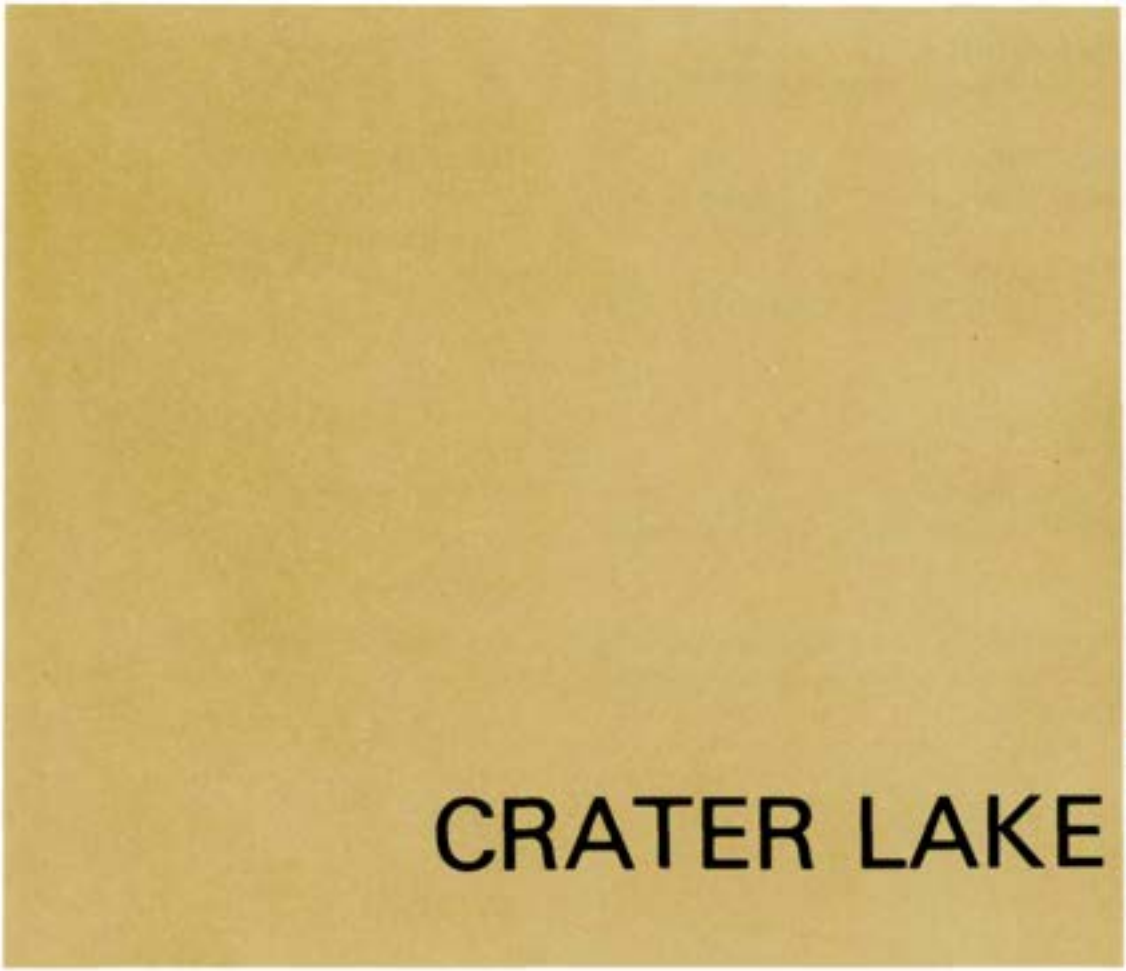
general management plan

december 1977



CRATER LAKE

NATIONAL PARK / OREGON

RECOMMENDED:

Allen D. Heubner — December 1977
Assistant Manager, Denver Service Center

CONCURRED:

Donald L. Bressler — December 1977
Associate Manager, Denver Service Center

Frank J. Betts — December 1977
Superintendent, Crater Lake National Park

Ernest J. Borgman — December 1977
General Superintendent, Klamath Falls Group Office

APPROVED:

Russell E. Dickenson — December 1977
Regional Director, Pacific Northwest Region

Individual parts of the general management plan may be approved at different times. When this occurs, separate approval pages appear at the beginning of the individual part.

United States Department of the Interior / National Park Service

GMP

general management plan

CRATER LAKE NATIONAL PARK / OREGON

GENERAL MANAGEMENT PLAN

Crater Lake National Park

CONTENTS

(Detailed contents are included at the beginning of each part of the document)

INTRODUCTION

The National Park Service has developed a general management plan to provide a rational basis for developing the best future for Crater Lake National Park which is in keeping with the intent of the establishment act for the park and which is within its own congressional mandate. The general management plan contains the long-range strategy for resource management, development, and visitor use within the park and assures awareness and compliance with a wide variety of legislative and executive requirements, management policies, and procedures. In order to ensure that park use is compatible with long-term resource conservation, the general management plan establishes general capacities for particular uses which are based upon the ability of park resources to absorb impact, the desired quality experience for park visitors, and the physical capacity of park developments.

A general management plan is dynamic, varying in complexity with the size and complexity of a given park. Its components are continually subjected to reevaluation and are revised as necessary to reflect changes in management objectives or in ecological, social, or economic conditions. As a plan is implemented, more specific proposals for actions are made. The associated plans will not always be prepared concurrently as components of the general management plan but will be consistent with one another and the statement for management.

The general management plan for Crater Lake National Park consists of the following interrelated planning documents:

STATEMENT FOR MANAGEMENT

This document defines the purpose of the park, lists constraints and influences on park management, indicates existing land uses, and gives management objectives envisioning the desired future condition of the park. The statement for management has been approved and now provides the direction for all other planning and management efforts at the park.

RESOURCES MANAGEMENT PLAN

The resources management plan for the park outlines the strategies for protecting, perpetuating, and preserving natural and cultural resources. This plan is being developed concurrently with the visitor use and general development plans to incorporate the results of recent resource investigations and to evaluate current and future resource needs and proposals.

VISITOR USE PLAN

This plan outlines strategies for interpreting park resources, for providing for visitor use and safety, and for supplying information and support services. The plan evolves, to a large extent, from the interpretive prospectus for the park (approved May, 1972).

GENERAL DEVELOPMENT PLAN

This document outlines the development necessary to accomplish the visitor use plan and the resources management plan and to obtain the conditions stated as Management Objectives in the statement for management.

SUBSIDIARY PLANS

Subsidiary implementation plans are often required within a park to deal with specific sites, subjects, or actions. As these plans are completed and approved, they become a part of the general management plan for the park. Depending upon their nature, these subsidiary plans may require further environmental analysis or environmental impact statement preparation.

statement for management

CRATER LAKE NATIONAL PARK / OREGON

STATEMENT FOR MANAGEMENT

CRATER LAKE NATIONAL PARK

Pacific Northwest Region
National Park Service

Prepared by: Frank J. Betts
Superintendent

Recommended by: Ernest J. Borgman
General Superintendent

Approved by: Edward J. Kurtz
Acting Regional Director

Date: November 8, 1977

GENERAL MANAGEMENT PLAN

Crater Lake National Park

PART I

STATEMENT FOR MANAGEMENT

ILLUSTRATIONS

STATEMENT FOR MANAGEMENT

PURPOSE OF THE PARK

Crater Lake with its encircling walls is an example of a caldera lake preserved in its natural surroundings. On May 22, 1902, President Theodore Roosevelt signed the act that established Crater Lake

". . . an area of two hundred and forty-nine square miles . . . dedicated and set apart forever as a public park or pleasure ground for the benefit of the people of the United States."

The act requires that adequate measures shall be taken for ". . . the preservation of the natural objects . . . the protection of the timber . . . the preservation of all kinds of game and fish . . ." and the use of ". . . scientists, excursionists, and pleasure seekers." (Underscoring added--see Appendix A, copy of the establishment act.)

SIGNIFICANCE OF THE PARK'S RESOURCES

Crater Lake is unique among American lakes. The "crater" is a caldera which was formed about 6,600 years ago when the top of the 12,000-foot volcano Mount Mazama collapsed (Williams, 1951). A jagged rim surrounds the lake, rises abruptly, and crests 500 to 2,000 feet above the water. From this rimmed summit, the land slopes gradually downward in all directions. Over the centuries, the caldera has collected water from rain and snow. Evaporation and seepage are now in near balance with precipitation, providing a fairly constant water level. The lake is an incomparable example of a deep, pure, and stable caldera lake. Only six lakes in the world are known to exceed the 1,932-foot depth of Crater Lake. The beauty and wonder of the lake constitutes one of the great scenic fascinations of the country. It is the deepest lake in the United States, and because of its remarkable clarity, it has been designated a national hydrological bench mark and is being studied by an increasing number of scientists.

Several ecological communities of importance exist within the park; Crater Lake, Boundary Springs on the north boundary, and Sphagnum Bog near the western boundary are the most outstanding.

Lying at the bottom of a steep-walled caldera, Crater Lake has no influent or effluent streams to provide continuing supplies of oxygen, nutrients, and large volumes of fresh water. Water entering the lake comes directly from rainfall or snowmelt and leaves by means of evaporation or seepage through fractures in the caldera wall. Man-caused pollution in any form would not be

"flushed" by water moving through the lake (Williams, 1951). Dilution of wastes, such as petroleum products and sewage, would become apparent visually because of the extreme clarity of the water.

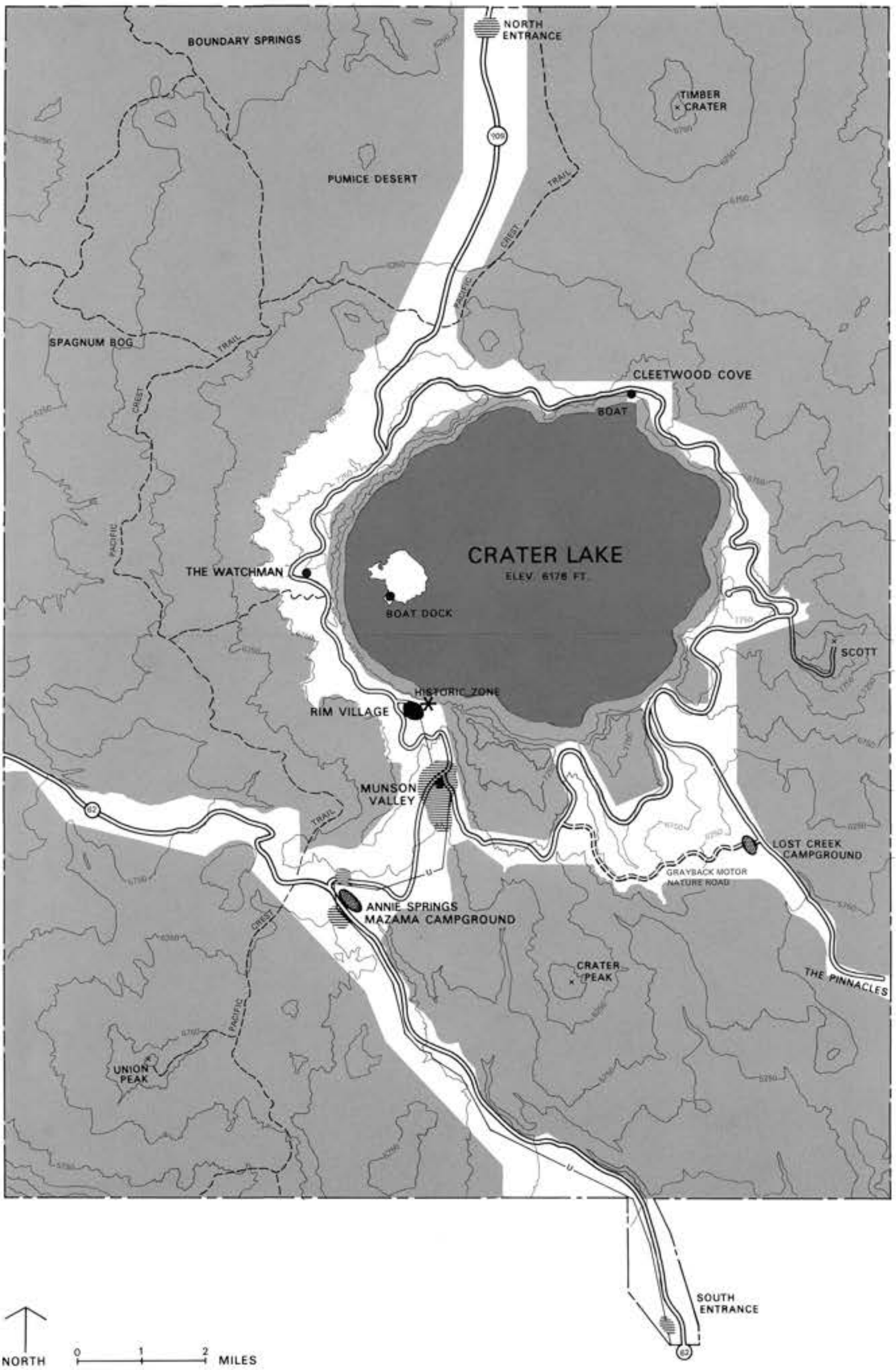
Boundary Springs is located near the isolated northwest corner of the park. This spring flows reliably in a pumice desert area where water during the summer months is scarce. Because ample water is present year-round, the area supports a delicate moss and herb flora (Applegate, 1939). Physical disturbance of these plants causes harm which can only be rectified by total protection for long periods of time. Since the spring is located within 1/8 mile of the park's boundary with the Forest Service, the Forest Service has assisted in its protection by designating a 320-acre scenic area which will not be logged.

Sphagnum Bog is fed by Crater Spring and exhibits a flora of mosses and herbs, including several species not recorded elsewhere within the park, and five species of insectivorous plants (Kezer, 1951). Sphagnum moss is dependent upon ample quantities of standing water. Disturbance or reduction of water flow from Crater Spring would cause a change in the habitat necessary for the moss to flourish. A corresponding detrimental effect would be felt by other plants found only in this location in the park. The delicate balance between these plants and their environment would be upset by increased human activity. The Forest Service has designated a scenic area of 830 acres to protect Sphagnum Bog, which is less than 1/2 mile from the park's boundary with the Forest Service.

Three forest types are dominant within the park: ponderosa pine at lower elevations, lodgepole pine extending from an elevation of from 5,500 to 6,500 feet, and mountain hemlock which is characteristic of the higher elevations. Growing throughout the park are Douglas-fir; shasta red, noble, white, and subalpine firs; and western white, whitebark, and sugar pines.

The variety of mammals found in the park are typical of the forested areas throughout the southern end of the Cascade range. The most commonly observed large animals are mule deer, Columbian black-tailed deer, and black bear. Seldom seen are the red fox, coyote, pine marten, porcupine, bobcat, and even more rarely the cougar. A small herd of approximately 160 Roosevelt elk summer in the park, with the largest concentration in the Union Peak area in the southwest corner of the park. This herd is part of a larger population on adjacent lands outside the park where hunting is allowed. Deer and elk leave the park with the arrival of fall snowstorms and are subject to hunting on adjacent lands.

The most conspicuous forms of wildlife within the park are the large populations of birds and small mammals near the parking areas



NATURAL ZONES

- WILDERNESS (Proposed)
- OUTSTANDING NATURAL FEATURE
- NATURAL ENVIRONMENT

HISTORIC ZONE

- PRESERVATION

DEVELOPMENT ZONES

- ADMINISTRATION – Headquarters, Maintenance, Visitor Contact, Residences
- VISITOR USE – Lodging, Food, General Stores, Picnic Areas, Interpretive Facilities, Boat Docks
- CAMPING – Including Related Services
- TRANSPORTATION – Paved/Unpaved Roads, Overlooks, Parking, Wayside Exhibits, Picnic Areas
- —U— UTILITY CORRIDOR

LAND USE ZONES

CRATER LAKE NATIONAL PARK / OREGON

UNITED STATES DEPARTMENT OF THE INTERIOR / NATIONAL PARK SERVICE

106	20017
DSC	DEC 77

along the rim. This includes Clark's nutcrackers, gray jays, Steller's jays, golden-mantled ground squirrels, and chipmunks.

EXISTING LAND USE (See Land Use Zones Map)

Total acreage of the park is 160,290 acres. Of this total, 159,890 acres are zoned as natural. Within this natural zone are three subzones: wilderness, outstanding natural feature, and natural subzone. The five units of the park totaling 122,400 acres which have been recommended for wilderness are identified as the wilderness subzone. The water surface of Crater Lake, an area of approximately 11,500 acres, is classed in the subzone of outstanding natural feature.

The remaining lands within the natural zone and the land on which the road system is located are in the natural subzone. This is an area of approximately 25,990 acres.

The only area in the historic zone is an area of approximately one acre on which the Crater Lake Lodge is located. The lodge is located at the eastern edge of the Rim Village complex. The lodge, which opened on July 1, 1915, has been nominated to the "National Register of Historic Places" which entitles it to protection under section 1(3) and section 2(b) of Executive Order 11593.

Five separate areas are zoned as development. These areas are:

1. Rim Village on the south rim of the caldera;

2. Munson Valley, located approximately three miles south and 600 feet below the Rim Village area;

3. Mazama Campground near the junction of the south and west entrance roads near Annie Springs;

4. Lost Creek Campground which is located in the southeastern part of the park; and

5. The maintenance area storage yard, approximately five acres, at the south end of the panhandle.

INFLUENCES ON MANAGEMENT

Legislative and Administrative Constraints

Exclusive Jurisdiction. Public Law 39 Stat. 521 of August 21, 1916, accepted exclusive jurisdiction of Crater Lake National Park from the state of Oregon. Similary on June 25, 1935, Public Law 49 Stat. 422 accepted exclusive jurisdiction over the south entrance

extension from the state of Oregon. Accordingly, all of the park is under exclusive jurisdiction of the federal government.

Mineral Entry Withdrawal. The establishment act for Crater Lake National Park, Public Law 32, Stat. 202, of May 22, 1902, provided that

". . . said reservation shall be open, under such regulations as the Secretary of the Interior may prescribe, to all scientists, excursionists, and pleasure seekers and to the location of mining claims and the working of the same."

There were no claims filed, and Public Law 94-429, Stat. 1342, of September 26, 1976, amended the above provision in Sec. 3(a) as follows:

"the first proviso of section 3 ofthe Act of May 22, 1902 (32 Stat. 203:16 U.S.C. 123), relating to Crater Lake National Park, is amended by deleting the words 'and to the location of mining claims and the working of same'." (See Appendix B, copy of Public Law 94-429.)

Provisions of Concessions. The establishment act of 1902 also provided

". . . that restaurant and hotel keepers, upon application to the Secretary of the Interior, may be permitted by him to establish places of entertainment within Crater Lake National Park for the accommodation of visitors, at places and under regulations fixed by the Secretary of the Interior, and not otherwise."

The existing concessioner's 30-year contract was executed in 1967, covering the period from November 1, 1967, to October 31, 1997. The contract includes provisions for the concessioner to provide for the lodging, food and beverages, transportation service station, trailer villages and related facilities, boat services on Crater Lake, and any and all services and merchandising which are customary in connection with such operations. Requirements for development by the concessioner are currently being held in abeyance due to a moratorium on all construction pending approval of the master plan.

Ownership of the concessioner facilities changed hands in March of 1976. Conditions incorporated in approval of the transfer by the National Park Service include: (1) no possessory interest to be allocated to the concessioner in 19 cold water cabins, (2) cold water cabins and two fourplex units to be removed within ten years, and (3) concessioner contract to be rewritten to conform to master plan provisions.

Pacific Crest National Scenic Trail. The Pacific Crest Trail, established October 2, 1968, Public Law 90-543, extends for 26 miles through Crater Lake National Park. The trail covers some 2,350 miles along the mountain ranges of the west coast states from the Mexican-California border northward to the Canadian-Washington border.

The act provides that

"The use of motorized vehicles by the general public along any national scenic trail shall be prohibited and nothing in this Act shall be construed as authorizing the use of motorized vehicles within the natural and historical areas of the National Park System."

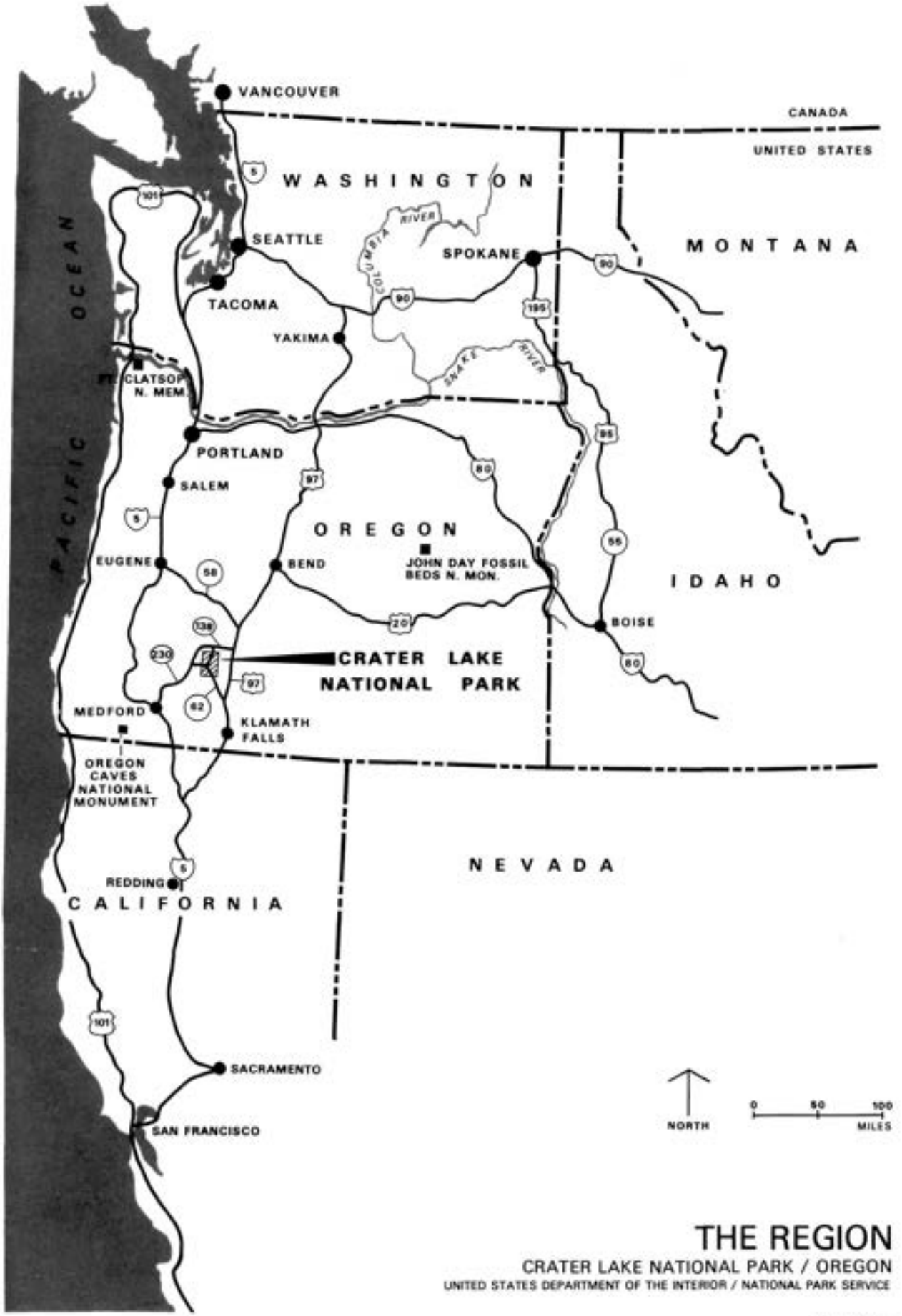
Recommended Wilderness. Five units of the park totaling 122,400 acres have been recommended for wilderness designation pursuant to the requirements prescribed in the Wilderness Act of 1964. This wilderness recommendation was sent to the Congress from the President on June 13, 1974. Exhibit A of the February 1974 wilderness recommendation report identifies the areas of the park so recommended and their respective acreages. Congressional action will be necessary to establish formally the areas as designated wilderness. Pending the congressional action, the recommended areas are being managed in accordance with the guidelines prescribed in the Wilderness Act and the National Park Service wilderness management policies.

Cooperative Agreements. There are two cooperative agreements affecting the management of the park. One is an agreement with the Forest Service for cooperative efforts in fire suppression and management, and the other is with the Oregon State Game and Fish Commission for cooperative research and monitoring of deer and elk herd migrations, population trends, and range conditions.

Regional Influences

Geographic. Crater Lake National Park is surrounded by three national forests: the Winema on the south and east, the Umpqua on the north, and the Rogue River on the west. These forests are managed for multiple use, and they support an important timber industry.

Outside the west boundary of the park, much of the area has been logged to within 100 yards of the boundary. The forest land lying immediately southwest of the park has not been logged, and the Forest Service is administering this area in a primitive condition. Although most of the area to the east of the park has been logged, it has been primarily through partial-cut methods. The existing timber stands east of the park vary from ponderosa pine to the north, changing to mixed species further south, to lodgepole pine



THE REGION

CRATER LAKE NATIONAL PARK / OREGON

UNITED STATES DEPARTMENT OF THE INTERIOR / NATIONAL PARK SERVICE

106 | 40007 C
D&C | DEC 77

at the southeast. Fishing, swimming, and boating are permitted seven miles north of the park in Umpqua National Forest's Diamond Lake area.

A number of major transportation routes transect the immediate region, providing access to the park from all directions. Interstate 5 (a north-south route) runs west of the park, passing through the Willamette Valley. U.S. Highway 97 (the high plateau route) runs east of the park, paralleling the Cascade Mountain range.

State designated and maintained highway routes join the park roads at the north, west, and south boundaries. State Route 62 is a state designated highway through the park, utilizing the south and west entrances. It is exclusively controlled and maintained by the National Park Service for year-round traffic.

Demographic. The park is within a 3-hour drive of a number of population centers included in the following table:

Population Center	Population	Distance from Park
Klamath Falls (Klamath County)	15,800 53,400	60 miles south
Medford (Jackson County)	28,500 108,100	75 miles southwest
Grants Pass (Josephine County)	12,500 45,100	100 miles southwest
Roseberg (Douglas County)	17,000 81,600	106 miles northwest

Socioeconomic. Regional recreational opportunities within a 100-mile radius of Crater Lake are numerous and varied. Seven ski areas operate during the winter months. At least two additional ones are proposed. There are 33 state parks and 64 private and state campgrounds. The region contains some of the best migratory waterfowl hunting in North America as four national wildlife refuges in the area offer public hunting. Big and small game-hunting opportunities are also numerous. Freshwater and anadromous fish abound in most of the region and are a major recreational attraction. Hunting and grazing require a certain amount of boundary patrol activity but have little direct bearing on visitor appreciation or utilization.

Major overnight accommodations are provided at population centers some distance removed from the park at Klamath Falls, Medford, and Bend. Few facilities exist close to the park except for several at the south entrance and fairly extensive camping facilities plus

some lodging on Forest Service land at Diamond Lake. The Forest Service also provides a considerable number of campsites in the Union Creek-Prospect vicinity, approximately 20 miles west of the park. The state of Oregon is developing a large campground on an impoundment presently being filled behind the Corps of Engineers dam at Lost Creek, 25 miles west of the park.

Camping and lodging facilities in the vicinity are presently adequate to handle the need. Gradual increase in demand will probably occur in future years. It would be reasonable to assume that private industry will provide facilities for future demand. Forest Service and Park Service attitudes are to maintain current levels and not to expand.

Land-use patterns within the vicinity are not expected to change materially in the foreseeable future.

The special interest groups and organizations that are most concerned with the management of the park are related to the forest industry and recreation activities. This includes the interest groups supporting a vigorous regional timber production industry as well as active environmental preservation groups that favor a strong wilderness and preservation system, both within the park boundaries and on lands administered by the Forest Service.

Within-Park Influences

Weather. The summer weather in Crater Lake National Park is usually very pleasant, with mild temperatures and clear skies except for occasional thunderstorms. During the warmest summer period, daytime temperatures are moderate and only occasionally exceed 85 degrees F. At lower park elevations, daytime temperatures may reach 95 degrees; however, after sunset, temperatures quickly drop and may reach 30 degrees (National Park Service 1924 to present). The park lies within the influence of the Pacific Ocean weather and the majority of storms that strike the north Pacific Coast each winter. Seventy percent of the park's annual precipitation occurs as snow from November through March. Average snowfall is 575 inches (48 feet), and snow depths of 100 to 200 inches (8 to 16 feet) are received each winter and are long lasting throughout much of the park. Daytime winter temperatures average slightly above freezing. Prevailing winds are from the northwest in summer and southwest in winter.

The U.S. National Weather Service maintains a precipitation gauge just north of the parking area for the Cleetwood Cove trailhead. The U.S. Geological Survey operates a water stage recorder on Crater Lake as a hydrological benchmark station at Cleetwood Cove. Snow survey courses are measured by the National Park Service for the Soil Conservation Service at Munson Valley and Annie Springs.

Topography and Park Roads. The topography around the lake is precipitous in many locations, with nearly all of the land sloping downward away from the rim. The Rim Drive and the entrance roads were constructed over 30 years ago to accommodate summer travel at that time.

The substrate on certain sections along the rim is highly susceptible to slides, and thus realignment of roads can be required at any time. In the winter, the roads are covered by snowpack. State Route 62 and the road to the Rim Village are the only park roads kept open during the winter months.

Road maintenance requires continuous attention to maintain water drainage which is necessary for protection of the road and avoidance of washouts and slides.

Visitor Activities. Crater Lake National Park is principally a day-use area with the majority of visitor use occurring between Memorial Day and Labor Day. In 1976, this period accounted for roughly 75 percent of the 606,636 total visitation to the park.

Eighty-five percent of the visiotrs remain in the park less than eight hours, sixty-five percent of these less than four hours. Seventy-five percent of the visitation occurs during the five-hour period between 10 a.m. and 3 p.m. Fifteen percent stay overnight, and five percent stay two or more nights.

The following compares various levels of use as tabulated for the park's peak summer season.

	Total Daily Vehicles	Arriving Peak Period (10 a.m.-3 p.m.)
Average	1,176	882
Maximum	3,161	2,337

Sightseeing is the primary activity of visitors, with the view into the caldera and of the lake as the main objective. The existing Rim Drive offers numerous parking areas for outstanding views.

There is moderate use of the short spur trails along the crater rim, including visitors taking naturalist-conducted walks. Backcountry use is light on the 65 miles of trails which include a 26-mile section of the Pacific Crest Trail. Most of the backcountry trails were originally constructed as fire access roads during the CCC program in the 1930s and in 1970 were converted to trail use only. The Pacific Crest Trail has received the greatest use, while the remaining trails receive only sporadic use. During 1976, 1,848 overnight backcountry visits were estimated for the park, with

approximately 80 percent occurring during the June through September months.

The lakeshore is accessible from the end of June through September over the 1.1-mile Cleetwood Cove Trail on the north side of the lake. Approximately 700 people a day hike this trail since this is the only access to the boat dock. Precipitous cliffs inside the caldera prevent access to other points along the lakeshore.

Fishing is a minor visitor activity in the park and is not an attraction to visit the lake. Fish are considered to be exotic to Crater Lake by virtually all students of this subject. Rainbow trout were first introduced into the lake in 1888, and through the early years of park administration, additional plantings of trout were made until 1941 when all planting was discontinued. In addition to rainbow trout, there are Kokanee (land-locked sockeye salmon) and brown trout that have maintained themselves by natural reproduction since the discontinuance of planting. Fishing success is poor, and because of the purity of the lake water and lack of food, populations are apparently quite low.

Some streams contain one or more species of trout. These are mostly small headwater streams, with only fair fishing. A limited amount of the hiking within the recommended wilderness is by fishermen.

Snowmobiling has become an extremely popular winter pastime throughout southern Oregon. However, Crater Lake did not have many oversnow vehicles until about 1969. Regulations restrict oversnow vehicles to the unplowed north road in the park from the north entrance to the north rim. The amount of snowmobile use Crater Lake National Park receives depends upon snow conditions at lower elevations. With good snowfall at lower elevations, this activity decreases at Crater Lake because of ample opportunities elsewhere, and during midwinter, snow is often too soft and deep for their use in the park.

Visitor Facilities. The concessioner has four 60-passenger tour boats, two boathouses on Wizard Island, and boat docks at Wizard Island and Cleetwood Cove. Two chemical toilets are located at Cleetwood Cove and on Wizard Island. The concessioner accommodated approximately 6,200 tour boat passengers in 1976. The number of boats will remain at the current level as provided in the current concessioner's contract, and additions will not be allowed.

Other principal visitor-use facilities for the park are located on the rim, including the Rim Village, where the concessioner operates the Crater Lake Lodge (located on the edge of the caldera rim), a cafeteria, gift shop, and cabins (back from the rim). The National

Park Service operates an information exhibit building and the Sinnott Memorial Overlook building (on the rim). Here, talks explaining the origin of Crater Lake are presented throughout the day in the summer. A 33-mile road circles the rim (one-way from Cleetwood Cove to Munson Valley Junction), with approximately 40 parking areas for view of the lake or adjacent mountain scenery.

Crater Lake has two developed campgrounds. Mazama Campground, with 198 sites, is located just north of the park's south entrance station near Annie Spring. Lost Creek Campground has 12 sites and is located just south of the junction between Grayback Motor Nature Road and the road to the Pinnacles near the east boundary.

Park administrative facilities and residences are located at Munson Valley, three miles below the rim. Heavy winter snows affect living and working conditions.

Natural Resources. Studies of ponderosa forest and lodgepole forest ecology have recently been completed and recommend fire as a management tool. Fire, therefore, is to be recognized as a management program rather than, as in the past, a suppression activity. A vegetative fire management plan has been approved.

The delicate nature of Sphagnum Bog and Boundary Springs dictates very careful planning so that ecological association will not be disturbed by visitor use.

MANAGEMENT OBJECTIVES

Conservation of natural resources
To conserve the park's natural resources free from the adverse influences of man while allowing those types of use and development that do not significantly impair park resources.

Research programs
To secure adequate information, through research or other means, to facilitate protection of park resources and management of visitor activities in ways that minimize impacts on the park's environment.

Interpretation
To foster an understanding and appreciation of the sequence of geological forces that created Crater Lake and how these forces affect the environment and ecological communities and provide information assistance appropriate for the safe and enjoyable use of the park resources without impairment of those resources.

Management efficiency
To optimize the efficiency of management through provision of appropriate staff and environmentally compatible facilities for park administration and operations.

Traffic circulation
To assure the highest quality of the visitor's experience by providing a traffic circulation system that best facilitates visitor use with special emphasis on visitor appreciation of park resources and safety.

Environmental awareness
To promote environmental awareness by encouraging the utilization of the park resources by schools and other groups for environmental study areas and cooperate with them in both off-site and on-site program assistance.

Concessioner programs
To coordinate the National Park Service and concessioner development programs to ensure that the needs of the public and the interests of the National Park Service are properly served.

Cooepration
To coordinate regional planning with other agencies and organizations to encourage development of accommodations and visitor services near the park appropriate to visitor understanding and enjoyment of the park, along with other regional resources.

Cultural resources
To identify, inventory, evaluate, preserve, monitor, and interpret the park's cultural resources in a manner consistent with the requirements of historic preservation law and National Park Service policies.

