



VISITOR INFORMATION SERVICE

Deschutes National Forest

1969

SISTERS RANGER DISTRICT
POST OFFICE BOX 248
SISTERS, OREGON 97759

By

Phil F. Brogan

Author of 'East of the Cascades'

NOV 10 1972

RECEIVED

*Connection to
1967 Deschutes N.F. history*

McMinnville, Oregon.
November 8, 1972.

(D-5)

A. O.	
T. M.	
FIRE	
LAND USE	
ENG.	
REC.	
R & WL	X
ADM. SERV.	
PERSONNEL	
BUD. & ACCT.	
CONTRACTING	
RANGERS	
NURSERY	
RECREATION	
E. S. SERV.	
RE. CHOP	

Forest Supervisor
Deschutes National Forest
Bend, Oregon.

Dear Mr. Nichols;-

Thanks for your letter of October 31. Thanks also for the loan of the Phil Brogan document, which is returned herewith.

The Brogan report is a well documented bit of history, well indexed for easy reference and reflects some rather extensive research. I do find a few minor discrepancies, however, and will comment on them briefly.

JAN 30 1973

Page 127. "First road to Paulina Lake by John Curl, 1912. Wrong. The first road, or more properly a wagon track, to Paulina Lake was put there by Ralph Colwell, a rancher on Paulina Prairie. Colwell built the dam at the Paulina Lake outlet to store water for irrigation. The road was brushed out to facilitate construction of the dam. The road and dam were both present on July 1, 1911, the day I first saw Paulina Lake.

ORA	
REC. ASST.	
FCO	
ASST. FCO	
TM	
AA	
HEAD. FILE	
BULL. BD.	

Page 130. Pine Mountain Fire, 1915. Wrong. There were some noteworthy fires on the Pine Mountain District in 1913 and while I was on detail to the Siuslaw, but none of special note in 1915. As I recall, there were some bad fires on the Fort Rock district, under Bill Harriman, in 1915. On one occasion I crossed over the district boundary to give Bill an assist. In 1918, a 1700 acre fire scorched the south face of Pine Mountain. It was controlled the first night with a very slight loss of timber. The most of the acreage was on the sage brush slope, including portions of my horse pasture.

Page 116. Sawmills. I find no reference to the Bend Lumber Company mill which burned, I believe, in 1912. Location was west of the river, a short distance below the Shevlin Hixon mill site.

Page 110. China Hat Road. I doubt if Bill Harriman had anything to do with the China Hat Road. The initial work on that project was done by a group of Fort Rock homesteaders, headed by George Reels. It was mostly a matter of driving through with horse drawn wagons, removing a tree, rock or a log where necessary. Lava Gap slowed them up slightly but removal of a few loose rocks allowed them to pass. At one spot north of China Hat, they did a small amount of grading, using a team and plow. The following spring, 1916, I grubbed brush and removed rocks to allow the passage of cars. Still later, I started a road from China Hat toward East Lake. I left this road unfinished when I transferred to Alaska.

Page 95. Telephone Lines. Around 1913 and 1914, Bill Harriman maintained Forest Service headquarters on his homestead at a site near what was to later become the Cabin Lake Well.

While on the homestead, he utilized 8 miles of barb wire fence to connect his office, by telephone, to the Michaelson store at Fort Rock. Harriman did not build the line connecting Fort Rock with Paulina Lake. The first phase of that line, from East Lake to Antelope Spring, was built by John Curl in 1914. The second phase, along China Hat road, was built by Joe Brinkley after I had distributed the wire along the route. Later, I ran a line across Pine Mountain and tied into the P. B. Johnson line at the Millican Store.

Page 97. Crane Prairie Squatters. The Brogan report says Frank Law came up from Portland to assist Merritt. Wrong. Merritt was in Portland and the assist was given to Supervisor Hastings.

Page 90. Pine Mountain District. Upon my detail to the Siuslaw Forest in August, 1913, John Curl, Ranger at Lapine, took charge of the Pine Mountain district. The actual on the ground management of the district was trusted to Forest Guard, Chester A. Smith. That arrangement continued until I returned to the Deschutes in November, 1914.

In pointing out these discrepancies, it is not my intention to downgrade the Brogan report, merely to set the record straight in a few non-essential details.

Sincerely yours,

Harold E. Smith.

VISITOR INFORMATION SERVICE BOOK
FOR THE
DESCHUTES NATIONAL FOREST

An abstract of literature, personal recollections, and
interviews dealing with the Deschutes Forest

By
Phil F. Brogan
Author "East of the Cascades"

for the
Deschutes National Forest
Forest Service
U.S. Department of Agriculture

1 9 6 9

F o r e w o r d

This is a presentation, largely geologic and historic, dealing with the Deschutes National Forest—its ancient pre-history, its pioneer days, its organization, its scenic assets, and its timber, animals, birds, fish, and plants.

Discussed is the old story of the white-domed Cascades and the volcanism and glaciers that, aided by the storms of eons, shaped the Three Sisters and their fine family of peaks—Bachelor, Little Brother, Wife, Husband, and others.

Some of the material has been abstracted from many sources, noted in the Appendix, and from interviews with old timers. The author was for 45 years a member of The Bulletin staff in Bend. During that time, he "covered" Deschutes National Forest news. He wrote about fires and tragedies. He told of deaths on peaks; and, in early days, hiked into the wintry Cascades on search and rescue missions. He wrote about the discoveries of caves and named some of them. He was with the Astronauts on their visits to the "Moon Country."

