DEPARTMENT OF THE INTERIOR

ENVIRONMENTAL ASSESSMENT

FOR

PRESCRIBED FIRE

IN THE PANHANDLE SECTION

CRATER LAKE NATIONAL PARK

OREGON

Prepared by
Crater Lake National Park

_____ 1976
Date

_____
Regional Director
Pacific Northwest Region

Table of Contents

I. Statement of the Problem 1

1. Map of the Ponderosa Pine Study Area 2
2. Summary of Prescribed Burning Plans 3

II. Specific Effects of Prescribed Burns on Wildlife Habitats and Populations 4

III. Determination and Approval by Regional Director 7

IV. Management Options 8
A. Suppress All Man-Caused And Natural Fires 8
B. Restore Natural Fire 8
C. Remove Understory Trees and Prepare Seedbed Mechanically 8
D. Conduct Prescribed Fires in Selected Areas 8

V. Description of the Environment 9
A. General Description 9
B. Geology 9
C. Soils 10
D. Climate 10
E. Wildlife 11
F. Park Vegetation 11

1. Ponderosa Pine Zone 11
2. Lodgepole Pine Zone 11
3. Pumice Desert 12
4. Mountain Hemlock Zone 12
5. Whitebark Pine Zone 12

G. Cultural Resources 12
H. Visitor Use 13
I. Socioeconomic Environment 13

VI. Management Actions Considered 14
A. Suppress All Man-Caused And Natural Fires 14
B. Restore Natural Fire 15
C. Remove Understory Trees and Prepare Seedbed Mechanically 16
D. Conduct Prescribed Fires in Selected Areas 17

VII. Literature Cited 19-20

I. STATEMENT OF THE PROBLEM

Purpose: This environmental assessment is part of a resources management program to manage the biotic resources of the park for the purpose of perpetuating the indigenous plant and animal associations. Another purpose is to help clarify what specific managment procedures are needed if examples of coniferous forest ecosystems of the southern Cascades are to be preserved in any semblance of a natural condition.

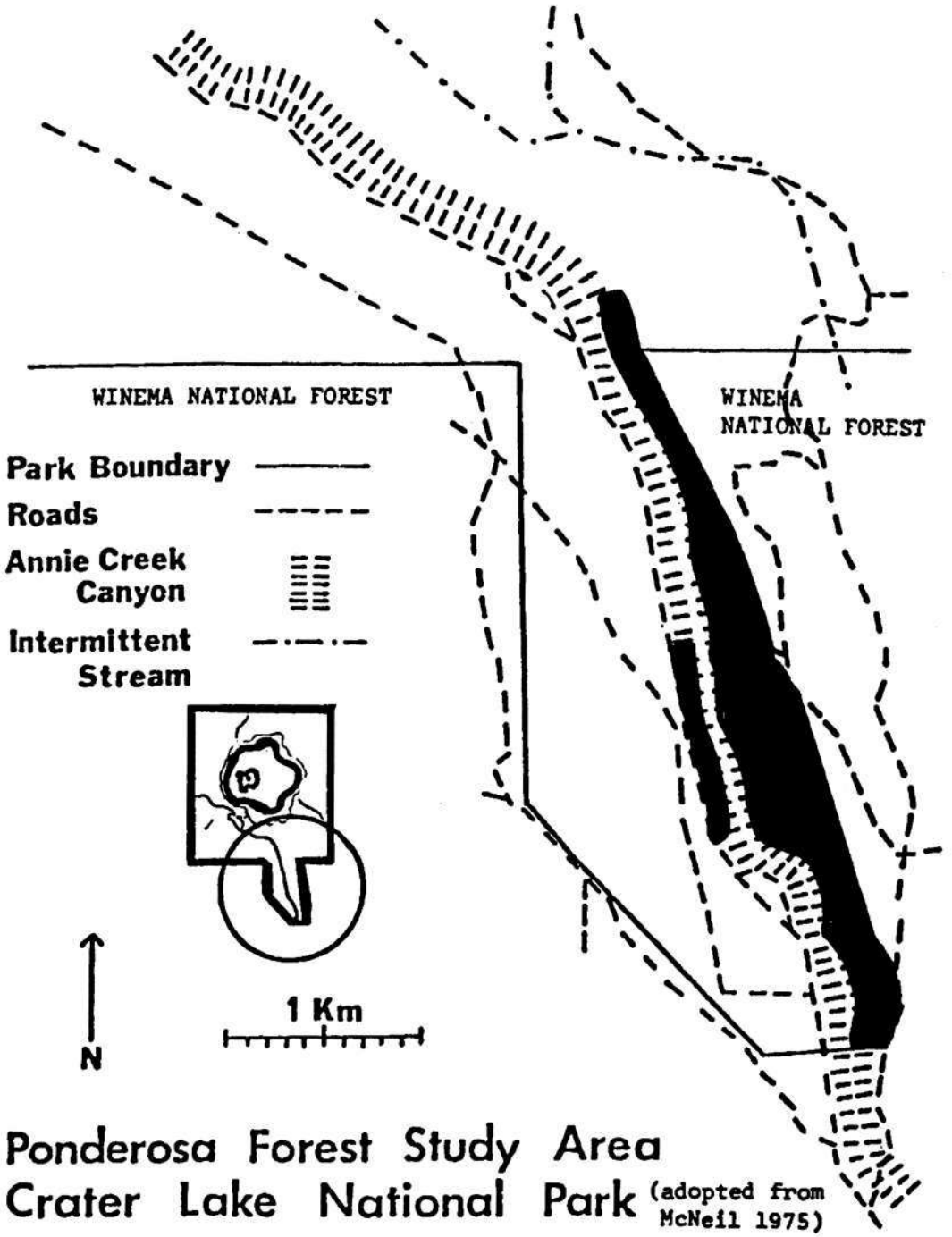
Crater Lake National Park was established on May 22, 1902, as a "Public park or pleasure ground for the benefit of the people of the United States..." In 1932, 973 acres along the east and west side of Annie Creek Canyon, now called the panhandle section, was obtained from Crater National Forest to secure a more attractive park entrance.