2

the environment

CRATER LAKE NATIONAL PARK / OREGON

GENERAL MANAGEMENT PLAN

Crater Lake National Park

PART II

THE ENVIRONMENT

ILLUSTRATIONS

TABLES

THE ENVIRONMENT

SETTING

Crater Lake National Park is in southwestern Oregon on the divide of the High Cascades. It lies in an area with a long history of volcanic and glacial activity, extending from Lassen Peak in northern California northward into Canada. Crater Lake occupies the collapsed crater, or caldera, of the once majestic Mount Mazama, a volcano of hypersthene basalts.

The lake is 4.5 to 6.0 miles across, has 20 miles of shoreline, a surface area of 21.5 miles, and with a depth of 1,932 feet at its deepest point, is the deepest lake in the United States. The landscape surrounding the rim of the caldera slopes downward and outward toward the boundaries of the park and is covered by volcanic debris of various ages and glacial detritus. Streams originating on the slopes of the caldera either join the Rogue River drainage to the west or the Klamath River drainage to the south and east.

The rectangular park surrounding Crater Lake has a varied topography which rises from 4,400 feet in the Panhandle at the south entrance to 8,926 feet at the summit of Mount Scott, a parasitic scoria cone on the eastern flank of what remains of Mount Mazama. Other topographic high points are Union Peak, an old, glacially eroded shield volcano; Hilman Peak, the highest point on the caldera rim; and Timber Crater, a young, unglaciated shield volcano in the northeast corner of the park. There are numerous scoria cones in the park which were fed from vents radiating outward from Mount Mazama. Many treeless and pumice-covered flats are reminders of the cataclysmic events which led to the collapse of Mount Mazama. Except for these flats, the park is heavily timbered. However, there is little understory of trees or brush and the terrain is open and park-like except in the southeastern portion where dense stands of ceanothus make travel difficult. Steep-walled canyons cut in pumice, such as at Annie, Castle, and Sun Creeks, also contribute to the ruggedness of the terrain.

The park's 160,290 acres are bounded on the north, south, and east by the Winema National Forest, on the north by Umpqua National Forest, and on the north and west by the Rogue River National Forest. A number of major transportation routes transect the immediate region and provide access to the park. The north-south route of Interstate 5 passes through Willamette Valley to the west of the park, and the high plateau route of U.S. Highway 97 parallels the east side of the Cascade mountain range east of the park.

More than 2.5 million people live within a 200-mile radius of the park. Portland and Eugene, Oregon have a combined population of more than 1.1 million people and are Oregon's primary industrial centers. Medford, Klamath Falls, Bend, and Grants Pass are the major towns within a three-hour drive of Crater Lake National Park. Within a 100-mile radius are 33 state parks and 64 private and Oregon State campgrounds with more than 3,000 camping sites, and numerous campgrounds in the surrounding National Forests. Private resorts and motels within the region have overnight accommodations for more than 12,000 lodgers.

GEOLOGY

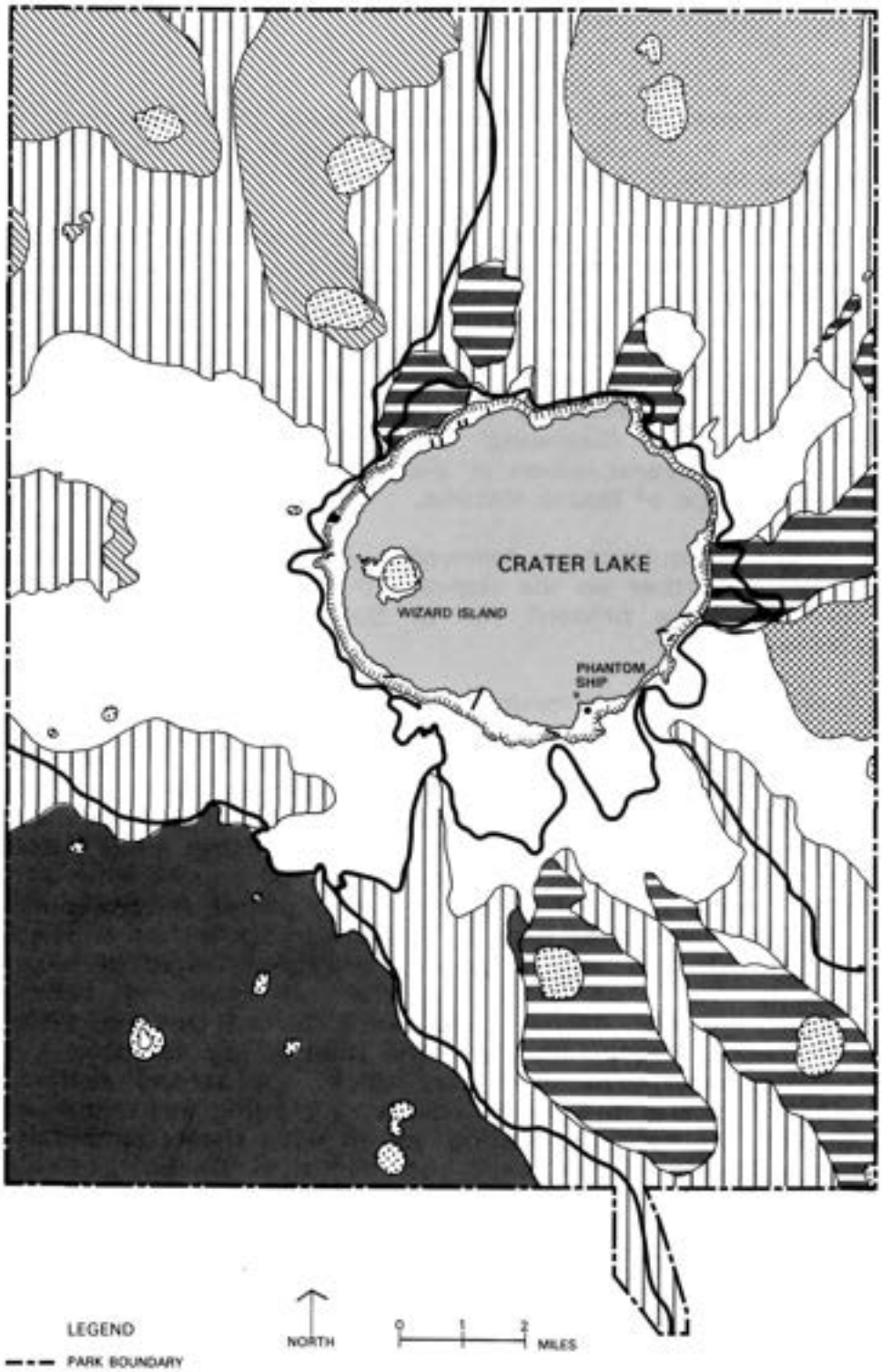
Geologic History

Volcanic activity in the region of the Cascades began some 50 million years ago, but it was not until 10 million years ago that uplifting began which was to produce the Cascade Range. During and following this uplift, wide-spreading flows of fluid basalt issued from north-trending fissures to form a chain of coalescing shield volcanoes extending from Mount Shasta in northern California to Mount Baker just south of the Canadian border. By the close of the Pliocene, about 2 million years ago, the crest of the Cascade Range had become a high plateau capped by these overlapping shield volcanoes occasionally capped by a towering composite cone.

During the Pleistocene most of the Cascade Range volcanoes became more explosive in nature. The lavas being erupted changed from a basaltic composition to andesitic and were less fluid than the earlier lavas. Earlier volcanic cones were covered by the steeper flows of the more recent volcanoes. Some of these later cones were deeply eroded by glaciers, and the harder rocks of their central pipes now stand out as summit pinnacles.

Mount Mazama was birthed about a million years ago on a base 5,000 to 6,000 feet in elevation in the depression formed between the dying volcanoes of Union Peak and Desert Ridge. The attitude of various lava flows indicate that the central cone rose to a height of over 12,000 feet. At no time was Mazama merely a single cone; there were always lesser parasitic cones on its flanks. The volcano grew almost entirely by eruption of andesitic lavas and ashes and closely spaced vents, and while it grew, glaciers advanced and retreated several times as evidenced by glacial moraines and tills interbedded with the lava flows.

Evidence of glaciation can be observed on the caldera walls, particularly on the north wall and on the east wall near Redcloud Cliff, where layers of volcanic rock alternate with layers of glacial debris. The last of the glaciers advanced slowly down the slopes, scratched and polished the lava surfaces, and formed the typical U-shaped valleys of Sun and Kerr Notches and Munson Valley.



GEOLOGY

CRATER LAKE NATIONAL PARK / OREGON

UNITED STATES DEPARTMENT OF THE INTERIOR / NATIONAL PARK SERVICE

106 | 40004 C
DSC | DEC 76

The glaciers reached their maximum size some 25,000 years ago at the end of the Pleistocene Epoch, obtaining a depth of 1,000 feet and extending 10 to 17 miles from the summit.

During the final retreat, when the glaciers were confined to the canyon bottoms of the upper slopes, a semicircular line of parasitic volcanoes developed on the northern slope of the mountain, about 5,000 feet below the summit, what is now the rim of caldera. Known as the Northern Arc of Vents, these cones issued great amounts of andesite lava and formed the mountains of Watchman and Hilman Peaks. Also formed at this time were the glassy dacites of the Llao Rock, the Cleetwood Cone Flow, and the V-shaped Redcloud Cliff. Several domes of andesite and dacite evolved close to the eastern slope of Mount Mazama.

A long period of quiescence followed. At the same time, glaciers were retreating farther up the slopes with only three tongues of ice remaining below the present rim at Sun and Kerr Notches and Munson Valley.

During the initial climatic eruption of Mount Mazama, the greatest gas pressure was released, forming the dacite magmas into sand size and smaller particles of frothy white pumice which appeared by two different forms of deposition. The major portion appeared as wind deposited pumice. As eruptions continued and gas diminished, particles increased in size, so that as the shifting wind patterns turned from the east to the northwest, 350,000 square miles of the surrounding countryside were covered with Mount Mazama pumice; at least 5,000 square miles were buried under six inches or more of pumice. The duration of the gaseous eruptions lasted perhaps as long as two months. The magma then changed drastically, becoming more viscous. Pasty dacite lavas were forced upward through numerous cracks, rarely flowing more than a few hundred yards with deposits several hundred feet thick. A second method of pumice deposition was the Nuee Ardente, a glowing avalanche which burst through the cone, spreading out in wide sheets extending to the Klamath Marsh on the east and north to Chemult, Oregon, distances of 25 miles. Some avalanches had velocities of 50 miles per hour and reached 35 miles into the Rogue River Valley. Some stream channels filled to depths of 300 feet by this frothy, semi-molten pumice which later fused to form hard, dense dacite.

When the activity ceased, a towering 12,000-foot mountain was replaced by a caldera 4,000 feet deep and six miles in diameter. The final explosions occurred about 6,600 years ago, according to carbon-14 dating of ten specimens of carbonized wood found in the Mount Mazama pumice (Fryxell, 1965, p. 1,288).

The elapsed time between the initial climatic eruptions and the collapse of the cone is believed to have been only a few days.

GEOLOGIC FEATURES

CRATER LAKE NATIONAL PARK / OREGON

UNITED STATES DEPARTMENT OF THE INTERIOR / NATIONAL PARK SERVICE

106 | 40032 A
DSC | DEC 76

Seventeen cubic miles of material had disappeared; only 10 to 12 cubic miles, mostly fresh magma, had been ejected from the volcano. It is probable that the remainder of magma drained by injection into cracks in the wall or by other withdrawal means, leaving only a shell of a mountain. Unable to support itself, the mountain collapsed.

After an undetermined period of time, new eruptions occurred, but were confined to the caldera floor and limited to three cones. Wizard Island, the last of the three cones to develop, is the only cone rising above the lake surface (800 feet). It is estimated that Wizard Island last erupted 1,000 years ago (Williams, 1942).

Mineral Resources

The geologic history of the park indicates that there is little potential for metallic mineral deposits in the area. Some limited amounts of sulphur and alunite occur within the park but not in sufficient amount to be economically feasible for mining. Pumice and volcanic rock for construction purposes do occur in the park in mineable amounts, but larger and more accessible deposits of such nonmetallic materials are readily and more economically available within the region and outside of the park. At this time there are no legally held mining claims, leases, or mineral rights within the park. Public Law 92-429, signed by the President on September 28, 1976, closes Crater Lake to future exploration or removal of minerals under the mining laws of 1872. (See Appendix B)

Geothermal Energy

Because of its recent volcanic history, the region of the park is considered to hold a potential for geothermal energy production. A large volume of heated silicic rock may still exist at depth beneath the region, but further exploration and measuring of heat flow will have to be done before its geothermal potential can be determined with any adequacy.

In nearby Klamath Falls, hot water from wells provides heating for some homes and commercial buildings, the Oregon Institute of Technology campus, the municipal swimming pool, and even one section of a city street.

Geologic Hazards

Barring a reactivation of volcanic processes, there are few geologic hazards within Crater Lake National Park. The area is seismically active, but the tremors and microquakes are sensible only to delicate instruments.

The topography around the caldera rim is precipitous in many locations. Unconsolidated volcanic and glacial material on steep slopes, such as along the inner crater, is subject to rockfalls and cavitation caused by wind and water erosion. The rock along some

sections of the rim road, especially in deep cuts, is susceptible to slides and rockfalls.

SOILS

Although soil surveys have been conducted up to the park boundaries and in the Panhandle area (McNeil, 1975), little is known about the precise characteristics of soils within the park. Much of the soil has developed on Mazama pumice, alluvium, and glacial debris and in general can be considered as regosols with poorly defined soil horizons. Precipitation, and not soil type, is the major influence that determines vegetation types in the park, and thus vegetation type does not indicate soil type.

Two Typic Cryorthents, the Maklak and Lapine series, and a Typic Cryopsamment, the Steiger series, make up the major named soils within the park. The physical properties of these soils are given in Table 1 and their suitability for various uses are given in the following table.

The Maklak series is the major soil found in the park. It consists of excessively drained, cindery soils formed in pumiceous and scoriacious cinders and ash. These soils occur on slopes of up to 15 percent at elevations of 4,400 to 7,000 feet on plateaus and in canyons of the park.

Typically, a thin needle mat rests on a surface layer of dark brown, loamy, coarse sand about 4 inches thick. Below this is about a 5-inch layer of dark brown, gravelly, loamy, coarse sand overlying dark brown and reddish brown, very gravelly, loamy, coarse sand to depths of 60 inches or more.

Lapine soils are not as extensive in the park as the Maklak soils. These soils are gravelly and sandy and like the Maklak soils are excessively drained. The Lapine soils are found on slopes up to 55 percent at elevations of 4,400 to 6,000 feet on tablelands, ridges, and cinder cones.

Typically, the surface mineral layer of Lapine soils consists of about 2 inches of dark brown, gravelly, loamy coarse sand about a 9-inch layer of yellowish-brown, gravelly, loamy coarse sand. Loamy buried soils and bedrock normally occur at depths of 40 to 70 inches.

The Steiger series soils consist of somewhat excessively drained, gravelly, loamy, coarse sand developed from ash and cinders. These soils are found on slopes up to 40 percent on terraces, ridges, and cinder cones at elevations of 4,400 to 6,000 feet within the park.

TABLE 1. Physical Properties of Major Soils at Crater Lake National Park

ESTIMATED SOIL PROPERTIES

Soil	Depth from Surface (in.)	Classification			Coarse Fract. Over 3 in.	% of Material Passing Sieve						Permeability (in/hr)	Avail. Water Cap. (in/in)	Soil Reaction (pH)	Shrink Swell Potential	Corrosivity	
		USDA Texture	Unified	AASHO		#4	#10	#40	#200	Liquid Limit	Plasticity Index					Steel	Concrete
Maklak	0-60	Very gravelly loamy coarse sand	GM, SM, GW-GM SW-SM	A-1, A-3	15-25	35-80	20-75	10-55	5-20	Nonplastic		6.0-20	.20-.40	5.6-6.5	Low	Low	Moderate
Lapine	0-72	Very gravelly coarse sand	(SP)	(A-1)	0	60-95	15-65	0-55	0-5	Nonplastic		20	.20-.40	5.6-7.3	Low	Low	Moderate
Steiger	0-60	Gravelly loamy coarse sand	SM	A-1-b, A-2	0-5	75-100	70-95	35-70	10-30	Nonplastic		6.0-20	.20-.40	5.6-6.5	Low	Low	Moderate

TABLE 2. Soil Suitability Chart

USE	SOIL	USE CAPABILITY*	UNDESIRABLE FACTORS
CAMPGROUNDS	MAKLAK	Moderate	Pebbles, too sandy, slope
TRAILS & PATHS	LAPINE	Moderate to Severe	Pebbles, dusty, slope
PICNIC AREAS	STEIGER	Moderate to Severe	Pebbles, too sandy, slope
MAIN	MAKLAK	Severe	Pebbles, slope
OVERLOOK	LAPINE	Severe	Pebbles, dusty, slope
AREAS	STEIGER	Severe	Pebbles, too sandy, slope
SEPTIC TANK	MAKLAK	Slight to Moderate	Slope
ABSORPTION	LAPINE	Moderate	Slope
FIELDS	STEIGER	Moderate	Slope
SEWAGE	MAKLAK	Severe	Cobbles, pebbles, slope
LAGOON	LAPINE	Severe	Pebbles, seepage, slope
	STEIGER	Severe	Seepage, slope
SANITARY	MAKLAK	Severe	Seepage
LANDFILL	LAPINE	Severe	Seepage, too sandy
TRENCH	STEIGER	Severe	Seepage, slope
SANITARY	MAKLAK	Poor	Cobbles, pebbles, packing
LANDFILL	LAPINE	Poor	Pebbles, too sandy, slope
COVER	STEIGER	Poor to Fair	Pebbles, too sandy, slope
SHALLOW	MAKLAK	Severe	Caving, cobbles, pebbles
EXCAVATIONS	LAPINE	Poor	Pebbles, too sandy
	STEIGER	Severe	Too sandy, slope
	MAKLAK	Slight to Moderate	Slope
ROADWAYS	LAPINE	Moderate to Severe	Slope, low strength
	STEIGER	Slight to Severe	Slope
	MAKLAK	Fair	Cobbles, low strength
ROADFILL	LAPINE	Poor to Fair	Low strength, slope
	STEIGER	Poor to Fair	Low strength, slope
	MAKLAK	Poor	Cobbles, pebbles, too sandy
TOPSOIL	LAPINE	Poor	Pebbles, too sandy, slope
	STEIGER	Poor	Pebbles, too sandy, slope
	MAKLAK	Fair	Excessive pumice gravel
SAND	LAPINE	Poor	Excessive pumice gravel
	STEIGER	Poor	Excessive ashy fines
	MAKLAK	Fair	Excessive pumice sand
GRAVEL	LAPINE	Poor	Excessive pumice sand
	STEIGER	Unsuited	Excessive ashy sand

*Capability for specified use because of limiting undesirable factors

Typically, the surface layer of Steiger series soils is a very dark brown, gravelly, loamy, coarse sand about 2 inches thick. The subsurface layer is dark brown, gravelly, loamy coarse sand about 7 inches thick. Underlying layers are dark yellowish-brown and dark brown gravelly, loamy, coarse sand to depths of more than 60 inches.

Permeability in all three series is very rapid to rapid, runoff is slow to very slow, and consequently the erosion hazard is slight. The effective rooting depth is more than 60 inches, the water-holding capacity varies from 8 to 24 inches, and the water supplying capacity ranges from 17 to 19 inches. Soils in the park range from neutral to medium acidity.

CLIMATE

Crater Lake National Park is near the midpoint of the Sierra-Cascade Mountain Province of the Pacific Mountain System. The climate of this province is characterized by cool summers and moist winters with heavy snowfall. The park lies astride the backbone of the Cascade Mountains near the southern extremity of their higher elevations with the general topography dropping 1,000 to 1,500 feet a short distance to the south. The crest of the mountains acts as a barrier to the prevailing frontal systems which approach the area from the North Pacific Coast.

The park is slightly south of the main storm track for these fronts, but still well within their belt of influence. These storms, together with the normal eastward movement of air across the region, are constantly bringing in a fresh supply of nearly saturated air whose temperatures closely approach those of the Pacific Ocean over which it has been traveling.

From late fall until early spring, the land masses become much colder than the ocean. Incoming air masses cool rapidly as they move up the slopes of the Cascade Mountains because of the colder ground and the increasing elevations. As the air cools, great amounts of precipitation are released. From late spring through early fall this situation is reversed, with the land being warmer than the overlying and incoming air mass. Due to ground heating, and despite the cooling caused by increased elevations, the temperatures at the crest of the range are considerably higher than the air crossing the coastline. As a direct result, the air becomes drier as it moves inland and up the west flank of the Cascades. This dry air situation is further exacerbated by a nearly total absence of large-scale moisture-laden storms during this time of year.

Rainfall, snowfall, and temperatures within the region of the park vary significantly with differences in elevation and are strongly

modified by the rain shadow configuration of the Cascade crest and the distance of the recording area from it. Table 3 shows comparative climatic data for the Crater Lake region. There is a steady decline in the mean annual temperature for all recording stations at higher elevations. Precipitation increases with increasing elevation but the total amounts are strongly influenced by the station's relationship to the morphology of the Cascade crest.

There is a greater range in mean annual totals of precipitation in the area of the park than there is in the entire northeastern quarter of the United States. The most rapid change in precipitation amounts within the park takes place down the eastern flank, where the heavy precipitation of the High Cascades gives way to the semiarid high plateau country of central Oregon. Topographic lows in the Cascade crest allow greater amounts of precipitation to fall at Fort Klamath on the south flank of the park, but Chemult, Chiloquin, and Klamath Falls to the east remain relatively dry.

Warm, clear days characterize the summer months in the area of Crater Lake National Park. At the rim of the caldera the daytime summer temperatures are very moderate. They average 60° to 70°F and seldom exceed 85°F. Since 1926, the record high temperature at park headquarters in Munson Valley has only been 91°F. Evenings are crisp, with the temperature dropping into the 40's and 50's on most nights, and taking an occasional plunge to freezing during any of the summer months. Daytime temperatures in the Panhandle area during the summer are often 10 or more degrees warmer than those at the caldera rim because of the elevation difference.

Only about 6 percent of the annual precipitation falls from June through August, and on the average, only about five days during this period will have precipitation greater than 0.10 inch. Summer thunderstorms seldom strike with enough force or volume to produce damaging rains or accompanying hail. Traces of snow have fallen in the park during all of the summer months.

Soils throughout the park are at their field capacity for water retention shortly after the melting of the heavy winter snows. Because of the dry summers, the soil moisture progressively declines so that maximum moisture stress on vegetation depends upon the length of rainless periods and upon the evapotranspiration rate during the warmer season.

As is true for most of Oregon, the park has a very definite heavy bias toward winter precipitation. Approximately 70 percent of the annual precipitation falls from November through March in the park, and practically all of it falls as snow. Snow depths of 100 to 200 inches on the ground are common at park headquarters, and the annual total snowfall is nearly 600 inches. In about half of the

TABLE 3. Comparative Climatic Data Crater Lake Region

through Station	Elevation	Latitude	Longitude	Temperature Average January	Temperature Average July	Temperature Average annual	Precipitation Average annual	Precipitation June through August	Precipitation Average snowfall
	FEET			DEGREES F.			INCHES		
Medford Airport	1312	42°22'	122°52'	36.7	71.9	52.2	20.46	1.40	7.5
Trail 14 NE	1885	42°47'	122°40'	35.6	65.4	51.3	47.22	2.46	
Prospect 2 SW	2482	42°44'	122°31'	35.5	66.7	50.1	42.87	2.38	
Klamath Falls 2	4098	42°12'	121°47'	29.5	68.1	47.9	14.18	1.67	41.0
Fort Klamath 7SW	4160	42°37'	122°05'	27.0	60.4	43.3	39.19	1.79	
Chiloquin	4220	42°35'	121°52'	26.4	59.1	42.8	18.34	1.81	
Chemult	4760	43°±2'	121°47'	25.2	60.0	41.8	26.40	2.35	160.0
CRATER LAKE HQ.	7465	42°54'	122°08'	24.8	53.3	37.7	69.74	3.99	590.0

(Date covers period 1941-1975)

winters, the first measurable snowfall in Munson Valley can be expected by the end of September, and at the park's lower elevations by the end of October. The greatest snow depth ever recorded in Oregon was 242 inches and that was in the rim area of Crater Lake at an elevation of 7,086 feet. Snow loads may reach 500 pounds per square foot on structures in Munson Valley and be only slightly less in the vicinity of Annie Springs. Measurable snowfall can be expected in Munson Valley on about 100 days each year, and up to 37 inches of snow have fallen in one 24-hour period (Sternes, 1963).

Daytime temperatures during the winter months average only slightly above freezing in Munson Valley and throughout much of the park, with nighttime temperatures dropping to between 17° and 20°F. Maximum temperatures of 50° to 60° and minimums of 0° or lower may both be expected occasionally during the winter months. The lowest minimum temperature recorded in the headquarters area of Munson Valley since 1926 has been 21°F.

On the lower eastern slopes of the park, the annual snowfall drops to 25 to 65 inches. These lower eastern elevations also receive the lowest winter temperatures due to the stagnant pooling of cold air, the invasion of Arctic fronts from the northeast, and the comparatively warm marine air of higher elevations gliding over the colder air mass instead of pushing it away.

LIMNOLOGY AND HYDROLOGY

With a depth of 1,932 feet, Crater Lake is the deepest lake in the United States. It covers an area of 21.5 square miles and has a shoreline of about 20 miles. It is estimated that if present climatic conditions had prevailed at the time of the volcano's collapse and continued to the present that it would have taken only 800 years for the lake to reach its present depth. However, evidence indicates (Phillips, 1968, p. 9) that the climate was warmer and dryer then so that the lake probably took 2,500 years or more to reach its present depth.

The lake is in balance so that the variations between precipitation and drainage into the lake and losses from seepage and evaporation cause only minor fluctuations of one to three feet per year in the lake's level. Precipitation falling directly into the lake accounts for about 78 percent of the total water entering the lake (Phillips, 1968). No perennial inflowing streams feed the lake; however, where lava rests on glacial debris such as at Dutton Cliff, Sentinel Point and Grotto Cove, copious springs discharge down the caldera walls into the lake (Williams, 1942).

Only 30 percent of the lake's water loss is due to evaporation. The remaining 70 percent is lost through seepage, primarily through glacial materials and volcanic agglomerates. No direct outlets are known to exist; however, large springs occur at lower elevations throughout the surrounding area, and it is assumed some of the seepage eventually must reappear in the Klamath and Rogue River basins.

Surface temperatures of Crater Lake vary from 32° to 65° with usual summer temperatures ranging from 50° to 58°. Below 200 feet, the temperatures approach 39.2° at maximum density (Nelson, 1961, p. 31-45). Most of the lake does not undergo the annual thermal turnover common to shallow lakes (Phillips, 1968, p. 11). Nor is there conclusive evidence indicating the existence of circulation (Nelson, 1961, p. 45-52).

Crater Lake is considered a youthful lake in an extremely oligotrophic state, with a water purity level of only 79 particles per million. This purity can be attributed to its relative youthful stage in an alpine environment, and the absence of inflowing streams introducing minerals and debris. The basin-forming rock is relatively insoluble and seepage of dissolved material may occur through the basin and walls.

Light penetration has been measured at the bottom of the lake, although blue light is the only illuminate below 350 feet. According to secchi disc reading of up to 40 meters, light penetration in Crater Lake exceeds the usual maximum of 20 to 25 meters for alpine lakes (Nelson, 1961, p. 51).

Oxygen saturation does occur to the bottom of the lake due to a small biotic population and absence of life in the lower three-quarters of the lake. Oxygen saturation is not indicative of circulation.

The lack of a wide range of dissolved minerals greatly restricts the growth of any aquatic biota. Absence of sufficient calcium carbonates inhibits the development of large shelled animals. A well-developed diatom flora does exist due to the high silica content and high alkalinity of the water (Nelson, 1961).

The clarity of the water enables a moss, Depanocladus adunous, to grow at depths of 60 to 425 feet, a unique condition found nowhere else.

Studies of fauna found in Crater Lake show that most are cosmopolitan and thus are very adaptable and common. These include bluegreen algaes Calothrix, Oscillatoria, and Nostoc; green algaes Spirogyra, Ulothrix, and Cladophora; zooplankton Daphinia, Cladocera, and rotifera; and the marsh and water plants Fontinalis, Ranunculus, Juncus, and Potomogeton (Nelson, 1961).

The concessioner operates four 60-passenger gas-powered boats on the lake. Pollution from petroleum products is a potential if not an actual threat. The possibility of waste products from the rim area also exists. This pollution potential is also magnified by the fact that the lake has no outflowing streams to "flush" the lake of any contaminates.

Crater Lake is monitored by the National Park Service and U.S. Geological Survey to insure the lake ecosystem remains in as natural a state as possible. The waters are analyzed for any contamination, such as hydrocarbons or any introduced inorganic materials. Tests are conducted in the spring prior to any recreational use and in late fall with the termination of the boat concession operation. Checkpoints are the center of the lake, proximal to Wizard Island, and at Cleetwood Cove. The lake was designated as a Hydrological Benchmark Station by the U.S. Geological Survey in 1962, and water level measurements as well as purity checks are recorded at this station in Cleetwood Cove.

The dendritic drainage patterns of tributaries commonly found on youthful geologic terrains are absent in the park. Even on steep slopes, the runoff channels are broad and poorly defined with the rounded contours of a mature drainage system. This is because the surface runoff in the park from rain and melting snow is negligible. Water sinks almost immediately into the porous volcanic soils and glacial debris and is released only slowly through evaporation, plant use, seeps, and a few springs. The pumice deposits alone are capable of holding water in amounts equaling 30 percent of their volume. Permanent stream beds in the park are in youthful appearing, sharp steep-sided channels. The erosion caused by running water in the park is at a minimum and its effects on the topography are probably equaled by those of wind deflation and gravitational mass movement.

BIOTIC RESOURCES

Vegetation

Plant Communities. The flora of the 250.4-square-mile Crater Lake National Park is typical of the vegetation found throughout the southern High Cascades (Farner, 1952). Generally, the vegetation of the region reflects a mosaic of forested areas and open non-forested areas. Climate, topography, soil development, and fire history all affect the composition and distribution of existing plant communities. Approximately 570 plant species, making up four general vegetation communities, are exhibited within the boundaries of the park (see vegetation map - Figure 14).

Ponderosa Pine Forest - The Ponderosa pine forest covers 31.4 square miles of the park, or 12 percent of the total park area. The soil consists of fine, well-drained volcanic dust, over ash and cinders which reach a depth of 200 to 300 feet. It is a zone of thick underbrush, the dominant species being snowbrush (Ceanothus velutinus), bitter cherry (Prunus emarginata) and willow (Salix sitchensis and Salix scouleriana) (Wynd, 1941).

The pine forest Transition Zone extends to elevations of 5,500 feet, so that the majority of the zone on the east, west, and north slopes of Mount Mazama lies outside the park. On the drier, east slope of Mount Mazama, almost pure open stands of ponderosa pine (Pinus ponderosa) occur, whereas on the moister, west slopes, considerable mixtures of Douglas-fir (Pseudotsuga menziesii), sugar pine (Pinus lambertiana), and white fir (Abies concolor) are found. A small area of ponderosa pine is established within the north rim of the caldera from Cleetwood Cove to Wineglass. Another relatively pure stand of ponderosa pine occurs in the northeast corner, extending southeastward of Timber Crater in an open, park habitat.

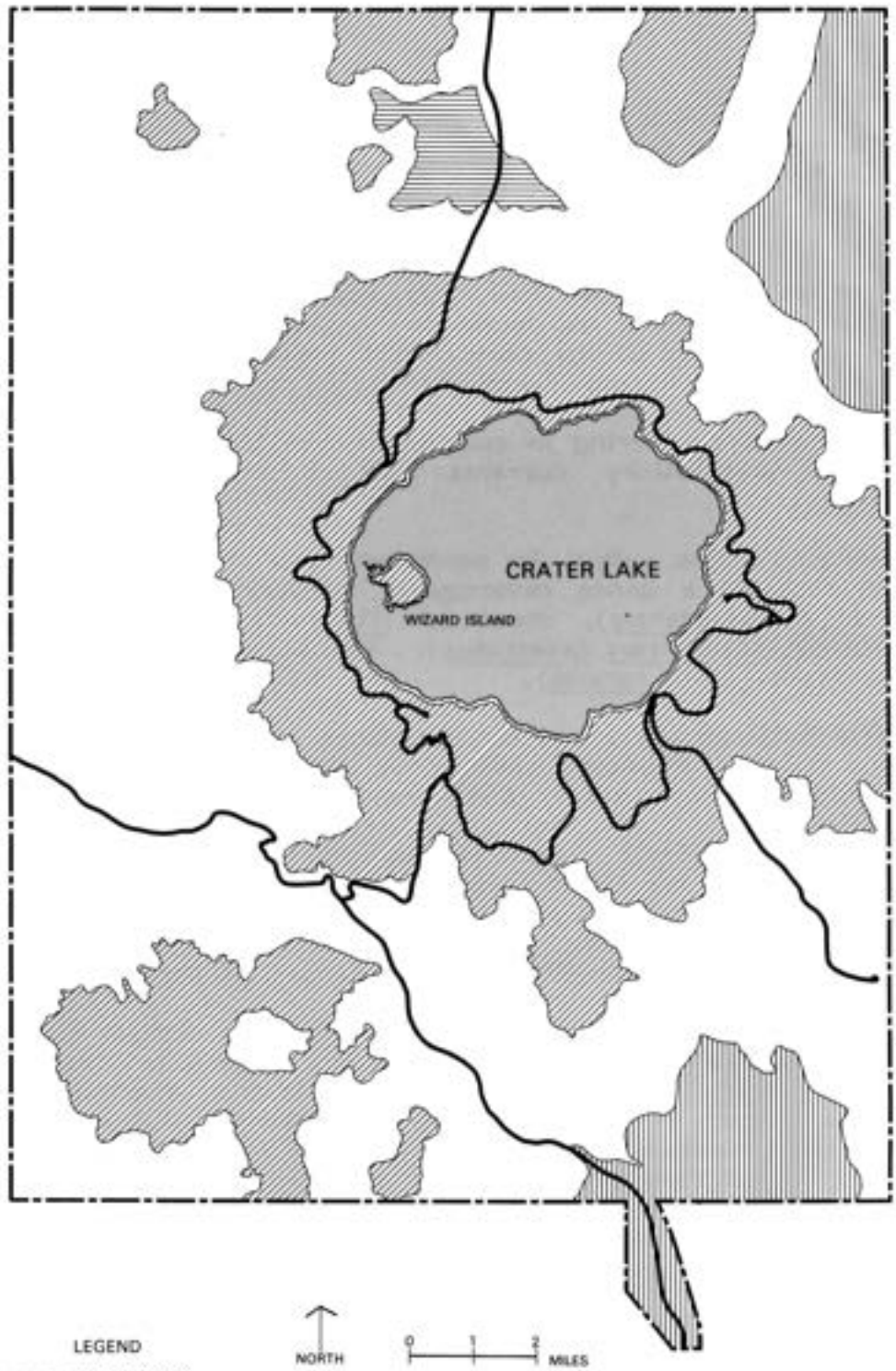
Douglas-fir replaces ponderosa pine along the south boundary, westward into the Red Blanket Creek Canyon. Also occurring in the area is white fir. Sugar pine is found on level areas along the canyons. These species are also represented in Annie Creek Canyon and Castle Creek.