It is not intended that excerpts be reprinted for general distribution or commercial purposes. Attempts to verify information were made, but the history spans a century and many sources are gone. In some instances, the information is merely an abstraction of previously reported or published material. Theories or situations, not necessarily noted, may have changed through the decades.

The research staff is deeply grateful to all who assisted in compiling this reference volume, intended to serve as a guide for those who work in the Deschutes National Forest.

Contents

	<u>Page</u>
Foreword.....	1
The Cascade Story	2
Naming of Mountains	2
Elevation of Cascade Peaks	3
Geology of the Cascades	4
Growth of Mountains	4
Geology of Three Sisters	5
Work of Glaciers	5
Mt. Multnomah theory	6
Scenery of Deschutes	7
Bachelor Butte geology	8
Recent volcanism	8
Lava bombs	8
Cone excavated	9
Le Conte Crater	10
McKenzie Pass Lavas	11
Lava cataract	11
Sisters Wilderness	12
Trail System	12
Belknap Volcano	13
McKenzie Highway	13
Summit lava fields	14
Blue Lake Crater	14
Spatter cones	15
The Mt. Mazama Story	16
Eruption described	16
Explosion dated	17
Glowing avalanches	17
"Ten Thousand smokes"	18
Newberry Volcano	19
Dome swallowed	20
Volcanic glass	20
Big Obsidian flow	20
Lava Cast Forest	21
Etna eruption discussed	22
Lava Butte	22
Deschutes blocked	23
Lake formed	23
Northwest rift zone	24
Mt. Newberry Lava Caves	25
Formation of caverns	25
Ice caves	25

	<u>Page</u>
Lavacicle Cave	26
Skeleton Cave	27
Fossil bones found	27
Derrick Cave	28
Ice Caverns of West	28
Cavern "glacier"	29
Hole-in-the-Ground	29
Devils Garden	30
 The Story of Fire and Ice	 31
Collier Glacier	31
Cascade storms	32
Glacier trails	33
Mt. Thielsen	33
Peaks cut by ice	33
Glaciers named	34
Thayer Glacier	35
Glacier canyons	35
 Deschutes Waters Region	 36
Lava in gorge	36
Metolius River	37
Deschutes flow uniform	37
Floods in the mountains	38
Dr. Newberry's visit	39
Break on Broken Top	39
 Lava Lands Interpretive Area	 40
Trail system planned	40
Lava Lands study	41
Center described	42
 Prehistoric times	 43
Sandals in cave	43
Old hunters described	44
Cave life rugged	44
Dr. Cressman quoted	45
Sandals from sage	46
Tragedy faced	46
The Wickiup knives	47
Paleolithic site	47
Artifacts found	48
Old camp excavated	48
Hunters saw volcanoes	49
Lakes covered old lands	49
Rock writings	50
Interpretation sought	51
Dry River site	51
 Trappers Blaze Deschutes Trails	 53
Ogden first explorer	53
Fremont totes canon	54

	<u>Page</u>
Summer Lake discovered	54
Immigrants blaze trails	55
Cascade road built	55
 Names on the Land	 57
Three Sisters sighted	57
Family of mountains	58
Indian names used	59
Cultus Lake	59
Dillman Cave	60
Named for river	60
Paulina much honored	61
Fremont's path traced	61
"Pivot Mountain" now Black Butte	62
Lakes given names	62
Diamond Peak	63
Death in Cascades	64
Three Fingered Jack	65
Mt. Washington	65
 Names for Lakes	 66
Wickiup Reservoir	66
Name honors Odell	67
Crescent Lake	67
Davis Lake	67
Crane Prairie	67
Elk Lake	68
Hosmer Lake	68
Suttle Lake	68
Summit Lake	68
Tragedy recalled	69
 Warm Springs Indian Reservation	 70
Area set aside	70
Three tribes involved	71
Kahneeta Resort	71
 First Settlers	 72
Old Indian Country	72
Scotts cross McKenzie	73
Ferry on Deschutes	74
Deschutes pastures used	74
First stockmen	74
John Y. Todd	75
Farewell Bend Ranch	76
John Sisemore, rancher	76
Metolius homesteads	77
 Range Wars - 1902 to 1906	 78
Bill Brown's "empire"	78
Deadlines established	79
Sheep slaughtered	80

Range fights end	80
Forest Service role told	80
Deschutes Water Diverted	82
Deschutes River Utilized	82
First use of river	82
Basin cracks develop	83
Big dams built	83
Tetherows used flow	84
Gardens irrigated	84
Irrigation Districts	84
Deschutes water lost	85
Madras lands irrigated	86
Deschutes Forest Created	87
"Entrymen" get timber	87
Deschutes Forest created	88
Ireland first supervisor	88
Supervisors listed	89
Ranger Districts	90
Tonseth Deschutes veteran	91
"Use Book" quoted	91
Cabins built	92
Ranger station sites located	93
Allingham station	93
Telephone lines	94
Incidents on new forest	96
Recreation and Special Uses	96
The House Case	97
Families squat upriver	97
Windy Point "gold strike"	98
Gold found near Broken Top	99
Cy J. Bingham, first ranger	99
Death of a guard	101
The Lava Lake murders	102
Roads through the Deschutes	103
The McKenzie Route	103
Scott Trail	104
Pass road detoured	104
Santiam Important Gateway	105
Toll gate established	105
Cache Creek Station	106
Hogg Pass Railroad	106
Grade still visible	108
Route of U.S. 97	108
Huntington's supply train	109
Deschutes roads	109
Newberry Crater Road	110
Mountain lakes lure	110
Sparks Lake Road	111

