

**WILDLAND FIRE MANAGEMENT PLAN**  
**STILLWATER NATIONAL WILDLIFE REFUGE**  
**COMPLEX**



2001

SEPTEMBER 2001

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Prepared:

\_\_\_\_\_  
Chris Farinetti  
Fire Management Officer  
Sheldon-Hart National Wildlife Refuge Complex

\_\_\_\_\_  
Date

\_\_\_\_\_  
Kim Hanson  
Project Leader  
Stillwater National Wildlife Refuge Complex

\_\_\_\_\_  
Date

Concurred:

\_\_\_\_\_  
Pam Ensley  
Regional Fire Management Coordinator  
Pacific Region, US Fish and Wildlife Service

\_\_\_\_\_  
Date

Approved:

\_\_\_\_\_  
Steve Thompson  
Acting Manager  
California/ Nevada Operations  
Pacific Region, US Fish and Wildlife Service

\_\_\_\_\_  
Date

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## **EXECUTIVE SUMMARY**

When approved, this document will become the Stillwater National Wildlife Refuge Complex (SNWRC) Fire Management Plan (FMP). This plan is written to provide guidelines for appropriate suppression and prescribed fire programs at Stillwater NWRC. Prescribed fires may be used to restore the natural processes and vitality of ecosystems, improve wildlife habitat, remove or reduce non-native species, reduce hazardous fuels, and/or conduct research.

Stillwater NWRC is developing a Comprehensive Conservation Plan (CCP) to meet the current policies and guidelines for management of the National Wildlife Refuge System as prescribed in the National Wildlife Refuge System Administration Act, as amended. This planning process will culminate in a new set of management objectives and management guidelines.

This FMP will update fire management procedures to adhere with Service policy and direction from the Fire Management Handbook. The 1995 National Fire Policy has been addressed and updated throughout the document. The 2000 Fish and Wildlife Service prescribed burning policies and direction have been implemented and updated accordingly.



## INTRODUCTION

The U.S. Fish and Wildlife Service began the process of developing a comprehensive conservation plan (CCP) for the Stillwater National Wildlife Refuge Complex (NWRC) in early 1997. The complex is comprised of Stillwater NWR, Anaho Island NWR, and Fallon NWR. This Fire Management Plan is a step-down plan under that CCP. The Draft CCP details establishing legislation and purposes for each NWR within the complex and that information will not be repeated here. Map 1 locates the three refuges in Western Nevada.

This plan meets the requirements of the National Environmental Protection Act (NEPA). An Environmental Assessment will not be completed for prescribed fire due to regulations published in the Federal Register (62 FR 2375) January 16, 1997. The regulation categorically excludes prescribed fire when used for habitat improvement purposes and conducted in accordance with State and local ordinances and laws. Wildland fire suppression and prescribed fire are both categorically excluded, as outlined in 516 DM 2 appendix 1. The Service has involved the public through the preparation of the Draft CCP for Stillwater NWR.

The draft CCP is undergoing ESA Section 7 consultation. A beneficial affect is anticipated for both Snowy Plover and Bald Eagle.

Fire activities at the Stillwater NWRC consist of management of wildland and prescribed fire. The Lahontan Valley has a limited history of wildland fire suppression activities. The Stillwater NWRC has a limited record of prescribed fire management extending back 50 years. Fire has been used as a tool in vegetation management on the refuge since the late 1940's, although is well documented only since 1980. Recent prescribed fire management activities have varied between 500 to 2,000 acres annually, depending on vegetation management needs and available water.

The headquarters for the Stillwater NWRC is located in Fallon, Nevada. The Stillwater NWRC has no fire engine crew based at the headquarters. All fire engine crews are staffed during fire season from the headquarters at the Sheldon-Hart NWR Complex in Lakeview, Oregon. The fire management staff at the Sheldon-Hart NWR Complex is also responsible for a fire management zone including Stillwater NWRC and has year round fire staff consisting of a Fire Management Officer, Assistant Fire Management Officer and a Prescribed Fire Specialist.

The Project Leader at Stillwater NWRC has met with the local fire department officials to develop agreements to provide initial response fire protection for Service lands. The Fallon/Churchill fire department will continue to suppress all fires within Churchill County as per State laws. The agreement(s) will be incorporated into this plan and will serve as a formal document for reimbursement for supplies or equipment damage (see Appendix D).

The Stillwater NWRC shares common ecological elements between the different refuges. Vegetation and wildlife are generally similar between the refuges. Wildland fuel model types are also generally similar. Variation in vegetation is most marked at the Anaho NWR, which is largely a desert shrub and annual grass island. These similar elements of this plan will be commonly described and the differences separated.

## COMPLIANCE WITH USFWS POLICY

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

Wildfires 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.

Bureaus 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 bureaus 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 A Interagency Agreement between the Bureau of Land Management, Bureau 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's goals and objectives can be found in the Draft Comprehensive Conservation Plan. Fire specific goals and objectives are indicated below.

- 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 farm and water management programs.
  - 6. Prevent human-caused wildland fires.
  - 7. Educate the public regarding the role of prescribed fire within the Refuge.
    - 1. Hazardous fuel reduction around structures.

## DESCRIPTION OF REFUGE

The Stillwater NWR Complex currently includes Stillwater NWR, Fallon NWR, and Anaho Island NWR. These refuges contribute substantially to the conservation of wildlife and their habitat in the western Great Basin. They encompass a great diversity of habitats, from freshwater marshes and river habitats to brackish water marshes and alkali playas, and a 25 mile long sand dune complex to a small island in a desert lake. These habitats attract nearly 400 species of vertebrate wildlife (more than 260 bird species) and countless species of invertebrates. Waterfowl, shorebirds, and other waterbirds are abundant, especially during migration.

Stillwater NWR and Fallon NWRs are located about 6 miles northeast of Fallon, Churchill County. Stillwater NWR is 79,570 acres and Fallon NWR 17,848 acres. Anaho Island NWR is in the Pyramid Lake Indian Reservation and is about 30 miles northeast of Reno, Washoe County.

### PHYSICAL RESOURCES

Wetlands in Stillwater NWR and Fallon NWR are components of the Lahontan Valley wetland ecosystem. The Lahontan Valley wetland ecosystem forms the terminus of the Carson River, which originates in the Sierra Nevada south of Lake Tahoe. Wetland-habitat in Stillwater NWR contribute toward meeting requirements of Public Law 101-618, including the need to sustain a long-term average of 25,000 acres of primary wetland-habitat in four designated areas in the Lahontan Valley.

When water is present, the Lahontan Valley wetlands are some of the most productive in the western United States. They provide expansive areas of relatively shallow wetland-habitats with waters of varying salinity. The Lahontan Valley wetlands are characterized by shrinking and swelling, both seasonally and annually, as well as over geologic time. This fluctuation creates a diverse Great Basin wetland ecosystem, which encompasses a wide range of wetland-habitat types within a localized area. Within the span of one season, these wetlands can transform from shallow lakes with clear, freshwater, to shallow, brackish marshes with high salt concentrations.

Anaho Island NWR is a rocky island rising from the waters of the southeastern portion of Pyramid Lake. From its two prominent center peaks, the terrain slopes gently toward the water's edge through a series of old stranded beaches. Anaho Island is the largest island in Pyramid Lake, currently estimated at 575 acres based on a water level elevation in Pyramid Lake of 3,809 feet in July 1997 (USDI 1997). The size of the Island depends on the level of the lake. In 1913 when the refuge was established, the island was 247 acres. The island harbors desert shrub communities, including greasewood and winterfat; nonnative annual grass species such as red brome and cheatgrass; and native bunch grasses and forbs such as desert needlegrass and buckwheat. Closer to the shoreline, vegetation is scant.

The Lahontan Valley landscape is dominated by gently rolling to flat desert shrublands and flat alkali playas. Desert shrub plant communities typically are made up of plant species that can tolerate moderate to highly alkaline soils and can survive on minimal precipitation (about five inches per year). Three different upland desert shrub community types have been identified; greasewood shrublands, saltbush desert shrublands, and dunes (Map 2.2). The topographic depressions tend to have saline, clayey soils that pond water and raised areas tend to have sandy, less saline, more well drained soils. The depressions are the playas that are scattered throughout the upland shrublands.

Although they comprise the smallest amount of area, the basin wetland and riparian areas support the highest diversity of wildlife. The main sources of water enter through the Newlands Project canals and drains and the Carson River. Historically, these riparian areas were dominated by cottonwoods and a variety of shrub species.

Deep water, more than four feet, is rare in Stillwater Marsh. This wetland is now characterized by shallow and deep emergent vegetation (such as alkali bulrush, cattails, and hardstem bulrush), vast areas of submergent vegetation (such as horned pondweed and wigeongrass), mudflat habitats, and wet meadow communities around the periphery of some wetland units and monotypic saltcedar communities along the edges of others. The wetlands at the delta of the Carson River (on Fallon NWR) has similar wetland-habitat when it has water, but it typically only contains water every three to four years. Saltcedar is abundant on Fallon NWR and encroaching significantly on Stillwater NWR.

#### **CLIMATE**

In general, the climate of the Lahontan Valley is arid, summers are hot, and winters are cold. In summer, night temperatures are characteristically cool. The average daytime maximum temperature during July-August, typically the hottest months, is about 91EF and the average daily low is about 52EF. Temperatures in July and August can exceed 100EF. The average daytime low temperature during December-January is about 18EF and the average high is about 46EF. The minimum temperature recorded since 1900 is -25EF and temperatures below 10EF are not uncommon. Annual precipitation ranges from one to nine inches and averages about five inches. An average of about two inches is received during February-May. Annual evaporation of surface water exceeds precipitation by about 12 to 1, due to the desert climate. Lahontan Reservoir, other Newlands Project regulating reservoirs, and the primary wetland areas show evaporative losses of 60 or more inches per year. The long-term average (1940 to 1990) evaporative loss rate for Fallon is 53 inches per year.

#### **CULTURAL RESOURCES**

Archeological, cultural, and historic resources have been identified through surveys conducted on the Refuge. An extremely rich and well documented archaeological record shows that prehistoric peoples lived in great numbers around and in Stillwater marsh for over 3,000 years (Raymond 1992). Numerous prehistoric sites, including villages, food processing, and burials, have been recorded on the Refuge. A complete survey of the entire Refuge has not been completed, but it should be assumed that many more, unrecorded sites exist. More recent historic sites exist as well, primarily associated with American settlement since 1880. Most of these sites consist of historic buildings or their remains, and the debris of the people who lived in them (trash dumps). Information gained from surveys which have identified and recorded many sites will be utilized in developing prescribed fire plans and wildland fire suppression tactics. Wildland fires present a threat to most sites located on the Refuge. Appropriate measures will be taken to protect sites during wildland fire suppression efforts, particularly those which contain human remains. Actual records of recorded sites are kept on file by the Regional Cultural Resources Staff, and due to their sensitive nature are not open to public review.

#### **FISH AND WILDLIFE**

Marsh bird species were abundant and diverse with most of the species present today represented in archaeological data (Livingston 1988, Fowler 1992). Changes in the use of Lahontan Valley by two species, common loon and sandhill crane, may be most representative of long-term habitat change from historic conditions. Evidence of both species have been found at archaeological sites but have since become rare visitors to the marsh. Loons commonly inhabit deep open water areas while sandhill cranes, as well as white-fronted geese, are associated with wet meadows. The change in composition and coverage by these two habitat types has likely led to the suspected decreases in these species numbers and suggests that the range of water depths in the present marsh is not representative of historic conditions.

Waterfowl assemblages have changed somewhat in composition; however, overall numbers of bird species were likely similar to those that now occur during periods of high water. While exact numbers

are not available from historic literature, archaeological remains suggest that several dabbling duck, diving duck, goose, and swan species were present. It would appear that deeper water associated species such as canvasback, redheads, ruddy ducks, goldeneye, surf scoter, and lesser scaup were more abundant than at present, likely due to more deep water habitats; however, dabbling ducks (such as mallards, pintail, green-winged teal, gadwall, and shovelers, comprised the majority of the Cattail-eater diet (Livingston 1988). Surf scoter were mentioned in several historic reports (Livingston 1988, Raven and Elston 1989, Fowler 1992) but are an infrequent visitor to the present-day marsh, likely for similar reasons as the common loon's more recent absence. White-fronted geese and trumpeter swans were also likely more abundant historically (Fowler 1992); however, trumpeter swan declines at the marsh are probably more related to decreases in continental populations.

Very little information about historic populations and species composition of shorebirds is available. It is assumed that population parameters were similar to what occurs at present, although there is at least some indication that long-billed curlew were more abundant historically (Fowler 1992). Reasons for this are not clear but it may be related to the reduced wet meadow habitat and the change in plant species composition in adjacent upland habitats.