Ponderosa and sugar pine were logged in the Yawkey and Gladstone tracts prior to their acquisition in 1941 and 1942, respectively. Both tracts are in the extreme southeast corner of the park. In these tracts, dense growths of chaparral, primarily manzanita and ceanothus species, are now locally dominant.

Ponderosa pine, a species dependent on fire for its propagation, has been altered through fire control practices since the early 1900's and in some areas, such as the Panhandle, the pine is being replaced by white fir as the dominant species at the younger forest level.

Seeding programs have been suggested to reintroduce ponderosa pine growth. Prescription burning is also proposed in the Resource Management Plan (1970); some test burning was accomplished in 1976.

Lodgepole Pine Forest - The lodgepole pine forest corresponds to the Canadian Life Zone, covering 102.7 square miles at elevations from 5,500 to 6,500 feet, depending on exposure, drainage, and humidity (Farner, 1952). Because of more than 70 years of past fire control history in the park, the lodgepole pine (Pinus contorta) is being replaced by other species. Shasta red fir (Abies magnifica) occurs frequently and occasionally in considerable abun-



VEGETATION

CRATER LAKE NATIONAL PARK / OREGON

UNITED STATES DEPARTMENT OF THE INTERIOR / NATIONAL PARK SERVICE

106 | 40002 E
DSC | FEB 77

dance. Other species include noble fir (Abies procera) and mountain hemlock (Tsuga mertensiana). Shasta red fir is found scattered throughout the lodgepole pine forest with a pure stand occurring on the lower north slope of Bald Peak.

White pine is also a codominant species and considered an indicator species of the Canadian Life Zone, though not as frequent as lodgepole pine. White pine are found in considerable numbers along streams and canyons of the park. Both white pine and lodgepole pine are common on Wizard Island.

Shrubs commonly occurring in association with the lodgepole forest are squaw and sticky currants (Ribes) and sedge (Carex concennoids).

Many exposed slopes within the ponderosa and lodgepole pine communities maintain a dense coverage of manzanita (Arctostaphylos patula or A. nevadensis), snowbrush (Ceanothus velutinus), and squaw carpet (Ceanothus prostratus). Also occurring frequently is squaw currant (Ribes cereum).

Chaparral habitats are found on the upper slopes of Red Blanket Canyon, Baldtop Mountain, Red Cove, Grayback Ridge, lower Dutton Ridge, Desert Ridge, Bald Crater, and along Sun Creek.

Mountain Hemlock Forest - Mountain hemlock forests are characteristic of the upper elevations (5,500 to over 8,000 feet), occurring in either pure stands or in association with Shasta red or noble firs complex. It is the primary indicator species of the Hudsonian Life Zone covering 91.5 square miles, or 36.5 percent of the park.

Mountain hemlock (Tsuga mertensiana) generally occurs in open park-like meadows. The scanty underbrush consists principally of wood-rush (Luzula glabrata). At upper elevations, mountain hemlock tends to grow in isolated stands or clusters. Also associated with mountain hemlock beginning at approximately 6,200 feet and occurring in the same park-like manner, is whitebark pine (Pinus albicaulus). At the highest elevations of Mount Scott and Cloudcap, mountain hemlock gives way to pure stands of whitebark pine.

Oregon grapefern (Botrychium pumicola), considered a rare species because of its limited occurrence, is found in the park along the flanks of Cloudcap and on the Llao Rock, the largest site in existence. Only a few other sites exist in Oregon and possibly one in California.

Montane meadows are interspersed throughout the forest zone, though confined to wet localities along streams or around the immediate vicinity springs. Characteristic flora include thickets of

willow bordered by subalpine fir and/or mountain hemlock. An abundance of flowering plants and sedges is also present.

Despite a higher frequency of fire than in the previous two forest zones, fires and/or fire suppression have had the least modifying influence in this zone.

The mountain hemlock forest surrounding the entire caldera rim receives the greatest visitor concentrations and impacts. The major visitor use developments, the Crater Lake Lodge, store and cafeteria and approximately 35 miles of roadways are located in this forest community.

The Pumice Desert - The Pumice Desert, a distinct desert-like environment covering about 3.1 square miles at an elevation of 6,000 feet near the northern boundary of the park, is actually part of the lodgepole pine forest (Wynd, 1941); but because of poor soil development, plant succession, composition and distribution have been significantly inhibited. Soil infertility is now regarded as the primary limiting factor in the rate of succession, not a lack of water as was previously thought (Mueller, 1961).

All but one of the 14 plant species of the desert are small herbaceous or woody-stemmed plants, the exception being lodgepole pine, which is invading the area and beginning to establish itself (Mueller, 1966, p. 29-42).

Due to the poor soil development, the desert is an extremely fragile environment. A small automobile turnout was built along the North Entrance Road at the southern edge of the desert in 1958. Since its construction, an area of compaction is evident, having a radius of over 100 yards. Compaction of vegetation is a result of walking and, although rarely seen, evidence indicates this area is driven over by a few sightseers. Use in the Pumice Desert, if not limited to trails and wildlife observation along the developed roadway, could result in rapid deterioration of plant life. The Pacific Crest Trail has been rerouted out of the Pumice Desert.

Other small open pumice areas within the park are restricted to slopes of the higher peaks, including Garfield, Applegate, Dutton Cliff, Cloudcap, and Llao Rock. Total acreage of these pumice areas is considerable.

Fragile Environments. Several areas within the park, including Sphagnum Bog, Boundary Springs, the east flank of Mount Scott, and the Sand Creek Canyon/Pinnacles site, contain extremely important ecological communities. Two areas, Sphagnum Bog and Boundary Springs, are especially significant and are currently managed as Outstanding Natural Features Area by the Park Service. Because of the proximity of these unique areas to U.S. Forest

Service lands, the Rogue River National Forest, in August of 1970, designated "buffer" zones on their lands as Scenic Areas.

Sphagnum Bog - Sphagnum Bog, fed by Crater Springs, is located in the northwest section of the park, only half a mile from the west boundary. The bog supports a flora of delicate mosses and herbs, several species of which are found nowhere else in the park. Included are two species of bladderworts (Utricularia intermedia and U. vulgaris) and two species of sundews (Drosera rotundifolia and D. longifolia), all insectivorous plants. This flora is dependent on ample amounts of water; any change in the flow of Crater Springs would have a profound influence on the existing balance. Eight hundred and thirty acres of Forest Service land have been designated as a protective buffer zone in which logging is prohibited.

Camping is also prohibited in the area and access to the bog is by hiking only. It has been suggested that the area be investigated and considered for classification as a Research Natural Area.

Boundary Springs - Boundary Springs is also located in the northwest corner of the park, and is approximately 1/8 mile from the north boundary. It is one of the headwater sources of the Rogue River.

Producing a reliable, year-round flow in an otherwise arid area, the springs exhibit a lush moss and herb flora (Applegate, 1936).

Recognizing the vital and delicate nature of the springs, and their location along the park boundary, the Forest Service established 320 acres proximal to the springs as a scenic area, thus prohibiting logging. A park trail now extends into the area but camping is not permitted within a mile of the springs.

Mount Scott - Mount Scott, a two-peaked mountain rising approximately 8,926 feet above sea level (the highest point in the park), is located in the east-central portion of Crater Lake National Park. The moderately timbered mountain (whitebark pine, Shasta red and noble fir, and mountain hemlock forests) is currently being managed as Class V - Primitive Area land by the National Park Service.

Sand Creek/Pinnacles Area: The Sand Creek/Pinnacles area begins in the southeast corner of Crater Lake National Park and extends on into the Winema National Forest east of the park. The entire site is of unique geological importance with Sand Creek passing through a wide canyon with sloping walls of scoria and pumice. Along those walls are numerous pinnacle formations, many 50 feet or more in elevation.

That portion of the Sand Creek/Pinnacles area within Crater Lake National Park is currently being managed as Class V - Primitive

Area land by the National Park Service. The U.S. Forest Service has declared the segment of the Sand Creek/Pinnacles area situated in the Winema National Forest as the Sand Creek Unusual Interest Area (Geological) through approval of a special zoning plan passed on April 18, 1967.

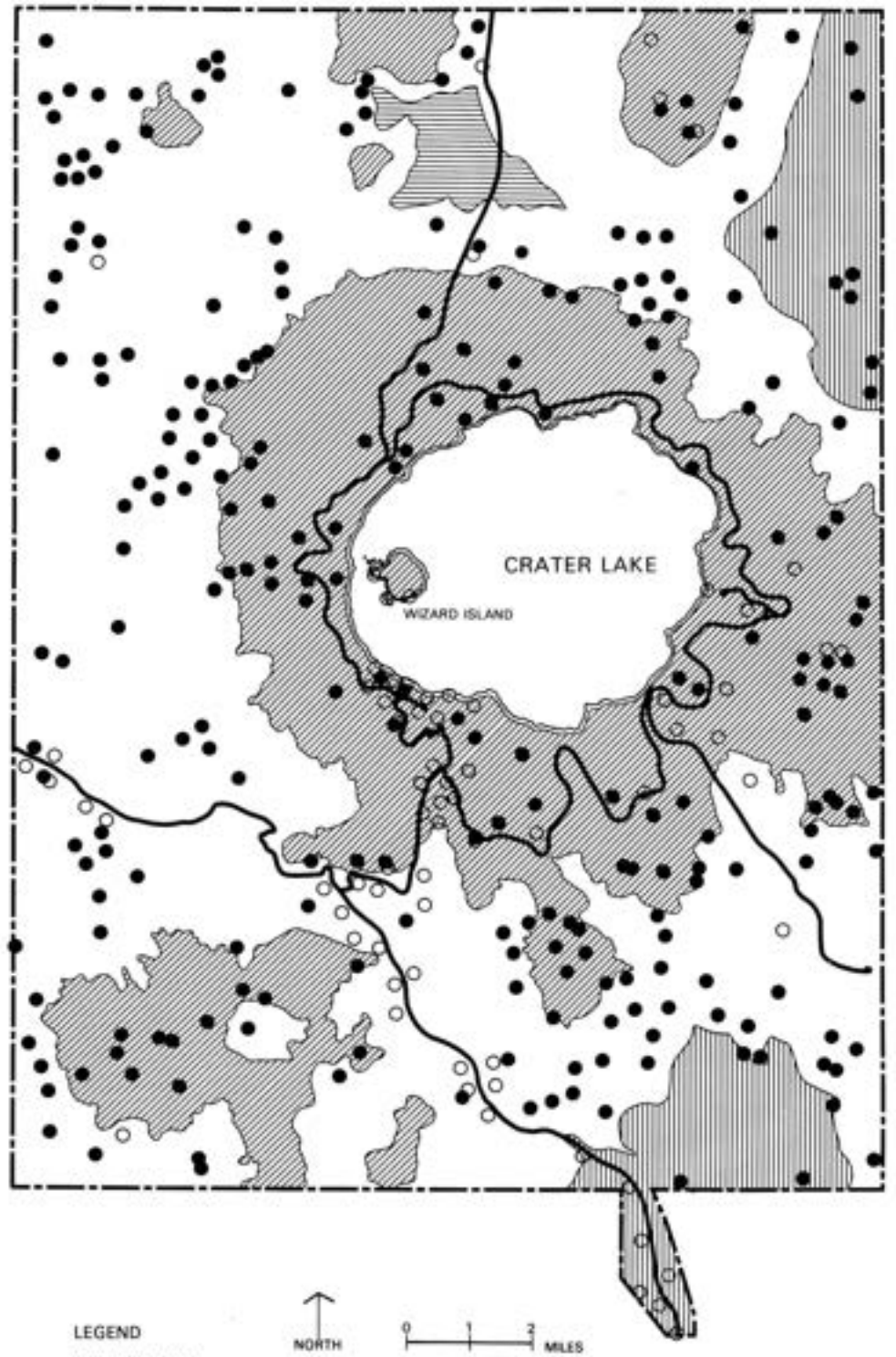
Thousand Springs - Although located in the Rogue River National Forest approximately 1½ miles southwest of the west entrance of Crater Lake National Park, Thousand Springs is another ecological system located within the region worthy of protection and preservation. The Thousand Springs site is a unique complex of freshwater springs that flow west into Union Creek and eventually out into the Rogue River.

Insects and Disease. Several species of forest insects which cause damage to trees within the region are commonly found in Crater Lake National Park. These species include the mountain pine beetle in ponderosa and lodgepole pine, the western pine beetle on ponderosa pine, and the balsam wooley aphid on subalpine and other true firs. White pine blister rust is occasionally found on whitebark pine within the park. Mistletoe infects a substantial portion of ponderosa pine and lodgepole pine.

Between 1923 and 1933, there was an extensive outbreak of the mountain pine beetle (Dendroctonus monticolae) in the lodgepole pine forests of the park. The outbreak moved from north to south, and by 1925 the beetles were killing an estimated 200,000 trees north of the park. These attacks often speeded the succession to forests of fir and hemlock. Limited bark beetle buildups occurred in 1946, 1947, 1948, and 1957 within the park.

Limited chemical control of beetles in the ponderosa forests along roadways was done by the National Park Service during the 1960's. At present, insects are not considered a serious threat to the park's forests and no control measures are in effect. A cooperative program with the U.S. Forest Service utilizes infrared aerial photography to monitor insect populations and infestation trends within the park.

Fire History. Summer storms often seem to have as much lightning as rain. Most of the natural fires caused by lightning are set by storms that cover a wide area on a single day and set multiple fires. Lightning fires are equally likely to occur at any altitude with equal frequency of storms and equal fuel conditions. As lightning strikes areas of high topography with greater frequency than low areas, lightning-set fires are more likely to be set along and near the tops of ridges. The prevailing summer storm systems strike the park from the south and east, but only a slight increase in fire frequency can be attributed to this factor in these portions of the park.



FIRE LOCATION

CRATER LAKE NATIONAL PARK / OREGON

UNITED STATES DEPARTMENT OF THE INTERIOR / NATIONAL PARK SERVICE

106 | 40003 D
DSC | FEB 77

Forest fires have always played an integral role in the normal growth and natural development of forests.

In Crater Lake National Park, the normal fire cycle was altered with the advent of forest fire control and protection policies more than 70 years ago. Lodgepole pine is an early invader of fire-devastated areas. With fire suppression, the lodgepole is being replaced by mountain hemlock, Shasta red and noble firs. For the same reason, the ponderosa pine in the Panhandle and elsewhere in the park is being invaded and replaced by white fir.

Fires in the park average two to four per year and are generally of .25 acres or less in size. Of the total of 385 fires since 1931, 84 have been man-caused and the rest lightning-set. Man-caused fires are most frequent in the Munson Valley and Annie Springs areas and along the park's major roadways. The highest fire frequency is from the first of August to mid-September when the forest is driest, lightning storms most frequent, and visitor use the heaviest.

Approximately 130 miles of fire roads were built in the early 1930's and used until 1970 when all roads were closed to motorized vehicles. All fires are now reached by hiking, and if essential to prevent a serious fire situation from developing, helicopters are available. Two lookout towers, one at Mount Scott and another on Watchman Peak, are no longer manned. Improvements in aerial detection have made this action feasible. Forest Service lookouts outside the park also aid in detection.

Timber Resources. The southern tip of the Panhandle was logged in 1909, 1910, 1911, and 1917, and the part of the Panhandle east of Annie Creek was logged in 1923 and 1927. Ponderosa and sugar pine were logged from the extreme southeastern corner of the park on the Yawkey and Gladstone tracts. These areas now have dense growths of chaparral, of which manzanita and ceanothus species are dominant. The remainder of the park has not been logged since its establishment.

Grazing. Prior to the establishment of the park, the entire region was open to grazing, primarily by sheep. The effects of this grazing have gradually diminished until little, if any, impact from it can be detected today.

The park is not fenced and trespass grazing is occurring from adjacent National Forest lands. Sheep trespass has occurred along the east boundary of the park and cattle trespass is common along the west and north boundaries. Although such trespass is normally light and the damage to the park's vegetation minor, both cattle and sheep have penetrated to all parts of the park at one time or another.

The fragile ecosystems at Sphagnum Bog and Boundary Springs are within one-half mile of the park boundary. Trespass grazing by cattle is impacting both of these unique areas, as the cattle are attracted by these two sources of water. The extent of the effect of the cattle upon the integrity of these two ecosystems has not been evaluated at this time.

Animals

The animal species living in the park are typical of the diversity of animals found in the southern High Cascades. A listing of the species which are known from the park area is given in Appendix A. The western and southern portions of the park contain the largest animal populations because of the presence of permanent streams. The animal populations in the northern section of the park are severely limited by a lack of available water.

Mammals. The most frequently seen animals in the park are the small mammals such as squirrels, chipmunks, pikas, marmot, and hares. Deer, black bear, pine marten, porcupine, and red fox are also seen with some regularity by park visitors and employees.

Black Bears - The black bear (Ursus americanus) ranges throughout the park, principally in the lodgepole and ponderosa pine forests. They are typically found in open meadows and near streams where they can obtain their food supply of berries, nuts, roots, insects, small game, and fish.

Prior to 1973, a few black bears were becoming pests in visitor-use areas of the park. Open dumps were closed and trash removed to areas outside of the park. Bear-proof garbage cans were installed and stubborn nuisance bears were trapped and transplanted to other areas of the park. Nuisance bears are not now a problem and the parkwide bear population seems to have stabilized at from 40 to 50 animals.

Grizzly bear (Ursus klamathensis) were exterminated in the region by 1895, and reintroduction efforts on their behalf have not been made.

Wolves and Coyotes - Wolves (Canus lupus) do not seem to have ever been common in the southern Cascade region and are now gone from the area. In the early 1900's, predator control programs largely exterminated this species in the region and the last recorded wolf kill in the State of Oregon was in 1927 east of Fort Klamath by Biological Survey predatory animal hunters.

The coyote (Canus latrans) has also been heavily persecuted by man. Because of its adaptability to man, as well as its capability to survive in a wide variety of habitats, the coyote still persists in

the region. The coyote is considered rare within the park, as it prefers the open country of the arid sagebrush areas found in the Upper Sonoran Life Zone. They are considered as permanent residents within the park and are apparently maintaining a stable population, although they are rarely seen because of their twilight and nocturnal habits.

Fox - The red fox (Vulpes fulva) has an estimated population of 40 individuals within the park and is one of the more commonly seen mammals. The red fox is commonly found in open meadows or park-like areas where the greatest concentrations of rodents are found. Dens are typically located in rocky areas. They are commonly observed in the village area in the wintertime.

The gray fox (Urocyon cinereoaxgenteus) prefers the chaparral-covered hills south and west of the park, but is an infrequent visitor to the ponderosa pine forests within the park.

Mountain Lion - The mountain lion (Felis concolor) has not been seen within the park since about 1950. Prior to this time, the cat was considered an infrequent visitor to the park and not a permanent resident. Man's encroachment into the cat's territory, hunting pressures from the public, and the elimination or reduction in numbers of prey species are the primary reasons for the elimination of this species from the region of the park.

Bobcats and Lynx - The bobcat (Lynx rufus) is an infrequent inhabitant of all of the life zones within the park. Its population within the park is only about 10 individuals, so sightings are rare. The lynx (Lynx canadensis) is native to the park but has not been reported for many years. It prefers the Canadian and Hudsonian forest habitats.

Elk - The Roosevelt elk (Cervus canadensis roosevelti) once ranged the valleys and open areas from the Cascades westward to the Pacific Coast. With the advance of civilization, the Roosevelt elk withdrew to the higher, forested mountain areas, and by 1917 was on the brink of extinction in the area of Crater Lake National Park. Fifteen Rocky Mountain elk (C. canadensis nelsoni) were brought to the park from Yellowstone National Park in that year, and interbreeding may have diluted any subspecies differentiation by now.

Elk have been seen in all areas of the park but are concentrated in two small herds in the western and southwestern parts of the park. The western herd concentrates around the Sphagnum Bog area and ranges southward to Bybee Creek and possibly as far as the Castle Creek drainage area. Their winter migration begins at the first snows and is westward into the Rogue River drainage area.

The southwestern herd centers around Union Peak and their winter migration is south to Red Blanket Creek and then westward until the lower elevations are reached where dense thickets of ceanothus offer plentiful browse and ample protection from hunting pressures. Exceptionally heavy snowfalls may force the herd further south to Bessie Creek and the Middle Fork of the Rogue River. This is the larger of the two herds. The total number of elk in the park is approximately 140 to 200 animals.

The elk within the park are part of a larger population of elk which range on adjacent lands. General trends for the region indicate that elk populations are increasing. A study of the elk herds within the park was begun in 1973 to determine their population, calving success, and migration routes.

Deer - From 200 to 300 mule deer (Odocoileus hemiones hemiones) live within the park during the snow-free period of summer. They inhabit the east-central area of the park down to the southeast corner and up to the crest of the Cascades just west of the lake. Mule deer prefer the drier eastern slopes and the open forest and mountainous terrain. Their principal browse is mountain mahogany, bitterbrush, and wild rose.

Winter movement is toward the south to the Sun Mountain area and then eastward across the Wood River Valley into the lower Red Blanket Creek area. In the spring they follow the creek drainages back into the park, advancing against the retreating snowline.

The blacktailed deer (Odocoileus hemiones columbianus) typically inhabit areas west of the Cascade crest, as they prefer denser forests than the mule deer. In the park these deer are principally in the west-central section and possibly range as far north as the Sphagnum Bog area. They move to lower elevations to the west at the commencement of winter.

Within recent years the whitetail deer (Odocoileus virginianus ochrounus) has apparently developed a resident population of about 30 animals within the park. Occasional sightings are made where the whitetail frequents stream margins, ponds, permanent potholes, and open wet meadows in the west-central portions of the park.

Mule deer and blacktailed deer integrate along the summit area in the park and some hybridization does occur. Most of the deer sightings in the Annie Springs and Sun Creek area have apparently been blacktail deer, even though this is a mule deer habitat. These may be hybrids. The resident whitetail deer may also be in fact hybrids of blacktail and mule deer.

Pronghorn - In 1896 the Oregon Biological Survey reported abundant pronghorn (Antilocapra americana) in the Pumice Desert

area of what was to become Crater Lake National Park. In 1915 the population was estimated at only 10 and pronghorn have been considered absent from the park until as recently as 1973. The Pumice Desert provides the only habitat in the park for this animal of the open plains, and in 1973, three separate sightings of individual pronghorn or small groups of them were made in this area. The pronghorn thus is present but transient within the park.

Exotic Species - The muskrat (Ondatra zibethicus) is present within the park as a result of its introduction into the surrounding region by man.

Birds. About 175 species of birds have been recorded within Crater Lake National Park. Several of these recorded species were identified on only a few observations and need to be verified. Among the most common species seen by the park visitor are Clark's nutcracker, the gray jay, and Steller's jay. Aquatic bird species are appearing in fewer numbers each year and may be a result of the draining of nearby Klamath Lake.

The golden eagle (Aquila chrysaetos) was once common within the park. It breeds within the park and is considered a permanent resident. It is considered rare, but appears to be maintaining a stable population.

Historically the bald eagle (Haliaectus leucocephalus) was more numerous than the golden eagle. In recent years the population declined to a single breeding pair which nested on the north slope of Wizard Island. They too appear to be gone from the park and the bald eagle may be extinct within the park.

Other infrequently sighted, or rare birds, within the park include two species of falcons. The peregrine falcon (Falco peregrinus) was never common in great numbers but was a regular summer resident. Its population is considered to be static and its occurrence rare. The prairie falcon (Falco mexicanus) is an occasional summer resident and has been known to nest within the park.

Reptiles and Amphibians. Seven species of reptiles and amphibians are found in the park. Although they are widespread through the park at elevations below 7,000 feet, their numbers are few. The valley garter snake is the only species of snake which occurs naturally in the park. It is relatively uncommon and generally inhabits the shores of Crater Lake, Wizard Island, and other watercourses and bogs within the park.

The Crater Lake newt (Taricha granulosa mazama) is the only amphibian in the park that is considered to be rare. It is a subspecies of the rough-skinned newt and is found only within the shoreline ecosystem of Crater Lake.

Fish. With the exception of Dolly Varden trout (Salvelinus malma) in Sun Creek, all of the fish found within Crater Lake National Park are planted exotics. A number of rainbow trout (Salmo gairdnerii iridus) were introduced into the lake as early as 1888. Other species introduced into the lake are the Coho, or silver salmon (Oncorhynchus kisutch); the landlocked sockeye salmon (kokanee) (Oncorhynchus nerka); the German brown trout (Salmo trutta); the brook trout (Salvelinus fontinalis); cutthroat trout (Salmo clarkii); and steelhead trout (Salmo gairdnerii gairdnerii). Only the rainbow and kokanee have been able to adapt and survive in the lake's environment. The kokanee is the best adapted of the two and the most numerous, with fish averaging 9 to 18 inches in length. While less abundant, the rainbows are the larger, measuring 12 to 24 inches in length. Neither of the fish are abundant and their numbers seem to be declining.

Freshwater shrimp and crayfish found in the lake are exotic species which have been introduced as a food source for the fish populations.

Four species of trout are found in the park's streams, although only brook trout and rainbow have been planted officially. Large numbers of rainbow have been stocked, but the survivors are few and scattered. Rainbow have been found in Munson, Annie, Bybee, Sun, and Castle Creeks. Brook trout plantings have been far more successful and this trout is the most abundant and firmly established fish in the park's streams.

A single specimen of brown trout has been recovered in Sand Creek from above the falls, which appear to form an effective barrier to upstream fish migration. It is probable that this fish is a survivor of an unrecorded or unauthorized planting in this creek. Dolly Varden are found in Sun Creek, and are considered the only native trout in the park, having entered Sun Creek from the Wood River and become well distributed in the lower portions of the creek.

Rare, Endangered, or Threatened Species

The American peregrine falcon (Falco peregrinus anatum) is the only animal found within Crater Lake National Park that is listed as endangered with extinction on the United States List of Endangered Fauna, maintained by the Secretary of the Interior. The prairie falcon (Falco mexicanus) was considered for the threatened species category by the U.S. Fish and Wildlife Service but has not yet been placed on the List of Endangered Species as "Threatened."

A number of endangered or threatened species of plants grow in Crater Lake National Park. Species endemic to the area, or species much diminished in range or habitat and listed as Endangered in House Document 94-51, "Report on Endangered and Threatened Plant

Species of the United States," are as follows: Botrychium pumicola, Collomia mazama, Polygonum cascadense, and Penstemon cinicola. Five additional species occur sufficiently close to the park that they are probably present, though as yet undiscovered. They are: Fritillaria adamantia, Dicentra formosa ssp. oregana, Lillum washingtonianum var. minus, Aster chilensis ssp. hallil, and Aster curtus.

Man's encroachment of the land, plus hunting pressures and predatory control programs, have eliminated several native species within the Crater Lake region. Other species have been so reduced in number that they are locally endangered with extinction. Extirpated species are often reported by untrained observers who, because of the natural desire to see a rare animal, turn feral dogs, black bears, and bobcats into wolves, grizzlies, and lynx.

The last known grizzly bear in the area was killed in 1895 and the last wolf was killed in 1927. Two sightings of "gray wolf" were made in the park in 1964 and one in 1975. The Canadian lynx and the wolverine inhabited the general area in the lodgepole forests but have been considered extinct in the Cascades for many years. However, recent reports indicate that at least the wolverine is present in the Crater Lake region and its population and range is slowly expanding. Mountain lions have not been sighted in the park since around 1950. The fisher (Martes pennanti) was considered extremely rare within the park for many years. However, there have been 14 sightings since 1955, indicating an increase in either its population or that of the observers.

The western gray squirrel (Sciurus griseus), mink (Mustela vison), and river otter (Lutra canadensis) were formerly reported from the park but have not been seen in recent years and may be locally extinct. The aplodontia (Aplodontia rufa) was formerly abundant near springs and seepage areas throughout the park. Its range is becoming severely restricted and it has disappeared from some localities. It is rarely seen and observations are based upon its series of burrow entrances and piles of vegetation placed near them.

CULTURAL RESOURCES

Historic

There is little indication that Indians used the area of Crater Lake National Park for anything other than occasional hunting trips. Hudson's Bay Company trappers arrived in the region in the 1820's to trap beaver at lower elevations. John C. Fremont passed through the country east of the park in 1843 and again in 1846 when he managed to have his party of soldiers ambushed by Indians on the western side of Upper Klamath Lake.

Crater Lake was "discovered" on June 12, 1853, by John Wesley Hillman, a young prospector and member of a party on a futile search for a rumored "Lost Cabin Mine." He named it Deep Blue Lake, and reported his discovery when he returned to Jacksonville, a mining camp in the Rogue River Valley west of Medford. On October 21, 1862, Chauncey Nye "discovered" the lake while leading a party of prospectors from eastern Oregon to Jacksonville. He named it Blue Lake. In August 1865, two soldiers stationed at nearby Fort Klamath "discovered" the lake again. They named it Lake Majesty. Four years later, visitors from Jacksonville finally gave the lake the name which has stuck with it to this day.

There was no American settlement in the park's area until 1863, when the United States established Fort Klamath south of the park. The fort was manned entirely by the Oregon volunteers until after the Civil War, and many of the soldiers became settlers after their military duty was completed. The Klamath and Modoc Indians made a treaty with the United States and the Klamath Indian Reservation was formed in 1864. In conjunction with the establishment of Fort Klamath, a road was built in 1863 and rebuilt in 1865 connecting it with Jacksonville. The road may have passed through the southern portions of the present park.

As settlers came in and settled around lakes and streams, they found that one part of the Modoc tribe was not at all content with living on a reservation. The band was led by Kientpoos, better known as Captain Jack, and in 1872 United States troops began the famous and bloody Modoc War by attempting to return Captain Jack and his followers to the reservation. With the end of the war, ranchers and cattlemen began to settle in the valleys east of the park.

The 1880's and 1890's saw the growth of towns. Fort Klamath, often called the most beautiful frontier post in America, was the social center of eastern Oregon. Large lumber companies became interested in the region's vast forests of ponderosa pine, Linkville became Klamath Falls, and the modern era was ushered in with the railroad to Klamath Falls in 1909.

For the most part, Crater Lake National Park is devoid of any significant cultural resources despite the colorful history of the region. In compliance with Section 106 of the National Historic Preservation Act of 1966 (80 Stat. 915), the National Register of Historic Places was consulted. The only property within the park which has been nominated to the National Register is the Crater Lake Lodge, a concession facility located in the Rim Village.

The State Historic Preservation Officer for Oregon has been contacted concerning the historic resources of the park and he confirmed that aside from the lodge building, there were no sites or

properties within the park currently being considered for nomination to the National Register.

A survey in March of 1976 identified a number of structures which may be eligible for nomination to the National Register. These are recorded on the List of Classified Structures. To comply with Executive Order 11593, such surveys are required prior to the initiation of any construction or development in the park which may endanger undisclosed historic resources. These surveys are documented with base maps and assessments based upon professional examination to see if any sites appear to qualify for nomination to the National Register, and to make recommendations for further study if necessary to conserve and manage the historic resources of the park.

In the event that historic resources are disclosed after survey and during the implementation of any action within the park, that action will be halted pending professional examination and assessment in accordance with the Advisory Council's "Procedures for the Protection of Historic and Cultural Properties" (36 CFR Part 800) and National Park Service operating procedures and policy.

Archeological

An archeological survey of the park was completed by Oregon State University in 1963. No significant archeological sites were found within the park. The results of the survey were recorded by Dr. W. A. Davis in "Archeological Survey of Crater Lake National Park and Oregon Caves National Monument, Oregon" (Davis, 1964).

In the event that any archeological or paleontological resources are disclosed during the implementation of any action within the park, that action will be halted pending professional examination and assessment in accordance with the Advisory Council's "Procedures for the Protection of Historic and Cultural Properties" (36 CFR Part 800). In view of the paucity of artifacts and sites disclosed by the above-mentioned survey, such action will probably not be necessitated.

EXISTING DEVELOPMENT

Major developments at Crater Lake National Park are concentrated in three general areas: (1) Rim Village on the south rim of the caldera; (2) Munson Valley, about four miles south and 500 feet below the Rim Village area; and (3) the Annie Springs area near the junction of the West and South Entrance Roads. Minor developments are located around the caldera, along the approach roads, and in the Lost Creek area.

Visitor Use Facilities

Roads. The park road system consists of approximately 85 miles of paved roads, including the 32.6-mile Rim Drive. The four-mile-long unpaved Grayback Ridge Motor Nature Road provides the visitor with an interpretive drive offering exposure to the wide variety of natural resource experiences available in the park. In addition to parking at the main developed areas, there are 123 parking pullouts along the approach roads and at various points around the rim.

In past years, during the peak visitation periods in the summer, a one-way circulation system was implemented on portions of the Rim Drive. The changeover from one-way to two-way traffic required the changing of directional signs. Since the roads are striped for two-way traffic, the visitor became confused, even with numerous signs providing guidance. The present system of one-way and two-way roads was implemented in 1976.

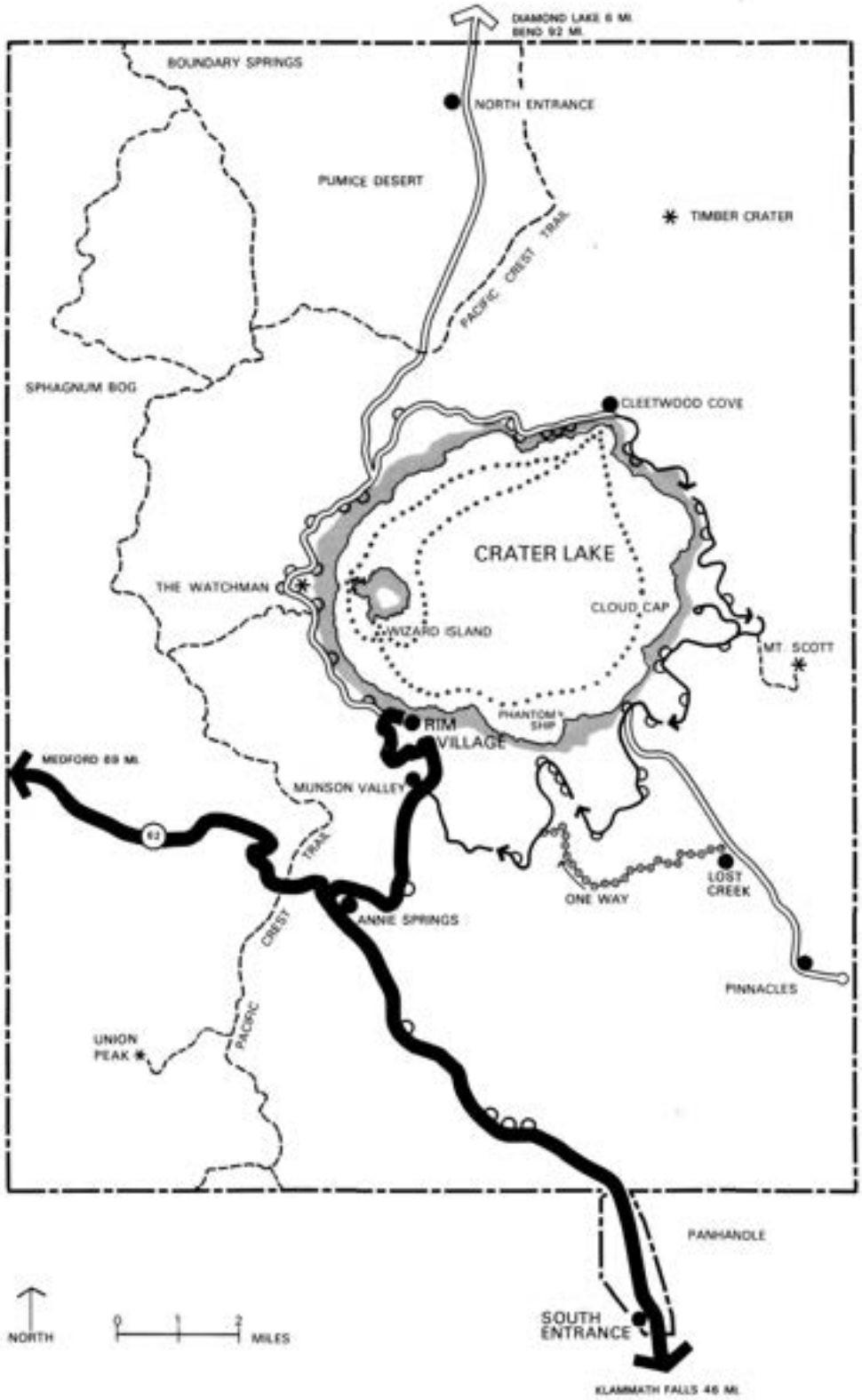
During the winter, the Southeast and West Entrance Roads (State Highway 62), the park road to the Rim Village, and the roads in the Munson Valley residential areas are the only roads that remain open.