	<u>Page</u>
Deschutes road system	111
Oregon Skyline Trail	112
Grazing on the Deschutes	113
Water hauled to stock	113
Sheep numbers drop	114
Sawmills on the Deschutes	115
Deschutes log runners	115
First sawmills	116
Rush for timber	116
Bend gets big mills	117
Shevlin-Hixon ends operations	118
Brooks-Scanlon mill modernized	118
Forest area listed	119
Deschutes weather	120
Dry Cycles Reviewed	120
Climate study made	120
Snow drifts over crest	122
"Bottoms up" frost	122
Anchor ice	123
Winter of "brown snow"	123
Flood records cited	124
"Year of Brown Belt"	125
Manzanita killed	125
Weather extremes listed	125
Deschutes recreation forest	126
Irving S. Cobb visits	126
Deschutes fishing good	127
Trout placed in East Lake	127
Paulina Game Refuge	128
International Girl Scouts visit	128
Deschutes forest fires	130
Early day fires	130
Fox Butte fire	131
Aspen Flat Fire, biggest	131
Airstrip Fire	132
Redmond Air Center	133
Smokejumpers trained	133
Center serves big area	133
Land Exchanges	135
Big pine mills come	135
Crusade to save scenery	136
Roadside strips set aside	136
City gets Shevlin Park	137
Deschutes ski slopes	138
New center sought	138

	<u>Page</u>
Bachelor Butte selected	139
Road kept open	139
Bend economy benefits	140
"Big Eye" on Pine Mountain	141
Remote stars studied	141
Water from rock	142
Movie sites provided	142
"Fort Benham" established	142
Movie city on Dutchman Flat	143
Visits by the Astronauts	145
"Moon country" studied	145
Lunar Geological Conference	146
Cascade Peaks conquered	147
Washington, Jack scaled	147
Flora and Fauna	149
High Cascades studied	149
Orchids on peaks	150
Plants of the Three Sisters Area	150
Zones described	151
Greenleaf Manzanita	151
Western Juniper Natural Area	152
Deschutes wildlife	153
Many birds in timberlands	153
Deer count figures listed	154
Silviculture Laboratory	155
Bend Pine Nursery	156
Mt. Jefferson Wilderness	156
Balancing rocks of the Metolius	157
East Lake and its twin, Paulina	158
Davis Lake and its lava	159
Bend U.S. Forest Service headquarters	159
Dates on the Deschutes	160
Bibliography	162
Index	165

THE CASCADE STORY

Grand on the Oregon skyline is the snow-tipped Cascade Range, created by volcanism, sculptured by glaciers, and blasted by the fierce high-altitude storms of centuries. Geologists interpret the basic story of the mountains. Historians tell of their discovery and the naming of the once fiery peaks. Alpinists trace the first attempts to scale the weathered crags of the old volcanoes, with some exploration chapters missing.

The Deschutes National Forest, headquartered in Bend, shares the central segment of the Cascades with a sister forest, the Willamette. In the southwest, the Cascade Divide is also the separating line between the Umpqua and the Deschutes. To the north, Mt. Jefferson, second highest peak in Oregon, is just outside the Deschutes Forest. That old volcano shares its bulk with the Warm Springs Indian Reservation and the Willamette National Forest.

Oregon's majestic Cascades could easily have been known by another name. "Cascades" apparently was not the original choice. Historians say the first attempt at a name for the range was by the Spaniard, Manuel Quimper. In 1790, he roughly mapped the range as "Sierras Nevadas de S. Antonio." In 1792, George Vancouver, English explorer, gave names to prominent peaks, but only referred to the Cascades as "snowy range" or "ridge of snowy mountains." Lewis and Clark, in 1805-06, mentioned the peaks but referred only in general terms to the range of mountains. There were other references to the sublime white peaks by explorers. Lewis and Clark were content to refer to them as "Western Mountains."

David Douglas, the pioneer botanist, had great need of a name for the mountains in writing his field notes and journal. He seems to have been the first to use the name "Cascade." He refers frequently to the "Cascade Mountains," but Douglas never claimed he was the first to use the name "Cascades" for the snowy peaks.

There was a real attempt, however, to christen the mountains "Presidents Range." This effort was spearheaded by Hall J. Kelley, who appears in history as "The Boston Schoolmaster." However, the Wilkes Expedition of 1841 charted the mountains as "Cascade Range." But, the proposed name, "Presidents Range," was contained in literature for a time. If the mountains had been called the Presidents Range, the Three Sisters of the present would probably be known as the "Madison Mountains," with Diamond Peak bearing the name Monroe. Mt. Shasta would have been Jackson, and McLoughlin, John Quincy Adams.

Mt. Jefferson was not named by Kelley. The high peak was seen by Lewis and Clark from a point near the mouth of the Willamette and was named by them in honor of Thomas Jefferson, President of the United States. The naming took place on March 30, 1806.

Oregon Indians, so far as known, had no general name for the Cascades. Each tribe probably had its own name. The Klamath Indians called the range Yamakiasham Yaina, literally "mountains of the northern people." Cascade Range is the official name adopted for the peaks by the U.S. Board on Geographic Names.

Indian trails skirted the mountains and, in some areas, crossed low passes. Branch trails led to alpine berry patches. There was a well-worn trail between the Klamath country and fishing grounds on the Columbia River. Early day explorers followed some of those trails.

