

WILDLAND FIRE MANAGEMENT PLAN
MALHEUR NATIONAL WILDLIFE REFUGE



2001

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EXECUTIVE SUMMARY

When approved, this document will become the Malheur National Wildlife Refuge's fire management plan. Major components include:

- B updated policy for prescribed fires at Malheur NWR.
- B conforms to Master Plan (1985) and Blitzen Valley (1990) and Double O Habitat Management Plans (1995).
- B format changes under the direction of Fire Management Handbook (Release Date 6/1/00).
- B Continues a Prescribed Fire Program to manage critical habitat and reduce hazardous fuels. Suppresses all wildland fires using appropriate management response.

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

INTRODUCTION



Jet flies through sunburst in smoke plume from E Upper Grain Camp Rx Burn. 28Jan2000 RAB

*“In preparing for battle, I have always found that plans are useless, but planning is indispensable.”
— Dwight Eisenhower*

Malheur fire crews have been actively involved in fighting wildland fires in cooperation with other agencies on the refuge and throughout the United States since the 1980's as well as conducting an average of nine prescribed burns a year averaging almost 2800 acres per year over the past 18 years.

The Malheur Fire Management Plan (FMP) was first approved in 1982, revised and approved in 1991, and is being revised again for approval in 2001. Although the main plan seems to be on a nine year cycle, parts of the FMP are dynamic and have been updated every year or so like the Fire Dispatch Plan and equipment and cache contents. Cooperative agreements with the BLM and US Forest Service have also evolved over the years from initial establishment in 1978. The more dynamic portions of the FMP will be attached as appendices so they can be more easily changed year to year without affecting the main body of the FMP.

Innovative research of fire effects on plant communities, indicator and sensitive species, and non-native invasive plants as well as creative approaches to staffing and implementing prescribed burning and wildland fire control operations on Malheur and in the Fire Management Zone including Idaho and Western Oregon has evolved into the busy, always on-the-road Malheur Fire Crew today. In 1990 a zone FMO was added to the Malheur Refuge staff to oversee Malheur, Western Oregon, Deer Flat, and SE Idaho refuges. Malheur fire crews now conduct prescribed burns on all zone refuges. Planning along with implementation makes this possible.

Increased zone responsibilities resulted in a Fire Prevention Plan for Hagerman National Fish Hatchery in 1995...a first for the Fish & Wildlife service. In 1999 a Prescribed Fire Specialist was added to the

Malheur fire staff to write and implement prescribed burn plans. The tremendous work load generated in the expansive geographic area of the Malheur Fire Zone resulted in the addition of an FMO and new fire crew in Pocatello, Idaho for the SE Idaho Refuges, and a Prescribed Fire Specialist and fire crew at Finley Refuge in 2001.

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

This plan will implement full suppression of all wildland fires using appropriate management response and continuation of the prescribed fire program to manage critical habitat and reduce hazardous fuels.



Smoke from the Dredger Rx burn blackens the sky in the Blitzen Valley. 29Jan2000 RAB.

COMPLIANCE WITH USFWS POLICY

This updated Fire Management Plan (FMP) is an extension of the Malheur National Wildlife Refuge Master Plan of 1985 and the Blitzen Valley and Double O Management Plans of 1990 and 1995, respectively. Both habitat management plans addressed NEPA compliance in regards to prescribed burning during the public review processes. A Comprehensive Conservation Plan (CCP) has not been completed for the refuge.

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

AWildfires may result in loss of life, have detrimental impacts upon natural resources, and damage to or destruction of man-made developments. However, the use of fire under carefully defined conditions is to be a valuable tool in wildland management. Therefore, all wildfires within the Department will be classified either as wildfire or as prescribed fires.

Wildfires, whether on lands administered by the Department or adjacent thereto, which threaten life, man-made structures, or are determined to be a threat to the natural resources or the facilities under the Department's jurisdiction, will be considered emergencies and their suppression given priority over normal Departmental programs.

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 AInteragency 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).

Using ATV w/drip pod to light ring fire in Prairie 7 Unit at Finley Refuge. Sep 2000 LR

FIRE MANAGEMENT OBJECTIVES

“Obstacles are those frightful things you see when you take your mind off your goals.” – Author unknown

Executive Order 12996 states the mission for the Refuge System is "to preserve a national network of lands and waters for the conservation and management of the fish, wildlife, and plants of the United States for the benefit of present and future generations." This mission sets the Refuge System apart from all other Federal lands. The National Wildlife Refuge System provides the following objectives for fire management:

- To preserve, restore, and enhance in their natural ecosystems (when practicable) all species of animals and plants that are endangered or threatened with becoming endangered.
- To perpetuate the migratory bird resource;
- To preserve a natural diversity and abundance of fauna and flora on refuge lands;
- To provide an understanding and appreciation of fish and wildlife ecology and man's role in his environment and to provide refuge visitors with high quality, safe, wholesome and enjoyable recreational experiences oriented toward wildlife to the extent these activities are compatible with the purposes for which the refuge was established.

President Theodore Roosevelt established The Lake Malheur Reservation in 1908 as a “preserve and breeding ground for native birds” after seeing William L. Finley’s photographs of the area. In 1935 President Franklin Roosevelt added the Blitzen Valley to the refuge “to serve as a refuge and breeding ground for migratory birds and other wildlife.” The name was officially changed to Malheur National Wildlife Refuge in 1940. The Double O unit was added in 1941. Small additions have been made since then. The refuge Master Plan states the following regarding fire and objectives of the program:

- The use of livestock grazing, haying, prescribed burning, and other necessary management tools will be made, as appropriate, to meet the needs of refuge habitats and animal population management programs.
- Habitat management will emphasize, where practical, the use of natural ecological processes such as drought-flood cycles, prescribed fire, and grazing rather than intensive management through manipulative practices such as storage reservoirs, irrigation wells, and pesticides.”

The Blitzen Valley and Double O Management Plans state that the primary objective of Malheur Refuge is to provide essential habitat for migratory birds during both nesting and migration periods. Habitat management should be aimed at enhancing areas for this objective.

As a result of the Blitzen Valley and Double O Management Plans, the following fire objectives have been developed:

- Reintroduce prescribed burning on much of the historical sandhill crane nesting areas on Malheur Refuge to maintain open meadow feeding, loafing, and brood rearing sites.
- Conduct prescribed burns to benefit the listed Trumpeter Swans, geese, other waterfowl and water birds who also need open marshes and meadows.
- Reintroduce fire to maintain favorable historic habitat conditions, especially considering cutbacks in the amount of AUM’s taken off much of the refuge by cattle grazing.
- Reintroduce fire to maintain the wildlife population goals set in the Master Plan.

A rotational burn schedule has been utilized for the past 15 years to maintain an early seral stage in the refuge marsh/meadow ecological plant communities. Units are burned every 3-5 years in each of the bio-units on both the Blitzen Valley and Double O portions of the refuge. We are on a

smaller scale mimicking the use of fire by the Native Americans to create and maintain the marsh and meadow habitat which supported wildlife before Europeans arrived in the 1800's.

Other objectives of prescribed fires on Malheur Refuge include: protecting resources at risk such as historic and contemporary buildings, structures, equipment, etc. from catastrophic wildland fire by removing hazardous fuel buildups; fire ecology and effects research projects; and resource maintenance burns — to use fire to maintain an early seral stage in fire dependent ecosystems.



South Dredger shortly after January burn. Feb 2000 RAB

DESCRIPTION OF REFUGE

Malheur, Mud, and Harney Lakes comprise a sump receiving terminal waters of the Blitzen and Silvies Rivers and Silver Creek. Terrain surrounding the lakes is flat to gently rolling. Extending south from the lake region, the refuge includes the rather narrow Blitzen River Valley. This valley is bordered on the west by the Jackass Mountain foothills and on the east by foothills of the Steens Mountains and the Diamond lava beds. The west portion of the refuge, the Double O Unit, is a gently rolling area which receives water from Silver Creek and local springs. It is bordered by lava rims and cinder cone deposits of moderate height.

Elevations of the valley floor range from 4234' where the Blitzen River enters the refuge, to 4079' at the bottom of Harney Lake. Some of the rims along the refuge boundary approach 4400' elevation.

The level and gently sloping terrain lends itself to ready development and management of marsh, cropland, and irrigated pasture. Low diking permits water regulation on marshlands. Gravity distribution of water may be readily accomplished via a system of canals.

The FMP identifies the following special resources at risk: three unique biological communities including research natural areas, twenty-four historical structures, two hundred and forty-three mapped archeological sites, and over \$3.3 million of real property (Appendix Q).

CULTURAL RESOURCES

Malheur Refuge includes three historic sites that have been nominated for inclusion on the National Register: the P-Ranch, Sodhouse Ranch, and the Double-O Ranch. Twenty-four historic structures have been listed on the refuge. In addition, approximately 243 archaeological sites have been investigated on the refuge (Appendix Q).

Archeological artifact collectors have started wildland fires on the refuge in recent years to clear an area of vegetative cover to reveal the arrowheads and other items for easy picking. Major village and burial sites have been burned and looted in the past. Refuge personnel complete an archeological clearance form on every prescribed burn plan, noting the locations of archeological sites. Ground disturbance and all types of fires are avoided, if possible, on critical archeological sites.

FISH AND WILDLIFE

Abundant bird life occurs on Malheur. The refuge bird list reports over 320 species. Trumpeter swans nest on the refuge. This re-introduced species has been removed from the threatened or endangered list but still occurs in limited numbers.

Canada geese nest throughout the refuge, concentrating on islands and in emergent aquatic vegetation. They raise their broods on the larger ponds. A variety of ducks nest on the refuge. Diving ducks, such as canvasbacks and redheads, nest in emergent vegetation in channels and in ponds. Other ducks nest on the uplands, preferring tall, dense grasses. These include the cinnamon teal, gadwall, and mallard.

Greater sandhill cranes nest over most of the refuge but concentrate in the Blitzen Valley. The breeding territory consists of flooded meadows with interspersed patches of emergents, usually burreed and bulrush. The nest usually consists of an expansive mound of vegetation in flooded emergents.

A variety of mammalian species also occur on Malheur Refuge. The refuge mammal list currently includes 65 species. Five of these species, White-tailed jackrabbit (*Lepus townsendii*), Black bear (*Ursus americanus*), mountain lion (*Felis concolor*), elk (*Cervus elaphus*), and Merriam's shrew (*Sorex merriami*) are considered to be relatively rare. Species which were historically on the refuge, but are no

longer present include the grizzly bear, lynx, bison, and big horn sheep, and western jumping mouse (*Zapus princeps*). There are 14 species of bats. Seventeen species of reptiles and six species of amphibians occur on the refuge.

