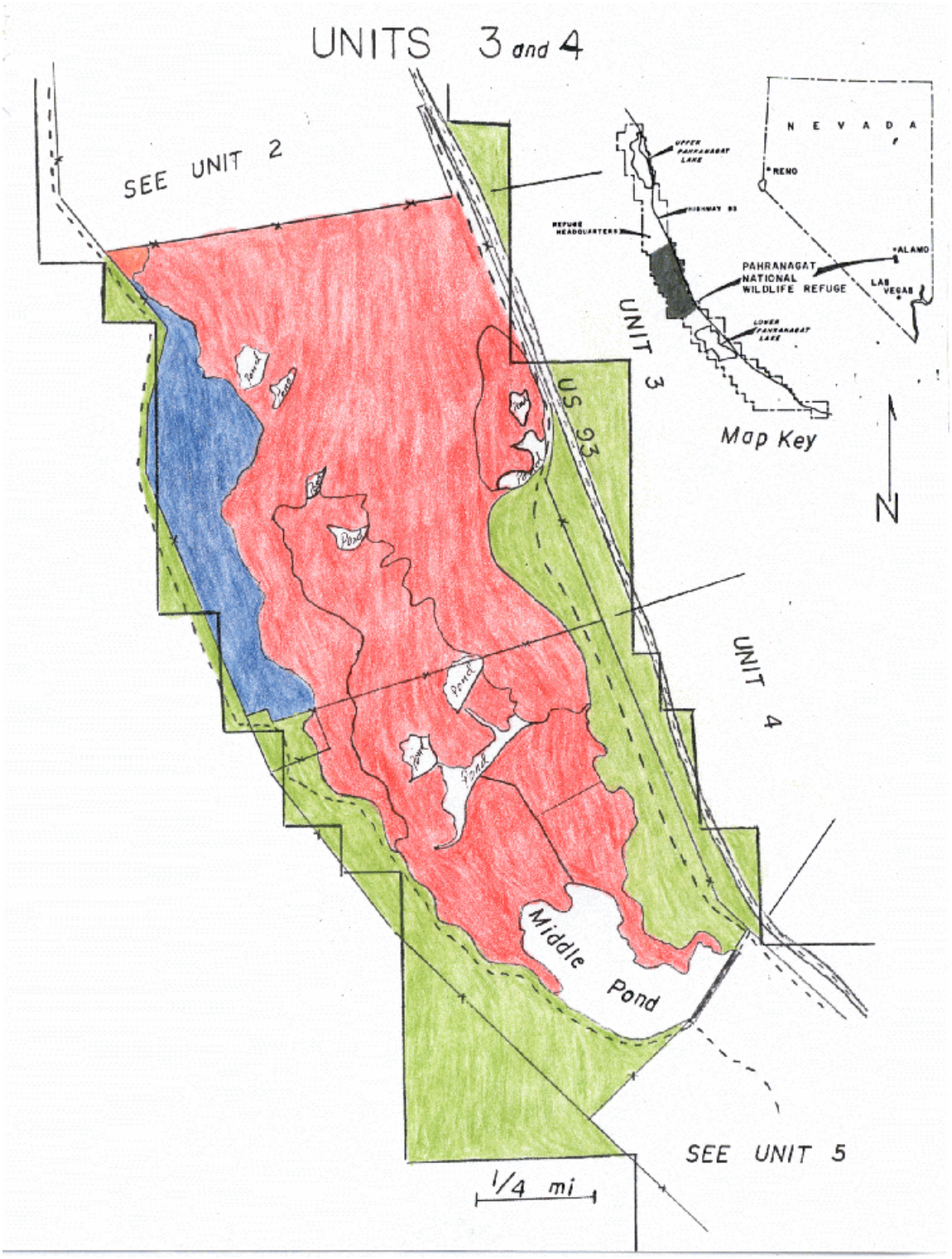


Figure 4: Unit 5

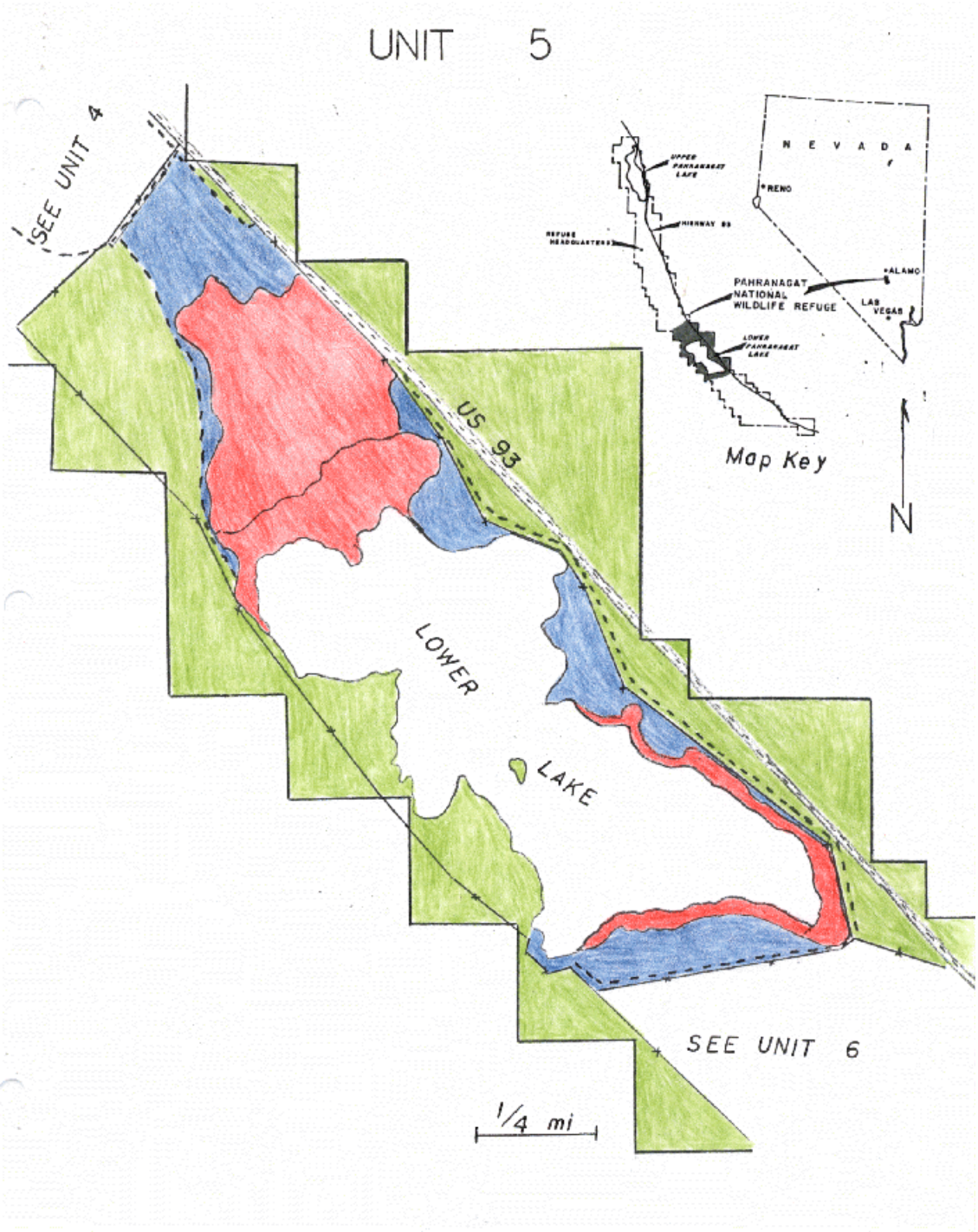


Figure 5: Unit 6

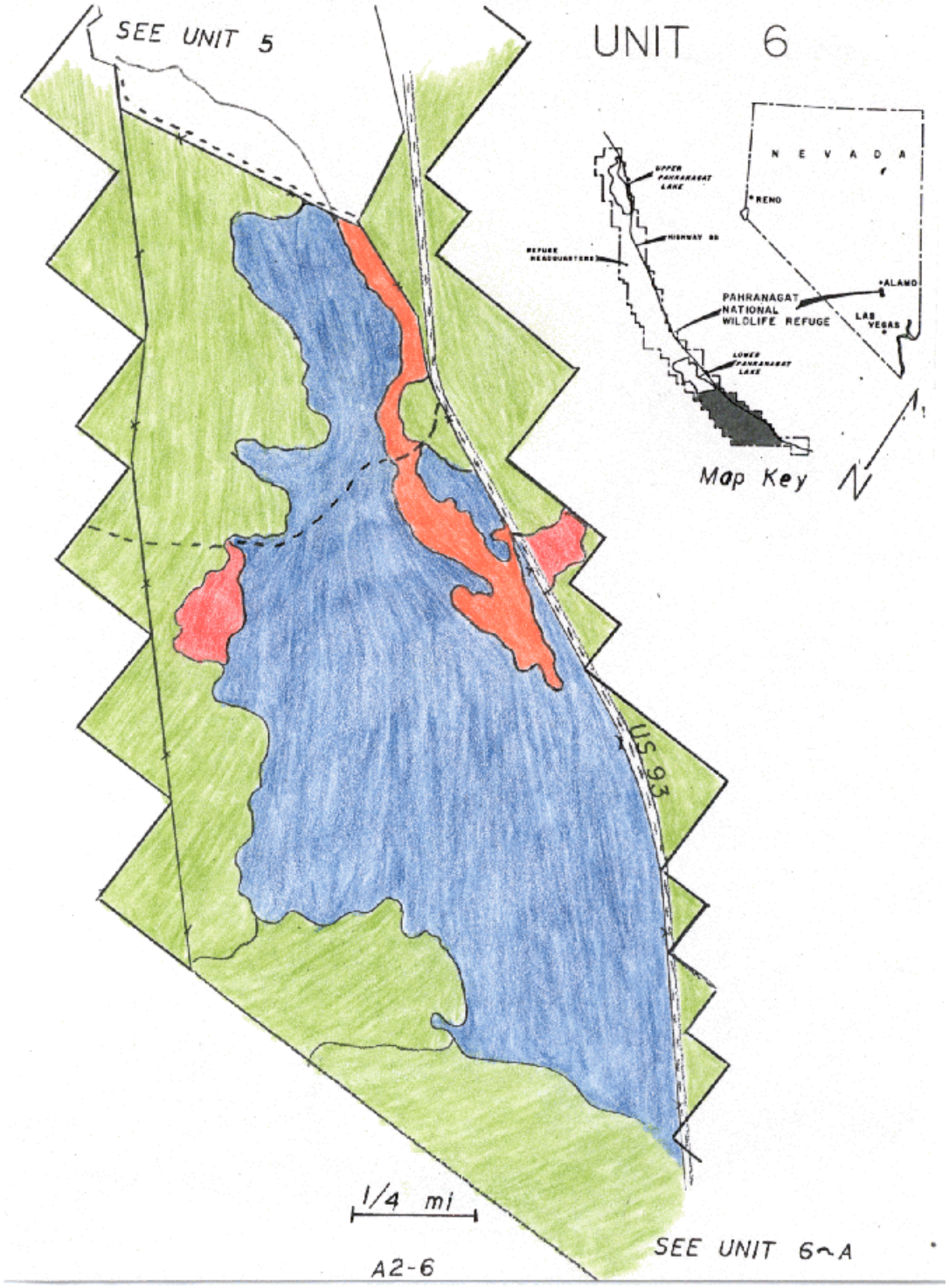
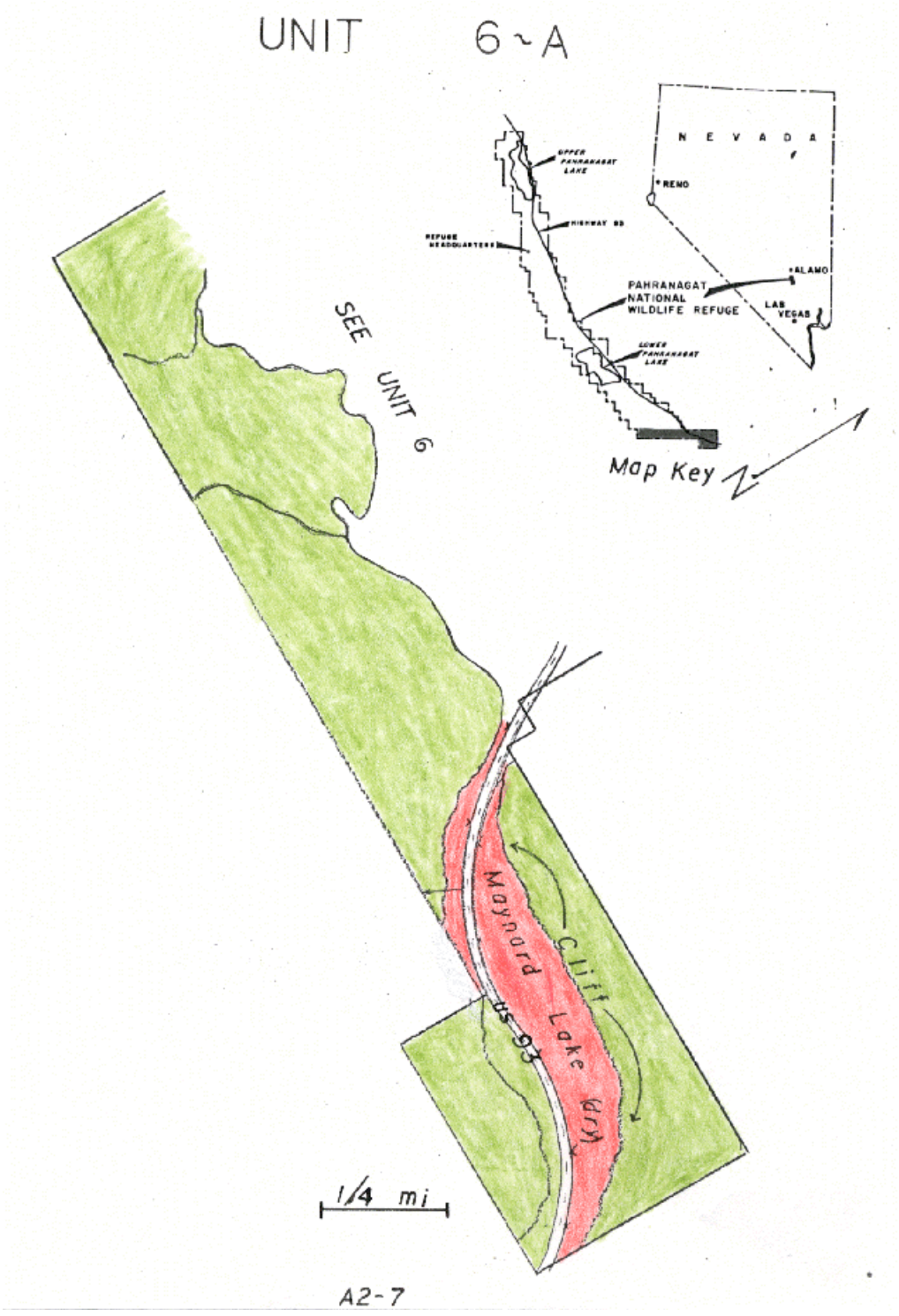


Figure 6: Unit 6A



WILDLAND FIRE MANAGEMENT SITUATION

HISTORIC ROLE OF FIRE

Pre-settlement fires

The plant communities characteristically have adapted to a very arid climate (7 inches of annual precipitation). When the communities are in good condition, shrubs are the dominant vegetative feature, and prior to Euro-american settlement, fine fuels were limited. Areas with less than about 8 inches of rainfall rarely support enough vegetation to carry a fire. Fire occurrence in areas receiving more than about 8 inches has been influenced by introduced grasses, which makes up about 45 present of the refuges land area. Shrub cover is generally widely spaced with large amounts of bare ground between individuals. Most species in this plant community are either somewhat fire-resistant or are vigorous re-sprouters after disturbance. Pre-settlement fire in such a community was likely a rare event, dependant upon extreme conditions of weather and prolonged periods of drought.

Due to expanses of standing water and lack of naturally occurring ignitions, historic natural fire in the Pahranagat NWR wetlands likely was also a rare event. It is quite feasible, however, that Native Americans regularly burned portions of the wetlands to enhance resource availability and quality.

Post-settlement Fire History

Historical overutilization of the shrub community through cattle and sheep grazing has led to declines in range condition and serious reduction of normally sparse native grass species, while allowing the introduction of exotic annuals. In recent years exotic native annuals have invaded increasingly large areas of the salt-desert community, including portions of the Pahranagat NWR. In particular, cheat grass (*Bromus tectorum*) has become co-dominant in some areas. This invasion can dramatically alter fire return intervals in this ecosystem, from a rare event to one often less than 10 years. When fire is applied to the desert-shrub community with few or no perennial plants and an exotic annual component present in the understory, the post-fire community will very likely be dominated by annuals.

Fire reports have been filed for each wildland fire occurring on the refuge since 1979.

Table 5. Wildland fire Occurrence, 1979-1998

YEAR & MONTH	IGNITION CAUSE	ACRES BURNED	LOCATION	CONTROLLED BY
1979/?	arson ?	30	Maynard	unknown
1980/?	lightning	2	Cottonwood	unknown
1982/?	arson ?	5	Maynard	unknown
1982/?	arson	1,300	Middle Pond	unknown
1984/June	unknown	1	Deadhorse	BLM
1986/?	unknown	2	Lower Lake	unknown
1988/?	field burn esc.	3	Lone Tree	BLM
1989/May	unknown	3	Maynard	BLM
1992/Dec	unknown	.5	Entryway	FWS
1994/July	power line	.3	unknown	non-FWS
1994/June	power line	.5	unknown	unknown
1995/Dec	unknown	.2	Roadside	unknown
1996/April	unknown	100	South end	BLM
1998/Oct	lightning	.1	Black Canyon	FWS
1999/May	vehicle	50	South end	BLM
2000/April	pahranagat	.2	unknown	unknown
2000/Aug.	Trash	.1	Camping area	FWS

Average number of fires per year 1979-1998: .7

Prescribed Fire History

Table 6. Prescribed Fire History

DATE	ACRES	HABITAT TYPE
1985 Nov	50	unknown
1985 Feb	520	wetland
1985 Jan	117	unknown
1986 Nov	80	wetland
1986 Nov	30	cropland
1987 March	150	wetland
1987 Jan	85	wetland
1988 Feb	310	wetland
1989 May	94	wetland
1989 March	46	cropland
1993 Oct	140	wetland
1996 Nov	600	wetland

RESPONSIBILITIES

Pahranagat NWR is one of four refuges in the southern Nevada area. Administrative functions for the four refuges (Complex) are handled by the Desert Refuge Complex office located in Las Vegas. Staff and equipment are often shared between the four refuges in the Complex. The Project leader supervises the four refuge managers in the field.

Pahranagat NWR is remote and has a small staff. All trained and qualified employees will participate to the level of their training and qualifications in fire management activities. Initial attack will be carried out in accordance with Service Policy. Wildland fires will be suppressed by local cooperators through a cooperative agreement. Specific responsibilities of Refuge staff and Zone fire Management staff are outlined below.

Project Leader

- Responsible for the overall management of the Complex, including the fire program at Pahranagat NWR.
- ensure that Department, Service, and Refuge policies are followed and maintained.
- May Serve as prescribed fire burn boss, as available and qualified.
- Approves prescribed fire plans.

Deputy Project Leader

- Supervise the resource management activities on the Complex including the selection of objectives and tools to be used in achieving objectives (including prescribed fire).
- During the absence of the Project leader, may be delegated the responsibility for managing the

wildland and prescribed fire programs
- Coordinates with Zone FMO to prepare annual FIREBASE budget request, approves and tracks use of FIREBASE accounts.

Refuge Manager
- Supervise the resource management activities on the Refuge including the use of prescribed fire.
- Implements the Refuge Fire Management Plan.
- Supervises maintenance and biological staff.
- Assists with the writing of prescribed burn plans.

Fire Management Officer
- Responsible for planning, coordinating, and directing preparedness activities including:
    - Fire training.
    - Physical fitness testing and Interagency Fire Qualification System (IFQS) data entry.
- Fire cache and equipment inventory accountability, maintenance, and operation.
- Cooperation with cooperative agencies. Revises cooperative agreements as necessary.
- Ensures fire management policies are observed.
- Has lead responsibility for managing the prescribed fire program including:
    - Assign (or serve as) a qualified prescribed fire burn boss.
    - Write prescribed fire plans.
    - Maintains liaison with Regional Fire Management Coordinator and Zone Fire Management Officer.
    - Updates the Fire Management Plan, maintains fire records, inputs fire reports (DI-1202), and updates for accuracy.

Seasonal and Collateral Duty Firefighters
- Maintain assigned fire equipment in ready state and use required PPE.
- Responsible for their personal protective equipment and physical conditioning.
- Qualify annually with the work capacity test.

Incident Commander
- The Incident Commander (IC) will be responsible for the safe and efficient suppression of the assigned fire.
- Ensure that personnel are qualified for the job they are performing.
- Ensure that fire behavior is monitored, data collected and recorded.
- Identify and protect sensitive areas.
- Utilize minimum impact strategies whenever possible.
- Ensure that rehabilitation needs have been considered. is fully
- Submit information for DI-1202 wildland fire report, crew time sheets, and a listing of any other fire related expenditures or losses to Project Leader within 10 days of fire being declared out.

Prescribed Burn Boss
- Implement approved prescribed burn plans within prescriptions.
- Assist with the administration, monitoring, and evaluation of prescribed burns.
- Document weather and fire behavior (including rates of spread and flame length) and submit to

Deputy Project Leader.
- Document necessary information to complete DI-1202 (fire report) and submit to the Project Leader within 30 days of the fire being declared out.

Employees participating in any wildland fire activities on Fish and Wildlife Service or cooperator's lands will meet fitness requirements established in PMS 310-1, except where Service-specific fitness requirements apply. Exceptions to fitness requirements on Initial attack activity are available from the Regional Fire Management Coordinator per guidelines in Chapter 1.5 of the Fire Management Handbook (USFWS 2000).

Position needs of the Fire Management program for both preparedness and prescribed fire at Pahranagat NWR are found in Table 5. Due to the low frequency of wildland fires (15 in the last 15 years), small staff size, and physical fitness and training requirements; wildland fires on the Refuge will be suppressed primarily by local BLM resources through an operating plan and secondarily by local cooperators through a cooperative agreement. The Zone Fire Management staff headquartered at Sheldon Hart Mountain Refuge Complex will assist the Refuge with preparedness planning and all prescribed fire planning and operations. Currently, no Pahranagat NWR employees are qualified for suppression or prescribed fire operations.

Table 7. Fire Management Needs

Position	**Minimum # Required**
Suppression Resources from local cooperator via agreement	determined by local cooperator
Prescribed Fire Burn Boss Type 2 (RXB2)	provided by the Zone fire staff for RX
Engine Boss (ENGB) for RX operations	provided by the Zone fire staff for RX
RX Resources from local BLM	negotiated as needed: engines, firefighters
Fire Fighter Type 2 (FFT2) for RX operations	(1) RX fire only
Prescribed Fire Burn Boss Type 3 (RXB3)	(1) refuge burn boss, provided by Desert Complex

INTERAGENCY OPERATIONS

Pahranagat will use the Incident Command System (ICS) as a guide for fireline organization. Qualifications for individuals is per DOI Wildland Fire Qualifications and Certification System, part of NIIMS and the National Wildland Fire Coordination Group (NWCG) Prescribed Fire Qualification Guide. Depending on fire complexity, some positions may be filled by the same person.

Pahranagat NWR is surrounded by federal lands owned and/or managed by the Bureau of Land Management, and private land. The BLM Ely District (Caliente Field Station) adjoins the Refuge and has primary fire management responsibility on their lands. In addition, the town of Alamo (4 miles north) has fire management responsibilities for the area. When ever possible the Refuge will support fire operations with a Resource Advisor although the cooperators have received direction on suppression tactics prior to initial attack activities.

The Ely District BLM (Caliente Field Office) will be the primary suppression resource dispatched to wildland fires on the Refuge. An operating plan will be developed with the Ely BLM. The closest suppression resources are located at the BLM guard station in Caliente, NV (60 miles north). Additional

BLM fire resources are available from the Las Vegas BLM, 90 miles south. The Refuge is located within Lincoln County, near the town of Alamo. The Alamo Volunteer Fire Department will respond to structural fires and wildland fires on the Refuge. The Refuge will develop a cooperative agreement with Alamo in order to clearly identify suppression objectives and limitations.

PROTECTION OF SENSITIVE RESOURCES
Sensitive resources will be protected using the following strategies:

- The use of aerial retardant will be allowed only in non-riparian areas.
- Hazard reduction prescribed fires may only be used in fire adapted communities that have not had significant fire for more than twice the normal fire frequency for that community type.
- Utilization of heavy equipment will be allowed only with the approval of the Refuge Manager or assigned Resource Advisor.
- Wildland fire use for resource benefit will not be utilized.