Trails. The park trail system of approximately 65 miles includes a 26-mile portion of the Pacific Crest Trail, utilizing for the most part former fire roads and trails. Other short but frequently used hiking trails are the 2.3-mile Mount Scott Trail, the 1.7-mile Garfield Peak Trail, the 0.8-mile trail to Watchman Peak, the Lake Trail leading 1.1 miles to Cleetwood Cove, the 1.5-mile Discovery Point Trail, the 1.2-mile trail to Wizard Island Crater, and the 0.5-mile Castle Crest Trail, which has been developed as a self-guided nature trail.

Picnic Areas. There are six designated picnic areas around the rim. These are provided with tables, waste receptacles, pit toilets, and parking for a total of 149 cars. A larger picnic area is available in the Rim Village, equipped with comfort stations, water, picnic tables, waste receptacles, and fire grilles. Three picnic areas are located along the south approach roads.

Campgrounds. Two campgrounds provide 210 campsites. The former Rim Village Campground has been converted to a day-use picnic area. Lost Creek Campground has 12 primitive campsites with water and a single toilet comfort station provided.

Mazama Campground, with 198 sites, is located just north of the south entrance in the Annie Springs area. There is a small, portable registration kiosk at the campground entrance. The sites are distributed around seven loops, each containing a modern comfort



RIM DRIVES

EAST RIM DRIVE ONE WAY CLOCKWISE FROM CLEETWOOD COVE TO MUNSON VALLEY – GRAYBACK RIDGE MOTOR NATURE ROAD ONE WAY FROM LOST CREEK TO EAST RIM DRIVE – ALL OTHER ROADS ARE TWO WAY.

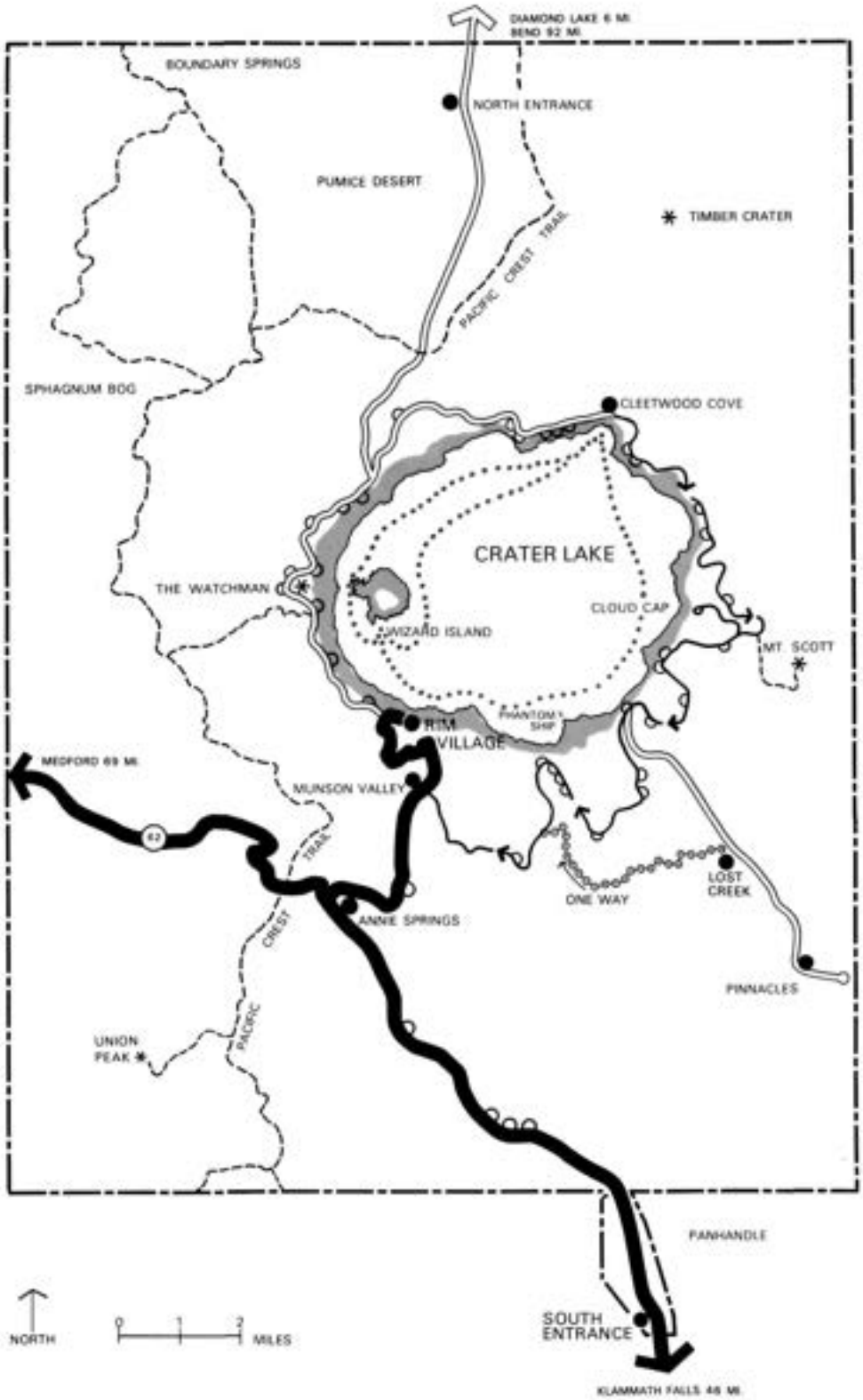
RIM DRIVES OPEN FROM ABOUT MID-JULY UNTIL CLOSED BY SNOW, USUALLY IN LATE OCTOBER.

ACCESS & CIRCULATION

CRATER LAKE NATIONAL PARK/OREGON

UNITED STATES DEPARTMENT OF THE INTERIOR/NATIONAL PARK SERVICE

105	400388
DSC	DEC 77



NORTH ENTRANCE
ENTRANCE STATION - SEASONAL RESIDENCE

CLEETWOOD COVE
BOAT DOCKS - REFRESHMENTS - WATER MONITORING STATION - FUEL STORAGE - CHEMICAL TOILETS - TICKET OFFICE

WIZARD ISLAND
BOAT DOCKS - BOAT STORAGE FACILITY - CHEMICAL TOILETS - TRAILS

RIM DRIVES
OVERLOOKS - PICNIC AREAS - COMFORT STATIONS - EXHIBITS - INTERPRETIVE TRAILS

THE WATCHMAN & MT.SCOTT
UNUSED FIRE LOOKOUTS - WATCHMAN USED FOR SHELTER & EXHIBITS

RIM VILLAGE
SINNOTT MEMORIAL OVERLOOK - RIM WALKS - PARKING - PICNIC AREA - COMFORT STATIONS - LODGE (99 ROOMS) - CABINS (33) - CAFETERIA/CURIO SHOP - EXHIBIT BUILDING - COMMUNITY BUILDING - EMPLOYEE DORMITORY

MUNSON VALLEY
ADMINISTRATION BUILDING - MAINTENANCE FACILITIES - GAS STATION - PERMANENT AND SEASONAL HOUSING

LOST CREEK
PRIMITIVE CAMPGROUND - GRAYBACK RIDGE MOTOR NATURE ROAD - INTERPRETIVE EXHIBITS - PINNACLES VIEW POINT

ANNIE SPRINGS
MAZAMA CAMPGROUND (198 SITES) - SOUTH ENTRANCE STATION - INFORMATION - SEASONAL RESIDENCE - MAIN PARK WATER SUPPLY - AMPHITHEATER - SANITARY DUMP STATION

SOUTH ENTRANCE/PANHANDLE
MAINTENANCE STORAGE AREA

BACKCOUNTRY
TRAILS - UNDEVELOPED CAMPSITES

RIM DRIVES
EAST RIM DRIVE ONE WAY CLOCKWISE FROM CLEETWOOD COVE TO MUNSON VALLEY - GRAYBACK RIDGE MOTOR NATURE ROAD ONE WAY FROM LOST CREEK TO EAST RIM DRIVE - ALL OTHER ROADS ARE TWO WAY.

RIM DRIVES OPEN FROM ABOUT (illegible) UNTIL CLOSED BY SNOW, USUALLY IN LATE OCTOBER.

PARK BOUNDARY
ROADS OPEN ALL YEAR
ROADS OPEN SUMMER ONLY
FOCAL POINT/DEVELOPED AREA
OVERLOOK/PARKING
BOAT TOUR ROUTE
GRAYBACK RIDGE MOTOR NATURE ROAD
TRAILS

EXISTING DEVELOPMENT

CRATER LAKE NATIONAL PARK/OREGON

UNITED STATES DEPARTMENT OF THE INTERIOR/NATIONAL PARK SERVICE

106	40037B
DSC	DEC 77

station. A sanitary dump station for recreation vehicles is located near the entrance to the campground. A 500-seat rear-screen projection amphitheater is used for evening interpretive programs.

Boat Tours. The concessioner owns and operates four 60-passenger tour launches, providing two-hour tours around the lake. Visitors may stop over on Wizard Island, taking a later boat back. The lakeshore terminus at Cleetwood Cove contains a floating dock, small ticket sales stand, a manually operated gas pump and storage tank, and two chemical toilets. A USGS water gauging station is located a short distance west of the landing. There are no electrical, water, or sewage treatment facilities at Cleetwood Landing.

Development on Wizard Island is limited to a small boat landing, two concession-owned boat houses, two chemical toilets for visitor use, and the trail to the top of Wizard Crater. The four launches are stored in the boat houses and the floating docks are stored in a cove on the west side of the island during the winter. There are no utility systems on Wizard Island.

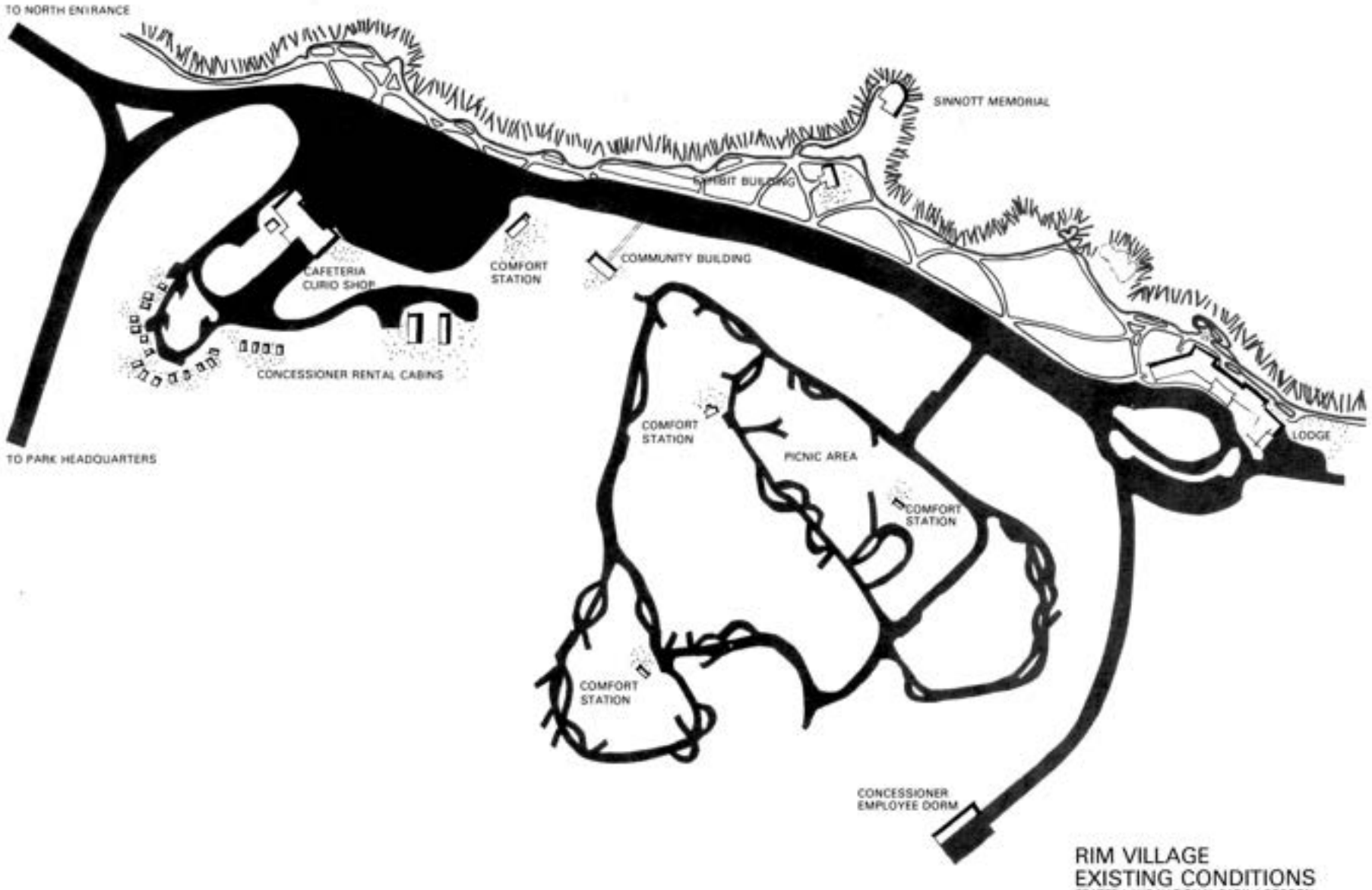
Parking, pit toilets, picnic tables, and a mobile refreshment stand are located at the Cleetwood Cove trailhead.

Rim Village. The major concentration of visitor-use facilities occurs in the Rim Village on the south rim of the caldera. The National Park Service operates the Sinnott Memorial, a stone structure on the caldera rim, where interpretive talks on the geology of the park are given; an exhibit building; a community building where indoor programs are held; the picnic area; and four comfort stations. Parking is provided for 371 cars adjacent to facilities and near the rim walkways.

Concessioner-operated facilities include the Crater Lake Lodge at the easternmost end of the developed area. The lodge has 80 operational rooms housing a maximum of 180 overnight guests; the dining room, bar, lobby and lounge areas serve the general visitors as well as lodge guests. A gift shop occupies a corner of the lounge.

A large cafeteria and curio shop, located at the westernmost end of the developed area, is the most heavily used facility. Behind the cafeteria the concessioner operates 20 small cabins, 18 of which are cold-water units. There is a new (1973-1974) dormitory south of the lodge for concessioner employees. A portion of the third floor of the lodge is also used for employee quarters.

During the winter the cafeteria is the only facility in the Rim Village that remains open.



RIM VILLAGE
EXISTING CONDITIONS

CRATER LAKE NATIONAL PARK / OREGON

UNITED STATES DEPARTMENT OF THE INTERIOR / NATIONAL PARK SERVICE

NDE | 80031 B
DSC | JUNE 77

Munson Valley. The only visitor use facilities in Munson Valley are the small information counter in the park administration building, the post office, and the concessioner-operated service station, serving both the visitor and park employees. Self-service pumps are available in the winter for employees and for visitors on an emergency basis.

Other Facilities. The National Park Service operates two entrance stations - one near the north boundary on the North Entrance Road, and the other near Annie Springs just north of the West and South Entrance Roads junction. These entrance stations are kiosk-type temporary structures of wood frame and glass construction, situated on a traffic island in the center of the road. While information is available at these entrance stations, the primary function is the collection of entrance fees.

A former fire lookout, a stone and wood structure situated atop The Watchman, serves as an interpretive and rest area.

There is a small comfort station at Kerr Notch, the only comfort station along the Rim Drive outside the Rim Village area.

Interpretive exhibits are located at various overlooks around the caldera and along the approach roads.

Management Facilities

Munson Valley. Currently, the hub of the National Park Service operation at Crater Lake is located at Munson Valley. The administration building houses the park's office and a small visitor information counter. Just west of the administration building is the Stone Housing area with nine employee residences, one three-unit apartment, one garage, and a ranger dormitory (used by the Youth Conservation Corps).

The park maintenance complex is located south of the administration building. It contains a warehouse, fire cache, gas house, three lumber/ equipment sheds, a mechanics shop and vehicle storage building, and a large mess hall (used by the Youth Conservation Corps). The center of the maintenance area is asphalt-paved, providing parking and maneuvering space for heavy equipment and other vehicles. Adjacent to and north of the maintenance area are a small transformer building and a paint storage building. A generator building is located north of the Steel Circle housing area.

South of the maintenance area, in an area known as Sleepy Hollow, are 14 small cottages used by seasonal employees during the summer months. A nine-car garage, used for storage, is also located at the lower end of the cottage area.

Eight trailer sites are situated south of the cottage area. Each site is provided with water, sewage and electrical connections. The trailer sites are available to summer seasonal employees who bring their own trailers and/or for NPS-provided trailers.

Across the main park road from the maintenance area is the Steel Circle employee housing area. Around Steel Circle are seven two-family, two-story housing units, one four-unit apartment building, a one-story seasonal quarters for concession employees, and a multi-purpose community building. All structures are of contemporary concrete block and frame construction.

Other Facilities. A large utility storage area is located a short distance inside the south boundary of the southern Panhandle of the park, just off the west side of the South Entrance Road. House trailers used in the park are stored here during the winter months. Various other construction equipment and materials are also stored here for use in the park. There are no utilities in the area; a primary power line passes close to the site. The U.S. Geological Survey, in its open file report on the resources of Crater Lake, suggests that a deep well in the Panhandle would be a good risk as a water source. An intake on Annie Creek or a pipeline from Annie Springs are other water sources which have been suggested.

A small seasonal cabin is located near the South Entrance Station at Annie Springs, a wooden frame patrol cabin located east of Cleetwood Cove at an area known as the Wineglass, an unused fire lookout on top of Mount Scott, and a small cabin and pit toilet near the North Entrance Station are the only other significant structures located in the park.

Utilities

Water. Two small water systems serve minor developments in the park:

> Lost Creek - spring-fed, treated, gravity water system to comfort station and faucets.
>
> Kerr Notch - spring-fed, treated, gravity water system to comfort station and drinking fountain.

There are no water systems at the north entrance or the south entrance maintenance area.

The major developed areas - Rim Village, Munson Valley, and Mazama Campground - are supplied with water from Annie Springs. The former Rim Village-Munson Valley system, which became contaminated, has been replaced. Water is chlorinated and pumped to a

storage reservoir above the headquarters area and then distributed by gravity lines to facilities in Munson Valley. Water for Mazama Campground is pumped to a reservoir near Annie Springs and fed by gravity to the campground. To serve the Rim Village, water is pumped from Munson Valley to a storage tank on Garfield Peak east of the village and then is gravity-fed to the facilities. The water system is adequate to supply existing and proposed facilities.

Sewage Treatment. Small septic systems are located at Lost Creek Campground and the Kerr Notch comfort station. Pit toilets serve picnic areas around the rim and the north entrance cabin while chemical toilets are used at Cleetwood Cove and Wizard Island.

Lagoon systems providing primary and secondary treatment are located at Mazama Campground and Munson Valley. The lodge and dormitory in the Rim Village are connected by gravity sewer line to the Munson Valley lagoon system. All facilities in Munson Valley are connected to the lagoon system by gravity sewer lines.

The Rim Village cabins, cafeteria, and picnic area comfort stations are connected to a septic tank with leaching trenches located south of the cafeteria. This septic system and the Munson Valley lagoon system are operating at capacity while the Mazama Campground system is not, as it was designed to handle future expansion needs. Both the Rim Village and Munson Valley sewage treatment facilities are being improved to increase their capacity.

Solid Waste. During the summer solid waste is removed by commercial contract. During the winter the National Park Service collects solid waste and hauls it to a sanitary landfill near Klamath Falls. The concessioner reimburses the National Park Service for this winter service.

Power. Commercial power (21,000-volt overhead line) enters the park at the south entrance, paralleling the park road system to Annie Springs and Munson Valley. National Park Service-owned primary and secondary distribution in Mazama Campground, the Rim Village, and most of Munson Valley is underground. The Steel Circle area has overhead lines with underground service to individual residences. A 250 KW diesel generator in Munson Valley provides standby power. There is no power at the north entrance, Cleetwood Cove, Lost Creek, or the southern Panhandle. However, the primary line passes just west of the Panhandle maintenance area and power could be made available.

Telephone. Telephone service is by microwave from White City, Oregon, to a reflector on Garfield Peak and then to a receiver/transmitter located at park headquarters. Telephone switching equipment is located in the mess hall building in Munson Valley. Underground telephone lines connect the Rim Village, park headquarters, Munson Valley, and Mazama Campground.

Radio. The park operates a radio system from park headquarters with a solar-powered repeater located in The Watchman lookout. The repeater/antenna provides radio contact with remote facilities, vehicles, and personnel aboard boats on the lake.

EXISTING VISITOR USE

Visitor Characteristics

The average Pacific Coast vacationer visits most of the highlights of his trip within a ten-day period. Crater Lake National Park is an important part of many of these trips, but few regard it as a terminal destination, and once there, seeing the lake is sufficient for most visitors. Thus, the visitation to the park is concentrated between June 1 and September 15, and is predominantly day-use.

As shown in Table 4, park travel is steadily increasing despite fluctuations caused by prolonged winter snowpacks or, as occurred in 1975, a partial closure of the park prompted by sanitation problems.

During 1974, approximately 45 percent of the total summer visitors were from California, 26 percent from Oregon, 8 percent from Washington, and the remaining 21 percent from all other states combined. Eighty-five percent of the summer visitors remain in the park less than eight hours and 65 percent of these, or 56 percent of the total, remain in the park less than four hours. Seventy-five percent of the summer visitation occurs in the five hours between 10 o'clock in the morning and 3 o'clock in the afternoon.

Automobile Sightseeing

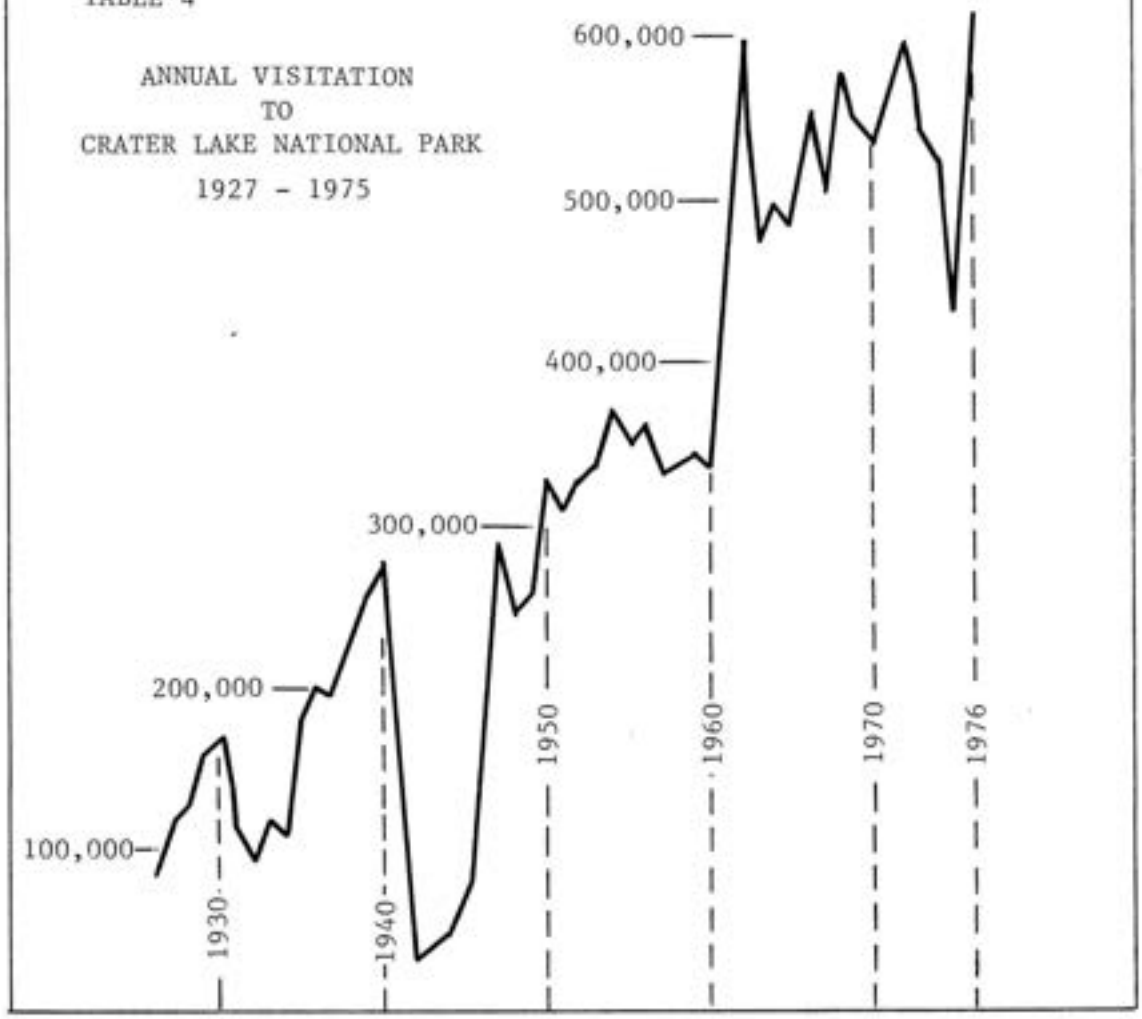
This is the major activity of visitors to Crater Lake National Park. The Crater Rim Road is normally open by the first of July and offers the auto-borne visitor outstanding views of the lake. The park concessioner offers two-hour bus tours around the rim each day. Ample parking space exists at most of the 40 or more overlook points around the crater.

Visitors arrive at the park primarily through the south entrance in their own or rented vehicle, or by a concessioner-operated minibus from Klamath Falls. In general, park roadways are adequate for present traffic volumes, although congestion does occur at major overlooks along the West Rim Drive and in the Rim Village where conditions during peak periods are comparable to a busy suburban shopping center parking lot.

The present circulation system, implemented in 1976, allows the visitors a choice between the more direct route of the West Rim

TABLE 4

ANNUAL VISITATION
TO
CRATER LAKE NATIONAL PARK
1927 - 1975



1927 - 81,155	1944 - 42,385	1961 - 415,567
1928 - 111,868	1945 - 77,864	1962 - 592,124
1929 - 127,146	1946 - 188,794	1963 - 475,684
1930 - 157,693	1947 - 289,681	1964 - 494,057
1931 - 170,284	1948 - 243,533	1965 - 480,478
1932 - 109,738	1949 - 255,610	1966 - 552,531
1933 - 90,512	1950 - 328,041	1967 - 499,357
1934 - 188,699	1951 - 306,668	1968 - 578,271
1935 - 107,701	1952 - 323,410	1969 - 544,932
1936 - 180,382	1953 - 332,835	1970 - 534,962
1937 - 202,403	1954 - 370,554	1971 - 557,958
1938 - 190,699	1955 - 343,839	1972 - 594,343
1939 - 225,101	1956 - 359,840	1973 - 539,527
1940 - 252,482	1957 - 330,499	1974 - 525,030
1941 - 273,564	1958 - 333,893	1975 - 427,252*
1942 - 100,079	1959 - 340,989	1976 - 606,636
1943 - 28,637	1960 - 330,398	

NOTE: 1927 through 1945 travel year ended in September.

*Low travel in 1975 due to closure of park for part of year.

Drive and the longer, more leisurely East Rim Drive. The narrow (18 feet) West Rim Drive forces traffic to move at a relatively slow pace and, because nearly all the visitors use this road, there is some congestion at the various overlooks.

The one-way East Rim Drive provides a more leisurely pace for the visitors with more time available. These visitors may also take a side trip to the Pinnacles area and drive the Grayback Ridge Motor Nature Road.

The visitor use of picnic areas within the park is moderate and present facilities appear adequate to meet public demand.

Interpretive Programs and Facilities

Conducted Trips. Guided trips are scheduled daily to points of interest within the park. The 2.5-hour hike along the Garfield Peak trail begins at the exhibit building in Rim Village. Other walks and hikes are scheduled periodically. Naturalists accompany most scheduled concessioner-operated boat trips on Crater Lake. When naturalists are not present, the boat operators conduct the tour. The attendance on guided tours within the park and on the lake has doubled in the last 10 years.

Interpretive Programs. Nightly interpretive programs are given at Crater Lake Lodge and at Mazama Campground during the summer months. Short talks on the geology of Crater Lake National Park are given hourly at Sinnott Memorial during the summer. The facilities at the lodge are inadequate for interpretive programs and the space at Sinnott Memorial is generally inadequate for the number of visitors attempting to attend programs given there.

Attended Stations. The park has no visitor center. One room of a small photographic studio, a relic from an earlier era now called the exhibit building, is used as a contact station for the Rim Village area. Located some distance from the main parking area, the building is not readily visible to visitors arriving in the Rim Village. The Sinnott Memorial is manned as an interpretive and observation station between the periodic geology talks and The Watchman fire lookout on the West Rim Drive is manned on a part-time basis. All of these facilities are overcrowded beyond their desired capacities and provide less than adequate individual services.

An information counter in the lobby of the headquarters administration building in Munson Valley is manned 16 hours a day during the summer and nine hours a day during the winter. General park information is also available at the park's two entrance stations.

Self-Guided Tours. The numerous interpretive markers and wayside exhibits along the Crater Rim Road create a 33-mile-long self-guided automobile tour which is quite effective in relating the geology of Crater Lake to the park visitor. A number of foot trails within the park are designed for self-guiding. They include the trail at Castle Crest Wildflower Garden near the park headquarters in Munson Valley, the Godfrey Glen Nature Trail near Mazama Campground, and the trail to The Watchman on the West Rim Drive.

The four-mile-long Grayback Ridge Motor Nature Road, east of the Rim Village, is self-guiding and displays the evolution of the surrounding landscape with excellent examples of glacial action and spectacular views of the Klamath Basin.

Lake Use

Boat Tours. Private boats and boating are prohibited on Crater Lake. The park concessioner maintains a four-boat fleet of 60-passenger launches. There are 10 trips of two-hour duration each day around the lake and one round trip to Wizard Island in the late afternoon which takes about 45 minutes. More than 500 people a day hike the 1.1 miles down the Cleetwood Cove Trail, as it is the only access to the lake's shore and to the docking facilities for the launch trips. The concessioner maintains facilities for docking and maintenance on Wizard Island.

Fishing. Fish are exotic in Crater Lake and within most of the park's streams. The fish population was planted and supplemented for many years by a stocking program. Only about one percent of the park visitors spend time fishing within the park, primarily in the lake but sometimes in the surrounding streams. Trout populations in the lake are decreasing, but kokanee salmon in the lake appear to be little affected by the light fishing pressures. Fish stocking programs have been discontinued in the park and it is expected that fishing will never become a major visitor activity.

Overnight Use

Lodging/Food Services. Lodge and cabin facilities operated by the park concessioner at Rim Village are available from June 15 until shortly after Labor Day. These facilities can accommodate approximately 265 visitors for sleeping. The facilities are normally at capacity during July and August and demand often exceeds capacity during these months. The lodge dining room can seat 74 visitors for breakfast and dinner. The cafeteria/curio shop can seat 184 downstairs and 104 upstairs in its lounge; a small snack bar offers a limited carry-out menu. A mobile refreshment stand at Cleetwood Cove provides light snacks.

Camping. There are two campgrounds in the park. Mazama Campground is the largest with 198 sites, while Lost Creek Campground with only 12 sites provides more primitive camping in the eastern portion of the park. Mazama Campground is normally open by mid-June and the July and August demand for campsites is usually greater than the supply. Approximately half of the campers at Mazama are in recreation vehicles, a proportion which seems to be increasing. To meet this type of demand, a second campground designed for trailer campers was initiated a number of years ago at the Mazama Campground area. Water and sewer systems were installed, but are not now in operation.

Backcountry Use

About 85 percent of Crater Lake National Park can be considered as backcountry. Seventy-six percent of the total park (122,400 acres) has been proposed for preservation under the Wilderness Act of 1964. This hinterland receives relatively light use. During 1974 there were an estimated 1,422 overnight stays in the backcountry, 79 percent of which occurred during the period of June through September.

The light use of the park's backcountry is attributed to the immediacy and availability of many other scenic and primitive backcountry areas in the region; a lack of well-marked trail systems in the park; a general lack of water in the backcountry of the park; few trails leading into the park from outside areas; a lack of well-demarcated trailheads in the park; and primarily, to the heavy snowfall which remains on the trails well into the summer.

A 26-mile portion of the Pacific Crest National Scenic Trail, which runs from Mexico to Canada, transects Crater Lake National Park in a north-south direction. Approximately 65 miles of trails exist in the park, most of which utilize old fire roads. Because of recent shifts in trail alignment on National Forest lands north of the park, it has been necessary to relocate sections of the trail in the park as well. The changes have been accomplished by utilizing old truck roads along with about 4½ miles of newly constructed trails. With completion of the new route, more of the trail is actually on or near the crest of the Cascade range.

Though it receives only moderate use, the Pacific Crest Trail is the most heavily used trail in the park. An average of four to five horseback parties traverse the park on the Pacific Crest Trail each year. However, they seldom deviate from the trail and eventually move on to areas outside the park, since a variety of scenic and primitive areas exist along the trail throughout the region.

Other popular hiking trails in the park backcountry include Lightning Springs Trail, the Boundary Springs-Sphagnum Bog Loop, and the Union Peak area.

Backcountry camping is concentrated at Stuart Falls, Lightning Springs, Bybee Creek, Oasis Spring, and Red Cone Spring. All major camping areas and trails are located on the west side of the park where water is most abundant. No campsite developments exist or are proposed for the backcountry.

Winter Use

Park visitation drops rapidly after Labor Day each year. Limited services and accommodations, including Mazama Campground, remain available until the first heavy snows in October. From October through July all roads in the park are closed except those from the south and west entrances, those in Rim Village, around the park headquarters and residence areas, and the road to Discovery Point.

Winter visitation consists mainly of local Oregon residents. The concessioner-operated cafeteria and curio shop is kept open daily and provides curios and light refreshments. In the past, to view the lake winter visitors had to climb steps cut in the snowbank in the Rim Village parking lot and walk across the snow to a roped-off viewing area. A culvert has been installed for the 1976-77 season as an experiment to provide a safe view of the lake for visitors.