The one salient feature of the park's panhandle section is the old-growth ponderosa pines (Pinus ponderosa). However, under past fire exclusion policy, true firs (Abies) have increased in density in the understory. True firs, such as the white fir (A. concolor), not only can reproduce beneath their own shade, but their seedlings can establish themselves on thick litter. In addition, fuel accumulations are increasing the danger of catastrophic wildfire; fires which can crown-out within the ponderosa pine canopies.

Since similar successional trends have been documented elsewhere in ponderosa pine and other shade-intolerant conifers (Weaver 1957), there is little doubt that ponderosa pines will no longer dominate the site under a fire exclusion policy due to the more aggressive true firs. Past fire frequencies and vegetation dynamics have been studied within the panhandle section (McNeil 1975). The fire history has been documented through tree wedges taken from fire-scarred ponderosa pines; habitat types have been define . Prescribed burning management has been recommended from this research. The primary objective is to restore the natural role of fire to reestablish the original vegetation composition which existed prior to the impacts of Western Man. Old photos show the park's early ponderosa pine forests were open with understories of several species including Ceanothus and manzanita (Arctostaphylos).

Much of Crater Lake National Park is administered as a natural area; the primary resource management objective of the National Park Service is "to maintain an area's ecosystem in as nearly pristine a condition as possible". The ideal objective is to restore the land and its biota to that which would exist without man's influence.

The past policy of suppression of all fires was understandable since fire's natural role was neither appreciated nor understood. However, now that there is better understanding of fire's role in natural systems, a change in management action is most appropriate.



Ponderosa Forest Study Area
Crater Lake National Park (adopted from McNeil 1975)

A park policy of letting lightning fires burn is only practical and applicable for areas largely devoid of fuels such as those surrounding the caldera rim. Any fire management plan in the national park must assure visitor safety, protect developments, and insure safety of lands outside the park. Prescribed fire used under safe burning conditions with careful planning and preparation should be successful in meeting ecological objectives.

2. Summary of Prescribed Burning Plans

Prescribed fires in the panhandle section will be in 10 to 20 ha plots. Firelines have been constructed around these plots where natural barriers such as Annie Creek or man-made ones such as roads do not exist. A 20-man U. S. Forest Service suppression team has built the firelines and they and their fire suppression equipment will be available during the burns.

Test burns to date have totalled only six acres and have provided the opportunity to observe fire behavior and effects in fuel types typical of the park's ponderosa pine forest.

Vegetation changes in the burn plots will be studied through inventories of permanent vegetation plots. These data will be significant in interpreting the actual results of the prescribed burns in the ponderosa pine forest. Additional periodic inventories in future years will yield data indicating whether the objectives of prescribed burning are being achieved.

Soil samples collected from both burned and unburned plots will be analyzed for nutrients. Such a comparison will be useful in understanding nutrient recycling and its affects on plant growth.

Because the burn plots are relatively small, correlations between any wildlife observations and the results of prescribed fire may be limited. However, several investigations suggest burning improved habitat for birds and mammals associated with the early stages of plant succession; generally the effects of such small burn plots on wildlife will be minimal.