Similarly, historic data are lacking on most other waterbird species with a few exceptions. American white pelicans were likely more abundant historically as the colony on Pelican Island (within Fallon NWR, near the Carson River delta) was considered a place to collect eggs and young sometime during the middle 1800s (Fowler 1992). A small colony has formed infrequently on Pelican Island and other small islands in the Carson Sink through the past century during high water years only (Refuge Files).

Species that have apparently benefitted from changes to the natural system include the common raven and white-faced ibis. Information on historic occurrence of ravens are scant, but from reviewing the literature, it can be estimated as having been low. Grayson (1985), found 11 specimens in a cave which suggests several were in this area; however, this is an upland site located away from the marsh and it is uncertain whether birds were collected at the marsh or in the Stillwater Mountains. Bailey (1898) completed an inventory of bird species observed during a spring trip from Stillwater to Ione (100 miles east of Fallon). His list did not include the common raven. For comparison, a 1996 inventory of Stillwater NWR revealed 112 common ravens in the core wetland area in early June (Stillwater NWR nest survey data).

White-faced ibis have likely become more abundant as a consequence of agricultural development (Fowler 1992). A slow increase in ibis abundance was observed from the early 1900s to the 1950s with most observed individuals feeding on newly flooded agricultural fields. This trend is also related to the abundance of nesting sites (e.g., flooded cattail and hardstem bulrush patches) so variations in population size probably varied considerably over the past 50 years.

Most of the animal bones and other parts found in archaeological remains are from a variety of smaller species of mammals including mice, voles, kangaroo rats, muskrats, mink, river otters, badgers, and rabbits (Schmitt 1988, Raven and Elston 1989). Larger species including coyotes, mule deer, and bighorn sheep were less common in these remains, most of which were found at marsh sites near the base of the Stillwater Mountains. It is unlikely that deer and sheep were common throughout the marsh during most of the year, but apparently were abundant in the nearby mountain ranges (Raven and Elston 1988). The described assemblages were likely more abundant and diverse than those at present (Bailey 1898, Schmitt 1988, Raven and Elston 1989, Fowler 1992).

Wetland specific mammalian species included muskrat, mink, raccoon, and river otter (Schmitt 1988,

Raven and Elston 1989, Fowler 1992). All of these species have been found at archaeological sites. River otter no longer exist in the present-day marsh and a relatively new addition, beaver, have become established in the system. When consulted about the historic presence of beaver, the response given by Wuzzie George of the Fallon Paiute-Shoshone Tribe was “he don’t belong here” (Fowler 1992). Additional inquiries suggest that the subspecies of muskrat was also different as Wuzzie George had no idea what the large muskrat mounds in the emergent vegetation zones were (Fowler 1992). It is likely that the original, bank-dwelling species was displaced by transplanting muskrat during 1949 following a wide scale muskrat die-off.

Large predators were also more abundant around the marsh. Bailey (1898) suggests that lynx were common in the area of north Carson Lake (Stillwater Marsh) and Raven and Elston (1989) found wolf and coyote remains at archaeological sites. Wolves and lynx have long since been extirpated from the Stillwater Marsh; however, coyotes appear to be more abundant at present, possibly due to the absence of these larger predators. It is uncertain whether historic descriptions of lynx refer to bobcat as common names have changed through history. Kit fox and mountain lion have been recently observed in the marsh (although few and infrequently) and it is interesting to note that few historic references to these species exist. Bailey (1898) made inquiries about the abundance of kit fox and found that no one in the valley had ever heard of it.

While several fish species have been documented in archaeological remains, only four were likely common in the Stillwater Marsh system (Tui chub, Lahontan red shiner, Lahontan speckled dace, and Tahoe sucker; Greenspan 1988). Even in the historic marsh, Lahontan cutthroat trout and mountain whitefish would likely not survive, although under certain conditions it is possible that the cutthroat made its way to the lower Carson River and associated wetlands. While data on relative population levels are not available, it is assumed that the tui chub and Tahoe sucker were more abundant during the late 1800s. Tui chub are thought to have declined while the Tahoe sucker is no longer present due to decreases in amount of permanent, open water habitat, reduced water quality, and the introduction of European carp, mosquito fish, and various species of gamefish. Because no recent inventories for Lahontan red shiner or Lahontan speckled dace have been conducted, it is uncertain whether these species are still present.

**VEGETATION**

Habitat on the Refuge can be separated into four broad types: wetland, riparian, desert shrub, and agricultural. Appendix K provides a brief summary of fire effects by plant species. Note: There are NO other T&E listed species on the refuge.

Table 1: Habitat Types

HABITAT	ACRES
wetland	22,325
riparian	30 miles
desert shrub	44,600
agricultural	200-300

**Wetland**

Generally the wetland plant communities fall into six main categories, each associated with different hydrologic regimes and salinity levels. The categories are:

1. submergent marsh- characterized by various species of pondweed, Chara and wigeon grass.
2. deep emergent marsh- characterized by hardstem bulrush, cattail, pondweed, and duckweed.
3. shallow emergent marsh- alkali bulrush, common three-square, and common cane.
4. flood plain meadow- wirerush, sedges, spikerush, water clover, muhly grass.
5. alkali mud flats- pickleweed, iodinebush, five-hook Bassia, and wigeongrass.
6. shrub- greasewood, quailbush, saltgrass, and saltcedar.

### **Riparian**

Historically, the banks of the Carson River in the Lahontan Valley were dominated by cottonwoods, willows, cattails, buffaloberry, and grasses. At present, saltcedar and Russian olive, which are introduced and highly invasive species, also inhabit riparian areas. Habitat along the river can be divided into the following categories:

1. Channel- permanently flooded portion of the river corridor characterized by duckweed, cattails, hardstem bulrush and sandbar willow.
2. Oxbow- old portions of the river channel cut off from current flow and characterized by cattails, bulrush, willows, old growth cottonwood, saltcedar, and Russian olive.
3. Bank- the seasonally hydrated portion of the river channel characterized by fremont cottonwood, red willow, big sagebrush, quailbush, a variety of grasses, saltcedar, Russian olive, and cocklebur.
4. Flood-plain meadow- characterized by wirerush, sedges, spikerush, water clover, saltgrass, and other grasses.
5. Delta- saltgrass, sea purslane, alkali bulrush, cattails, and bulrush.

### **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 5 inches per year). They provide the most common habitat in the Stillwater NWRC.

Two different upland desert shrub communities have been identified on the Stillwater NWRC: sagebrush shrubland and saltbush shrubland. Sagebrush shrubland is abundant in the state but are rare in the Complex area. Saltbush desert shrubland is a low, multi-layered shrub community often accompanied by the perennial herb desert-mallow and an understory of widely scattered native annuals. This plant community is abundant at the southern end of Stillwater NWRC. See Appendix K for a summary of fire effects on plants in this habitat type.

### **Agricultural**

Within agricultural areas, cultivated species, introduced species of weeds, and to a limited extent, native grasses and forbs occur. Perennial crops such as alfalfa and pasture grasses are the primary crops. Grain crops such as wheat, barley, and corn are also cultivated, but to a lesser extent. Grasses and forbs (native and introduced), have survived due to frequent watering and high groundwater table. Current and proposed management actions include restoration of some of these areas to native grasses. Restoration involves weed control and re-seeding with native grasses; western wheat grass, creeping wild rye, great basin wild rye, and alkali sacaton. See Appendix K. for a summary of fire effects on plants in this habitat type.

### **SPECIES OF CONCERN**

A number of species of concern, which have been observed as incidental visitors to the Lahontan Valley, are not known at this time to occur regularly within the Refuge. The effects of fire upon these species will be listed under Protection of Sensitive Species. Continued biological evaluation of the Stillwater

NWRC may at a future date identify Federally-listed species, at which time amendments to this plan may be necessary.

Peregrine Falcons have been observed hunting in the Stillwater NWRC.

A sizable population of Bald Eagles frequents the wetlands and reservoirs of Lahontan Valley. Important wintering sites are recognized along the Carson River. Cottonwood trees are commonly used for nesting platforms and foraging perches.

Swainson's Hawk (*Buteo swainsoni*), Ferruginous Hawk (*Buteo regalis*), and Logger Headed Shrike (*Lanius ludovicianus*) prefer open foraging habitat. All utilize grasslands in the restored agriculture fields and the shrub uplands.

Mountain Plover (*Charadrius montanus*) are very rare winter visitors and Western Snowy Plover (*Charadrius alexandrinus*) are common migrants and local breeders on saltgrass prairies/alkali flats of the Stillwater NWRC. They prefer fairly open areas with limited vegetation and/or disturbed areas for both foraging and nesting.

Burrowing owls (*Speotyto cunicularia*) occur periodically in the open, dry shrub/grassland on Stillwater. They inhabit abandoned coyote/badger burrows.

Nevada Viceroy (*Limenitis archippus*) inhabits the streamside communities. The thickets of willow (*Salix* sp.) and possibly Cottonwood (*Populus* sp.), provide important larval food sources.

The White Faced Ibis (*Plegadis chihi*), Trumpeter Swan (*Cygnus Buccinator*), Black Terns (*Chlidonias niger*), American Bitterns (*Botaurus lentiginosus*), Long-Billed Curlew (*Numenius americanus*), and Western Least Tern (*Ixobrychus exilis*) inhabit freshwater marshes and riparian zones. They nest in bulrush, willow thickets, or in trees in or immediately adjacent to water. They forage in swallow marshes, emergent wetlands, along shorelines and in adjacent meadows.

The Yellow Warbler (*Dendroica petechia*) breeds and lives in wet deciduous thickets of early successional habitats, wooded stream-sides, and shrubby thickets along riparian zones. Nesting occurs in spring.

Western Pond Turtles (*Clemmys marmorata*) are extremely uncommon in the lakes, and marshes of Stillwater NWRC. They mainly stay in or immediately adjacent to aquatic areas. Freshwater wetlands are important to their survival.

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 pallascens*), and Pacific Townsend's Big-eared Bat (*Plecotus townsendii townsendii*), are regularly observed on the Stillwater NWRC. 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. Two rare plant species, Nevada oryctes (*Oryctes nevadensis*) and Nevada Dune Beardtongue (*Penstemon arenarius*) are known to grow close to the Stillwater NWRC.

## **STRUCTURES AND FACILITIES**

There are a number of structures and facilities located throughout the Stillwater NWR. These include a maintenance facility with associated fueling stations, hazardous material storage. Most heavy equipment, boats, airboats, and vehicles are parked in a common area at this facility, located on the shore of

Stillwater Point Reservoir. Routine refuge equipment maintenance activities occur in this area. Hazardous material storage buildings are located at this facility. Herbicides, cleaning chemicals, paint and petroleum products are the most common hazardous materials used on the refuge. One residence is located 1 mile northeast of the town of Stillwater and a second is located 2 miles north of Stillwater, off Jackrabbit road. Currently there is no map available for this plan, we are hoping to get a GIS inventory map of structures and facilities in the near future (FY 2002).

Stillwater NWR has 90 miles of dirt and gravel roads. Several roads have been improved from native surface to crushed and rolled aggregate. Most secondary roads are to facilitate maintenance of wetlands and canals. Several interior roads parallel water delivery canals. Vehicle access on primary roads are good, except during wet weather conditions. Secondary roads are inaccessible when wet. Two primary roads are maintained by Churchill County; West and East County Roads. These currently traverse the east and west boundaries of the refuge. The refuge has several bridges that are being replaced to culverts and pipe crossings. The refuge has 45 miles of canals built to facilitate water deliveries to the various wetlands. These canals are typically filled with water from March until November.

Anaho Island NWR and Fallon NWR have no structures or facilities.

*Map 3. Displays the private in-holdings and proximity to other private and non refuge lands.*

Note: There is NO map available.

## WILDLAND FIRE MANAGEMENT SITUATION

### HISTORIC ROLE OF FIRE

#### Pre-settlement fires

Stillwater NWRC is characterized by extensive low-lying wetlands surrounded by uplands dominated by a salt-desert plant community. Although limited populations of sage/grasslands community exists in the uplands, they account for a small percentage of the over-all total acreage. Greasewood/ shadscale saltbush co-dominant the vast majority of the community, with Indian rice grass and salt grass evident, scattered widely through the understory. This particular plant community has adapted to a very arid climate (5 inches or less of annual precipitation) and is generally situated on very fine-grained lacustrine soils high in either salinity or alkalinity. When this community is in a good condition, shrubs are the dominant vegetative feature, and prior to Euro-american settlement, fine fuels were limited. 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. Due to large expanses of standing water, generally high live fuel moisture levels, and lack of naturally occurring ignitions, historic natural fire in the Lahontan wetlands likely was also a rare event. It is quite feasible; however, that Native Americans regularly burned portions of the wetlands prior to Euroamerican settlement to enhance resource availability and quality.

#### Post-settlement Fire History

Historical overutilization of the salt-desert 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 Stillwater NWRC. In particular, cheat grass (*Bromus tectorum*) has become dominant or co-dominant over vast areas. This invasion has altered fire return intervals in this ecosystem, from a rare event to more frequent, larger fires. 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 return intervals for a pure cheat grass stand range from 2-4 years. Fire, either wild or prescribed, is still a fairly rare event on the Stillwater NWRC. Fire reports have been filed for each wildland fire occurring on the refuge since 1988 (Table 4).