VEGETATION

Emergent vegetation generally consists of hardstem bulrush (*Scirpus acutus*) and cattail (*Typha latifolia*). Shrubs and trees occur along the streams and canals; willows (*Salix spp.*), golden currant (*Ribes aureum*), and choke-cherry (*Prunus virginiana*) are representative species.

Uplands consist primarily of big sagebrush (*Artemisia tridentata*) and basin ryegrass (*Elymus cinereus*). Alkaline sites produce greasewood (*Sarcobatus vermiculatus*) and saltgrass (*Distichlis stricta*).

THREATENED & ENDANGERED SPECIES

There are no resident endangered species on Malheur NWR. The Northern Bald Eagle is a federally threatened species which winters on the refuge and is proposed for de-listing. The Western Snowy Plover is a state threatened species which nests on the refuge.

WATER RESOURCES

Malheur Refuge includes 187,000 acres of shallow marshes, irrigated meadows, sagebrush-grass uplands, alkali flats and occasional greasewood-covered alkali uplands. The refuge is 27 miles wide at the widest point and 41 miles long. The mean elevation is approximately 4,100 feet. The main units within the refuge boundaries are Malheur Lake, Harney and Mud Lakes, the Double-O and the Blitzen Valley.

Malheur Lake is one of the largest freshwater marshes in the western United States. It is one of the most important areas of Malheur Refuge and comprises about one-third of the refuge. Because of the high biological productivity of Malheur Lake and the rapid rate of destruction of wetland habitat in the United States, Malheur Lake deserves recognition as a unique ecosystem. Duebbert (1969) presents a good discussion of the ecology of Malheur Lake (Appendix A).

Harney Lake has no outlet and serves as a sump for Malheur Lake and the Harney Basin. During years when the water level of Malheur Lake is high, the water overflows through Mud Lake and into Harney Lake. Harney Lake is, at such times, a vast body of water covering over 30,000 acres and, at other times, a dry alkali flat. Harney Lake is presently a National Research Natural Area and has been proposed as a wilderness area.

The Double-O area is the western-most unit of Malheur Refuge. A variety of habitat types occur in this area. A number of springs, along with Silver Creek, supply water for numerous small ponds. Wet meadows exist around some of these ponds. Uplands are dry and dominated by greasewood. Basaltic rimrocks are found on the southern and western edges of the area. Stinking Lake Research Natural Area is located in this unit.

The Blitzen Valley, extending south from refuge headquarters, is flat, narrow, and bordered by rimrocks. Small ponds and sloughs are interspersed among irrigated meadows. The Blitzen River flows north from Steens Mountain through the Blitzen Valley before entering Malheur Lake.

GEOLOGY AND SOILS

Malheur Refuge lies in the Harney Basin which is young geologically. Faulting action formed the mountains in the area during the Tertiary and Quaternary periods. This was followed by erosion and sedimentation which produced the present topography.

A soil survey was done on the refuge to determine which areas contain soils with enough organic matter to support peat fires and which areas may produce the habitat desired for wildlife following fire.

The large closed lake basins contain a large proportion of Oregon's wetlands. These areas are important in the Pacific Flyway for migrating waterfowl.

The high desert valleys, plateaus, and mountains have extensive habitat for many wildlife species.

Fury, Housefield, Homefield, and Opie soils are found in the open water and shallow water marsh habitat. Species using this habitat include swans, geese, ducks, eagles, grebes, terns, curlews and other shorebirds, sandhill cranes, glossy ibis, egrets, cormorants, herons, twelve species of ducks, the western Canada goose, and the rare trumpeter swan.

Slightly alkaline phase soils (Thenarrows, Duckclub, and Sandgap) are found on the islands of Malheur Lake. The highly productive marshes produce huge quantities of invertebrates, which support fish and wildlife at higher food levels including listed bat species (e.g., Townsend's big-eared, little and big brown, Yuma myotis, hoary, and pallid).

In the valleys and basins, terraces soils provide habitat for riparian and upland wildlife species. These meadow areas support populations of waterfowl, rodents, predatory birds, and mammals. Fish inhabiting the perennial streams include the native red-band trout, introduced carp, mountain whitefish, bridge-lipped suckers, sculpin, red-sided shiners, dace, tui-chubs, and introduced rainbow trout.

The tablelands, hills, and mountains are comprised of upland soils (e.g., Raz, Brace, Lonely, Pearlwise, Gaib, and Baconcamp). These areas are important habitat for mule deer, pronghorn antelope, feral horses, elk, beaver, skunks, raccoons, muskrats, mink, long-tailed weasels, cottontail and jackrabbits, coyotes, and bobcats. These uplands areas also support introduced species such as ring-necked pheasant, Hungarian partridge, and chukar along with native sage grouse, mourning doves, and valley quail.

Transition zone soils (e.g., Ninemile, Carryback, Merlin, Sagehen, and Wagontire) between the meadow and tableland soil series are dominated by low sagebrush. They are important feeding areas for pronghorn antelope and for sage grouse "leks" or mating arenas.

The Rock Outcrop-Rubbleland areas on the edge of the refuge is important habitat for golden eagles, red-tailed hawk, prairie falcon, great horned owl, long-eared owl, and barn owls, chukar, and yellow-bellied marmots.

CLIMATE

The climate is characterized by dry summers with maximum temperatures seldom exceeding 90EF. Annual average precipitation is 9 inches, and snow depth rarely exceeds 6 inches at any one time. Surface waters are usually frozen in December, January, and early February. El Niño and La Niña conditions in the Pacific along with the Jet Stream affect the frequency and moisture of the storms which bring rain, snow, and lightning to eastern Oregon. They also add or detract from the snowpack on the surrounding mountains which affect the fuel production on and around the refuge. Late summer dry lightning storms are a major cause of wildland fires. About 20-30% of wildland fires are human-caused.

STRUCTURES AND FACILITIES

Facilities at Malheur Refuge include the headquarters site with 18 buildings, the Buena Vista Sub-station with 4 buildings, the Double O Sub-station with 9 buildings, and the P Ranch with 7 buildings. There are numerous pump houses, storage buildings, bridges, and service buildings in addition to these. Large culverts have replaced several bridges on the refuge in recent years. Fuel reduction around buildings and

structures on the refuge is a major fire prevention task each year. Firebreaks are mowed around the residences at headquarters and the Malheur Field Station at the beginning of the wildland fire season. A 500 gallon trailer-mounted pumper unit is pre-positioned at the Malheur Field Station each summer for suppression. The Malheur Field Station covers about 5 acres and has residential, maintenance, and guest accommodations set in a rustic, natural, and burnable sage brush/native grass environment.

There are few ranch structures left near the refuge boundary. Extensive flooding in the mid to late 1980's eliminated many ranch structures around Malheur Lake. They were flooded out and have not been rebuilt. However, the small town of Frenchglen at the south end of the refuge is almost completely bordered by refuge land (Appendix T).

SOCIAL -ECONOMIC CONCERNS

Malheur is a high interest public use area. Most of the public use is for enjoyment through wildlife observation and environmental interpretation and education. Many school groups, from elementary through college age, use the refuge as an outdoor classroom. Adults from varied backgrounds enjoy the great diversity of wildlife present here.

Wildlife produced on Malheur is appreciated elsewhere. Birds that are produced here or stop during migration move on to other areas where they interact with humans. Many are enjoyed simply through viewing, while others are harvested through hunting.

The haying and grazing of refuge lands by local ranchers under special use permits constitutes a very important economic use. The management of the haying and grazing program has a direct economic impact on the local community and a profound effect on local public relations.

WILDLAND FIRE MANAGEMENT SITUATION

HISTORIC ROLE OF FIRE

Due to the high elevation (4100') of the refuge and the dry climate, relative humidity can drop below 20 percent during any month of the year. A fire in February, 1991 burned at midnight in tules over water at 16% RH. A marsh wildland fire in October, 1990 had a rate-of-spread of 180 feet per minute. In addition the surrounding mountains create local winds that can change at mid-day and create unstable conditions which readily form fire whirls and can cause Rx burns to cross firebreaks over 100' wide.

Wildland fires occur during every month of the year on Malheur Refuge with the most happening in February, March, July, September and October. Wildland fire and prescribed burn assists to neighboring agency lands normally occur between March and November with the majority of the wildland fire assists taking place from July through September while the prescribed burning assists mostly take place in April and September. Refuge prescribed burning is done in the fall (October – December) and winter (January – March). Prescribed crews from Malheur are sent to burn at zone refuges in Idaho and Western Oregon August through October. Spring Rx burning is done at Bear Lake and Deer Flat Refuges (March – April).

Pre-settlement fires

Malheur Refuge is located in the northeastern part of the Great Basin, an area dominated by sagebrush-grass communities. Information concerning fire history in sagebrush-grass communities prior to human influence is very limited. Houston (1973) reported that the average fire frequency in sagebrush-grass communities in northern Yellowstone National Park was 32 to 70 years. Wright et al. (unpub. man.) indicated that the fire frequency was probably about 50 years. Shinn (1977) reported that the arid grass shrub plains of the northern Great Basin reflect features characteristic of landscapes having close association with fire. Shinn (1977) found twenty-four references to native cultural burning in historical journals. According to Steward (1956, 1963) the impact of artificial burning surpasses that of naturally-occurring fires. Trapper Peter Skene Ogden (1826-1829) made reference to extensive fires near Malheur Lake, attributing them to activities of the local natives (Davies, 1961; Maloney, 1945; Williams, 1971). Early European settlers viewed the cultural burning practices of native Americans with contempt. A policy of total fire prevention evolved based on the premise that all fires were unnatural. Fire exclusion was incorporated in federal land management policies around the turn of the century (Shinn, 1977; Kilgore, 1976; Komarck, 1962).

Even before the presence of man, fires initiated by lightning have acted as an evolutionary force in a wide variety of ecosystems (Komarek 1962, 1964). Natural and man-caused fires have certainly been an integral part of the environment both regionally and within communities of Malheur Refuge (Griffiths 1902, Shinn 1977). Lightning fires have burned several thousand acres of terrestrial and wetland communities on the refuge every summer in the early 1980's. These fires have started both in wetland communities and in adjacent uplands, subsequently spreading into wetland areas. Annual narrative reports for Malheur Refuge indicate such fires have occurred in most of the years for which records have been maintained. Fire is undoubtedly an important component of wetland ecosystems at Malheur Refuge.