II. SPECIFIC EFFECTS OF PRESCRIBED BURNS ON WILDLIFE HABITATS AND POPULATIONS

It is difficult to generalize about the effects of fire on the numbers and kinds of birds and mammals found within a given habitat type (Bendell 1974). Plant and animal responses to fire vary because fires differ in intensity, frequency, location, duration, shape and extent (Bendell 1974). Fires' effects may vary with fuel size, its moisture content, density or arrangement; and with the seasonal and daily weather patterns (Cushwa and Martion 1969, Bendell 1974). Furthermore, because of only recent use of prescribed burning as a management tool, most of the fire ecology literature and hence the information contained in this report, deal only with wildfire effects. There is a paucity of information on the specific effects of prescribed burning on wildlife habitat and populations (Cushwa and Martin 1969).

According to Farner (1952) birds common to the Ponderosa pine forests of Crater Lake National Park include: Common Flicker (Colaptes auratus), Williamson's Sapsucker (Sphyrapicus thyroideus), Hairy Woodpecker (Dendrocopos villosus), Hammond's Flycatcher (Empidonax hammondii), Stellar's Jay (Cyanocitta stelleri), Mountain Chickadee (Parus gambeli), Red-breasted Nuthatch (Sitta canadensis), American Robin (Turdus migratorius), Mountain Bluebird (Sialia currucoides), Yellow-rumped Warbler (Dendroica coronata), Western Tanager (Piranga ludoviciana), Dark-eyed Junco (Junco hyemalis), Fox Sparrow (Passerella iliaca), Red Crossbill (Loxia curvirostra), Evening Grosbeak (Hesperiphona vespertina), Hermit Thrust (Hylocichla guttata), Nashville Warbler (Vermivora ruficapilla), Gray Flycatcher (Empidonax wrightii), and Western Wood Pewee (Contopus sordidulus).

Wallis (1947) reports the mammals common in Crater Lake's Ponderosa pine forest include: shrew-mole (Neurotrichus gibbsi), vagrant shrew (Sorex vagrans), black bear (Ursus americanus), badger (Taxidea taxus), golden mantled squirrel (Citellus lateralis), yellow pine chipmunk (Eutamias amoenus), chickaree (Tamiascirus douglasi), northern flying squirrel (Glaucomys sabrinus), deer mouse (Peromyscus maniculatus), richardson vole (Microtus richardsoni), aplodontia (Aplodontia Ruta), porcupine (Erethizon dorsatum), mule deer (Odocoileus hemionus), and elk (Cervus canadensis).

Several investigators (Hakala et.al. 1971, fide Bendell 1974; Howard et.al. 1959, fide Bendell 1974; Komarek 1969, fide Bendell 1974; Vogl 1973, fide Bendell 1974) maintain direct mortality caused by fire is negligible. However, burning does significantly affect wildlife by changing vegetation structure and altering microclimates (Bendell 1974).

Burned land generally experiences higher maximum and lower minimum temperatures than unburned land (Bendell 1974). Redback voles (Clethrionomys), which inhabit the ponderosa pine forest, abruptly disappear after fire; increased daily temperature apparently cause their decline (Ahlgren 1966, fide Bendell 1974; Beck and Vogel 1972, fide Bendell 1974).

Burned plots show wider flucuations in humidity and are drier during the day than unburned plots (Bendell 1974). Soil moisture and humidity may determine the local distribution and range of birds and mammals (Henderson 1971, fide Bendell 1974; Pruit 1953, fide Bendell 1974; Salt 1952, fide Bendell 1974). Blue Grouse prefer the dry open burns during the summer, while Ruffed Grouse inhabit wet areas of burns (Bendell 1974).

The wind may increase in frequency and velocity through burned plots making the area cooler and better for some birds (Stoddard 1962, fide Bendell 1974) and too cold for some others (Bendell 1974).

The winter survival of many northern birds and mammals depends upon the appropriate snow conditions (Pruitt 1959, fide Bendell 1974). When a forest is burned wildlife may find the snow favorable or unfavorable. When trees are removed by burning, deeper snow, alternate crusting and thawing,and a shorter duration of snow cover may result (Bendell 1974). Deep snow and little crust immobilized deer in British Columbia and excluded them from food supplies (Edwards 1956, fide Bendell 1974). Grouse, on the otherhand, prefer deep snow to burrow into for roosting and escaping from the cold and predators (Bendell 1974).