The use of earth moving equipment poses a threat to cultural resources found below the ground surface. The use of earth moving equipment for suppression activities within the Refuge must be approved by the Refuge Manager or Resource Advisor on a fire-by-fire basis, and the possible presence of cultural resources will be considered in the approval process. Whenever possible, efforts will be made to contact the Regional Archaeologist to discuss the consequences of the use of earth moving equipment prior to the deployment of the equipment on the fire. Resource advisors will be utilized whenever possible to assist is fire suppressions efforts on the refuge.

All suppression tactics will be reevaluated and modified when appropriate for the protection of life and property.

Cultural Resources
Planning for prescribed burns will include a review of known sites that may be impacted. An index of known sites is maintained by the Regional Archeologist in Portland, OR. Known sites or newly discovered sites will be protected from negative impacts. Prescribed burns in the Marsh and Wet Meadow/Grassland prescribed burn units are the most likely to contain sites due to less modern day disturbance. The Cropland Units have been heavily disturbed during modern times through cultivation, plowing, excavation, etc. Soil disturbance associated with control lines will not be permitted until the area is cleared by an FWS approved cultural resources technician.

The Regional Archaeologist and/or his/her staff will work with fire staff, project leaders, and incident commanders to ensure that cultural resources are protected from fire and fire management activities. The "Request For Cultural Resource Compliance" form (RCRC, Appendix J) will be used to inform the Regional Archaeologist of impending activities, thereby meeting the regulations and directions governing the protection of cultural resources as outlined in Departmental Manual Part 519, National Historic Preservation Act (NHPA) of 1966, Code of Federal Regulations (36CFR800), the Archaeological Resources Protection Act of 1979, as amended, and the Archaeological and Historic Preservation Act of 1974. The NHPA Section 106 clearance will be followed for any fire management activity that may affect historic properties (cultural resources eligible to the National Register of Historic Places).

Impacts to archaeological resources by fire resources vary. The four basic sources of damage are (1) fire intensity, (2) duration of heat, (3) heat penetration into soil, and (4) suppression actions. Of the four, the most significant threat is from equipment during line construction for prescribed fires or wildfire holding actions (Anderson 1983).

The following actions will be taken to protect archaeological and cultural resources:

Wildland Fires

- Minimum impact fire suppression tactics will be used to the fullest extent possible.
- Resource Advisors will inform Fire Suppression personnel of any areas with cultural resources. The Resource advisor should contact the Regional Archaeologist and/or his/her staff for more detailed information.
- Foam use should be minimized in areas known to harbor surface artifacts.
- Mechanized equipment should not be used in areas of known cultural significance.
- The location of any sites discovered as the result of fire management activities will be reported to the Regional Archaeologist.
- Rehabilitation plans will address cultural resources impacts and will be submitted to the Regional Archaeologist using the RCRC.

Prescribed Fires

- The Refuge Fire staff will submit a completed RCRC to the Regional Archaeologist and/or his/her staff as soon as the burn area is identified (i.e., as soon as feasible).
- Upon receipt of the RCRC, the Regional Archaeologist and/or his/her staff will be responsible for consulting with the FMO and evaluating the potential for adverse impacts to cultural resources.
- When necessary, the Regional Archaeologist and/or his/her staff will coordinate with the State Historic Preservation Officer (SHPO). The SHPO has 30 days to respond. The Refuge will consider all SHPO recommendations.
- Mechanized equipment should not be used in areas of know cultural significance.
- The location of any sites discovered as the result of fire management activities will be reported to the Regional Archaeologist.

Endangered, Threatened, and Species of Concern

Section 7 Consultation was conducted with the Las Vegas Office of Ecological Services during this FMP (Appendix I). Emergency consultation may be necessary if a wildland fire may affect threatened and endangered species or critical habitat.

Unknown numbers of American peregrine falcons are known to use the Refuge Fire will not be introduced into any suitable nesting habitat areas. Size of acreage to be burned yearly in cropland and wetlands restoration on the Refuge will be incidental to the total available hunting habitat acreage.

Small numbers of bald eagles use the Refuge Protecting these mature cottonwoods from fire is essential to providing suitable bald eagle roosting habitat. Prescribed fire will have little effect upon this species. Prescribed fire will be kept to grasslands and marsh areas and should enhance foraging habitat. Any wildland fire in or threatening habitats suitable for Eagle roosting, especially the riparian forest type, will be vigorously suppressed.

The Pahranagat Valley montane vole is endemic to the Pahranagat Valley. Protection of identified areas of habitat will be a priority during wildland fire suppression actions and during prescribed fire planning. Prescribed fire may be beneficial in maintaining vigorous meadow habitat.

Swainson's Hawk (Buteo swainsoni), Ferruginous Hawk (Buteo regalis), (Acipiter gentilis) prefer open foraging habitat. Fire in this habitat should have little or no direct effect upon these species as adults can easily escape fire. Periodic fires would keep foraging habitat open for their continued use. Prescribed fire should be used to create mosiac burn patterns rather than large uniform habitat types. These species do, however, utilize trees and thickets along riparian areas for roosting and nesting. Fire could have a detrimental effect upon this area. No prescribed fire will be introduced into this ecosystem without evaluation of potential impacts and all wildland fires there will be vigorously suppressed.

Short-eared owls occupy a variety of open habitats to include; marshes, wet meadows, grasslands, and shrublands. Most adult birds escape fire. Fire in early spring, before fledging occurs, may kill some juveniles. Fire destroys some nests, but because many grass fires burn in a patchy pattern, some are skipped. Fire can maintain or expand habitat by maintaining open grasslands and marshlands. Burn timing and creating mosaic is important.

Burrowing owls (Speotyto cunicularia) occur in the open, dry shrub/grassland. Except for late March through early May, when nesting and brood rearing occurs, fire poses little threat to this species, and may in fact benefit them by maintaining their preferred habitat.

The White Faced Ibis (Pleyadis chihi), inhabit freshwater marshes and riparian zones. Fire of any type should be avoided during their nesting season (spring). Prescribed fire can be effective in favorably manipulating their habitat. Fire removes excessive accumulations of hydrophytes, permitting better water fowl access and growth of desirable aquatic food plants. Mosaic burn patterns are preferred over landscape level burns to maintain acceptable levels of cover. Wildland fire should pose little threat to these species except during their nesting and brooding season, as adults can fly from danger.

The Yellow Warbler (Dendroica petechia) breeds and lives in wet deciduous thickets of early sucessional habitats, and shrubby thickets of the riparian forest. Fire should be kept out of this particular habitat in the spring. Prescribed fire, especially winter burns, can be used successfully to improve habitat for this species by creating small openings and extensive edge effect along riparian zones. Wildland fires should be vigorously suppressed in this habitat type.
The Southwestern Willow Flycatcher utilize a stand of large cottonwoods and willows at the north end of the Refuge for nesting. Protection from wildland fire of this habitat island is a high priority. Prescribed fire may be a useful tool in maintaining or improving openings and edge.

A number of bats, including Long-eared Myotis (Myotis evotis), Fringed Myotis (Myotis thysanodes), Long-legged Myotis (Myotis volans), Yuma Myotis (Myotis yumanensis), Pale Townsend's Big-eared Bat (Plecotus townsendii pallescens), and Pacific Townsend's Big-eared Bat (Plecotus townsendii townsendii), are observed on the Pahranagat NWR. Fire should not directly harm any of these species except in instances when nesting sites are directly threatened by fire. All fire should be kept from potential nesting areas (snags). Prescribed fire used to improve or maintain the health of riparian areas will contribute to healthy populations of bats.

WILDLAND FIRE ACTIVITIES

Fire program management describes the operational procedures necessary to implement fire management at Pahranagat NWR. Program management includes: fire prevention, preparedness, emergency preparedness, fire behavior predictions, step-up staffing plan, fire detection, fire suppression, minimum impact suppression, minimum impact rehabilitation, and documentation.

All fires not classified as prescribed fires are wildland fires and will be appropriately suppressed. The BLM will have the responsibility to suppress all wildland fires on FWS land. The Las Vegas Interagency Coordination Center (LVICC) will notify refuge personnel of reported wildland fires.

Records show that fire season is typically from mid-April until mid-October. This is primarily based on fire occurrence. Other methods for predicating fire occurrence and fire severity include weather analysis and identifying trigger points of the burning index.

FIRE MANAGEMENT STRATEGIES

All unplanned wildland fires will be suppressed in a prompt, safe, aggressive, and cost-effective manner to produce fast, efficient action with minimum damage to resources using appropriate management strategies. Specifically, strategies to meet fire management objectives will be:

- The Refuge will utilize appropriate management strategies to suppress all wildland fire including lightning ignitions occurring within the boundaries of the Pahranagat NWR.
- Suppress all wildland fires in a safe and cost effective manner consistent with resources and values at risk.
- Suppression strategies and tactics will be unique to each incident dependent on safety considerations, weather conditions, cost of suppression, fuel conditions, availability of resources and location of the fire in relation to structures and cultural resource sites.
- Minimum impact strategies and tactics will be used whenever possible.
- The use of aerial retardant will be allowed only in non-riparian areas.
- Hazard reduction prescribed fires may only be used in fire adapted communities that have not had significant fire for more than twice the normal fire frequency for that community type.
- Utilization of heavy equipment will be allowed only with the approval of the Refuge Manager or assigned Resource Advisor or if life and/or property is at risk.
- Wildland fire will not be managed primarily to benefit resources.

Although resource impacts of suppression alternatives must always be considered in selecting a fire management strategy, resource benefits will not be the primary consideration. Appropriate suppression action will be taken to ensure firefighter safety, public safety, and protection of the resources.

Critical protection areas, such as the Willow fly catcher habitat at the north end of the refuge, will receive priority consideration in fire control planning efforts. In all cases, the primary concerns of fire suppression personnel shall be the safety, and if needed, all individuals not involved in the suppression effort may be evacuated.

Suppression strategies should be applied so that the equipment and tools used to meet the desired objectives are those that inflict the least impacts upon the natural and cultural resources. Minimum impact suppression strategies will be employed to protect all resources. Natural and artificial barriers will be used as much as possible for containment. When necessary, fire line construction will be conducted in

such a way as to minimize long-term impacts to resources.

Vehicle access to normally closed areas of the refuge will be made using existing fire roads when possible. When off-road travel is determined to be necessary, vehicle access will be allowed with approval of the Refuge Manager or Delegate.

Heavy equipment such as crawlers, tractors, dozers, or graders will not be used within the refuge boundaries unless their use is necessary to prevent a fire from destroying privately-owned and/or government buildings and historic resources. The use of any heavy equipment requires approval from the Refuge Manager or Delegate.

Given the fuel types and historic fire occurrence at Pahranagat there is no indication that fires will ever burn beyond the first operational period precipitating the need to initiate a WFSA . However, if a need is identified, a WFSA will be completed by the Fire Management Officer in conjunction with the Project Leader.

Sites impacted by fire suppression activities or by the fire will be rehabilitated as necessary, based on an approved course of action for each incident.

PREPAREDNESS

Preparedness is the work accomplished prior to fire occurrence to ensure that the appropriate response, as directed by the Fire Management Plan, can be carried out. Preparedness activities include: budget planning, equipment acquisition, equipment maintenance, dispatch (Initial attack, extended, and expanded), equipment inventory, personnel qualifications, and training. The preparedness objective is to have a well trained and equipped fire management organization to manage all fire situations within the monument. Preparedness efforts are to be accomplished in the time frames outside the normal fire season dates.

Table 8: Annual Refuge Fire Management Activities

	MONTH											
ACTIVITY	1	2	3	4	5	6	7	8	9	10	11	12
Update Interagency Fire Agreements/AOP's			x									
Annual Refresher Training			x	x								
Annual Fitness Testing				x	x							
Prescribed Fire Plan Preparation		x									x	
Review and Update Fire Management Plan	x	x										
Prepare Pre-season Risk Analysis			x	x								

Activities should be completed prior to the end of the month that is indicated. These activities will be conducted by the Fire Management Staff.

Prescribed fire activities will not be conducted when the National Preparedness is at Levels IV or V, without approval of the Great Basin Wildfire Coordinating Group and Regional Fire Management Coordinator.

Historical weather analysis
There has been no historical weather data collected for the refuge. Future plans for more effective fuels management of the refuge include the pre- positioning of a portable RAWS station for pre-burn preparation.

Records show that fire season is typically from mid-April until mid-October. This is primarily based on fire occurrence. Other methods for predicating fire occurrence and fire severity include weather analysis and identifying trigger points of the burning index. This information is generated through LVICC and disseminated during fire season through daily fire weather forecasts.

Due to the low frequency of wildland fires, a wildland fire season is not evident. Fuels are generally cured during the months of July through March. Wildland fires may occur during any of these months. Green up is usually in April through June, during which time fuels are not available to sustain fire spread. Most wildland fires in the area are associated with traffic along Highway 93, and escaped agricultural burning.

Fire Prevention
An active fire prevention program will be conducted in conjunction with other agencies to protect human life and property, and prevent damage to cultural resources or physical facilities.

Human caused and natural ignitions burning without a prescription are likely to result in unwanted damage to cultural and/or natural resources. In order to prevent wildland fire, an educational program will be utilized to reduce the threat of human caused fires. Ongoing monitoring will be conducted by refuge staff, visitors, and cooperators to detect fire ignitions. Actions taken to implement this include:

1. All staff members should be familiar with this plan. New employees and volunteers will be given an orientation session which includes discussion of fire prevention and detection.
2. Fire prevention will be discussed at safety meetings, prior to the fire season, and during periods of high fire danger. Periodic training of staff in regards to fire prevention will be conducted.
3. During periods of high fire danger, warnings will be posted at visitor information stations.
4. A thorough investigation will be conducted of all fires suspected to have been illegally set. Upon completion of the investigation, appropriate action will be taken

A review of fire records indicates that during the period of 1979-01 a total of 14 fires were probably human caused. One fire was from an adjacent landowner burning ditches, two fires from downed power lines, three from suspected arson, and six fires from unknown human origin. Records are incomplete but many of the unknown fires were probably from unattended campfires in the campground and vehicle accidents along Highway 93. An analysis has not been completed due to the low number of human caused ignitions. If ignitions significantly increase or begin to occur in new areas, prevention strategies will be reviewed and modified, if necessary. As new visitor facilities are developed or use levels significantly increase, the fire plan will be reviewed and modified if necessary.

Staffing Priority Levels
Currently the only fire staff that exists on the refuge is the Complex Fire Management Officer located in Las Vegas. Non-fire funded personnel will not be on step-up fire coverage during times of high fire danger. Existing agreements between the BLM and FWS are in place for suppression coverage (Appendix C).

BLM, Ely District (Caliente Station) and BLM, Las Vegas District fire resources will be the primary suppression resources during wildland fire incidents. The Refuge may provide Resource Advisors.

Training

Fish and Wildlife Service policy sets training, qualification and fitness requirements for all wildland firefighters and prescribed fire positions. All personnel involved in fire management functions will be provided with the training required to meet Service qualification standards for the position they are expected to perform. Interagency training opportunities will be utilized whenever possible.

The Regional Office will pay for all approved fire training if the following criteria are met:

1. Participant completes and submits to the FMO a National Wildfire Coordinating Group Interagency Training Nomination form (NFES 2131), complete with supervisory approval and an estimated cost of training, travel and per diem prior to the commencement of training.
2. The training is approved by the Regional Fire Management Coordinator.
3. Upon completion of the training, a copy of the Certificate of Completion and a copy of the travel voucher are sent to the Budget Assistant for Refuges and Wildlife in the Regional Office.

All personnel involved in Fire Management activities are required to participate in 8 hours of fire management refresher training annually in order to be qualified for fire management activities in that calendar year. Refresher training will concentrate on local conditions and factors, the Standard Fire Orders, LCES, 18 Situations, and Common Dominators. NWCG courses Standards for Survival, Lessons Learned, Look Up, Look Down, Look Around, and others meet the firefighter safety requirement; but, efforts will be made to vary the training and use all or portions of other NWCG courses to cover the required topics. Fire shelter use and deployment under adverse conditions, if possible, must be included as part of the annual refresher.

All personnel involved in fire management activities will meet the fitness standards established by the Service and Region. At this point in time, firefighters participating in wildland fire suppression must achieve and maintain an Arduous rating. Firefighters participating in Prescribed Burns must achieve and maintain a Moderate rating. A trained and qualified American Red Cross Responder (or equivalent) who can recognize symptoms of physical distress and appropriate first aid procedures must be on site during the test.

Wildland fire fitness tests shall not be administered to anyone who has obvious physical conditions or know heart problems that would place them at risk. All individuals are required to complete a pre-test physical activity readiness questionnaire prior to taking a physical fitness test. They must read and sign the Par-Q health screening questionnaire, an informed consent form. If an employee cannot answer NO to all the questions in the PAR-Q health screening questionnaire, or is over 40 years of age, unaccustomed to vigorous exercise, and testing to achieve a Moderate or Light rating, the test administrator will recommend a physical examination. As noted below, all individuals over 40 years of age must receive an annual physical prior to physical testing.

All individuals involved in arduous fire management activities over the age 40 or newly hired are required to complete an annual physical fitness examination. Standard forms and procedures required by the Service will be used and followed. The cost of examination will be born by the Service ane the results sent to the Region Personnel Department.

Supplies and Equipment
A small fire cache will be maintained by the FMO at Complex headquarters in Las Vegas. At present the complex relies on the BLM fire management division for maintaining fire equipment and supplies for fire suppression operations.

DETECTION
The Refuge relies on neighbors, visitors, cooperators, and staff to detect and report fires. All fires occurring within the Refuge will be reported to the BLM Caliente Field Office Dispatch. The person receiving the report will be responsible for implementing the Fire Dispatch Plan (Appendix E.).

The Zone Fire Staff at Sheldon Hart Mountain Complex will be able to assist with managing an extended attack incident.

The Fire Management Plan does not discriminate between human-caused and lightning caused fire. All wildland fires will be suppressed. However, detection shall include a determination of fire cause. Moreover, human-caused fires will require an investigation and report by qualified law enforcement personnel. For serious human-caused fires, including those involving loss of life, a qualified arson investigator will be requested.

COMMUNICATIONS
For lists/names of people to contact see Appendix E, Fire dispatch plan.

DESERT NATIONAL WILDLIFE REFUGE COMPLEX HEADQUARTERS
Primary Repeater/Channel: LV LOC, CH 1
Alternate Repeater/Channel: HAYFORD, CH 5 to reach Desert or Pahranagat if CH 1 isn't working; use CHARLESTON, CH 11 to reach Ash Meadows if CH 1 isn't working.

Dick Birger, Project Leader: 6000
Paul Bannister, Fire Management Officer: 6001
Callie Le'au Courtright, Outdoor Recreation Planner: 6002
Joanne Hammaren, Admin. Support Assistant: 6003

DESERT NATIONAL WILDLIFE RANGE/CORN CREEK
Primary Repeater/Channel: LV LOC, CH 1
Alternate Repeater/Channel: HAYFORD, CH 5
NOTE: Use CHARLESTON, CH 11 to reach Ash Meadows
Amy Sprunger-Allworth, Refuge Manager: 6100
Bruce Zeller, Biologist: 6101

ASH MEADOWS NATIONAL WILDLIFE REFUGE
Primary Repeater/Channel: CHARLESTON, CH 11
Alternate Repeater/Channel: LV LOC, CH 1
David St. George, Biologist: 6200
Lee Talbot, Maintenance Worker: 6201

PAHRANAGAT NATIONAL WILDLIFE REFUGE
Primary Repeater/Channel: HAYFORD, CH 5
Alternate Repeater/Channel: VIRGIN, CH 4
In case of emergency, use CALIENTE, CH 9 if CH 4 and CH 5 aren't working

Jim Docktor, Maintenance Worker: 6300

LAW ENFORCEMENT
NOTE: Follow above guidelines for repeater/channels depending on location.
Linda L. Miller, Deputy Project Leader: 6400
Eric Hopson, Refuge Manager: 6401
Larry Ulibarri, Refuge Manager: 6402
Henry Ebinger, Maintenance Worker: 6403

(Law Enforcement may only status with Lake Mead)

Note: Your 4 digit code is very important when using the radio. It avoids using names for safety reasons and avoids confusion between people with the same last name. The first number (#6) tells dispatch and other personnel that it is a FWS employee. The second number designates duty station or LE and the last two numbers identify who you are.

Pre-Attack Plan
Upon discovery of a fire, all subsequent actions will be based on the following:

1. The Incident Commander (IC) will locate, size-up, and coordinate suppression actions.
2. Provide for public safety.
3. Considering the current and predicted fire conditions, the Incident Commander will assess the need for additional suppression resources and estimate the final size of the fire. The potential for spread outside of the refuge should be predicted, as well as the total suppression force required to initiate effective containment action at the beginning of each burning period.
4. The Incident Commander will assess the need for law enforcement personnel for traffic control, investigations, evacuations, etc. and make the request to the FMO.
5. Document decisions and complete the fire report (DI-1202).
6. Should a wildland fire move into an extended attack a Delegation of Authority will be invoked. Once a Delegation of Authority has been authorized the Incident Commander will make the final decisions pertaining to the fire. A copy of Delegation of Authority is in Appendix M.

FIRE MANAGEMENT UNITS
Fire Management Units (FMUs) are areas on a refuge which have common wildland fire management objectives and strategies, are manageable units from a wildland fire standpoint, and can be based on natural or manmade fuel breaks. All of Pahranagat NWR will be considered as one FMU for wildland fire suppression. The Refuge will be divided into five Prescribed Fire Units (see Prescribed Fire Activities).

Due to staff limitations, relatively small land management parcels, long response times, valuable resources, and values at risk on neighboring lands, this plan does not recommend wildland fire managed for resource benefit as an option. Wildland fires will be suppressed using the appropriate suppression response.

Fire Effects

Effects on Soil
Prescribed burning may directly affect soil by altering soil physical properties, soil chemical properties, nutrient amounts, post-fire soil temperature, microorganism population, and erosion potential. Prescribed

burning affects soil physical characteristics and processes (Blaisdell 1953, Wright and Heinselman 1973, Nimer and Payne 1978, DeBano 1990, Acker 1992). Nature and extent of fire effects on soil are specific to vegetation type, succession state, and fire regime (Kilgore 1981, Parsons and DeBenedetti 1979, Bunting et al. 1987, DeBano 1990).

Vegetation type and succession stage influence the amount and distribution of nutrient pools in live and dead organic matter and, to a significant extent, fire regime (Parsons and DeBenedetti 1979, Wright and Heinselman 1973, Kilgore 1981, Bunting et al. 1987).

Combustion of organic matter causes immediate, on-site reduction in total nitrogen and carbon through combustion, but increases short-term availability of nutrients to nitrifying bacteria and plants through deposition of nitrogen and phosphorus in ash and consequent leaching into upper profiles of the soil (Wright and Heinselman 1973, Nimer and Payne 1978, DeBano 1990, Acker 1992). Within vegetation type, the greater the severity of a fire, the greater the reduction of carbon and primary plant nutrients through combustion (DeBano 1990, Kilgore 1981).

Soil surfaces blackened by fire and charred organic matter increase soil surface temperature and therefore stimulate earlier plant growth over the short-term (Nimer and Payne 1978). Short-term decline in infiltration after fire is followed by a long-term increase in infiltration associated with change in ground cover and vegetation structure (e.g., shrub to grass dominated) (Tiedemann et al. 1990, Sturges 1993). Similarly, short-term increase in wind and water erosion potential after fire are followed by long-term decline in wind and water erosion associated with vegetation succession, enhanced vegetation vigor, increased vegetal cover, and increased ecological condition (Blaisdell 1953, Tiedemann et al. 1990, Sturges 1993).

Potential for cheatgrass invasion after burning is determined by the interaction of the soil disturbance (i.e., consumption of organic matter, change in levels of micronutrients), occurrence and amount of cheatgrass seed in the post-burn seed pool, and cover and density of perennial bunchgrasses (Hedrick et al. 1966, Young and Evans 1974, Evans et al. 1978). Burned sites without a seed source of cheatgrass will maintain dominance of native herbaceous species, notwithstanding variation in burn severity and site ecological condition (Bunting et al. 1987, Refuge files).
Sites with a source of cheatgrass seed react differently than sites devoid of the species (Young and Evans 1973, Bunting et al. 1987). On aridisol sites occupied by big sagebrush, pre-burn ecological condition and amount of cheatgrass in the seed pool are principal determinants of the post-burn composition of cheatgrass, burn severity notwithstanding (Young and Evans 1973, Young et al. 1976). For example, probability of increased cheatgrass cover rises with increased amounts of cheatgrass seed in the post-burn seed pool (Young and Evans 1973, Young et al. 1976). However, potential for cheatgrass increase is diminished on aridisol sites rated in high to very high ecological condition as perennial bunchgrasses survive in sufficient densities to out-compete cheatgrass (Young et al. 1976, Bunting et al. 1987). On mollisol sites dominated by basin big sagebrush and mountain big sagebrush, severe burns can lower ecological condition and reduce bunchgrass densities, which results in increased composition of cheatgrass in the post-burn community (Sapsis 1990). Reseeding such sites with perennial grasses the year after burning may be appropriate if the site had low cover of perennial grasses before burning and after burning (<10%) (Evans et al. 1978, Bunting et al. 1987).