Table 4. Wildland fire Occurrence 1988-2001

YEAR	IGNITION CAUSE	ACRES BURNED	LOCATION	CONTROLLED BY
1996	unknown	1,660	West Marsh	natural barriers
1997	field burn	36	Boundary	County Fire Dept.
1999	unknown	70	South Lead Lake	natural barriers
2001	unknown	80	SW Lead Lake	natural barriers

Average number of fires per year for the years 1988-2001: .3

**Prescribed fire history**

Prescribed fire has not been used in the recent past by the refuge staff due to changes in Federal, Departmental, and Service policy regarding physical fitness and training standards (pack-test arduous 45 and annual refreshers). Refuge staffing levels and general workload have not allowed time to meet new policy and standards. Since 1996 the Zone fire staff in Lakeview writes burn plans and implements our burns. Refuge maintenance staff preps units by mowing or grading adjacent roads which are used for firelines.

**RESPONSIBILITIES**

Fire program management at Stillwater NWRC is now largely the responsibility of the Zone fire management staff located at Sheldon Hart Mountain Complex in Lakeview, OR. This program has increased to the level where Zone fire management staff (in concert with Refuge support) will now be capable of handling Stillwater NWRC prescribed fire program needs. Zone fire staff will plan and conduct all prescribed burns on the Refuge. Stillwater NWRC staff will assist when and where possible. In the future, the Refuge will strive to maintain one or more Prescribed Burn Boss Type 3 (RXB3) on the staff. Position needs of the Fire Management program for both preparedness and prescribed fire at Stillwater NWRC are found in Table 5. Due to the low frequency of wildland fires (two in the last 10 years), small staff size, and physical fitness and training requirements; wildland fires on the Refuge will be suppressed 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 Stillwater NWRC employees are qualified for suppression or prescribed fire operations.

Table 5. 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
Engine Operator (ENOP) for RX operations	(1) RX fire only
Fire Fighter Type 2 (FFT2) for RX operations	(1) RX fire only
Prescribed Fire Burn Boss Type 3 (RXB3)	(1) refuge burn boss

The Stillwater NWRC 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 Refuge, including the fire program.
- Insure that Department, Service, and Refuge policies are followed and maintained.
- Insure sufficient collateral duty firefighters meeting Service standards are available for initial attack.
- Serves as prescribed fire burn boss, as available and qualified.
- Approves prescribed fire plans.

### **Deputy Project Leader**

- Supervise the maintenance and biological staff.
- Supervise the resource management activities on the Refuge 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.
- May serve as prescribed fire burn boss, as available and qualified.

### **Zone 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.
- Insures fire management policies are observed
- Has lead responsibility for managing the prescribed fire program including:
  - Serve as prescribed fire burn boss.
  - Write prescribed fire plans
- Maintains liaison with Regional Fire Management Coordinator
- Updates the Fire Management Plan, maintains fire records, reviews fire reports (DI-1202) 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 before April

### **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.

- 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.

### **INTERAGENCY OPERATIONS**

Cooperative agreements with various federal, state and local agencies (Appendix D) generally provide that resources of each agency are available to assist in initial attack efforts. These agreements have detail payment among cooperators, list of response areas, communications frequencies, and have been reviewed by a contract specialist and/or solicitor.

Stillwater NWRC will use the Incident Command System (ICS) as a guide for fireline organization. Qualifications for individuals are 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.

Stillwater NWRC is surrounded by federal lands owned and/or managed by the Bureau of Land Management, tribal land, and private land. The BLM Carson City District adjoins the Refuge and has primary fire management on their lands. In addition, Churchill County has fire management responsibilities for the entire County.

The Stillwater NWRC is located within Churchill County. Churchill County Fire Department will suppress wildland fires on Stillwater and Fallon NWRs. Anaho Island NWR is located in Washoe County and is part of the Pyramid Lake Paiute Indian Reservation.

The Refuge Complex will develop a cooperative agreement with Churchill County in order to clearly identify suppression objectives and limitations.

### **PROTECTION OF SENSITIVE RESOURCES**

#### **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 and tactics used to suppress them present a threat to sites located on the Refuge. Appropriate measures will be taken to protect sites during wildland fire suppression efforts.

The use of earth moving equipment poses a threat to cultural resources found below the ground surface. A Resource Advisor familiar with Stillwater Refuge or the surrounding area should be involved in any suppression activities whenever possible. The use of earth moving equipment for suppression activities within the Refuge must be approved by the Refuge Project Leader 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.

Whenever feasible, earth disturbing equipment will be restricted to existing roads, heavily disturbed areas, or areas cleared by cultural resources staff. All surface disturbances occurring during any suppression activities shall be reported immediately to the Regional Cultural Resources Staff for evaluation. All fire rehabilitation work involving any earth disturbing activity will require the direct involvement of the Regional Cultural Resources Staff.

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. Direct consultation with the Cultural Resources Staff will be necessary prior to any implementation of prescribed burn projects. Known sites or newly discovered sites will be protected from negative impacts. Prescribed burn projects in the Wetlands Prescribed Burn Unit are the most likely to contain sites due to less modern day disturbance. The Upland Restoration and Maintenance 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, attached) 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 will 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 known cultural significance.
  - The location of any sites discovered as the result of fire management activities will be reported to the Regional Archaeologist.

### **Sensitive Animal Species**

The effects of fire on these species were obtained from the on-line Fire Effects Information System (U.S. Department of Agriculture 2001).

Peregrine Falcons have been observed hunting in the Stillwater NWRC. Prescribed fire will have little or no effect upon this species. Fire will not be introduced into any suitable nesting habitat. Size of acreage to be burned yearly in field and wetlands restoration on the Complex will be a minute portion of the total available hunting habitat acreage.

A sizable population of Bald Eagles frequents the wetlands and reservoirs of Lahontan Valley. Important wintering sites are recognized along the Carson River. Cottonwood trees are commonly used for nesting platforms and foraging perches. Protecting these mature cottonwoods from fire is essential to providing suitable bald eagle nesting and foraging habitat. Prescribed fire will have little effect upon this species. Prescribed fire will be kept to fields and tule/bulrush areas and away from any riparian habitat suitable for nesting. Any wildland fire in or threatening habitats suitable for eagle nesting, especially along forested waterways, will be vigorously suppressed.

Swainson's hawk (*Buteo swainsoni*), Ferruginous Hawk (*Buteo regalis*), and Logger Headed Shrike (*Lanius ludovicianus*) prefer open foraging habitat. All utilize grasslands in the restored agriculture fields and the shrub uplands. Fire in this habitat should have little or no direct effect upon these species as adults can easily escape fire. Periodic fire would keep foraging habitat open for their continued use. Prescribed fire should be used to create mosaic burn patterns rather than large uniform habitat conversions. These species 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 knowingly introduced into this ecosystem and all wildland fires there will be vigorously suppressed.

Mountain Plover (*Charadrius montanus*) are very rare winter visitors and Western Snowy Plover (*Charadrius alexandrinus*) are common migrants and local breeders on saltgrass prairies/alkali flats of the Stillwater NWRC. They prefer fairly open areas with limited vegetation and/or disturbed areas for both foraging and nesting. Prescribed fire can be successfully used to maintain their preferred habitat. Fire should be kept out of their nesting areas in the spring, although they prefer bare sandy nest sites with only limited vegetation. Any human disturbance can be detrimental to their nesting activities.

Burrowing owls (*Speotyto cunicularia*) occur periodically in the open, dry shrub/grassland on Stillwater. They inhabit abandoned coyote/badger burrows. Except for late March through early May, when nesting and brood rearing occurs, fire poses little threat to this species, and may in fact prove a benefit by maintaining preferred habitat.

Nevada Viceroy (*Limenitis archippus*) inhabits the streamside communities. The thickets of willow (*Salix* sp.) and possibly Cottonwood (*Populus* sp.), provide important larval food sources. Prescribed fire should be used sparingly or not at all in these areas, except on small-scale burns to encourage localized

re-sprouting of willows. Wildland fire will be vigorously suppressed in this habitat type.

The White Faced Ibis (*Plegadis chihi*), Trumpeter Swan (*Cygnus buccinator*), Black Terns (*Chlidonias niger*), American Bitterns (*Botaurus lentiginosus*), Long-Billed Curlew (*Numenius americanus*), and Western Least Tern (*Ixobrychus exilis*) inhabit freshwater marshes and riparian zones. They nest in bulrush, willow thickets, or in trees in or immediately adjacent to water. They forage in swallow marshes, emergent wetlands, along shorelines and in adjacent meadows. 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 amounts of hydrophytes, permitting better waterfowl access and growth of desirable aquatic food plants. Mosaic burn patterns are preferred over landscape level burns to maintain adequate 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 successional habitats, wooded stream-sides, and shrubby thickets along riparian zones. Nesting occurs in spring. 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.

Western Pond Turtles (*Clemmys marmorata*) are extremely uncommon in the lakes, and marshes of Stillwater NWRC. They mainly stay in or immediately adjacent to aquatic areas. Freshwater wetlands are important to their survival. Burning should have no immediate effect on their survival, but improving wetlands health through burning off accumulations of dead/decadent foliage and creating mosaics of open water interspersed with vegetation is beneficial.

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 regularly observed on the Stillwater NWRC. 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. 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.

### **Sensitive Plant Species**

Two rare plant species, Nevada oryctes (*Oryctes nevadensis*) and Nevada Dune Beardtongue (*Penstemon arenarius*) are known to grow close to the refuge. Although little is known about how fire affects these, both inhabit dry, sandy areas which commonly have vegetation too sparse to carry fire.

## **WILDLAND FIRE ACTIVITIES**

Fire program management describes the operational procedures necessary to implement fire management at Stillwater NWRC. 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.

### **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.

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.

One critical protection area, the Stillwater shop compound, is located on Stillwater Road along the shore of Stillwater Point Reservoir. The compound houses shops, vehicle and heavy equipment storage, fueling stations and hazardous material storage, visitor centers, and wildlife rehabilitation centers. The large expanse of gravel yard surrounding the compound make it impervious to wildland fire.

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 tactics 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.

The Refuge will utilize the appropriate management response to suppress all wildland fire ignitions occurring within the boundaries of the Stillwater NWR Complex. The following strategies will be utilized to accomplish this:

- Suppress all wildland fires in a safe and cost effective manner consistent with resources and values at risk.
- Suppression 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 suppression tactics will be used whenever possible.
- Prescribed fire will be utilized to modify vegetative communities for improved wildlife habitat, ecosystem function and hazard fuel reduction.
- 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 Project Leader or Resource Advisor.
- Wildland fire use for resource benefit will not be utilized.

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 Complex. Preparedness efforts are to be accomplished in the time frames outside the normal fire season dates.

Table 6: Annual Refuge Fire Management Activities

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

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

No prescribed fire activities will be conducted when the National Preparedness is at Levels IV or V, with out approval of the Great Basin Coordinating Group.

**Historical weather analysis**

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.

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 escaped agricultural burns.

Fire Family Plus runs are currently using BLM Dead Camel RAWS station 260701. Dead Camel best represents the fire season on Stillwater NWR Complex.

**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 will 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 1988-98 a total of 2 fires were human caused. One fire was from an adjacent landowner burning ditches, the other fire was human caused of unknown origin. An analysis has not been completed due to the insignificant number of human caused ignitions. If ignitions significantly increase or begin to occur in new areas, prevention strategies will be reviewed and modified, as necessary. As new visitor facilities are developed or use levels significantly increase, the fire plan will be reviewed and modified if necessary.

During periods of extreme or prolonged fire danger emergency restrictions regarding refuge operations, or area closures may become necessary. Such restrictions, when imposed, will usually be consistent with those implemented by cooperators. Closures will be authorized by the Refuge Project Leader.

### **Staffing Priority Levels**

A listing of requested positions for wildland fire management activities can be found in Section III, Table 5. Current staffing status can be found in Appendix C. Churchill County fire resources will be the primary suppression resources during wildland fire incidents. The Refuge will provide non arduous support in the form of Resource Advisors.

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

### **Training**

Departmental policy requires that all personnel engaged in suppression and prescribed fire duties meet the standards set by the National Wildfire Coordinating Group (NWCG). Stillwater NWRC will conform strictly to the requirements of the wildland fire management qualification and certification system and USFWS guidelines.

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 Zone 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, LACES, 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. Standard forms and procedures required by the Service will be used and followed. The cost of examination will be born by the Service and the results sent to the Region Personnel Department.

### **Supplies and Equipment**

The Refuge does not have any fire equipment or trained personnel and will rely on the Fallon Volunteer Fire Department. 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 Project Leader or Resource Advisor except when there are threats to human life and or property.