The greatest change by fire affecting wildlife is the change in the structure of vegetation (Bendell 1974). Cushwa and Martin (1969) report millions of acres of Coastal Plain forest are intentionally burned annually for one or more of the following reasons: (a) to reduce wildlife hazard by fuel removal, (b) to dispose of slash and prepare seedbeds, (c) to increase the quality and quantity of native cattle forage and (d) to improve wildlife habitat.

Bendell (1974) maintains that although for some species vegetation structure may be a limiting factor, for others a number of factors such as the structure of vegetation, temperature, humidity and wind all interact to either encourage or discourage wildlife.

Data compiled by Bendell (1974) from several studies of small bird communities of different habitats indicates fire results in a slightly richer avifauna. Most breeding species of birds remain after a forest fire (Bendell 1974). Only a few species disappear; the greatest loss being from foragers of the tree trunk and canopy (Bendell 1974). More new species enter the area; the greatest gain being among those birds that feed on the ground, perhaps due to the growth of grasses, herbs and shrubs after burning (Bendell 1974). Data compiled on several small mammal communities reveal there is little change in the total number of species after their habitat is burned (Bendell 1974). 85% of the small bird populations and 75% of the small mammal populations showed either no change or increased in density (Bendell 1974).

In summary, the effects of prescribed burning on wildlife habitat and populations in ponderosa pine forests is not really known. However, several studies suggest that burning probably improves habitat for birds and mammals associated with the early stages of succession, but on the whole wildlife populations show a high degree of stability.

III. DETERMINATION

It is our conclusion that option "D", Conduct Prescribed Fires In Selected Areas, should be implemented to properly manage the panhandle section. This management decision is in accordance with the Management Policies for Natural Areas in the National Park System. The size of the prescribed burn plots will be between 25 and 50 acres or less. Because the plot size is small, we have further determined that the proposed activity is not a major federal action which significantly affects the quality of the human environment; thus, an environmental impact statement will not be prepared.

Date:_____ Approved:_____
Regional Director
Pacific Northwest Region

Prescribed Burning Objectives:

1. To perpetuate the indigenous plant and animal associations in the panhandle section.

2. To initiate the return of fire to as natural a role as possible in portions of the park where lightning fires can not be allowed to run their course.

3. To serve as demonstration areas where park visitors can observe biotic succession following fire and weigh the merits and disadvantages of returning fire to park ecosystems.

4. To serve as research areas where a better understanding of biotic succession following fire can be gained.

5. To provide experience in prescribed burning for National Park Service personnel, to improve their understanding of fire behavior in the area and to test the feasibility of such operations in Crater Lake National Park.

PRESCRIBED FIRES IN THE PANHANDLE SECTION OF CRATER LAKE NATIONAL PARK, OREGON

IV. FOUR MANAGEMENT OPTIONS EXIST FOR THE PONDEROSA PINE FOREST LOCATED IN THE PARK'S PANHANDLE SECTION:

A. Suppress All Man-Caused And Natural Fires

Forest succession in the ponderosa pine stand will be permitted to continue as is under fire exclusion. Since ponderosa pine cannot perpetuate itself beneath its own shade, true firs will eventually dominate the site. Fuels will continue to accumulate and inevitably a wildfire will occur with the results probably catastrophic.

B. Restore Natural Fire

Whenever lightning fires occur, they will be permitted to burn if proper weather conditions prevail. Because large quantities of fuels have accumulated under fire exclusion management, lightning fires may become too intense and result in catastrophic wildfires.

C. Remove Understory Trees and Prepare a Seed Bed Mechanically

Removal of the excessive understory growth by means of saws and axes and preparing a suitable seed bed for future seedlings with heavy equipment is a possible solution to the problem Time consuming and expensive, the project would also lack any semblance of natural processes at work in a National Park. The results of such large scale mechanical disturbances would be difficult to predict in advance. Also, nutrients within the finer fuels would not be released as would occur through fire.

D. Conduct Prescribed Fires of Limited Size in Selected Areas

Recent investigations of fire frequencies and vegetation dynamics within the ponderosa pine forest have revealed historic fires occuring at intervals from three to more than 50 years (McNeil 1975). Other investigators have shown ponderosa pine forests to be fire climax vegetation; that is, perpetuated by periodic fire. Ponderosa pine requires sunlight and a mineral soil seedbed to develop. It cannot survive shade or establish itself on thick forest litter. To reduce fire injury to ponderosa pine seed trees, selected true firs (less than 25 cm, dbh) will be cut close to the ground and either burned on the surface or in piles.

V. DESCRIPTION OF THE ENVIRONMENT

A. General Description

Crater Lake National Park is located in southwestern Oregon in the southern high Cascades. The area has had a long history of volcanic and glacial activity.