The Oregon Cascades and their various segments (the Hood area, Mt. Jefferson, the central peaks comprising the Three Sisters family, and the southern anchor once ruled by the great mountain Mazama) are dominantly volcanic in character. The high crest of the Cascades is made up of a series of giant but long extinct volcanoes. The range differs markedly in origin from the Sierra Nevada of California.

Highest peak of the Oregon Cascades is Hood, 11,245 feet. Stately Jefferson, 10,495 feet high, ranks second; and the South Sister, which escaped much of the erosive action of Ice Age glaciers, is next at 10,354 feet. All three of the Sisters exceed the 10,000 foot mark. Height of the North Sister is 10,094 feet, and that of the Middle Sister, 10,053 feet.

Mt. Washington, pinnacled peak of the central Cascades, is 7,802 feet high, but once was much higher. Three Fingered Jack's height is 7,848. Glaciated peaks, lava domes, and satellite craters and other volcanoes, comprise other beads of the "great rosary of Mountains" considered unique in America.

Not all the old volcanoes formed along the crest. Bachelor Butte, for instance, stands just to the east of the crest.

G E O L O G Y O F T H E C A S C A D E S

The old fire mountains known as the Cascades, from the great gorge of the Columbia south through the Deschutes country and past Crater Lake to the California line, hold in a basalt-bound volume many chapters of Oregon's interesting geologic story.

It is a story of two mountain ranges, one vastly old, the other recent. Geologists call one of the longitudinal belts the Western Cascades, spectacularly exposed in the "slide area" of the South Santiam Highway. The other is the High Cascades, moulded and shaped in two epochs of time.

The Western Cascades consist of gently folded volcanic rocks that range in age from the Eocene, some 60 million years ago, through the highly-volcanic Miocene. The topography of this region is mature and bears no relation to the original volcanic forms. The Western Cascades came into existence as a highly-active line of volcanoes just east of the present Willamette Valley, and apparently dumped some of their debris into an ancient offshore embayment.

The ash-belching, lava spouting Western Cascades spread their debris over a basement of marine deposits and ancient lands on which grew semi-tropical plants. Beneath the high Cascades, the early Tertiary deposits interfinger with volcanic formations to the east--the Clarno, John Day, Columbia lavas and Mascall beds. In his studies of the Cascades and his report on "Volcanoes of the Three Sisters Region," Dr. Howel Williams noted that the old land masses in turn may be underlain by the sediments of Cretaceous seas under the Three Sisters. It is known that such seas, and older ones, spread over Central Oregon in the Age of Reptiles--the era known as the Mesozoic. However, Dr. Williams noted: "Not a single fragment of any of these basement rocks has been recognized among the ejecta of the Three Sisters and neighboring cones." So far as known, no volcano in the High Cascades, with the exception of Mt. Mazama, has blown out fragments of pre-Pliocene bedrocks. Rocks found at Crater Lake are those torn from the topmost portion of the basement.

Dr. Williams concludes that the lava-feeding chambers of the High Cascades probably lie at shallow depths.

After the original Cascades to the west had been extensively folded and uplifted, the High Cascades, comprising the skyline of the present Cascades, started growing. It is indicated by fossil flora that, prior to the birth of the High Cascades, there was no mountain barrier to check moisture-bearing winds from surging inland to dampen redwood forests and associated trees and plants. Redwoods continued to grow in the John Day basin until the close of the Miocene, the epoch that spilled great floods of Columbia basalts over the Pacific Northwest.

Of major importance in the Deschutes geologic story are the High Cascades.

It has been suggested by geologists that the volcanic Cascades that now rule the western and central Oregon skyline came into existence on a fault which extends the length of the range with the east side downdropped. Lava intrusions then built the eastern side to the present imposing heights. Hot springs at Kitson, McCredie, Foley, and Belknap indicate the presence of such a fault. Dr. Williams says the uplift of the older Tertiary rocks was accompanied by opening of a north-south belt of fractures along what is now the crest of the Cascades.

The present Cascades, with their glaciated peaks, are believed to have started their growth in Pliocene time and to have continued to grow through that entire epoch. Activity was of the quiet, effusive type. By the end of the period, just prior to the opening of the Ice Age, basic lava had formed many large, shield-shaped volcanoes. Some of these continued to erupt into the Pleistocene, time of the earth's long winter. Many new volcanoes of andesite and dacite arose above and alongside the older basic lava domes.

Finally, within the Recent Period, eruptions of dacite, chiefly in the form of pumice and obsidian, and of basalt and flows of scoria, occurred from widely scattered vents. Much of this recent volcanism was in the High Cascades directly west of the upper Deschutes country.

The Three Sisters of the mid-Oregon Cascades have their own story, one that is of great interest to tourists and others visiting the area. The North Sister is the older of the trio of peaks. It is largely a product of the Pliocene epoch and was a great shield volcano. In the Ice Age, the North Sister was heavily glaciated, in a period when all peaks of the High Cascades were sheathed with thick ice that sent long glaciers down the McKenzie and into old, now-buried valleys of the Bend area. In the Age of Ice, the North Sister lost about a fourth of its massive bulk.

The Middle Sister, which possibly was built in three stages, also suffered heavily from glaciation, but not as much as its elder North Sister. Of the Three Sisters, the South is the only one which still has a crater. There is much proof that it continued to erupt after both the North and Middle Sisters were extinct. Dr. Williams found, in his field studies, that the South Sister is actually a group of superimposed cones.