Additional equipment and supplies are available through cooperators and the interagency cache system. Requests for additional personnel and equipment are made through the contact list which can be found in Appendix E.

### **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 Churchill County Fire Dispatch. The person receiving the report will be responsible for implementing the Fire Dispatch Plan (Appendix G.).

The Zone Fire Staff at Sheldon Hart Mountain Complex will be able to assist with managing an extended attack incident. Requests for assistance by cooperators on fires not threatening the Refuge must be made

to the Project Leader or designee. Only qualified and properly equipped resources meeting NWCG standards will be dispatched off of the Refuge.

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

### **COMMUNICATIONS**

The Sierra Front Interagency Dispatch Center (775) 882-9187 is responsible for dispatching of fire resources and handling requests for additional resources. The dispatch center documents and tracks all resources and coordinates with the duty officers for national dispatch requests. The current frequency use agreements and the common frequencies used are listed in Appendix G

### **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. The IC will complete the pre-attack planning checklist (Appendix G).
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 H .

### **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. An FMU may coincide with a prescribed fire burn block or treatment area or unit, but this is not always the case. On smaller refuges the whole refuge may be treated as a single FMU.

All of Stillwater NWR will be considered as one FMU for wildland fire suppression. The Refuge will be divided into three Prescribed Fire Management Units (Table 7). 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 for any of the units. Wildland fires will be suppressed using the appropriate suppression response. Prescribed fires will be used to reduce hazardous fuels and to meet resource management objectives.

### **Fire effects on Vegetation**

#### *Native Uplands*

The upland landscape of Stillwater NWRC is characterized by gently rolling to flat desert shrublands and flat alkali playas. Desert shrub plant communities typically are made up of plant species that tolerate

moderate to highly alkaline soils and can survive on minimal precipitation (about 5 inches per year). Three different upland desert shrub community types are: greasewood shrublands, saltbush desert shrublands, and dunes (Map 4). The objective of burning upland areas is to increase plant diversity and create lower successional stage vegetation. Sagebrush and greasewood stands have infrequently been burned at Stillwater NWR Complex to remove older shrub and grass plants and to reduce the age composition of the vegetation.

### *Riparian*

The riparian vegetation communities are characterized by variable stands of cottonwoods and willows common along the lower reaches of the Carson River; upland shrub, grasses, and emergent vegetation along the Stillwater Slough. Prescribed burning is rarely used in this plant community.

### *Wetlands*

Generally, the basin-wetland plant communities fall into five main categories, each associated with different water depths and salinity levels. The categories are:

- **Submergent marsh** - Dominated by various species of pondweed, Chara and wigeon grass;
- **Deep emergent marsh** - Dominated by hardstem bulrush, cattail, pondweed, and duckweed;
- **Shallow emergent marsh** - Dominated by alkali bulrush, common three-square, and common cane
- **Moist-soil** - Dominated by five-hook bassia, swamp timothy, summer cypress, wild millet, smartweed, and red goosefoot;
- **Wet meadow** - Dominated by wirerush, sedges, spikerush, water clover, muhly grass, and saltgrass;

### *Deep Emergent Marsh*

The objective for burning this vegetation type is to remove accumulated plant biomass to facilitate increasing plant diversity, provide nesting habitat, restore vigor and palatability of forage, and create a mosaic of vegetative stages. Removal of biomass also facilitates discing or plowing of marsh habitat to create vegetation mosaics. The vegetation is cured either by draining the marsh area or when the dead plants cure during winter freeze conditions. Prescribed burning reduces accumulated materials, creating a diversity of submergent or emergent vegetation in the usually mono-culture stands of hardstem bulrush. Roots of bulrush can be temporarily killed in small aggregations, leaving more open water in continuous expanses of marsh. Permanent marsh areas are usually burned approximately every four years. Prescribed fire is being used to manage permanent marshes at Stillwater NWR Complex.

### *Shallow Emergent Marsh*

The objective for burning this vegetation type is to remove accumulated plant biomass and reduce opportunities for disease and insect epidemics by maintaining a mosaic of climax and sub-climax vegetation. This vegetation type cures in the late summer or early fall. Areas of seasonal marsh are burned to increase plant diversity, to create openings and provide improved forage. Migratory bird forages are improved by burning this type. Burning is also used to encourage the use of these areas by wading shorebirds, herons, ibis and egrets.

### *Croplands*

Prescribed burning of cropland residues is one of the current practices used for preparing farmed areas of the Stillwater NWR for planting small grain crops and controlling invasive weeds. The wildlife objective for burning agricultural crop land is to reduce coarse decadent plant growth and stimulating green

succulent forage for migratory waterfowl and resident wildlife.

#### *Invasive Weed Management*

The objective of burning this type of vegetation is site preparation. Prescribed burning is usually conducted over small areas in preparation of biological or chemical control of invasive weeds and maintaining native grass plantings that contain weeds. The strategy is to continue the use of prescribed fire in conjunction with other tools to assist in the control of invasive weeds. Prescribed fire use for invasive weed control will be coordinated with the Integrated Pest Management Specialist and Refuge Biologist.

#### *Wildlife Habitat Improvement*

Use of prescribed fire to improve and maintain habitat for migratory birds is a primary role of fire management at the Complex. All of the refuges in the Complex were established to provide habitat for migratory birds. The vegetation and associated habitats at the refuges provide transitory or permanent habitats for over 430 vertebrate wildlife species. Threatened and endangered migratory avian predators, such as the bald eagle, depend on the resident or migratory birds for food. The strategy of the use of prescribed fire for wildlife habitat improvements is to maintain habitats at an optimum level for plant diversity and forage production.

### **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, windspeed, 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 (BEHAVE) developed for this purpose. The various prediction systems provide outputs of rate of spread, fireline intensity, heat per unit area, and flame length.

Wildland fire can be dangerous and unpredictable during any season of the year, however the months of August and September typically have the potential for the most severe fire behavior. During these months, fine fuels and other plants have cured out, relative humidity is usually low, temperatures are the highest of the year, wind speeds are typically high in the afternoon, ignition sources however are uncommon.

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 (90<sup>th</sup> percentile) . This fuel model occurs on Refuge farm fields and restored grassland uplands.

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 some naturally occurring wetlands.

Fuel Model 6 Shrub - describes areas where the shrub layer carries the fire at wind speeds greater than 8 mile/hour. Fire drops to the surface layer at lower wind speeds 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 wind speeds. 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.

## **SUPPRESSION STRATEGIES FOR STRUCTURES/FACILITIES/INHOLDINGS**

The maintenance staff creates and maintains defensible space for refuge structures where appropriate. The fire management staff prescribe burns heavy accumulations of hazardous fuels. The majority of fuel around structures is Greasewood which is extremely hard to consume (fuel resistant). The combination of fuels abatement and prescribed burning allows the refuge to handle structure protection with local fire departments. Structure protection is covered by a Cooperative Agreement between Stillwater NWR and Fallon/Churchill Fire Department. In addition the Nevada Cooperative Fire Protection Agreement addresses Structure protection. See appendix D. Stillwater is in the process of finalizing the EIS from the refuge CCP and boundary revision. When boundary approvals are finalized in-holdings will have to be addressed in further detail.

### **Suppression Tactics**

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

The following suppression tactics will be utilized to meet the objectives of providing for firefighter safety and safety of refuge visitors, cooperators, and personnel, minimizing damage to refuge resources from suppression efforts, preventing fires from burning off of the refuge onto adjacent lands, and preventing damage to cultural resources:

1. 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.
2. Conduct backfiring operations from existing roads and natural barriers to halt the spread of fire.
3. Use burnouts to stabilize and strengthen the primary control lines.
4. If the use of heavy equipment is warranted, upon approval of the Refuge Manager, construction of control lines will border existing roads where possible.
5. Retardants may be used on upland areas.
6. Constructed fireline will be rehabilitated prior to departure from the fire.
7. Utilize minimum impact suppression tactics (MIST).

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**

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.

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 Zone FMO of the situation. The Zone FMO will assist the Project Leader in completing a Wildland Fire Situation Analysis (WFSA) and Delegation of Authority (Appendix H).

The IC will be responsible for mop-up and rehabilitation of suppression actions on Refuge fires. Refuge fires will be monitored until declared out.

The use of earth moving equipment for suppression activities (dozers, graders, plows) on the Refuge will not be permitted without the approval of a FWS Resource Advisor. Note: In order to save life and or property prior approvals may be waived by the IC.

### **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 Project Leader, 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.

### **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.

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 aviation 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 Zone 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).

## **PRESCRIBED FIRE ACTIVITIES**

All prescribed fires, prior to implementation must have a written plan which is reviewed and approved by the Project Leader. Habitat management burns, hazard fuels reduction, debris removal, roadside and ditch burning must have a written plan. The BOR and irrigation districts are responsible for completing the planning for all burns associated with the farm lease program and meeting Departmental policy. The Department of Interior, Departmental Manual, chapter on Wildland Fire Suppression and Management (910 DM 1), section b (2) states: "No prescribed fire may be allowed to burn without suppression action unless a current and valid prescription has been approved by the responsible line officer. All prescriptions must address:

1. The land use objectives for the area.
2. Historical fire occurrence.
3. Expected fire behavior.
4. Natural role of fire.
5. Buffer and safety zones.
6. Energy release component (ERC).
7. Constraints which may be required due to regional and national fire activity.
8. Predetermined limit on the number of fires burning in the planning area at one time.
9. Perimeter and acreage burned limit.
10. Analysis of the cumulative effects of weather and drought on fire behavior.
11. Potential impacts upon visitors, users, and local communities, both on and off site.
12. Considerations of environmental, cultural, economic, and social effects, both on and off site.

### **PRESCRIBED BURN PROGRAM OBJECTIVES**

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

As a result of the CCP/EIS process, Biologist and Managers have 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 methods such as mechanical, herbicide, grazing, etc).
3. Periodic reduction of dense cattail growth in wetland units.
4. Maintain/rejuvenate nesting cover for waterfowl and other native birds.
5. Maintain water delivery systems and the farm program. Primarily burning; stubble in preparation of planting, weed control, burning irrigation ditches, and burning debris piles.
6. Hazardous fuels reduction.

Prescribed fire will be used in three areas of the Stillwater NWR Complex:

- 1) Restored Native Uplands: These fields are lands reclaimed from past agricultural operations. They are managed extensively for habitat restoration. The intent is to convert these acreages from agricultural uses and re-introduce native grass species. Maintenance burns on a rotational basis will be applied.

2) Wetlands: Shortgrass/meadow, short emergent, tall meadow - all grouped together as wetlands. The intent is to manage for mosaics of wetland vegetation.

3) Maintenance Burns: Ditches, stubble, patches of weeds, and piles of debris

Achieving many of the goals will require repeated burn cycles for an indefinite length of time. Burn frequency will vary from every 1 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 fire has been used on a limited basis on the Refuge primarily to facilitate the accomplishment of maintenance operations such as; irrigation ditch maintenance, farm field preparation, pile burning, and weed control.

Prescribed fire has also been used to remove dead emergent wetland vegetation that was impairing productivity of wetlands. Historical files on prescribed fire activities were not maintained. Long term Refuge employees say that fire has been an effective method in managing maintenance operations and the habitat management program.

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. Prescribed fire complexity on Stillwater NWR will be determined by the FWS Fire Complexity Analysis contained in FIREBASE. All prescribed fires currently being considered are of low to moderate complexity.

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.

### **BURN UNITS**

The Refuge will be divided into three prescribed fire management units (Table 7). The units were created using habitat types under the basic assumption that each habitat presents its own unique fire behavior, objectives, and prescription values.

Table 7: Prescribed Fire Management Units

Unit	Total Acreage	Burn per year
Wetlands	22,325	150-2000 acres
Restored Native Uplands	400-500	65-125 acres
Maintenance (stubble, piles, ditches)	200-400	100-150 acres

## **Native Uplands**

Prescribed fire will be utilized to help restore fields once used for agricultural purposes to a more natural state. Fields will be burned for several purposes; at the start of the restoration process to eliminate weeds and annuals while at the same time preparing a seed bed, and for periodic vegetation maintenance after establishment of planted native grasses. Native grasses, selected for their ability to thrive in salt or alkali rich soils and to resist prolonged drought, were also chosen which are also generally fire adaptive. The native bunch grass species planted on restored agricultural fields on Stillwater NWR Complex are listed below along with a brief statement about how fire affects each.

1.) Western Wheat Grass (*Pascopyrum smithii*) - Fire usually consumes the dry vegetative component of this grass to ground level, but it usually revegetates rapidly from rhizomes after fires. Spring burns, before new growth is initiated, favor western wheatgrass, increasing plant abundance and density. Fall burning also stimulates productivity but to a lesser degree. Fire can cause severe injury to this plant during its growing period, from late spring through the summer, resulting in less above-ground foliage and reduced below-ground rhizome growth.