Approximately 6,600 years ago, Mt. Mazama underwent a tremendous eruption. The shattered summit collapsed into a cavity forming a caldera 4.5 (7.2 km) to 6 (9.6 km) miles in diameter.

The lake within the caldera is approximately 6176 ft. (1872 m) above sea level. It reaches a depth of 1932 ft. (585 m) and has a surface area of 20.5 square miles.

From the rim of the caldera, the surrounding landscape slopes gently downward toward the boundaries of the park. Two major drainages exist in the park; they are the Rogue River to the west and the Klamath River in the south and east. Each system is traversed by one or more streams originating on the sides of the caldera. A number of these form steep-walled pumice canyons.

Wilderness designation has been recommended for 122,400 of the 160,290 acres (48,960 of the 64,116 ha) within Crater Lake National Park. The National Park Service is now managing the areas recommended for wilderness in accordance with guidelines contained in the Wilderness Act of September 3, 1964. Prohibited uses are set forth in Section 4(c) of the Wilderness Act:

> "Except as specifically provided for in this Act, and subject to existing private rights, there shall be no commercial enterprise and no permanent road within any wilderness area designated by this Act and, except as necessary to meet minimum requirements for the administration of the area for the purpose of this Act (including measures required in emergencies involving the health and safety of persons within the area), there shall be no temporary road, no use of motor vehicles, motorized equipment or motor boats, no landing aircraft, no other form of mechanical transport and no structure or installation within any such area."

B. Geology

With the exception of small areas of glacial deposits, Crater Lake National Park is underlain by volcanic rocks of Tertiary and Quarternary age.

The principal rock types of the area are andesitic lava flows, basaltic lava flows, and pumiceous volcanic flow breccias and tuffs largely of dacitic and andesitic composition. The andesitic lava flows are the most common rocks in the park. Sometimes they are interstratified with flows of dacite and glacial debris.

The rock units are: (1) the pre-Mazama lavas, (2) lava flows, pyroclastic materials, and cinder cones and (3) airborne and flow pumice. The pre-Mazama lavas consist of poorly permeable olivine and basaltic andesite. The lava flows, pyroclastic materials and cinder cones consist of ejecta from ancestral Mount Mazama and are of andesitic, dacitic,and basaltic composition. The airborne and flow pumice consists of dacitic materials, including some semiconsolidated materials and forms a mantle on the slopes and plains.

C. Soils

Little is known about the soils within the park. The major soil is thought to be the Maklak Series, consisting of excessively drained, cindery soils formed in pumiceous and scoriaceous cinders and ash. Typically, the coarse sand surface layer is dark brown, gravelly, loamy and about four inches thick. The subsurface layer is dark brown and reddish brown, very gravelly, loamy, coarse sand to depths of 60 inches or more. The soils are medium to slightly acid throughout. Cinders range from pebble to cobble size. Soil permeability is rapid and runoff is slow, resulting in little, if any, erosion problems.

Lapine soils, another major soil series, also may be found throughout the park. Typically, the surface mineral layer consists of about two inches of dark brown, gravelly, loamy, coarse sand; while the subsurface is yellowish-brown, gravelly, loamy, coarse sand 9 inches thick. Loamy, buried soils and bedrock occur at depths of from 40 to more than 70 inches. The soil ranges from medium acidic to neutral throughout.

In the panhandle section the soils are of two major groups: those derived from pumice and thosederived from alluvium from Annie Creek. Many of the pumice soils are within the Lapine Series derived from pumice fall; the Steiger Series includes pumice flow material. The A_1 and AC horizons of the Steiger and Lapine soils are similar. However, the Lapine lacks cobbles and has more gravel generally. Additional descriptions of these soils are available (McNeil 1975; Dryness and Youngberg 1964).

The high porosity of pumice soils gives them a higher water holding capacity. Pumice soil fertility is governed by organic matter and weathering rates. Nitrogen is the most limiting nutrient; phosphorous and sulpher are also limiting in contrast to potassium and calcium which are available. The alluvial material deposited after the culminating eruptions contains varying porportions of pumice, scoria.and different kinds of harder rocks. It is possible that soil properties vary over short distances, due to deposits of different materials as the stream meandered.

D. Climate

Climatic variation characterizes Crater Lake National Park. About 70% of the annual precipitation occurs from November through March. Less than 6% occurs between June through August. Practically all of the winter precipitation occurs in the form of snow; the annual average fall is over 575 inches (1,461 cm). Greater variation in the average annual precipitation totals exist within the park than there is in the northeastern United States

(Sternes 1961). The most rapid change takes place down the eastern slope of the park. The average total declines from over 65 inches at the Cascade crest to about 25 inches at the lower eastern edge.