The older Cascade mounts suffered heavily from glaciation in Pleistocene times. Prior to the Ice Age, Mt. Washington was a big shield volcano. It emerged from the "long winter" merely a shell of itself. Three Fingered Jack, with an ancestral story similar to that of Washington, also suffered from erosion as rockshod glaciers cut wide valleys and moved to the lowland. Broken Top, on the skyline west of the present Bend site, was gouged, torn, and scoured by great glaciers. Well to the south, near Crater Lake, ancient Thielsen in Pliocene days was a bulky mountain. It emerged from the Ice Age as a series of sharp pinnacles overlooking glacier-gnawed valleys.

Broken Top provides a fine laboratory for the study of volcanism and glaciation. Cutting masses of ice exposed the innards of this old volcano, revealing that successive explosions apparently had their origins in different magmas. As a result, there is a banded structure within the old volcano.

Glaciers, born in the packed snows of Broken Top of long ago, not only cut into the Pliocene volcano but moved into the foothills, leaving their "trails" in many places. These trails were cut into the underlying andesitic rocks by the rock-shod masses of ice. These ice-rock trails make it possible for glaciologists to trace the movements of the great sheets of ice that slipped from the steep Broken Top slopes.

Striations cut into the old rocks by the ever moving glaciers of ancient days are an attraction for visitors to the Crater Creek area near the Broken Top Crater. This is an easily-reached area, location of Girl Scout and Campfire Girl camps through the years.

Old timers of the upper Deschutes Country and stockmen who grazed their flocks of sheep and herds of cattle in the Sparks-Todd Lakes area believed that Broken Top was the remnant of a terrific volcanic blast that shattered the dome of the old mountain. The pinnacled peak got its name as a result of this belief. Not until geologists and Mazama alpinists studied the area did it become evident that ice, not fire and explosion, shaped jagged Broken Top, leaving shaky spires to rule over the scenic Green Lakes area close to the base of the South Sister.

Oregon geology was in the national spotlight in 1925 when Dr. E. T. Hodge, geologist, published "Mt. Multnomah, Ancient Ancestor of the Three Sisters." Dr. Hodge advanced a theory that the central part of the Three Sisters area was once occupied by a single, enormous volcano, which he named "Mt. Multnomah." The theory said this great volcano that fathered the Three Sisters was volcanically built in Oligocene and Miocene times and then decapitated either by explosion or collapse, leaving a vast caldera in its place. It was in and around the edges of this hypothetical caldera that the present Three Sisters and their great family of mountains stand, the theory stated. The theory had part of its basis on the fact that the North Sister, Little Brother, Husband, Sphinx, Wife, and Broken Top, are in a roughly circular arrangement. The early-day geologist in his preliminary studies considered these peaks remnants left by the destruction of a single central cone. The Mt. Multnomah theory had many strong points in its support.

Years later, however, Dr. Howel Williams, then of the University of California, carefully studied the Three Sisters region and made this statement: "...The conclusion is therefore inescapable: Mt. Multnomah never existed. Then what of the great caldera? That, too, is fictitious. If a caldera once existed in this region, it can only have been produced by collapse or by explosion, or by a combination of these processes, and the catastrophe must have taken place in late Pliocene if not in Pleistocene time. The evidence therefore should be plain..."

Dr. Williams voiced his attack on the Mt. Multnomah theory in his report on "Volcanoes of the Three Sisters Region, Oregon Cascades," published in 1944. Gradually through the years, the Mt. Multnomah theory faded. In the past 30 years, the Three Sisters region has been extensively studied, and little support has been found for the vanishing Mt. Multnomah hypothesis.

Few areas of the Cascades have been more extensively studied, geologically, than the Three Sisters region. Dr. Williams wrote:

"Throughout their length in Oregon, the High Cascades are crowned by huge snow and ice-capped cones. For magnificence of glacial scenery, for wealth recent lavas, and for graphic examples of dissected volcanoes, no part of this range surpasses the area embracing the Sisters and McKenzie Pass. Seventeen glaciers still survive in the higher peaks; moraine-dammed lakes and ice-cut tarns occur in profusion around their feet; barren sheets of basalt, no more than a few centuries old, cover almost 100 square miles; youthful cinder cones and fresh fields of blocky obsidian add variety to the landscape; and the older volcanoes are so deeply denuded that their central conduits and radial dikes are magnificently displayed."

Dr. Williams noted that, judging from the extent to which the volcanoes have suffered from erosion, they may be divided into the following groups:

Older glaciated cones--Most of these, like the North Sister, Little Brother, Wife, Sphinx, Broken Top, Black Crater, and Mt. Washington, have been so deeply denuded that the fillings of their conduits are exposed and their flanks are marked by cirques and U-shaped canyons. It is assumed the main activity of these cones ended in early Pleistocene times.

Younger glaciated cones--The forms of these are much better preserved and their conduits are still concealed. In this group belong the South Sister and Bachelor Butte. It is believed the main growth of these volcanoes occurred in the Pleistocene, though some continued to be active until quite recent times.

Unglaciated cones--Of these, Trout Creek Butte and Tumalo Mountain were the first to become extinct. Next to die was Belknap Crater. Still younger are the parasitic cinder cones just north of the North Sister and the Cayuse and LeConte Crater close to the southern slopes of the South Sister. Apparently, the youngest of all mid-Cascade flows are the big obsidian flow of Rock Mesa and the chain of obsidian domes that runs east of Devil's Hill adjacent to the Cascade Lakes Highway.