It is apparent from the literature cited above and especially Wright, et. al., 1979, that fire has played a significant role in the evolution of the plant and animal communities on the refuge. Generally the marshes, meadows, and grasslands in this area evolved through successive fires. Fire has a positive effect on these habitats and the wildlife which inhabit them. The greatest ecological impact on the refuge may have been the exclusion of uncontrolled wildland fire.

Fire has been used as a management tool on Malheur Refuge for many years. Refuge narrative reports first mention experimental burning of refuge lands in 1949. Fire has been used in recent years to treat sagebrush-dominated uplands and encourage their conversion to grasslands to provide desirable nesting

cover for ground nesting species of birds. In the 1980's the refuge began applying burning as a tool to create better interspersions in marsh and meadow habitats for the purposes of improving conditions for pairing and brooding wildlife.

Post-settlement Fire History

Reports in the files of Malheur Refuge mention approximately 70 wildland fires occurring on or in the vicinity of the refuge between 1939 and 1977. Of these, 17 were caused by lightning, 24 by human activities, and the rest were either unknown or unreported. An account of a 1937 wildland fire that started a peat fire in the Boca Lake area of the S Blitzen Valley near Five-Mile can be found in Appendix F.

Since the rate of spread on all Malheur refuge fuel types is high to extreme, the severity index for the refuge is high. During the past 20 years (1980-1999) sixty-four wildland fires have burned 22,510 acres on Malheur NWR...an average of 3.2 wildland fires and 352 acres per wildland fire each year.

Local ranchers usually support aggressive suppression of fire. They would much rather use grazing to treat vegetation than "waste" forage through burning. However, some wildland fires have removed brush and increased grasses and this has fostered some measure of positive local attitudes toward burning.

Economic losses from wildland fires on the refuge usually involve bridges, fences, corrals, hay, haying equipment, and potentially, livestock. Fences have been the most common economic loss in the past ten years

Prescribed fire history

The Malheur Refuge prescribed burn program averages 9 units and almost 2800 acres treated annually (Appendix F). Since 1992 there has been an increase in prescribed burning on Malheur zone refuges. In the past 3 years (1998-2000) Malheur Refuge crews averaged burning 37 units totaling 14,498 acres per year including prescribed burns in Florida, Minnesota, and on USFS and BLM lands..

RESPONSIBILITIES

Malheur Refuge currently has 2 engine crews. One is stationed at Frenchglen; the other at headquarters. These engines are tied in closely with the Burns Interagency Fire Zone (BIFZ) which consists of the Ochoco and Malheur National Forests, Burns BLM, and the Oregon Department of Forestry. They are primarily initial attack wildland fire suppression engines used to protect the refuge and under the "closest forces" concept, to provide assistance to surrounding federal lands during the height of the wildland fire season which is Mid-June – October according to the ERC chart from the Basque Hills RAWs station (Appendix F). Throughout the rest of the year Malheur Refuge engine crews are used as a zone resource primarily for prescribed burning on various refuges in the Central Oregon zone covered by the FMO stationed at Malheur. On an average the Malheur Refuge engine crews spend half their time on wildland fire assists and the other half on prescribed burns.

The refuge has a good working relationship with the BIFZ on wildland fires and Rx burns. The BLM, USFS, and ODF crews help us on the refuge, and refuge crews help them on their lands. There has been no exchange of funds to pay for this assistance in recent years with the advent of cost codes to cover working on another federal agency's land.

In July, 1999 Malheur Refuge added a Prescribed Fire Specialist to help with the heavy schedule and workload of Rx burns throughout the zone. This position entails a lot of travel and planning. In 1999 refuge crews burned 23 units totaling 8715.3 acres on Malheur refuge. They also burned 7 units for the USFS and BLM totaling 5,768 acres. A total of 52 units including zone refuges totaling 17,295 acres were burned at a cost of \$16.81/acre. In 2001 the Idaho refuges and hatchery were split off our zone. With the reduction in work load, Malheur crews can be expected to be burning 20 units a year totaling over 10,000 acres.

In detail, the Malheur Refuge fire program responsibilities are as follows:

Agency Administrator/ Project Leader (PL)

- Is responsible for implementation of all Fire Management activities on the refuge and will ensure compliance with Department, Service and refuge policies.
- Decides when to request overhead or additional firefighting personnel and equipment.
- Selects the appropriate management responses to wildland fire.

Deputy Project Leader (DPL)

- Coordinates refuge programs to ensure personnel and equipment are made available and utilized for fire management activities including fire suppression, prescribed burning and fire effects monitoring.
- Ensures that the fire management program has access to Refuge and complex resources when needed.
- Ensures that Refuge Managers and complex Staff consider the fire management program during Refuge related planning and implementation.

Refuge Manager (RM)

- Identifies prescribed burn units and biological objectives to Fire Management Officer (FMO) and Prescribed Fire Specialist (PFS), notifies FMO of prescribed fire project constraints, and ensures that Refuge resources are available to accomplish prescribed fire and fire suppression objectives.
- Acts as the primary Refuge Resource Management Specialist during fire management planning and operations.
- Ensures fire effects monitoring is being implemented, drafts wildfire Rehabilitation Plans for Deputy Project Leader, and is responsible for posting and enforcing fire restriction regulations.

Biologist

- Coordinates through Refuge Managers and Deputy Project Leader to provide biological input for the fire program with the FMO and PFS.
- Assists in design and implementation of fire effects monitoring, with FMO and PFS.
- Participates, as requested, in prescribed burning and wildfire suppression.

Fire Management Officer (FMO)

- Responsible for all fire related planning and implementation for the complex.
- Supervises Prescribed Fire Specialist and Lead Technician.
- Integrates biological Refuge objectives into all fire management planning and implementation.
- Solicits program input from the RM and Biologist.
- Supervises prescribed fire planning.
- Coordinates fire related training.
- Coordinates with cooperators to ensure adequate resources are available for fire operational needs.
- Determines when ecological and political triggers are reached for wildfire and prescribed fire implementation purposes.

- Is responsible for implementation of this Plan. This responsibility includes coordination and supervision of all prevention, pre-suppression, detection, wildfire, prescribed fire, suppression, monitoring, and post-fire activities involving Refuge lands.
- Is responsible for preparation of fire reports following the suppression of wildfires and for operations undertaken while conducting prescribed fires.
- Prepares an annual report detailing fire occurrences and prescribed fire activities undertaken in each calendar year. This report will serve as a post-year's fire management activities review, as well as provide documentation for development of a comprehensive fire history record for the complex.
- Submits budget requests and monitors FIREBASE funds allocated to Malheur Refuge.
- Maintains records for all personnel involved in suppression and prescribed fire activities, detailing the individual's qualifications and certifications for such activities.
- Updates all fire qualifications for entry into the Fire Management Information System.
- Nominates personnel to receive fire-related training, as appropriate.
- Designates the person to serve as Incident Commander (IC) for initial attack purposes. The FMO may assume the position of IC at his/her discretion or designate other personnel to take over that position at his/her discretion.

Prescribed Fire Specialist (PFS)

- Responsible for the planning and implementation of a program, which collects information for the documentation, analysis, and prediction of fire behavior and effects.
- Develops and recommends, plans, and schedules management ignited fire activities for the refuge.
- Implements and directs burns.
- Plans and develops a program to collect information on the effects and behavior of prescribed fire.
- Plans and directs studies to monitor and analyze fire behavior parameters, then uses these data to support the development of fire plans.
- Plans and directs surveys for the collection, analysis and documentation of data relating to fire effects on biotic and abiotic resources.
- Organizes and performs studies to develop fire management prescriptions for prescribed burns.
- Plans and conducts fuel management surveys to document presence or absence of hazardous amounts of fuel.
- Is responsible for ensuring a cadre of qualified prescribed fire overhead by recommending personnel for training, through both formal in-house and field training assignments.
- Is responsible for record keeping associated with burn planning, fire occurrence reporting and fire weather.
- Identifies areas of fire management requiring research and works with research scientists in the development of project statements to accomplish this research.

Supervisory Range Technician (SRT)

- Is 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 other agencies.
- Insures step-up plan is followed.
- Ensures fire management policies are observed.

- When available, may serve as prescribed fire burn boss, propose prescribed fire projects.
- Assists the PFS and the Biologist with fire effects monitoring.
- Helps prepare a Refuge fire prevention plan, and coordinates fire prevention with other employees.
- Maintains liaison with Regional Fire Management Coordinator and Zone FMO.
- Assists in updates of this Plan, maintains fire records, reviews fire reports (DI-1202) for accuracy, and enters fire reports into FMIS.
- Maintains engines in state of readiness; stresses safety with tools, equipment, PPE, and personnel.

Fire Management/Suppression Personnel

- Consist of all Complex Refuge personnel, whether permanent or seasonal, who meet the minimum standard set by the National Wildfire Coordinating Group (NWCG) for firefighters.
- Are fully equipped with proper personal protective equipment, have taken and passed the minimum classroom training, and meet physical fitness standards required.
- Undertake fire management duties as assigned by the qualified IC on each suppression action or by the Prescribed Fire Burn Boss on each prescribed fire project.
- Are responsible for their personal protective equipment and physical conditioning, qualifying annually with the work capacity test.

Incident Commander

Incident Commanders (of any level) use strategies and tactics as directed by the Refuge Manager and WFSAs where applicable to implement selected objectives on a particular incident. A specific Limited Delegation of Authority (in Fire Dispatch Plan, Appendix D) will be provided to each Incident Commander prior to assuming responsibility for an incident. Major duties of the Incident Commander are given in NWCG Fireline Handbook, including:

- Brief subordinates, direct their actions and provide work tools.
- Ensure that safety standards identified in the Fire Orders, the Watch Out Situations, and agency policies are followed at all times.
- Personally scout and communicate with others to be knowledgeable of fire conditions, fire weather, tactical progress, safety concerns and hazards, condition of personnel, and needs for additional resources.
- Order resources to implement the management objectives for the fire.
- Inform appropriate dispatch of current situation and expected needs.
- Coordinate mobilization and demobilization with dispatch and the Collateral FMO.
- Perform administrative duties; i.e., approving work hours, completing fire reports for command period, maintaining property accountability, providing or obtaining medical treatment, and evaluating performance of subordinates.
- Assure aviation safety is maintained to the highest standards.

Initial attack teams

Initial attack teams will consist of experienced, fully-qualified firefighters, those on their first fire, and well-qualified leadership. Teams will be prepared and equipped with hand and power tools as needed and will be dispatched with a day's supply of food and water, so they can continue work for 24 hours without additional support.