2.) Creeping Wild Rye (*Elymus triticoides*) - Not a lot of information on how fire affects this grass is available, but it appears to be reasonably well adapted to fire due to a rhizomous root system. Fire generally consumes all above-ground foliage, but the plant apparently survives by sprouting from rhizomes. 3.) Great Basin Wild Rye (*Leymus cinereus*) - This grass is generally considered to be well adapted to fire. When fire burns this grass, coarse, dense stems tend to insulate basal buds located near ground level from the damaging heat of even high-intensity fires. Most individuals readily survive fire, sprouting from basal buds or rhizomes as well as establishing postfire seedlings. Rapidity of recovery is generally related to season and severity of burn, however. Burning during periods of dormancy appears to be most conducive to the rapid recovery of this grass. Generally less damaged by fall-season fires, this grass also recovers almost as rapidly from spring-season fires as well. Basal buds can be destroyed by very intense, summer fires.

4.) Alkali Sacaton (*Sporobolus airoides*) - This grass is generally considered tolerant of fire. Fires usually consume dry aboveground parts to ground level. Little downward transfer of heat into belowground plant parts occurs. Alkali sacaton regenerates via seeds and spreads via tillers.

## **Wetlands**

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

## **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 zone FMO and project leader or designee. 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. 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 planning 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 PLANNING**

### **Annual Activities**

Refuge management staff will develop annual prescribed fire objectives and target specific burn units prior to the prescribed burn season. The planning for the Refuge Complex refuges is normally accomplished in late winter when the farming and water management programs are being developed for the year. Burns may be conducted during any season of the year depending on the specific management objectives of the burn. However, due to the normal life cycle of this area, burns are bimodal, meaning that spring burning is done prior to green-up and fall burning is accomplished after maturation. Little or no burning is accomplished during the summer period as the vegetation is green.

The Zone 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.

Prescribed Fire activities will be reviewed annually by the Zone Fire Management Officer, Assistant Fire Management Officer, and Prescribed Fire Specialist. Necessary updates or changes to the Prescribed Burn 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 further approval of the plan.

### **Management Unit Objectives**

Management unit objectives for prescribed fire are developed through environmental analysis and the subsequent habitat management plans for each refuge. A refuge may have several decision documents to reflecting the land management actions occurring at the refuge. Plans for management of threatened and endangered species, waterfowl, other migratory birds and uses such as agriculture, may be reflected in different documents. The initiation of comprehensive conservation planning (CCP) in the Complex is planned for approximately 2005.

Several refuges share the same prescribed fire management objectives for similar vegetation types. Management of unique applications of prescribed fire is described for each refuge. Common management techniques using prescribed fire will be described by vegetation type.

### **Prescribed Burn Plan**

The Prescribed Burn Boss will conduct a field reconnaissance of the proposed burn location with the Zone FMO, AFMO, PFS, biologist, and/or Refuge Manager to discuss objectives, special concerns, and gather all necessary information to write the burn plan. After completing the reconnaissance, a qualified Prescribed Burn Boss will write the prescribed burn plan.

All prescribed fires will have prescribed burn plans. The prescribed burn plan is a site specific action plan describing the purpose, objectives, prescription, and operational procedures needed to prepare and safely conduct the burn. The treatment area, objectives, constraints, and alternatives will be clearly outlined. No burn will be ignited unless all prescriptions of the plan are met. Fires not within those parameters will be suppressed. Prescribed Burn Plans will follow the format contained in Appendix N. The Project Leader has the authority to approve the burn plan. The term "burn unit" refers to a specific tract of land to which a prescribed burn plan applies. The Refuge Project Leader 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 Zone FMO and zone fire management staff will be consulted for assistance in developing a prescription that will achieve the desired results.

### **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.

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

Stillwater 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.

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 of 10-, 100-, and 1000-hour down and dead logs (where applicable) and of live plants may be monitored each week and percent moisture contents figured to help determine when the prescription criteria are met. Go/No-Go elements:

1. Prescription adequate for a safe burn
2. Plan includes a prediction of expected fire behavior
3. Plan provides for getting spot weather forecast
4. Test fire is planned, if not explain
5. Qualifications of personnel reviewed and found adequate
6. Proposed organization structure reviewed and found adequate
7. Fuels adjacent to burn identified and problem areas highlighted
8. Plan includes instructors for overhead
9. Maps adequate
10. Escape Contingency Plan adequate
11. Safety Plan adequate
12. Post-burn plan included for both short and long term effects
13. Cultural Resources protection
14. Smoke Management concerns
15. Recommended for approval

When all prescription criteria are within the acceptable range, the Prescribed Burn Boss in consultation with Refuge staff will select an ignition date 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 Type III Incident Commander will be assigned in the event of an escaped prescribed burn. The next available qualified FWS Incident Commander will assume responsibility as soon as is practicable thereafter. 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 Zone FMO will be notified immediately of any control actions on a prescribed burn. A WFSA will be completed as necessary 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.

Prior to implementation of the burn, all refuge suppression equipment will be checked to insure readiness for the prescribed burn. Specialized equipment for the burn such as portable pumps and porta-tanks will be checked and put in place on the burn site along with any required hose lines and laterals. After completion of the burn the Sierra Front Interagency Dispatch Center is notified that the burn is completed and any additional information is passed on at this time. In addition the appropriate state air quality control office is notified prior to implementation to secure a permit for the burn.

### **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.

### **Maintenance of Refuge Infrastructure**

The strategy for refuge infrastructure maintenance is to remove debris along roadsides, in water delivery structures, around water control structures, around electrical structures and around buildings. Mechanical manipulation of debris and prescribed fire will be used.

### **Ecosystem Role of Fire**

Increasing the natural role of fire in the vegetation communities on the Complex's refuges is a strategy and goal of management. Because of the fragmentation of the land ownerships in the Lahontan Valley and the relatively small size of the refuge, prescribed fire will be the only way that fire can safely be returned to the ecosystem on a regular basis. Using prescribed fire to manage the refuge's vegetation is highly favored over the impacts of wildland fire and its associated severity of effects, safety issues, potential damage to adjacent properties and the unplanned nature of wildland fire.

All wildland fires will be appropriately suppressed. However, monitoring wildland fires may be appropriate and potentially valuable in mapping and documenting the growth of the fire, measuring on-site weather and fuel loading to provide the fire staff with present and expected fire behavior and effects. During prescribed burns, monitoring can serve as a precursor to invoking suppression action by determining if the fire is in prescription, assessing its overall potential, and determining the effects of the prescribed burn.

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 Stillwater NWR Complex exists, general conclusions can be made from the Fire Effects Information System. Appendix K contains a table which depicts the anticipated effects of fire on plant species that are found on Stillwater NWR Complex prescribed burn units.

Fire monitoring protocols for the Region or Service will be used at Stillwater NWR Complex. (Appendix L). 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 CCP.

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**

The Zone Fire Management staff, Biologist and Deputy Project Leaders will critique each prescribed burn. 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 Department of Environmental Protection (NDEP) approved a Smoke Management Plan July 2001 to address air quality issues. See Appendix M. for a copy of the current Nevada Smoke Management Plan. Updates to the SMP can be found on the State of Nevada web page [www.ndep.state.nv.us/baq/smoke1.htm](http://www.ndep.state.nv.us/baq/smoke1.htm).

There are no non attainment areas near the Refuge. Smoke sensitive areas in the area include Refuge, County, and State roads. The community of Fallon, NV. (population 10,000) is approximately 15 miles southwest of the refuge. The Fallon Naval Air Station is approximately 15 miles south of the Refuge. Private and Tribal lands adjacent to the Refuge 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. Tribal, military, and county 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 50-100 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: wetlands restored native uplands, and maintenance. The table below illustrates representative PM 10 emissions in tons per average burn.

Table 8. Prescribed Fire Emissions

<i>Burn Type</i>	<i>Average Size of Burn</i>	<i>PM10 Emissions per Burn</i>
<i>wetland</i>	<i>75 acres</i>	<i>2.25 tons</i>
<i>restored native upland</i>	<i>30 acres</i>	<i>.45 tons</i>
<i>maintenance</i>	<i>20 acres</i>	<i>.1 tons</i>

## **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 Stillwater NWR Complex 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.

## **PUBLIC SAFETY**

Stillwater NWR Complex is dedicated to ensuring the safety of each visitor and to all residents and property adjacent to the refuge's boundary. Roads may be closed to the public during prescribed burning and or wildland fire suppression activities.

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 may be used to promote the prescribed fire program to the public:

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

## **FIRE CRITIQUES AND ANNUAL PLAN REVIEW**

### **FIRE CRITIQUES**

Fires will be critiqued by the IC/ Burn Boss. The Regional Fire Management Coordinator will conduct formal critiques in the event of:

- Significant injury, accident or fatality
- Significant property or resource damage.
- Significant safety concerns are raised.

### **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 to ensure the fire program advances and evolves with the FWS and the Refuge's mission and updated as necessary. 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**

The following agencies, organizations and/or individuals were consulted in preparing this plan.

Roddy Baumann, Prescribed Fire Specialist, Pacific Region, USFWS, Portland, OR.  
Rob Bundy, Wildlife Biologist/Planner, Stillwater NWR Complex, Fallon, NV.  
Chris Farinetti, FMO, Sheldon-Hart Mountain Refuges, Lakeview, OR.  
Mike Goddard, Deputy Project Leader, Stillwater NWR Complex, Fallon, NV.  
Andy Goheen, Prescribed Fire Specialist, Sheldon-Hart Mountain Refuges, Lakeview, OR.  
Bill Henry, Wildlife Biologist, Stillwater NWR Complex, Fallon, NV.  
Amanda McAdams, Fire Planner, Pacific Region, USFWS, Portland, OR.  
Richard Hadley, Assistant Refuge Supervisor, California/ Nevada Operations, Sacramento, CA.

All fire management program activities will be implemented in cooperation and coordination with the State of Nevada Department of Environmental Protection, and with member agencies of the GREAT BASIN NWCG, Nevada Fire Operations Group. Other agencies and organizations will be consulted as needed.

## APPENDICES

### APPENDIX A: REFERENCES CITED

Raymond, Anan W. 1992, Who Were the Ancient People of the Stillwater National Wildlife Refuge, Nevada? U.S. Fish and Wildlife Service, Fallon, Nevada.

U.S. Department of Agriculture July 2001, Fire Effects Information System, Forest Service, Rocky Mountain Research Station, Ft Collins, CO

U.S. Fish and Wildlife Service. 1998, Fire Management Plan for Seedskedee NWR

\_\_\_\_\_. June 2001, Fire Management Plan for Hart Mountain NWR

\_\_\_\_\_. June 2001, Fire Management Plan for Sheldon NWR

\_\_\_\_\_. March 2000, Draft Environmental Impact Statement for the Stillwater National Wildlife Refuge Complex Comprehensive Conservation Plan and Boundary Revision, Churchill and Washoe Counties

## **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.

Bureau. Bureaus, 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: CURRENT EMPLOYEE QUALIFICATIONS**

As of June 2001

NAME	POSITION	QUALIFICATIONS
Bill Henry	READ, FFT2	READ qualified, FFT2 not current
Bob Henderson	FFT2	not current
Rob Bundy	READ, FFT2	READ qualified, FFT2 not current
Mike Goddard	FFT2	not current
Dave Wills	FFT2	not current
Kim Hanson	FFT2	not current

ENOP - Engine Operator  
FFT2 - Firefighter Type 2  
READ-Resource Advisor

## **APPENDIX D: FIRE MANAGEMENT AGREEMENTS**

**APPENDIX E: FIRE COOPERATORS**

<b>AGENCY</b>	<b>NAME/TITLE</b>	<b>PHONE NUMBER</b>
BLM Carson City, NV	Leonard Wehking, AFMO	775-885-6101
Sierra Front Interagency Dispatch	24 hour Fire Phone	775-882-9187
Churchill County Sheriff	Dispatch	775-423-3116
Churchill County Fire Station	Dispatch	775-423-6521
Fallon Naval Air Station	Operations	775-426-2419
Fallon Paiute Tribe	Administrative Office	775-426-8848
NV Dept. of Environmental Protection	Curtis Payne, Permitting	775-687-4670ext.3083
Sheldon Hart Refuges Zone Fire Staff	Chris Farinetti, FMO	541-947-3315 office 541-947-6315 LIFC dispatch
Ambulance/Medical/Accident	Emergency	911
Canvasback Gun Club	John Carrington, Manager	775-741-8244

**APPENDIX F: 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					X
Detection patrol conditional				X	X
Closures subject to Project Leader				X	X
No Mowing fields or Welding around grass fuels					X

The Zone Fire Management Officer sets fire danger levels.

## **APPENDIX G: FIRE DISPATCH PLAN**

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 SIERRA FRONT INTERAGENCY FIRE DISPATCH CENTER**

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 Project Leader and work down list till someone is contacted.
- B. During regular working hours:
  1. Notify Project Leader.
  2. Refuge Biologist and or designated resource advisor
- C. Contact Zone Fire Management Staff ASAP.
- A. Establish Communication
  1. Hailing frequency.
  2. Operations frequency.