Despite the apparent recency of volcanism in the Cascades, there are no signs of volcanic action at present; hot springs, fumaroles, and solfataras are lacking.

Bachelor Butte, much in the spotlight because of the development of a new and popular ski area, is considered one of the most recent volcanoes of the Cascade system. It is listed by geologists as "a great basaltic cone," which rises some 3,000 feet above the surrounding region. Because of its height, 9,060 feet above sea level, a small glacier still survives near its summit, occupying a small cirque on the shady northern slope. Aside from the cirque gouged by the little glacier, the symmetry of the volcano, at times called "The Fujiyama of Central Oregon," is unmarred.

There is a possibility that Bachelor started its growth in the Ice Age. Regardless of its start, the volcano, which faces the Three Sisters from the east and received its name because it stands apart from the trio of mountains, continued its growth until very recent times. "No one who sees the barren flows of basalt which poured from fissures on the northern flank and spread in branching tongues into Sparks Lake can doubt that they must have escaped only a few centuries ago," Dr. William noted.

Accompanying the flank eruptions of lava were fragmental explosions from a number of parasitic scoria cones. One of these cones is adjacent to the lodge and parking area at the Mt. Bachelor, Inc., ski development. This cone, known as Red Hill, towers over the ski area. Excavations in the parking area indicate that some of the final eruptions from this parasitic cone occurred when the wind was blowing from the southwest. The wind carried cinders a short distance into the northeast.

Hikers following the trail from Broken Top Crater to Green Lakes will find much evidence of volcanic recency, especially in the Cayuse Cone area. This cone lies on the south slope of the Broken Top volcano. Part of it is composed of yellow lapilli tuffs, and tuff breccias, but in the main it consists of red and black basaltic scoria. On the east side, this cone has a double rim.

In the Cayuse Cone area are many volcanic bombs, ranging in size from the thumbnail type to huge boulders weighing tons. Around the summit of the cone are almond shaped and ropy bombs up to a yard in length. Some of these have glassy skins tinted a brilliant, iridescent greenish blue. Not far to the northwest are two small cones, about 35 feet high, with dimpled summits.

Lava bombs and other rocks from volcanic explosions are not confined to the Cayuse Cone area of the Deschutes National Forest. They are found in many places, in all four districts of the forest, with cones on the Mt. Newberry slopes providing their share. This is especially true in the Mokst Butte area. These rocky bombs, of many shapes, are among the most curious of lava features found in the Deschutes Forest and adjacent areas. Generally, they are found on cinders and near spatter cones; but occasionally they cover the ground hundreds of yards from their source of origin. Apparently, these were tossed high into the air from exploding cones or fissures.

These bombs range in size from pebbles to giants weighing tons. There are three classes of bombs; ribbon, bread-crust, and spindle. Bombs of the spindle type have tapering projections on the ends of bodies resembling footballs. Geologists say these owe their origin to a clot of lava being thrown through the air with a spiral spin. Generally, these are close to their source, indicating a short flight. Many of these bombs have long, tapering ends. It is obvious that the ends were broken off by the fall of the bombs and are found scattered over the surface.

Not all liquid masses of rock flying through the chilling air retained their football shapes. Some were stretched into ribbons and give this type their name. They are not to be confused with ribbon flows

from small tongues of lava. Different speeds of rotation by two connected clots probably resulted in the taffy-like pulling apart of lava and the creation of long ribbons.

Bombs of a third kind are light and covered with a crust that resembles that of bread. These are the bread-crust bombs, formed by a clot of lava filled with gas being hurled through the air.

In 1943-44, a small volcano just east of U.S. 97 opposite the Camp Abbot site of that day was extensively excavated for cinders. Excavation brought to light many small bombs, some of the iridescent cinder type. The iridescence, apparently the result of mineral-laden gases seeping through the hot cinders at the time of the formation of the cone, provides rainbow colors for some of the material in the pit area. This is a favored mineral collecting place.

The iridescence apparently is only surface deep. It is enhanced by being dampened.

In the excavation work, much of the north side of the cone was stripped, with the cinders used to provide the base for streets and roads in the old Camp Abbot area. The iridescent cinder site is only a few hundred yards south of U.S. 97 at the Sunriver junction of the present.

Lava Lands of the Deschutes also hold another interesting volcanic feature--spatter cones, mounds of which are found just south of Lava Butte on U.S. 97. These cones were formed by smaller fire fountains. Geologists say the clots of lava thrown from these fountains were not sufficiently inflated with gas to form cinders. Instead of falling as cold cinders a short distance from the fountains, the chunks of hot lava fell as clots in a molten state and adhered to each other. In this manner, they built the spatter cones, some a dozen feet high. Different from the spatter cones are lava domes. They consist of compact lava, generally with flat tops, and rise as high as 50 feet or more above the surrounding country.

Some fine lava domes are found in the Devils Garden area of the Fort Rock Basin.

Cayuse Cone in the Broken Top area might be considered one of Oregon's finest outdoor geologic laboratories. primarily because of the various types of volcanism found there. For instance, after Cayuse Cone was built, its southern wall was breached by outbursts of lava. Walls of the source fissure show clearly that many successive gushes of basalt escaped.

For a mile or so from the vent, the flows are traversed by longitudinal ridges and furrows produced, in part, by collapse following drainage of lava tubes. The flow eventually split into two branches. One emptied into Fall Creek, impeding drainage and producing a series of waterfalls. the other poured into Soda Creek, deflecting that stream and following the canyon as far as Cascade Lakes Highway.