Employees participating in any wildland fire activities on Fish and Wildlife Service or cooperators' lands will meet fitness requirements established in PMS 310-1, except where Service-specific fitness requirements apply.

Exceptions to fitness requirements on Initial attack activity are available from the Regional Fire Management Coordinator per guidelines in Chapter 1.5 of the Fire Management Handbook (USFWS 2000).

INTERAGENCY OPERATIONS

Malheur Refuge is a participant with the Burns Interagency Fire Zone (BIFZ) and has interagency contracts for dispatch services, the fire cache, and radio maintenance (Appendix C). The BIFZ consists of The Burns District BLM, Malheur National Forest, Ochoco National Forest, Oregon Department of Forestry, and Malheur Refuge. Radio frequency agreements are also in Appendix C.

The interagency agreements with the BIFZ enables the refuge to use the closest forces concept during initial attack of fires on or next to the refuge. The multi-agency Frenchglen Fire Station improves response time for both agencies on the south end of the fire district. Shared cost of this facility benefits both agencies. Programming other agency frequencies on refuge radios via the BLM radio maintenance contract results in cost savings due to faster response times on wildland fires. Refuge crews are given initial attack assignments off the refuge on wildland fires where they are the closest available resource. Refuge fire fighters are also used in lead positions on prescribed burns on USFS/BLM lands. For example, in 1999 refuge crews burned 5768 acres of USFS and BLM land. BLM used our RAWs (portable weather station) and crews on prescribed burns on the Steens Mountain in 1998 and 1999.

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

PROTECTION OF SENSITIVE RESOURCES

Although Malheur Refuge doesn't have any permanent resident threatened or endangered species, it does have many sensitive species and habitats. The sensitive northern bald eagle occurs on the refuge during the late fall, winter, and early spring. Other sensitive bird species that are found on the refuge include: white pelican, trumpeter swan, Swainson's hawk greater sandhill crane, western snowy plover, Lewis' woodpecker, willow flycatcher, western bluebird, loggerhead shrike (U.S. Fish and Wildlife Sensitive Special Report, 1982). The refuge's cultural and historical resources are irreplaceable.

A refuge manager or designated resource advisor will be present on all large wildland fires on Malheur Refuge. Any wildland fire that requires Interagency assistance and more than 2 engine crews would be a large fire. Prescribed burns will follow the prescribed burn plan requirements for the number and type of personnel on the fire.

A refuge manager or resource advisor will be contacted whenever a previously undiscovered sensitive cultural or natural resource is found during a wildland fire. If there is no immediate threat to human life or property, any potentially destructive activity (e.g. dozer/plow line construction) should be ceased in that area. The refuge manager/resource advisor will determine the next course of action.

Gross firebreaks were established throughout Malheur Refuge to protect historic and contemporary structures from large wildland fires. Dozer/plow lines will be avoided wherever possible. When human safety dictates using a dozer/grader/plow, rehabilitation will be initiated immediately after the fire is

controlled. The Delegation of Authority in the Dispatch Plan (Appendix D) contains maps and specific instructions for avoiding cultural resource damage on Malheur Refuge.

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 use will be limited in areas known to harbor surface artifacts.
- § Mechanized equipment should not be used in areas of known cultural significance.
- § The location of any sites discovered as the result of fire management activities will be reported to the Regional Archaeologist.
- § Rehabilitation plans will address cultural resources impacts and will be submitted to the Regional Archaeologist using the RCRC.

Prescribed Fires

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

WILDLAND FIRE ACTIVITIES

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

All fires not classified as prescribed fires are wildland fires and will be appropriately suppressed.

Records show that fire season is typically from Mid-June-October. Depending on the specific weather of any particular year the seasons may be shorter or longer and, therefore, may start earlier or last longer. Appendix F has fire occurrence tables and an ERC chart for the refuge.

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. Other strategies include:

- § All Wildland fires will be suppressed using the appropriate management strategy.
- § No ground disturbance in known cultural areas without archaeologist approval.
- § Fire adapted communities that have not had a significant fire for more than twice the normal fire frequency for that community type may be undergoing change in community structure and function. Depending upon other consideration, prescribed fire should be reintroduced into these communities if the reintroduction is consistent with land use objectives established for the communities.
- § Fireproofing of all historic structures will be done annually wherever practical.

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 in that order of priority.

Occupied residences, refuge administrative buildings and Field station facilities shall receive the highest priority. Evacuation will be at the discretion of the IC. However, it must be recognized that **REFUGE PERSONNEL ARE NOT PROPERLY TRAINED NOR EQUIPPED TO FIGHT STRUCTURAL FIRES AND THEIR EFFORTS SHOULD BE DIRECTED AT MINIMIZING SPREAD ONLY!** Structural firefighters will be called to fight structural fires. This applies to vehicle fires which occur regularly on Malheur Refuge. Standard urban interface fireproofing safeguards such as installing fire resistant roofs like metal or tile, clearing brush around buildings, etc. should be implemented at all refuge facilities. Priority should also be given to adjacent private buildings, haystacks, corrals, etc. Each spring we a 500 pumper mounted on a trailer is positioned at the Field Station and a firebreak is mowed around the compound. Field Station personnel are trained to use the pumper in an emergency until fire personnel can arrive. The purpose of these precautions is to keep a wildland fire from entering the compound and threatening the facilities and residences. The Malheur Field Station is about 3 miles west of refuge headquarters.

Second priority areas involve refuge historic sites. These areas will be protected by firebreak maintenance as much as possible, and all wildland fires will be fully suppressed. As a last resort the building will be foamed if possible to prevent hot embers from igniting the structure.

All other refuge fires will be contained as quickly as possible to minimize spread. Control will emphasize the use of natural and maintained firebreaks surrounding the blaze.

Suppression tactics 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.

As a general rule heavy equipment that mechanically disturbs the sub-surface soil will not be used on the refuge to fight wildland fires or create fire breaks for prescribed burns unless an archeologist first clears the area for such disturbance. Life-threatening situations would be an exception to this rule. When cleared by the archeologist, immediate repair to the area will be done as part of mop-up.

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 key to victory” – General Douglas MacArthur

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

Preparation for the wildland fire season begins before June by servicing and setting up a 500 gallon pump unit at the Malheur Field Station. Fire crews mow a 30' wide firebreak around the Field Station Compound. Hazardous fuels are cleared from around refuge buildings at headquarters, Buena Vista, Double O, and the P-Ranch sub-stations. Fire personnel inventory the refuge fire cache and order replacements if needed. Each engine is checked to make sure it is fully serviced, equipped, and fire ready. Fire quarters are checked and made ready for occupancy. All new and experienced firefighters have their quals, medical exams, and pack test completed.

One engine crew is positioned at Frenchglen to cover the south end of the refuge and one engine crew lives at headquarters to cover Double O and the north end of the refuge. Normally three to four other Interagency engines are stationed at Frenchglen to cover the several million acres of federal land in the south end of Harney County.

Historical weather analysis

The refuge can experience sub 20% relative humidity conditions any time from late June through February. Normally, our greatest wildland fire danger period is late July through October. The normal calendar year starts with January and February having enough dry weather to permit us to do prescribed burns. March brings green-up along with irrigation of the refuge and increased moisture which shuts down our burn program. April and May are usually wet also. June is the beginning of summer and the refuge starts to dry out, especially in drought years when irrigation water is unavailable. By late July and early August we can have very dry, hot conditions. The fall is usually very sunny and relatively dry which makes it a dangerous time of year regarding fire, especially if dry lightning storms occur. These conditions may last until November or even late December when winter snows may shut down the fire season. Malheur's burning index is 91 at the 90% level. (see the burning index chart in Appendix F).

The refuge has some of the most dangerous and erratic fire behavior anywhere. The flat terrain combined with uneven heating, low humidity, light and variable winds, an unstable lapse rate in the lower atmosphere, and up/down canyon wind flows are all conducive to generating fire whirls. On the Faye fire in 1991, a dozen fire whirls were seen crossing the Blitzen River and Center Patrol Road (a 100' wide firebreak) many times carrying fire to both sides of the natural break. One of these was 50' in diameter with active fire a quarter of a mile high. On the Diamond Valley fire in 1990, the fire burned at an estimated rate of 180 fpm. It covered over 4 miles and burned 3200 acres in two hours. Refuge grass fires can move rapidly and cross firebreaks via horizontal flame lengths of over 50 feet or fire whirls.

Fire Prevention

An active environmental education fire prevention program has been conducted in conjunction with local grade school teachers in the Burns School District. A Fire Prevention Plan was completed for the Hagerman NFH in 1995. Both the programs and the plan emphasize protection of human life and property, and prevention of damage to cultural resources or physical facilities.

Visitor contacts, bulletin board materials, handouts and interpretive programs may be utilized to increase visitor and neighbor awareness of fire hazards. Trained employees need to relate to the public the beneficial effects of prescribed fires as opposed to unwanted human-caused fires, with emphasis on practical information essential to understanding the potential severity of human-caused wildland fires and how to prevent them.

Lightning strikes cause over half the wildland fires on Malheur NWR. Arson, catalytic converters or sparks from vehicles, haying and mowing equipment, and carelessness ignite the rest. An escaped prescribed burn started the Baker Wildland Fire in 1992. One 3-acre fire was started by refuge personnel mowing in September of 1999. Visitors and permittees started the rest over the past 10 years.

When fire danger is VERY HIGH or EXTREME, visitors will be alerted at headquarters which will coincide with the BLM fire danger sign at Wright's Point. Permittees will also be reminded of fire danger under these same conditions. In addition each permittee involved with cutting, baling, or removing hay is required to possess an operable fire extinguisher while on the refuge. Five gallon portable metal sprayers are available for heavy equipment during high fire danger periods in addition to the required fire extinguishers mounted on the vehicle. Refuge operations may be curtailed during extreme fire danger.

Staffing Priority Levels

Since most of the fuels on the refuge are in the one-hour class, our fire danger can change rapidly with the current relative humidity. The BICC keeps the refuge informed of the Energy Release Component (ERC) and Burning Index (BI) acquired from the National Fire Danger Rating System (Appendix G). When fuel moisture gets low or dry lightning storms are imminent, patrols are increased and crews are placed on standby along with the Interagency crews and are integrated into the step-up plan of the Burns Interagency Fire Zone.