Adverse effects of prescribed burning on soil can be lessened by development of a burn prescription specific to the type of soil and vegetation, and evaluation of the relationship between burn parameters and habitat response after burning (Bunting et al. 1987). Prescription factors that will influence soil response to fire include: (1) ignition technique, (2) fuel, organic layer, and soil moisture at time of burning, (3)

thickness and packing of litter layers, (4) depth and duration of heat penetration into organic and soil layers, (5) soil type, and (6) soil texture (Bunting et al. 1987, USDI-BLM 1991:3-37).

Effects on Shrubs
Knowledge of shrub response to fire is essential for understanding the dynamics of vegetation types, which is the focus of Refuge and fire management goals and objectives (USFWS 1994). The goal of maintenance and restoration of native plant communities seeks to strike a balance between (1) the amount of shrubs and herbaceous species within late successional vegetation types and (2) relative proportions of different succession stages dominated by shrubs, herbs, or mixtures of both within and among vegetation types (Thomas et al. 1976b, Winward 1991, USFWS 1994). Because shrubs can dominate community interactions of uplands (Laycock 1991), fire management objectives usually specify reduction of shrub cover as a principal prescription objective (Bunting et al. 1987). For example, substantial reduction of sagebrush biomass, cover, and density on sagebrush-dominated sites induces successional response by herbaceous species (Wright et al. 1979, Bunting et al. 1987).

A diversity of shrub species occur on the Refuge. Species include those which potentially dominate biomass and cover on a site, and, consequentially, biomes and vegetation types are named for their cover and aspect dominance during late successional stages (e.g., mountain big sagebrush within the shrub-grassland biome) (Winward 1980, Blaisdell and Holmgren 1984, USFWS 1994). Other species assume sub-dominant status in terms of biomass, cover, and density within plant communities (Blaisdell et al. 1982, Young 1983, Blaisdell and Holmgren 1984). These species function as a component of biodiversity and wildlife habitat, however, they do not assume the same importance in regulation of community interactions and succession dynamics (Young 1983). Knowledge of species response is sufficient to generalize response patterns for the majority of shrub species which occur on the Refuge.

Fuel Types and Fire Behavior
Fire behavior is dependent on many factors. Some of the most important influences are relative humidity, air temperature, fuel type, fuel moisture, wind speed, slope, aspect, time of day, and season. On site predictions of estimated fire behavior can be made with the above inputs through the use of nomograms and models developed for this purpose. The various prediction systems provide outputs of rate of spread, fireline intensity, heat per unit area, and flame length.

The following are brief descriptions of each fuel type.

- Fuel Model 1 Grass - describes areas dominated by short grass, such as saltgrass. Rate of spread of 78 chains/hour with flame lengths of 4 feet are possible under moderate conditions. This fuel model occurs on Refuge wet meadows and grasslands.
- Fuel Model 3 Grass - describes areas dominated by grass or grasslike vegetation averaging 3 feet in height. This would include cured stands of cattail and hard-stem bullrush. Rate of spread of 104 chains/hour with flame lengths of 12 feet are possible under moderate conditions. This fuel model occurs around developed wetlands and naturally occurring wetlands.
- Fuel Model 6 Shrub - describes areas where the shrub layer carries the fire at windspeeds greater than 8 mile/hour. Fire drops to the surface layer at lower windspeeds or openings in the stand. This fuel model occurs in extensive upland areas containing greasewood, and several other species of desert shrub. Little if any fine dead fuels may be present, and the shrub layer will only carry a fire under moderate to severe windspeeds. The desert shrub plant community on the Refuge has a patchy, sparse fuel characteristic. Fire will only spread under the most extreme conditions (wind speeds 20 mph or higher). Fires generally stop when they reach the desert shrub

zone.

At the present time the Refuge does not have a weather station, therefore the necessary data has not been collected to accurately determine a fire weather history. Until such time as the refuge purchases and installs a weather station and catalogues site specific data in WIMS, a BLM weather station at a representative site will be used to determine potential fire behavior and trends necessary to properly manage the fire suppression program.

SUPPRESSION TACTICS

Wildland fires will be suppressed in a prompt, safe, aggressive, and cost-effective manner to produce fast, efficient action with minimum damage to resources. All wildland fires will be suppressed commensurate with the values at risk.

Suppression tactics and strategies for structure protection are located in Appendix O.

Engines are the primary initial attack resource on the Refuge because of the predominance of fine fuels and access roads. Earth moving equipment is available, however it will only be used after approval of the Refuge Manager or Resource Advisor.

Personnel and equipment must be efficiently organized to suppress fire effectively and safely. To this end, the FMO assumes the command function on major or multiple fire situations, setting priorities for the use of available resources and establishing a suppression organization.

The following strategies will be applied to the entire Refuge:

- Provide for firefighter safety and safety of refuge visitors, cooperators, and personnel.
- Due to the low frequency of wildland fires, the small size of the Refuge staff and the level of physical fitness and training required to staff wildland fires; wildland fires on the refuge will be suppressed by local cooperators through cooperative agreement.
- Through local cooperators, the Refuge will utilize the appropriate management response to suppress all wildland fire including lightning ignitions occurring within the boundaries of the Refuge.
- Minimize the damage to refuge resources from suppression efforts, particularly sensitive species habitat.
- Prevent fires from burning off of the refuge onto adjacent lands.
- Prevent damage to cultural resources.
- Utilize existing roads and trails, bodies of water, areas of sparse or non-continuous fuels as primary control lines, anchor points, escape routes, and safety zones.
- When appropriate, conduct backfiring operations from existing roads and natural barriers to halt the spread of fire.
- Use burnouts to stabilize and strengthen the primary control lines.
- If the use of heavy equipment is warranted, upon approval of the Refuge Manager, construction of control lines will border existing roads where possible.
- Retardants may be used on upland areas.
- Constructed fireline will be rehabilitated prior to departure from the fire.
- Priority areas for protection are: riparian forest habitat type.

The Incident Commander will choose the appropriate suppression strategy and technique. As a guide: On low intensity fires (generally flame lengths less than 4 feet) the primary suppression strategy will be direct attack with hand crews and engines. If conditions occur that sustain higher intensity fires (those with flame lengths greater than 4 feet) then indirect strategies which utilize back fires or burning out from natural and human-made fire barriers may be utilized. Those barriers should be selected to safely suppress the fire, minimize resource degradation and damage and be cost effective.

Suppression Conditions

Initial Attack

All fires occurring on the Refuge will be supervised by a qualified incident commander (IC). The IC will be responsible for all management aspects of the fire. All resources will report to the IC (either in person or by radio) prior to deploying to the fire and upon arrival to the fire. The IC will be responsible for: (1) providing a size-up of the fire to dispatch as soon as possible; (2) determine the resources needed for the fire; and (3) advising dispatch of resource needs on the fire.

The IC will receive general suppression strategy from the Fire Management Plan, but appropriate tactics used to suppress the fire will be up to the IC to implement. Minimum impact suppression tactics (MIST) will be used whenever possible.

Escaped Fires/Extended Attack

Whenever it appears a fire will escape initial attack efforts, leave Service lands, or when fire complexity exceeds the capabilities of command or operations, the IC will take appropriate, proactive actions to ensure additional resources are ordered. The IC, through dispatch or other means, will notify the Complex FMO of the situation. The Complex FMO will assist the Project Leader to complete a Wildland Fire Situation Analysis (WFSA, Appendix F) and Delegation of Authority (Appendix M).

Limits to Suppression Activities

The use of earth moving equipment for suppression activities (dozers, graders, plows) on the Refuge will not be permitted without the approval of the Resource Advisor (Refuge employee) or Refuge Manager or there is an immediate threat to life and/or property. Cutting snags in the riparian forest habitat type will not be permitted without approval of the Refuge Manager or Resource Advisor.

Wildland Fire Situation Analysis

For fires that cannot be contained in one burning period, a WFSA must be prepared. The Incident Commander, in conjunction with the FMO, will prepare the WFSA. Approval of the WFSA resides with the Project Leader.

The purpose of the WFSA is to allow for a consideration of alternatives by which a fire may be controlled. Damages from the fire, suppression costs, safety, and the probable character of suppression actions are all important considerations.

Public safety will require coordination between all refuge staff and the IC. Notices should be posted to warn visitors, trails may be closed, traffic control will be necessary where smoke crosses roads, etc. Where wildland fires cross roads, the burned area adjacent to the road should be mopped up and dangerous snags felled. Every attempt will be made to utilize natural and constructed barriers, including changing fuel complexes, in the control of wildland fire. Rehabilitation efforts will concentrate on the damages done by suppression activities rather than on the burned area itself. A sample WFSA is located in Appendix F.

Aircraft Operations
Aircraft may be used in all phases of fire management operations. All aircraft must be Office of Aircraft Services (OAS) or Forest Service approved. An OAS Aviation Policy Department Manual will be provided by OAS.

Helicopters may be used for reconnaissance, bucket drops and transportation of personnel and equipment. Natural helispots and parking lots are readily available in most cases. Clearing for new helispots should be avoided where possible. Improved helispots will be rehabilitated following the fire. As in all fire management activities, safety is a primary consideration. Qualified aviation personnel will be assigned to all flight operations.

EMERGENCY STABILIZATION AND REHABILITATION
When suppression action is taken, rehabilitation is appropriate. The most effective rehabilitation measure is prevention of impacts through careful planning and the use of minimum impact suppression techniques.

Rehabilitation will be initiated by the Incident Commander, FMO, or Refuge Manager. Rehabilitation will be directed toward minimizing or eliminating the effects of the suppression effort and reducing the potential hazards caused by the fire. These actions may include:

1. Backfill control lines, scarify, and seed.
2. Install water bars and construct drain dips on control lines to prevent erosion.
3. Install check dams to reduce erosion potential in drainages.
4. Restore natural ground contours.
5. Remove all flagging, equipment and litter.
6. Consider and plan more extensive rehabilitation or revegetation to restore sensitive impacted areas.

If revegetation or seeding is necessary, only native plant species will be used.

If Emergency Stabilization and Rehabilitation (ESR) measures are needed or if rehabilitation is needed to reduce the effects of a wildland fire then the Refuge can request appropriate funding through the burned area ESR fund. The ESR fund is administered through the Service's ESR coordinator at the National Interagency Fire Center.

Fire rehabilitation will be as prompt as possible to prevent erosion and spread of non-native plants. This will be developed by the Refuge staff and submitted to the Regional Fire Management Coordinator for review within 90 days of the unplanned ignition being declared out.

REQUIRED REPORTING
The incident commander (IC) on a wildland fire or the prescribed fire burn boss on a prescribed burn will be responsible for the information needed for a DI-1202 Fire Report as well as Crew Time Reports for all personnel assigned to an incident and return these reports to the Project Leader. The IC or burn boss should include a list of all expenses and/or items lost on the fire and a list of personnel assignments on the DI-1202. The Complex FMO will enter all data into the FMIS computer database within 10 days after the fire is declared out. The Project Leader will inform the timekeeper of all time and premium pay to be charged to the fire and ensure expended supplies are replaced.

FIRE INVESTIGATION

Fire management personnel will attempt to locate and protect the probable point of origin and record pertinent information required to determine fire cause. They will be alert for possible evidence, protect the scene and report findings to the fireline supervisor.

Prompt and efficient investigation of all suspicious fires will be carried out. However, fire management personnel should not question suspects or pursue the fire investigation unless they are currently law enforcement commission qualified.

Personnel and services of other agencies may be utilized to investigate wildland fire arson or fire incidents involving structures. All fire investigations should follow the guidelines outlined in 4.1-2 of the Fire Management Handbook (2000). If fire investigator is required it will be ordered through LVICC.

PRESCRIBED FIRE ACTIVITIES

The approved 1990 Pahranagat NWR Fire Management Plan stated that prescribed fire would be used for the following;

- Remove overgrown and decadent vegetation to improve grazing conditions in irrigated pastures and native meadows.
- Remove weeds and other dense vegetation in croplands to facilitate plowing, disking, and planting.
- To open up and /or remove dense marsh vegetation to renew plant vigor and seed production.

Historical files on prescribed fire activities were maintained on a limited basis. Size, time of year, and habitat type treated was documented (see Table 6). Prescribed fire has been an effective method in managing cropland operations and in maintaining productive marsh vegetation. Fire was less effective in improving grazing conditions in irrigated pastures and native meadows.

Prescribed fire has not been used in the recent past due to changes in Federal, Departmental, and Service policy regarding physical fitness and training. Refuge staffing levels and general workload have not allowed time to meet new policy and standards. Fire program management at Pahranagat NWR is now largely the responsibility of the Complex Fire Management Officer located at the Complex headquarters in Las Vegas, NV. This program has increased to the level where Zone fire management staff (in concert with Refuge support, and BLM assistance) will now be capable of handling Pahranagat NWR prescribed fire program needs. Complex fire staff will plan and conduct all prescribed burns on the Refuge, with assistance from qualified refuge staff and local BLM fire personnel and equipment. The Desert Complex will strive to maintain one Prescribed Burn Boss Type 2 (RXB2) on the staff.

PRESCRIBED BURN PROGRAM OBJECTIVES

Prescribed fire can be a useful tool for restoring and maintaining natural conditions and processes at Pahranagat.

Based on current vegetation management strategies identified for implementation at Pahranagat , it has been affirmed that the use of prescribed fire is an appropriate management tool. Prescribed burning will be used to restore, create, and/or maintain a diversity of plant communities in order to perpetuate native plant and wildlife species. The goals of the prescribed fire program are:

1. Restoration/perpetuation of native grass, forb, and shrub species.
2. Reduction of non-native species (to either injure the plant or prepare it for other control such as mechanical, herbicide, grazing, etc).
3. Periodic reduction of dense cattail and bulrush growth in wetland units.
4. Maintain/rejuvenate nesting cover for waterfowl and other native birds.
5. Maintain water delivery systems and the cropland program. Primarily burning; stubble in preparation of planting, weed control, burning irrigation ditches, and burning debris piles.

Achieving many of the goals will require repeated burn cycles for an indefinite length of time. Burn frequency will vary from every 2 to 10 years dependent on management objectives, historic fire frequency, and funding. As part of the prescribed fire program, a monitoring program will be instituted to verify that objectives are being achieved.

Prescribed fires involve the use of fire as a tool to achieve management objectives. Research burning may also be conducted when determined to be necessary for accomplishment of research project objectives. Actions included in the prescribed burn program include: the selection and prioritization of prescribed burns to be carried out during the year, prescribed burn plans, burn prescriptions, burn operations, documentation and reporting, and burn critiques.

Measures to ensure the successful implementation of the prescribed fire program are addressed through a complexity rating system found in the Firebase program. All burn projects are rated on complexity type under a weighted factor from 1-10, one being the least to demonstrate control problems. The following factors are weighted to estimate complexity: Potential for escape, Values at risk, Fuels/ Fire behavior, Fire duration, Air quality, Ignition method, Management team size, and Treatment objectives.

The refuge reserves the option to utilize an interagency team approach for complex burns carried out on the boundaries and close to developed areas or burns of large acreage. The most highly qualified and experienced personnel in the regional interagency community would be requested to serve on this team.

FIRE MANAGEMENT STRATEGIES

Prescribed fire will be used to reduce hazard fuel accumulation, restore fire to fire-dependent ecological communities, improve wildlife habitat, and to maintain cultural/ historic scenes where appropriate. All prescribed fire activity will comply with applicable Federal, state, and local air quality laws and regulations.

All prescribed fire projects will have a burn plan approved by the Project Leader. Each burn plan will be prepared using a systematic decision-making process, and contain measurable objectives, predetermined prescriptions, and using an approved environmental compliance document. Appropriate NEPA documentation (Appendix I) exists for this Fire Management Plan. Therefore, additional NEPA documentation will be necessary only for prescribed fire projects not meeting the criteria outlined in this Plan.

Prescribed Fire Burn Plans must include components such as a GO/ No-Go Checklist, contingency actions to be taken in the event the prescription is exceeded, and the need for alerting neighbors and appropriate public officials to the timing and the planing of the burn. A burn plan format meeting all required needs is located in Appendix N.

Fire monitoring will be used to evaluate the degree to which burn objectives are accomplished. Monitoring can assist managers in documenting success in achieving overall programmatic objectives and limiting occurrence of undesired effects.

PRESCRIBED FIRE MANAGEMENT UNITS

The Refuge will be divided into three prescribed fire management units as described below (Table 9). The units were created using habitat types under the basic assumption that each habitat presents its own unique fire behavior, objectives, and prescription values. Prescribed fire will be used in three habitat types:

1) Wet Meadow/grassland: Mixture of rushes, sedges, grasses and forbs. Bulrush, cattails, alkali sacaton, wiregrass, and inland saltgrass are common. Willows and wild rose may grow in patches. Saltcedar and knapweed are problem exotics in this habitat type. Small areas of open water are scattered throughout.

2) Marsh: Predominantly hardstem bulrush and cattail. The intent is to manage for mosaics of wetland vegetation. Saltcedar and knapweed are problem exotics in this habitat type.

3) Croplands and Maintenance Burns: Ditches, stubble, weed control, piles of debris. Crops are barely, winter wheat, and milo. Saltcedar and knapweed are problem exotics in this habitat type.

Table 9: Prescribed Fire Management Units

Unit	Total Acreage	Burn per year (projected)
Marsh	420	50 acres
Wet meadow/grassland	510	100 acres
Croplands	180	50 acres

Fire effects information for the dominant plants in the prescribed fire units can be found in Appendix G. Effects are generally well documented and predictable.

Prescribed burns may be conducted within or near Refuge development zones, sensitive resources, and boundary area to reduce the risk from wildland fire damage. To the greatest extent possible, hazard reduction prescribed fires will only be used when they compliment resource management objectives.

PRESCRIBED FIRE PLANNING

Annual Activities

The FMO will be responsible for completing an annual fire summary report. The report will contain the number of fires by type; acres burned by fuel type, cost summary, personnel utilized, and fire effects.

Preparation for prescribed fire operations includes the following:

January	Proposed burn sites submitted to FMO for evaluation.
March-April	Spring burning.
April-June	FMO/ PFS visits burn sites and makes recommendations to Refuge Manager. Pre-burn monitoring completed as scheduled. FMO distributes annual burn schedule to Refuge Staff. Post-burn growing season monitoring implemented.
July	Post-burn monitoring completed as scheduled.
August-September	Late summer burning begins.
October-November	Fall burning.
December-February	Winter burning.
January- December	FMO/AFMO/PFS complete burn plans for the Complex.

Prescribed Fire activities will be reviewed annually. Necessary updates or changes to the Fire Management Plan will be accomplished prior to the next fire season. Any additions, deletions, or changes will be reviewed by the Refuge Manager to determine if such alterations warrant a re-approval of the plan.

Prescribed Burn Plan
The Refuge Manager is responsible for supervising the development of resource management objectives for individual units. The Refuge staff will provide assistance in the selection of the appropriate management tool needed to meet objectives. Prescribed fire is just one of a combination of available tools. The FMO and zone fire management staff will be consulted for assistance in developing a prescription that will achieve the desired results.

A burn plan will be written that will document the treatment objectives, the prescription, and the plan of action for carrying out the burn. Burn plans will also identify resource concerns and any mitigation/ special precautions necessary to alleviate potential detrimental fire effects.

Burn plans can be written by any qualified burn boss. The burn plan will follow the format in Appendix N and address all aspects as specified in the FWS Fire Management Handbook. All burn plans will be reviewed by the Refuge Manager and FMO, and approved by the Desert Complex Refuges Project Leader prior to implementation.

Pahranagat NWR is located in the Western Great Basin Geographic Area. Prescribed fires cannot be ignited when the Western Great Basin Geographic Area is in a fire danger Preparedness Level V and/or the National Preparedness level is V, without the approval of the Western Great Basin Geographic Area Coordination Group and Regional Fire Management Coordinator.

Drought can have an effect upon fire severity and control. One or more drought indicators (PDI - KBI) will be used to determine the degree of drought. These indicators can be accessed on the web at http://www.boi.noaa.gov/fwxweb/fwoutlook.htm.

Prescribed fire complexity on Pahranagat NWR will be determined by the FWS Fire Complexity Analysis. Smoke management and sensitive wildlife species are the primary concerns affecting complexity at Pahranagat NWR. All prescribed fires currently being considered are of low to moderate complexity.

Strategies and Personnel
Execution of prescribed burns will only be executed by qualified personnel. The Prescribed Burn Boss will fill all required positions to conduct the burn with qualified personnel. All personnel listed in the burn plan must be available for the duration of the burn or the burn will not be initiated.

Weather and fuel moisture conditions must be monitored closely in planned burn units to determine when the prescription criteria are met. A belt weather kit may also be utilized to augment monitoring. Fuel moisture samples may be monitored each week and percent moisture contents figured to help determine when the prescription criteria are met.

Preparation of prescribed burn units will be handled on an individual basis with site preparation identified in the burn plan for that unit.

Prescribed burns can be conducted at any time of year depending on resource objectives and prescription; however, the normal prescribed fire season is during the fall, winter and spring, when vegetation is dormant and cured and prior to breeding season.

When all prescription criteria are within the acceptable range, the Prescribed Burn Boss will select an ignition time based on current and predicted weather forecasts. A thorough briefing will be given by the

Prescribed Burn Boss and specific assignments and placement of personnel will be discussed. An updated spot weather forecast will be obtained on the day of ignition and all prescription elements will be rechecked to determine if all elements are still within the approved ranges. If all prescription elements are met, a test fire will be ignited to determine on-site fire behavior conditions as affected by current weather. If conditions are not satisfactory, the test fire will be suppressed and the burn will be rescheduled. If conditions are satisfactory the burn will continue as planned.

A qualified Incident Commander Type III will be available within a two hour response in the event of an escaped prescribed burn. If the prescribed burn escapes the predetermined burn area, all further ignition will be halted except as needed for suppression efforts. Suppression efforts will be initiated, as discussed in the pre-burn briefing. The FMO will be notified immediately of any control actions on a prescribed burn. If the burn exceeds the initial suppression efforts, the burn will be declared a wildland fire and suppressed using guidelines established in this plan. A WFSA will be completed and additional personnel and resources ordered as determined by the Incident Commander. If the fire continues to burn out of control, additional resources will be called from the local cooperating agencies via the servicing dispatch. A management overhead team may be requested to assume command of the fire.

Monitoring and Evaluation

Monitoring of prescribed fires is intended to provide information for quantifying and predicting fire behavior and its ecological effects on refuge resources while building a historical record. Monitoring measures the parameters common to all fires: fuels, topography, weather and fire behavior. In addition, ecological changes such as species composition and structural changes will be monitored after a fire. This information will be very useful in fine-tuning the prescribed burn program.

Past monitoring and evaluation of prescribed fires has been limited due to funding and staffing limitations. Pre-burn evaluation was limited to general photographs and/or qualitative evaluation of fuel conditions and green up conditions. Burn day evaluations documented weather (many times not on site) and limited documentation of fire behavior. Subjective measurements (visual) such as the percent of fuel consumed were also made. Post burn evaluation was limited to subjective qualitative estimates of species response and effectiveness in achieving objectives.

Although little site specific data on the effects of fire for Pahranagat NWR exists, general conclusions can be made from the Fire Effects Information System. Appendix G contains a table which depicts the anticipated effects of fire on plant species that are found on Pahranagat NWR prescribed burn units.

Fire monitoring protocols for the Region or Service will be used at Pahranagat NWR (Appendix H). Protocols will be established to determine if burn objectives are being met and to monitor long-term vegetation responses. Fire monitoring will be consistent with monitoring goal and objectives identified in preferred alternative of the Draft Cropland and Grazing Management Plan.

Environmental Conditions will be recorded at the site periodically prior to ignition and hourly during the burn. Conditions to be evaluated will include Air Temperature, RH, and Wind speed and direction.

Fuel moisture(s) will be measured or estimated using tables, charts, or other prediction system (BEHAVE). Fire Behavior such as flame length and rates of spread will be recorded. Post fire effects will be measured or estimated. These effects include scorch height, percent of area burned, percent of fuel consumed - based on fuel (time-lag) classification, amount of duff removed, etc.

Required Reports
All prescribed burn forms will be completed as outlined by the Prescribed Burn Boss. A monitor will be assigned to collect all predetermined information and complete all necessary forms prior to, during, and after the burn. All records will be archived in the refuge's fire records for future use and reference.

The Prescribed Burn Boss will prepare a final report on the prescribed burn for the Fire Analysis Committee. Information will include a narrative of the burn operation, a determination of whether objectives were met, weather and fire behavior data, map of the burn area, photographs of the burn, number of work hours, and final cost of the burn.

Prescribed Burn Critique
Each prescribed burn will be critiqued. A report detailing the actual burn will accompany any recommendations or changes deemed necessary in the program. This report will be submitted to the Refuge Project Leader. A post-season critique of the fire management program, including the prescribed burn program, will be held each year by the Fire Analysis Committee at the conclusion of the fall fire season.

AIR QUALITY / SMOKE MANAGEMENT GUIDELINES

The State of Nevada is in the process of developing a State Smoke Management Plan to address air quality issues. See Appendix N for a copy of the current Draft Nevada Smoke Management Plan.