As it is in the summer, sightseeing is the most popular visitor activity. The park receives light but steadily increasing use from cross-country skiers and snowshoers, with most of their activity being concentrated around the park headquarters and the Rim Village. Snow depths of up to 16 feet attract increasing numbers of snowmobilers into the park each winter and numerous snowmobiling opportunities exist at lower elevations when heavy snowfalls occur. The bulk of the snowmobiling typically takes place during weekends throughout the winter months. Winter snowmobile use in the park approximates the summer use of the backcountry, with about 1000 participants each year. Snowmobile use is restricted to the North Entrance Road, which remains unplowed throughout the winter months.

Seven alpine ski areas are located in the region and at least two more are being proposed. These areas seem to provide a sufficient outlet for this type of winter recreation and little public interest has been shown for alpine skiing within the park.

SOCIOECONOMIC FACTORS

Access

The principal access routes to the park within the region include Interstate 5 (a north-south route) to the west of the park in the Willamette Valley. East of the park, and paralleling the Cascades,

is U.S. 97 across the high plateaus. Interstate 80 intersects the Cascades from the east and forms the northern regional boundary. All- weather routes, State 62 in the south and State 230 in the west, lead directly into the park. State Route 138 enters the park from the north and is closed during the winter.

Regional Recreational Opportunities

Regional recreational opportunities abound in this section of the Pacific Northwest. Within a 100-mile radius of the park there are 33 state parks and 64 private and state campgrounds with a total of about 3000 campsites in addition to numerous Forest Service campgrounds and recreation sites. Other state and private resorts and motels maintain lodging facilities for nearly 13,000 overnight visitors.

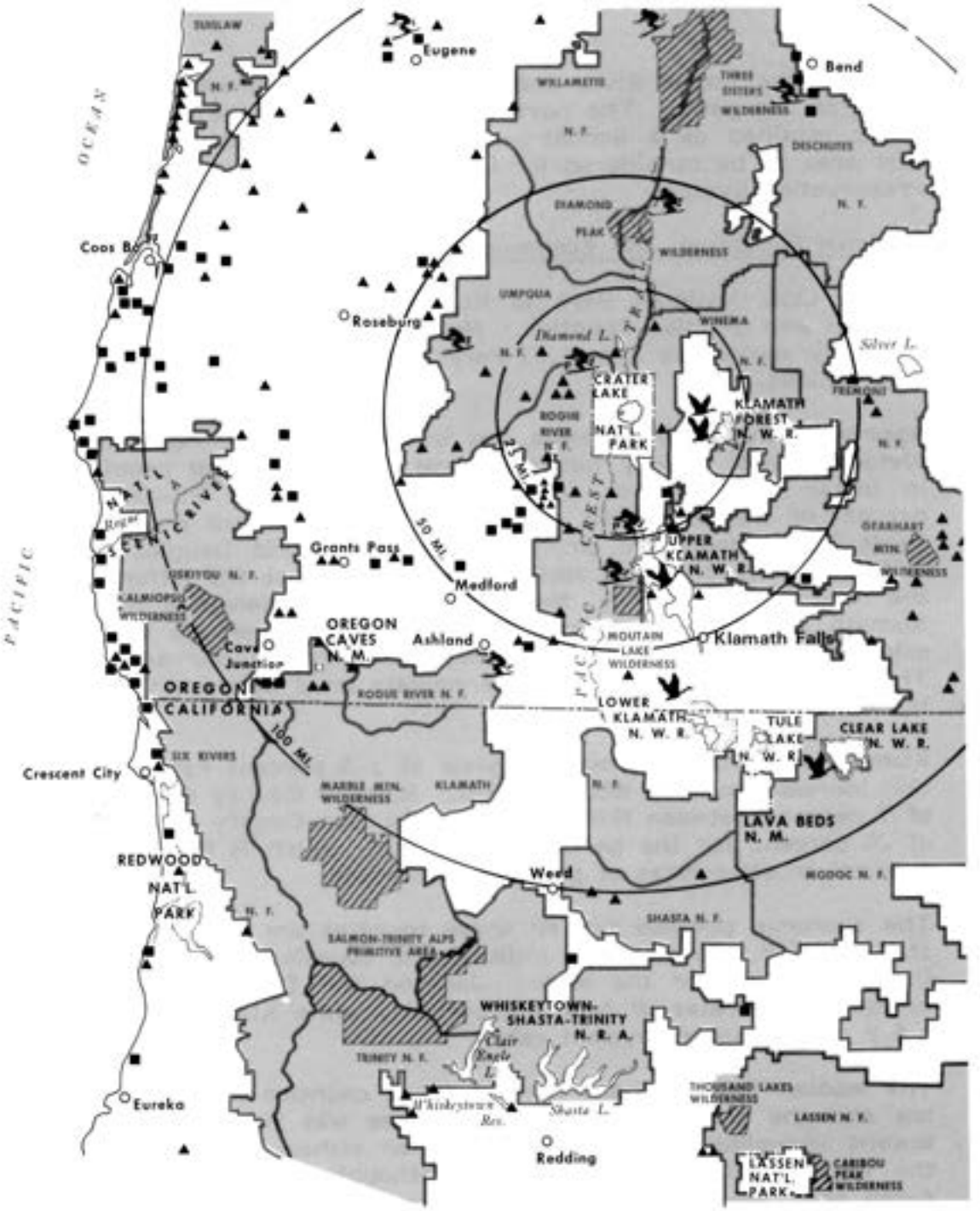
A large dam/reservoir is under development approximately 30 miles southwest of the park. This development will presumably attract additional recreation users into the area.

The area contains some of the best migratory waterfowl hunting in North America on four National Wildlife Refuges, as well as excellent opportunities for both big and small game hunting. The Klamath Basin to the east of the park is on the Pacific Flyway and is a principal stopover for some 4 million ducks and geese each year. Over 100 mountain lakes and 80 streams within Klamath County alone offer fine trout fishing opportunities.

Upper Klamath Lake to the east of the park is the largest body of fresh water in Oregon and offers boating, fishing, waterfowl, and the chance to water-ski for over 30 miles in a straight line.

Crater Lake National Park is surrounded by three national forests, and the forest land immediately southwest of the park is currently being administered as a primitive area. The feasibility of extending the Upper Rogue River Trail is being explored by the U.S. Forest Service and the State of Oregon. The final trail system will ultimately link the Pacific Ocean coast with the Cascade Mountains and Crater Lake, and act as a feeder trail to the Pacific Crest National Scenic Trail, which passes through the park.

Wilderness areas also offer a variety of regional recreational opportunities. Thirty miles south of the park is the 23,071-acre Mountain Lakes Wilderness Area, located in the Winema National Forest. Diamond Peak Wilderness Area (35,440 acres) lies 30 miles north of the park in Willamette and Deschutes National Forests. The 18,709-acre Gearhart Mountain Wilderness Area lies 75 miles southeast of the park in the Fremont National Forest and a 76,900-acre Kalmiopsis Wilderness Area in the Siskiyou National Forest lies 100 miles southwest of the park. The 107,900-acre Sky Lakes study



LEGEND

- STATE PARK
- SKI AREA (EXISTING)
- SKI AREA (POTENTIAL)
- CAMPGROUND : PRIVATE & STATE
  (ONLY MAJOR FOREST SERVICE CAMPGROUNDS ARE SHOWN)
- WILDLIFE REFUGE

REGIONAL RECREATION OPPORTUNITIES

CRATER LAKE NATIONAL PARK / OREGON

UNITED STATES DEPARTMENT OF THE INTERIOR / NATIONAL PARK SERVICE

106 | 20002-A
DSC | OCT 76

zone, in the Rogue River and Winema National Forests, lies directly south of the park. The northern two-thirds of the study zone are to be retained as a limited-use area with the northern portion of that area to be considered for inclusion into the National Wilderness Preservation System.

Regional Population and Economic Structure

Crater Lake National Park is in Klamath County and adjacent to Jackson and Douglas Counties. Most lands proximal to the park are Federally owned by the U.S. Forest Service or are part of Indian reservations.

Approximately 220,000 people live in the tri-county region and are divided nearly equally between rural populations and people living in urban centers with populations greater than 2,500. Forty percent of the population lives in the five urbanized areas listed in Table 5. Demographic profiles for Klamath and Douglas Counties differ significantly from Jackson County because the latter contains the region's largest city, Medford. Population densities are low for Klamath and Douglas Counties, with 8 and 14 persons per square mile, while Jackson County averages 34 persons per square mile. This latter density is at an intermediate level between Oregon and the nation (see Table 7).

Klamath and Douglas Counties grew at a 5 percent rate of population increase between 1960 and 1970. Klamath County grew at a rate of 7 percent between 1970 and 1974. Jackson County grew at a rate of 28 percent for the period 1960 to 1970, which is higher than the national or state rates of population increase.

The economic profiles for all three counties are similar. The 1970 statistics for unemployment indicate the counties had a higher rate than the nation or the state. Jackson and Douglas Counties had unemployment rates of nearly 9 percent, while Klamath County had a 6.9 percent unemployment rate.

The median family income for the three counties was comparatively low and the distribution of family income was more heavily skewed toward low-middle income brackets than either Oregon's profile or the national income distribution. Although this data is somewhat dated and care should be taken in the interpretation of raw income data, they do serve as relatively good indications of current economic trends in the region.

The economic structure of the region is largely tied to its resource base, forested land being the dominant land use, with the percentage of land devoted to forests ranging from 70 percent for Klamath County to 87 percent for Jackson and Douglas Counties. The commercially important species are Douglas fir in Jackson and Douglas Counties and ponderosa pine in Klamath County.

TABLE 5. Tri-County Communities With 5,000 or More Inhabitants - 1970*

Urbanized Area	County	1960 Population	1970 Population	% Change
Altamount	Klamath	10,811	15,746	+45.6
Ashland	Jackson	9,119	12,342	+35.3
Klamath Falls	Klamath	16,949	15,775	- 6.9
Medford	Jackson	24,425	28,454	+16.5
Roseburg	Douglas	11,467	14,461	+26.1

*From "County and City Data Book" 1972. U.S. Department of Commerce, Bureau of the Census, U.S. Government Printing Office, Washingtin, D.C.

TABLE 6. Land Use Crater Lake National Park Region Klamath, Jackson, and Douglas Counties Percentage of Total Land Use in 4 Categories*

County	Urban	Agriculture	Forests	Grazing
Klamath	.35	7.34	70.39	15.48
Jackson	.29	7.86	87.85	3.79
Douglas	.27	4.38	86.35	8.71
State of Oregon	.49	6.52	44.84	41.50

*Resources for Development, Oregon Department of Planning and Development, March 1969.

TABLE 7. Socioeconomic Characteristics*

Variable	Nation	Oregon	Klamath	Doulgas	Jackson
1970 Population	203,212,877	2,091,385	50,021	71,743	94,533
% Change 1960 to 1970	13.3	18.3	5.4	4.8	27.8
Net Migration % Change 1960 to 1970	1.7	9.0	-7.1	-7.3	19.7
Population per square mile	57	22	8	14	34
% Urban	73.5	67.1	63.1	34.3	55.3
% Rural Non-Farm	22.4	26.5	29.3	56.3	36.3
% Farm	4.0	6.4	7.6	9.4	6.4
Median Family Income	9586	9487	8645	8572	8670
1969 Family Income					
% less $3000	10.3	9.2	9.7	11.7	11.1
% $3000 to 4,999	10.0	9.9	12.9	9.6	12.3
% $5,000 to 6,999	11.9	11.8	14.4	13.7	13.7
% $7,000 to 9,999	20.9	22.9	23.6	25.7	24.2
% $10,000 to 14,999	26.6	28.2	24.6	25.5	25.4
% $15,000 to 24,999	16.6	14.2	12.1	11.3	10.4
% above $25,000	4.6	3.8	2.6	1.2	2.9
1970 Unemployment Rate	4.4	7.0	6.9	8.9	8.8

*City & County Data Book 1972, U.S. Department of Commercie, Bureau of the Census

An economic base analysis was developed from census data that demonstrates the heavy dependence on forest products. In this model exports from the region are viewed as the fundamental determinants of all economic activity, since they generate flows of income into the regional economy. The relative importance of each industrial sector is measured in terms of the employment that exceeds the needs for the production of the goods and services required for consumption within the region. Table 9 demonstrates that about 65 percent of the export employment for the three counties originates in the furniture/lumber section. Klamath County's forest products industry alone has 4,000 employees and a payroll of 46 million dollars.

Other important industries include the agricultural section and the retail trade sector, with 15 percent and 13 percent of the export employment respectively. Any general economic problems that may become manifest in the region will be greater magnified due to the relatively high dependence upon a single resource industry.

The agricultural sector is the second major export industry for the three counties. But the export employment of 15 percent is substantially less than that found in the furniture/lumber sector. Also, the percentage of land devoted to agriculture is relatively low, ranging from 4 to 8 percent for the three counties (see Table 6). Major crops in the region include wheat, barley, hay, potatoes, and onions. Apple and pear orchards represent important commodities in the Medford area. Cattle and sheep ranching are important activities in the Klamath and Tule Lake basins.

The retail trade sector is the last major export employer. Included in this sector are such industries as tourism and recreation-related activities. There is an abundance of private state and Federal facilities which promote camping, fishing, and hiking in the region. National forests contiguous to Crater Lake (Rogue River, Umpqua, and Winema) provide a wealth of recreation opportunities. For the three national forests an aggregate of available camping facilities includes 950 trailer sites and 400 tent sites. Lodging within a 20-mile radius of the park consists of 168 motel units and 16 cabins. Lodging is best characterized as cottage industries and none are franchised. The one major development at Diamond Lake has 84 units and camping services. Most of the lodging appears to be resort-type and therefore may not cater to transient accommodations. However, overnight accommodations are well developed in the major urban centers of the region. Approximately 1000 motel units are available in Klamath Falls and almost 2000 units in the Medford/Ashland area.

Agriculture is the second most important industry in the region. However, the proportion of land in agriculture is relatively small when compared to state or national averages (see Table 6). In

TABLE 8. Economic Base - Klamath, Jackson, and Douglas Counties, Oregon*

Sector	Location Quotient	Actual Employ.	Export Employ.	Percent of Export Employ.	Service Employ.
Agriculture	2,748	5,630	2,882	14.707%	2,748
Mining	610	230	0	0	263
Construction	4,423	4,042	0	0	4,042
Furniture, Lumber	947	13,520	12,573	64.161	947
Primary Metal	1,172	306	0	0	306
Fabricated Metal	142	306	164	0.838	142
Machinery	1,926	404	0	0	404
Electrical Mach.	1,842	164	0	0	164
Motor Vehicles	2,069	218	0	0	218
Other Durables	1,986	877	0	0	877
Non-durable Man.	7,832	1,972	0	0	1,972
Transportation	5,017	4,677	0	0	4,677
Wholesale Trade	3,031	2,899	0	0	2,899
Retail Trade	10,873	13,497	2,624	13.390	10,873
Finance	3,713	2,747	0	0	2,747
Business Serv.	2,317	1,844	0	0	1,844
Personal Serv.	3,421	3,520	99	0.504	3,421
Entertainment	611	594	0	0	594
Professional	11,945	13,199	1,254	6.399	11,945
Public Admin.	4,065	3,390	0	0	3,390
Total		74,057	19,596	100%	54,461

* From "General Social and Economic Characteristics 1970" U.S. Department of Commerce, Bureau of the Census.

TABLE 9. Employment by Main Industrial Sector (1970)*

Industry	Klamath County People	%	Jackson County People	%	Douglas County People	%
Agriculture Forestry, & Fisheries	1,621	10	2,597	8	1,341	6
Manufacturing (Furniture, lumber, and Wood Products)**	3,089	18	4,110	13	6,321	26
Manufacturing (other)	582	3	1,890	5	1,763	8
Transportation, Communications, Public Services	1,609	9	1,922	6	1,146	5
Wholesale Trade	685	4	1,674	5	540	2
Retail Trade	3,365	19	6,315	19	3,817	16
Financial	510	3	1,473	5	764	3
Services	3,734	21	8,777	30	5,526	23
Professional	1,254	7	1,959	6	1,297	5
Total Employed (16 or older)	17,460		32,513		24,083	

* County and City Data Book, 1972. U.S. Department of Commerce, Bureau of the Census, U.S. Government Printing Office, Washington, D.C.

**General Social and Economic Characteristics: Oregon, 1970

addition, land is being taken out of agriculture and put to other purposes more rapidly in this tri-county area than in the state or nation as a whole.

Klamath County's agricultural valleys are Oregon's top cash value producers of alfalfa, cattle, and potatoes and rank second in the value of barley produced. In 1974, 44,000 acres of alfalfa produced income of $8,390,000; 8,500 acres of potatoes produced 13,000 carloads worth $10,800,000; and 24,000 acres of barley produced a crop worth $3,823,000. In recent years, Klamath Basin agricultural sales have regularly exceeded 52 million dollars. Wheat and onions are also important cash crops, and in the Medford area southwest of the park, apple and pear orchards produce significant crops.

Regional terrain and soils are generally suitable for these crops; however, rainfall is normally insufficient during the growing season and irrigation waters maintain the agricultural products of the region at a far higher level than that otherwise possible. Klamath County alone has 198,100 acres in irrigated farmland and 120,000 acres in irrigated pastureland. Cattle and sheep ranching are important economic activities in the Klamath and Tule Lake basins.

Tourism and recreation-oriented activities are important secondary industries in the region. There is an abundance of private and state facilities which promote camping, fishing, and hiking (see recreation opportunities map). Federal recreation facilities also are extremely abundant in the area. National forests contiguous with the park (Rogue River, Umpqua, and Winema) provide facilities and permits for boating, picnicking, hunting, hiking, camping, horseback riding, swimming, and snowmobiling. The Lost Creek Dam Recreation Area, located southwest of the park, is currently being developed by the U.S. Corps of Engineers. The area is scheduled for completion in 1977, and will provide 300 overnight campsites for public use as well as boating and fishing facilities.

Seven miles north of the park, in the Umpqua National Forest, is the Diamond Lake resort area. In the vicinity of the lake there are 535 campsites, 400 overnight units, and a trailer park with 114 sites. The area offers summer camping, picnicking, horseback riding, hiking, swimming, boating, fishing, bicycle riding, nature study programs, and during the winter there is cross-country skiing, snowshoeing, and snowmobiling.

3

the plan

CRATER LAKE NATIONAL PARK / OREGON

PART 3 SECTION A

resource management

CRATER LAKE NATIONAL PARK / OREGON

GENERAL MANAGEMENT PLAN
Crater Lake National Park

Park III A

RESOURCES MANAGEMENT PLAN

This portion of the general management plan is under preparation and will be concerned exclusively with the management of the biological and other natural features of Crater Lake. When completed and approved, this document will be included here as a basic element of the general management plan.

PART 3 SECTION

B

visitor use / interpretation

CRATER LAKE NATIONAL PARK / OREGON

GENERAL MANAGEMENT PLAN

Crater Lake National Park

PART III B

VISITOR USE/INTERPRETATION

ILLUSTRATIONS

VISITOR USE/INTERPRETATION

INTRODUCTION

The typical first-time visitor to Crater Lake National Park gains little understanding of the sequence of geological forces that created Crater Lake. The average visitor, with only a few hours to spend in the park and with little information to guide him, encounters various road directional signs and congested parking areas in his quest to reach the rim and view the lake. This goal achieved, the visitor then moves on to other destinations and often overlooks other interesting features and the diversity of the resources within the park.

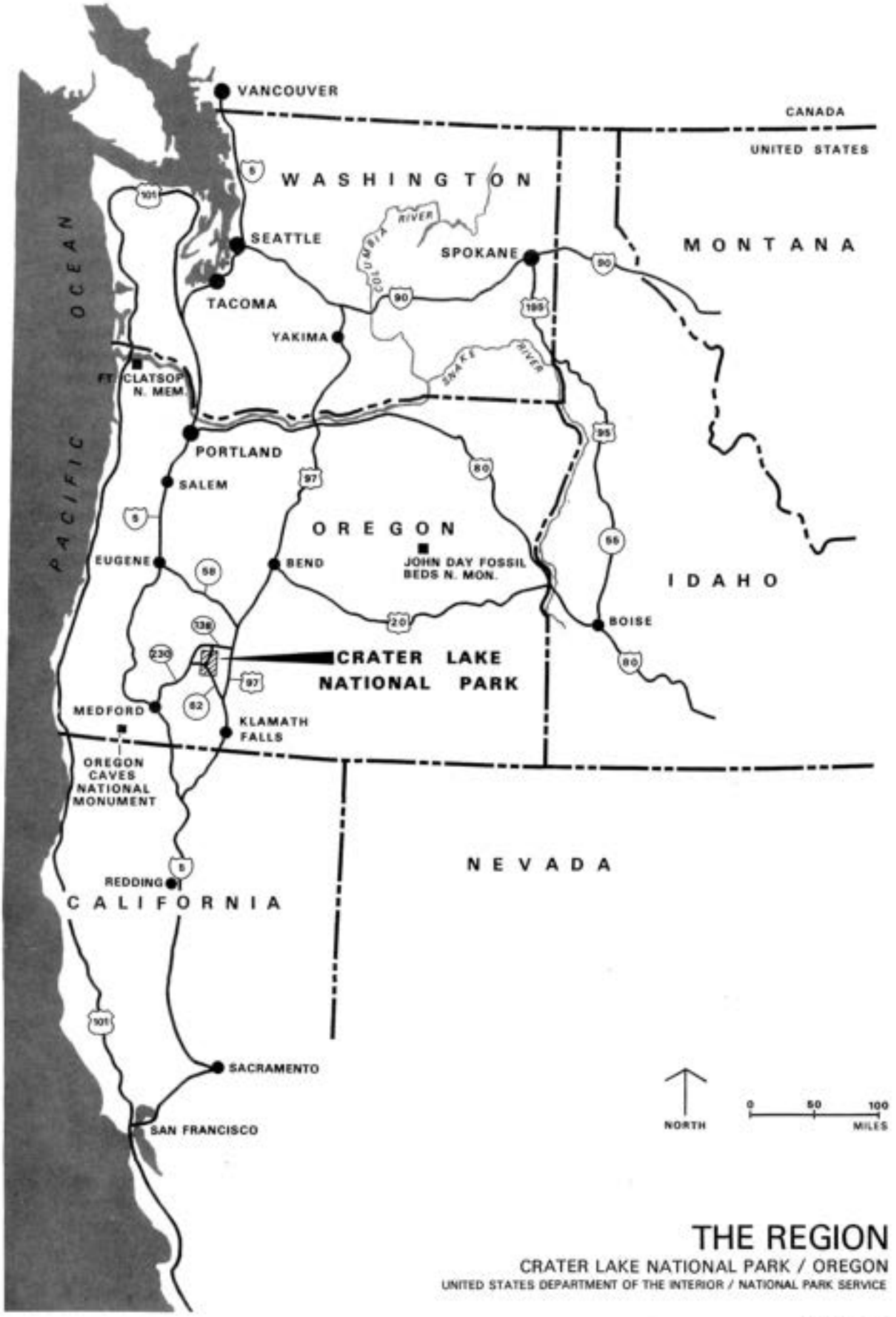
Some of the day visitors who have allowed more than a few hours, and the overnight visitors can seek out these other experiences. However, an increasing percentage of the park visitation will continue to be day visitors with presumably only a few hours to spend in the park.

The visitor use plan places emphasis on providing a quality experience for these short-stay day users while providing optional experiences for those visitors who choose to spend a little more time to enjoy the subtle beauties of the park. The plan proposes a gradual redevelopment of the facilities and programs to enhance the primary experience - viewing Crater Lake - while, at the same time, making interpretation more accessible. Recognizing that the Rim Village will remain a primary viewing area and will have a degree of congestion as long as there are facilities to attract the visitors, the plan seeks to improve the quality of the visitors' experience through the removal of distracting facilities, the restructuring of needed facilities and services, and the development of improved interpretive facilities and programs throughout the park.

Coupled with advance information/orientation to assist the visitors in planning their stay, the interpretive programs will allow the visitor to select the depth of interpretation desired to obtain a better understanding of the forces which created this natural wonder.

The plan outlines proposals for serving the visitor, strategies for providing interpretation, information, and orientation, support services such as food and lodging, and other concepts for making the park safe, enjoyable, and memorable.

The plan will allow Crater Lake National Park to accommodate an increasing number of day visitors, providing a continually improving primary experience along with options for a variety of experiences based upon the time available to them.



THE REGION

CRATER LAKE NATIONAL PARK / OREGON

UNITED STATES DEPARTMENT OF THE INTERIOR / NATIONAL PARK SERVICE

106 | 40007 C
DSC | DEC 77

GOALS FOR VISITOR USE

The visitor's total experience of the park resources is augmented or diminished by all aspects of use - be it access, information, lodging, or safety. Pivotal to these considerations is interpretation - which might be defined as the means through which the visitor perceives the park.

The following goals encompass interpretation in its purest definition, as well as the other visitor considerations that must be met for the experience to be satisfying and enjoyable.

Informational and directional assistance necessary for safe, compatible, and enjoyable use of the park's resources should be provided early, prominently, and conveniently.

Interpretation at Crater Lake should provide visitors the opportunity to experience the park and learn its story in a variety of interpretive levels. At a primary level, the purest sensory response is to the size and beauty of the lake and its setting. Ideally the rim environment should be as pristine and natural as possible. The next interpretive level involves consideration of the geologic forces and events that created this phenomenon, which finally evolves to the third level, reflection on the implication this story has in terms of today's human experience.

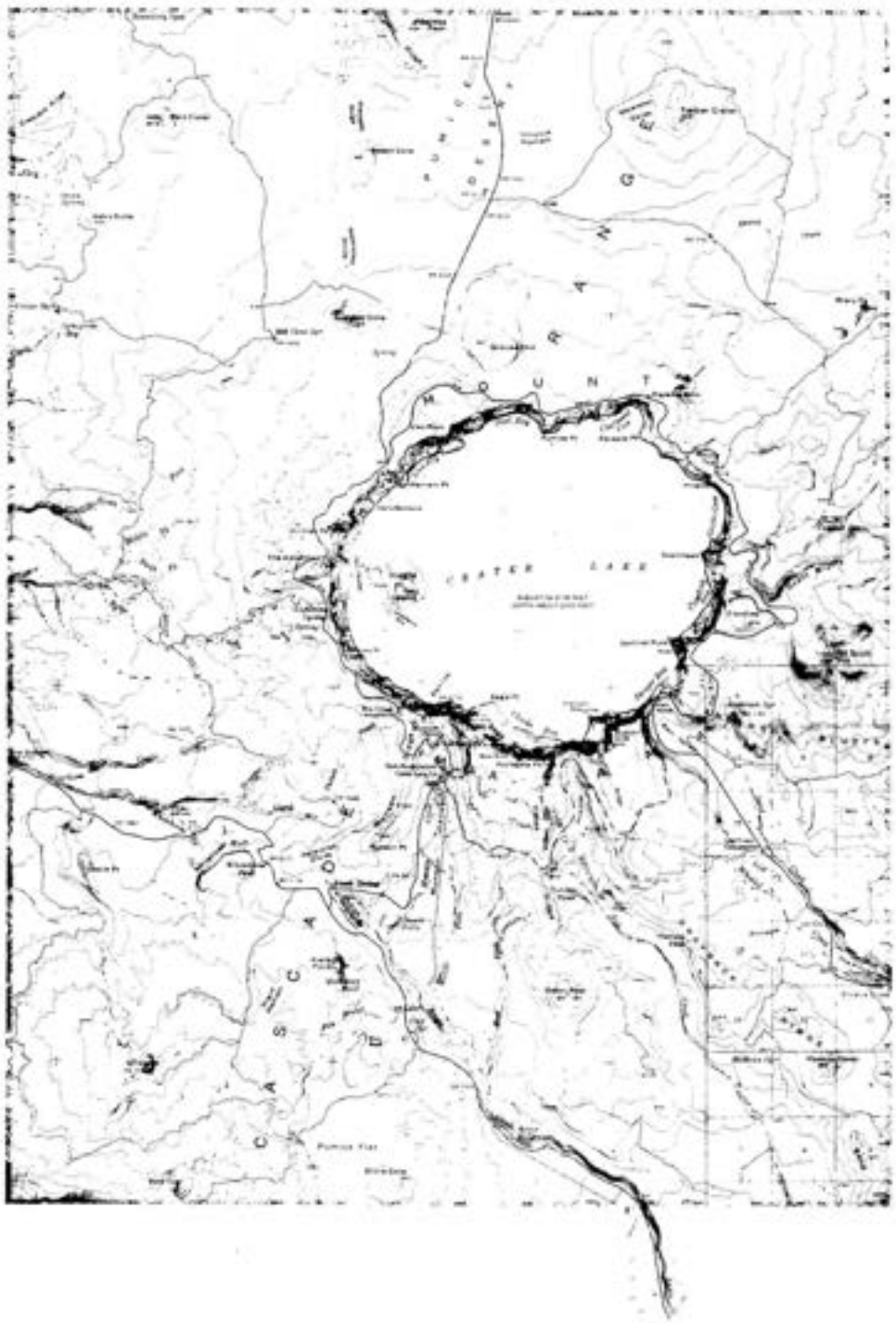
Interpretive means should be imaginative and various. While recognizing that the focal point of interest is the lake, interpretation should also be provided to a limited extent in lesser used portions of the park.

The circulation system should lead visitors to the best possible vantage points from which they may view the lake and its surroundings, and also provide a safe and convenient routing.

Though used by a limited number, the opportunity to experience the lake via boat should be available, as well as bicycle paths for those wishing to experience the park via this means of transportation.

Winter use should be encouraged and accommodated through winterization of some facilities and interpretive programs geared to this season. Conflicts between competing winter uses should be minimized through zoning.

Backcountry use should be aided and accommodated through well maintained trails and information.



NORTH

0 1 2 3
MILES

TOPOGRAPHY

CRATER LAKE NATIONAL PARK / OREGON

UNITED STATES DEPARTMENT OF THE INTERIOR / NATIONAL PARK SERVICE

108 | 40038 B
DSC | DEC 76

Overnight use by visitors should be continued and encouraged through a modest expansion of facilities. The visitors who remain overnight have the opportunity to see and experience the park in the quiet morning and evening hours and to participate in interpretive programs not available to day visitors.

EXISTING VISITOR USE

Crater Lake is principally a day-use area, with approximately two-thirds of its yearly half million visitors staying less than four hours. Visitation occurs mainly in the summer, with 75 percent arriving from Memorial Day to Labor Day.

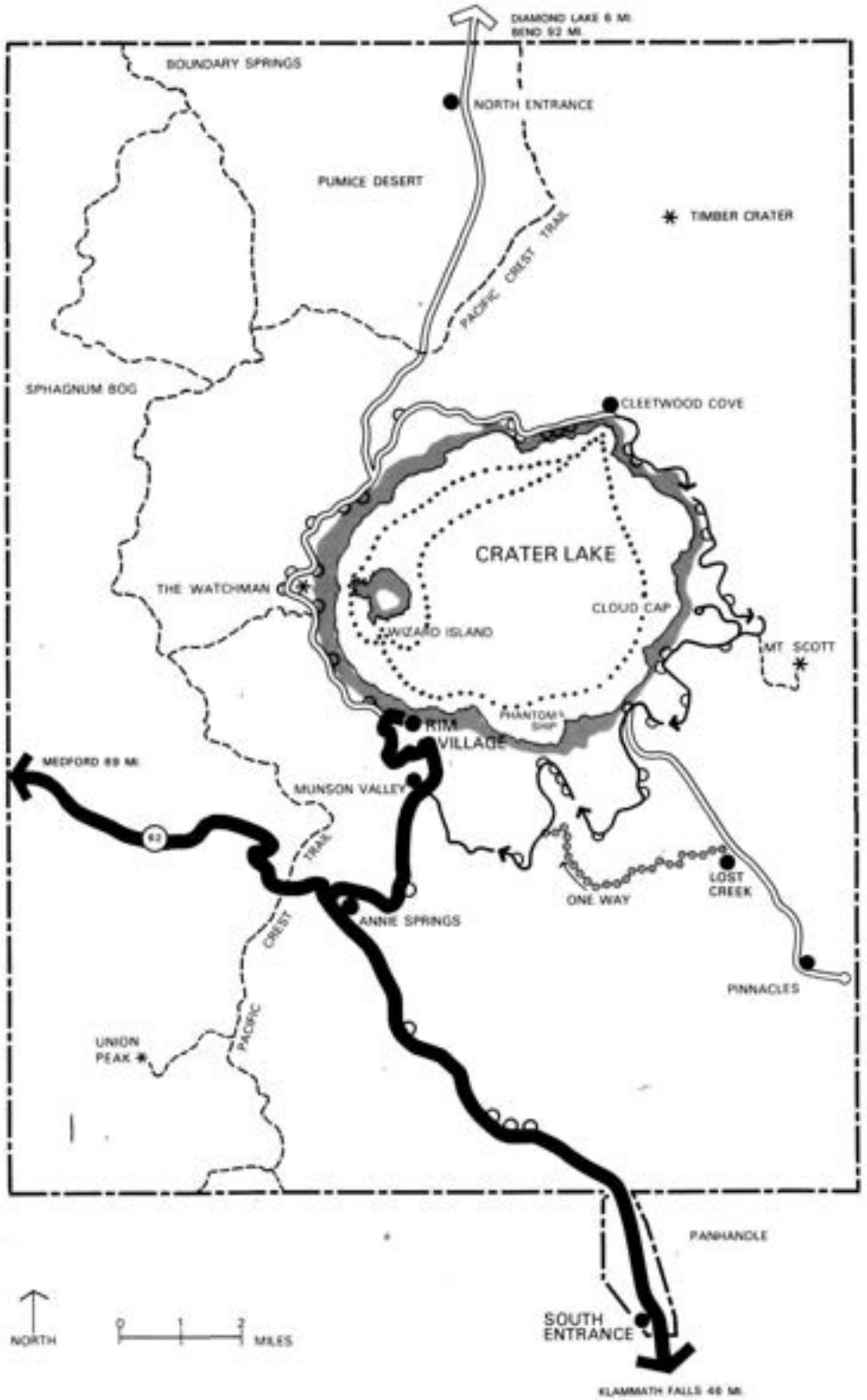
For most visitors, a stop at Crater Lake is a part of a north-south trip which includes visits to other areas. Although the average visitor remains a short time, he has deliberately ventured off the main travel routes just to see the lake. Almost 80 percent of the visitors are West Coast residents, over half of these from California.

For the small percentage of people remaining overnight (15 percent), about two-thirds of those camp in Mazama Campground, approximately half utilizing recreation vehicles. The 12-site Lost Creek Campground offers primitive camping and receives relatively light use, while Crater Lake Lodge and Cabins accommodate approximately one-third of the overnight demand.

Backcountry use is still minimal, with the Pacific Crest Trail receiving the heaviest use. Winter use is also minimal (but steadily increasing), consisting mainly of regional residents sightseeing. Cross-country skiing and snowshoeing is largely concentrated around park headquarters and the Rim Village, while snowmobiling is restricted to the park road from the north entrance to the caldera rim.

Heaviest day use activity is centered around Rim Village and Rim Drive, which affords many scenic overlooks. Rim Village now contains the main interpretive facility, Sinnott Memorial, and most of the support facilities, including a cafeteria, cabins, lodge, and store. During the summer, approximately 500 people a day hike down to Cleetwood Cove and take a launch for a guided tour around the lake.

Limited information is provided at the entrance stations, and geologic interpretation is provided on the rim at Sinnott Memorial through personal services and exhibits. Approximately 20 interpretive waysides are located on the Rim Drive and more on the approach roads. Grayback Ridge Motor Nature Road offers an interpretive tour relating the theme of Evolution of a Landscape.