FIRE PERSONNEL DIRECTORY - 2001  
 Stillwater National Wildlife Refuge Complex  
 Address: 1000 Auction Road Phone:(775) 423-5128  
 Fallon, NV. 89406 FAX: (775) 423-0416

FIRE REPORTING OR ASSISTANCE REQUEST:

Name/Title	Office Phone	Home Phone
Kim Hanson, Project Leader	775-423-5128 775-530-8719(Cell)	775-867-4626
Mike Goddard Deputy Project Leader	775-423-5128 775-426-9138(Cell)	775-423-5943
Bill Henry, Biologist	775-423-5128	775-423-7226
Bob Henderson Law Enforcement	775-423-5128 775-426-9137(Cell)	775-423-6845
Dave Wills Law Enforcement	775-423-5128	775-428-2257
Rob Bundy, Biologist	775-423-5128	775-423-0736
Zone Fire Staff	541-947-3315	

## RADIO FREQUENCIES

Agency	Location	RX	TX	Tone
Zone 1: Fallon Area				
Stillwater WNRC	Fallon Base	164.575	164.575	6A
BLM	Local		169.775	169.775
BLM	Fairview Peak		169.775	169.025114.8
NDOW	Fallon	151.475	151.475	110.9
Churchill County	Rattlesnake Hill	155.190	155.910	5B
Zone 2: Outlying Area				
Pyramid/Nixon PD	Ranger Station	158.730	153.860	123.0
BLM	Reno		169.775	169.025173.8
BLM	Hawthorne		169.775	169.025151.4
NDOW	Reno		151.475	151.160123.0

**SHELDON - HART FIRE CREW PHONE NUMBERS**

Chris Farinetti	Lakeview FMO 500	(541) 947-5551 Home 219-0161 Cell Mobile 219-1462 Cell after hours
Tom Romanello	Lakeview AFMO 501	(541) 947-4409 219-0013 Cell Mobile and after hours
Andy Goheen	Lakeview PFS 502	1-530-946-4146 Home 219-0316 Cell Mobile
Kevin Conn	Hart Engine 541 Lakeview AFMOT 503	947-3337 947-2731 Hart Mtn. 219-0619 Engine Cell
Paul Pallas	Sheldon Engine 542 Station Manager 504	947-5370 Home 775-941-0211 1000 Creek GS 219-0163 Engine Cell
Sheldon - Hart Mtn. Office		947-3315 947-4414 Fax
Lakeview Interagency Fire Center (Dispatch) LIFC	Contact after hours	(541) 947-6315
Hart Mtn. Headquarters		947-2731 947-3152 Fax
Hart Mtn. Shop		947-3252 947-6086 Fax
Dufurrena Shop		775-941-0200 775-941-2000 Fax "wait 6 rings"
Yellow Peak		219-0620

**COOPERATORS:**

BLM Carson City, NV. Leonard Wehking, FMO.....775-885-6103  
 Sierra Front Interagency, Dispatch .....775-882-9187 [24 hour Fire Phone]  
 Fallon Naval Air Station, Operations.....775-426-2419  
 Fallon Paiute Tribe, Admin Office.....775-426-8848  
 Nevada Dept. of Environmental Protection .....775-687-4670  
 Nevada Division of Forestry, Ronan Thornhill FMO.....775-849-2500 ext. 229  
 Fire calls.....775-883-5995[24 hour Fire Phone]

**FIRE DEPARTMENTS:**

All Fire Emergencies....."911"  
 Churchill County Fire Station,

Fallon Dispatch.....775-423-6521

**LAW ENFORCEMENT:**

All Law Enforcement Emergencies....."911"  
Churchill County Sheriff, Dispatch.....775-423-3116  
Nevada Highway Patrol:  
Business (Fallon).....775-423-7946

**MEDICAL:**

Ambulance Services  
All Medical Emergencies....."911"  
Hospitals Churchill Community Hospital:  
801 East Williams Ave.  
24-hour emergency.....775-423-3151  
Main number.....775-423-3151

U.C. Davis Regional Burn Center:U.C. Davis Medical Center  
2315 Stockton Blvd (Sacramento).....916-734-3636

**COORDINATION CENTERS**

Region 1 FWS Fire Management Coordinator:RFMC, Pam Ensley  
Office.....503-231-6174  
Fax.....503-231-2364  
Home.....360-835-7004

RFMO, Andy Anderson  
Office.....503-231-6175  
Fax.....503-231-2364  
Home.....360-666-5031

RPFS, Roddy Baumann  
Office.....503-231-2075  
Fax.....503-231-2364  
Home.....360-573-9444

National Weather Service, Reno, NV Office  
2350 Raggio Pkwy 775-673-8100  
Reno, NV 89503 <http://www.wrh.noaa.gov/reno/>

**APPENDIX H. DELEGATION OF AUTHORITY**

**DELEGATION OF AUTHORITY**

Stillwater NWR Complex  
Fallon, Nevada

As of (time) , (Date) , I have delegated authority to manage the (Fire Incident Name) , (Fire Number) , Stillwater NWR Complex, to Incident Commander (Name) and his/her Incident Management Team.

As Incident Commander, you are accountable to me for the overall management of this incident including its control and return to local forces. I expect you to adhere to relevant and applicable laws, policies, and professional standards. While the suppression of the fire is your primary task, you are expected to do so in a manner that provides for the safety and well being of involved personnel. Consideration for the needs of local residents and communities is essential for successful management of the incident.

I am assigning (name) as the line officer representative to act as liaison and provide any help you need. (S)he is authorized to speak for me in the event a decision is needed.

My specific considerations for management of this fire are:

1. Ensure the safety of firefighters, visitors, and neighbors.
2. Protect private and refuge property to the extent possible.
3. Minimize damage to environmental resources
4. Key resource considerations are: protecting rare, threatened, and endangered species; preserving as much wildlife habitat as possible; protection of cultural resources; avoiding wildlife entrapment situations; and limiting degradation of the Refuge's aesthetic values.
5. Restrictions for suppression actions are no earthmoving equipment (dozers, discs, plows, graders) without approval of the Refuge Manager.
6. Manage the fire cost-effectively for the values at risk.

(signed)

(date)

Project Leader

## **APPENDIX I. FIRE REPORTING**

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 Landowners

Name :

Phone #

## **APPENDIX J: 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 *	_____	



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			

<p>G. Risk Assessment</p> <p>- Probability of success</p> <p>- Consequence of failure</p>	<p>_____</p> <p>_____</p>	<p>_____</p> <p>_____</p>	<p>_____</p> <p>_____</p>
<p>H. Complexity</p>			
<p>I. Attach maps for each alternative</p>			

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 Forge 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			
<b>Alternatives</b>	<b>A</b>	<b>B</b>	<b>C</b>
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											
			P R E P A R E D N E S S L E V E L	I N C I D E N T P R I O R I T Y	R E S O U R C E A V A I L A B I L I T Y	W E A T H E R F O R E C A S T	F I R E B E H A V I O R P R O J E C T I O N S	W F S A V A L I D			
			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

	Yes/No	
<b>A. FIRE BEHAVIOR: Observed or Predicted</b>		
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.	___	___
4. Weather forecast indicating no significant relief or worsening conditions.	___	___
Total	___	___
<b>B. RESOURCES COMMITTED</b>		
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	___	___
<b>C. RESOURCES THREATENED</b>		
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	___	___
<b>D. SAFETY</b>		
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	___	___
<b>E. OWNERSHIP</b>		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 K: FIRE EFFECTS ON SELECTED SPECIES**

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.
Artemisia tridentata ssp. tridentata (Wyoming big sagebrush)	Plants killed by most fires. Re-establishment through on site seed and off site sources..
Artemisia tridentata ssp. vaseyana (mountain big sagebrush)	Plants killed by most fires. Re-establishment through on site seed and off site sources.
Artemisia tridentata ssp. wyomingensis (Basin big sagebrush)	Plants killed by most fires. Re-establishment through on site seed. Seed in surface layer stimulated by low intensity fires.
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.

SPECIES	FIRE ECOLOGY/ADAPTATION
	.
<i>Cardaria draba</i> (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.
<i>Centaurea repens</i> (Russian knapweed)	May be top-killed by fire, but sprouts from rhizomes and re-establishes from seed.
<i>Chrysothamnus paniculatus</i> (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.
<i>Cirsium arvense</i> (Canada thistle)	Survives most fires through perennating buds located on underground roots. Also re-establishes through seed.
<i>Distichlis spicata</i> (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.
<i>Elaeagnus angustifolia</i> (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.
<i>Eleocharis rostellata</i> (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.
<i>Elymus elymoides</i> (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.
<i>Elymus triticoides</i> (creeping wild rye)	Well adapted to fire due to rhizomus root system. Top-killed by fire but resprouts readily.

SPECIES	FIRE ECOLOGY/ADAPTATION
<i>Elytrigia repens</i> (quackgrass)	Tolerant of fire when dormant. May be injured severely if burned while actively growing.
<i>Grindella squarrosa</i> (curlycup gumweed)	Top-killed by fire, but quickly re-establishes after a fire.
<i>Halogeton glomeratus</i> (halogeton)	Burning does not appear to control halogeton as it readily re-invades sites.
<i>Juncus balticus</i> (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.
<i>Krascheninnikovia lanata</i> (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.
<i>Lepidium latifolium</i> (perennial pepperweed)	Survives by sprouting from underground tap root and rhizomes.
<i>Leymus cinereus</i> (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.
<i>Lythrum salicaria</i> (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.
<i>Oryzopsis hymenoides</i> (Indian ricegrass)	May be slightly damaged by higher intensity fires. Low culm density reduces charring below the soil surface.
<i>Muhlenbergia asperifolia</i> (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.
<i>Pascopyrum smithii</i> (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.

SPECIES	FIRE ECOLOGY/ADAPTATION
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.
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.

SPECIES	FIRE ECOLOGY/ADAPTATION
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 fuel moisture and salt content make ignition difficult. Increased flowering and seed production after fire.
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 L: 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 % Cover Continuity Crown ratio Depth of Fuel Bed Other	(By Size Class) (Type/Model)
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.

# Nevada Smoke Management Program

July 6, 2001

**Purpose**

**Cooperation**

**Goals**

**Smoke Management Responsibilities**

**Definitions**

**Applicability**

**Smoke Management Contingency Plan**

**Permits**

**Authority**

**Permit Application Requirements**

**Permit Conditions**

**Pre-ignition Notification**

**Affected Agency Notification**

**Wildland Fire Use**

**Wildfire**

Wildland Fire Use and Wildfire Reporting

Annual Reporting of Fire Activity

Fire Behavior and Environmental Monitoring

Air Quality Monitoring

Program Support

Smoke Management and Emission Reduction Techniques

Burner Qualifications

Surveillance and Enforcement

Appendix 1 -- Copy of the Open Burn Permit Application

Appendix 2 -- List of Air Quality Regulators

Appendix 3 -- Applicable Regulations

Purpose

The public policy of the State of Nevada is to achieve and maintain levels of air quality which will protect human health and safety, prevent injury to plant and animal life, prevent damage to property, and preserve visibility and the scenic and esthetic values of the state. The purpose of this program is to coordinate and facilitate the statewide management of prescribed outdoor burning on lands in the state of Nevada. This program is designed to meet the requirements of NRS445B.100 through 445B.845, inclusive which deal with air pollution, and the requirements of the EPA Interim Air Quality Policy on Wildland and Prescribed Fires (May 1998). This program in no way supersedes the authority of local governments to regulate and control smoke and air pollution under NRS244.361 and NRS268.410 or the authority of the state forester to regulate controlled fires under NRS527.122 through 527.128.

#### Cooperation

An ongoing cooperative effort by all organizations involved in the use of prescribed fire for accepted range, agricultural and forestry practices is essential to the success of this plan.

#### Goals

Protect human health and safety from the effects of outdoor burning

Facilitate the enjoyment of the natural attractions of the state

Provide a burning program for the people of this state

Provide the opportunity for forest, rangeland, and crop burning while minimizing air quality impacts

Foster and encourage the development of reasonable alternative methods for disposing of or reducing the amount of organic refuse on lands in Nevada

Acknowledge the role of fire in Nevada and allow the use of fire under controlled conditions to maintain healthy ecosystems while meeting the requirements of the Clean Air Act

To encourage the development of better smoke management models and techniques

To provide for a voluntary approach to the implementation of a statewide smoke management program

To address interstate smoke transport issues through enhanced communication and the development of interstate/interagency agreements

#### Smoke Management Responsibilities

Each land manager involved in the use of prescribed fire, whether management or naturally ignited, is responsible for proper smoke management for the prescribed fires it conducts and shall identify and

implement appropriate smoke management techniques to minimize the amount and/or impact of smoke produced and to avoid exceedances of the Nevada and National Ambient Air Quality Standards.