In this highly volcanic area are many spectacular features. One is LeConte Crater, a perfectly preserved cone some 200 feet high that rises from Wickiup Plain just south of the South Sister. On top is a bowl-shaped crater 100 feet deep which holds a small lake in early summer. From a distance, the cone looks like other parasitic scoria mounds of the region. The hiker, on closer examination, finds the surface of the little cone littered with pumice and angular fragments of lava. Andesites and basalts are represented in the debris. Some of the rocks take the form of glacial erratics. What was the source of this "foreign" debris on the little cone? Dr. Williams found it consists of debris blown from a vent concealed beneath the nearby obsidian of Rock Mesa. The Mesa, incidentally, is one of the spectacular features of the Three Sisters Cascades. It is in the Sisters Wilderness Area and can be reached from a trail branching from the Cascade Lakes Highway a short distance southwest of the Devils Lake Campground.

M C K E N Z I E P A S S L A V A S

Several volcanoes played major roles in shaping Oregon's spectacular McKenzie Pass region, partly in the Willamette National Forest, partly in the Deschutes. Floods of lava eddied from the exploding cones. Explosions from closely-spaced vents poured a huge stream from the Yapoah Crater area, just north of the North Sister. Other flows eddied from Little Belknap Crater to the north.

The flows merged close to the place now crossed by the McKenzie Highway. This road, little used by through traffic since a modern highway was built through the Clear Lake area, cuts across an almost treeless wilderness of basalt, some 70 square miles in extent. Close to the roadside, the black, clinkery lava which seems only lately to have congealed, strikingly contrasts with ice-scratched pavements of older basalt erupted by the North Sister and Black Crater. The summit scenery includes one of the most imposing sheets of lava in the continental United States.

Lavas on the McKenzie Pass apparently erupted quietly from fire fountains and vents on volcanic peaks. Lava flowed from both Belknap Craters, but it was the streams from Little Belknap that reached the present highway area. Little Belknap is parasitic to Belknap Crater, a typical shield volcano.

At the summits are "the islands," two steep-toe buttes around which flowed Little Belknap lava some 2,000 years ago. Some of the most spectacular flows in the northwest are found in the lava streams that isolated the two pumice-covered mounds. These were known as "islands" since early days, and some 50 years ago stockmen moved herds of sheep there for a few days to graze in the natural pasture.

To the south of the old McKenzie Highway is another "island" near the Huckleberry Camp. It is a large natural pasture, also used by early-day stockmen who trailed their flocks over a path crushed in jagged lava. Up near the head of this "island" is a rocky cataract, formed when a stream of lava spilled into a huge bowl at the summit. The molten rock congealed as it spilled over the crater lip and spread over the floor. The result is Oregon's finest "frozen river of rock."

Spectacular volcanic features on the McKenzie Pass early attracted the attention of foresters administering the area. Pioneers found the lava challenging. First trails over the lava beds were made by Warm Springs Indians for summer travels to the McKenzie Valley. In 1862, Felix Scott, Jr., used this route to lead a party east with supplies and cattle for mining regions in Idaho. Scott's route, blasted and crushed into the lava, was later developed as a regular wagon road. It followed a natural pass just north of the North Sister to avoid some of the lava fields. The Scott party, with cattle, horses, and wagons, made the crossing with difficulty and spent the winter of 1862-63 on Trout Creek in Jefferson County of the present. In the late 1860's,

the present route up Lost Creek Canyon was discovered, and a rough road was built. It became a toll road in 1872, a free county road in 1898, and a state highway in 1917. The road of pioneers is now used only in the summer months, generally from June to November.

Importance of the high lava wilderness, with its white mountains, as a tourist attraction was long evident to Oregonians; and, in 1933, an observatory was constructed at the summit, close to the point where Deschutes and Lane Counties join and the Deschutes and Willamette Forests merge. The rocky structure was named the Dee Wright Memorial, honoring Dee Wright, U.S. Forest Service packer for 24 years. Wright was foreman of the Civilian Conservation Corps crew that built the memorial. He died in 1934. His ashes were scattered from a plane along the summit of the Cascades, "and the high country he had worked in so many years became a final resting place."

The Willamette National Forest has undertaken the task of providing for visitors to the McKenzie Summit a marked trail. This makes it possible for visitors to interpret the story of the Cascade volcanism and to identify the sparse plants and trees along the trail. At one point, the trail, which has its starting point at the Dee Wright Memorial, dips into a spectacular lava fault.

Assisting in the geological study of the summit area prior to the creation of the nature trail was the University of Oregon's geology department, with Dr. G.T. Benson in charge of the field work.

Sisters Wilderness

In this high volcanic region, the Three Sisters Wilderness, a rugged and beautiful country of high peaks, lava flows, glacial lakes, and alpine vegetation, has been set aside for the preservation of its primitive environment. The 196,708-acre area lies astride the summit of the Cascades in parts of the Deschutes and Willamette National Forests. It is managed by the U.S. Forest Service, Department of Agriculture, "to preserve the natural attractions of the land and to provide the people with a retreat from civilization where they can find ample opportunities for spiritual inspiration, physical, and mental enjoyment, and scientific study."

The Cascade Mountains separate the Three Sisters Wilderness into two geographic divisions. To the west of the divide, moisture laden winds come in contact with cold mountains and lose their moisture—ninety to one hundred inches of rain falls annually. East of the divide, in the Deschutes National Forest, the precipitation decreases sharply. Much of the precipitation, from November to June, falls as snow.