NORTH ENTRANCE
ENTRANCE STATION – SEASONAL RESIDENCE

CLEETWOOD COVE
BOAT DOCKS – REFRESHMENTS – WATER MONITORING STATION – FUEL STORAGE – CHEMICAL TOILETS – TICKET OFFICE

WIZARD ISLAND
BOAT DOCKS – BOAT STORAGE FACILITY – CHEMICAL TOILETS – TRAILS

RIM DRIVES
OVERLOOKS – PICNIC AREAS – COMFORT STATIONS – EXHIBITS – INTERPRETIVE TRAILS

THE WATCHMAN & MT SCOTT
UNUSED FIRE LOOKOUTS – WATCHMAN USED FOR SHELTER & EXHIBITS

RIM VILLAGE
SINNOTT MEMORIAL OVERLOOK – RIM WALKS – PARKING – PICNIC AREA – COMFORT STATIONS – LODGE (66 ROOMS) – CABINS (20) – CAFETERIA/CURIO SHOP – EXHIBIT BUILDING – COMMUNITY BUILDING – EMPLOYEE DORMITORY

MUNSON VALLEY
ADMINISTRATION BUILDING – MAINTENANCE FACILITIES – GAS STATION – PERMANENT AND SEASONAL HOUSING

LOST CREEK
PRIMITIVE CAMPGROUND – GRAYBACK RIDGE MOTOR NATURE ROAD – INTERPRETIVE EXHIBITS – PINNACLES VIEW POINT

ANNIE SPRINGS
MAZAMA CAMPGROUND (198 SITES) – SOUTH ENTRANCE STATION – INFORMATION – SEASONAL RESIDENCE – MAIN PARK WATER SUPPLY – AMPHITHEATER – SANITARY DUMP STATION

SOUTH ENTRANCE/PANHANDLE
MAINTENANCE STORAGE AREA

BACKCOUNTRY
TRAILS – UNDEVELOPED CAMPSITES

RIM DRIVES
EAST RIM DRIVE ONE-WAY CLOCKWISE FROM CLEETWOOD COVE TO MUNSON VALLEY – GRAYBACK RIDGE MOTOR NATURE ROAD ONE-WAY FROM LOST CREEK TO EAST RIM DRIVE – ALL OTHER ROADS ARE TWO-WAY.

RIM DRIVES OPEN FROM ABOUT MID-JULY UNTIL CLOSED BY SNOW, USUALLY IN LATE OCTOBER.

PARK BOUNDARY
ROADS OPEN ALL YEAR
ROADS OPEN SUMMER ONLY
FOCAL POINT/DEVELOPED AREA
OVERLOOK/PARKING
BOAT TOUR ROUTE
GRAYBACK RIDGE MOTOR NATURE ROAD
TRAILS

EXISTING DEVELOPMENT

CRATER LAKE NATIONAL PARK/OREGON

UNITED STATES DEPARTMENT OF THE INTERIOR/NATIONAL PARK SERVICE

106 | 400376
DSC | DEC 77

The typical day visitors arriving from the south will proceed to the Rim Village, park their vehicles, and proceed to the rim for their first view of the lake or to the concessioner facilities and then to the viewing areas. They may attend one of the talks in the Sinnott Memorial and view the exhibits in the exhibit building.

Depending upon the remaining time available, they may stop at other viewpoints, take a boat tour, or proceed on to their next destination.

Visitors entering the park from the north receive information at the North Entrance Station and proceed toward the rim. At the road junction with the Rim Drive, they may choose either the longer route to the left with its numerous overlooks and viewpoints of the lake or the shorter route to the right along the west side of the lake to reach the Rim Village.

With the one-way Rim Drive system established during the last five years for improvements in the circulation system, there remain opportunities to improve the information-orientation-interpretation aspects and to provide a higher quality visitor experience for those entering the park from the north.

THE PLAN FOR VISITOR USE

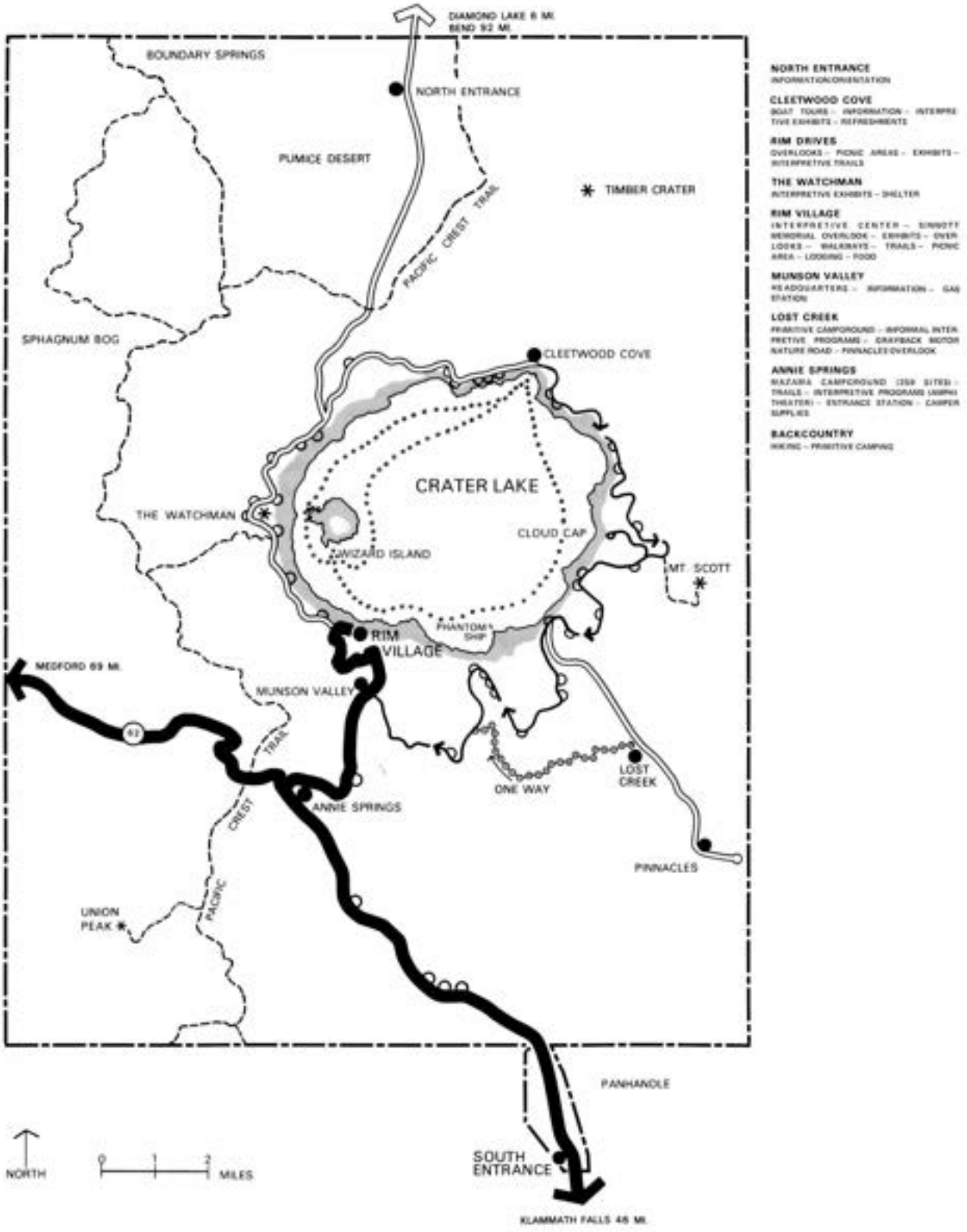
Access and Circulation

Access to the park will remain unchanged and it is assumed a majority of the visitors will continue to arrive through the south entrance at Annie Springs. The internal circulation system will provide safe and convenient routing and allow a variety of options depending upon the time they have available. The circulation system will lead the visitors to the best vantage points for viewing the lake and the surrounding countryside.

The present circulation system combining one-way and two-way roads will allow visitors to choose their destinations while minimizing repeat trips over the same stretch of road. Improvements to enhance safety should be made where necessary and bicycle use should be accommodated whenever possible.

Access into the caldera and the launch trip around the lake perimeter provide an added dimension to the visitor experience. Excursions on the lake will continue with the present number of launches and tours along designated routes. Improvements to enhance visitor and employee safety should be made where necessary.

Access to the Pinnacles and Lost Creek areas and the Grayback Ridge Motor Nature Road will remain somewhat restricted by the



VISITOR USE CONCEPTS (SUMMER)

CRATER LAKE NATIONAL PARK/OREGON

UNITED STATES DEPARTMENT OF THE INTERIOR/NATIONAL PARK SERVICE

106 | 40035 B
D&C | D&C 76

one-way road system. These areas provide options for visitors with more time to spend in the park. Lower use levels are desirable to protect the resources and retain a higher quality visitor experience, thus the circulation system aids in regulating use of these areas without the need to place any formal restrictions.

Information/Orientation

Information and orientation are essential for a safe and enjoyable visit. It needs to be dispensed early in the visit and at a point or points where many of the visitors can be reached.

Information of a general nature can be provided at many points: information centers in nearby towns and in the adjacent national forests; at the park entrance stations; at headquarters and the campground registration kiosk. These programs will be coordinated to assure that the visitor is receiving similar information at all points. In particular, the National Park Service and Forest Service will coordinate their efforts in providing information to visitors; information on resources, facilities, and recreational opportunities will be available in the park, and park information will be available at Forest Service facilities.

Orientation seeks to help the visitors plan their visit: where they are; what their options are; where they want to go; how to best utilize their time. While some elements of orientation can be accomplished at the various regional information centers, it is best accomplished when the visitor has arrived in the park.

Orientation will be provided in two locations within the park. The north entrance information/orientation facility will be located just north of the present entrance station, freeing the entrance station personnel of the task of dispensing information. The facility will be designed to be staffed but also to function without staffing. Here the visitors will be able to plan their visit so that they are not faced with confusing choices as they proceed into the park. Ideally, for the overnight visitor, lodge or campground reservations could be confirmed here so that the visitors do not have to rush to be sure they have not lost their space.

The second location where orientation will be provided is the Rim Village Interpretive Center. The visitors will have more options immediately available here since the major interpretive programs are concentrated in the Rim Village area. But orientation remains the key to helping the visitors utilize their available time to their best advantage. Overnight visitors who plan to camp will already have been directed to the campground. Lodge users can easily walk over to the lodge to register.

Information on the launch tours around the lake will be available at all points but should be repeated at the Cleetwood Cove trailhead. It is particularly important to inform the visitors of the trail's difficulty (a steep climb out at high altitude) and encourage only the hardier visitors to hike down and take the launch trips.

Interpretation

The lack of an adequate interpretive center has hampered efforts to make contact with the public. The proposed Interpretive Center in the Rim Village will provide a central point at which the largest percentage of visitor contacts will be made, and during the winter months it will be virtually the only source of interpretive services.

The Interpretive Center will house information, orientation and interpretation functions and will provide an area which can be enclosed during the winter for safe viewing of the lake. Regardless of whether it is the first or last stopping point on the rim, the Interpretive Center should be a mood setter for the visitor experience. It should draw all diverse interpretation themes and impressions into an ordered and understandable whole.

Interpretation should progress through or offer differing levels of involvement to the visitor. At its primary level is the purely sensory response to the size and beauty of the lake and its setting. Ideally, the rim environment should be as pristine and natural as possible. The secondary level involves consideration of the geologic forces and events which created this phenomenon, which finally evolves to a third conceptual level of reflection on the implication this story has in terms of today's human experience. The interpretive section is divided into these three suggested levels with considerations on ways to accomplish each.

Primary level - The sensory response to the lake and its setting:

At this first level of involvement, little or no interpretation is required. It is sufficient that the visitor be provided with suitable and relatively easy access to the best possible vantage points, including the lake surface. The landscape should contribute to the atmosphere and mood and be as natural and free of man-made facilities as possible. The visitor should be able to respond to the beauty with a minimum intrusion of cars, noise and congestion. In the Rim Village, where this intrusion is greatest, as much of the rim will be restored to as natural and pedestrian a character as is possible.

Secondary level - The seeking of awareness and relationships resulting in a deeper understanding of the natural processes that have worked and are continuing to work:

Having experienced the initial visual impact from the caldera rim, the visitor will become inquisitive about the lake's creation. Within this geologic context, other themes are included: plant and animal life which change coincident with changes in the landscape and act as agents of change, as well as early man, witnessing Mt. Mazama's fall and creating a body of legend concerning the event.

Because of its location within and below the rim and its panoramic view of the lake and its walls, Sinnott Memorial is an ideal location for interpreting the overall geologic history of the lake during the summer. In the winter, when the Sinnott Memorial is not accessible, this interpretive theme will be handled in the Interpretive Center viewing area. Emphasis will be on personal contact interpretation, but for those times of exceptionally light or heavy use, it is helpful to have the series of panels that depict the appearance of Mt. Mazama before, during, and after the collapse. In addition, during the winter, a brief audio interpretation of the geology of the caldera should be provided.

The Rim Drive provides numerous points where the visitor will be confronted with evidence of the mountain's geologic past. There will be emphasis on on-site interpretation of specific natural features, principally by wayside exhibits which should be unified and reduced from the existing number. These exhibits will generally be site-specific and not in sequential order around the rim.

The Watchman Parapet, one of the most popular visitor destinations in the park, offers a high unobscured view of the lake and its surroundings. The upper part of the tower is no longer used for fire detection; the lower room is to be used as a lounge area, with interpretation approached through contact by an on-site interpreter and exhibits.

A small, unmanned interpretive wayside shelter should be located near the Cleetwood Cove trailhead. An exhibit here should stress that Crater Lake is a "closed, nearly self-regulating" natural system, and the importance of maintaining the lake free of pollutants.

The Grayback Ridge Motor Nature Road is well suited for the purpose of interpreting the theme Evolution of a Landscape. A new guidebook, published in 1976, has replaced the obsolete wayside exhibits.

Interpretation along trails is presently accomplished through guided walks on Garfield Peak and Annie Creek Canyon trails, and a self-guided walk on the Castle Crest trail. The trails are well suited to illustrate ecologic truths and the subtheme of plant and animal life. They provide variety in both interpretive content and activity for visitors. Guided walks, which are presently concen-

trated in the rim area, should be extended to other areas in the park.

Conceptual level - Evolution of change, a constant and universal quality of the natural world:

The visitor experience will assume a more lasting quality if the diverse elements are brought together into a meaningful whole. Unified by a consideration of change, the conceptual theme should allude to man's evolving role in change from that of a mere witness to that of a primary cause.

This intellectual involvement with the resource is less dependent on physical reference. It can be a point of introduction to the story and an invitation to seek evidence in the field, or it can act as a summary, drawing together the previously experienced diverse elements and impressions into an understandable whole. It can be handled through audiovisual means, but is best handled through on-site, personal exchange between the visitors and interpreters. It is the underlying theme of all the interpretive programs.

Overnight Use

Overnight use of the park offers a worthwhile experience and needed service to park visitors. Tent campers presently are mixed along with the recreational vehicle campers. A separate area designed for tent camping only would provide an option for those wishing a less structured experience away from the vehicular campers.

Lost Creek Campground should continue to serve the visitors desiring a more primitive camping experience. If this demand increases, the campground will be expanded within the limits of environmental considerations.

Early morning or evening interpretive activities should be encouraged. Because of the nighttime habits of many of the park animals, wildlife viewing opportunities are especially good at that time. Moonlight walks or hikes can reveal a different mood of Crater Lake and a totally different set of responses can take place. Traditional personal services provided by the evening programs at Mazama Campground will be continued and an informal campfire circle will be provided at Lost Creek.

The overnight facilities provided at Crater Lake Lodge will continue throughout the useful life of the building. The lodge, an historic structure, provides a traditional park experience for a limited number of visitors. The lodge will be maintained to retain and restore the historic character which represents an early era in park development.

Winter Use

Winter visitors, although relatively few in number, have had at best a cursory glimpse of the lake without benefit of interpretation. A more comprehensive winter program of interpretation and use regulation will be developed.

An information, orientation and interpretive facility should be available year-round. The Rim Village Interpretive Center will be designed for year-round use and will include, as an integral part of its structure, a safe, sheltered place to view the lake. Concession-operated visitor services will also be available as the demand warrants. Until such time as a permanent winter viewing shelter can be constructed, temporary facilities should be utilized to assure the safety of the visitors.

Special activities, including guided snowshoe hikes and cross-country ski trips, will be expanded as visitation increases. Conflicts in winter activities will be minimized through zoning. Snowmobile use will be limited to the North Entrance Road between the entrance station and the crater rim.

Backcountry Use

Backcountry use of the park is minimal due to snow on the trails late into the season and to a short season. Most of the backcountry trails are former fire roads which require little improvement but must be well maintained. A Backcountry Use and Operations Plan, subject to occasional updating, will guide management and use of backcountry resources.

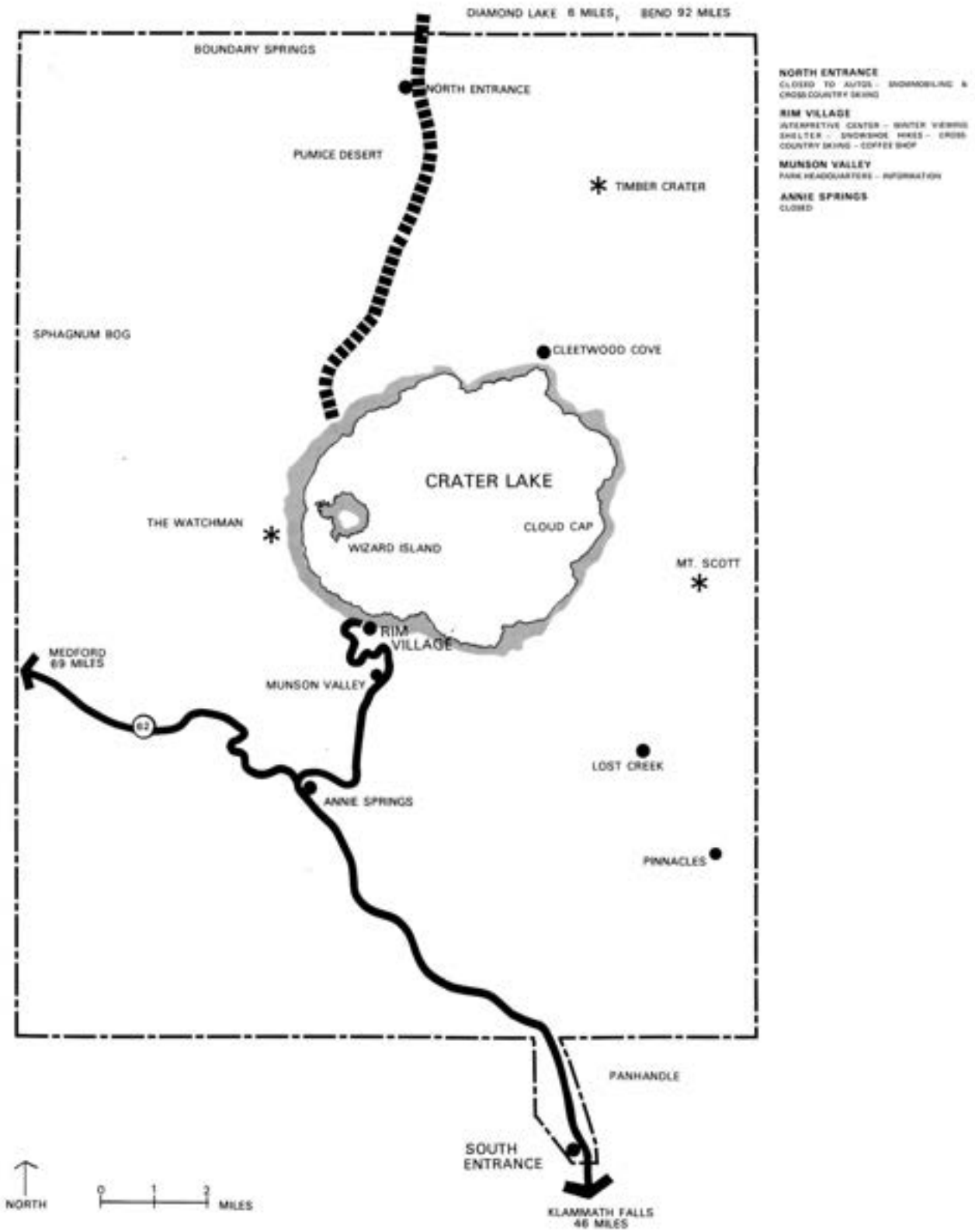
Support Facilities

Support facilities should be conveniently provided, but not detract from the scenic resources. Campers and visitors will have access to food, gas, and needed provisions and services within a reasonable distance from the centers of activity or campground facilities. Picnic areas are located at several points along the Rim Drive.

Visitor Capacity

At the present time, there is no indicated need to establish day-use capacities for the park. Although congestion occurs during the summer at some viewpoints and in the Rim Village area, the remainder of the park remains relatively uncongested. Winter use is moderate; backcountry use is minimal; overnight use will be limited to approximately 1,140 persons using the lodge and campgrounds.

The park will continue to be managed primarily for day use. A gradual increase in visitation is anticipated. There are no indica-



LEGEND

- PARK BOUNDARY
- ROADS OPEN IN WINTER
- SNOWMOBILE TRAIL
- FOCAL POINT/DEVELOPED AREA

VISITOR USE CONCEPT - WINTER

CRATER LAKE NATIONAL PARK / OREGON

UNITED STATES DEPARTMENT OF THE INTERIOR/NATIONAL PARK SERVICE

106 | 40038 B
DSC | DEC 76

tions that there will be any dramatic increase in visitation. The development of new recreational facilities in the vicinity of Crater Lake National Park will attract people to the area and, it is assumed, Crater Lake will also be visited by a percentage of these people as a part of their recreational experience.

The general management plan for Crater Lake National Park recognizes that crowding will occur at some points. The proposals in the plan are designed to reduce congestion through improved information and orientation services which will encourage visitor dispersal, allowing the park to accommodate an increasing number of visitors.

The effects of increasing visitation will be monitored, and, if needed, a capacity study will be initiated as part of the normal process of updating the general management plan.

IMPLEMENTATION

The Plan for Visitor Use presents long-range goals for improving the quality of the visitor experience through improved programs and facilities. However, implementation need not await the improvement or development of facilities. The National Park Service needs to improve its interpretive program and facilities in order to be more easily identifiable and accessible to visitors at the rim. A strong identity and a general enhancement of the environment throughout the park can be achieved through improved employee attitudes, maintenance, signing, and landscaping. Temporary facilities and additional personnel may be needed until more permanent facilities can be provided, but any temporary development must be accomplished with the goals of this plan in mind.

PART 3 SECTION C

general development

CRATER LAKE NATIONAL PARK / OREGON

GENERAL MANAGEMENT PLAN

Crater Lake National Park

PART III C

GENERAL DEVELOPMENT

ILLUSTRATIONS

GENERAL DEVELOPMENT

INTRODUCTION

The General Development Plan, along with the Resources Management, Visitor Use, and Backcountry Use plans, provides a long-range program for the preservation and use of Crater Lake National Park.

The management and visitor-use facilities required to implement the Visitor Use and Resource Management plans for Crater Lake National Park are outlined in broad concepts in the General Development Plan. Comprehensive designs will be needed for the major projects. Many of the development concepts involve long-range redevelopment of existing management and visitor-use areas and facilities requiring coordination between the phase out of certain existing facilities and the development of new facilities. Some of the proposed projects can be implemented in the near future while others are indefinite; thus, requirements are generalized, recognizing that they will change to reflect current needs at the time of construction.

Development Concept

The majority of the facilities at Crater Lake were developed prior to the 1940s, in an era before the great increase in mobility and leisure time. The only major recent improvement to visitor facilities has been the development of the 198-unit Mazama Campground, which supplemented (and ultimately replaced) the older campground in the Rim Village. Park maintenance and housing facilities have been expanded to meet the increasing needs, but the majority of management and visitor facilities are old and are inefficient to operate and maintain.

Winter visitor use is on the increase. The levels of summer use have strained the facilities and caused increasing levels of congestion on the roads and in the Rim Village where most of the visitor facilities are concentrated. These increases in visitor use that are continuing through the winter mandate an increase in permanent personnel to adequately manage and successfully operate a year-round program for visitor use. A one-way travel system on most of the Rim Drive was implemented in recent years in an attempt to relieve some of the congestion and improve circulation. This has been partially successful, but crowded conditions continue at the Rim Village and major overlooks. The present combination of one-way and two-way roads evolved through the planning process. While it does not significantly reduce congestion, it does provide options for the visitor, reducing travel time and mileage for visitors and employees.

The cost of maintaining a year-round operation in Munson Valley, where snow depths reach 16 feet, has risen drastically, and the employee morale drops proportionately in this confining environment. The cost of heating the older buildings and the poorly insulated newer buildings, along with the general problems of snow removal, shoveling roofs, and power failures, all contribute to the costly operation of Munson Valley in its present form as the main headquarters and residential site for the park.

Goals. The development plan for Crater Lake is based on the following broad goals, some of which are long-range.

Provide only those facilities on the crater rim which contribute directly to the visitor enjoyment and understanding of this natural wonder.

Develop an access and circulation system which aids in reducing congestion, maximizes convenience to the visitor and park management, and provides for safe travel in the park.

Provide facilities for improved interpretation, information, and orientation programs.

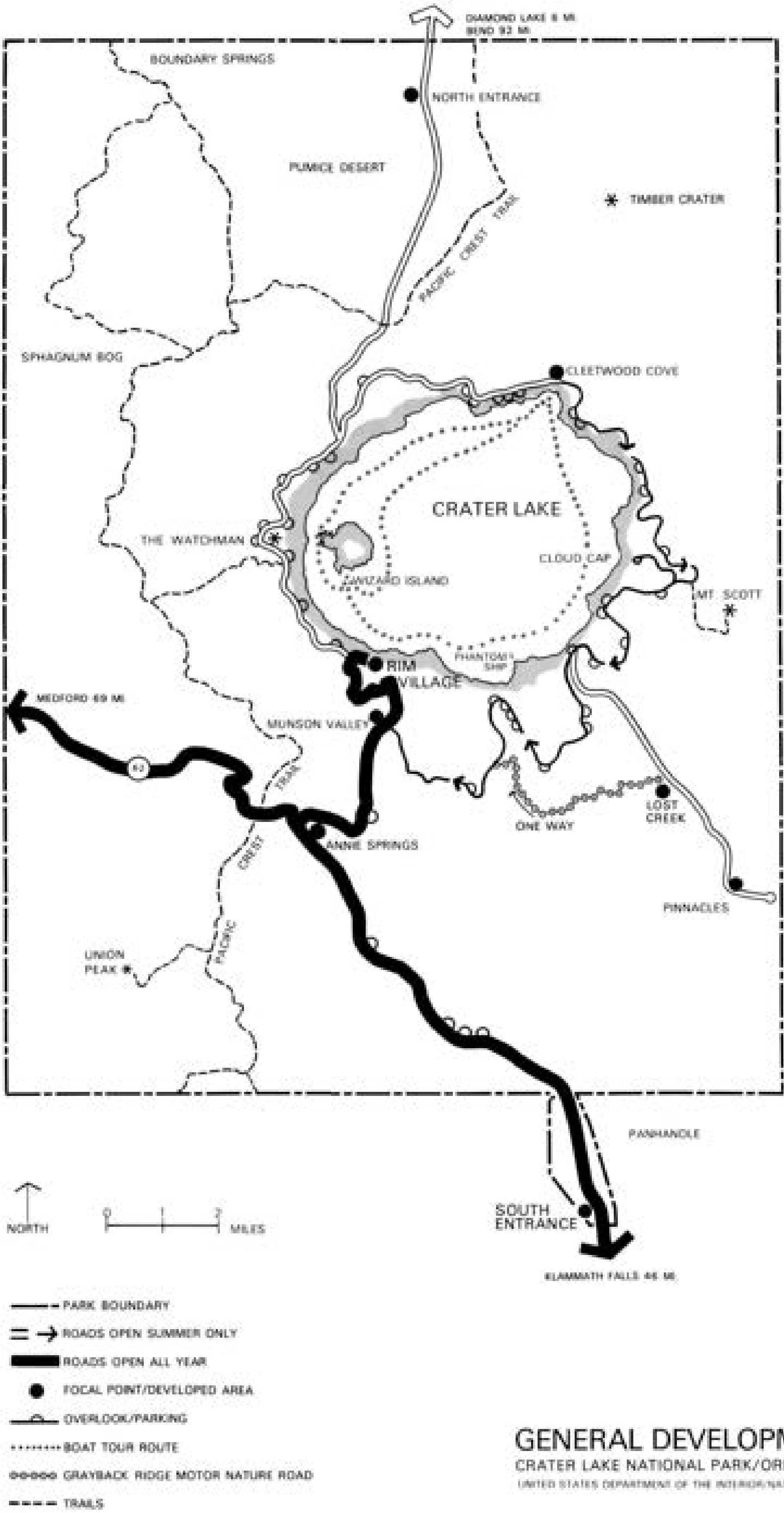
Provide the necessary visitor-use service facilities in an area which does not infringe upon the lake-viewing experience - facilities which can be operated efficiently on a year-long basis.

Provide all necessary access for the handicapped to facilities and features throughout the park, and devise ways and means to enlarge upon the experience of handicapped visitors.

Provide efficient, economical, and environmentally suitable housing and administrative facilities for permanent and seasonal park employees.

To accomplish these objectives, the development concept calls for a long-range goal of restoring the rim of the caldera to an interpretive zone. Those facilities not directly related to the viewing experience and interpretation of the natural resources would be removed upon the termination of their useful life. Needed facilities would be relocated, obsolete facilities eliminated, and new facilities provided for more efficient management operations.

Overnight lodging would be continued at the rim as long as the existing lodge is serviceable. Whether or not the lodging units are replaced elsewhere in the park following the termination of their useful life will depend upon the prevailing conditions at that time and the availability of facilities within the nearby communities. Camping facilities would be expanded on a modest scale in areas



NORTH ENTRANCE
DEVELOP INFORMATION/ORIENTATION FACILITY, WATER & SEWAGE TREATMENT SYSTEM – REMOVE SEASONAL RESIDENCE & CONSTRUCT NEW RESIDENCES AT DIAMOND LAKE.

CLEETWOOD COVE
RETAIN & IMPROVE EXISTING DEVELOPMENT AT COVE & WIZARD ISLAND – DEVELOP INFORMATION & EXHIBIT FACILITIES AT TRAILHEAD – IMPROVE REFRESHMENT FACILITIES – RETAIN WINTER PATROL CABIN

RIM DRIVES/PARK ROADS
WIDEN NORTH ENTRANCE AND WEST RIM ROADS FOR TWO-WAY STANDARD – RESTRIPE EAST RIM ROAD FOR ONE-WAY TRAFFIC – ADD BICYCLE LANE – REHABILITATE OVERLOOKS, EXHIBITS, PICNIC AREAS – IMPROVE TOILET FACILITIES

THE WATCHMAN
RENOVATE THE LOOKOUT FOR EXHIBIT/REST AREA

RIM VILLAGE
PHASE OUT CABINS – RELOCATE PARKING & ROADS – DEVELOP INTERPRETIVE CENTER/WINTER VIEWING SHELTER, PEDESTRIAN WALKWAYS, LANDSCAPING – REHABILITATE PICNIC AREA – REPLACE OBSOLETE COMFORT STATIONS – MAINTAIN/RESTORE HISTORIC LODGE – REMOVE OBSOLETE STRUCTURES

MUNSON VALLEY
PARK HEADQUARTERS – REMOVE OBSOLETE STRUCTURES – CONSTRUCT NEW HOUSING – RENOVATE OLDER HOUSING

LOST CREEK
EXPAND CAMPGROUND TO 25 SITES – REPLACE COMFORT STATION – DEVELOP INFORMAL CAMPFIRE CIRCLE

ANNIE SPRINGS
ADD 52 TENT SITES TO MAZAMA CAMPGROUND, INCLUDING ROADS, PARKING, COMFORT STATIONS & UTILITY EXTENSIONS – REMOVE SEASONAL RESIDENCE – RETAIN ENTRANCE STATION – DEVELOP CAMPER SERVICES FACILITY (CONCESSIONER)

SOUTH ENTRANCE/PANHANDLE
MAINTENANCE STORAGE AREA

BACKCOUNTRY
IMPROVE DIRECTIONAL SIGNS – POSSIBLE MINOR ADDITIONS TO TRAIL SYSTEM

RIM DRIVES
EAST RIM DRIVE ONE-WAY CLOCKWISE FROM CLEETWOOD COVE TO MUNSON VALLEY – GRAYBACK RIDGE MOTOR NATURE ROAD ONE-WAY FROM LOST CREEK TO EAST RIM DRIVE – ALL OTHER ROADS ARE TWO-WAY.

RIM DRIVES OPEN FROM ABOUT MID-JULY UNTIL CLOSED BY SNOW, USUALLY IN LATE OCTOBER.

GENERAL DEVELOPMENT CONCEPT

CRATER LAKE NATIONAL PARK/OREGON

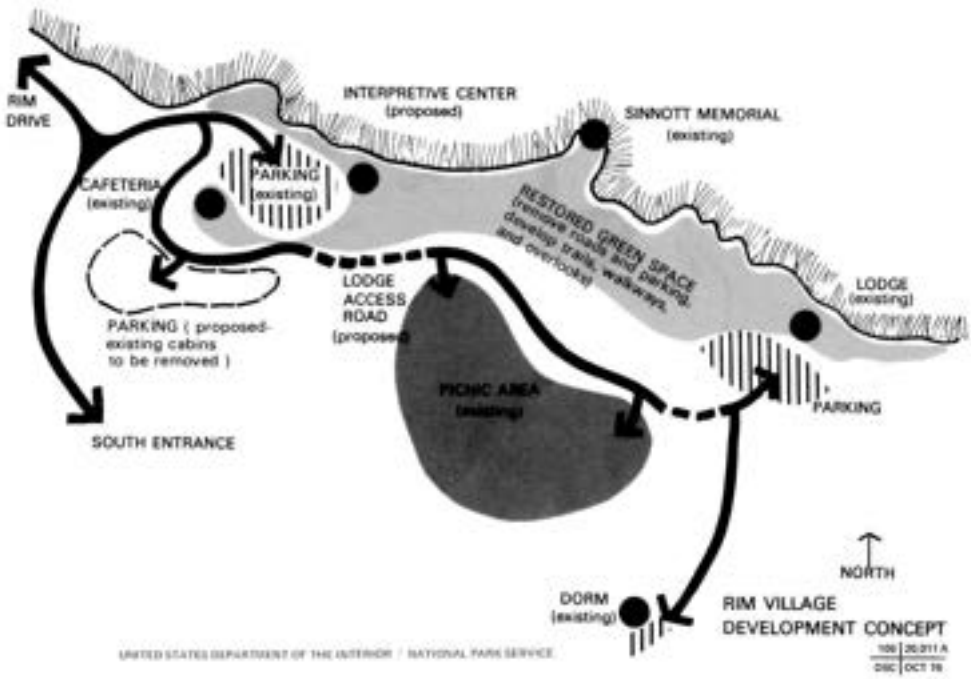
UNITED STATES DEPARTMENT OF THE INTERIOR/NATIONAL PARK SERVICE

106 | 40034C
DSC | DEC 77

other than the rim. Interpretive facilities and programs would be improved.