The Division of Environmental Protection will work with the land managers and air agencies in other states to ensure that interstate transport of air pollutants does not unfairly restrict the ability of Nevada's land managers to implement prescribed fire programs.

#### Definitions

Class I Area includes all international parks, national wilderness areas which exceed 5,000 acres in size, national memorial parks which exceed 5,000 acres in size, and national parks which exceed 6,000 acres in size and which are in existence on August 7, 1977 (CAA Section 162(a)). The only Class I area designated in Nevada is the Jarbidge Wilderness.

Land manager includes any federal, state, local or private entity that administers, directs, oversees or controls the use of public or private land, including the application of fire to the land.

National Ambient Air Quality Standards (NAAQS) refers to standards for maximum acceptable concentration of pollutants in the ambient air to protect public health with an adequate margin of safety, and to protect public welfare from any known or anticipated adverse effects of such pollutants (e.g., visibility impairment, soiling, materials damage, etc.) in the ambient air.

PM10 refers to particulate matter 10 microns in diameter or smaller.

PM2.5 refers to particulate matter 2.5 microns in diameter or smaller.

Prescribed fire includes management ignited and conducted to meet management objectives. It does not include fire training, public open burning or any other type of burning that is not specifically listed in the applicability section on page 5 of this document.

Public open burning is the burning of vegetative yard waste conducted by single family residences within the jurisdiction of and under a permit obtained by the local fire protection agency. The vegetative yard waste must be generated only from the residence conducting the burn.

Smoke management includes but is not limited to techniques to reduce emissions and smoke impacts, the identification and avoidance of smoke sensitive areas, the monitoring and evaluation of the smoke impacts of each burn, and coordination among land management agencies to minimize cumulative impacts.

Smoke sensitive areas include but are not limited to Class I areas as well as other designated scenic and/or important views especially during times of significant visitor use, urban and rural population centers, homes, schools, hospitals, nursing homes, airports, recreational areas, and other locations that may be sensitive to smoke impacts for health, safety, and/or aesthetic reasons.

Suppression action includes any activity in which the responsible fire control agency personnel are actively trying to confine, contain or control the fire. Use of natural fire barriers such as cliffs, rocks, or rivers, etc., to contain the fire may be regarded as suppression as long as this is part of the suppression strategy.

Wildfire is an unwanted wildland fire that does not meet resource management objectives and is, therefore, subject to suppression.

Wildland fire use is the management of naturally ignited wildland fires to accomplish specific prestated resource management objectives in predefined geographic areas outlined in forest management plans.

#### Applicability

The provisions of this smoke management program apply to all areas of the state under the jurisdiction of the Nevada Division of Environmental Protection. The Division's jurisdiction does not include Washoe or Clark Counties or any Bureau of Indian Affairs (BIA) trust lands.

Provided no reasonable alternative exists (see p. 5 -- Permit Application for Management Ignited Prescribed Fires, Section (a) for a discussion of reasonable alternatives), open burning under this smoke management program may be conducted for the following types of projects:

- a. Hazard fuel reduction;
- b. Slash disposal from timber sales and roads constructed within contract areas;
- c. Wildlife and livestock habitat improvement;
- d. Forest and rangeland improvement;
- e. Insect, weed and disease control;
- f. Site preparation for revegetation;
- g. Watershed management and water yield improvement;
- h. Maintenance and improvement of natural ecosystems;
- I. Maintenance of threatened and endangered species;
- j. Other vegetative management improvement projects; and,
- k. Agricultural practices.

The permitting requirements described below do not apply to small wood fires for recreational, ceremonial, heating or cooking purposes or to burning conducted by single-family residences, as defined

under public open burning, at least one mile beyond the boundaries of the following cities, towns and areas: Austin, Babbit, Battle Mountain, Caliente, Carlin, Dayton, Elko, Ely, Eureka, Fallon, Fernley, Gabbs, Gardnerville, Gardnerville Ranchos, Genoa, Hawthorne, Johnson Lane, Lovelock, McGill, Minden, Pahrump, Pioche, Panaca, Tonopah, Topaz Ranch estates, Virginia City, Weed Heights, Wells, Winnemucca, and Yerington; and on the Nevada side of the Tahoe Basin, in Carson City and in those portions of Douglas and Lyon Counties that are within one mile of the Carson City line, provided the burning is not being conducted as an agricultural practice or for any of the other types of projects listed above. For burns conducted by single-family residences within the cities, towns and areas listed above, the local fire protection agency must request a burn permit to allow public open burning. An open burn permit must be obtained for any fire training being conducted or any other open burns not specifically listed above regardless of size.

#### Smoke Management Contingency Plan

In plans for prescribed fires, each land management organization will have contingency plans identified enabling it to reduce smoke emissions. Contingency plans will be implemented when meteorological conditions warrant, the Nevada Division of Environmental Protection, Bureau of Air Quality determines that acceptable limits of smoke accumulation are or will be exceeded, and/or the responsible land management organization anticipates that the prescription for a particular fire will be exceeded. Should prescriptive elements cease to conform to those in the approved open burn permit, the land manager shall immediately take the appropriate corrective action to reduce further impacts and shall consult with the Division as expeditiously as possible.

#### Permits

##### Authority

1. Federal Clean Air Act. Section 118(a), "Control of Pollution from Federal Facilities"; Section 110, Implementation Plans"; Section 116, "Retention of Authority"; Section 169(a), "Visibility Protection for Federal Class I Areas"; Section 176(c), "Limitations on Certain Federal Assistance".
2. Nevada Revised Statutes. Section 445B.100, Declaration of public policy; Section 445B.110, Air pollution defined; Section 445B.210, Powers of the commission; Section 445B.220, Additional powers of the commission; Section 445B.230, Powers and duties of the department; Section 445B.235, Additional powers of the department; Section 445B.240, Power of representatives of department to enter and inspect premises; Section 445B.300, Operating permit for source of air contaminant; notice and approval of proposed construction; administrative fees; failure of commission or department to act; Section 445B.595, Governmental sources of air contaminants to comply with state and local provisions regarding air pollution; permit to set a fire for training purposes; planning and zoning agencies to consider effects on quality of air.
3. Nevada Administrative Code. Section 445B.381 Open burning.

4. Implementation of this program in no way supersedes the authority of local governments to regulate and control smoke and air pollution under NRS244.361 and NRS268.410 or the authority of the state forester to regulate controlled fires under NRS527.122 through 527.128.

#### Permit Application for Management Ignited Prescribed Fires

Land managers must obtain a permit from the Nevada Division of Environmental Protection for all management ignited prescribed fires which emit greater than 1.0 tons of PM10. The permit must be obtained prior to ignition. For each project emitting between 1.0 and 10 tons of PM10, a one-page permit application form must be completed and submitted to the Division at least two weeks prior to the planned date of ignition. For fires emitting more than 10 tons of PM10, the complete application package must be submitted at least 30 days prior to the planned ignition date. Completed applications will be reviewed by the Division and, if approved, signed and returned to the applicant as soon as possible, but at least one week prior to the planned date of ignition. Should circumstances occur which will not allow the land manager to submit a completed permit application 14 or 30 days prior to the burn, the Division will make a good faith effort to work with the land manager to issue the permit as soon as possible. Concerns raised about this approach by the agricultural community will be addressed after survey results have been evaluated.

The issuance of a permit does not constitute final approval. Final approval must be obtained 24 hours prior to ignition (see “Pre-ignition Notification and Authorization” p. 8). Final approval will be based on ambient air quality conditions. If a request for final approval is denied, the Division will provide the land manager with written record of that denial within 10 days after the verbal denial was issued.

In reviewing the application for an open burning permit, the Division will consider the following factors:

- a. Consideration and evaluation of alternatives to burning. When one management objective is to maintain a fire dependent ecosystem the effects of fire cannot be duplicated by other tools. Fire may be the preferred management tool even when other treatments may be equally effective for meeting other objectives. Fire can also be used to reduce heavy fuel loads and prevent catastrophic wildland fires. Wildland owners/managers may have an array of tools, including fire, that can be used to accomplish land use plans, depending on the resource benefits to be achieved. Several factors should be considered when selecting appropriate treatments. Those factors include the environmental impacts (e.g. air and water quality, soil, wildlife, etc.), whether fire must be used to meet management objectives and the costs of treatment. The best combination of treatments are those that meet management goals with the most favorable environmental impacts at the most reasonable costs. A detailed description of the alternatives considered and the rationale for rejecting them must be submitted for all projects estimated to emit more than 10 tons of PM10. The Division recognizes that alternatives are not without potential negatives and that multiple resources must be weighed along with air quality benefits. However, a permit will not be issued if this information has not been submitted.

For smaller projects, the certification signed by the responsible party indicating that alternatives have been considered will suffice. However, the responsible signatory should be prepared to discuss the alternatives considered should Division staff request the information. Once the Division determines that the description of alternatives considered and the rationale for rejecting them has not been submitted, the Division will immediately notify the permit applicant and request the information. If the applicant is unable to provide the information, the Division will notify the applicant in writing that the application is incomplete and that the permit cannot be issued.

- b. Proximity to populated areas and points of nearest public access. For any project generating more than 10 tons of PM10, the applicant shall provide information regarding the proximity of smoke sensitive areas to the planned project and the points of nearest public access. Procedures for notifying the public of burn dates in smoke sensitive areas shall be included with the applicant's burn plan.
- c. Climatic conditions on the day or days of burning.

Where burn plans are required, burns must be conducted within the meteorological conditions indicated in the burn plan, but the Division may limit projects in certain geographic areas during "high pollution periods" when existing air quality or cumulative impacts may warrant such limitations.

- d. Potential contribution to area air pollution

For projects that will emit more than 25 tons of PM10 or greater than 10 tons of PM10 if located within 15 miles of a Class I area, an area that is in non-attainment for CO or particulate matter, or a smoke sensitive area, the applicant shall demonstrate that the project shall not violate applicable ambient air quality standards (within and outside of Nevada). This demonstration shall be conducted using currently accepted models. The model output shall explicitly show conditions under which the burn will be conducted so as to minimize impacts of emissions.

Valid permit dates. Although the Division would like to monitor potential burns as closely as possible, we recognize that land managers must be able to respond to meteorological conditions appropriate for the burn being permitted. Permits will be issued that are valid for up to three months. If more time is required, the applicant can request additional time when the application is submitted. Each permit shall be valid for the dates listed on the permit. The permittee must note the expiration date of each permit. Requests for an extension or modification of dates may be made verbally, but must be approved by the Division in writing prior to the burn taking place.

### **Permit Application Requirements**

1. For prescribed fires emitting more than 1.0 but less than 10 tons of PM<sub>10</sub>, the permit applicant need only complete the application form provided by the Division (Appendix 1).
2. For prescribed fires emitting more than 10 tons of PM<sub>10</sub> and located more than 15 miles from a smoke sensitive area, Class 1 area or carbon monoxide or particulate matter non-attainment area, the completed application must be accompanied by a burn plan. The burn plan must include the following:
  - a. The specific location and description of the area to be burned;
  - b. The responsible personnel;
  - c. An emergency telephone number that is answered 24 hours a day;
  - d. The property owner;
  - e. The agency/contractor conducting the burn;
  - f. The burn prescription;
  - g. The number of acres to be burned, the type of fuel, fuel loading estimates and the ignition technique to be used;
  - h. A list of agencies and private parties involved;
  - I. A map depicting the potential impact of the smoke. The potential impact shall be determined by mapping both the daytime and nighttime smoke path and down-drainage flow for 15 miles from the burn site, with smoke sensitive areas delineated. The map shall use the appropriate scale to show the impacts of smoke adequately;
  - j. Discussion of public notification to be conducted; and
  - k. Evaluation of alternative treatments.
3. For prescribed fire projects emitting more than 25 tons of PM<sub>10</sub>, or more than 10 tons if the burn is within 15 miles of a Class I area, an area that is non-attainment for particulates, a carbon monoxide non-attainment area, or other smoke sensitive area, the following information must also be submitted with the burn plan:
  - a. A smoke management plan including actions taken to minimize emissions before, during and after the fire;
  - b. Emission estimates including the models, methods and emission factors used;
  - c. Identification of smoke sensitive areas;
  - d. Safety and Contingency plans.
  - e. List of potential affected air regulators to be notified; and
  - f. Air monitoring to be conducted.

## **Permit Conditions**

The following permit conditions shall apply to permits issued by the Division of Environmental Protection for open burning.