Daily fire danger is obtained for the refuge from the BLM Basque Hills weather station located at the south end of Catlow Valley. It is the most representative station for the refuge fuel types and elevations. A chart showing average burning index (BI) values for the past 10 years along with the BLM staffing break points is included in Appendix G. The BLM uses the average, below average, and above average percentiles to change the staffing levels. Generally, any reading above 80% (BIFC uses 80% rather than 90%) or a 100+ BI will get you into Level 4 and anything above 95% or a BI of 140+ will result in a Level 5 designation if it lasts for more than a day or two. The Level 3 comes in at 60% and the Level 2 at 40%. Other factors including the Haines Index and various drought indexes are used to change staffing levels..

No prescribed burning will be initiated when the Preparedness Level is 3. This may effect late fall/early winter burning at times in October or November on the refuge. Also the quantity of prescribed burns will not exceed the capability of available refuge fire crews to control and monitor. This normally limits the number of burns to no more than two per day.

When fire Preparedness reaches a Level 3 crews may be directed to patrol during and immediately after lightning storms and/or to be on extended hours of standby duty.

At Level 4 all refuge firefighters will be made available for fire duty (24/7). A refuge dozer is loaded on a flat-bed trailer with a refuge operator at home with fire clothes and equipment but available to Burns Dispatch over the weekends in case a dozer is needed on a wildland fire. Strong consideration is given to cease all Rx burn activities.

At Level V all Rx burn activities are put on hold and all firefighters are made available for wildland fire duties.

Training

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

In mid-June the refuge participates in an Interagency Fire Guard School with the Burns BLM, Malheur and Ochoco National Forests, and the Oregon Department of Forestry. New fire fighters are taught S-130/190 and everyone takes a refresher Standards For Survival course and practices shelter deployment.

Basic wildland fire training refreshers are offered annually for red-carded firefighters and records kept in a centralized database. Additional training is available from surrounding agencies in pump and engine operation, power saws, firefighter safety, fire weather and fire behavior, helicopter safety and prescribed fire objectives and activities. On-the job training is encouraged and will be conducted at the field level. Whenever appropriate, the use of fire qualification task books will be used to document fire experience of trainees. The FMO will coordinate fire training needs with those of other nearby refuges, cooperating agencies, and the Regional Office.

The refuge supports the development of individual Incident Command System (ICS) overhead personnel from among qualified and experienced refuge staff for assignment to overhead teams at the local, regional, and national level.

Fire suppression is an arduous duty. On prescribed fires, personnel may be required to shift from implementation/monitoring activities to suppression. Poor physical condition of crew members can endanger safety and lives during critical situations.

All persons used in wildland fire suppression must have completed the minimum NIFQS requirements for Firefighter 2 (FFT2) or above, pass the pack test, complete fire shelter deployment, and review Standards For Survival annually. Since Malheur firefighters also may go on an interagency wildland fire or Rx burn, all our fire fighters must be at least FFT2 qualified.

Local fire classes are taught by the BIFZ employees including Fish & Wildlife personnel, at Central Oregon Community College, or the Redmond Air Center. Qualifications are kept up-to-date on the national SACS computer. Red cards are printed from the database at NIFC and mailed to the refuge zone FMO for signature. The zone FMO then gives them to fire personnel.

Personnel performing fire management duties will maintain a high level of physical fitness. This requires successful completion of the arduous fitness pack test. Personnel must complete a three mile hike with a 45 pound pack in less than 45 minutes to be qualified for arduous fireline duties.

Supplies and Equipment

Malheur Refuge maintains a small ten-person fire cache at headquarters and has access to the 100 person cache at Burns BLM. The Fire Dispatch Plan contains an updated list of refuge fire equipment (Appendix D).

Fire equipment and facility needs are updated annually in the FIREBASE database (Appendix R).

DETECTION

Refuge employees routinely watch for smoke during normal working hours. In addition, refuge fire crews will be dispatched to patrol for fires when the Burns BLM fire dispatch office is responding to a staffing class of 3 or higher. In addition to refuge personnel, BLM will provide assistance in monitoring for wildland fires with post storm reconnaissance flights and fire crews stationed in Burns and Frenchglen under the cooperative Burns Interagency Fire Zone Agreement (Appendix C).

The Fire Management Plan does not discriminate between human-caused and lightning caused fire. All wildland fires will be suppressed. However, detection shall include a determination of fire cause. Fire personnel approaching a fire are trained to note license plates and vehicle descriptions of persons leaving the area of the fire and talk to them if possible to see if they know anything about the fire. Moreover, known 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

Malheur Refuge has a UHF radio system with a repeater at headquarters. The refuge is currently changing to a narrowband digital system. Each firefighter has their own hand-held radio or can use the mobile radio in their engine. Through agreements (Appendix C) our radios are programmed to use various local interagency frequencies including two National Forests, ODF, and the Burns BLM (Appendix D). The radio shop at Burns BLM repairs, installs, and programs our radio system.

PRE-ATTACK PLAN

All dispatching is handled by the Burns Interagency Fire Zone. In most cases, dispatch will contact the FMO, Prescribed Fire Specialist, Deputy Manager, Refuge Operations Specialist, or Refuge Manager, in that order, before dispatching our crews or equipment. There is an agreement with the BLM to dispatch our crews immediately in an emergency (Appendix D). A fire personnel and equipment status report is sent to dispatch each morning during fire season to let them know the location and availability of the refuge resources for wildland fire assignment that day. Out of state or long-term assignments are always cleared through the FMO.

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 operation decisions pertaining to the fire using the DOA guidelines for strategies and tactics. A copy of Delegation of Authority is in the Fire Dispatch Plan (Appendix D).

FIRE MANAGEMENT UNITS

Fire Management Units (FMU's) have been described to enable managers to know what objectives, resources at risk, and fire fighting strategies can be used to control and use fire on all parts of the refuge.

The combination of large bodies of water (Harney and Malheur lakes) and the orographic updrafts caused by Steens Mountain create thunderstorms with lightning over the refuge which start many wildland fires. Most of the vegetation on the refuge is marsh-meadow community surrounded by narrow uplands of cheatgrass-sagebrush, and saltgrass-greasewood. Marsh-meadow communities have high rates of fire spread when they dry out in September through November and again in March. These months present the greatest wildfire danger due to dry fuel and low humidity. Hayed and grazed areas usually create gaps in this high danger fuel by the end of August. This patchwork effect creates firebreaks which are often utilized in wildland fire suppression although under extreme dry and windy conditions fire will burn through the hay stubble.

Because water management and the key species used to establish long range habitat management goals vary in different areas of Malheur Refuge, fire management units were separated by these management goals instead of simply by fuel types. Rotational burning of different units in each habitat management area therefore will depend on the habitat of the key species. Prescribed burning is a management tool used to obtain specific objectives in each habitat management plan.

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.

North Malheur Lake

This area of the refuge consists of meadow and marsh for the most part; mostly fuel types 1 and 3. Due to the close proximity of adjacent private lands with hay, livestock, and buildings; all wildland fires will be aggressively suppressed using natural fire breaks where possible to minimize impacts on the land. This unit contains many important archeological village sites which is another reason to not allow fires to burn in this area. Burning archeological sites can damage certain artifacts and expose surface artifacts to looters.

No prescribed burns will be done in this portion of the refuge at this time due to archeological and private resources at risk.

Recent arson fires in late March and early April of 1996 have shown extreme fire behavior including burning through the night and consuming over 1500 acres in one day. Inaccessibility and long flame lengths have precluded direct attack with equipment. Dry weather any time of the year can produce the right conditions for wildland fires in this area due to fine fuels and heavy fuel loading.

Double O

The entire Double O Unit of the refuge excluding the Harney Lake and Stinking Lake RNAs consists of marsh, alkali flats, meadow, and upland ridges. Fuel types include 1, 2, and 3. The Double O Management Plan includes Rx burning. Wildland fires will be contained and controlled using the safest methods and natural fire breaks wherever possible. Efforts will be made to contain the fire on the refuge.

The Double O area is the least volatile FMU on the refuge due to many alkali flats, abundance of water, and lack of fine fuel loading in some habitat types. However, adjacent private lands and ranching practices make it essential that initial attack and containment is swift and effective.

South Blitzen Valley

The Blitzen Valley Unit of the refuge between Frenchglen and the Diamond Valley Road consists of marsh, meadow, riparian, and upland habitat. Fuel types include 1, 2, and 3. The Blitzen Valley Management Plan includes Rx burning. Wildland fires will be suppressed according to the Delegation of

Authority (Appendix D) to avoid resource damage. Otherwise wildland fires will be contained and controlled using the safest methods and natural and established fire breaks wherever possible. Several historical structures and adjacent private lands and structures need protection. Fire breaks will be installed, as needed, to minimize the potential threats of a wildland fire (on Refuge lands) to the town of Frenchglen and these historic structures.

Fire behavior can be extreme any time of the year in the South Blitzen Valley when dry conditions exist since marsh fuels are not tied to the dry fuel moisture or relative humidity. Marsh plants do not transpire as much water to the surrounding air as upland plants and may actually be drier and burn hotter than surrounding vegetation.

North Blitzen Valley

This area between the south end of Malheur Lake at headquarters to the Diamond Valley Road consists of marsh, meadow, riparian, and upland habitats similar to the South Blitzen Valley (fuel types 1, 2, and 3) but has a larger infestation of perennial pepperweed, a non-native species. There are also large stands of big sagebrush covering over 30,000 acres. Scattered archeological sites and lack of natural or man-made fire breaks make it difficult to divide this large area into smaller units for easier control. The Blitzen River flows through the area creating riparian areas of willows and other minor shrubs and small trees. It also is included in the Blitzen Valley Management Plan. Wildland fires will be suppressed but must consider and avoid resource damage. Specifically, existing fire breaks will be used in lieu of creating additional disturbance with heavy equipment. Otherwise wildland fires will be contained and controlled using the safest methods and natural fire breaks wherever possible. Historical sites, archeological sites, refuge buildings and structures, and adjacent private lands and resources need to be protected as well.

Like the South Blitzen Valley, fire behavior can be extreme any time of the year here when dry conditions exist since marsh fuels are not tied to the dry fuel moisture or relative humidity.

Vegetation Type

The effect of fire on Malheur Refuge varies with the vegetative community burned and is species specific. Young (1986) found that vegetative response was not sensitive to timing during the dormant season, but fire significantly altered structure and community function. Above ground herbage production increased for 1 to 2 years in all but burreed communities. Shoot density of rhizomatous species increased after burning, and shrubs sprouted and grew vigorously, quickly replacing canopy cover and volume. Vegetative communities will return to pre-burn status in 3 to 5 years.