There are no non attainment areas near the Refuge. The city of Las Vegas is 90 miles to the south and is a non-attainment area. The community of Alamo, NV (population 400) is approximately four miles north of the Refuge. State Highway 93 runs through the Refuge lengthwise. Highway 93 is heavily traveled, and is two lanes. Private lands adjacent to the Refuge on the north are primarily agricultural with some single family residences. Agricultural burning in and around the Refuge is widespread, frequent, and commonly accepted by the public.

Prescribed fire operations will be conducted in compliance with the Nevada State Smoke Management Plan. Individual prescribed burn plans will specifically address smoke management concerns and actions required to ensure public safety and prevent negative impacts from smoke. The public will be informed of prescribed fire activity on the Refuge through several methods including; in person or telephone notification of nearby neighbors, Refuge press releases, information bulletins posted at information kiosks, smoke signs and traffic control devices. Federal, State, County, and local entities will be contacted prior to burning by phone or in person as part the required elements of each prescribed burn plan.

Burn plans will also include contingency plans which will be implemented in the event of unexpected negative smoke dispersal conditions. In general, prescribed burns will be small in size (average 10-300 acres), have light fuel loads (.25-3 tons of fuel per acre), will be burned under low fuel moisture conditions, and will be burned under specific wind direction and atmospheric stability conditions.

Prescribed burns on the Refuge fall into the Prescribed Fire Units: marsh, wet meadow/grassland, and croplands. The table below illustrates representative PM 10 emissions in tons per average burn.

FIRE RESEARCH

Research on the effects of fire within Refuge boundaries has been limited to observations by Refuge staff.

Monitoring will comply with accepted scientific methods. Fire behavior data will be collected on all prescribed fires occurring on Pahranagat NWR as outlined above. The data recorded, along with information gathered through research studies in similar plant communities, will be used to improve the effectiveness of the fire management program. The Refuge will continue to encourage fire related research on FWS lands where research operations will not conflict with resource management objectives.

No specific fire research needs have been identified at this time. It is anticipated that research regarding sensitive wildlife species will be needed in the near future.

PUBLIC SAFETY

Firefighter and public safety always take precedence over property and resource protection during any fire management activity.

Under moderate to severe fire danger index ratings, flaming fronts are capable of moving at fast speeds in all fuel models. In order to eliminate safety hazards to the public, all public access into the burn units will be closed the day of the burn. Fire crews will be briefed that should an individual who is not a member of the fire crew be observed in the prescribed burn unit, they will be immediately escorted out of the area.

During wildland fires, the IC is responsible for managing hazards from smoke. Smoke mitigation and management will be included in the prescribed burn plan and is the responsibility of the burn boss. Smoke from a Refuge fire could impair visibility on roads and become a hazard. Actions to manage smoke include; use of road guards and pilot car, signing, altering ignition techniques and sequence, halting ignition, suppressing the fire, and use of local law enforcement as traffic control.

Wildland fires which might escape FWS land and spread to inhabited private property are also a concern. The IC is responsible for warning and evacuating the public from potentially dangerous situations.

PUBLIC INFORMATION AND EDUCATION

Informing the public is an important part of fire suppression, fire prevention, prescribed fire, and the FWS mission. Information and education are critical to gaining public support for the Refuge's fire management programs. There are several different aspects to this task.

During wildland fire suppression, the IC is responsible for dispersal of information to the press and the public. The IC may delegate this responsibility as appropriate.

Informing the public is a vital component of the prescribed fire program. Areas that have been burned will present opportunities for the public to actually see the effects of fires, and offer staff members an opportunity to explain the purpose of the burns to the public. The following will be used to promote the prescribed fire program to the public:

1. Presentations in local schools.
2. Attendance at local fire department meetings.
3. 3.Including a prescribed fire message in Refuge interpretive publications and materials.
4. 4.Follow prescriptions in burn plans to prevent escapes.

FIRE CRITIQUES AND ANNUAL PLAN REVIEW

FIRE CRITIQUES

Fire reviews will be documented and filed with the final fire report. The FMO will retain a copy for the refuge files.

ANNUAL FIRE SUMMARY REPORT

The FMO will be responsible for completing an annual fire summary report. The report will contain the number of fires by type, acres burned by fuel type, cost summary (prescribed burns and wildland fires), personnel utilized, and fire effects.

ANNUAL FIRE MANAGEMENT PLAN REVIEW

The Fire Management Plan will be reviewed annually. Necessary updates or changes will be accomplished prior to the next fire season. Any additions, deletions, or changes will be reviewed by the Refuge Manager to determine if such alterations warrant a re-approval of the plan.

CONSULTATION AND COORDINATION

Roddy Baumann Prescribed Fire Specialists, Pacific Region, USFWS, Portland, OR.

Dick Birger, Project Leader, Desert NWR Complex, USFWS, Las Vegas, NV.

Chris Farinetti, Zone FMO, Sheldon - Hart NWR, USFWS, Lakeview, OR.

Dennis Macomber, Fire Management Consultant, Portland, OR.

Amanda McAdams, Fire Planner, Pacific Region, USFWS, Portland, OR.

Tom Suwyn, Interagency FMO, USFS/ BLM, Las Vegas, NV.

Larry Ulibarri, Refuge Manager, Pahranagat NWR, USFWS, Alamo, NV.

APPENDICES

APPENDIX A: REFERENCES CITED

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APPENDIX B: DEFINITIONS

Agency Administrator. The appropriate level manager having organizational responsibility for management of an administrative unit. May include Director, State Director, District Manager or Field Manager (BLM); Director, Regional Director, Complex Manager or Project Leader (FWS); Director, Regional Director, Park Superintendent, or Unit Manager (NPS), or Director, Office of Trust Responsibility, Area Director, or Superintendent (BIA).

Appropriate Management Action. Specific actions taken to implement a management strategy.

Appropriate Management Response. Specific actions taken in response to a wildland fire to implement protection and fire use objectives.

Appropriate Management Strategy. A plan or direction selected by an agency administrator which guide wildland fire management actions intended to meet protection and fire use objectives.

Appropriate Suppression. Selecting and implementing a prudent suppression option to avoid unacceptable impacts and provide for cost-effective action.

BLM. BLMs, offices or services of the Department.

Class of Fire (as to size of wildland fires):
Class A - 3 acre or less.
Class B - more than 3 but less than 10 acres.
Class C - 10 acres to 100 acres.
Class D - 100 to 300 acres.
Class E - 300 to 1,000 acres.
Class F - 1,000 to 5,000 acres.
Class G - 5,000 acres or more.

Emergency Fire Rehabilitation/Burned Area Emergency Rehabilitation (EFR/BAER). Emergency actions taken during or after wildland fire to stabilize and prevent unacceptable resource degradation or to minimize threats to life or property resulting from the fire. The scope of EFR/BAER projects are unplanned and unpredictable requiring funding on short notice.

Energy Release Component (ERC) A number related to the available energy (BTU) per unit area (square foot) within the flaming front at the head of a fire. It is generated by the National Fire Danger Rating System, a computer model of fire weather and its effect on fuels. The ERC incorporates thousand hour dead fuel moistures and live fuel moistures; day to day variations are caused by changes in the moisture content of the various fuel classes. The ERC is derived from predictions of (1) the rate of heat release per unit area during flaming combustion and (2) the duration of flaming.

Extended attack. A fire on which initial attack forces are reinforced by additional forces.

Fire Suppression Activity Damage. The damage to lands, resources and facilities directly attributable to the fire suppression effort or activities, including: dozer lines, camps and staging areas, facilities (fences, buildings, bridges, etc.), handlines, and roads.

Fire effects. Any consequences to the vegetation or the environment resulting from fire, whether neutral,

detrimental, or beneficial.

Fire intensity. The amount of heat produced by a fire. Usually compared by reference to the length of the flames.

Fire management. All activities related to the prudent management of people and equipment to prevent or suppress wildland fire and to use fire under prescribed conditions to achieve land and resource management objectives.

Fire Management Plan. A strategic plan that defines a program to manage wildland and prescribed fires and documents the Fire Management Program in the approved land use plan. The plan is supplemented by operational procedures such as preparedness plans, preplanned dispatch plans, prescribed fire plans and prevention plans.

Fire prescription. A written direction for the use of fire to treat a specific piece of land, including limits and conditions of temperature, humidity, wind direction and speed, fuel moisture, soil moisture, etc., under which a fire will be allowed to burn, generally expressed as acceptable range of the various fire-related indices, and the limit of the area to be burned.

Fuels. Materials that are burned in a fire; primarily grass, surface litter, duff, logs, stumps, brush, foliage, and live trees.

Fuel loadings. Amount of burnable fuel on a site, usually given as tons/acre.

Hazard fuels. Those vegetative fuels which, when ignited, threaten public safety, structures and facilities, cultural resources, natural resources, natural processes, or to permit the spread of wildland fires across administrative boundaries except as authorized by agreement.

Initial Attack. An aggressive suppression action consistent with firefighter and public safety and values to be protected.
Maintenance burn. A fire set by agency personnel to remove debris; i.e., leaves from drainage ditches or cuttings from tree pruning. Such a fire does not have a resource management objective.

Natural fire. A fire of natural origin, caused by lightning or volcanic activity.

NFDRS Fuel Model. One of 20 mathematical models used by the National Fire Danger Rating System to predict fire danger. The models were developed by the US Forest Service and are general in nature rather than site specific.

NFFL Fuel Model. One of 13 mathematical models used to predict fire behavior within the conditions of their validity. The models were developed by US Forest Service personnel at the Northern Forest Fire Laboratory, Missoula, Montana.

Prescription. Measurable criteria which guide selection of appropriate management response and actions. Prescription criteria may include safety, public health, environmental, geographic, administrative, social, or legal considerations.

Prescribed Fire. A fire ignited by agency personnel in accord with an approved plan and under prescribed conditions, designed to achieve measurable resource management objectives. Such a fire is designed to

produce the intensities and rates of spread needed to achieve one or more planned benefits to natural resources as defined in objectives. Its purpose is to employ fire scientifically to realize maximize net benefits at minimum impact and acceptable cost. A written, approved prescribed fire plan must exist and NEPA requirements must be met prior to ignition. NEPA requirements can be met at the land use or fire management planning level.

Preparedness. Actions taken seasonally in preparation to suppress wildland fires, consisting of hiring and training personnel, making ready vehicles, equipment, and facilities, acquiring supplies, and updating agreements and contracts.

Prevention Activities directed at reducing the number or the intensity of fires that occur, primarily by reducing the risk of human-caused fires.

Rehabilitation (1) Actions to limit the adverse effects of suppression on soils, watershed, or other values, or (2) actions to mitigate adverse effects of a wildland fire on the vegetation-soil complex, watershed, and other damages.

Suppression. A management action intended to protect identified values from a fire, extinguish a fire, or alter a fire's direction of spread.

Unplanned ignition. A natural fire that is permitted to burn under specific conditions, in certain locations, to achieve defined resource objectives.

Wildfire. An unwanted wildland fire.

Wildland Fire. Any non-structure fire, other than prescribed fire, that occurs in the wildland.

Wildland Fire Situation Analysis (WFSA). A decision-making process that evaluates alternative management strategies against selected safety, environmental, social, economical, political, and resource management objectives as selection criteria.

Wildland/urban interface fire A wildland fire that threatens or involves structures.

APPENDIX C: COOPERATIVE AGREEMENTS

APPENDIX D: STEP-UP PLAN

The Step-up plan will guide fire preparedness operations and use of emergency preparedness funding.

PREPAREDNESS ACTION	FIRE DANGER				
	low	**mod**	**high**	**very high**	**extreme**
Maintain Radio Contact	X	X	X	X	X
No prescribed burning				X	X

Tour of duty changed at Manager's discretion			X	X	X
Off road driving prohibited/limited					X
Detection patrol conditional				X	X
Closures subject to Refuge Manager				X	X
Campfires Prohibited					X

APPENDIX E: FIRE DISPATCH PLAN

Contact List

AGENCY	NAME/TITLE	PHONE NUMBER
BLM, Caliente Field Office	24 hour dispatch	775-726-8146
Alamo Volunteer Fire Department	Vol. Capt.	775-725-3375
Lincoln County Sheriff	Dispatch	775-962-5151
BLM Las Vegas	Tom Suwyn, FMO	702-647-5161
Las Vegas Interagency Dispatch	Rawles Williams, Center Manager	702-631-2300
NV Dept. of Environmental Protection	Chet Sargant, Permitting	775-687-4670
Sheldon Hart Refuges Zone Fire Staff	Chris Farinetti, ZFMO	541-947-3315 541-947-6315
Ambulance/Medical/Accident	Dispatch	911
Complex Fire Staff	Paul Bannister, FMO	702-249-3366

PAHRANAGAT NWR.
Upon report of smoke or fire:

I Record as much information as possible from the caller below.

II. Maintain log of all radio and telephone communication (log form attached).

Initial information from reporting party:

A. Name:

B. Callback number:

C. Location of smoke or fire (be specific):

D. Access to fire:

E. Color of smoke:

F. Size of fire:

G. Type of vegetation:

H. Fire behavior:

I. Improvements threatened:

J. Anyone at the fire scene:

K. See anyone in area or vehicles leaving area:

III. CALL DISPATCH CENTER: BLM -LAS VEGAS INTERAGENCY 702-631-2300

Check map for ownership/protection status.

IV. If fire is on refuge:

A. After regular working hours use Fire Personnel Directory for contacting Refuge staff. Start with Refuge Manager and work down list until someone is contacted.

B. During regular working hours:

1. Notify Refuge Manager.

2. Project Leader and or designated resource advisor

FIRE DIRECTORY
PAHRANAGAT NWR
FIRE PERSONNEL DIRECTORY - 2001

FIRE REPORTING OR ASSISTANCE REQUEST:

NAME	WORK PHONE	HOME PHONE
Larry Ulibarri, Refuge Manager	775-725-3417	775-725-3835
Dick Birger, Project Leader	702-646-3401	702-396-6596
Paul Bannister, FMO	702-646-3401	702-304-2592

WHEN A FIRE IS REPORTED, OBTAIN THE FOLLOWING INFORMATION:

PERSON REPORTING THE FIRE.
LOCATION OF THE FIRE.
BEST ACCESS TO FIRE.
VALUES THREATENED.
LANDOWNER - PROTECTION STATUS.
SIZE.
SUSPECTED CAUSE.

ADJACENT LANDOWNER LIST:

NAME XXXX: PHONE #

APPENDIX F: SAMPLE WILDLAND FIRE SITUATION ANALYSIS

Incident Name:
Jurisdiction:

Date and Time Completed:

This page is completed by the Agency Administrator(s).

Section I, WFSA Information Page

A. Jurisdiction(s): Assign the agency or agencies that have or could have fire protection responsibility, e.g., USFWS, BLM, etc.

B. Geographic Area: Assign the recognized "Geographic Coordination Area" the fire is located in, e.g., Northwest, Northern Rockies, etc.

C. Unit(s): Designate the local administrative unit(s), e.g., Hart Mountain Refuge Area, Flathead Indian Reservation, etc.

D. WFSA #: Identify the number assigned to the most recent WFSA for this fire.

E. Fire Name: Self-explanatory.

F. Incident #: Identify the incident number assigned to the fire.

G. Accounting Code: Insert the local unit's accounting code.

H. Date/Time Prepared: Self-explanatory.

I. Attachments: Check here to designate items used to complete the WFSA. "Other could include data or models used in the development of the WFSA. Briefly describe the "other" items used.

I. Wildland Fire Situation Analysis		
To be completed by the Agency Administrator(s)		
A. Jurisdiction(s)	B. Geographic Area	
C. Unit(s)	D. WFSA #	
E. Fire Name	F. Incident #	
G. Accounting Code:		
H. Date/Time Prepared _____@_____		
I. Attachments		
- Complexity Matrix/Analysis *	_____	
- Risk Assessment/Analysis *	_____	
Probability of Success *	_____	
Consequences of Failure *	_____	
- Maps *	_____	
- Decision Tree **	_____	
- Fire Behavior Projections *	_____	
- Calculations of Resource Requirements *	_____	
- Other (specify) * Required ** Required by FWS	_____	

This page is completed by the Agency Administrator(s).

Section II. Objectives and Constraints

A. Objectives: Specify objectives that must be considered in the development of alternatives. Safety objectives for firefighter, aviation, and public must receive the highest priority. Suppression objectives must relate to resource management objectives in the unit resource management plan.

   Economic objectives could include closure of all or portions of an area, thus impacting the public, or impacts to transportation, communication, and resource values.

   Environmental objectives could include management objectives for airshed, water quality, wildlife, etc.

   Social objectives could include any local attitudes toward fire or smoke that might affect decisions on the fire.

   Other objectives might include legal or administrative constraints which would have to be considered in the analysis of the fire situation, such as the need to keep the fire off other agency lands, etc.

B. Constraints: List constraints on wildland fire action. These could include constraints to designated wilderness, wilderness study areas, environmentally or culturally sensitive areas, irreparable damage to resources or smoke management/air quality concerns. Economic constraints, such as public and agency cost, could be considered here.

II.	Objectives and Constraints
To be Completed by the Agency Administrator(s)	

A. Objectives (Must be specific and measurable)

1. Safety

- Public

- Firefighter

2. Economic

3. Environmental

4. Social

5. Other

B. Constraints

This page is completed by the Fire Manager and/or Incident Commander.

Section III. Alternatives

A. Wildland Fire Management Strategy: Briefly describe the general wildland fire strategies for each

alternative. Alternatives must meet resource management plan objectives.

B. Narrative: Briefly describe each alternative with geographic names, locations, etc., that would be used when implementing a wildland fire strategy. For example: "Contain within the Starvation Meadows' watershed by the first burning period."

C. Resources Needed: Resources described must be reasonable to accomplish the tasks described in Section III.B. It is critical to also look at the reality of the availability of these needed resources.

D. Final Fire Size: Estimated final fire size for each alternative at time of containment.

E. Estimated Contain/Control Date: Estimates of each alternative shall be made based on predicted weather, fire behavior, resource availability, and the effects of suppression efforts.

F. Cost: Estimate all incident costs for each alternative. Consider mop-up, rehabilitation, and other costs as necessary.

G. Risk Assessment - Probability of Success/Consequences of Failure: Describe probability as a percentage and list associated consequences for success and failure. Develop this information from models, practical experience, or other acceptable means. Consequences described will include fire size, days to contain, days to control, costs, and other information such as park closures and effect on critical habitat. Include fire behavior and long-term fire weather forecasts to derive this information.

H. Complexity: Assign the complexity rating calculated in "Fire Complexity Analysis" for each alternative, e.g., Type II, Type I.

I. A map for each alternative should be prepared. The map will be based on the "Probability of Success/Consequences of Failure" and include other relative information.

III. Alternatives (To be completed by FMO / IC)			
	A	**B**	**C**
A. Wildland Fire Strategy			
B. Narrative			

C. Resources needed Handcrews Engines Dozers Airtankers Helicopters			
D. Final Size			
E. Est. Contain/ Control Date			

F. Costs			
G. Risk Assessment - Probability of success - Consequence of failure	_____ _____	_____ _____	_____ _____
H. Complexity			
I. Attach maps for each alternative			

This page is completed by the Agency Administrator(s), FMO and/or Incident Commander.

Section IV. Evaluation of Alternatives

A. Evaluation Process: Conduct an analysis for each element of each objective and each alternative. Objectives shall match those identified in Section II.A. Use the best estimates available and quantify whenever possible. Provide ratings for each alternative and corresponding objective element. Fire effects may be negative, cause no change, or may be positive. Examples are: 1) a system which employs a "-" for negative effect, a "0" for no change, and a "+" for positive effect; 2) a system which uses a numeric factor for importance of the consideration (soils, watershed, political, etc.) and assigns values (such as -1 to +1, - 100 to +100, etc.) to each consideration, then arrives at a weighted average. If you have the ability to estimate dollar amounts for natural resource and cultural values, this data is preferred. Use those methods which are most useful to managers and most appropriate for the situation and agency. To be able to evaluate positive fire effects, the area must be included in the resource management plan and consistent with prescriptions and objectives of the fire management plan.

Sum of Economic Values: Calculate for each element the net effect of the rating system used for each alternative. This could include the balance of:
pluses (+) and minuses (-), numerical rating (-3 and +3), or natural and cultural resource values in dollar amounts. (Again, resource benefits may be used as part of the analysis process when the wildland fire is within a prescription consistent with approved Fire Management Plans and in support of the unit's Resource Management Plan.)

IV. Evaluation of Alternatives			
To be Completed by the Agency Administrator(s) and Fire Manager / Incident Commander			
A. Evaluation Process	A	B	C
Safety Firefighter Aviation Public			
Sum of Safety Values			
Economic Forage Improvements Recreation Timber Water Wilderness Wildlife Other (specify)			

Sum of Economic Values			
Environmental Air Visual Fuels T & E Species Other (specify)			
Sum of Environmental Values			
Social Employment Public Concern Cultural Other (Specify)			

Sum of Social Values			
Other			

This page is completed by the Agency Administrator(s) and Fire Manager and/or Incident Commander.

Section V. Analysis Summary

A. Compliance with Objectives: Prepare narratives that summarize each alternative's effectiveness in meeting each objective. Alternatives that do not comply with objectives are not acceptable. Narrative could be based on effectiveness and efficiency. For example: "most effective and least efficient," "least effective and most efficient," or "effective and efficient." Or answers could be based on a two-tiered rating system such as "complies with objective" and "fully complies with or exceeds objective." Use a system that best fits the manager's needs.

B. Pertinent Data: Data for this Section has already been presented, and is duplicated here to help the Agency Administrator(s) confirm their selection of an alternative. Final Fire Size is displayed in Section III.D. Complexity is calculated in the attachments and displayed in Section III.H. Costs are displayed on page 4. Probability of Success/Consequences of Failure is calculated in the attachments and displayed in Section III.G.

C. External and Internal Influences: Assign information and data occurring at the time the WFSA is signed. Identify the Preparedness Index (1 through 5) for the National and Geographic levels. If available, indicate the Incident Priority assigned by the MAC Group. Designate the Resource Availability status. This information is available at the Geographic Coordination Center, and is needed to select a viable alternative. Designate "yes," indicating an up-to-date weather forecast has been provided to, and used by, the Agency Administrator(s) to evaluate each alternative. Assign information to the "Other" category as needed by the Agency Administrator(s).

Section IV. Decision

Identify the alternative selected. Must have clear and concise rationale for the decision, and a signature with date and time. Agency Administrator(s) is mandatory.

V.	Analysis Summary		
To be Completed by the Agency Administrator(s) and Fire Manager / Incident Commander			
Alternatives	**A**	**B**	**C**
A. Compliance with Objectives Safety Economic Environmental Social Other			
B. Pertinent Data Final Fire Size Complexity Suppression Cost Resource Values Probability of Success Consequences of Failure			
C. External / Internal Influences National & Geographic Preparedness Level _____ Incident Priority _____ Resource Availability _____ Weather Forecast (long-range) _____ Fire Behavior Projections _____			
VI.	Decision		
The Selected Alternative is: _____ Rationale: _____ _____ Agency Administrator's Signature Date/Time			

This Section is completed by the Agency Administrator(s) or designate.

Section VII. Daily Review

The date, time, and signature of reviewing officials are reported in each column for each day of the incident. The status of Preparedness Level, Incident Priority, Resource Availability, Weather Forecast, and WFSA validity is completed for each day reviewed. Ratings for the Preparedness Level, Incident Priority, Resource Availability, Fire Behavior, and Weather Forecast are addressed in Section V.C. Assign a "yes" under "WFSA Valid" to continue use of this WFSA. A "no" indicates this WFSA is no longer valid and another WFSA must be prepared or the original revised.

Section VIII. Final Review

This Section is completed by the Agency Administrator(s). A signature, date, and time are provided once all conditions of the WFSA are met.

VIII.	Daily Review								
To be completed by the Agency Administrator(s) or Designate									
Selected to be reviewed daily to determine if still valid until containment or control									
			PREPAREDNESS LEVEL	**INCIDENT PRIORITY**	**RESOURCE AVAILABILITY**	**WEATHER FORECAST**	**FIRE BEHAVIOR PROJECTIONS**	**WFSA VALID**
Date	Time	By						

If WFSA is no longer valid, a new WFSA will be completed!
VIII. Objectives Final Review
The elements of the selected alternative were met on: _____ _____ Date Time By:_____ (Agency Administrator(s)

A GUIDE FOR ASSESSING FIRE COMPLEXITY

The following questions are presented as a guide to assist the Agency Administrator(s) and staff in analyzing the complexity or predicted complexity of a wildland fire situation. Because of the time required to assemble or move an Incident Management Team to wildland fire, this checklist should be completed when a wildland fire escapes initial attack and be kept as a part of the fire records. This document is prepared concurrently with the preparation of (and attached to) a new or revised Wildland Fire Situation Analysis. It must be emphasized this analysis should, where possible, be based on predictions to allow adequate time for assembling and transporting the ordered resources.

Use of the Guide:

1. Analyze each element and check the response "yes" or "no."

2. If positive responses exceed, or are equal to, negative responses within any primary factor (A through G), the primary factor should be considered as a positive response.

3. If any three of the primary factors (A through G) are positive responses, this indicates the fire situation is, or is predicted to be, Type I.