Rim Village. Although the National Park Service goal is to eliminate congestion and visitor-use conflicts in the Rim Village area, it recognizes that the area will remain a focal point for visitor use. While some congestion will inevitably remain, conflicting visitor uses can be minimized through a planned location and design of the Rim Village facilities.

Year-long interpretive and viewing facilities are essential. Pedestrian walkways, a small picnic area, and rest room facilities are also proposed. Parking space will be redesigned to minimize interference with the prime viewing zone of the rim and pedestrian traffic.



The major concessioner-operated visitor-use facilities in the Rim Village will continue as long as the structures retain a useful life and their operations are economically viable. Crater Lake Lodge, a historic structure, has been determined to be eligible for inclusion in the "National Register of Historic Places" and will be maintained as a first-class lodge. Any refurbishing and maintenance will be done in a manner that retains its historic character.

The plan for the Rim Village calls for the following:

Relocate approximately 185 parking spaces and associated small roads along the rim, and remove the four comfort stations, exhibit building, community building, and 20 concessioner rental cabins.

The key to implementing the plan for the Rim Village lies in the removal of the rental cabins. When this is accomplished, other successional elements of adjustments of the rim facilities can begin.

Prior to any major actions, a comprehensive design will be prepared for the Rim Village area. This design would determine the location of the interpretive center, pedestrian areas, relocated and reorganized parking areas, access to the lodge, picnic area and employee dormitory, and the excess roads to be removed in the picnic area. Preliminary studies indicate that the cabin-service area of approximately 8 acres behind the cafeteria is an area of possible consideration for replacement of parking removed from the rim. The main parking area in front of the cafeteria/curio shop will be redesigned to improve parking and circulation. Native plant materials can be utilized to make the parking areas and buildings more attractive. (This may require the use of portable plant containers which can be removed to facilitate snow removal in winter.)

A new access road to the picnic area, lodge, and employee dormitory will relocate this traffic further from the rim. The lodge parking area, for 150 cars, is expected to be contained within the present parking areas but organized for more efficient use of the available space.

A maintenance plan for the lodge will be developed in cooperation with the concessioner. This will assure that the historic character is retained while providing first-class accommodation for visitors.

Following the relocation of the parking area presently existing along the rim between the lodge and the main parking in front of the cafeteria/curio shop, the area will be landscaped with native vegetation and walkways, providing an area for leisurely viewing and interpretive activities free from the intrusion of constantly moving auto traffic.

An Interpretive Center designed for year-round use will be located adjacent to the main parking area. The center will contain an enclosed area for winter viewing of the lake and space for information and interpretive services (exhibits, publications, informal audiovisual programs, and/or personal services). The center is visualized as a relatively open, unobtrusive structure which can be enclosed in the winter. Through location and design, it will become the focal point for visitor activities in the Rim Village.

Upon completion of the new Interpretive Center, the exhibit building and community building would be recorded and removed and the sites restored with native vegetation. The old comfort station would be replaced with new facilities in the center.

The Sinnott Memorial will be retained to continue its function as a major interpretive facility.

Two of the three comfort stations in the picnic area will be replaced with new facilities and excess roads will be removed from the area. These actions are independent of other actions and could occur whenever funds are available.

The final phase of the long-range rim redevelopment will consist of the removal of obsolete concession facilities. At that point, the parking areas could conceivably be reduced in size, excess roads removed, and the sites of the facilities restored to a natural-like condition or landscaped in harmony with the other rim developments.

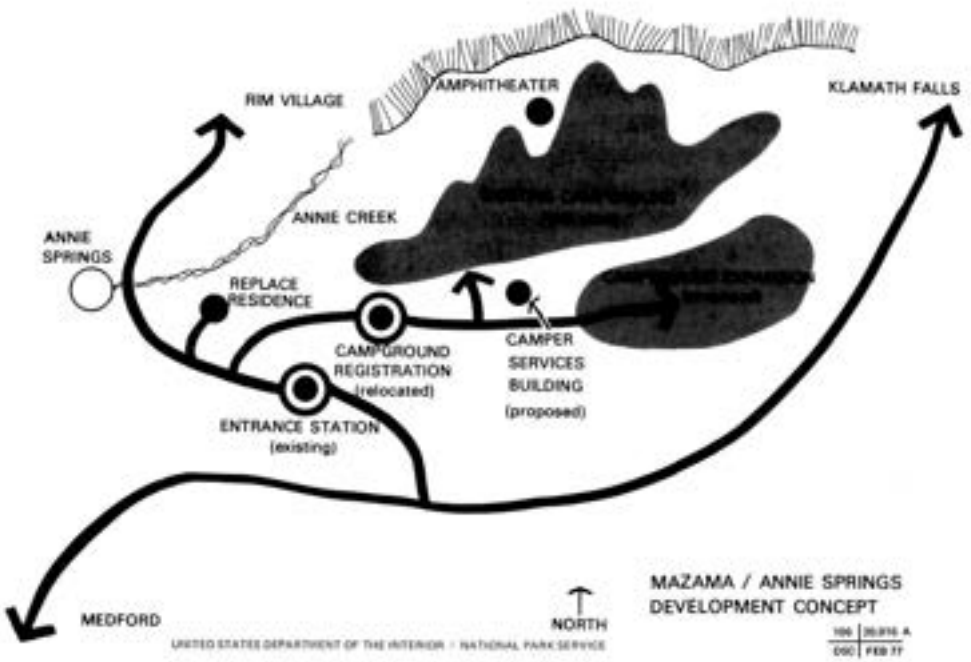
Utility changes in the Rim Village area will be minimal. Conversion of the campground to a picnic area has reduced the load on the present septic system and current improvements to the system will assure that it is adequate for the foreseeable future. The new picnic area comfort stations and the Interpretive Center will be connected to this system. Water, power, and telephone lines will be extended to the new Interpretive Center. If the major concessioner facilities are removed, numerous power, sewer, water, and telephone lines will be abandoned or removed.

Upon completion of the main phases of the Rim Village modification, there will be greater emphasis placed on the interpretive services available, and the entire area will be aesthetically appealing with less intrusion of the automobile on the prime lake viewing area.

Annie Springs.

Mazama Campground: The campground will be expanded. The 52 new sites will be designed for tent camping, with several sites grouped around small parking areas. The visitors will have the

option to choose between the drive-in sites of the existing campground or the added less structured sites. Two new comfort stations will be required to serve the new campsites and the existing road will require some reconstruction to develop parking spaces and a more pleasant alignment. The registration kiosk will be relocated on the campground approach road. Capacity of the campground will be increased from 198 sites to 250 sites with the new development. The obsolete ranger residence will be replaced.



Camper Service Facilities: A concessioner-operated camper services building will be built near the campground entrance, providing groceries and supplies. These items are presently sold in the cafeteria building in the Rim Village. Relocating this function from the Rim Village should aid in relieving congestion since campers will no longer have to drive to the Rim Village to obtain supplies.

Other camper services such as shower and laundry facilities have been suggested. The need for and desirability of these services will receive further evaluation.

The present sanitary dump station needs some improvement to make it a more functional and sanitary operation. A potable water supply is also needed. Major renovation is not required and the improvements can most likely be accomplished as a part of the maintenance program.

Future Visitor Service Facilities Consideration: If future demands and a proven need for additional facilities or relocation of some of the facilities within the park arise, consideration should be given to the Annie Springs area as a possible site location. Adequate utility systems exist, and the areas impacted by previous use are suitable to new development.

Such long-range possibilities will be subject to further analysis and planning prior to any action.

Access and Circulation.

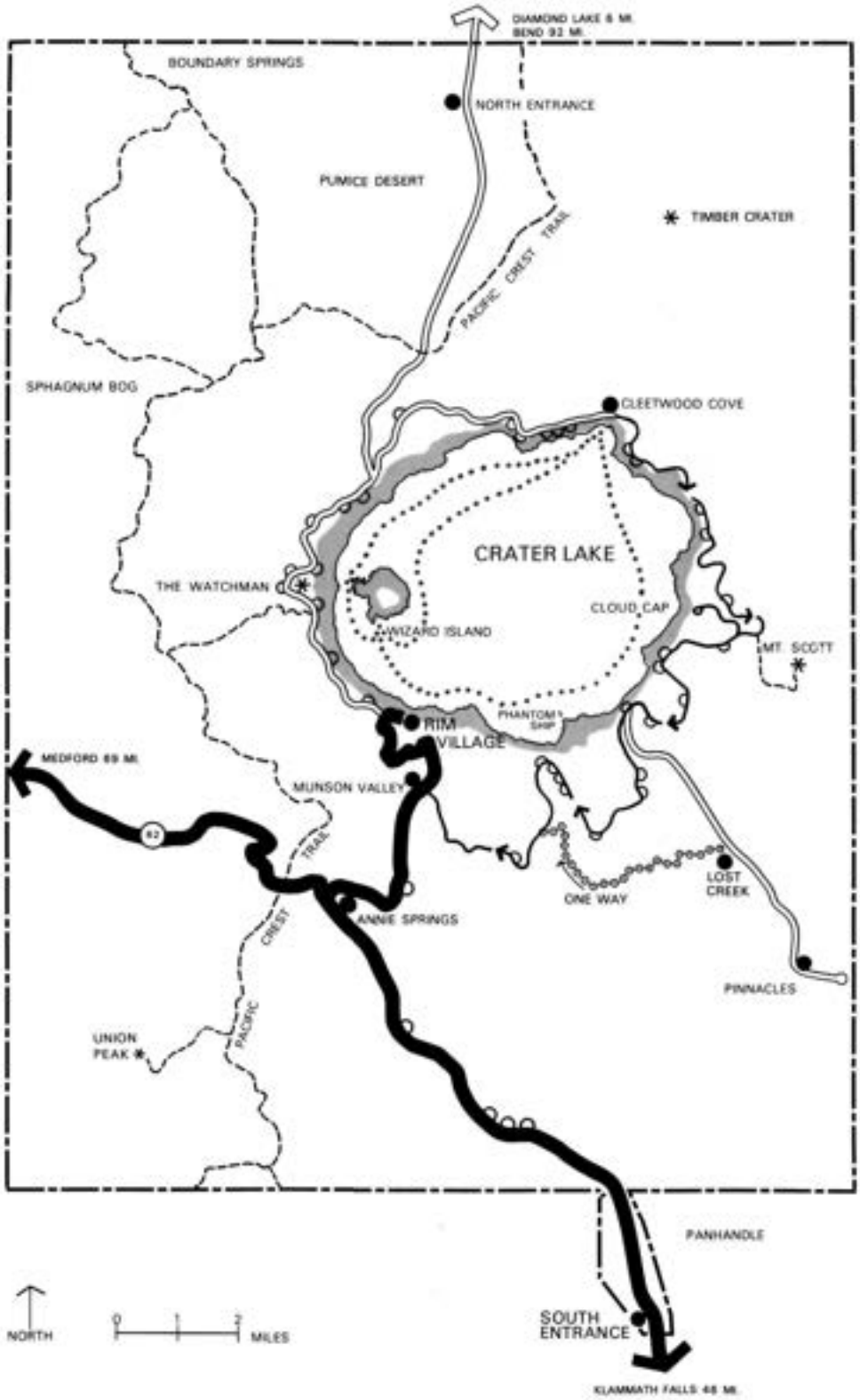
The present combination of one-way and two-way roads evolved through trial-and-error, public input, and analysis of visitor and management requirements. The present system will be continued, and will require some improvements.

The North Entrance Road and West Rim Drive will be upgraded to meet minimum standards for two-way traffic. Turnouts and overlooks would also be renovated as a part of this project.

The East Rim Drive will be continued as a one-way road and will require restriping and signing for one-way travel. A bicycle lane would be added at this time.

These modifications will provide the visitor with a choice of a more leisurely pace on the one-way East Rim Drive or a more direct route to many points via the West Rim Road. Improving the narrow two-way roads should reduce accidents and provide a better driving experience for the visitor.

Consideration was given to providing a two-way stretch of road between Munson Valley and the Lost Creek area. It was concluded that the limited number of visitors and employees who would benefit



RIM DRIVES

EAST RIM DRIVE ONE-WAY CLOCKWISE FROM CLEETWOOD COVE TO MUNSON VALLEY – GRAYBACK RIDGE MOTOR NATURE ROAD ONE-WAY FROM LOST CREEK TO EAST RIM DRIVE – ALL OTHER ROADS ARE TWO-WAY.

RIM DRIVES OPEN FROM ABOUT 2ND JULY UNTIL CLOSED BY SNOW, USUALLY IN LATE OCTOBER.

- PARK BOUNDARY
- ROAD OPEN ALL YEAR
- ROAD OPEN SUMMER ONLY
- FOCAL POINT/DEVELOPED AREA
- OVERLOOK/PARKING
- BOAT TOUR ROUTE
- GRAYBACK RIDGE MOTOR NATURE ROAD
- TRAIL

ACCESS & CIRCULATION

CRATER LAKE NATIONAL PARK/OREGON

UNITED STATES DEPARTMENT OF THE INTERIOR/NATIONAL PARK SERVICE

105	400388
DSC	DEC 77

are, at this time, more than offset by the number of visitors enjoying the leisurely pace of the one-way road.

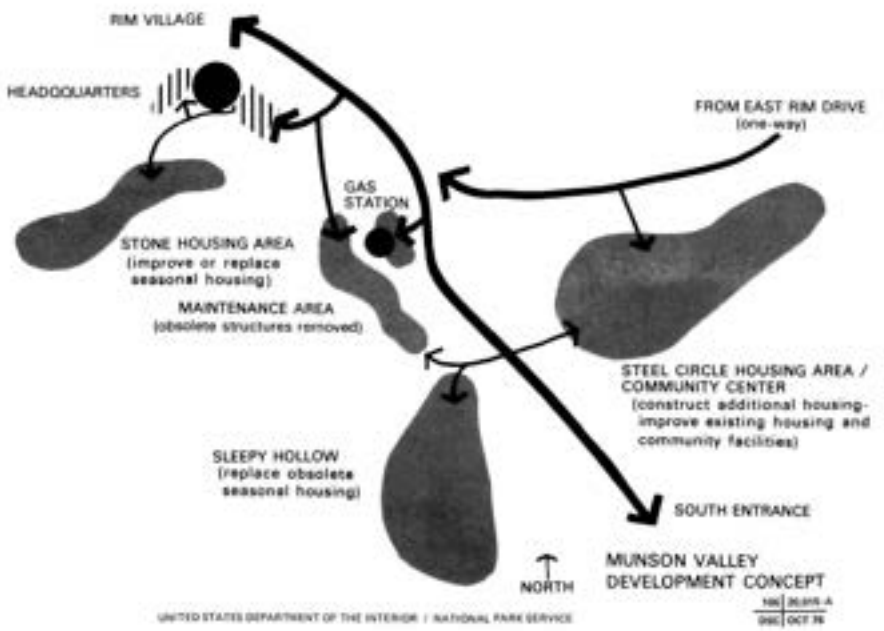
No changes in winter access are planned. The North Entrance Road will be available for snowmobile use as far as the rim and park roads will remain open to the Rim Village.

Munson Valley/Panhandle.

Winter operation of the existing facilities in Munson Valley has proven expensive and inefficient. Housing units are poorly insulated, fuel costs are high, and the winter environment affects employee morale.

Serious consideration has been given to new locations for the administrative, maintenance, and permanent housing facilities. However, during the course of this planning effort, it was recognized that Munson Valley is the logical location for these facilities in both summer and winter. The cost of building new facilities, the cost of maintaining both the new facilities and the remaining facilities needed for summer operation in Munson Valley, and the marginal benefits for employees, all weighed against further consideration of a move out of Munson Valley.

Administrative, maintenance, and employee housing facilities will remain in Munson Valley. Obsolete housing will be replaced or extensively renovated and other remaining housing will continue to be improved to make these units more energy efficient.



The harsh and confining winter environment at Munson Valley and the distance to schools, shopping and medical facilities will be made clear to prospective employees; hopefully, only those who can tolerate or enjoy these living conditions will apply for positions on the park staff.

Park management will actively pursue a program for the improvement of community educational and recreational programs and facilities which will offer amenities during the confining winter months.

The obsolete cabins and trailers in the Sleepy Hollow area will be removed and replaced with 22 new housing units. These units would be used primarily for summer seasonal housing but would be built to full winter standards so that the housing would also be available for year-round use should staffing needs change. Other housing, particularly in the Stone Housing area, will be extensively remodeled or replaced as these units become obsolete, and, as needed, additional housing for permanent employees will be built in the Steel Circle area. The number of housing units to be built, the space requirements, and the renovation of other units would be considered in a comprehensive housing study to be completed prior to any major construction projects.

The Panhandle area will remain a maintenance sub-area, primarily for storage. Some of the obsolete storage structures in Munson Valley will be replaced or supplemented with storage structures in the Panhandle. No water or sewage treatment systems are proposed for the Panhandle site; chemical toilets will be used, if needed. Electricity, if needed, can be brought into the site from the nearby primary line now serving the park.

Lost Creek.

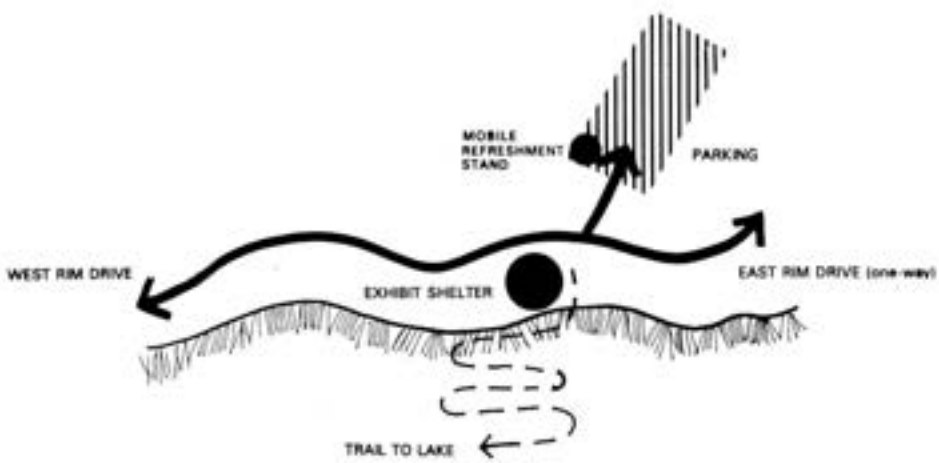
Expansion of the small, primitive Lost Creek Campground would occur since there is a proven need for additional campsites. The Lost Creek Campground would be expanded from 12 to a maximum of 25 sites. This expansion is based on the limited capacity of the sewage treatment system and the desire to retain the informal aspects of this campground. The existing single toilet comfort station would be replaced with a new structure of adequate size to handle the increased number of visitors. The general character of the campground would remain primitive, with relatively informal campsites. Additional parking spaces will be needed, which may require short extensions of the campground road. An informal campfire circle will also be provided for evening interpretive programs.

Boat Tours-Facilities.

Concessioner-operated boat tours will continue at the present level of operation. The present high water level has required the development of temporary docking facilities which do not adequately provide for visitor and employee comfort and convenience. The docking facilities will be rehabilitated with the waiting and ticket sales area away from the base of the cliff.

The feasibility of converting the tour boats to electric power will be explored. There is no power supply available at the Cleetwood Cove landing; the nearest power source is the Rim Village. Conversion to electrically powered boats would require the extension of an underground power line from the Rim Village to Cleetwood Cove, or the development of an alternate source of power near Cleetwood Cove.

The concessioner-operated refreshment stand at the trailhead will be relocated to an area adjacent to the parking areas.



Information/Orientation/Interpretation Facilities.

Improvements to interpretation facilities will occur at several levels. Wayside exhibits at overlooks and turnouts will be redesigned to improve text and theme continuity. Little new construction would be required - some exhibits may be replaced, removed, or relocated.

Minor improvements to The Watchman fire lookout will provide improved exhibit space and a small rest area. A small exhibit structure will be provided at the Cleetwood Cove trailhead. Information on the boat tours will also be available at the trailhead. Backcountry directional signs will also be improved.

The park's major interpretive center will be located in the Rim Village. The requirements for this facility were previously discussed under the plan for the Rim Village.

Information will be available at the administration building and at the Annie Springs entrance station, but visitors arriving from the south will be directed to the new Interpretive Center in the Rim Village for more detailed information and orientation.

A small information-orientation structure with a small parking area will be constructed just north of the North Entrance Station.

North Entrance.

The present seasonal residence at the north entrance is obsolete and will be removed. A replacement residence for seasonal employees, most likely a duplex with efficiency apartments, will be located at the Forest Service administrative site near Diamond Lake through special use arrangement with the Umpqua National Forest. The apartments will be winterized so that they may be used by personnel on patrol in the winter.

Past attempts to obtain a reliable water source from wells at the north entrance have been futile. Preliminary studies indicate that a catchment system to collect rainwater and snowmelt should provide a primary water supply for the small facility. Supplementary water sources may need to be explored.

A self-contained sewage treatment system will be required to serve the entrance station and information-orientation facility.

4

summary of major proposals

CRATER LAKE NATIONAL PARK / OREGON

GENERAL MANAGEMENT PLAN
Crater Lake National Park

Part IV

SUMMARY OF MAJOR PROPOSALS

Major visitor use and development proposals, estimated costs and phasing are illustrated in the following tables. Resource management proposals will be added upon completion of that element of the general management plan.

These proposals do not require legislative action. A wilderness proposal is awaiting Congressional action.

DEVELOPMENT PROGRAM / PHASING / CONSTRUCTION COST

	Phase I	Phase II	Phase III	Construction Cost*
RIM VILLAGE				
Construct interpretive center.		▮▮▮▮▮▮▮		1,000,000
Provide pedestrian walkways – landscaping.	▮▮▮▮	▮▮▮▮▮▮▮		82,000
Remove exhibit building and community building. Restore sites.		▮▮▮▮▮▮▮		10,000
Redevelop picnic area. Remove excess roads.	▮▮▮▮▮▮▮			40,000
Remove 20 cabins.	▮▮▮▮▮▮▮			40,000
Construct 2 comfort stations. Remove 4.	▮▮▮▮	▮▮▮▮▮▮▮		44,000
Develop lodge access road, new parking areas; reorganize old parking areas.		▮▮▮▮▮▮▮		418,000
ANNIE SPRINGS				
Construct 52 campsites, parking utilities, and 2 comfort stations.		▮▮▮▮▮▮▮		144,000
Concessioner construct camper service facilities.	▮▮▮▮▮▮▮			160,000
Replace seasonal quarters.	▮▮▮▮▮▮▮			80,000
ROADS/OVERLOOKS				
Improve West Rim Drive.	▮▮▮▮▮▮▮			1,020,000
Sign and stripe East Rim Drive for one-way.	▮▮▮▮▮▮▮			10,000
Improve North Entrance Road.	▮▮▮▮▮▮▮			1,240,000
Improve overlooks, pullouts.	▮▮▮▮▮▮▮	▮▮▮▮▮▮▮		252,000
MUNSON VALLEY				
Remove Sleepy Hollow cabins.		▮▮▮▮▮▮▮		30,000
Construct new employee residences – renovate others.		▮▮▮▮▮▮▮		900,000
Remove obsolete maintenance buildings.			▮▮▮▮▮▮▮	30,000

	Phase I	Phase II	Phase III	Construction Cost*
PANHANDLE				
Construct storage sheds.		▮▮▮▮▮▮▮		45,000
LOST CREEK				
Add 13 campsites, including roads and water.	▮▮▮▮▮▮▮			84,000
Construct comfort station.	▮▮▮▮▮▮▮			40,000
Construct campfire circle.	▮▮▮▮▮▮▮			10,000
CLEETWOOD COVE				
Improve docking and visitor use facilities.	▮▮▮▮▮▮▮			40,000
Provide electric power supply – if feasible.	▮▮▮▮▮▮▮			360,000
INFORMATION/ORIENTATION/INTERPRETATION				
Improve wayside exhibits.	▮▮▮▮▮▮▮	▮▮▮▮▮▮▮		30,000
Construct exhibit structure at Cleetwood Cove trailhead.	▮▮▮▮▮▮▮			10,000
Construct information/orientation facility at north entrance, including parking.		▮▮▮▮▮▮▮		170,000
Improve backcountry directional signs.	▮▮▮▮▮▮▮			5,000
NORTH ENTRANCE				
Construct duplex apartment and utility systems, near Diamond Lake		▮▮▮▮▮▮▮		320,000
Remove seasonal cabin and pit toilet at north entrance.		▮▮▮▮▮▮▮		2,000

*Construction cost in 1976 dollars. Preliminary cost estimates are based on conceptual ideas in this document and will be revised as specific requirements are developed. The costs of planning, design and supervision are not included in the estimates.

SUMMARY OF CONSTRUCTION COST BY AREA AND PHASES	PHASE I	PHASE II	PHASE III	SUBTOTAL
RIM VILLAGE	114,000	1,520,000	– 0 –	1,634,000
ANNIE SPRINGS	240,000	144,000	– 0 –	384,000
ROADS/OVERLOOKS	2,422,000	100,000	– 0 –	2,522,000
MUNSON VALLEY	– 0 –	930,000	30,000	960,000
PANHANDLE	– 0 –	45,000	– 0 –	45,000
LOST CREEK	134,000	– 0 –	– 0 –	134,000
CLEETWOOD COVE	400,000	– 0 –	– 0 –	400,000
INFORMATION/ORIENTATION/INTERPRETATION	30,000	185,000	– 0 –	215,000
NORTH ENTRANCE/DIAMOND LAKE	– 0 –	322,000	– 0 –	322,000
TOTALS	3,340,000	3,246,000	30,000	6,616,000

SUMMARY OF MAJOR PROPOSALS

	Existing	Proposed	Type of Change
Capacity	Day Use: No limitation Lodging: 80 room lodge; 18 cabins, 2 fourplex cabins	No limitation at present time Retain lodge, remove cabins and fourplexes	No change Decrease lodging by 24 units
	Camping: Mazama campground - 198 drive-in sites Lost Creek - 12 primitive sites	Mazama - increase to 250 sites Lost Creek - increase to 25 sites	Increase by 65 sites
	Boat Tours: Four 60 passenger launches - scheduled tours accomodating ±500 people per day	No change	No change
	Winter Use: Rim Village and headquarters open - snowmobile trail on North Entrance Road - no limitation on use	No change	No change
Access and Circulation	±85 miles paved road, 4 miles unpaved motor nature road - one-way traffic on East Rim Drive	Widen ±14 miles of North Entrance Road and West Rim Drive from 18' to 20' minimum - repair overlooks - add bicycle lane on one-way road	Minimum safety improvements + bicycle lanes
Rim Village	Lodge, cafeteria-store, rental cabins, community building, exhibit building, Sinnott Memorial overlook, employee dormitory, picnic area, 4 comfort stations, walks, trails, 371 parking spaces	Remove rental cabins, relocate ±185 parking spaces from rim to cabin area, restore rim parking area (±8 acres) to pedestrian green space, construct new lodge access road and reorganize lodge parking (±2 acres), construct all-season interpretive center, remove exhibit and community building, replace 4 obsolete comfort stations	No change in functions - restore part of Rim Village to pedestrian use - provide all-season interpretive facilities -

		with 2 new ones, remove excess roads in picnic area - all new development (except lodge access road) to occur on presently developed land - remove 10-14 acres of development, 8-12 developed acres returned to more natural state, 2 acres new development (access road) on partially disturbed land	remove/replace obsolete facilities - reduce developed area
Campgrounds	Mazama Campground: 198 drive-in sites, 7 comfort stations, registration kiosk, sanitary dump station, 500 seat amphitheater, employee cabin, south entrance station	Add 52 walk-in sites, central parking and 2 comfort stations (12-15 acres partially disturbed land), relocate registration kiosk, replace cabin with employee residence, construct camper services building	Increase capacity, provide separation for RV/tent campers, relocate camper services from Rim Village to campground, replace obsolete residence
Munson Valley	Park administrative and maintenance facilities, employee housing, community building, public gas station	Replace obsolete employee housing, remove obsolete maintenance structures - replacement of facilities to occur on presently impacted (developed) sites - probable decrease in total land use with removal of some maintenance structures	No change in functions - obsolete facilities replaced

Panhandle	Maintenance storage area	Add storage structures - no increase in land use	No change in function
Utilities	Present water and sewage treatment systems meet all standards and are designed to meet present and future needs	Add water collection/storage system and sewage treatment facilities at North Entrance - provide electric power at Cleetwood Cove	Continued upgrading of facilities
North Entrance	Entrance station, seasonal employee cabin	Remove obsolete employee cabin. Replace with new residences near Diamond Lake. Construct information/ orientation facility with parking, water supply and self-contained sewage treatment system. ±2-4 additional acres required for development.	Provide visitor information/ orientation facilities, remove obsolete employee facilities

SUMMARY OF LAND USE CHANGES: New or replacement development will occur on 20-26 acres of land partially disturbed by previous use and/or development. Between 8-12 acres of intensively developed land will be returned to a more natural condition with pedestrian use. Widening of ±14 miles of road will affect an undetermined amount of adjacent land.

SUMMARY OF FUNCTIONAL CHANGES: Existing use patterns will remain essentially unchanged; improved information, orientation and interpretation facilities will allow better utilization of the visitors' time. Lodging facilities will decrease; camping sites will increase. Obsolete visitor and management facilities will be replaced or removed. Intrusion of vehicle traffic on viewing experience in Rim Village will be substantially reduced.

abcde

appendixes

CRATER LAKE NATIONAL PARK / OREGON

6. Crater Lake National Park

An Act Reserving from the public lands in the State of Oregon, as a public park for the benefit of the people of the United States, and for the protection and preservation of the game, fish, timber, and all other natural objects therein, a tract of land herein described, and so forth, approved May 22, 1902 (32 Stat. 202)

Public lands. Crater Lake National Park, Oreg., established. Boundaries.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the tract of land bounded north by the parallel forty-three degrees four minutes north latitude, south by forty-two degrees forty eight minutes north latitude, east by the meridian one hundred and twenty-two degrees west longitude, and west by the meridian one hundred and twenty-two degrees sixteen minutes west longitude, having an area of two hundred and forty-nine square miles, in the State of Oregon, and including Crater Lake, is hereby reserved and withdrawn from settlement, occupancy, or sale under the laws of the United States, and dedicated and set apart forever as a public park or pleasure ground for the benefit of the people of the United States, to be known as "Crater Lake National Park." (U.S.C., title 16, sec. 121.)

Regulations, etc., by Secretary of Interior.

SEC. 2. That the reservation established by this act shall be under the control and custody of the Secretary of the Interior, whose duty it shall be to establish rules and regulations and cause adequate measures to be taken for the preservation of the natural objects within said park, and also for the protection of the timber from wanton depredation, the preservation of all kinds of game and fish, the punishment of trespassers, the removal of unlawful occupants and intruders, and the prevention and extinguishment of forest fires. (U.S.C., title 16, sec. 122.)

Settlement in, etc., prohibited.

SEC. 3. That it shall be unlawful for any person to establish any settlement or residence within said reserve, or to engage in any lumbering, or other enterprise or business occupation therein, or to enter therein for any speculative purpose whatever, and any person violating the provisions of this act, or the rules and regulations established thereunder, shall be punished by a fine of not more than five hundred dollars, or by imprisonment for not more than one year, and shall further be liable for all destruction of timber or other property of the United States in consequence of any such unlawful act: *Provided*, That said reservation shall be open, under such regulations as the Secretary of the Interior may prescribe, to all scientists, excursionists, and pleasure seekers and to the location of mining claims and the working of the same: *And provided further*, That restaurant and hotel keepers, upon application to the Secretary of the Interior, may be permitted by him to establish places of entertainment within the Crater Lake National Park for the accommodation of visitors, at places and under regulations fixed by the Secretary of the Interior, and not otherwise. (U.S.C., title 16, sec. 123.)

Penalties.

Provisos.
Admission of visitors, etc.

Hotels, etc., permitted.
(Amended by 39 Stat. 535, as amended. See pp. 9–12.)

Act of Legislature of Oregon, approved January 25, 1915, ceding to the United States exclusive jurisdiction over Crater Lake National Park in the State of Oregon. (Oregon Laws, 1920, vol. II, p. 3487.)

Be it enacted by the people of the State of Oregon, That exclusive jurisdiction shall be, and the same is hereby, ceded to the United States over and within all the territory which is now, or may hereafter be, included in that tract of land in the State of Oregon set aside by an act of Congress, approved May 22, 1902, entitled "An Act reserving from the public lands in the State of Oregon, as a public park for the benefit of the people of the United States, and for the protection and preservation of the game, fish, timber, and all other natural objects therein, a tract of land herein described, and so forth," for the purposes of a national park, known and designated as Crater Lake National Park; saving, however, to the said State the right to serve civil or criminal process within the limits of the aforesaid park in any suits or prosecutions for, or on account of, rights acquired, obligations incurred, or crimes committed in said State but outside of said park; and saving further to the said State the right to tax persons and corporations, their franchises and property on lands included in said park: *Provided, however*, That jurisdiction shall not vest until the United States, through the proper officers, notifies the Governor of said State that they assume police and military jurisdiction over said park.

SEC. 2. All acts and parts of acts in conflict with this act are hereby repealed.

SEC. 3. Inasmuch as at this time there exists confusion concerning the jurisdiction of the Federal and State courts over the property and within the territory in this Act described, the passage of this Act is declared to be immediately necessary for the immediate protection of the peace, health, and safety of the State, and an emergency is hereby declared to exist, and this Act shall go into immediate force and effect from and after its passage and approval by the Governor.

An Act To accept the cession by the State of Oregon of exclusive jurisdiction over the lands embraced within the Crater Lake National Park, and for other purposes, approved August 21, 1916 (39 Stat. 521)

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the provisions of the act of the Legislature of the State of Oregon, approved January twenty-fifth, nineteen hundred and fifteen, ceding to the United States exclusive jurisdiction over the territory embraced within the Crater Lake National Park, are hereby accepted and sole and exclusive jurisdiction is hereby assumed by the United States over such territory, saving, however, to the said State the right to serve civil or criminal process within the limits of the aforesaid park in suits or prosecution for or on account of rights acquired, obligations incurred, or crimes committed in said State but outside of said park, and saving further to the said State the right to tax persons and corporations, their franchises and property, on the lands included in said park. All the laws applicable to places under the sole and exclusive jurisdiction of the United States shall have force and effect in said park. All fugitives from justice taking refuge in said park shall be subject to the same laws as refugees from justice found in the State of Oregon. (U.S.C., title 16, sec. 124.)

Crater Lake National Park, Oreg.
Sole jurisdiction over, ceded by Oregon to United States.
State process, etc.

SEC. 2. That said park shall constitute a part of the United States judicial district for Oregon, and the district court of the United States in and for Oregon shall have jurisdiction of all offenses committed within said boundaries. (U.S.C., title 16, sec. 125.)

Jurisdiction of Oregon judicial district.

SEC. 3. That if any offense shall be committed in the Crater Lake National Park, which offense is not prohibited or the punishment for which is not specifically provided for by any law of the United States, the offender shall be subject to the same punishment as the laws of the State of Oregon in force at the time of the commission of the offense may provide for a like offense in said State; and no subsequent repeal of any such law of the State of Oregon shall affect any prosecution for said offense committed within said park. (U.S.C., title 16, sec. 126.)

Punishment under Oregon laws.