Peat fires which burn subsurface organic material can be used to create brood ponds in marsh habitats for waterfowl and waterbirds. One such pond created in 1989 is still viable in 2000. They will be useful for 10 to 30 years or more depending on how deep they burned into the marsh. Peat fires resulting from the Diamond Valley wildland fire in 1990 created holes large enough to bury an entire pickup truck. Those newly created ponds will last for several decades.

Fuel Types

The predominant vegetation on Malheur Refuge is fuel type 3, tall grass, which is represented by tule bulrush, giant burreed, cattails, and reed canary grass in the marshes. Uplands usually contain a mixture of shrubs such as sagebrush, saltbush, and black greasewood and various forbs and grasses. Fuel type 6 is fairly representative there. Meadows contain fuel type 3 and some fuel type 1, short grass, represented by juncus, spikerush, sedges, and saltgrass.

Habitat maps from the refuge Geographic Information System have been included to show fuel types (Appendix K). Rate of spread for each habitat type is based upon past observations and documentations by refuge personnel.

Table 4. Number of acres by fuel model on Malheur NWR.

FUEL MODEL	#1 (meadows)	#2 (marsh)	#3 (upland/riparian)	TOTAL
N. Blitzen Valley	11230 (31%)	6033 (17%)	18814 (52%)	36077
S. Blitzen Valley	10650 (41%)	3269 (12%)	12366 (47%)	26285
Double-O	5605 (38%)	2065 (14%)	7081 (48%)	14751
Total	21880 (35%)	9302 (15%)	31180 (50%)	77113

Habitat types are rated as follows:

Habitat Type	Dominant Fuels	Calculated Fire Behavior	Fuel Model
Upland	Brushy fuels, continuous grass	High	1,2,3
Riparian	Brushy fuels, continuous grass	High to extreme	2,3,6
Meadow	Grass fuels/continuous	Extreme & high	1,3
Marsh	Very heavy fuels	Extreme	3
Open Water	NONE	N/A	

Damage potential for fire on average worst five day was rated using the following color codes on the Malheur Refuge Fuel Map (Appendix K).

- BLUE - No Damage.
- YELLOW - Some resource loss and loss of habitat or detrimental effect on refuge objectives. Fire may get off refuge.
- RED - Resource loss and loss of ability to meet refuge objectives. Fire has potential to get off refuge and cause loss of private property, structures, etc.

A Fire Severity Index is presented below to indicate acres in each category as follows:

Degree of Severity	Acres
Low	60,000
Medium	50,000
High	70,000

Fire Behavior

Normal fire behavior in the marsh areas which can contain up to 8 tons of fuel per acre produces flame lengths over 25 feet and rates of spread of 180 or more feet per minute depending on the wind. Extreme behavior can happen in the marsh, meadow, and upland fuel types resulting in fire whirls, extreme wind shifts, and uncontrollable rates of spread. Normal tactics require indirect attack by burning out from a distant secure firebreak.

SUPPRESSION TACTICS

Wildland fires will be suppressed in a prompt, safe, aggressive, and cost-effective manner to produce fast, efficient action with minimum damage to resources. Suppression involves a range of possible actions from initial attack to final suppression. All wildland fires will be suppressed.

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

There will be only one Incident Commander responsible through the FMO to the Project Leader. The Incident Commander will designate all overhead positions on fires requiring extended attack. Reference should be made to a Delegation of Authority (Appendix D).

The cost of wildland fire suppression on the refuge or an interagency wildland fire assist off the refuge shall be charged to subactivity 9261 and four digits assigned by the national fire database (FMIS).

Malheur Refuge will be able to respond to wildland fire promptly, efficiently and effectively. This station will maintain initial attack capabilities through the effective use of station based suppression resources and an Interagency Agreement between the refuge and Burns Interagency Fire Zone. The suppression of wildland fire shall take priority over all other functions on this refuge, except the safeguarding of human life. This capability will be highest during the fire season (Mid-June thru Oct) but will be present to a lesser degree the rest of the year.

The refuge has primary responsibility for all pre-suppression prevention activities on refuge lands. An Interagency Agreement has been developed between the district BLM office in Burns and the refuge (Appendix C) which outlines a mutually agreed upon set of guidelines to be used in the event of a refuge fire. A review of this agreement is required by all personnel involved in the wildland fire suppression program.

A Wildland Fire Situation Analysis Worksheet is in Appendix J. The Incident Management Teams transition guidelines in the FMH (3.2-12) will be followed in the case of a large wildfire which requires an outside management team to take over the fire on the refuge.

Suppression Conditions

As a general rule heavy equipment that mechanically disturbs the sub-surface soil will not be used on the refuge to fight wildland fires or create fire breaks for prescribed burns unless an archeologist first clears the area for such disturbance. Life-threatening situations would be an exception to this rule. When disturbance is necessary and cleared by the archeologist, immediate repair to the area will be done as part of mop-up to restore it to natural-looking conditions.

Motorized vehicles are not permitted in the Harney Lake and Stinking Lake National Research Natural Areas without project leader approval. However, fires are unlikely in these areas as fuel is limited. Private lands often contain less fuels than adjacent refuge lands due to haying and grazing programs during the peak fire season and these boundary areas can serve as potential control points in the event of a wildland fire. Bulldozers, trucks, etc. will normally not be allowed in the lake basin below the normal high water mark. If control is required within the Malheur Lake marsh because of adjacent hazards, indirect or aerial attack would be initiated at the nearest natural fuelbreak to protect buildings and equipment.

Existing firebreaks will be utilized whenever available during suppression operations. Two gross firebreaks have been established at Rockford Lane and Five Mile Lane (see Vicinity Map in Appendix T). They could also be called mini fuel breaks. The Rockford Lane break located about halfway between Buena Vista and refuge headquarters is thirty feet wide and will be graded and mowed each year to separate Biological Unit 7 from Unit 8 and provide a place to anchor a back fire to cut off a wildland fire from going either north or south. This break is about 3¼ miles long between Highway 205 and the east boundary of the refuge. The first westernmost half mile is on BLM land so the break can be anchored to the highway. It was widened and completed in 1997.

The Five Mile Lane gross firebreak was made in 1995 by removing willows along the north side of Five Mile Road between Highway 205 and the Center Patrol Road. The area north of the Five Mile Road was excavated (the south end of the Jones Unit) to create a 30 foot wide pond the length of the road. The road and flooded ditch comprise a fifty foot wide firebreak which continues east of the Center Patrol Road to the East Canal along the south edge of the Dredger #2 Unit. This fire break essentially divides Unit 11 from Unit 12 and provides an anchor point for backfiring or stopping a wildland fire heading north or south at this juncture. These gross firebreaks will not stop a wildland fire on their own but will provide a safe place to backfire or burn out ahead of a wildland fire.

Both of these gross firebreaks are important strategic structures created specifically to enable resource and fire managers to prevent a catastrophic wildland fire from devastating large areas of prime wetland and meadow habitat on Malheur Refuge.

Wildland Fire Situation Analysis

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

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. An OAS Aviation Policy Department Manual will be provided by OAS.

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

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

REHABILITATION AND RESTORATION

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. Completely restore camping areas and improved helispots.
7. Consider and plan more extensive rehabilitation or re-vegetation to restore sensitive impacted areas.

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

Any rehabilitation of a wildland fire for damage caused by fire operations should be accomplished along with mop-up when crews and equipment are available and be charged to the fire. When it is not possible to complete the rehab work in a short period of time (e.g. rebuild a fence, re-seed, or rehab an extensive fire camp) a Fire Rehabilitation Plan will be completed and submitted to the Regional Fire Management Coordinator immediately following the fire.

If emergency resource rehabilitation 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 Emergency Rehabilitation (BAER) fund.

Ten areas are identified on Malheur Refuge where a wildland fire could most easily escape from the refuge to adjacent private lands and potentially cause damage to private property. These areas include lands north of Double-O, Double-O Station, south of Double-O, the Sodhouse area, Headquarters, east of Headquarters, the Malheur Field Station, Buena Vista Station, Diamond Valley, and the Frenchglen and P-Ranch area (Appendix M).

Private range lands may require re-seeding and re-fencing. Structures (buildings, bridges, weirs, etc.) may need to be replaced. Livestock and feed (grain, hay, etc.) may be destroyed and require replacement. Rehabilitation plans for each fire will be reviewed. A final plan will be submitted to Region for establishing an account. Rehabilitation should be initiated prior to complete demobilization or early the following season.

REQUIRED REPORTING

The IC will be responsible for documenting decisions and completing the fire report (e.g., Ics-214, DI-1202; examples in Appendix S). The FMO will be responsible for any additional required reports.

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). A fire investigator will be requested through the BICC dispatch center in Burns.

PRESCRIBED FIRE ACTIVITIES

PRESCRIBED BURN PROGRAM OBJECTIVES

Prescribed burning always has some risk associated with it. Without risk, there would be no prescribed burning. Fuel loads and the extent and severity of the wildland fires would be altered without prescribed fire.

The general objective of prescribed burning on Malheur Refuge is to improve wildlife habitat. Fire is applied in an effort to create openings in large monotypic stands of emergent vegetation. This is done by burning during the fall or winter and following up with flooding to provide early season open water. In addition, some grass/sedge meadows are also treated on a periodic basis to enhance vigor and/or improve the structure of nesting cover. This is done in areas where grazing and/or haying conflict with habitat and/or wildlife objectives.

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.

BURN UNIT VEGETATION TYPES

The following discussion is intended to show how treatments meet land use and/or habitat objectives. Each habitat type is discussed separately as upland, meadow, emergent marsh, and riparian.

Upland

Burning of upland sites has been done to remove the shrub component and promote increased graminoid and forb production. However, unintentional burning of uplands can occur when adjacent habitat types are treated and/or a wildland fire develops. Following is a more-detailed discussion of the impact of prescribed burning and how variation in intensity, frequency, and seasonality can affect management of upland cover.

Prescribed burning intensity can be expressed as a percentage of the total cover removed in relation to the total amount of pre-burn standing cover. Burning intensity is influenced by temperature, topography, soil moisture, fuel moisture, relative humidity and wind speed. In general, burning done under conditions promoting a hot, intense flame will remove more vegetation (cover) than a less-intense flame. However, a minimum level of fuel is needed before a fire will carry through the vegetation and, because of this, it is not possible to provide light-intensity treatments with burning. A burn which is hot enough to carry through a site will remove at least 80% of the cover and will usually remove close to 100% of the cover (personal observation). Therefore, the impacts of burning to cover can be very severe in comparison to other treatment strategies. By burning in the winter or under wet conditions this effect can be mitigated.