4. Factor H should be considered after all the above steps. If more than two of these items are answered "yes," and three or more of the other primary factors are positive responses, a Type I team should be considered. If the composites of H are negative, and there are fewer than three positive responses in the primary factors (A-G), a Type II team should be considered. If the answers to all questions in H are negative, it may be advisable to allow the existing overhead to continue action on the fire.

GLOSSARY OF TERMS

Potential for blow-up conditions - Any combination of fuels, weather, and topography excessively endangering personnel.

Rate or endangered species - Threat to habitat of such species or, in the case of flora, threat to the species itself.

Smoke management - Any situation which creates a significant public response, such as smoke in a metropolitan area or visual pollution in high-use scenic areas.

Extended exposure to unusually hazardous line conditions - Extended burnout or backfire situations, rock slide, cliffs, extremely steep terrain, abnormal fuel situation such as frost killed foliage, etc.

Disputed fire management responsibility - Any wildland fire where responsibility for management is not agreed upon due to lack of agreements or different interpretations, etc.

Disputed fire policy - Differing fire policies between suppression agencies when the fire involves multiple ownership is an example.

Pre-existing controversies - These may or may not be fire management related. Any controversy drawing public attention to an area may present unusual problems to the fire overhead and local management.

Have overhead overextended themselves mentally or physically - This is a critical item that requires judgment by the responsible agency. It is difficult to write guidelines for this judgment because of the wide differences between individuals. If, however, the Agency Administrator feels the existing overhead cannot continue to function efficiently and take safe and aggressive action due to mental or physical reasons, assistance is mandatory.

FIRE COMPLEXITY ANALYSIS

A. FIRE BEHAVIOR: Observed or Predicted		Yes/No	
1. Burning Index (from on-site measurement of weather conditions). Predicted to be above the 90% level using the major fuel model in which the fire is burning.		___	___
2. Potential exists for "blowup" conditions (fuel moisture, winds, etc.)		___	___
3. Crowning, profuse or long-range spotting.		___	___
Weather forecast indicating no significant relief or worsening conditions.			___ ___
	Total		___ ___
B. RESOURCES COMMITTED			
1. 200 or more personnel assigned.		___	___
2. Three or more divisions.			___ ___
3. Wide variety of special support personnel.		___	___
4. Substantial air operation which is not properly staffed.	___	___	
5. Majority of initial attack resources committed.		___	___
	Total		___ ___
C. RESOURCES THREATENED			
1. Urban interface.		___	___
2. Developments and facilities.		___	___
3. Restricted, threatened or endangered species habitat.	___	___	
4. Cultural sites.		___	___
5. Unique natural resources, special designation zones or wilderness.			___ ___
6. Other special resources.		___	___
	Total		___ ___
D. SAFETY			
1. Unusually hazardous fire line conditions.		___	___
2. Serious accidents or facilities.		___	___
3. Threat to safety of visitors from fire and related operations.		___	___
4. Restricted and/or closures in effect or being considered.	___	___	
5. No night operations in place for safety reasons.	___	___	
	Total		___ ___
E. OWNERSHIP		Yes/No	
1. Fire burning or threatening more than one jurisdiction.		___	___
2. Potential for claims (damages).		___	___
3. Conflicting management objectives.		___	___
4. Disputes over fire management responsibility.		___	___

5.	Potential for unified command.		___	___
		Total		___ ___

F. EXTERNAL INFLUENCES

1.	Controversial wildland fire management policy.		___	___
2.	Pre-existing controversies/relationships.		___	___
3.	Sensitive media relationships.		___	___
4.	Smoke management problems.		___	___
5.	Sensitive political interests.		___	___
6.	Other external influences.			___ ___
		Total		___ _

G. CHANGE IN STRATEGY

1.	Change in strategy to control from confine or contain.		___	___
2.	Large amount of unburned fuel within planned perimeter.		___	___
3.	WFSA invalid or requires updating.		___	___
		Total		___ ___

H. EXISTING OVERHEAD

1.	Worked two operational periods without achieving initial objectives.		___	___
2.	Existing management organization ineffective.		___	___
3.	IMT overextended themselves mentally and/or physically.		___	___
4.	Incident action plans, briefings, etc., missing or poorly prepared .		___	___
		Total		___ ___

Signature_____

Date_____ Time_____

APPENDIX G: FIRE EFFECTS ON SELECTED SPECIES
(TAKEN FROM FEIS)

SPECIES	FIRE ECOLOGY/ADAPTATION
Achillea millefolium (western yarrow)	Generally increases after fire of low to moderate intensity. Resprouts from extensive rhizomes.
Agropyron cristatum (crested wheatgrass)	Minimum leafy material transfers little heat below surface. Rapid regrowth of tillers following fire.
Allenrolfa occidentalis (idoinebush)	High live fuel moisture restricts fire damage to this plant
Artemisia nova (black sagebrush)	Plants are readily killed by most fires. Re-establishment occurs through off site seed sources. Generally will not carry a fire.
Artemesia spinescens (bud sage)	Plants killed by fire. Would be nearly impossible to carry fire due to lack of fuels.
Atriplex canescens (fourwing saltbush)	Reported as tolerant of fire. Sprouts vigorously after fire and quickly recovers to pre-burn levels. Low volitization rate, very difficult to burn.
Atriplex confertifolia (shadscale saltbush)	Low volitization rate, very difficult to burn.
Atriplex gardneri (Gardner's saltbush)	Low volitization rate, very difficult to burn. Very low fuel load.
Bromus rubens (red brome)	Similar to cheat grass. Frequent fire favors species. Introduced annual reestablishes quickly post-fire from in-ground seeds and vigorously colonizes burned areas from off-site seeds.
Bromus tectorum (cheatgrass)	Extreme volitization rate, burns easily and frequently with decreasing fire return intervals as plant density increases. Frequent fire favors cheatgrass. Annual reproducing by seed quickly re-establishes post fire.
	.
Cardaria draba (hoary cress)	Top-killed by fire easily. Resprouts from rhizomes and may establishes additional density from soil-stored seed following fire. An introduced noxious weed, this plant grows extremely rapidly following even severe fire disturbance and may be favored by temporarily reduced competition from natives.
Centaurea repens (Russian knapweed)	May be top-killed by fire, but sprouts from rhizomes and re-establishes from seed.

SPECIES	FIRE ECOLOGY/ADAPTATION
Chrysothamnus paniculatus (desert rabbitbrush)	Top-killed by moderate to severe intensity fire. Resprouts vigorously from root crowns and grows rapidly following fire. Produces extensive seed source which can blow into burned areas and rapidly establish new population. Sprouts and seedlings most abundant the first growing season after fire.
Cirsium arvense (Canada thistle)	Survives most fires through perennating buds located on underground roots. Also re-establishes through seed.
Distichlis spicata (saltgrass)	Most fires consume aboveground foliage, but plant immediately sends up new growth from rhizomes. Density of new growth following fire is increased and has higher nutritive quality. Viable seed reserves are stored in soils which readily sprout following fire. Flooding of growing site following fire can kill rhizomes.
Elaeagnus angustifolia (Russian olive)	Vigorously resprouts from root crown after top-kill by fire. Also is a vigorous off-site colonizer of burn sites through seed. Fire in combination with herbicides can prevent resprouting, as this plant is considered a noxious weed.
Eleocharis rostellata (beaked spikerush)	Top-killed by fire. Shallow rhizomes may be damaged or killed by high-severity fire. Grows in marshy conditions so is not often burned except during drought conditions.
Elymus elymoides (bottlebrush squirreltail)	Rapid combustion of foliage with little downward heat transfer makes the plant tolerant of fire. Damage has been reported when burned during May and when successive years of growth accumulate increasing fire loads.
Elymus triticotes (creeping wild rye)	Well adapted to fire due to rhizomus root system. Top-killed by fire but resprouts readily.
Elytrigia repens (quackgrass)	Tolerant of fire when dormant. May be injured severely if burned while actively growing.
Grindella squarrosa (curlycup gumweed)	Top-killed by fire, but quickly re-establishes after a fire.
Halogeton glomeratus (halogeton)	Burning does not appear to control halogeton as it readily re-invades sites.
Juncus balticus (baltic rush)	Plants survive fire through extensive rhizomes. Postfire production is generally higher. Soils are generally moist, however drought may cause fire to burn into organic matter and kill plants.

SPECIES	FIRE ECOLOGY/ADAPTATION
Krascheninnikovia lanata (winterfat)	Severe intensity fires can kill plants. Low and/or moderate intensity fires top kill plant, but resprouting often occurs from root crown. Any fire at all may decrease plant density and vigor. Regeneration from seed sources is rare.
Lepidium latifolium (perennial pepperweed)	Survives by sprouting from underground tap root and rhizomes.
Leymus cinereus (Basin wildrye)	Considered adapted to fire. Coarse stems insulate perennating buds. Burning during plant dormancy encourages rapid recovery. Basal buds can be destroyed/damaged by very intense, dry season fires.
Lythrum salicaria (purple loosestrife)	Although easily top-killed by fire, resprouts from below-ground rootstock. Colonizes burned areas by seed easily. A noxious, introduced weed, fire is not an effective eradication tool. Plant begins spring growth later than common associates and spring fires may favor plant over natives.
Oryzopsis hymenoides (Indian ricegrass)	May be slightly damaged by higher intensity fires. Low culm density reduces charring below the soil surface.
Muhlenbergia asperifolia (muhly grass)	Favored by early spring and winter burns. Top-killed but regenerates from tillers and seeds. Fire in dry conditions appears to harm plant.
Pascopyrum smithii (western wheatgrass)	Fire top-kills plant. Resprouts vigorously from rhizomes. Spring burns, prior to green-up, and to a lesser degree, Fall burns after dormancy favor plant, increasing abundance and density. Summer fires can cause severe injury to plant, killing above-ground foliage and reducing rhizome growth.
Phleum pratense (timothy)	Well adapted to fire. Easily top-killed, this plant has underground regenerative organs that are not harmed by even moderately intense fires. Fire stimulates the production of reproductive tillers in this species. Only the most severe fire intensities may kill root crowns. Winter burns stimulates earlier and accelerated green-up in the spring.
Populus angustifolia (narrowleaf cottonwood)	Reported to sprout after low intensity fires, however several studies indicate even mature trees killed by cool fires. Fire should not be used where maintenance of mature cottonwoods is desired.
Rhus trilobata (quailbush)	Top-killed by fire. Resprouts well from woody rhizomes following fire. Has ability to delay sprouting for up to a year following fire, enhancing survival in harsh environments.

SPECIES	FIRE ECOLOGY/ADAPTATION
Salix exigua (sandbar willow)	Aboveground plant parts killed by fire. Resprouts vigorously from root crown. Considered important off-site colonizer postfire years 1 & 2 through wind, water, animal carried seeds. Due to usual proximity to water or high water tables, may serve as natural fire breaks if community is dense enough.
Salix lyallii (red willow)	Same as sandbar willow.
Salsola kali (Russian thistle)	Plants and portions of seed killed by fire. Considered initial-offsite colonizer. Ascribed plants blow across burns, spreading seed. Frequent fires favor establishment. Can spread fire by rolling.
Sarcobatus vermiculatus (black greasewood)	Resprouts readily following fire. Small fuel loads limit burning to extreme conditions in most sites.
Scirpus acutus (hard-stem bulrush)	Top-killed by fire. Fire removes matted and dead aboveground foliage allowing for resprouting from rhizomes following fire. Protein content increases with resprouting.
Scirpus validus (soft-stem bulrush)	Sprouts from rhizomes following fire. Fire increases protein content in Scirpus acutus.
Shepherdia argentea (silver buffaloberry)	Exhibits a fair tolerance to low and moderate intensity fire, especially in dormancy. Top-kill often leads to sprouting from root crown, although survival rates decrease as intensity of fire increases. High intensity fire likely kills plants.
Scolochloa festucacea (whitetop)	Top killed by fire. Vigorous resprouts from rhizomes. A wetland plant, it occurs on sites that most often experience fire only in late summer or fall when sites dry out. Fire benefits plant by removing excess litter which suppresses growth and by creating openings where plant can rapidly colonize.
Sporobolus airoides (alkali sacaton)	Clumped growth habit and loose coarse culms limit heat transfer into the root crown, allowing most plants to survive fire. Considered generally tolerant of fire. A nonrhizomatous species, plant regenerates via seed and sprouting, and spreads via tillers.
Tamarix ramosissima (saltcedar)	Considered to be fire adapted. High fule moisture and salt content make ignition difficult. Increased flowering and seed production after fire.

SPECIES	FIRE ECOLOGY/ADAPTATION
Typha latifolia (cattail)	Quickly regrows from rhizomes after fire. Mosaic burns may enhance habitat for some species. Manipulation of water levels pre and post fire have provided control of cattail at some sites.

APPENDIX H: RECOMMENDED FIRE MONITORING STANDARDS

The following are the recommended standards to be used when planning, implementing, and evaluating prescribed burns. These should be viewed as minimum values to be monitored and the information contained in this check list incorporated into a monitoring record sheet.

Planning and Preparation

Environmental Conditions Prior to the Burn

Photo Points Established	
Fuel	
Model(s)	
Loading	(By Size Class)
% Cover	(Type/Model)
Continuity	
Crown ratio	
Depth of Fuel Bed	
Other	
Air Temperature	(Maximum - Minimum to develop trends)
Relative Humidity	(Maximum - Minimum to develop trends)
Wind Speed and Direction	(Eye-level/20 Foot)
Fuel Moisture	
Dead Fuel Moisture	(Use of Fuel Sticks and/or Drying Ovens highly recommended)
Live Fuel Moisture	(Fuel Models 2, 4, 5, 7, 10)
Soil Moisture	(Dry, Moist, Wet)
Drought Indicator	(Track One or More)

Execution

Environmental Conditions During the Burn

Date/Time

Air Temperature	(Every 30 minutes)	
Relative Humidity	(Every 30 minutes)	
Wind Speed and Direction	(Eye Level)	(Every 30 minutes)
Cloud Cover		

Fuel Moisture (Indicate How Determined: Calculated, Actual)

Dead Fuel Moisture (Using above values, calculate every 30 minutes utilizing Tables and Worksheets, Nomograms, BEHAVE, etc.)

Live Fuel Moisture (Fuel Models 2, 4, 5,7,10 - Collect immediately prior to the burn and evaluate later)

Fire Behavior

Flame length	(Head, Flank, Backing)
Rate of Spread	(Forward, Flank, Backing)
Resistance to Control	
Spotting Distance	

Smoke/Air Quality

Mixing/Dispersal	(Good, Fair, Poor)
Trajectory of Column	(Surface/Upper Level)
Duration	(Active Burning/Smoldering)
Problems	

Note: It is recommended that photos be taken to document smoke dispersal.

Post Burn

First Order Fire Effects

Photo Point
Percent of Area Burned
Percent of Fuels Consumed (By Fuel Loading Size Class, when possible)
Percent of Thatch/Duff Consumed
Scorch Height
Mortality

Note: The information in the first two categories will be used to determine the amount of particulate matter produced, and may/will be used by State Air Quality Regulators.

APPENDIX I: COMPLIANCE DOCUMENTS
NEPA Compliance

United States Department of the Interior

FISH AND WILDLIFE SERVICE
2233 Watt Ave., Suite 375
Sacramento, California 95825

Finding of No Significant Impact:

Environmental Assessment for Wildland Fire Management
at Pahranagat NWR,
Nevada

An environmental assessment (EA) was prepared by the U.S. Fish and Wildlife Service (Service) to evaluate a proposal to conduct a Wildland Fire Management Program at Pahranagat NWR. This EA was made available for public review and comment from July 31,2001, through August 13, 2001.

Pursuant to requirements of the National Environmental Policy Act (NEPA) of 1969, this EA (copy attached) was prepared to evaluate the environmental effects of the proposal to implement a prescribed fire program and alternatives to the proposal:

Alternative 1: Full suppression of All Wildland Fires (No Action).
Alternative 2: Prescribed Fire and Full Suppression of all Wildland Fires (Proposed Action).

Under the program, the primary objective is to provide for firefighter and public safety. Prescribed fire will be utilized to reduce hazardous fuels, manage habitat, and return fire as a natural process to the ecosystem. Prescribed fire may be used in conjunction with mechanical or chemical treatments to meet management goals. All wildland fires will continue to be fully suppressed, utilizing natural fuel breaks and protecting resources from damage where feasible.

The proposal has been coordinated with interested and/or affected agencies and organizations. The public was informed of the availability of the EA and DRAFT Fire Management Plan (FMP) through a public notice. No comments were received. The EA, DRAFT FMP, and this Finding of No Significant Impact (FONSI) are available upon request from the U.S. Fish and Wildlife Service, Desert National Wildlife Complex, 1500 Decatur Blvd. Las Vegas, NV 89108. (702) 646-3401

Implementation of the proposed action would be in full compliance with the Endangered Species Act. An internal section 7 consultation determined that action may effect, but not likely to adversely effect.

Based on a review and evaluation of the information contained in the EA, I have determined that the proposed action (Prescribed Fire and Full Suppression of All Wildland Fires) would not constitute a major Federal action significantly affecting the quality of the human environment within the meaning of

section 102(2)(C) of the National Environmental Policy Act of 1969. Accordingly, preparation of an environmental impact statement for the proposed action is not required.

_____ _____

CNO Manager Date
National Wildlife Refuge System

ENVIRONMENTAL ASSESSMENT

WILDLAND FIRE MANAGEMENT PLAN

PAHRANAGAT NATIONAL WILDLIFE REFUGE

JULY 2001

U. S. DEPARTMENT OF INTERIOR
U.S. FISH AND WILDLIFE SERVICE
ENVIRONMENTAL ASSESSMENT

for

WILDLAND FIRE MANAGEMENT PLAN
Pahranagat National wildlife Refuge
Nevada

Summary:

The *2001 Federal Wildland Fire Management Policy* requires that each Federal land management agency develop fire management plans to, among other things, integrate fire management activities with other natural resource goals. The attached environmental assessment addresses the environmental consequences of implementing the Fire Management Plan for the Pahranagat National Wildlife Refuge.

The Fire Management Plan calls for continued suppression of all wildland fires. Prescribed fires (management-planned ignitions) are called for at the refuge in order to return fire as a natural process, maintain historic/cultural scenes, and to reduce fuel loads. Prescribed fires would only be started under project specific burning prescriptions (predetermined conditions of weather, fuel moisture, and personnel availability). Objectives of the prescribed fires would be documented in individual burn plans. Sec. 7 consultation per the Endangered Species Act of 1973, as amended, will be conducted for each site-specific burn plan. Monitoring and research of fire effects would determine if management goals are being achieved and if burn prescriptions are appropriate.

Address Comments To:

Larry Ulibarri, Refuge Manager
Pahranagat NWR
P O Box 510
Alamo, NV 89001

PURPOSE AND NEED

The purpose of the *Pahranagat National Wildlife Refuge Fire Management Plan* is to implement the *2001 Federal Wildland Fire Management Policy* and to achieve refuge resource objectives. This policy requires that each Federal land management agency develop fire management plans to, among other things, integrate fire management activities with other natural resource goals. Key points of the policy include:

> Firefighting - Ensure adequate preparedness for future fire seasons
> Rehabilitation and Restoration - Restore landscapes and rebuild communities damaged by wildfire
> Hazardous Fuel Reduction - Invest in projects to reduce fire risk
> Community Assistance - Work directly with communities to ensure adequate protection
> Accountability - Be accountable and establish adequate oversight and monitoring for results

The development and implementation of the *Pahranagat National Wildlife Refuge Fire Management Plan* is consistent with guidance from the US Fish and Wildlife Service's *Wildland Fire Management Handbook* (USFWS 2000). This handbook defines the service-wide goal of wildland fire management to achieve resource objectives through prevention of human-caused wildland fires, to minimize the negative impacts on resources from all wildland fires that occur, and to guide the use of prescribed fire as an integral part of the resources management in a manner which would minimize the risk to the lives of employees, visitors, neighbors and their property.

The Pahranagat National Wildlife Refuge was created out of an existing agriculture operation in the early 1960s. The refuge to a large extent continued certain agricultural practices to produce a food source for migrating waterfowl, particularly for the Canada goose. Recent changes in program direction at the refuge has resulted in abandoning agricultural practices in favor of managing for more natural ecosystems, improving water management practices, and maintaining and improving habitat for threatened and endangered species and other species at risk.

The use of prescribed fire is an important tool to maintain certain ecosystems, such as the wet meadow/grassland communities at the refuge in an early more productive seral condition. Farmlands, once an important component at the refuge, have laid fallow over the past few years. Unfortunately, Russian knapweed (a noxious weed) has invaded these fallow fields and threatens to expand within the refuge. The use of prescribed fires is one of a number of important management tools to help eradicate this noxious weed and other invasive exotic plants such as salt cedar. Prescribed fire is also an important tool to reduce high fuel loads, which if left intact, could result in catastrophic wildfires that could negatively impact the various riparian habitats within the refuge and refuge property. The riparian habitats are important habitat for the Federally listed Southwestern willow flycatcher. Once wildfires start or advance in the riparian habitats, they will be very difficult to extinguish before considerable habitat is lost. Prescribed fire will also be used to reduce fuel loads along the interface of the refuge boundary and private lands to reduce the potential liability of wildland fires spreading from one property to the other.

Wildland fires will continue to be suppressed as aggressively as feasible to provide protection of life, property, and cultural resources.

Through consultation with the U.S. Fish and Wildlife Service's Southern Nevada Project Office, it was decided that Sec. 7 consultation per the Endangered Species Act of 1973, as amended, would occur for each site-specific burn plan.

In summary, prescribed fire will be used as a complimentary management tool to other management actions to: reduce fuel loads, thus reducing the frequency and intensity of wildland fires; reduce weed infestations; increase native plant abundance and diversity; improve water delivery systems; and improve open water to plant cover ratios in marshlands..

ALTERNATIVES

The following alternatives were analyzed for this environmental assessment. Under both alternatives, appropriate suppression response would be taken on all wildland fires, including human- and lightning-caused fires.

ALTERNATIVE A: FULL SUPPRESSION (NO ACTION)

The No Action alternative represents continued suppression of all fires on the refuge. Under this alternative, all ignitions within the Pahranagat National Wildlife Refuge, including those of natural origin would be suppressed. Suppression would be accomplished through the use of appropriate techniques. No prescribed burning or mechanical fuel manipulation would be conducted.

ALTERNATIVE B: PRESCRIBED FIRE (PROPOSED ACTION)

Under this alternative, prescribed fires, ignited by qualified fire personnel, would be used to simulate the ecological effects of natural fire, reduce hazard fuels and noxious weeds, and improve wildlife habitat. Prescribed fires would be intentionally ignited to accomplish management objectives in specific areas under prescribed conditions identified in approved prescribed burn plans. All other ignitions (whether of natural or human origin) would be suppressed. All prescribed fires would be monitored and be available as research projects. Mechanical manipulation of fuels for site preparation prior to ignition of prescribed fire projects might be used. If so, it will be implemented with the use of hand crews using chainsaws, shovels and other hand tools for the purpose of creating firelines and moving and stacking of downed fuels for ignition during burning windows.

Treatment will occur in wet meadow/grassland habitats (510 acres), marsh habitats (420 acres), and croplands (180 acres), and along water delivery systems. Prescribed fire will also be conducted within or near refuge development zones and boundary areas to reduce the risk from wildland fire damage. To the greatest extent possible, hazard reduction prescribed fires will only

be used when they compliment resource management objectives. Prescribed burns may also be used adjacent to riparian areas to burn excess fuel removed from the riparian area and to develop fire breaks. This would be implemented to reduce the potential for catastrophic wildland fires within the riparian habitat. Burn frequency will vary from 2 to 10 years, depending upon specific management objectives, historic fire frequency, and funding. No more than 35% of any specific habitat type will be burned in any particular year. The reduction of fuel hazards or establishment of fire breaks within riparian areas will be by hand crews only. Removed material will be stacked and burned. All riparian woodlands and significant stands of salt cedar adjacent to surface water will be identified as a no burn zone. Eventually, as more riparian habitats are created at the refuge, the refuge, in consultant with the Service's Ecological Services's office, will use prescribed fire to eradicate all salt cedar within the refuge boundary. A 100 hundred foot buffer zone will be established around each no burn zone of which the refuge will coordinate any planned prescribed fire with Ecological Services.

A site-specific burn plan will be developed for each prescribe fire and will include site specific objectives to be achieved, the prescription to be used, and a plan of action for carrying out the burn. The plans will also identify resource concerns and specific mitigation measures or special precautions to alleviate potential detrimental fire effects.

Prescribe fires are not new to the refuge. Between 1985 and 1996, twelve prescribed fires burned a total of 2,222 acres for an average of 185 acres per burn. These fires were all implemented between October and May with all but two occurring between November and March.

The goals of the prescribed fire program are to:

- Restore/perpetuate native grasses, forbs, and shrubs.
- Reduce non-native plant species.
- Periodically reduce dense cattail and bulrush growth in wetlands to improve the ratio of open water to cover.
- Maintain/rejuvenate nesting cover for waterfowl and other native birds.
- Maintain water delivery systems.
- Protect riparian habitats from catastrophic wildland fire events through the establishment of firebreaks.