1. Air pollution emergencies and alerts: Permits will not be valid during periods of air pollution emergency or alert in the area of burning. At the determination by the Division of such a period, the Division shall notify each permit holder.
2. Pre-ignition notification and approval: For projects emitting more than 1.0 tons of PM10, the land manager must notify the Division on the business day preceding the burn and received final approval before the prescribed burn can be ignited.
3. Smoke Management: In order to minimize smoke impacts and emissions, each permittee shall apply the best smoke management and emission reduction techniques. It is recognized that no two fires are alike in terms of smoke emissions and impacts. Neither are any two fires alike in the smoke management options available. Therefore, the land manager will select appropriate smoke management techniques on a case-by-case basis. While the application of smoke management is required in order to obtain a permit from the Division, it is a general goal and responsibility of the land manager to select the appropriate emission reduction and impact minimization techniques for each fire.
4. Precautions: Prescribed fires shall be supervised by one or more responsible persons dependent on the type of burning. Precautions shall be taken to localize the burning and to, in no way, constitute a fire hazard to persons or property within or adjacent to the burn area. The granting authority and the employees or agents thereof, in the issuing of a permit, do not assume any responsibility or liability for any hazardous condition created by the permittee which results in damage to the person or property of the permittee, or the person or property of any third person.
5. Availability of Permit: The approved permit or copy thereof shall be made available without unreasonable delay by the permittee upon request of the Division or their representatives.
6. Inspection by the Division: All open burning operations shall be subject to inspection by the Division.
7. Local Regulations: The permit is for compliance with state air pollution control requirements only and is not a permit to violate any existing local laws, rules, regulations, or ordinances regarding fire, zoning, or building.
8. Revocation of Permit: If at any time the Division determines that any condition of the permit is not being complied with, the permit may be revoked for the specific project where non-compliance is occurring. At such time, all burning activities at the site of the non-compliance shall be terminated. In addition to revocation of the permit, the Division may take any other enforcement action authorized under state statutes, rules and regulations.
9. Other Conditions may be added to the permit if deemed necessary by the Division and approved by the SMP working group.

### **Pre-ignition Notification**

The land manager shall not ignite a prescribed burn for which a permit is required without receiving the approval of the Division. The land manager must notify the Division as expeditiously as practicable, but no later than 10 am of the business day preceding the burn. Notifications must be made to the Smoke Management Coordinator at (775) 687-4670, ext 3083. If the coordinator is unavailable, the land manager will leave a message including the date of the proposed burn, the permit number, location, responsible agency, estimated number of acres to be burned and a contact name and phone number. The Division shall issue a final decision, either approval, approval with conditions, or disapproval, of the burn, on the same business day. If the Division does not communicate its decision by 5 pm of the same business day, the burn is deemed approved. If ambient air quality conditions are poor enough that no burning will be allowed on a specific day in certain areas of the state, and land managers are unable to reach the coordinator directly, his/her voice mail message will specify the areas of the state where no burning is allowed and land managers calling in to request authorization to burn should assume that their request has been denied. If a land manager wishes to receive a written notice of the denial, a message to that effect should be left on the coordinator's voice mail.

### **Affected Agency Notification**

For prescribed fire projects that emit more than 10 tons of PM10 and are within 15 miles of the state border, BIA trust lands managed under the jurisdiction of a tribal air quality agency, or the borders of Washoe or Clark counties, the air regulators of those counties, tribes or bordering states must be notified prior to the burn. A list of the agencies and individuals to be notified must be included in the burn plans. Appendix 2 provides a listing of state, local and BIA/tribal contacts. This list will be updated by the Division at least annually.

### **Wildland Fire Use**

1. Permit application: Application for wildland fire use areas shall be made on an annual basis on a form provided by the Division. A burn plan and map showing the area where prescribed fire will be allowed shall be included with each initial application. The burn plan must include a list of the conditions under which burning would be allowed rather than suppressed, and a list of the criteria for determining when suppression should be implemented in response to smoke impacts. The application will be reviewed within 30 days after the application is received and approved or denied. Subsequent annual applications for approved areas need not include the plan and maps. Minor necessary changes for that area should be indicated on the annual permit application, however, any substantial changes in the wildland fire use area or plan will require a full submittal.
2. Daily Evaluation of Fire: If a wildland fire occurs, the responsible land management agency shall evaluate the burn daily to determine if the conditions meet the prescription of the permitted burn and that ambient air quality standards are not being violated.

## **Wildland fire**

Wildland fire will not require a permit as long as suppression action is initiated against that fire.

### **Wildland Fire Use and Wildland fire Reporting**

The land manager in whose jurisdiction a naturally ignited prescribed fire or a wildland fire occurs shall report all such fires when it is expected to attain a size of greater than 300 acres for rangeland and 100 acres for forest land on a daily basis to the Division. The land manager shall include in the report the location, estimated control date, and estimated incident size of each wildland fire. For wildland fire use, the land manager shall report the location, the daily anticipated growth in the number of acres potentially burned, the maximum allowable perimeter or size, the type or types of fuels involved, the actual acres burned on the previous day, and the anticipated duration of the fire. The land manager shall also provide information on projected smoke and air quality impacts if requested by the Division. This may include mapping the daytime and nighttime smoke path and down-drainage flow for 15 miles from the burn site, with smoke sensitive areas delineated; modeling; or, air quality monitoring. If this information can be made available to the Division through regional dispatch centers, no additional reporting will be required. In areas where burns under 100 acres may have significant air quality and public health impacts (e.g. the Tahoe Basin), the Division will work with land managers in those areas to develop additional reporting requirements as necessary.

### **Annual Reporting of Fire Activity**

Each permitted user of prescribed fire who emits more than 10 tons of PM10 per year shall provide the Division with an annual reporting of fire activity by March 31 for the previous calendar year's (January through December) activities. Information to be reported includes: the permit number, the name of the individual conducting the burn or the agency name and contact, date and time ignition began, date and time the fire is declared out, actual acreage burned, fuel type, fuel loading, emissions estimates, emission factors used and their source, names of air quality regulators notified and the notification date, and the emission reduction techniques used. All permitted ignitions must be reported, even if they were not carried out. The emissions inventory shall be made available to all interested Working Group members.

### **Fire Behavior and Environmental Monitoring**

1. Prescribed fire -- Management ignited and wildland fire use
  - a. If at any time the responsible land management agency determines that the prescription for a particular prescribed fire has been exceeded (including impacts on visibility) and/or conditions of the permit are not being met (i.e., designated areas for burn, proper notification, etc.) the responsible parties shall promptly initiate suppression action unless, after consultation with the Division, the prescription is modified, or other appropriate actions are taken.  
The responsible signatory must monitor the actual fire to a sufficient level to provide information regarding whether or not the fire is within prescription. Monitoring data collected

before, during and after the burn should be used to evaluate the achievement of specific smoke management objectives, and to provide feedback for refinement of future prescriptions.

- b. If at any time it is determined by the Division, in consultation with the responsible land management agency, that the prescribed fire, whether begun as a planned ignition or a wildland fire being managed for resource benefit is degrading air quality to levels expected to violate air quality standards and/or permit conditions, the responsible parties shall promptly initiate suppression action unless, after consultation with the Division, the prescription is modified, or other appropriate actions are taken. Factors that the Division will consider in this determination include, but are not limited to:
  - I. Modeled data that indicates expected violations of any Ambient Air Quality Standard (e.g. carbon monoxide (CO), particulate matter under 10 microns in diameter (PM10), or particulate matter under 2.5 microns in diameter (PM2.5).
  - ii Air quality monitoring data that indicates expected violations of any Ambient Air Quality Standard.
  - iii. Proximity of the fire to smoke sensitive areas
  - iv. Citizen complaints
  - v. National Weather Service Fire Weather Forecast predictions.
  - vi. Fuel conditions
  - vii. Existing and predicted size of the fire.

### **Air Quality Monitoring**

The extent of the monitoring should match the size of the fire and potential human health impacts. For small fires or fires that are remote enough to result in no noticeable impact on the public, visual monitoring of the direction of the plume and monitoring nuisance complaints by the public may be sufficient. Other monitoring techniques include posting personnel on vulnerable roadways to look for visibility impairment and initiate safety measures for motorists; posting personnel at other smoke sensitive areas to look for smoke intrusions; using aircraft to track the progress of smoke plumes; and continued tracking of meteorological conditions during the fire. For large fires expected to last more than one day, locating real-time particulate matter monitors at smoke sensitive areas may be warranted to facilitate timely response to smoke impacts.

If pollutant levels are anticipated to create a significant threat to human health, the Division may require the responsible land management agency to monitor in or near population centers impacted by smoke generated from a particular prescribed fire or wildland fire. The Division will assist in identification of instrumentation, site selection, installation of instrumentation, operation, calibration, quality assurance, quality control, laboratory analysis, data interpretation and supplies. Impact from wildland fire will be monitored by the Division.

Due to the cooperative interagency nature of this Smoke Management Plan, cost sharing and pooling of resources associated with monitoring and/or modeling is understood. However, especially with respect to prescribed fires, the ultimate responsibility and financial burden is on the land management agency consistent with the principle that the source of pollution should internalize the costs of its pollution, the so called “polluter pays” principle that is applied to other sources of air pollution as well. The Division may therefore ask the responsible land management agency for financial reimbursement as negotiated and mutually agreed upon on a case-by-case basis between the Division and the responsible land management agency before resources are expended on modeling or monitoring.

### **Program Support**

Land managers and air regulators will work together to assess program implementation needs and to develop a mechanism for providing adequate program support. Program support may be in the form of in-kind services, equipment and space. Program support agreements will be formalized under an MOU and an Interagency Agreement between the Nevada Division of Environmental Protection and the land management agencies. The agreement will be evaluated periodically to ensure that implementation needs continue to be met.

### **Smoke Management and Emission Reduction Techniques**

Each land manager conducting prescribed burning shall implement as many smoke management and emission reduction measures as are feasible for the specific burn and shall include a description of the emission reduction techniques used in the annual fire activity report submitted. The following smoke management and emission reduction techniques are considered best management practices. However, the Division understands that emission reduction techniques (or best available control measures) are not without potential negatives and must be prescribed and used with careful professional judgment and full awareness of possible tradeoffs.

1. Reducing the biomass by use of techniques such as yarding or consolidation of unmerchandiseable material, multi-product timber sales or public firewood access, when economically feasible. When allowing public firewood access, the public must also be informed of the adverse impacts of using green or wet wood as fuel;
2. Burning in seasons characterized by meteorological conditions that allow for good smoke dispersion;
3. Using mass ignition techniques such as aerial ignition by helicopter to produce high intensity fires with short duration impacts;
4. Igniting burns under good-to-excellent ventilation conditions and suspending operations under poor smoke dispersion conditions;
5. Considering smoke impacts on activities conducted by local communities and land users;
6. Burning only those fuels essential to meet resource management objectives;
7. Minimizing duff consumption and smoldering through fuel moisture considerations;

8. Minimizing dirt content when slash piles are constructed by using a root rake on material-moving equipment and by constructing piles under dry soil conditions or by using hand piling methods;
9. Burning piles when other burns are not feasible, such as when snow or rain is present;
10. Using all opportunities that meet the burn prescription and all burn locations to spread smoke impacts over a broader time period and geographic area;
11. Burning during optimum mid-day dispersion hours, with all ignitions in a burn unit completed by 3 p.m. to prevent trapping smoke in inversions or diurnal wind flow patterns;
12. Using chunking of piles and other consolidations of burning material to enhance fuel consumption and to minimize smoke production;
13. Implementing maintenance burning in a periodic rotation mimicking natural fire cycles to reduce excessive fuel accumulations and subsequent excessive smoke production through smoldering or wildland fire; and,
14. Managing smoke impacts as follows:
  - a. Limiting smoke impacts to roads, highways, and airports to the amounts, frequencies, and durations consistent with any guidance provided by highway and airport personnel;
  - b. Using appropriate signing if smoke will impact any point of public access, i.e. highways, dirt roads, trails, campgrounds, etc.
  - c. Notifying the public at potentially impacted smoke sensitive areas; and
  - d. Determining nighttime impacts and taking appropriate precautions.

### **Burner Qualifications**

All burns conducted by state and federal land managers shall be conducted by personnel trained in prescribed fire and smoke management techniques to the minimum level required by the land management agency in charge of the burn.

The local fire management officer of the state or federal land management agency having jurisdiction over the prescribed burn shall have had smoke management training obtained through successful completion of a National Wildfire Coordinating Group (or equivalent) course dedicated to smoke management.

### **Surveillance and Enforcement**

A land manager conducting a prescribed burn shall permit Division staff to enter and inspect burn sites unannounced, before, during and after burns, to verify the accuracy of the permit information and compliance with the burn plan and smoke management plan, if appropriate. Site inspections conducted by the Division during and after fires shall be coordinated with the appropriate the land manager as necessary to ensure the safety of Division employees and land managers. Should protective equipment be required, Division employees will have been properly trained in its use prior to entering any restricted area. Except under extraordinary circumstances, inspections will be conducted during reasonable business hours.

Inspections on private property will be limited to valid permit days and within one week following the prescribed fire.

Failure to comply with the procedures and conditions specified in the permit may result in enforcement action. Penalties of up to \$10,000 per day per violation may be assessed.

appendices will be posted on <http://www.ndep.state.nv.us/baq/smoke>

Appendix 1 -- Copy of the Open Burn Permit Application

Appendix 2 -- List of Air Quality Regulators

Appendix 3 -- Applicable Regulations