Historical records indicate the fire frequencies have averaged from 32-70 years in sagebrush/grass communities (Wright et al., 1979) or perhaps as often as 20-25 years (Houston, 1973). This frequency seems acceptable in Class 2 or 3 upland sites where it is desirable to maintain sagebrush as a component of the composition. However, in Class 1 sites where management for dense, residual standing cover is the primary objective, burning should be used on an as-needed basis. A basin wildrye site can recover to pre-burn cover conditions in 3-4 years (Young, 1987, personal observation). However, over time, treatment again becomes necessary. Observations of Class 1 upland sites which have been idle for 15 years indicate that these areas would benefit from a burning treatment. Upland are classified according to vegetative structure, residual vegetation, ground cover, and cupola. For nesting cover purposes they are described as:

Class 1	Class 2	Class 3	Class 4
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Optimum conditions; excellent cover	Almost optimum; good cover	Less than optimum; fair cover	Unacceptable condition; poor to no cover
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Meadow

The effects of fire on meadows have been studied at Malheur Refuge by Young (1986). In meadows he studied sedge (*Carex atherodes*), Baltic rush (*Juncus balticus*) and spike rush (*Eleocharis palustris*). Among his major findings were that dormant season burning: 1) increased above ground standing crop for at least 2 years after burning, 2) increased shoot densities, and 3) increased reproductive effort (inflorescence) in sedge but not in rush or spike rush. In short, fire "rejuvenates" meadows vegetation.

Advantages of fire in meadows are: 1) it simulates a natural process 2) it creates habitat diversity, 3) it can be relatively inexpensive in some situations and, 4) a wide variety of wildlife respond very favorably to burns, particularly for maintenance. Disadvantages of fire are: 1) it is sometimes very expensive to plan and execute, 2) it's often difficult to control and the jeopardy/threat to other property and resources can be high, 3) clean hot burns actually decrease habitat diversity by making fields homogeneous, 4) it removes nesting and escape cover thus impacting, in the short term, species needing residual cover and 5) it removes detritus needed by invertebrates.

Emergent Marsh/Pond

The use of fire to manipulate emergent vegetation has been thoroughly described by numerous authors (Lynch, 1941; Linde, 1969; Vogl, 1980; Linde, 1985; Young, 1986). Kantrud (1986) provides an excellent review of the effects of marsh burning on breeding waterfowl. Generally, marsh burning that leads to increased habitat heterogeneity results in increased use by breeding waterfowl. Emergent burning usually leads to increased protein in plants during the following growing season (Smith et al., 1984) which, in turn, makes plants more attractive to muskrats and grazing waterfowl. These "aquatic herbivores" may alter marsh communities by their grazing activities (Smith and Kadlec, 1985a).

Generally, two different types of marsh burns are recognized (Young, 1986): (1) cover burns which remove above-ground plant biomass, and (2) subsurface burns which oxidize materials within the soil (peat burn).

Cover burns generally only remove above-ground materials, usually leaving below-ground rootstalks and tubers of marsh emergents undamaged. Generally, cover burns don't alter vegetation communities within marshes and only cause short-term changes in plant productivity due to release of nutrients during the burn.

Young (1986) studied the effects of dormant season burning on marsh emergents at Malheur Refuge. He concluded that the timing of the burn during the dormant period had little effect on results in growth of emergents the following spring. Generally, burning resulted in increased above-ground standing crop, increased shoot densities, and decreased shoot weight for two years following the burn for all marsh emergents with the exception of burreed, which burning did not seem to significantly affect. Cover burns can be used to remove excess litter and stimulate new growth within marshes, and have been used in conjunction with mechanical methods (cutting or discing) to achieve changes in plant communities. Nelson and Dietz (1986) used cover burns to allow easier mowing or discing of areas that were later flooded to control cattails. Burning, alone, can lead to increases in emergent biomass due to the release of nutrients (Smith and Kadlec, 1985b). To control emergent vegetation, burning should be supplemented with a mechanical treatment (e.g. cutting/discing) and flooding to drown rootstalks and tubers.

Young (1986) provides burning prescription recommendations for use in planning cover burns in marshes during the dormant season.

Peat burns can be effective in controlling emergents by killing tubers and rootstalks. They generally deepen marsh areas as organic peat soils are turned to ash. These burns required very dry soil conditions and are generally achievable only following a long, dry period. Peat burns are difficult to manage and have been known to burn underground for months (Vogl, 1980). The ability to rapidly flood the area is a pre-requisite for control of peat burns.

Riparian

The effects of fire on riparian ecosystems are poorly documented. Generally, the literature suggests that resilience of riparian habitat decreases with increased fire intensity (Ewel, 1978). Willows often regenerate quickly after fire (Loveless, 1959; Spencer and Hakala, 1964; Leege, 1968; Leege, 1969; Vallentine, 1971; and Rose and Scotter, 1973). Fire on Malheur Refuge has generally resulted in removal of about half of the above-ground willow structure, following fire. Linde (1969) found that in Wisconsin, spring burning resulted in resprouting and increased density of willow stands, while fall burning tended to control willows. The difference was probably related to fire intensity. Coyote willow naturally spreads rapidly on the refuge. We can control this spread with fall fires or encourage it with winter/spring fires.

FIRE MANAGEMENT STRATEGIES

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

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

The Blitzen Valley Management Plan proposes the use of prescribed burning as a treatment on 3,000-6,000 acres per year to treat marshes, meadows, and selected uplands. The Double O Plan includes additional treatment areas. Total acres treated by fire may have to be reduced due to the increased amount of perennial pepperweed on the refuge in recent years. Burning tends to favor this non-native pest plant unless it is used in conjunction with a herbicide. The high cost of the herbicides and the additional cost of application prohibits burning too many acres each year. Areas of the refuge void of pepperweed will not be affected by this restriction. Fifteen to twenty thousand acres could be burned annually at Malheur when the pepperweed problem is solved.

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

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

The FMO is responsible for prescribed fire planning. The Prescribed Fire Specialist will implement and assist in the overall planning on the refuge.

Annual Activities

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

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

Refuge specialists (biologists, irrigators, etc.) provide habitat objectives for each burn. General prescribed burn fire prescriptions are developed by fuel model and time of year for the entire refuge. Specific fire objectives, site preparation, ignition techniques, smoke management, safety hazards, and other considerations are added to each prescription. A detailed map is then generated to reflect the site-specific prescription. Pre-burn monitoring information is collected. There are more than 100 potential areas to be burned for a variety of reasons and each prescription is developed the year the burn is to occur. These prescriptions are kept on file for future reference if the burn is to be duplicated.

Generally habitat is burned annually on Malheur Refuge using the following percentages. Specifically uplands (14% of total acres burned) will be burned to improve nesting cover. Meadows (50%) are burned to also enhance nesting cover, enable maintenance projects, maintain vigorous vegetation, and provide feeding habitat for wildlife. Emergent marshes and ponds (35%) will be burned to enhance waterfowl pairing/brood habitat, maintain open water, and facilitate maintenance. Riparian areas (1%) are burned to a limited extent to maintain water delivery and for research. These percentages will vary in each FMU from year to year, but overall the burns will total close to these percentages of habitat. Most of the Rx burns are in meadows and marsh with a little upland and very little riparian habitat burned.

Prescribed Burn Plan

The Prescribed Burn Boss will conduct a field reconnaissance of the proposed burn location with the FMO, AFMO, PFS, biologist, archeologist, and Refuge Manager to discuss objectives, special concerns, and gather all necessary information to write the burn plan. After completing the reconnaissance, the Prescribed Burn Boss will develop a plan and schedule to accomplish the agreed to objectives. 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 O. Each burn plan will be reviewed by the Refuge Manager, biologist, archaeologist, FMO/AFMO, PFS, and Burn Boss. All burn plans can be approved at the Refuge Manager level. The term Aburn unit@ refers to a specific tract of land to which a prescribed burn plan applies.

Strategies and Personnel

Prescribed burning at Malheur Refuge is generally limited to the period when most native plant species are in dormancy to accomplish habitat objectives. Thus most burns are planned and accomplished when safe burning conditions exist. This is generally after the first snow and before the spring irrigation season begins (October to March).

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

Weather and fuel moisture conditions must be monitored closely in planned burn units to determine when the prescription criteria are met. Fuel moisture samples of dead and live plants may be monitored each week and percent moisture contents figured to help determine when the prescription criteria are met.

See Rx Plan Checklist and Go/No Go Checklist in Appendix O.

When all prescription criteria are within the acceptable range, the Prescribed Burn Boss 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.

Contingency resources MUST be specified in each burn plan prior to approval and implementation.

Complexity

Malheur Refuge prescribed burns vary from medium low complexity (150) to high complexity (300). Most marsh burns are simple and have well defined firebreaks using water or roads to contain the fire. Ignition is straight forward involving several lighters using drip torches, terra-torches, or ATV mounted torches and a backing or ring fire technique.

More complex burns involve strip-head fire lighting techniques and may need coordinated timing of separate burn teams to do the burn properly. Proximity to structures, highways, private lands and resources may add even more complications. The burns sometimes need to be black-lined at night or under cool, wet conditions prior to the actual burn. Large hose lays over one-half miles long may be needed in areas where vehicle access is not possible. Additional personnel and equipment is then required to conduct a safe burn.

Weather conditions affected by local topography and resulting local winds need to be factored into a plan. In the South Blitzen Valley, for example, a down-canyon/up-canyon wind shift occurs in the afternoon around 1-2 pm. Ignition patterns need to take that into consideration and be prepared for it.

Dense marsh vegetation and soft ground makes lighting in some units dangerous. Pen flares, flare pistols, and other devices may need to be used to get these units burning safely. Some units may have a 10 mile long boundary which makes holding difficult unless the burn team size is increased greatly.

Peat (organic) soils also present a challenge. Peat fires burn underground and may pop up on the wrong side of a fire break. They may also decide to burn for months or even years unless there is a capability to deep flood the burn unit. Peat soils are prevalent throughout the refuge and may only burn under certain conditions when the unit is dry. If the plan is to burn a peat unit to create deep open water in a marsh, there must be the ability to flood the unit rapidly in case the fire refuses to go out on its own. Even if the fire itself is in no danger of leaving the unit, the resulting smoke may not be a wanted addition to the adjacent highway, ranch house, or airshed. Non-native plants must also be considered for each burn unit. Does the refuge have the time and money to eradicate an invader after a prescribed burn if the burn stimulates the non-native?