Prescribe fire will be used in conjunction with other ongoing management actions to meet the following refuge objectives:

General Objective	Specific Objective	Target Species
Enhance wildlife diversity through habitat management with special emphasis on endangered, threatened, candidate species.	Improve/maintain riparian habitats in good condition and reduce the potential for catastrophic wildland fire events.	Southwestern willow flycatcher bald eagle peregrin falcon phainopepla
	Improve/maintain wet meadow habitats by using prescribed fires to reduce fuel loads and to maintain the appropriate successional plant community	Pahranagat Valley vole
Provide fall and spring migration habitat with special emphasis on the maintenance of duck and greater sandhill crane feeding and resting	Improve/maintain the optimal ratio of open water to cover in marshlands.	migratory waterfowl. peregrine falcon

[1]An increase in migratory waterfowl will have a beneficial affect on peregrine falcon.

habitat. [1]	Reduce noxious weeds and improve the perennial grass, legume, and other native species component within grasslands and croplands	migratory waterfowl. greater sandhill crane peregrine falcon
	Reduce fuel loads to reduce the potential for catastrophic wildland fire events within grassland and cropland habitats, and maintain these habitat types in an early successional stage and/or towards a natural native plant community. This includes reducing decadent vegetation and promoting more native succulents.	migratory waterfowl greater sandhill crane peregrine falcon
Increase habitat quantity and quality for native nesting aquatic and terrestrial birds.	Improve/maintain riparian habitats in good condition and reduce the potential for catastrophic wildland fire events.	Southwestern willow flycatcher bald eagle peregrine falcon phainopepla other native birds

	Improve/maintain the optimal ratio of open water to cover in marshlands.	migratory waterfowl. peregrine falcon

ALTERNATIVES CONSIDERED BUT FOUND TO BE INFEASIBLE

No Wildland Fire Suppression or Prescribed Fire
Under this alternative all ignitions would be allowed to burn in all areas and at all times. This alternative was found to be undesirable due to unacceptable risk to human life and property, with significant political, socioeconomic, and environmental impacts.

Modified Wildland Fire Suppression to Achieve Management Objectives
Under this alternative, natural (lightning-caused) ignitions would be managed in predetermined areas for resource benefits, if all prescription criteria were met. This alternative was found to be undesirable due to staff limitations, small land management parcels, long response times, valuable cultural resources, and values at risk on neighboring lands.

Mechanical Manipulation of Fuels Only
Under this alternative, hazard fuel buildups would be removed or manipulated strictly by mechanical means to the extent practicable. This alternative was found to be undesirable because it would be extremely expensive and in some cases not as effective as prescribed fires. However, mechanical manipulation will still be a management tool at the refuge as part of a holistic approach using prescribed fire.

AFFECTED ENVIRONMENT

BACKGROUND

The Pahranagat National Wildlife Refuge is located 90 miles north of Las Vegas and four miles south of Alamo, Nevada in Lincoln County and was established on August 16, 1963 under authority of the Migratory Bird Conservation Act of 1929. The refuge is located along a 10-mile stretch of Pahranagat Valley and consists of 5,380 acres set at an elevation of 3300 to 3800 feet. Pahranagat Valley consists of three distinct topographical features: steep mountain slopes, alluvial fans and terraces, and the flood plain. The White River, an ancient perennial stream that was once a tributary to the Colorado River, once flowed through Pahranagat Valley from the north. It established a well-defined but relatively narrow flood plain. The river bed is dry for many miles upstream and downstream from Pahranagat Valley but contains water from large thermal springs in Pahranagat Valley. Habitat types include the Mojave Desert scrub, wet meadows and grassland, fallow agricultural fields, marshes, open water, and riparian habitats.

Numerous wildland fires occur annually on lands in and surrounding the refuge. Many of the fires surrounding the refuge are human-caused resulting from local landowners burning debris along their irrigation ditches. Fires of natural origin occur on lands within and adjacent to the refuge. Most fires in the area occur during the summer months with the majority of ignitions in July, August, and September. These months are generally hot and dry with scattered summer monsoons.

Management emphasis in the past has been the production of short-grass habitat and croplands for Canada geese. The short-grass habitat has traditionally been maintained with the use of livestock grazing and haying. Recent refuge emphasis has been to manage for a more natural ecosystem by allowing for recovery of habitats to their natural condition.

VEGETATION

Vegetation within the refuge is associated with five major plant communities; the Mojave/Great Basin Desert scrub, wet meadow/grassland, riparian, cropland, and marsh.

Mojave Desert Scrub (2,780 acres): Most of this plant community occurs along the peripheral of the refuge (mostly on the west side). Due to the latitude of the refuge, the Mojave Desert is near the extent of it's range. Consequently, some Great Basin Desert plant species are more common than may occur elsewhere in this plant community. Major plant species within this community include Joshua tree (*Yucca brevifolia*), creosote bush *(Larrea tridentata*), Mojave yucca (*Yucca schidigera*), cholla (*Opuntia spp.*), prickly pear (*Opuntia spp.*), bursage, (*Ambrosia dumosa*), shadscale (*Atriplex confertifolia*), cheesebush (*Hymenoclea salsola*), hopsage (*Grayia spinosa*), winterfat (*Ceratoides lanata*), greasewood (*Sarcobatus vermiculatus*), Mormon tea (*Ephedra spp.),* blackbrush (*Coleogyne ramosissima*), big galleta grass (*Hilaria rigida*), dropseed,(*Sporobolus spp.*), Indian ricegrass (*Oryzopsis hymenoides*), bush muhly (*Muhlenbergia porteri*) and fluffgrass (*Tridens pulchella*). Many other species also occur. The occurrence or abundance of any particular species will vary at any given location.

Wet Meadow/Grassland (510 acres): Common species within these habitat types include: wheatgrass (*Agropyron sp.*), bentgrass (*Agrostis sp.*), foxtail (*Alopecurus sp.*), saltgrass (*Distichlis sp.*), Basin wildrye (*Elymus sp.*), barley (*Hordeum sp.)* Muhly grass (*Muhlenbergia sp.*), and Alkali sacaton (*Sporobolus airoides*). In the more moist environments, rushes (*Juncus sp.*) and Yerba mansa (*Anemopis californica*) also occur.

Riparian (80 acres): The riparian community consists of Fremont cottonwood (*Populus fremontii*), Gooding willow (*Salix nigra*), coyote willow (*Salix exigua*), and salt cedar (*Tamarix pentandra*). This community is found in relatively small clumps or narrow linear stands.

1This view shows Southwestern willow flycatcher habitat at the riparian (cottonwood/willow stand) area at North Marsh. Notice the old growth of material in the grassland to the right. The green patch to the right of the trees is Yerba mansa, commonly associated with marshland.

Cropland (180 acres): Because the refuge is no longer planting croplands, these sites are rapidly changing in plant composition. Unfortunately, Russian knapweed has invaded a significant portion of these fields.

Marshland (420 acres): The predominant species in the refuge's marshlands is cattail (*Typha latifolia*). Other species include rushes and spike rushes (*Elocharis sp. and Juncus sp.*), sedges (*Cyperus and Carex spp.*), bulrushes (*Scirpus sp.*), pennywort (*Hydrocotyle verticellata*), pondweed *(Potamogeton sp.*), algae (*Chara sp., Spirogyra sp., and Compsopogon sp.*), Yerba mansa (*Anemopis californica*), and watermilfoil ((Myriophyllum *sp.*).

FUELS AND WILDLAND FIRE OCCURRENCE

Four different fuel types are currently recognized in the refuge: grasslands, riparian areas or woodlands, salt cedar stands, and Mojave Desert. Grasslands are characterized by dry, open, grassy areas, which allows surface fires to move rapidly through the cured grass and associated materials. Vegetation in this area remains green during the first half of the fire season. As the grass cures, this community becomes more flammable. The riparian areas are occupied by willow and cottonwood dominated communities. Native and non-native grasses are found throughout the community. Vegetation in this area remains green during the majority of the fire season, but as the grasses cure the understory becomes more flammable. Salt cedar stands vary greatly from single trees, to small clumps of trees, to relatively thick large stands of very dense cover. The later has virtually no under story but the extremely heavy foliage provides very high fuel loads. The Mojave Desert community has a relatively low fuel load characterized by low to moderate shrubs separated by mostly bare ground surface with low density perennial grasses. Good fall/winter rains produce dramatic increases in spring herbeceous production. The occurrence of invasive species such as red brome (*Bromus rubens*), *Schismus sp.*, and *Erodium cicutarium* have greatly increased fuel loads during high production springs. When in abundance, these plants provide a fuel source to carry fire between the inter-spaces of shrubs thus providing favorable conditions for wildland fire.

Between1979 and 1998, fourteen wildland fires burned 1,447.6 acres. Though most fires were less than 3 acres, one fire burned 1,300 acres, another 100 acres, and a third 30 acres. The habitat types of which the fires occurred in were not well documented. The 1,300 acre fire was believed to have been an arson fire.

THREATENED AND ENDANGERED SPECIES

There are three Federally listed threatened and endangered species that use the refuge at least seasonally. These include the Southern bald eagle, Southwestern willow flycatcher, and the desert tortoise. Small numbers (less than 6) of bald eagles have used the refuge from time to time for foraging and roosting during winter migration. The North Marsh appears to be their favored hunting grounds. (See the attached map for the location of the marsh areas.) They use the mature cottonwood trees for roost sites. The Southwestern willow flycatcher is known to nest in mature Gooding willow near the north end of the North Marsh and in cottonwoods along

irrigation ditches just south of the North Marsh (Krueger, personal comm. 2001). The desert tortoise occurs primarily along the western edge of the refuge within the Mojave Desert scrub vegetation. As the refuge is close to the limit of the desert tortoise range, population densities are believed to be relatively low.

SPECIES OF CONCERN

The following table lists species located within and adjacent to the refuge that are listed by the USFWS as "species of concern" or by the Bureau of Land Management as "special status species".

Species	USFWS Species of Concern	BLM Special Status Species
Pahranagat Valley montane vole	X	X
Townsend's big-eared bat	X	X
Spotted bat	X	
Western small-footed myotis	X	X
Phainopepla		X
peregrine falcon	X	X
Ferruginous hawk	X	
White-faced Ibis	X	
Yellow-billed cuckoo[2]		

The Pahranagat Valley montane vole is endemic to the Pahranagat Valley and has been documented east and north of North Marsh, the northern portion of the Middle Marsh unit, and just north and west of the Middle Marsh Pond. In all cases they were located in areas of moist meadow habitats with good grass cover. The peregrine falcon has been seen foraging as recently as the summer of 1998 at Middle Marsh. The phainopepla occurs in and around the riparian habitats during the spring/summer nesting period. The white-faced ibis inhabits the marshes and riparian areas during their migration periods. The yellow-billed cuckoo is known to occur in some of the riparian areas within the refuge and is believed to also be nesting (Krueger, personal comm. 2001). Bats primarily use the refuge for foraging over the meadows, marshes, and open water.

[2]The yellow-billed cuckoo has been petitioned for listing and is currently under evaluation as a threatened species by the Service.

WILDLIFE

A variety of other wildlife species occur within the refuge including Swainson's hawk, ferruginous hawk, red-tailed hawk, short-eared owl, burrowing owl, American kestral, Gambel's quail, a number of neo-tropical migrant birds during the spring and fall migration periods (see the draft *Cropland and Grazing Management Plan* for list of birds), kit fox, coyote, desert cottontail, jack rabbit, and a variety of reptiles and amphibians. Because the refuge has existed primarily for migratory waterfowl, a large variety of waterfowl occur within the refuge. During the peak spring migration period (usually March), the refuge has averaged (over the period of 1993-1998) 4,571 ducks and 67 Canada geese. Twenty five to fifty pairs of redheads, gadwalls, mallards, and ruddy ducks as well as 10 pair of Canada geese have used the refuge for nesting. During the peak fall migration (late October), approximately 10,000 ducks use the refuge with the majority being pintails, green-winged teals, mallards, and American wigeon. By winter, duck populations at the refuge drop to approximately 1,000 birds. During the December/January period, Canada geese numbers can reach nearly 2,000. Approximately 2,000 greater sandhill cranes use the refuge during winter and fall migrations.

MIGRATORY BIRDS

The Migratory Bird Treaty Act (MBTA) protects migratory birds and their active nests from "take", which is defined as **"**to pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt" those things (50 CFR. 10.12). Virtually all of the avian species that use the refuge are protected under the Migratory Bird Treaty Act.

WETLANDS/RIPARIAN ZONES

There are 590 acres of wetlands and riparian habitats within the refuge. There descriptions are provided under the vegetation descriptions above.

VISUAL RESOURCES

Because the lakes, marshes, wet meadows, grasslands, and pockets of deciduous woodlands (riparian areas) are in stark contrast to the surrounding desert environment, the refuge provides a pleasant visual relief. The landscape forms a long narrow ribbon of relatively flat green meadows and grasslands during the growing season that turns brown during the winter with relief provided by lakes and patches of cottonwoods, willows, salt cedars, and cattails.

2Notice the contrast between the upland Mojave Desert scrub in the background and the lake, marshland (dark green) and grasslands. The foreground is a transition between Mojave Desert scrub and grassland.

AIR QUALITY

The Pahranagat National Wildlife Refuge is within a Class II air quality area as specified by the Clean Air Act. Prescribed fire would be conducted under the guidelines of State air quality standards as identified in the *Nevada Smoke Management Program Plan* (July 1999).

SOILS

Soils of the refuge are typically loams with a high percentage of clay that display moderate to severe erosion potential when vegetation is removed. The following table identifies the major soil types and associated plant communities:

Soil Type/Description	Associated Vegetation	Management Objective
Geer Fine Sandy Loam - very sandy	desert scrub and fallow cropland Knapweed infestation common in fallow fields	Manage for natural reestablishment of native upland grasses and shrubs including four-wing saltbush and quail bush. Use prescribe fires to control noxious weeds and enhance natural recovery. The temporary planting of more drought tolerant species such as orchard grass, crested wheatgrass, and/or rye grass is proposed within the croplands during the interim. Also manage for cottonwood and willow where they become established.
Ash Springs Silt Loam (reclaimed) - very productive	fallow cropland and grassland	Establish native willows and cottonwoods through a planting program. Grain crops such as oats, 2-rowed barely, and/or wheat will be planted for sand hill cranes outside the willow/cottonwood establishment areas. Fields include Dugway & Orchard fields.

Seaman Sandy Loam	desert scrub	Same as above and includes Pasture, Upper Headquarters, and Orchard fields.
Ash Springs Silt Loam - somewhat poorly drained and moderately to strongly saline	fallow cropland and grassland	The southern portion of this soil type will be will managed as marsh habitats. Where salt concentrations are not too high, grains such as 2- rowed barley, oats, or wheat may be planted and rotated with legumes. Includes Lower Headquarters field and portions of Cabin field.
Pahranagat Silt Loam (drained)	fallow cropland and grassland	Same prescription as the Geer Fine Sandy Loam above or if feasible establish willow/cottonwood riparian areas.
Pahranagat-Ash Springs complex	wetlands and wet meadows	Manage as wetlands and wet meadows

Peat	wetlands and wet meadows	Manage as wetlands and wet meadows

CULTURAL RESOURCES

Black Canyon, located within ½ mile of the refuge headquarters, is listed in the National Register of Historic Places and contains significant Native American cultural resources. The site contains large and unique rock art, rock shelters, and hunting camps/blinds.

NOXIOUS WEEDS

There are four primary invasive exotic weed species (excluding those invasive species described in the Mojave Desert scrub) within the refuge. These include salt cedar (*Tamarisk ramosissima*), Russian knapweed (*Centaurea repens*), Russian thistle (*Salsola iberica*), and five-hook bassia (*Bassia hyssopifolia*). Salt cedar and Russian knapweed are listed as noxious weeds under Nevada Revised Statues (NRS 555). These statues require every landowner (including private, city, county, and Federal) to take action to eradicate noxious weeds on their property. Knapweed currently infests approximately 45 acres of fallow croplands and pastures. Another 30 acres along roadsides and irrigation ditches are infested with Russian thistle and/or bassia. The most significant noxious weed issue on the refuge is salt cedar which infests approximately 200 acres along irrigation canals, springs, and lake and marsh shorelines. The use of herbicides will be the primary control mechanism used for eradication of these species (see the *Integrated Pest Management Plan, Pahranagat NWR*). Prescribed fire may be used to reduce the canopy of thick salt cedar stands to allow crews better access for mechanical and herbicide treatment. Prescribe fire will be used to burn salt cedar debris piles created by the cut-surface method and mechanical method of eradication. Prescribe fire may also be used on Russian knapweed.

CONSEQUENCES OF THE PROPOSED AND ALTERNATIVE ACTIONS

VEGETATION

Alternative A: Full Suppression (No Action)
Full and immediate fire suppression activities will generally keep wildland fires relatively small. However, in some habitat types such as the riparian areas (which are habitat for the Federally threatened Southwestern willow flycatcher and Southern bald eagle), a wildland fire could be catastrophic. The refuge relies on BLM fire personnel stationed in Caliente, Nevada (miles away) to respond to wildland fires. The response time is well over 45 minutes, which means that riparian habitats could experience extreme danger from wildland fires. .

Wet meadows and grasslands could become decadent and unproductive without mechanical or fire treatment to set back succession. Fuel loads would increase dramatically over time thus creating conditions for more high intensity fires that may cause more damage to plant root systems and destroy soil microbes and productivity. Instead of rejuvenating the plant community to a younger seral stage with more succulent plant growth, a high intensity wildland fire could create conditions more conducive to invasive weeds. The same condition applies to marshlands/wetlands where cattails can literally and choke out openings of which many waterfowl require.

Suppression activities would result in localized adverse resource impacts from mechanically built firelines, helispot construction, cross-country vehicular travel and other activities.

Alternative B: Prescribed Fire (Proposed Action)
Effects of fire on vegetation are directly related to the type of vegetation and the fire behavior exhibited by the fire. Fire intensity, temperature, flame length, duration, time of day, and season influence fire impact. Prescribed fires of low intensity and temperature may damage some With a low temperature fire, root systems are generally not damaged and most plants can readily put on new growth. Rather than potentially altering a vegetative community that could occur from a wildland fire, a prescribed fire would maintain the plant community in a healthy condition.

Prescribed burns would prevent catastrophic damage to fire tolerant species and would reduce fuel accumulations that could contribute to large and potentially dangerous conflagrations. Prescribed burns could also be planned in a systematic way so that habitat types could be burned on a regularly scheduled rotational basis thus reducing dangerous fuel load buildups and maintaining a greater proportion of the refuge in good ecological condition.

Prescribed burns, especially for hazard fuel reduction projects, are often conducted during the season best suited to fire control efforts. Burning during these times of year can increase mortality rate of some plant species that are not fire adapted. Thus hazard fuel burning, in some instances, can reduce the biological diversity of an area.

Due to decades of fire suppression in the refuge, some areas have very high fuel loads. Prescribed fires in areas of high fuel loads could become uncontrollable or burn hotter than desired and might result in the mortality of plants that are fire adapted.
Preburn preparation of a prescribed burn project might include manual manipulation of fuels prior to ignition. This manipulation might include line preparation using hand tools, wet line, or foam techniques, and the movement of downed fuels to nearby areas where they might be safely ignited. Manual manipulation would not include the use of heavy equipment (dozers, front end loaders, etc.).

FUELS

Alternative A: Full Suppression (No Action)
Implementing this alternative would create a gradual and unnatural increase in fuel accumulations leading to increased potential of wildland fires of greater size and intensities than would occur under natural fire regimes. Control capabilities would be compromised or exceeded, and suppression expenses increased. The potential of threat to life and property rises, as well as an increased potential for large destructive fires.

Alternative B: Prescribed Fire (Proposed Action)
Prescribed burning, in conjunction with mechanical fuel manipulation, would reduce accumulations of fuels which contribute to large and potentially catastrophic fires.

Prescribed fires in areas where fuel loads are very high might escape control lines.

WILDLIFE

Alternative A: Full Suppression (No Action)
Wildlife populations would be influenced directly and indirectly by the impacts on associated vegetative communities. The increased probability of intense wildland fires would lead to fire-caused mortalities. The potential for catastrophic fire events in important habitat for the Federally listed Southwestern willow

flycatcher and Southern bald eagle is quite high. The potential for inadvertent wildlife habitat destruction could occur from fire suppression activities such as fireline construction as well as loss of successional stages for habitat.

Full suppression might have adverse impacts on fish populations in several areas. Aged, decadent, or even non-native stream side vegetation would continue to alter the structure of riparian zones at alarming rates.

Alternative B: Prescribed Fire (Proposed Action)
This alternative would allow greater flexibility in planning for, locating, and avoiding disturbance to wildlife populations. Habitat impacts would be determined by prescribed burn timing, location, conditions, and patterns. Considering the small size of the refuge and the modest proposed prescribed fire program, any impacts to wildlife would be minimal and temporary. No long-term changes in wildlife populations are anticipated. Though prescribed burns are not planned for riparian habitats, prescribed fires would reduced fuel loads in adjacent habitats thus reducing the chance of wildland fires progressing into these important habitat areas.

Proper planning and management of prescribed fires would aid in the reduction of ash and other contaminants that might be washed into streams. Prescribed fires would occur in the fall, winter or spring. Timing of prescribed burning would be coordinated to minimize impacts on spawning times for fish species, and also to minimize ground cover loss and the resultant surface washing that may produce contaminates in water resources.

Impacts to the mammals and birds on the federal and state species of concern list should be temporary in nature and minor in intensity. There should be no impacts on the Federally threatened Southwestern willow flycatcher. The Southern bald eagle could be temporarily forced from their roost sites if a prescribed burn is conducted near their roosting habitat and prevailing winds were to blow smoke in their direction. To decrease negative impacts to wildlife populations, prescribed fires will be burned in a mosaic pattern (with only 40-70% of acreage within the fire perimeter actually burned). This type of burn pattern will provide refuge for small mammals and will ensure that forage for bat and bird species remains intact. No more than 35% of any one habitat type would be burned in any given year thus providing safe havens for wildlife populations (such as the Pahranagat Valley vole) that can rebound to repopulate the burn areas.

AIR QUALITY

Alternative A: Full Suppression (No Action)
Implementation of this alternative would generate a short term reduction of particulate matter from fires due to suppression efforts. The type and amount of emissions would vary greatly dependent upon fuel moisture, fire intensity and other physical characteristics of the environment. This alternative would increase the potential for severe episodes of air pollution due to accumulated fuels resulting from suppression actions. The potential for large, high intensity fires which might be difficult to suppress would continue to increase, further contributing to uncontrolled and undesirable impacts to air quality and visibility.

Alternative B: Prescribed Fire (Proposed Action)
Local air quality would be adversely affected for short periods of time during prescribed burns, with air quality returning to normal following the completion of burning. Particulate matter would be the primary pollutant with localized effects, therefore no significant long-term health impacts are expected. The effect

of particulate matter and visibility on local communities and commercial establishments can be lessened by the proper use of smoke management and public notification. The controlled nature of these burns makes their effect on air quality less severe than from catastrophic wildland fires.

WATER RESOURCES

Alternative A: Full Suppression (No Action)
Implementation of this alternative would cause only short term benefits. This alternative would increase the potential for severe episodes of wildland fire due to accumulated fuels resulting from suppression actions. The potential for large, high intensity fires which might be difficult to suppress would continue to increase, further contributing to vegetation and land impacts with associated runoff to hydrologic resources. Soils stripped of vegetative cover might suffer severe erosion during certain periods of the year. This could affect water quality by increasing nitrate pollution of the water and temporarily increasing water turbidity.

Alternative B: Prescribed Fire (Proposed Action)
Because of the controlled area, timing, and intensity of prescribed burning in this alternative, there should be little or no long- or short-term changes in hydrologic conditions within the prescribed burn areas. Burn activities would be timed for target species growth potentials, promoting stand rejuvenation. Some erosive effects would result from the construction of firelines and other ground disturbing activities. Firelines created as a result of burn activities would be rehabilitated to minimize erosion. Burning has been shown to aid in increasing grass, forb and understory cover, all of which would reduce surface runoff. With an increase in these constituents in all areas of the refuge, the potential for damaging runoff is reduced. The reduction of down and dead fuel loads by prescribed fire may also reduce ash into water resources. Erosion resulting from this alternative should approximate natural erosion levels.

SOILS

Alternative A: Full Suppression (No Action)
Long-term impacts of this alternative, with increased potential for catastrophic fire, would have adverse impacts to soils. Diurnal temperature regimes would be altered from effects of catastrophic fire due to loss of shading and insulating cover. High intensity wildland fires could severely impact soils by destroying soil organic material. Some erosive effects would result from the construction of firelines and other ground disturbing activities. Firelines created as a result of burn activities would be rehabilitated to minimize erosion. Soils stripped of vegetative cover might suffer severe erosion during certain periods of the year.

Alternative B: Prescribed Fire (Proposed Action)
Because of the controlled area, timing, and intensity of prescribed burning in this alternative, there should be little or no long- or short- term changes in soils within the prescribed burn areas. Lower temperature prescribed fires would have almost no affect on soil organic material. Some erosive effects would result from any construction of firelines and other ground disturbing activities. Firelines created as a result of burn activities would be rehabilitated to minimize erosion. Burning is often patchy which prevents soils in these areas from sheet erosion as well as increasing interception of precipitation.