Average monthly temperatures range from about 25 degrees F for January to about 55 degrees for July.

E. Wildlife

A wide variety of wildlife inhabits the park; some of the more commonly sighted mammals are the mule deer, black bear, red fox and golden-mantled ground squirrels. A small herd (less than 175 animals) of elk inhabits the southwestern and southeastern sections primarily during the summer months.

Over 191 species of birds have been recorded in the park. Eleven species of reptiles and amphibians occur. All the fish within the park are thought to be exotic except for the Dolly Varden trout found in Sun Creek. Kokanee salmon and rainbow trout live in Crater Lake. Park streams contain rainbow, brown and brook trout.

F. Park Vegetation

The following vegetation zones are found in the park:

1. Ponderosa Pine Zone (Pinus ponderosa)
Forests dominated by ponderosa pine cover 6,000 acres (2,400 ha) of the park and have an elevational range from 3,500 to 5,500 feet (1,061 to 1,667 m). Two different parent materials characterize various habitat types in the panhandle section. Alluvial soils are typical of the relatively dry white fir-snowberry habitat type (Abies concolor-Symphoricarpos mollis h.t.).

Pumice soils support the white fir-pipsissewa habitat type (A. concolor - Chimaphila umbellata h.t.). Douglas-fir forest dominates on more mesic sites and special topographic aspects along both slopes of Annie Creek, Occasional sugar pine occurs as an associate of ponderosa pine and represents a late seral species within the community. Under fire exclusion policy, true firs (white and grand fir including hybrids) are becoming very numerous beneath the ponderosa canopy.

Typical understory vegetation in the ponderosa pine forest is composed of ceanothus, manzanita, bittercherry and willows. Ceanothus seeds remain viable in the soil for long periods and germination response takes place following fire; it is also a nitrogen-fixer and improves the fertility status of typically deficient pumice soils.

2. Lodgepole Pine Zone (Pinus contorta)

Over 100 square miles of the park represents lodgepole pine forest. Typically, an agressive seral species throughout much of the west, lodgepole pine does occur in climax stands on certain pumice and poorly drained

substrates. Recent research along the park's east boundary has defined several ponderosa and lodgepole pine communities (Volland 1976). Several types exist along the west slopes of the Cascades. One type of lodgepole pine community has a depauperate understory; another has pinemat manzanita as the sole understory species; whereas another type is seral with a dense invasion of true fire and/or mountain hemlock. A current study in the park emphasizes past fire frequencies within lodgepole pine as well as community identification and mapping (Zobel and Ziegler 1976).

3. The Pumice Desert

The Pumice Desert consists of 5.5 square miles of only sparsely scattered lodgepole pines and scant herbaceous growth. Of the 14 species found within this area, lodgepole pine is the only woody species. An ecological study revealed soil moisture in the Pumice Desert not to be a limiting factor in plant growth. However, nutrient deficiences, especially of nitrogen and sulfur, inhibit growth (Mueller 1966). Other open meadow types occur throughout the park's subalpine zone. These pumice meadow types are generally more lush and varied than Pumice Desert.

4. Mountain Hemlock Zone (Tsuga mertensiana)

Extensive forests of mountain hemlock occur in the park, between 5,500 and 7,000 feet (1,667 and 2,121 m). One habitat type soon to be described is the mountain hemlock-smooth woodrush h.t. (Tsuga mertensiana - Luzula hitchcockii h.t.). This habitat type pattern is repeated throughout the landscape mosiac (especially along the south and west subalpine zones). True firs (Shasta red and noble fir including hybrids) occur in association with mountain hemlock. Among the subalpine meadows, this species forms colonies with some whitebark pine; the only understory plant is smooth woodrush.

5. Whitebark Pine Zone (Pinus albicaulis)

The highest habitats within the park are wooded with whitebark pine, a species with the greatest longevity of any park conifer. Pure stands form open forests on Cloudcap and Mt. Scott between 7,500 and 9,000 feet (2,273 and 2,727 m). The growing season is shortest within this zone and recovery from disturbance would require the greatest time. Whitebark pine is interrelated with the Clark's nutcracker whose depredations upon its cone crop not only open the seed cones, but also consume most of the supply. Lightning fires are restricted to a few or individual trees and are never extensive due to the scarcity to fuels. A "let burn" designation for this highest forest is appropriate; its extent in the park is only 550 acres (220 ha).