SEC. 4. That all hunting or the killing, wounding, or capturing at any time of any wild bird or animal, except

Hunting, fishing, etc., prohibited.

dangerous animals when it is necessary to prevent them from destroying human lives or inflicting injury, is prohibited within the limits of said park; nor shall any fish be taken out of the waters of the park in any other way than by hook and line, and then only at such seasons and in such times and manner as may be directed by the Secretary of the Interior. That the Secretary of the Interior

Regulations, etc.

shall make and publish such rules and regulations as he may deem necessary and proper for the management and care of the park and for the protection of the property therein, especially for the preservation from injury or spoliation of all timber, mineral deposits other than those legally located prior to the passage of this Act, natural curiosities, or wonderful objects within said park, and for the protection of the animals and birds in the park from capture or destruction, and to prevent their being frightened or driven from the park; and he shall make rules and regulations governing the taking of fish from the

Evidence of violations.

streams or lakes in the park. Possession within said park of the dead bodies, or any part thereof, of any wild bird or animal shall be prima facie evidence that the person or persons having the same are guilty of violating this

Punishment for violations.

Act. Any person or persons, or stage or express company, or railway company, who knows or has reason to believe that they were taken or killed contrary to the provisions of this Act and who receives for transportation any of said animals, birds, or fish so killed, caught, or taken, or who shall violate any of the other provisions of this Act or any rule or regulation that may be promulgated by the Secretary of the Interior with reference to the management and care of the park or for the protection of the property therein, for the preservation from injury or spoliation of timber, mineral deposits other than those legally located prior to the passage of this Act, natural curiosities, or wonderful objects within said park, or for the protection of the animals, birds, or fish in the park, or who shall within said park commit any damage, injury, or spoliation to or upon any building, fence, hedge, gate, guidepost, tree, wood, underwood, timber, garden, crops, vegetables, plants, land, spring, mineral deposits other than those legally located prior to the passage of this Act, natural curiosities, or other matter or thing growing or being thereon or situate therein, shall be deemed guilty of a misdemeanor, and shall be subject to a fine of not more than $500 or imprisonment not exceeding six months, or both, and be adjudged to pay all costs of the proceedings. (U.S.C., title 16, sec. 127.)

Forfeiture of guns, traps, etc.

SEC. 5. That all guns, traps, teams, horses, or means of transportation of every nature or description used by any person or persons within said park limits when engaged in killing, trapping, ensnaring, or capturing such wild beasts, birds, or animals shall be forfeited to the United States and may be seized by the officers in said park and

held pending the prosecution of any person or persons arrested under charge of violating the provisions of this Act, and upon conviction under this Act of such person or persons using said guns, traps, teams, horses, or other means of transportation, such forfeiture shall be adjudicated as a penalty in addition to the other punishment provided in this Act. Such forfeited property shall be disposed of and accounted for by and under the authority of the Secretary of the Interior. (U.S.C., title 16, sec. 128.)

Commissioner. Appointment, authority, etc.

SEC. 6. That the United States District Court for Oregon shall appoint a commissioner who shall reside in the park and who shall have jurisdiction to hear and act upon all complaints made of any violations of law or of the rules and regulations made by the Secretary of the Interior for the government of the park and for the protection of the animals, birds, and fish, and objects of interest therein, and for other purposes authorized by this Act.

Judicial power in violations of rules, etc.

Such commissioner shall have power, upon sworn information, to issue process in the name of the United States for the arrest of any person charged with the commission of any misdemeanor, or charged with a violation of the rules and regulations, or with a violation of any of the provisions of this Act prescribed for the government of said park and for the protection of the animals, birds, and fish in said park, and to try the person so charged, and if found guilty, to impose punishment and to adjudge the forfeiture prescribed.

Appeals.

In all cases of conviction an appeal shall lie from the judgment of said commissioner to the United States District Court for Oregon, and the United States court in said district shall prescribe the rules of procedure and practice for said commissioner in the trial of cases and for appeal to said United States District Court. (U.S.C., title 16, sec. 129.)

Procedure in criminal cases.

SEC. 7. That any such commissioner shall also have power to issue process as hereinbefore provided for the arrest of any person charged with the commission within said boundaries of any criminal offense not covered by the provisions of section four of this Act to hear the evidence introduced, and if he is of opinion that probable cause is shown for holding the person so charged for trial shall cause such person to be safely conveyed to a secure place of confinement within the jurisdiction of the United States District Court for Oregon, and certify a transcript of the record of his proceedings and the testimony in the case to said court, which court shall have jurisdiction of the case: *Provided*, That the said commissioner shall grant bail in all cases bailable under the laws of the United States or of said State. (U.S.C., title 16, sec. 130.)

Proviso. Bail.

Service of process.

SEC. 8. That all process issued by the commissioner shall be directed to the marshal of the United States for

the district of Oregon, but nothing herein contained shall be so construed as to prevent the arrest by any officer or employee of the Government or any person employed by the United States in the policing of said reservation within said boundaries without process of any person taken in the act of violating the law or this Act or the regulations prescribed by said Secretary as aforesaid. (U.S.C., title 16, sec. 131.)

Salary.

SEC. 9. That the commissioner provided for in this Act shall be paid an annual salary of $1,500, payable quarterly: *Provided*, That the said commissioner shall reside within the exterior boundaries of said Crater Lake National Park, at a place to be designated by the court making such appointment: *Provided further*, That all fees, costs, and expenses collected by the commissioner shall be disposed of as provided in section eleven of this Act. (U.S.C., title 16, sec. 132.)

Proviso.
Residence.

Disposal of fees, etc.

United States fees, etc.

SEC. 10. That all fees, costs, and expenses arising in cases under this Act and properly chargeable to the United States shall be certified, approved, and paid as are like fees, costs, and expenses in the courts of the United States. (U.S.C., title 16, sec. 133.)

Deposit of fines and costs.

SEC. 11. That all fines and costs imposed and collected shall be deposited by said commissioner of the United States, or the marshal of the United States collecting the same, with the clerk of the United States District Court for Oregon. (U.S.C., title 16, sec. 134.)

Acceptance of cession.

SEC. 12. That the Secretary of the Interior shall notify, in writing, the governor of the State of Oregon of the passage and approval of this Act.

Excerpt from "An Act Making appropriations for sundry civil expenses of the Government for the fiscal year ending June 30, 1918, and for other purposes," approved June 12, 1917 (40 Stat. 152)

Crater Lake National Park. Acceptance of donated lands, etc. (Repealed by 46 Stat. 1028, but subject matter covered by U.S.C., title 16, sec. 6, 41 Stat. 917. See p. 13.)

The Secretary of the Interior is authorized to accept patented lands or rights of way over patented lands in the Crater Lake National Park that may be donated for park purposes. (U.S.C., title 16, sec. 135.)

An Act Accepting certain tracts of land in the city of Medford, Jackson County, Oregon, approved June 7, 1924 (43 Stat. 606)

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the Secretary of the Interior be, and he is hereby, authorized to accept certain tracts of land in the city of Medford, Jackson County, Oregon, described as lots numbered 15 and 16, block 9, amended plat to Queen Ann Addition to the city of Medford; and lot 3, block 2, central subdivision to the city of Medford, which have been tendered to the United States of America in fee simple by the city of Medford, Oregon, as sites for buildings to be used in connection with the administration of Crater Lake National Park, Oregon.

Crater Lake National Park, Oreg. Acceptance from city of Medford of lots, as sites for buildings in.

An Act To add certain land to the Crater Lake National Park in the State of Oregon, and for other purposes, approved May 14, 1932 (47 Stat. 155)

Crater Lake National Park, Oreg.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That all of that certain tract described as follows: Beginning on the south boundary line of Crater Lake National Park at four mile post numbered 112; thence west along the south boundary line of said park four and twenty-six one-hundredths chains which is the northwest corner of this tract; thence south one hundred and fourteen and forty-two one-hundredths chains; thence south forty degrees fifty-nine minutes east, eighty-four and thirty-nine one-hundredths chains; thence east fifteen and thirteen one-hundredths chains to highway stake numbered 130; thence north eighty-nine degrees thirty minutes east, eighteen and six one-hundredths chains; thence north twenty and eighty-three one-hundredths chains; thence north nineteen degrees and forty minutes west, one hundred and twenty-six and four one-hundredths chains; thence north twenty-seven degrees fifty-two minutes west forty-three and fifty one-hundredths chains to the south boundary of Crater Lake National Park; thence west twenty-four chains following the south boundary of said park to the place of beginning, in the State of Oregon be, and the same is hereby, excluded from the Crater National Forest and made a part of the Crater Lake National Park subject to all laws and regulations applicable to and governing said park. (U.S.C., 6th supp., title 16, sec. 121a.)

Land added to. Description.

Transferred from Crater National Forest.

An Act To authorize the acquisition of additional land in the city of Medford, Oregon, for use in connection with the administration of the Crater Lake National Park, approved May 14, 1932 (47 Stat. 156)

Crater Lake National Park, Oreg.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the Secretary of the Interior be, and he is hereby, authorized to acquire on behalf of the United States for use in connection with the present administrative headquarters of the Crater Lake National Park, that certain tract of land in the city of Medford, Jackson County, Oregon, adjoining the present headquarters site and described as lot 4, block 2, central subdivision to said city of Medford, Oregon, which tract of land has been offered to the United States for the purpose aforesaid by the city of Medford, Oregon, free and clear of all encumbrances for the consideration of $300.

Purchase of certain tract from Medford, Oreg., as addition to, authorized.

SEC. 2. That not to exceed the sum of $300 from the unexpended balance of appropriations heretofore made for the acquisition of privately owned lands and/or standing timber within the national parks and national monuments be, and the same is hereby, made available for the acquisition of land herein authorized.

Price.

Fund available. Vol. 46, p. 1154.

Public Law 94-429
94th Congress, S. 2371
September 28, 1976

An Act

To provide for the regulation of mining activity within, and to repeal the application of mining laws to, areas of the National Park System, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the Congress finds and declares that—

National Park System, Mining activity, regulation. 16 USC 1901.

(a) the level of technology of mineral exploration and development has changed radically in recent years and continued application of the mining laws of the United States to those areas of the National Park System to which it applies, conflicts with the purposes for which they were established; and

(b) all mining operations in areas of the National Park System should be conducted so as to prevent or minimize damage to the environment and other resource values, and, in certain areas of the National Park System, surface disturbance from mineral development should be temporarily halted while Congress determines whether or not to acquire any valid mineral rights which may exist in such areas.

SEC. 2. In order to preserve for the benefit of present and future generations the pristine beauty of areas of the National Park System, and to further the purposes of the Act of August 25, 1916, as amended (16 U.S.C. 1) and the individual organic Acts for the various areas of the National Park System, all activities resulting from the exercise of valid existing mineral rights on patented or unpatented mining claims within any area of the National Park System shall be subject to such regulations prescribed by the Secretary of the Interior as he deems necessary or desirable for the preservation and management of those areas. 16 USC 1902.

SEC. 3. Subject to valid existing rights, the following Acts are amended or repealed as indicated in order to close these areas to entry and location under the Mining Law of 1872:

(a) the first proviso of section 3 of the Act of May 22, 1902 (32 Stat. 203; 16 U.S.C. 123), relating to Crater Lake National Park, is amended by deleting the words "and to the location of mining claims and the working of same";

(b) section 4 of the Act of February 26, 1917 (39 Stat. 938; 16 U.S.C. 350), relating to Mount McKinley National Park, is hereby repealed; Repeals.

(c) section 2 of the Act of January 26, 1931 (46 Stat. 1043; 16 U.S.C. 350a), relating to Mount McKinley National Park, is hereby repealed;

(d) the Act of June 13, 1933 (48 Stat. 139; 16 U.S.C. 447), relating to Death Valley National Monument, is hereby repealed;

(e) the Act of June 22, 1936 (49 Stat. 1817), relating to Glacier Bay National Monument, is hereby repealed;

(f) section 3 of the Act of August 18, 1941 (55 Stat. 631; 16 U.S.C. 450y-2), relating to Coronado National Memorial is amended by replacing the semicolon in subsection (a) with a period and deleting the prefix "(a)", the word "and" immediately preceding subsection (b), and by repealing subsection (b); and

Repeal.

(g) The Act of October 27, 1941 (55 Stat. 745; 16 U.S.C. 450z), relating to Organ Pipe Cactus National Monument, is hereby repealed.

Certain mining operations, temporary cessation.
16 USC 1903.

SEC. 4. For a period of four years after the date of enactment of this Act, holders of valid mineral rights located within the boundaries of Death Valley National Monument, Mount McKinley National Park, and Organ Pipe Cactus National Monument shall not disturb for purposes of mineral exploration or development the surface of any lands which had not been significantly disturbed for purposes of mineral extraction prior to February 29, 1976: *Provided*, That if the Secretary finds that enlargement of the existing excavation of an individual mining operation is necessary in order to make feasible continued production therefrom at an annual rate not to exceed the average annual production level of said operation for the three calendar years 1973, 1974, and 1975, the surface of lands contiguous to the existing excavation may be disturbed to the minimum extent necessary to effect such enlargement, subject to such regulations as may be issued by the Secretary under section 2 of this Act. For purposes of this section, each separate mining excavation shall be treated as an individual mining operation.

16 USC 1904.

SEC. 5. The requirements for annual expenditures on mining claims imposed by Revised Statute 2324 (30 U.S.C. 28) shall not apply to any claim subject to section 4 of this Act during the time such claim is subject to such section.

Certain unpatented mining claims, recommendations for acquisition.
16 USC 1905.

SEC. 6. Within two years after the date of enactment of this Act, the Secretary of the Interior shall determine the validity of any unpatented mining claims within Glacier Bay National Monument, Death Valley and Organ Pipe Cactus National Monuments and Mount McKinley National Park and submit to the Congress recommendations as to whether any valid or patented claims should be acquired by the United States, including the estimated acquisition costs of such claims, and a discussion of the environmental consequences of the extraction of minerals from these lands. The Secretary shall also study and within two years submit to Congress his recommendations for modifications or adjustments to the existing boundaries of the Death Valley National Monument and the Glacier Bay National Monument to exclude significant mineral deposits and to decrease possible acquisition costs.

Study.
Recommendations, submittal to Congress.

Recommendations, submittal to Congress.
16 USC 1906.

SEC. 7. Within four years after the date of enactment of this Act, the Secretary of the Interior shall determine the validity of any unpatented mining claims within Crater Lake National Park, Coronado National Memorial, and Glacier Bay National Monument, and submit to the Congress recommendations as to whether any valid or patented claims should be acquired by the United States.

Mining claims, recordation.
16 USC 1907.

SEC. 8. All mining claims under the Mining Law of 1872, as amended and supplemented (30 U.S.C. chapters 2, 12A, and 16 and sections 161 and 162) which lie within the boundaries of units of the National Park System shall be recorded with the Secretary of the Interior within one year after the effective date of this Act. Any mining claim not so recorded shall be conclusively presumed to be abandoned and shall be void. Such recordation will not render valid any claim which was not valid on the effective date of this Act, or which becomes invalid thereafter. Within thirty days following the date of enactment of this Act, the Secretary shall publish notice of the requirement for such recordation in the Federal Register. He shall also publish similar notices in newspapers of general circulation in the areas adjacent to those units of the National Park System listed in section 3 of this Act.

Notice, publication in Federal Register.

Landmarks.
16 USC 1908.

SEC. 9. (a) Whenever the Secretary of the Interior finds on his own motion or upon being notified in writing by an appropriate scientific,

historical, or archeological authority, that a district, site, building, structure, or object which has been found to be nationally significant in illustrating natural history or the history of the United States and which has been designated as a natural or historical landmark may be irreparably lost or destroyed in whole or in part by any surface mining activity, including exploration for or removal or production of minerals or materials, he shall notify the person conducting such activity and submit a report thereon, including the basis for his finding that such activity may cause irreparable loss or destruction of a national landmark, to the Advisory Council on Historic Preservation, with a request for advice of the Council as to alternative measures that may be taken by the United States to mitigate or abate such activity.

Report to Advisory Council on Historic Preservation.

(b) The Council shall within two years from the effective date of this section submit to the Congress a report on the actual or potential effects of surface mining activities on natural and historical landmarks and shall include with its report its recommendations for such legislation as may be necessary and appropriate to protect natural and historical landmarks from activities, including surface mining activities, which may have an adverse impact on such landmarks.

Report to Congress.

Legislative recommendations.

SEC. 10. If any provision of this Act is declared to be invalid, such declaration shall not affect the validity of any other provision hereof.

Severability. 16 USC 1909.

SEC. 11. The holder of any patented or unpatented mining claim subject to this Act who believes he has suffered a loss by operation of this Act, or by orders or regulations issued pursuant thereto, may bring an action in a United States district court to recover just compensation, which shall be awarded if the court finds that such loss constitutes a taking of property compensable under the Constitution. The court shall expedite its consideration of any claim brought pursuant to this section.

Civil actions. 16 USC 1910.

SEC. 12. Nothing in this Act shall be construed to limit the authority of the Secretary to acquire lands and interests in lands within the boundaries of any unit of the National Park System. The Secretary is to give prompt and careful consideration to any offer made by the owner of any valid right or other property within the areas named in section 6 of this Act to sell such right or other property, if such owner notifies the Secretary that the continued ownership of such right or property is causing, or would result in, undue hardship.

16 USC 1911.

SUNSHINE IN GOVERNMENT

SEC. 13. (a) Each officer or employee of the Secretary of the Interior who—

Interior Department employees, financial disclosure. 16 USC 1912.

(1) performs any function or duty under this Act, or any Acts amended by this Act concerning the regulation of mining within the National Park System; and

(2) has any known financial interest (A) in any person subject to such Acts, or (B) in any person who holds a mining claim within the boundaries of units of the National Park System;

shall, beginning on February 1, 1977, annually file with the Secretary a written statement concerning all such interests held by such officer or employee during the preceding calendar year. Such statement shall be available to the public.

(b) The Secretary shall—

(1) act within ninety days after the date of enactment of this Act—

(A) to define the term "known financial interest" for purposes of subsection (a) of this section; and

(B) to establish the methods by which the requirement to file written statements specified in subsection (a) of this section will be monitored and enforced, including appropriate provisions for the filing by such officers and employees of such statements and the review by the Secretary of such statements; and

Report to Congress.

(2) report to the Congress on June 1 of each calendar year with respect to such disclosures and the actions taken in regard thereto during the preceding calendar year.

Possible exemptions.

(c) In the rules prescribed in subsection (b) of this section, the Secretary may identify specific positions within such agency which are of a nonregulatory or nonpolicymaking nature and provide that officers or employees occupying such positions shall be exempt from the requirements of this section.

Violation, penalty.

(d) Any officer or employee who is subject to, and knowingly violates, this section or any regulation issued thereunder, shall be fined not more than $2,500 or imprisoned not more than one year, or both.

Approved September 28, 1976.

LEGISLATIVE HISTORY:

HOUSE REPORT No. 94-1428 (Comm. on Interior and Insular Affairs).
SENATE REPORT No. 94-567 (Comm. on Interior and Insular Affairs).
CONGRESSIONAL RECORD, Vol. 122 (1976):
Feb. 3, 4, considered and passed Senate.
Sept. 14, considered and passed House, amended.
Sept. 17, Senate concurred in House amendments.

APPENDIX C BIBLIOGRAPHY

APPLEGATE, S. I.
1939 Plants of Crater Lake National Park. Am. Midland Nat., V. 22, No. 234, p. 225-314.

ATWOOD, W. W., JR.
1935 The glacial history of an extinct volcano, Crater Lake National Park. Journal. Geology, V. XLIII, No. 2, p. 142-168.

BAILEY, VERNON
1936 The Mammals and Life Zones of Oregon. U.S. Dept. of Agriculture, North American Fauna 55, 416 p.

DAVIS, WILBUR A.
1964 Archeological Surveys of Crater Lake National Park and Oregon Caves National Monument. Oregon State University.

DEALY, J. EDWARD
1969 Habitat characteristics of a central Oregon mule deer range. (In preparation for publication, Pacific Northwest Forest and Experiment Station, USDA Forest Service, Portland, Oregon.)

DILLER, J. S., and PATTON, H. B.
1902 The Geology and Petrography of Crater Lake National Park. U.S. Geology Survey, Prof. Paper 3, 164 p.

DILLER, J. S.
1912 Geological history of Crater Lake, Oregon. U.S. Dept. of Interior, Public Info. Bull., 31 p.

DYRNESS, C. T., AND C. T. YOUNGBERG
1958 Soil-Vegetation Relationships in the Central Oregon Pumice Region. First North Am. Forest Soils Conference Proc., p. 57-66.

FRANKLIN, JERRY F., AND DYRNESS, C. T.
1969 Vegetation of Oregon and Washington. Pacific Northwest Forest and Experiment Station, U.S. Dept. of Agriculture, Forest Service, Portland, Oregon. USDA Forest Service Research Paper, PNW-80.

FRYXELL, RONALD
1965 Mazama and Glacier Volcanic Ash Lagers, relative ages. Science, V. 147, p. 1288-1290.

GEOLOGICAL SURVEY
1973 Letter dated April 24, 1973 (copy in EIS of Wilderness Proposal, Feb. 1974).

INGLES
1967 Mammals of the Pacific States - California, Oregon, and Washington. Stanford, California: Stanford University Press.

KEEN, F. P.
1937 Climatic cycles in Eastern Oregon indicated by tree rings. U.S. Dept. of Agriculture, Monthly Weather Review, V. 65, No. 5, p. 175-188.

KEZER, JAMES
1951 Additions to Flora of Crater Lake National Park, Crater Lake Nature Notes.

MERRIAM, C. H.
1898 Life Zones and Crop Zones of the U.S. Bull. 10, p. 1-79, Biol. Surv., U.S. Dept. of Agriculture.

McCOLLUM, MIKE T.
1973 Elk, Their Ecology and Management. Crater Lake National Park. CRLA-N-15A.

McCOLLUM, M. T.
1974 Research Management of Black Bears in Crater Lake National Park. RSP CRLA-N-2A.

NATIONAL PARK SERVICE
1924 Weather Records, Crater Lake National Park, Oregon.

1931 Fire Atlas, Crater Lake National Park, Oregon.

1970 Resources Management Plan, Crater Lake National Park.

1976 Dispersed Winter Recreation Use Patterns and Visitor Attitudes - Crater Lake/Diamond Lake Area.

1977 Environmental Assessment, Draft Visitor Use and General Development Plans - Crater Lake National Park.

NELSON, C. H.
1961 Geological Limnology of Crater Lake, Oregon. M.S. Thesis, University of Minnesota.

PHILLIPS, KENNETH N.
1968 Hydrology of Crater, East and Davis Lakes, Oregon. U.S. Geological Survey Water-Supply Paper, 1859-E.

STERNES, G. L.
1963 Climate of Crater Lake National Park. Crater Lake, Oregon: Crater Lake National History Association, 12 p.

TIDBALL, RONALD
1965 A Study of Soil Development on Dated Pumice Deposits from Mt. Mazama, Oregon. Ph.D. Thesis, University of California.

WALLIS, ORTHELLO L.
1947 Mammals of Crater Lake. Oregon State College (Research).

1948 Trout Studies and Stream Survey of Crater Lake National Park, Oregon. M.S. Thesis, Oregon State University.

WESTERN LAND GRANT UNIVERSITIES AND COLLEGES AND U.S. SOIL CONSERVATION SERVICE
1964 Soils of the Western United States (exclusive of Hawaii and Alaska). Pullman, Washington: Washington State University, 69 p. illus. map.

WILLIAMS, HOWEL
1942 The Geology of Crater Lake National Park, Oregon. Carnegie Institute, Washington, Pub. 540, 162 p.

1943 Ancient Volcanoes of Oregon. Eugene, Oregon: Oregon University Press, 68 p.

1957 A geologic map of Bend quadrangle and a Reconnaissance Geologic Map of central portion, high Cascade Mt., Oregon. Oregon Dept. Geol. Mining Ind. in cooperation with U.S. Geological Survey.

1957 Crater Lake, the Story of Its Origin. Berkeley, California: California University Press, 97 p.

1961 The Floor of Crater Lake, Oregon. Am. Jour. Sci., V. 259, No. 2, p. 81-83.

WIRTZ, JOHN
1956 A Jog in the Bog, Crater Lake Nature Notes.

WYND, F. L.

1936 The Flora of Crater Lake National Park. Am. Midland Nat., V. 17, No. 6, p. 881-949.

1941 The botanical features of the life zones of Crater Lake National Park. Am. Midland Nat., V. 25, No. 2, p. 324-347.

APPENDIX D CHECKLIST OF MAMMALS, BIRDS, AMPHIBIANS, AND REPTILES

Checklist of Mammals

Vagrant Shrew	Sorex vagrens	Common
Northern Water Shrew	Sorex palustris	Moderately Abundant
Shrew Mole	Neurotrichus gibbsi	Common
California Mole	Scapanus latimanus	Uncommon
Little Brown Myotis	Myotis lucifugus	Common
Long Saked Myotis	Myotis evotis	Uncommon
Silver Haired Bat	Lasionycteris noctiuagans	Abundant
Big Brown Bat	Lptesicus fuscus	Common
Black Bear	Ursus americanus	Common
Raccoon	Prycyon lotor	Rare
Marten	Martes caurina	Common
Fisher	Martes pennanti	Extremely rare
Shorttail Weasel	Mustela erminea	Uncommon
Longtail Weasel	Mustela frenata	Common
Mink	Mustela vison	Absent from park
River Otter	Lutra canadensis	Rare
Wolverine	Gulo luscus	Absent from park
Badger	Taxidea taxus	Common
Striped Skunk	Mephitis mephitis	Rare
Coyote	Canis latrans	Rare
Red Fox	Vulpes fulva	Common
Gray Fox	Urocyon cinereoargenteus	Infrequent
Mountain Lion	Felis concolor	Infrequent
Bobcat	Lynx rufus	Infrequent
Aplodontia	Aplondontia rufa	Common
Yellow-Bellied Marmot	Marmota flaviventris	Common
California Ground Squirrel	Citellus beechegi	Common
Golden-Mantled Ground Squirrel	Citellus lateralis	Abundant
Townsend's Chipmunk	Sutamias townsendi	Common
Yellow-Pine Chipmunk	Sutamias amoenus	Abundant
Western Gray Squirrel	Sciurus griseus	Rare
Chickaree	Tamiasciurus douglasi	Common
Northern Flying Squirrel	Glaucomys sakrinus	Common
Sierra Pocket Gopher	Thomomys monticola	Common
Beaver	Castor canadensis	Absent from park
Deer Mouse	Peromyscus maniculatis	Abundant

Bugstail Woodrat	Neotoma cinerea	Common
Mountain Phenacomys	Phenacomys intermedius	Uncommon
California Redback Mouse	Clethrionomys occidentalis	Common
Longtail Vole	Microtus longicaudus	Frequent
Richardson Vole	Microtus richardsoni	Common
Muskrat	Ondatra zibethicus	Infrequent
Western Jumping Mouse	Zapus trinotatus	Common
Porcupine	Erethizon donsatum	Common
Pika	Ochotona princeps	Frequent
Snowshoe Hare	Lepus americanus	Frequent
Mountain Cottontail	Syluilagus nuttalli	Rare
Elk	Cervus canadensis	Locally common
Mule Deer	Odocoileus hemiones hemiones	Common
Blacktail Deer	Odocoileus hemiones columbianus	Common
Whitetail Deer	Odocoileus virginianus	Rare

Checklist of Birds

U - Uncommon
P - Permanent

Loons
- U Common Loon

Grebes
- U Red-necked Grebe
- U Eared Grebe
- U Western Grebe
- U Pied-billed Grebe

Pelicans
- U White Pelican

Cormorants
- U Double-crested Cormorant

Herons and Bitterns
- U Great Blue Heron
- U Common Egret (American)
- U Black-crowned Night Heron

Swans
- U Whistling Swan

Eagles
- P Golden Eagle
- P Bald Eagle

Stiff-Tailed Ducks
- U Ruddy Duck

Mergansers
- U Hooded Merganser
- Common Merganser

American Vultures
- Turkey Vulture

Accipters or Bird Hawks
- U-P Goshawk
- Sharp-shinned Hawk
- Cooper's Hawk

Geese
- Canada Goose
- U Black Brant
- White-fronted Goose
- U Snow Goose

Surface Feeding Ducks
- U Mallard
- U Gadwall
- U Pintail
- U Green-winged Teal
- U Blue-winged Teal
- U Cinnamon Teal
- U American Widgeon
- U Shoveler

- U Wood Duck

Diving Ducks
- U Redhead
- U Canvasback
- U Lesser Scaup
- U Common Goldeneye
- U Barrow's Goldeneye
- U Bufflehead

Harriers
- U Marsh Hawk (Harrier)

Ospreys
- U Osprey

Falcons
- U Prairie Falcon
- U Peregrine Falcon
- U Pigeon Hawk (Merlin)
- Sparrow Hawk (Kestrel)

Grouse
- P Blue Grouse
- P Ruffed Grouse

Buteos or Buzzard Hawks
- P Red-tailed Hawk
- Swainson's Hawk
- U Rough-legged Hawk
- U Ferruginous Hawk

Rails and Coots
- U American Coot

Plovers and Turnstones
- U Semipalmated Plover
- U Snowy Plover
- U Killdeer
- Black-bellied Plover
- U Ruddy Turnstone

Snipes, Sandpipers, etc.
- U Common Snipe (Wilson's)
- Spotted Sandpiper
- U Solitary Sandpiper (Western)
- U Wandering Tattler
- U Greater Yellowlegs

Phalaropes
- U Wilson's Phalarope

Gulls
- California Gull
- Ring-billed Gull
- U Western Gull

Hummingbirds
- U Allen's Hummingbird
- Rufous Hummingbird
- Calliope Hummingbird
- U Black-chinnted Hummingbird

Kingfishers
- U Belted Kingfisher

Woodpeckers
- Red-shafted Flicker
- U Pileated Woodpecker
- Lewis's Woodpecker
- Yellow-bellied Sapsucker
- Red-breasted Sapsucker (color variety)
- Williamson's Sapsucker
- P Hairy Woodpecker

Quail - Partridges - Pheasants
- U Mountain Quail (Plumed)

Cranes
- U Sandhill Crane

Terns
- U Forester's Tern
- U Black Tern

Pigeons and Doves
- U Band-tailed Pigeon
- U Rock Dove (Domestic Pigeon)
- U Mourning Dove

Owls
- U Screech Owl
- U Great Horned Owl
- P Pygmy Owl
- U Spotted Owl
- U Great Gray Owl
- U Long-eared Owl

Goatsuckers
- U Poor-will
- Common Nighthawk

Swifts
- U Vaux's Swift
- U White-throated Swift

Tyrant Flycatchers
- U Western Kingbird
- U Ash-throated Flycatcher
- U Black Phoebe
- U Say's Phoebe
- U Traill's Flycatcher
- Hammond's Flycatcher
- Dusky Flycatcher
- Western Flycatcher
- Western Wood Pewee
- Olive-sided Flycatcher

Larks
- Horned Lark

Swallows
- Violet-green Swallow
- U Tree Swallow

Woodpeckers (Cont.)
- U Downy Woodpecker
- U White-headed Woodpecker
- P Black-backed 3-Toed Woodpecker (Arctic)
- U Northern 3-Toed Woodpecker

Jays, Magpies, Crows
- P Gray Jay
- P Steller's Jay
- U Scrub Jay
- U Black-billed Magpie
- P Common Raven
- U Common Crow
- P Clark's Nutcracker

Titmice and Bushtits
- Black-capped Chickadee
- P Mountain Chickadee
- P Chestnut-backed Chickadee
- U Plain Titmouse (Gray)
- U Common Bushtit

Nuthatches
- U-P White-breasted Nuthatch
- P Red-breasted Nuthatch
- U Pygmy Nuthatch

Creepers
- P Brown Creeper

Dippers
- P Dipper (Water Ouzel)

Wood Warblers
- Orange-crowned Warbler
- Nashville Warbler
- U Yellow Warbler
- U Myrtle Warbler
- Audubon's Warbler
- U Black-throated Gray Warbler
- U Townsend's Warbler
- Hermit Warbler
- MacGillivray's Warbler
- Wilson's Warbler (Pileolated)

Weaver Finches
- U House Sparrow (English)

Swallows (Cont.)
- U Rough-winged Swallow
- U Barn Swallow
- U Cliff Swallow

Wrens
- U House Wren (Western)
- U-P Winter Wren
- U Bewick's Wren
- Rock Wren

Thrushes, Bluebirds, Solitaires
- Robin
- Varied Thrush
- Hermit Thrush
- Swainson's Thrush
- Western Bluebird
- Mountain Bluebird
- Townsend's Solitaire

Kinglets
- P Golden-crowned Kinglet
- Ruby-crowned Kinglet

Waxwings
- U Cedar Waxwing

Vireos
- U Solitary Vireo (Cassin's)
- U Red-eyed Vireo
- Warbling Vireo (Western)

Grosbeaks, Finches, Sparrows, Buntings
- U Black-headed Grosbeak
- Lazuli Bunting
- Evening Grosbeak
- U Purple Finch
- P Cassin's Finch
- U House Finch (Linnet)
- P Pine Grosbeak
- Gray-crowned Rosy Finch
- U Common Redpoll
- Pine Siskin
- U American Goldfinch
- Red Crossbill
- U White-winged Crossbill
- U Green-tailed Towhee
- U Rufous-sided Towhee

Meadowlarks, Blackbirds, Orioles

U Western Meadowlark
U Red-winged Blackbird
Brewer's Blackbird
U Brown-headed Cowbird

Tanagers

Western Tanager

U Savannah Sparrow
U Vesper Sparrow
U Lark Sparrow
U Slate-colored Junco
P Oregon Junco
U Tree Sparrow
Chipping Sparrow
White-crowned Sparrow
Golden-crowned Sparrow
Fox Sparrow
Lincoln's Sparrow
U Song Sparrow

Checklist of Amphibians and Reptiles

Amphibians

Northwestern Salamander	Ambystoma gracile
Long-toed Salamander	A. Macrdactylum
Rough-skinned Newt	Talicha granulosa
Oregon Salamander	Insatina eschscholti oregonsis
Tailed Frog	Ascaphus truei
Bozeal Toad	Bufo boreas boreas
Pacific Tree Frog	Hyla regilla
Cascade Frog	Rana cacadae

Reptiles

Northern Sagebrush Lizard	Sceloporus gracious gracious
Pygmy Horned Lizard	Phrynosoma douglassi douglassi
Northern Alligator Lizard	Gerrhonotus coeruleus
Valley Garter Snake	Thamnophis sirtailis fitchi

APPENDIX E PLANNING TEAM

Numerous individuals and organizations have participated in the planning process for Crater Lake National Park. The staff of Crater Lake National Park, Klamath Falls Group Office, Pacific Northwest Regional Office, and consultants from the Denver Service Center have contributed to various sections of the General Management Plan. The basic planning team consisted of the following participants:

Frank J. Betts	Superintendent Crater Lake National Park
Ernest J. Borgman	General Superintendent Klamath Falls Group Office
James S. Rouse	Chief, Compliance Division Planning and Resource Preservation Pacific Northwest Regional Office
Douglas B. Cornell, Jr.	Architect/Planner Team Captain Denver Service Center
Bonnie M. Campbell	Interpretive Planner Denver Service Center
Jon Haman	Environmental Specialist Denver Service Center

*U.S. Government Printing Office: 1978-777-033/75 Region 8

As the nation's principal conservation agency, the Department of the Interior has basic responsibilities to protect and conserve our land and water, energy and minerals, fish and wildlife, parks and recreation areas, and to ensure the wise use of all these resources. The department also has major responsibility for American Indian reservation communities and for people who live in island territories under U.S. administration.

Publication services were provided by the graphics staff of the Denver Service Center. NPS 1270