CULTURAL RESOURCES

Alternative A: Full Suppression (No Action)
Recorded cultural resources would receive protection from wildland fire under this alternative. Potential for cultural landscape damage by fire would increase in the long-term scenario. There would be an increased possibility of destruction of previously unrecorded cultural resources as a result of fire suppression activities such as fire line construction and backfiring operations. Risk to historic buildings increases as the chance for a catastrophic fire increases.

Alternative B: Prescribed Fire (Proposed Action)
With the scheduled nature of burning under this alternative, there would be an ability to plan for, locate, and avoid the disturbance of cultural resources due to either ignition or fire control activities. Dangerous fuel buildups near known resources would be reduced. Cultural features, structures, and other resources would receive increased protection by reducing fuels through controlled burns in appropriate areas.

SAFETY

Alternative A: Full Suppression (No Action)
The occurrence of catastrophic fires resulting from high fuel loadings caused by fire suppression would pose a threat to the safety of both firefighters and the public. Efforts at direct attack or suppression of severe fires would pose a threat to firefighter safety due to the nature of the activity. Examples of this are fireline construction, helicopter transport, backfiring operations, and exposure to smoke.

Alternative B: Prescribed Fire (Proposed Action)
The implementation of prescribed burning would allow fireline construction to be accomplished in a safe manner by enabling managers to schedule such activities and to plan their construction in an orderly fashion. Fires would be ignited in a preplanned pattern. There would be a potential safety problem from prescribed fires that might cross control lines.

VISUAL OR AESTHETIC VALUES

Alternative A: Full Suppression (No Action)
Implementing this alternative would reduce the short-term visual effects that would result from other alternatives utilizing prescribed fire. However the increased potential for high-intensity fire developing over the long run would result in drastic changes in the aesthetic appearances of affected areas and a short-term black appearance to the landscape.

Alternative B: Prescribed Fire (Proposed Action)
Through the use of prescribed burns, areas with sensitive visual resources can be protected from fire. Short-term visual effects would consist of scorching of foliage. Prescribed fires would aid in the maintenance of the historic/ cultural scene and also in the rejuvenation of the natural vegetation. This would result in increased visitor enjoyment, wildlife viewing, and protection of resources.

OVERALL PROGRAM RISK

Alternative A: Full Suppression (No Action)
In the short term, full suppression poses the least amount of risk to natural resources and developments in the refuge and surrounding areas. In the long-term, fuel buildup would increase the potential for large, uncontrollable fires that would pose a significant risk to developed areas and natural resources in and near the refuge. The chance that a fire starting in the refuge and spreading to adjacent lands increases in the long-term.

Alternative B: Prescribed Fire (Proposed Action)
This alternative would present a low amount of short-term risk. Prescribed burns are conducted by trained fire personnel and would be conducted only in conditions that present an opportunity to control. There would be limited potential for loss of fire control. Long-term risk is moderate as compared to Alternative A.

MITIGATING MEASURES

The following mitigating measures, some of which are included in the proposed alternative, are adopted to reduce potential impacts of the proposed alternative.

1. All cottonwood/willow riparian habitats and extensive salt cedar stands adjacent to surface water will be identified on a map as a "no burn zone".

2. A 100 foot buffer zone will be identified around each of the "no burn zones". Prescribed burn plans within these buffer zones will require concurrence of the Service's Ecological Services branch in Las Vegas, Nevada.

3. No more than 35% of any given habitat type will be burned in any particular year.

4. Habitat types will be closely monitored to ensure that prescribe burn frequencies do not alter the habitat conditions managed for.

5. Prescribed burns will only be conducted during the period of October through April to avoid migratory bird nesting activity in general and the Southwestern willow flycatcher in particular.

6. Prescribed burns will be implemented to achieve a mosaic affect within the burn area in so far as possible.

7. Cottonwoods and willows will be planted within the refuge to increase overall riparian habitats and to replace salt cedar stands that may be treated with prescribed burns and other management prescriptions.

8. Salt cedar stands identified as "no burn zones" will not be treated until item 7 above is implemented.

9. Local communities will be notified prior to the ignition of prescribed fires.

10. Prescribed burn prescriptions will include measures to insure that smoke doesn't affect local the air quality in local communities.

11. Prescribed burn prescriptions will include provisions to ensure that the burns do not burn at temperatures that may have significant negative impacts on plant survivability, soil microbes, and soil organic matter.

CUMULATIVE IMPACTS

Alternative A: Full Suppression (No Action)

Implementing this alternative would create a gradual and unnatural increase in fuel accumulations leading to increased potential of wildland fires of greater size and intensities than would occur under natural fire regimes. These fires could result in catastrophic impacts to some wildlife species, especially those like the Southwestern willow flycatcher and many other species associated with riparian areas, as the chances for such fires increase over time without fuel load reductions. Suppression activities would result in adverse resource impacts from firelines, helispot construction and other activities. The potential of threat to life and property rises. The potential for inadvertent wildlife habitat destruction could occur from fire suppression activities. This alternative would increase the potential for severe episodes of air pollution due to accumulated fuels, especially given that wildland fires often occur simultaneously region-wide. The potential for large, high intensity fires further contributes to vegetation and land impacts with associated runoff to hydrologic resources, again with simultaneous fires region-wide increasing the

magnitude of the effect. Soil productivity could be reduced due to high intensity wildland fires. There would be an increased possibility of destruction of previously unrecorded cultural resources. Risk to historic buildings increases as the chance for a catastrophic fire increases. The occurrence of catastrophic fires resulting from high fuel loadings poses a threat to the safety of both firefighters and the public. As fire hazards increase due to the continuing buildup of fuels, the magnitude of the suppression effort would rise as would associated suppression costs.

Alternative B: Prescribed Fire (Proposed Action)
No adverse cumulative impacts would be expected from the Proposed Action. Local air quality would be affected for short periods of time during prescribed burns, with air quality returning to normal following the completion of burning. Effects of smoke from prescribed fires throughout the basin may be mitigated with careful planning. Particulate matter would be the primary pollutant with localized effects, therefore no significant long-term health impacts would be expected. The controlled nature of these burns would make the effect on air quality less severe than from catastrophic wildland fires. There should be little or no long- or short- term changes in soils within the prescribed burn areas. Some erosive effects would result from the construction of firelines and other ground disturbing activities. There is a potential safety problem from prescribed fires that might cross control lines. The use of prescribed fires is an important tool for managing various habitats at the appropriate ecological condition to meet refuge objectives. The use of mechanical means alone is too expensive and often less effective, than the use of fire to achieve the management objectives.

PREPARERS

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CONSULTATION AND COORDINATION

The following individuals were consulted in the preparation of this environmental assessment:

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Roddy Baumann, Prescribed Fire Specialist, US Fish and Wildlife Service, Portland, OR

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Section 7 Compliance

INTRA-SERVICE SECTION 7 BIOLOGICAL EVALUATION FORM

Originating Person: Paul Bannister
Telephone Number: 702-646-3401
Date: 07/10/01

I. Region: One

II. Service Activity: Implementation of the National Fire Plan, H.R. 4578-85.

III. Pertinent Species and Habitat:

A. Listed species and/or their critical habitat within the action area:

The listed species include the Southwestern willow flycatcher**,** Bald eagle, Desert tortoise. There is no critical habitat within the action area. The following are brief species accounts for each of the species.

Bald Eagle: Pahranagat NWR is receives minimal (less than 10 individuals) bald eagle use in a given year, and use is primarily restricted to wintering individuals. Eagle use is concentrated around North Marsh where wintering waterfowl and fish provide foraging opportunities. Eagles utilizing the Refuge may also be associated with riparian forest areas where they may perch and roost between foraging bouts. There are no nesting eagles associated with the Refuge, the closest known bald eagle nest to the Refuge is located XXX miles (cardinal direction). The Refuge is located in Recovery Unit 37 as identified in the Service's 1986 Pacific Bald Eagle Recovery Plan. To date XX eagles nest within the state of Nevada, the wintering population in southern Nevada has never supported more than 5% of the known wintering individuals in the state.

Southwestern willow flycatcher: Habitat for this species on the Refuge is most closely associated with habitats characterized as riparian forest in the FMP. Currently approximately 80 acres of this habitat exists within the Refuge. Results of 2000 surveys conducted on the Refuge identified 12 nesting pairs of willow flycatchers, 21 nests, and 30 fledglings. The species is currently known to nest in both native (*Salix* sp.) and may nest in non-native species (*Tamarisk* sp.). To date surveys for the species have been restricted to the northern portion of the Refuge near North Marsh. Species and habitat surveys being conducted this year will provide a better estimate of habitat availability on the Refuge. In the interim, it is assumed that all suitable and potentially suitable habitat on the Refuge could support the species. The Service's 2001 Draft Recovery Plan for the species (USDI 2001) identified the Pahranagat NWR as a contemporary breeding location, and a subset of the Lower Colorado River recovery unit. The draft plan prescribes recovery goals and objectives for the area, including the need for fire management planning and exotic species control.

(Paul and Jeri, you should probably discuss the fit of the FMP with objectives of the draft recovery plan, specifically recovery action 1.1.2.3.1. While I do not think it needs to be included in the FMP, you should make sure that it is consistent with it.)

Desert Tortoise: Pahranagat NWR is located at the northern most extent of the species range. Habitat for the tortoise on the Refuge is most closely associated with the Mojave/Great Basin Desert shrub communities. Although this habitat is considered marginally suitable it may support a low density of individuals. Currently approximately 2,780 acres of this habitat exists on the Refuge. Critical habitat for this species has not been designated within the project area, the nearest critical habitat unit is located XX miles from the (direction) boundary of the Refuge. The closest known sizeable population of desert tortoise occurs approximately 30 to 40 miles south of the Refuge (P. Medica, pers. Comm. July 2001). Comprehensive surveys of this habitat have not been completed on the Refuge to date.

B. Proposed species and/or proposed critical habitat within the action area

None.

C. Candidate species within the action area:

Yellow billed cuckoo: On July 25, 2001, the Service published a federal register notice identifying the yellow-billed cuckoo as a candidate for listing (FR Vol. 66, No. 143, 38611). The cuckoo inhabits riparian forests containing willow and cottonwood. Within the Refuge habitat for the cuckoo is limited to the existing 80 acres of riparian forest type. Distribution of the species in Nevada is sparse, with the population estimated at roughly 20 to 30 individuals. Sporadic sightings of the species have occurred along the Colorado and Virgin Rivers.

D. Include species/habitat occurrence on a map.
Figure 1 is a map of the Pahranagat wildlife refuge that identifies the known habitat areas for the southwestern willow flycatcher, and the yellow-billed cuckoo. Potential habitat for the desert tortoise exists in the Mojave Great Basin shrub community that occurs throughout the Refuge. The bald eagle is a seasonal visitor to the refuge and may utilize riparian communities for foraging and roosting, marsh habitats containing waterfowl habitat may also be used by the bald eagle during foraging bouts.

IV. Geographic area or station name and action:

Interior Basin Ecoregion, Pahranagat National Wildlife Refuge, Fire Management Plan for Prescribed Fire and Wildland Fire Suppression Activities.

V. Location (attach map): The Pahranagat National Wildlife Refuge is located approximately 90 miles north of Las Vegas and four miles south of Alamo, Nevada in Lincoln County. Established on January 15, 1964, under the authority of the Migratory Bird Conservation Act of 1929, the 5,380 acre refuge is located along a 10-mile stretch of Pahranagat Valley and ranges in elevation from 3300 to 3800 feet. See attached map.

A. County and State: Lincoln County, Nevada

B. Section, township, and range (or latitude and longitude):

C. Distance (miles) and direction to nearest town:
6 miles north is the town of Alamo

VI. Description of proposed action: The purpose of the Fire Management Plan is to establish an operational guide for the use of prescribed fire and wildland fire suppression tactics that may be utilized on the Pahranagat National Wildlife Refuge. Management objectives of the Refuge focus on maintaining quality and quantity for all migratory and native species which may frequent the Refuge, and providing compatible use opportunities for both the wildlife and the public who use the Refuge. This biological evaluation assesses the potential programmatic effects of the use of prescribed fire and wildland fire suppression activities that may occur on the Refuge as a result of the implementation of the FMP. This assessment is meant to be programmatic in nature and is not intended to cover site specific fire management activities that may be developed based on the management goals and objectives described herein. Site specific National Environmental Policy Act (NEPA) compliance and section 7 consultation will be completed for each action that may result from the development of this FMP. Further, any wildland fire that may occur on the Refuge is subject to additional section 7 consultation pursuant to 50 CFR 402.05, the regulations governing emergency consultation.

In terms of the action the following categories have established for ease of review. Actions described under each category are not meant to be all inclusive since the FMP does not prescribe site specific actions, however, the foundation for the prescribed fire program and its implementation are characterized herein. Activities that may be associated with wildland fire suppression are included for review including proposed avoidance and minimization measures.

PRESCRIBED FIRE ACTIVITIES:

Prescribed fire can be a useful tool for restoring and maintaining natural conditions and processes at Pahranagat NWR. Prescribed fire involves the use of fire as a tool to achieve management objectives. Prescribed fires may also be conducted to satisfy research objectives regarding the effectiveness of prescribed fire as a tool, or the effects of fire management on ecosystem function and dynamics. Planning activities associated with program include: fire area identification; selection of areas to be treated; prioritization of selected areas; and prescribed fire implementation. Planning activities will be conducted through an interdisciplinary process to ensure that all resource values and concerns are addressed.

This FMP amends from the approved 1990 Paranagat NWR Fire Management Plan that stated the goals of the prescribed fire program would be used for the following:

- Remove overgrown and decadent vegetation to improve grazing conditions in irrigated pastures and native meadows.
- Remove weeds and other dense vegetation in croplands to facilitate plowing, disking, and planting.
- To open up and /or remove dense marsh vegetation to renew plant vigor and seed production.

Prescribed Burn Program Objectives

The current vegetation management strategy for the Refuge identifies prescribed fire as an appropriate management tool to be applied in the control of non-native and/or exotic species. Prescribed burning will be used to restore, create, and/or maintain a diversity of plant communities in order to perpetuate native plant and wildlife species, including the perpetuation of threatened and endangered species habitats. The goals and objectives of the prescribed fire program are:

1. Restoration/perpetuation of native grass, forb, and shrub species;
2. Reduction of non-native species (to either injure the plant or prepare it for other control such as mechanical, herbicide, grazing, etc);
3. Maintain and protect habitat for threatened and endangered species;
4. Periodic reduction of dense cattail and bulrush growth in wetland units;
5. Maintain/rejuvenate nesting cover for waterfowl and other native birds;
6. Maintain water delivery systems and the cropland program. Primarily burning stubble in preparation of planting, weed control, burning irrigation ditches, and burning debris piles.

Achieving many of the goals and objectives of the FMP will require repeated burn cycles for an indefinite length of time. Burn frequency will vary from every 2 to 10 years dependent on management objectives, historic fire frequency for a particular vegetative community, and funding. As part of the prescribed fire program, a monitoring program will be instituted to verify that objectives are being achieved. This program will be developed in coordination with staff from Ecological Services to ensure habitat needs and/or recovery objectives for listed species are considered and/or met.

Fire Management Strategies

Prescribed fire will be used to reduce hazardous fuel accumulation, reintroduce fire to fire adapted ecosystems, improve and protect wildlife habitat, and to maintain cultural/ historic scenes where appropriate. All prescribed fire activity will comply with applicable Federal, state, and local air quality laws and regulations.

All prescribed fire projects will have a burn plan approved by the Project Leader. Each burn plan will be prepared using a systematic decision-making process, and contain measurable objectives, predetermined prescriptions, and an approved environmental compliance document.

All Prescribed Fire Burn Plans must include components such as a GO/ No-Go Checklist, contingency actions to be taken in the event the prescription is exceeded, and the need for alerting neighbors and appropriate public officials to the timing and the planing of the burn. A burn plan format meeting all required needs is located in Appendix N of the FMP.

Fire monitoring will be used to evaluate the degree to which burn objectives are accomplished. Monitoring can assist managers in documenting success in achieving overall programmatic objectives and limiting occurrence of undesired effects. Monitoring of fire effects on habitats and species will be done in coordination and cooperation with staff from Ecological Services.

Prescribed Fire Management Units

The Refuge will be divided into three prescribed fire management units (Table 1). The units were created using habitat types under the basic assumption that each habitat has its own unique fire behavior, objectives, and prescription values. Prescribed fire will be used in three habitat types on Pahranagat NWR:

1) Wet Meadow/grassland: Mixture of rushes, sedges, grasses and forbs. Bulrush, cattails, alkali sacaton, wiregrass, and inland saltgrass are common. Willows and wild rose may grow in patches. Saltcedar and knapweed are problem exotics in this habitat type. Small areas of open water are scattered throughout.

2) Marsh: Predominantly hardstem bulrush and cattail. The intent is to manage for mosaics of wetland vegetation. Saltcedar and knapweed are problem exotics in this habitat type.

3) Croplands and Maintenance Burns: Ditches, stubble, weed control, piles of debris. Crops are barely, winter wheat, and milo. Saltcedar and knapweed are problem exotics in this habitat type.

Table 1: Prescribed Fire Management Units

Unit	Total Acreage	Burn per year
Marsh	420	???? acres
Wet meadow/grassland	510	???? acres
Croplands	??????180	???? acres

Avoidance areas will be established around all threatened, endangered, proposed and candidate species habitats where no prescribed fire will occur. These areas will be delineated in cooperation with ES staff to assure avoidance of impacts to these species.

Fire effects information for the dominant plants in the prescribed fire units can be found in Appendix G of the FMP. Effects are generally well documented and predictable.

Prescribed burns may be conducted within or near Refuge development zones, sensitive resources, and boundary area to reduce the risk from wildland fire damage. To the greatest extent possible, hazard reduction prescribed fires will only be used when they compliment resource management objectives.

WILDLAND FIRE ACTIVITIES

Fire program management describes the operational procedures necessary to implement fire management at Pahranagat NWR. Program management includes: fire prevention, preparedness, emergency preparedness, fire behavior predictions, step-up staffing plan, fire detection, fire suppression, minimum impact suppression, minimum impact rehabilitation, and documentation.

All fires not classified as prescribed fires are wildland fires and will be appropriately suppressed. The BLM will have the responsibility to suppress all wildland fires on FWS land. The Las Vegas Interagency Coordination Center (LVICC) will notify refuge personnel of reported wildland fires.

Records show that fire season is typically from mid-April until mid-October. Depending on the specific weather of any particular year the seasons may be shorter or longer and, therefore, may start earlier or last longer.

Fire Management Strategies:

All unplanned wildland fires will be suppressed in a prompt, safe, aggressive, and cost-effective manner to produce fast, efficient action with minimum damage to resources using appropriate management strategies. Specifically, strategies to meet fire management objectives will be:

1. The Refuge will utilize the appropriate management response to suppress all wildland fire including lightning ignitions occurring within the boundaries of the Pahranagat NWR.

2. Suppress all wildland fires in a safe and cost effective manner consistent with resources and values at risk.

3. The Resource Advisor will contact the appropriate ES office as soon as the extent of the incident is known for recommendations regarding minimization measures to reduce the impacts of all suppression tactics on listed, proposed, and candidate species associated with the suppression action.

4. Suppression strategies and tactics will be unique to each incident dependent on safety considerations, weather conditions, cost of suppression, fuel conditions, availability of resources and location of the fire in relation to structures and cultural resource sites.

5. Minimum impact strategies and tactics will be used whenever possible.

6. Prescribed fire will be utilized to modify vegetative communities for improved wildlife habitat, ecosystem function and hazard fuel reduction.

7. The use of aerial retardant will be allowed only in non-riparian areas.

8. Hazard reduction prescribed fires may only be used in fire adapted communities that have not had significant fire for more than twice the normal fire frequency for that community type.

9. Utilization of heavy equipment will be allowed only with the approval of the Refuge Manager or assigned Resource Advisor.

10. Wildland fire use for resource benefit will not be utilized.

Appropriate suppression action will be taken to ensure firefighter safety, public safety, and protection of the resources.

Critical protection areas, such as listed species habitats, buildings, and wildland urban interfaces will receive priority consideration in fire control planning efforts. In all cases, the primary concerns of fire suppression shall be the safety of personnel, and if needed, all individuals not involved in the suppression effort may be evacuated.

Suppression strategies should be applied so that the equipment and tools used to meet the desired objectives are those that inflict the least impacts upon the natural and cultural resources. Minimum impact suppression strategies will be employed to protect all resources. Natural and artificial barriers will be used as much as possible for containment. When necessary, fire line construction will be conducted in such a way as to minimize long-term impacts to resources.

Vehicular access to closed areas of the refuge will be required to use existing fire roads when possible. When off-road travel is determined to be necessary, vehicle access will be allowed with approval of the Refuge Manager or Delegate in coordination with the Resource Advisor.

Heavy equipment such as crawlers, tractors, dozers, or graders will not be used within the refuge boundaries unless their use is necessary to prevent a fire from destroying privately-owned and/or government buildings and historic resources. The use of any heavy equipment requires approval from the Refuge Manager or Delegate.

Sites impacted by fire suppression activities or by the fire will be rehabilitated as necessary, based on an approved course of action for each incident.

Suppression Tactics

Wildland fires will be suppressed in a prompt, safe, aggressive, and cost-effective manner to produce fast, efficient action with minimum damage to resources. All wildland fires will be suppressed commensurate with the values at risk.

Engines are the primary initial attack resource on the Refuge because of the predominance of fine fuels and access roads. Earth moving equipment is available, however it will only be used after approval of the Refuge Manager or Resource Advisor.

Personnel and equipment must be efficiently organized to suppress fire effectively and safely. To this end, the FMO assumes the command function on major or multiple fire situations, setting priorities for the use of available resources and establishing a suppression organization.

The following strategies will be applied to the entire Refuge:

1. Provide for firefighter safety and safety of refuge visitors, cooperators, and personnel.
2. Due to the low frequency of wildland fires, the small size of the Refuge staff and the level of physical fitness and training required to staff wildland fires; wildland fires on the refuge will be suppressed by local cooperaters through cooperative agreement.
3. Through local cooperators, the Refuge will utilize the appropriate management response to suppress all wildland fire including lightning ignitions occurring within the boundaries of the Refuge.
4. Minimize the damage to refuge resources from suppression efforts, particularly sensitive species habitat.
5. Prevent fires from burning off of the refuge onto adjacent lands.
6. Prevent damage to cultural resources.
7. Suppression Strategies and Techniques
8. Utilize existing roads and trails, bodies of water, areas of sparse or non-continuous fuels as primary control lines, anchor points, escape routes, and safety zones.
9. When appropriate, conduct backfiring operations from existing roads and natural barriers to halt the spread of fire.
10. Use burnouts to stabilize and strengthen the primary control lines.
11. If the use of heavy equipment is warranted, upon approval of the Refuge Manager, construction of control lines will border existing roads where possible.
12. Retardants may be used on upland areas.
13. Constructed fireline will be rehabilitated prior to departure from the fire.
14. Priority areas for protection are: riparian forest habitat type, and listed, proposed, and candidate species habitats.

The Incident Commander will choose the appropriate suppression strategy and technique. As a guide: On low intensity fires (generally flame lengths less than 4 feet) the primary suppression strategy will be direct attack with hand crews and engines. If conditions occur that sustain higher intensity fires (those with flame lengths greater than 4 feet) then indirect strategies which utilize back fires or burning out from natural and human-made fire barriers may be utilized. Those barriers should be selected to safely suppress the fire, minimize resource degradation and damage and be cost effective.

Suppression Conditions

Initial Attack
All fires occurring on the Refuge will be supervised by a qualified incident commander (IC). The IC will be responsible for all management aspects of the fire. All resources will report to the IC (either in person or by radio) prior to deploying to the fire and upon arrival to the fire. The IC will be responsible for: (1) providing a size-up of the fire to dispatch as soon as possible; (2) determine the resources needed for the fire; and (3) advising dispatch of resource needs on the fire.

The IC will receive general suppression strategy from the Fire Management Plan, but appropriate tactics used to suppress the fire will be up to the IC to implement. Minimum impact suppression tactics (MIST) will be used whenever possible.

Escaped Fires/Extended Attack
Whenever it appears a fire will escape initial attack efforts, leave Service lands, or when fire complexity exceeds the capabilities of command or operations, the IC will take appropriate, proactive actions to ensure additional resources are ordered. The IC, through dispatch or other means, will notify the Complex FMO of the situation. The Complex FMO will assist the Project Leader to complete a Wildland Fire Situation Analysis (WFSA) and Delegation of Authority found in Appendices L and M, respectively in the FMP.

Limits to Suppression Activities
The use of earth moving equipment for suppression activities (dozers, graders, plows) on the Refuge will not be permitted without the approval of the Resource Advisor (Refuge employee) or Refuge Manager.

Cutting snags in the riparian forest habitat type will not be permitted without approval of the Refuge Manager or Resource Advisor.

Wildland Fire Situation Analysis

For fires that cannot be contained in one burning period, a WFSA must be prepared. In the case of a wildland fire, the Incident Commander, in conjunction with the FMO, will prepare the WFSA. Approval of the WFSA resides with the Refuge Project Leader.