G. Cultural Resources

The "National Register of Historic Places" (Federal Register of February 4, 1974, and monthly supplements) was consulted. Crater Lake Lodge, a concession facility located at Rim Village, is the only site in the park which is listed. The State Historic Preservation Officer was contacted in September, 1974, in regard to the master plan study. He reported that other than the lodge building, no sites or properties within the park were currently being considered for the National Register.

An archeological survey of the park was completed by Oregon State University in 1963. The survey located no significant archeological sites or properties in the park.

H. Visitor Use

Crater Lake National Park is principally a day-use area with sightseeing being the major activity. In 1974, annual visitation totaled 525,030, roughly 2.9 percent less than was recorded in 1973. Approximately 75 percent of the visitation occurs from Memorial Day to Labor Day. Eighty-five percent of the visitors remain in the park less than 8 hours and 65 percent of these less than 4 hours. Seventy-five percent of the visitation occurs during a 5-hour period between 10 a.m. and 3 p.m.

Winter visitation consists primarily of local residents, with sightseeing being the major attraction. Roads up to the Rim Village are maintained throughout the winter. However, only the west and south entrances remain open. The cafeteria at Rim Village is also kept open during weekends in the winter.

I. Socioeconomic Environment

Nearly all the land adjacent to the park is national forest: Rogue River National Forest to the west and southwest; Winema National Forest to the east and southeast; and the Deschutes National Forest to the north.

Several cities exist within a 1 1/2 to 3 hour drive of the park; Klamath Falls (population ca. 16,000), Medford (28,500), Grants Pass (12,500), Eugene (76,500), and Bend (13,800). Timber and forest products are the most important industries, economically, in the region. Agriculture is the second most important industry in the area.

Tourism and recreation-oriented activities are also important secondary industries in the region. There is an abundance of private, state and federal facilities which promote camping, fishing, and hiking.

VI. MANAGEMENT ACTIONS CONSIDERED

A. Suppress All Man-Caused And Natural Fires

All fires in the panhandle section will be extinguished as rapidly as possible.

1. Unavoidable Adverse Impacts

Continuation of total fire suppression will have the following major impacts:

a. The vegetation will progressively depart from that which existed prior to European man's fire suppression activities. The dense true fir understory will continue to severely compete with residual pines. Due to low light intensities and a thick forest litter, the germination and survival of new ponderosa and sugar pine seedlings will be minimal. Gradually these shade-intolerant conifers will become less frequent or even disappear under long term fire exclusion. Competition for soil moisture and nutrients will become more severe and may contribute to growth decline in residual ponderosa pine.

b. Since 1830, only two lightning fires have been recorded in the panhandle section (Fire Atlas, Crater Lake National Park). However, McNeil (1975) conservatively estimates the mean interval between fires before 1902 as being from 9-42 years. In 1864, 1846 and 1818, fires burned the entire 400 ha west of Annie Creek (McNeil 1975).

Forest fuels will continue to accumulate with an increased potential for future serious conflagrations. If wildfire enters the ponderosa pine forest during critical summer fire danger periods, the dense understory will act as ladder fuels into the ponderosa canopy causing severe danger.

c. Reduced habitat diversity will gradually result in decreased diversity of birds, mammals, insects and plants. Forage quality and availability will decline for large ungulate species.

d. Continued total fire suppression is expensive and involves long-term commitments of resources.

e. The concept of wilderness, where natural forces are dominant and man is only an observer, become farcical with total fire suppression.

2. Mitigating Measures

a. People have become conditioned to expect all forest fires to be extinguished as quickly as possible. There is rarely an adverse reaction from the public if the fire is controlled; only if the fire escapes does criticism ensue.

Total suppression is consistent with the promotion of an

absolute fear of fire and is regarded by some as crucial to the continued success of fire suppression programs. The concept that a burned forest may not always be a disaster and may create good habitat for wildlife is not consistent with anti-fire literature. Recognition of the natural role of fire may weaken the effect of fire prevention campaigns.

b. The short term protection of the scenic foreground along Highway 62 will be guaranteed.

B. Restore Natural Fires

All natural (e.g., lightning-caused) fires will be allowed to burn except under exceptional circumstances such as dry conditions and high winds, endangered human life, or uncontrollable spread to national forest or adjacent park lands. All man-caused fires will be extinguished.

1. Unavoidable Adverse Impacts

Allowing all natural fires to burn (except under exceptional circumstances) will have the following major impacts:

a. As it may be years before a lightning fire occurs in the panhandle section, the dense true fir understory will continue to severely compete with residual pines and forest fuels will continue to accumulate.

b. Because most natural fires occur during mid-to-late summer or in the fall, many undesirable effects could result from reliance on this means of accomplishing understory reduction and seedbed preparation after 44 years of fire exclusion policy.