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.

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.

During prescribed burning, monitoring should include mapping, weather, site and fuel measurements and direct observation of fire characteristics such as flame length, rate of spread and fire intensity. Operational monitoring provides a check to insure that the fire remains in prescription and serves as a basis for evaluation and comparison of management actions in response to measured, changing fire conditions, and changes such as fuel conditions and species composition.

All fires may be monitored regardless of size. The FMO will establish specific fire information guidelines for each fire to update intelligence about the fire. Highest priority for monitoring will be assigned to large fires or fires which threaten to leave the refuge.

The prescribed burning monitoring program involves five basic steps as follows:

1. Complete Rx burn plan (this identifies purpose, dates, prescriptions, etc. and is filed as part of the annual burn plan).
2. Establish pre-burn data collection procedure (this depends upon objectives, vegetation types, etc.).
(See the example of Nesting Habitat Monitoring Forms in Appendix H.)
3. Monitor actual burn conditions and document on post burn report.
4. Collect post burn vegetation and/or wildlife data by duplicating pre-burn collection procedures.
5. Analyze and write up burning effects and results.

Monitoring data is being coupled with research efforts from the National Ecology Research Center to determine burning intensities, frequencies, and season for proper burning of upland and willow riparian habitat types. However, we currently feel that periodic burning of uplands, with 3-5 years of idle treatment, is optimum for maintaining nesting cover.

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 Fire Analysis Committee 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 Manager. 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.

Informal critiques are conducted at the conclusion of a prescribed burn by the burn boss and crew. Questions such as, “What went well; What didn’t?” are discussed as well as, “What could we do to do it better next time?”.

(The “Critique of Burn”, “Post Burn Monitoring”, and “Follow-Up Evaluation” forms included in every Prescribed Burn Plan are in the Appendix I.)

AIR QUALITY / SMOKE MANAGEMENT GUIDELINES

Portions of the refuge and/or roads on or near the refuge may be closed when visibility problems arise from smoke from a wildland or Rx fire. State and local law enforcement agencies are notified to assist with this process. Normally, smoke is not a problem in this part of Eastern Oregon where population densities are low. The Pine Springs Complex large wildfire of August, 1990 did create a smoke problem in the Burns/Hines area, but nothing could be done about it until the fire was extinguished. There are no agencies restricting agricultural or wildland prescribed burning in our county.

In the late 1990's DEQ monitored air quality in the Harney Basin. As of 2001 no new restrictions have been imposed on prescribed burning on Malheur Refuge. There are no large populated centers near the refuge as well as no airports, major highways, or other areas that could be impacted by smoke from a prescribed fire on the refuge. Smoke could impact the seldom traveled Highway 205 or a neighboring ranch house. Burn plans are designed to keep smoke off the highways near the refuge. Burn days are chosen when the air is unstable and the smoke tends to rise up to a higher altitude before it levels off or gets blown away by the transport winds.

Peat fires in refuge marshes are a major cause of concern. In 1989 an escaped Rx burn in the West Swamp unit adjacent to Highway 205 in the Blitzen Valley caused limited visibility for a month or so until the unit could be flooded and the fire extinguished.

Smoke management on wildland fires could become a hazard along Highway 205. The Harney County Sheriff's office (573-6156) and Oregon State Police (573-2188) should be notified for traffic control if smoke management could become a problem.

FIRE RESEARCH

There are no current fire research projects on Malheur Refuge. In the past various fire related studies have been conducted on Malheur Refuge including:

Britton, C. M. and R. G. Clark. 1977. Evaluating Prescribed Burns. Texas Tech University.

Johnson, D. N. 1986. Objectives and Strategies for Developing a Habitat Management Plan: Malheur National Wildlife Refuge. David N. Johnson.

Laws, M. S. 1999. Control of *Lepidium latifolia* and Restoration of Native Grasses. MS thesis. Oregon State University 34 p.

Strassmann, B. I. 1987. Effects of Cattle Grazing and Haying on Wildlife Conservation at National Wildlife Refuges in the United States. Environmental Management, Vol. 11(1), pp. 35-44.

Toepel, K. A. and R. Minor. 1983. Cultural Resources Survey of the Eagles Nest Burn, Malheur National Wildlife Refuge, Harney Co., Oregon. Heritage Research Associates Report No. 24.

Young, Richard Paul. 1986. Fire Ecology and Management in Plant Communities of Malheur National Wildlife Refuge, Southeastern Oregon. Ph. D. dissertation, Oregon State University 183 p.

There is no mechanism in place to fund fire research from annual fire monies. The Department of Interior Fire Coordinating Committee Fire Research Initiative is included in Appendix P.

PUBLIC SAFETY

Malheur Refuge is dedicated to ensuring the safety of each visitor and to all residents and property adjacent to the refuge's boundary. During wildland and prescribed burns where smoke may cause a visibility or other safety problem, refuge roads are closed to the public. This enables firefighting equipment and personnel to access the fire and keeps the general public from dangerous situations.

Areas of fire activity will be clearly signed at visitor centers and bulletin boards. Smoke caution signs are placed on State Highway 205, county, and refuge roads during prescribed burns to warn motorists of possible visibility hazards. Residents adjacent to the refuge will be notified in advance of any prescribed burn and if any fire poses a threat to burn outside the refuge boundaries. A list of refuge neighbors and their phone numbers is in the Fire Dispatch Plan. (Appendix D)

During prescribed burns at least one burn team member will have first aid training. A first aid kit will be on-site for prescribed burns as well as wildland fires. The local police, fire, and emergency medical services will be notified prior to the ignition of any prescribed burn. They will also be notified of the location of any wildland fires.

PUBLIC INFORMATION AND EDUCATION

Educating the public on the value of fire as a natural process is important to increasing public understanding and support for the fire management program. The refuge will use the most appropriate and effective means to explain the overall fire and smoke management program. This may include supplemental handouts, signing, personal contacts, auto tour routes, or media releases. When deemed necessary, interpretive presentations will address the fire management program and explain the role of fire in the environment.

The public information program will be developed as follows:

1. Concepts of the prescribed burn program will be incorporated, as appropriate, in publications, brochures, and handouts.
2. Fire related games and activities will be used with school-aged children environmental education programs.
3. The fire management program may be incorporated into visitor contacts. Particular attention will be given when fires are conspicuous from roads or visitor use areas.
4. News releases will be distributed to the media as appropriate.
5. The public information outlets of neighboring and cooperating agencies and the regional office will be provided with all fire management information.
6. The fire management program will be discussed in informal talks with all employees, volunteers, residents, and neighbors.

Prior to the lighting of any planned ignition, information will be made available to visitors, local residents, and/or the press about what is scheduled to happen and why. On-site information will be provided to alleviate visitor concern about the apparent destruction of resources by fire or the impairment of views due to temporary smoke. This information will include prescribed burn objectives and control techniques, current fire location and behavior, effects caused by the fire, impacts on private and public facilities and services, and restrictions and closures.

As outlined in the prevention section, emergency closures or restrictions may become necessary during periods of extreme or extended fire danger.

FIRE CRITIQUES AND ANNUAL PLAN REVIEW

FIRE CRITIQUES

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

ANNUAL FIRE SUMMARY (END OF YEAR) REPORT

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

ANNUAL FIRE MANAGEMENT PLAN REVIEW

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

CONSULTATION AND COORDINATION

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

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

Jonathan Manski, Burns Interagency Communication Center Manager, Burns BLM, Burns, OR.

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Russ Truman, AFMO, Fuels, Fire Planning, USFS, Hines, OR

Rick Roy, Wildlife Biologist, Malheur NWR, Princeton, OR.

Meg Laws, Wildlife Biologist, Malheur NWR, Princeton, OR.

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APPENDIX B: DEFINITIONS

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

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

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

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

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

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: INTERAGENCY AGREEMENTS

APPENDIX D: MALHEUR REFUGE FIRE DISPATCH PLAN

APPENDIX E: FIRE EFFECTS TABLE

APPENDIX F: MALHEUR FIRE HISTORY TABLES

APPENDIX G: BIFZ STEP-UP PLAN

APPENDIX H: NESTING MONITORING FORMS

APPENDIX I: RX CRITIQUE AND MONITORING FORMS

APPENDIX J: WILDFIRE SITUATION ANALYSIS WORKSHEET

APPENDIX K: MALHEUR REFUGE FUELS MAP

APPENDIX L: MALHEUR REFUGE FIRE RESPONSE TABLE

APPENDIX M: FIRE DAMAGE POTENTIAL MAP

APPENDIX N: REFUGE MANAGEMENT PLANS W/ NEPA DOCUMENTS

APPENDIX O: SAMPLE RX BURN PLAN W/CHECKLISTS

APPENDIX P: FIRE RESEARCH INITIATION

APPENDIX Q: RESOURCES OF CONCERN

APPENDIX R: FIRE EQUIPMENT AND FACILITIES NEEDS

APPENDIX S: SAMPLE FIRE REPORTS

APPENDIX T: VICINITY MAP

APPENDIX U: MALHEUR FIRE ZONE ORGANIZATION CHART

APPENDIX V: LAND BASED FIRE PROGRAM NEEDS

APPENDIX W: REQUEST FOR CULTURAL RESOURCE COMPLIANCE
REQUEST FOR CULTURAL RESOURCE COMPLIANCE
U.S. Fish and Wildlife Service, Region 1

Project Name:				Program: (Partners, Refuges, JITW, WSECP, etc.)	
State: CA, ID, HI, NV, OR, WA		EcoRegion: CBE, IPE, KCE, NCE		FWS Unit: Org Code:	
Project Location:	County	Township	Range	S e c t i o n	FWS Contact: Name, Tel#, Address
USGS Quad:				Date of Request:	
Total project acres/linear ft/m:		APE Acres / linear ft/m (if different)		Proposed Project Start Date:	
MAPS Attached		Check below			
Copy of portion of USGS Quad with project area marked clearly (required)				Project (sketch) map showing Area of Potential Effect with locations of specific ground altering activities (required)	
Photocopy of aerial photo showing location (if available)				Any other project plans, photographs, or drawings that may help CRT in making determination (if available)	
Directions to Project: (if not obvious)					
Description of Undertaking:	Describe proposed project and means to facilitate (e.g., provide funds to revegetate 1 mile of riparian habitat, restore 250 acres of seasonal wetlands, and construct a 5-acre permanent pond). How is the project designed (e.g., install 2 miles of fence and create approximately 25' of 3' high check dam)?				

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