The purpose of the WFSA is to allow for a consideration of alternatives by which a fire may be controlled. Damages from the fire, suppression costs, safety, and the probable character of suppression actions are all important considerations.

Public safety will require coordination between all refuge staff and the IC. Notices should be posted to warn visitors, trails may be closed, traffic control will be necessary where smoke crosses roads, etc. Where wildland fires cross roads, the burned area adjacent to the road should be mopped up and dangerous snags felled. Every attempt will be made to utilize natural and constructed barriers, including changing fuel complexes, in the control of wildland fire. Rehabilitation efforts will concentrate on the damages done by suppression activities rather than on the burned area itself. A sample WFSA is located in Appendix F.

Aircraft Operations

Aircraft may be used in all phases of fire management operations. All aircraft must be Office of Aircraft Services (OAS) or Forest Service approved. An OAS Aviation Policy Department Manual will be provided by OAS.

Helicopters may be used for reconnaissance, bucket drops and transportation of personnel and equipment. Natural helispots and parking lots are readily available in most cases. Clearing for new helispots should be avoided where possible. Improved helispots will be rehabilitated following the fire.

As in all fire management activities, safety is a primary consideration. Qualified aviation personnel will be assigned to all flight operations.

Rehabilitation and Restoration

Rehabilitation of suppression actions will take place prior to firefighters being released from the fire. Action to be taken include:

- All trash will be removed
- Firelines will be refilled and waterbars added if needed
- Damage to improvements caused by suppression efforts will be repaired, and a rehabilitation plan completed if necessary. Service policy states that only damage to improvements caused by suppression efforts can be repaired with fire funds. Service funds cannot be used to repair damage caused by the fire itself (i.e. burnt fence lines).
- If re-seeding is necessary, it will be accomplished according to Service policy and regulations.

VII. Determination of effects:

A. Explanation of effects of the action on species and critical habitats in items III.

A. Potential effects associated with the implementation of the Prescribed Fire Management portion of the FMP may include harm and harassment to southwestern willow flycatchers and yellow-billed cuckoos and their habitat resulting from potential habitat modification or loss due to escaped prescribed fires. Prescribed fire will be used on XXXX acres of the Refuge. Three presribed fire management units have been identified for treatment in the FMP they include: (1) XXX acres of marsh habitats; (2) XXX acres of wet meadow/grassland; and (3) XXX acres of grassland. Effects associated with treatment of these units will depend on their juxtaposition to existing suitable habitat and potentially suitable habitat for the southwestern willow flycatcher and yellow-billed cuckoo. However impacts to these habitats are expected to be offset by the use of a minimum of 300 foot buffers to minimize the risk of fire spread into suitable habitat. In addition, surveys prior to site specific project implementation will be conducted in and adjacent to stands of exotics to minimize the potential for harm or harassment of southwestern willow flycatchers that may be using this habitat. Potential harassment of these species will be offset by seasonal restrictions, which only allows the use of prescribed fire outside each species breeding seasons. . However the likelihood of these type of effects occurring are minimized by the proposed measures to minimize impacts to listed, proposed, and candidate species associated with the Refuge.

The potential effects of implementation of the wildland fire management program may include harm and harassment resulting from habitat loss or modification and disturbance associated with suppression activities. The assignment of a qualified Resource Advisor to all wildland fire incidents occurring on the Refuge will help minimize any potential effects to the species and their habitats, as minimization measures specific to the incident can be prescribed during the course of the suppression activities. In addition, suppression tactics that utilize the least environmentally damaging practices such as hand lines will be used adjacent to all suitable habitat for the species. The use of aerial retardants is also restricted within all riparian habitats on the Refuge. Restoration and rehabilitation following all wildland fire incidents will be done in coordination with ES staff and will require the use native species.

Potential effects of the implementation of the FMP on the desert tortoise may include harm and harassment associated with both prescribed fire and wildland fire activities. Although the Refuge is considered to be marginal habitat for the species, there remains the potential for tortoises to harmed or harassed as a result of site specific actions. Measures proposed to minimize impacts to the tortoise will alleviate most impacts and include the restriction of vehicles to existing roads. The most suitable habitat for the species on the Refuge is located along the western boundary, all site specific actions that may affect this area are subject to further section 7 consultation. Harm associated with habitat loss or modification resulting from implementation of site specific actions can be minimized at the project level and programmatically include the restrictions associated with use of heavy equipment, and vehicles.

Potential impacts to bald eagles may include harassment due to impaired visibility resulting from smoke associated with the implementation of a site specific action. The low numbers of eagles using the Refuge and the likelihood of their being present during the implementation of a prescribed is relatively low.

Finally, any potential for harm or harassment to any listed species or their habitats will be considered on a project by project basis and will require site specific section 7 consultation to further minimize any affects associated with implementation of the FMP. Any potential impacts to the species considered in this biological evaluation that may result from wildland fire suppression actions will be further covered during emergency consultation procedures described at 50 CFR 402.05.

Based on my review of the Prescribed Fire and Wildland Fire Management Programs covered in this FMP it is unlikely that the future implementation of activities will result in take of listed species or their habitats. There is no critical habitat for any of the species considered in this biological evaluation on the Refuge, therefore none is likely to be affected.

B. Explanation of actions to be implemented to reduce adverse effects:

- All site specific action associated with the implementation of this FMP will undergo appropriate individual section 7 consultation.
- No prescribed fires shall occur within the breeding season of the southwestern willow flycatcher, May 1 through September 15.
- Surveys will be conducted for listed, proposed and candidate species and their habitats prior to site specific prescribed fire management activities occur.
- A 300 foot wide buffer is required around currently occupied, suitable and potentially suitable southwestern willow flycatcher habitat subject to treatment resulting from this FMP.
- Maps of all sensitive species habitats on the Refuge will be prepared prior to site specific prescribed fire management planning activities.
- No prescribed burns will take place in areas identified on a refuge map as no burn or habitat areas. This will include areas of potential habitat.
- All vehicles associated with prescribed fire and suppression activities will use existing roads to minimize the potential for impacting desert tortoise.
- Prescribed fires will only be conducted during Fall and Spring seasons when the willow fly catcher is not known to be nesting on the Refuge. Additionally, the burns will only be conducted under conditions identified in a burn plan that are conducive to easy control. Burn duration will be short to encourage any roosting birds to return after quick smoke dispersal.
- Some of the burning parameters to be identified within the burn plans include: wind speed and direction, relative humidity**,** fuel moisture levels and long range weather out looks. All of these conditions properly regulated can assist in predicting the behavior of a prescribed before ignition. These mitigation measures properly analyzed and followed can help greatly reduce and even eliminate the risk of fire adversely effecting the specified species and habitat areas.
- All fire suppression resource staff will be informed of listed, proposed, and candidate species and habitat needs during daily incident action plan briefings.
- No aircraft will be allowed within bald eagle use areas of the Refuge while bald eagles are present.
- Resource advisors will coordinate with the local ES office to ensure all listed, proposed, and candidate species and habitat needs are addressed during wildland fire suppression incidents.

VIII. Effect determination and response requested:

Determination:

A. Listed species or designated critical habitat: After my review of the direct, indirect and cumulative effects of the proposed action, the status of the species and their habitats within the action area, it is my determination that the Pahranagat National Wildlife Refuge Fire Management

Plan may affect and is not likely to adversely affect the sSouthwestern willow flycatcher**,** bald eagle, or the desert tortoise.

B. **Proposed species/proposed critical habitat:** There is no proposed or designated critical habitat for any of the species found on the Refuge, therefore none will be affected.

C. **Candidate species:** It is my determination that the proposed action may affect but is not likely to jeopardize the continued existence of the yellow-billed cuckoo.

Response Requested:

A. Concurrence
B. N/A
C. Concurrence

_____ _____
signature date
[Title/office of supervisor at originating station]

IX. Reviewing ESO Evaluation:

A. Concurrence _____ Nonconcurrence _____

B. Formal consultation required _____

C. Conference required _____

D. Informal conference required _____

E. Remarks (attach additional pages as needed):

_____ _____
signature **date**
[Title/office of reviewing official]

APPENDIX J: CULTURAL RESOURCES

REQUEST FOR CULTURAL RESOURCE COMPLIANCE

U.S. Fish and Wildlife Service, Region 1

Project Name:					Program: (Partners, Refuges, JITW, WSECP, etc.)	
State: CA, ID, HI, NV, OR, WA		EcoRegion: CBE, IPE,KCE, NCE			**FWS Unit: Org Code:**	
Project Location:	**County**	**Township**	**Range**	**Section**	FWS Contact: Name, Tel#, Address	
USGS Quad:					**Date of Request:**	
Total project acres/linear ft/m:		APE Acres / linear ft/m (if different)			**Proposed Project Start Date:**	

MAPS Attached	Check below		
Copy of portion of USGS Quad with project area marked clearly (required)			Project (sketch) map showing Area of Potential Effect with locations of specific ground altering activities (required)
Photocopy of aerial photo showing location (if available)			Any other project plans, photographs, or drawings that may help CRT in making determination (if available)

Directions to Project: (if not obvious)	
Description of Undertaking:	Describe proposed project and means to facilitate (e.g., provide funds to revegetate 1 mile of riparian habitat, restore 250 acres of seasonal wetlands, and construct a 5-acre permanent pond). How is the project designed (e.g., install 2 miles of fence and create approximately 25' of 3' high check dam)?

					Area of Potential Effects (APE):	Describe where disturbance of the ground will occur. What are the dimensions of the area to be disturbed? How deep will you excavate? How far apart are fenceposts? What method are you using to plant vegetation? Where will fill be obtained? Where will soil be dumped? What tools or equipment will be used? Are you replacing or repairing a structure? Will you be moving dirt in a relatively undisturbed area? Will the project reach below or beyond the limits of prior land disturbance? Differentiate between areas slated for earth movement vs. areas to be inundated only. Is the area to be inundated different from the area inundated today, in the recent past, or under natural conditions? Provide acres and/or linear ft/m for all elements of the project.
Environmental and Cultural Setting:	Briefly describe the environmental setting of the APE. A) What was the natural habitat prior to modifications, reclamation, agriculture, settlement? B) What is land-use history? When was it first settled, modified? How deep has it been cultivated, grazed, etc.? C) What is land use and habitat today? What natural agents (e.g., sedimentation, vegetation, inundation) or cultural agents (e.g., cultivation) might affect the ability to discover cultural resources? D) Do you (or does anybody else) know of cultural resources in or near the project area?					

APPENDIX K: COMMUNICATIONS

APPENDIX L: DELEGATION OF AUTHORITY

Paul Bannister, Fire Management Officer is assigned as Incident Commander of all Type III Incidents on Pahranagat NWR for the U.S. Fish and Wildlife Service, effective January 1, 2001.

You have full authority and responsibility for managing the fire suppression activities within the framework of the law and Fish and Wildlife Service policy and direction as provided by this office. Resource Management Plans and other appropriate documents will be provided by the Resource Advisor. Your primary responsibility is to organize and direct your assigned resources for efficient and effective suppression of the fire.

Refuge Managers, Biologist and other designated staff will be assigned to you as Resource Advisors. He/She or the Refuge Managers should be consulted in situations where natural resource decisions or tradeoffs are involved.

The Fire Management Officer should take appropriate suppression actions on all fires originating on Fish and Wildlife Lands.

The Incident Commander has full approval to issue press releases that are specific to the fire. Approval and release authority for other public and fire information matters is reserved for the Project Leader or Designee.

Specific direction and fire suppression priorities for fire are as follows, and are in priority order:

1. Firefighter safety.

2. Protect life, property, and resources from unwanted fire.

3. Utilize natural barriers and roads if possible for burnout operations.

4. Use of dozers requires resource advisor approval prior to shift plan implementation. The widening of existing roads and two tracks is not restricted.

Project Leader, _____Desert NWR. Complex, January 1, 2001

APPENDIX M: PRESCRIBED BURN PLAN FORMAT

PRESCRIBED FIRE PLAN

Refuge or Station

Unit

Prepared By: _____ Date:_____
Prescribed Fire Specialist

Reviewed By: _____ Date: _____
Refuge Biologist

Reviewed By: _____ Date: _____
Prescribed Fire Burn Boss

Reviewed By: _____ Date: _____
FMO/AFMO

Reviewed By: _____ Date: _____
Biological Investigation Unit

Reviewed By: _____ Date: _____
Refuge Manager

The approved Prescribed Fire Plan constitutes the authority to burn, pending approval of Section 7 Consultations, Environmental Assessments or other required documents. No one has the authority to burn without an approved plan or in a manner not in compliance with the approved plan. Prescribed burning conditions established in the plan are firm limits. Actions taken in compliance with the approved Prescribed Fire Plan will be fully supported, but personnel will be held accountable for actions taken which are not in compliance with the approved plan.

Approved By: _____ Date: _____

Complex Project Leader

PRESCRIBED FIRE PLAN

Refuge:_____ Refuge Burn Number:

Sub Station: _____ Fire Number:

Name of Area: _____ Unit No.

Acres To Be Burned:___ Perimeter Of Burn:

Legal Description: Lat. ___ Long. ___ T_ R_ S

County & State:

Is a Section 7 Consultation being forwarded to Fish and Wildlife Enhancement for review ? Yes__No (check one).

(Page 2 of this PFP should be a refuge base map showing the location of the burn on Fish and Wildlife Service land)

The Prescribed Fire Burn Boss/Specialist must participate in the development of this plan.

I. GENERAL DESCRIPTION OF BURN UNIT

Physical Features and Vegetation Cover Types (Species, height, density, etc.):

Primary Resource Objectives of Unit (Be specific. These are management goals):

1)
2)
3)

Objectives of Fire (Be specific. These are different than management goals):

1)
2)
3)

Acceptable Range of Results (Area burned vs. unburned, scorch height, percent kill of a species, range of litter removed, etc.):

1)
2)

3)

[*Attach Project Map Here*]

[*Attach Project Pre-Burn Photos Here*]

I. PRE-BURN MONITORING

Vegetation Type	Acres	%	FBPS Fuel Model
Total			

Habitat Conditions (Identify with transect numbers if more than one in burn unit.):

Type of Transects:

Photo Documentation (Add enough spaces here to put a pre-burn photo showing the habitat condition or problem you are using fire to change/correct. A photo along your transect may reflect your transect data.):

Other:

III. PLANNING AND ACTIONS

Complexity Analysis Results: (Attach a completed copy of the Complexity Analysis worksheet to this plan.)

Site preparation (What, when, who & how. Should be done with Burn Boss):

Weather information required (who, what, when, where, how, and how much):

Safety considerations and protection of sensitive features (Adjacent lands, visitors, facilities, terrain, etc., and needed actions. Include buffer and safety zones. Be specific, indicate on a burn unit map. Map should be a USGS quadrangle if possible, so ridges, washes, water, trails, etc. can be identified.)

Special Safety Precautions Needing Attention (Aerial ignition, aircraft, ignition from boat, etc.):

Media Contacts (Radio stations, newspaper, etc., list with telephone numbers):

Special Constraints and Considerations (Should be discussed with Burn Boss):

Communication and Coordination on the Burn (Who will have radios, frequencies to be used, who will coordinate various activities.):

IV. IGNITION, BURNING AND CONTROL

Planned or Proposed Actual

Scheduling: Approx. Date(s)

Time of Day

Acceptable Range

FBPS Fuel Model	Low	High	Actual
Temperature			
Relative Humidity			
Wind Speed (20' forecast)			
Wind Speed (mid-flame)			
Wind Direction			
ENVIRONMENTAL CONDITIONS			
Soil Moisture			
1 hr. Fuel Moisture			
10 hr. FM			
100 hr. FM			
Woody Live Fuel Moisture			
Herb. Live Fuel Moisture			
Litter/Duff Moisture			
FIRE BEHAVIOR			
Type of Fire (H,B,F)	B	H	
Rate of Spread (ch/hour)			
Fireline Intensity			
Flame Length			

Energy Release Component NFDRS Fuel Model __L_____			

Note: Attach BEHAVE Runs as an appendix to the end of this plan.

Cumulative effects of weather and drought on fire behavior:

Ignition Technique (Explain and include on map of burn unit. Use of aerial ignition must be identified in this plan. Last minute changes to use aircraft will not be allowed and will be considered a major change to the plan. This will require a resubmission):

Prescribed Fire Organization (See Section VII, Crew and Equipment Assignments. All personnel and their assignments must be listed. All personnel must be qualified for the positions they will fill.)

Other (If portions of the burn unit must be burnt under conditions slightly different than stated above, i.e., a different wind direction to keep smoke off of a highway or off of the neighbors wash, detail here.)

Prescription monitoring (Discuss monitoring procedure and frequency to determine if conditions for the burn are within prescription):

V. SMOKE MANAGEMENT

Make any Smoke Management Plan an attachment. Also attach pertinent smoke variances (if any) and all SASEM runs.

Permits required (who, when):

Distance and Direction from Smoke Sensitive Area(s):

Necessary Transport Wind Direction, Speed and Mixing Height (Explain how this information will be obtained and used):

Visibility Hazard(s) (Roads, airports, etc.):

Actions to Reduce Visibility Hazard(s):

Residual Smoke Problems (Measures to reduce problem, i.e., rapid and complete mop-up, mop-up of certain fuels, specific fuel moistures, time of day, etc.):

Particulate emissions in Tons/Acre and how calculated (This should be filled in after the burn so more precise acreage figures can be used):

VI. FUNDING AND PERSONNEL

Activity Code:

Costs

	Equipment & Supplies	**Labor**	**Overtime**	**Staff Days**	**Total Cost**
Administration (planning, permits, etc.)					
Site Preparation					
Ignition & Control					
Travel/Per Diem					
Total					

VII. BURN-DAY ACTIVITIES

Public/Media Contacts on Burn Day (List with telephone numbers):

Crew & Equipment Assignments (List all personnel, equipment needed, and assignments. The following is not an all inclusive list for what you may need.)

Crew Briefing Points (Communications, hazards, equipment, water sources, escape fire actions, etc. To be done by Burn Boss. Refer to Safety Considerations in Planning Actions and points listed below):

Ignition Technique (Methods, how, where, who, and sequence. Go over what was submitted in Section IV and any changes needed for the present conditions.) Attach ignition sequencing map if necessary:

Personnel Escape Plan:

Special Safety Requirements:

Go-No-Go Checklist:

GO-NO-GO CHECKLIST

_____

Unit

_____ Is burn plan complete and approved?

_____ Are all fire prescriptions specifications met?

_____ Are all smoke management prescriptions met?

_____ Is the current and projected fire weather forecast favorable?

_____ Have all air quality considerations and smoke requirements been met?

_____ Have all required cultural resource protection objectives been met?

_____ Are all personnel required in the prescribed burn plan on-site and are they all qualified for their assigned duties?

_____ Have all personnel been briefed on the prescribed burn plan requirements?

_____ Have all personnel been briefed on safety hazards, escape routes, and safety zones?

_____ Is all required equipment in place and in working order?

_____ Are available (including back-up) resources adequate for containment of escapes under the worse-case conditions?

_____ Are answers to all of the above questions “YES”?

_____ In your opinion, can the burn be carried out according to the plan and will the burn meet planned objectives?

_____ Is there an adequate contingency plan developed and proofed?

All 14 questions have been answered “YES”.

_____ _____

Burn Boss Date

_____ _____

Refuge Manager or Designee Date

Holding and Control:

Critical Control Problems:

Water Refill Points:

Other:

Contingency Plan for Escaped Fire (Are there crews standing by to initial attack or will people doing other jobs be called upon to do initial attack, who must be called in case of an escape, what radio frequencies will be used, etc.)

Mop Up and Patrol:

Rehabilitation Needs:

DI 1202 Submission Date:

Special Problems:

VIII. CRITIQUE OF BURN

Were burn objectives within acceptable range of results? (Refer to Section I):

What would be done differently to obtain results or get better results?

Was there any deviation from plan? If so, why?

Problems and general comments:

IX. POST-BURN MONITORING

Date:_____ Refuge Burn Number:
Length of Time after Burn:
Vegetative Transects:

Comments on Habitat Conditions, etc.:

Photo Documentation:

Other:

X. FOLLOW-UP EVALUATION

Date: _____ Refuge Burn Number:

Length of Time after Burn:

Vegetative Transects:

Comments on Habitat Conditions, etc.:

Photo Documentation:

Other:

DAILY FIRE BEHAVIOR MONITORING SHEET

Refuge:

Project Name:_____ RX Fire Number:

Date of Burn:

Ignition Time: Start:_____ Finish:

Weather Observations During Burn:
Time of Weather Observations

Dry Bulb Temp							

Wet Bulb Temp							
RH							
Wind Speed							
Wind Direction							
Cloud Cover %							

Comments Concerning Weather:

Last Live Fuel Moisture Measurement:_____ 1-Hour Fuel Moisture:

10-Hour Fuel Moisture (from fuel stick): _____ Haines Index:

Test Fire Results:

Firing Pattern:

Fire Behavior Characteristics (Rate of Spread, Flame Length, Fire Spread Direction, etc.):

Acres Treated:

Smoke Dispersal Narrative (venting height, transport wind speed & direction, visibility, holding problems, problem spots, complaints, etc.):

Burn Severity

Effects to Vegetation Narrative:

Ground Char (%): Unburned _____ Light_____ Moderate_____ Deep

Soil Moisture on Day of Burn:

Were Resource Objectives Met? (If burn was successful, what conditions made it possible, ie: low live fuel moisture, high winds, etc.)

Photos of Fire Area: Preburn Yes _____ No
During Burn Yes _____ No
Postburn Yes _____ No

Daily Burn Cost:

Personnel Cost: $

Equipment Cost: $

Fuel Cost: $

Total: $

Cost per Acre: $

Vehicles Used:

Burn Organization:

Burn Boss:

Ignition Specialist: _____ Holding Specialist:
Lighting Crew: _____ Holding Crew:

Burn Evaluation Prepared By:_____ Date:

**Attach pertinent Spot Weather Forecast,WIMS/NFDRS, Smoke Mgt Variance, etc. information for burn day to back of sheet.

APPENDIX N: NEVADA SMOKE MANAGEMENT PLAN

Reference: Nevada Division of Environmental Protection, BLM of Air Quality, Smoke Management Program. At: **http://ndep.state.nv.us/baq/smoke2.htm**

Pahranagat NWR Structure Protection Plan

Pahranagat NWR has three types of structures which management protects; Headquarters/ maintenance buildings, residential houses, and historical structures. The strategies and tactics employed by the Paranagat NWR staff is to protect and maintain these properties in as fire safe a manner as possible. Pahranagat's remote nature and relatively long distance to the nearest fire department with structural capabilities (Alamo, NV) provides a challenge for protecting structures. Prevention and education are the only logical solutions to save structures and to protect the safety of inhabitants in the event of a wildfire or building fire.

It must be noted that the Service fire program was established to provide wildland fire protection, structure protection in the event of a threat from an on-site wildland fire, and to perform various pre-suppression projects aimed at minimizing the potential fire danger to existing Refuge properties and structures. Fighting actual structure fires has never been the focus of the Service fire program. The fire staff on duty at Pahranagat NWR do not have the adequate equipment, safety gear, or training to be classified as structure firefighters. Once a building is totally involved with fire, the life of residents and associated public safety is the chief concern of management, therefore the building is considered an acceptable loss if this concern is addressed.

The Structures

This complex of six buildings (2 residences, an office, a maintenance building and two small historical structures) is maintained by the refuge maintenance staff using graders, dozers, and other equipment. The compound is covered with 85% crushed rock and 15% grass. Where vegetation interfaces with structures, green grass/lawn is maintained by maintenance staff, and residents. There are multiple water hose outlets located in the compound with enough water pressure and hose to suppress small fires.

Strategies *(to prevent fire occurrence)*

- Create defensive space around complex. Prescribe burn around structures to remove heavy accumulations of fuel. Mow or physically remove existing fuels from facility boundaries (annual maintenance project).
- Keep debris around buildings to a minimum at all times.
- Keep laws mowed and watered (green strip) regularly throughout the summer months.
- Train refuge staff regarding fire safety and service policy annually.
- No open burning unless accompanied by an approved prescribed burn plan and qualified fire personnel.

- Fire Management staff and refuge managers should monitor these strategies throughout the burning season.
- Fire Management Staff should be contacted if noncompliance of these strategies are taking place.
- Project Leaders and Refuge Managers are immediately contacted and advised about potential consequences regarding noncompliance issues and must deal with resolving the identified issues.

Tactics *(to suppress fires if they occur)*

- Evacuate buildings and compound of all nonessential fire staff/residents/public.
- Use existing green strip around structures to burn out unburned fuels if wildfire is threatening structures. Qualified fire personnel with adequate supervision will perform this duty.
- Use engines to foam down structures and out buildings if time permits.
- Use engines to support burn out operations and utilize fire hose boxes with fire hoses to pre-treat the structures if necessary.
- Foam down propane tanks and above ground fuel tanks before venting occurs.
- Use aerial retardant (SEAT or Heavy Air Tanker) if time permits.
- Helicopter with bucket should be considered.

Note: These tactics are based upon a worst case scenario and will probably never be needed if strategies are followed and enforced by management.