Because of very dry conditions, which are typical in the area throughout the summer and fall, a fire may: burn an excessive amount of organic material and actually retard regeneration of most vegetative cover, including ponderosa pine seedlings; present a high risk of spreading upward into the ponderosa pine canopy and severely damaging or killing the trees; and cause serious damage to the somewhat fire resistant mature ponderosa pines by searing through the thick bark down to the cambium layer of the trunk.

c. As naturally occurring fires would be likely to appear during a high visitation period in the park, a reduction of the aesthetic quality of the panhandle section by smoke, a temporarily fire blackened landscape, and by the presence of Park Service personnel and vehicles would occur.

2. Mitigating Measures

a. The environmental impacts on flora and fauna from natural fires will not be severe because each fire-affected ecosystem has developed in the presence of fire over evolutionary periods of time.

The vegetative pattern created by natural fire is a mosaic, due to differential burning, creating habitat for organisms associated with the early stages of succession. The quality and quanity of ungulate forage increases after natural fire. Crude protein and phosphoric acid content increase in preferred browse species. Ground cover within the reach of deer follows fire. Certain birds such as mountain bluebirds utilize woodpecker holes in fire-killed forests.

C. Cut Understory Trees and Prepare a Seedbed Mechanically

A possible method of improving the unnatural condition in the ponderosa pine forest is to cut some understory true firs by axe or saw and to mechanically scarify the forest floor.

1. Unavoidable Adverse Impacts

a. Use of equipment to expose mineral soils for ponderosa pine seed germination could cause soil horizon disturbance including soil compaction problems. Site productivity is dependent upon the upper soil horizons; such soil disturbance will retard vegetation successional trends.

b. Removal of certain small true firs by saws would not reduce fuel loads on the forest floor or prepare the seedbed. In addition, nutrients contained within the fuels (especially foliage) would not be recycled in the manner fire would accomplish.

c. Chainsaw operation by field workers in the panhandle section would constitute a prolonged disturbance to wildlife for a portion of one summer.

2. Mitigating Measures

a. Close supervision of the field crews would be required to avoid injury to the large residual ponderosa pines which constitute the future seed source.

b. The cutting of true fir ladder fuels will greatly reduce both prescribed fire intensity and scorching of residual ponderosa pines.

D. Prescribed Burning in Selected Areas

1. Unavoidable Adverse Impacts

a. Fire lines or chemical retardants used in controlling a a prescribed burn will add an impression of artificiality to the scene. Fire lines allow soil to erode, and are areas of delayed plant succession due to removal of surface materials to mineral soil.

b. Prescribed burns in wilderness will have an effect on the wilderness aspect of the park. By using prescribed burns, park managers become gardeners rather than guardians.

c. Temporary disturbance of wildlife in the test areas can be expected. Any detrimental result of prescribed fire on wildlife would be similar to that resulting from natural fire.

d. Smoke from the prescribed fire would be visible to park visitors and may cause some temporary concern and discomfort. Smoke is an important factor causing public concern over prescribed burning.

e. Burned landscapes may not be aesthetically pleasing to some.

f. A prescribed fire could escape and damage developments or biotic communities that were not intended to be burned.

g. The concept of wilderness, where nature's forces are dominant, may be lost.

h. Fire impact on soil depends on size and intensity of fire, soil type and slope. There is usually an increase in nutrients, decrease in acidity and volatilization of nitrogen. Infiltration, runoff, and erosion are usually not significantly changed following prescribed fire. Where soils are unstable, some slumping may occur following fire.

2. Mitigating Measures

a. The variables affecting fire behavior are under the most control in prescribed fire. Often there is less smoke affecting visibility and less impact on social and economic factors.

b. The knowledge gained through prescribed fire studies is prerequisite for the proper management of the ponderosa pine forest.

c. Use of natural fire breaks such as Annie Creek Canyon, Highway 62, and other roads throughout the area would be utilized to assure both containment of prescribed fires, and fast response by fire fighting crews.

d. Fuel loads can be reduced especially around developments. Wildfire damages have decreased in areas where prescribed fires have been applied. Prescribed burns can create buffer zones around developed areas.

e. Quality and quantity of ungulate forage increases after prescribed burning. Crude protein and phosphoric acid content increase in preferred browse species. Ground cover within reach of deer follows fire.

f. Diverse habitats are created by interspersing prescribed burns with unburned areas. Some wildlife will benefit from such vegetation diversity.

g. Both informational and interpretive signing along the park road will inform park visitors of the prescribed fire objectives.

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