In the Sisters Wilderness area are some 240 miles of trail. Forty miles of the Oregon Skyline Trail traverse the area from north to south. The route is part of the Pacific Crest Trail System which extends through Oregon and Washington. Many small trails also serve the area by providing access from the periphery.

With the exception of trails and occasional rustic shelters maintained by the Forest Service, the area exists in its natural state.

Virtually all prominent features of the wilderness area are the result of volcanism, although glaciers played a big part in shaping the volcanic mountains. Central features of the area, of course, are the Three Sisters, all more than 10,000 feet high.

Within the wilderness area around the Three Sisters is a variety of wildlife. Columbia black-tailed deer, Roosevelt Elk, and black bear are common. When

snow falls, deer and elk move to lower elevations. There are also smaller fur-bearing animals--mink, marten, raccoons, bobcat, and coyotes. The entire area is open to hunting during the annual seasons. Fishing is good in many areas, with 90 percent of the many lakes stocked periodically by the Oregon State Game Commission.

Full information relative to the Three Sisters Wilderness Area may be obtained from any ranger station. Maps are also available.

The Belknap Volcano

Of the many volcanic centers along the Cascade crest, none spilled a greater volume of lava than the shield surmounted by Belknap Crater, in the Mt. Washington Wild Area. The role Belknap played in shaping McKenzie Pass scenery has already been mentioned. Those studies were by Dr. Howel Williams in 1944. More recently, in 1965, Dr. Edward M. Taylor, Department of Geology, Washington State University, added a new and interesting chapter to the story of Belknap, sprawling cone that looms over the McKenzie Pass region and the rugged country north to Mt. Washington.

Belknap stands in the midst of an impressive array of Pleistocene cinder cones, in an area that exceeds 85 miles. Some of the most recent volcanism of the Deschutes-Willamette Cascades left its spectacular imprint on this area.

Dr. Taylor in his field work found that lava flows, so old that forests now hide them from view, issued from four separate vents close to the western boundary of the Cascades. These include the Park Creek Flow, the flows on the west slope of Maxwell Butte, and the Anderson Creek flow. No cinder cones were recognized in association with these lavas.

In this area is a well-known land form, Hoodoo Butte, location of a ski area. In the late summer of 1967, a great fire, which started near the Big Lake Air-strip, raged through this area, crossing the Cascade crest into the Deschutes. The fire was checked before it blackened thick alpine timber adjacent to the Santiam Highway at the summit.

Hoodoo Butte is an isolated cinder cone which rises 500 feet above the eastern edge of a glaciated platform, midway between Sand Mountain Cones and Santiam Pass. The small summit crater is open to the east, but geologists say it could not have been breached by lava because none has been found in association with the Hoodoo Cone. Instead, the incomplete appearance of the crater rim is a result of the very irregular topography on which the cone was built. Much of the volcanic debris simply fell over the east edge of the platform. Hoodoo Butte was in the path of fallout from the Sand Mountain cones, but much of the ash that once blanketed the area has been washed onto surrounding lowlands.

Much of the lava lands of the Santiam Pass can be seen from the top of bulky Belknap Crater, not a difficult hike from the McKenzie Highway at the summit. The surface of Belknap is covered largely by lava which poured repeatedly from vents marginal to a composite summit cone. The lava was relatively fluid and eventually spread over an area of some 37 square miles. Dr. Taylor noted that the lava did not move in long, continuous streams. Instead, short channels branched and crossed one another, resulting in lava lobes with complex drainage patterns. The volume of Belknap rocks has been roughly estimated at 1 1/3 cubic miles. Oldest known lavas of the Belknap shield occur on the Deschutes National Forest east flanks.

Belknap lavas were erupted from vents, now poorly defined. Many of the vents were possibly buried under lava as Belknap continued its development. Lavas moved principally into the northeast, diverging into two lobes on either side of a ridge called Dugout Butte. Both lobes descended to an elevation of 4,150 feet, 7 miles from their source. Dugout Lake, in this rocky, alpine area, was the scene of a costly Deschutes National Forest fire in 1930.

The Belknap volcano's summit cone rises 400 feet above its basal shield. Two deep craters at the top of the cone emitted ashes and coarse cinders. These accumulated as high mounds of stratified lapilli-tuff on their east rims. Exposed in the walls of the southern crater, which is about 250 feet deep and more than 1,000 feet across at the rim, are thick rock flows. Some lava spilled over the southwest edge of this crater and is now partly covered by spatter. Along the west rim of the north crater are found well-formed spindle bombs, up to 3 feet in length. A broad pit 200 feet long was blasted through a vent at the north base of the cone.

There is evidence that, when the summit eruption occurred, strong winds were blowing from the east. Thin deposits of scoria are found on lava just west of the cone.

Great quantities of lava poured from south, west, and north vents during a late stage of the development of the Belknap cone. These lava streams sluggishly moved west toward the McKenzie River. They joined other streams of lava and finally plunged into a steep cascade in the McKenzie Gorge. The river was altered profoundly by the molten rock that spread across its path. Beaver Marsh and Tamolitch Falls on the McKenzie resulted from the lava blockade. Some tree molds were also formed in this area.

Most recent addition to the Belknap volcano took the form of quiet discharge of lava from a vent called Little Belknap, 1 mile east of the summit craters. This can be reached over a good crushed-lava trail from the uppermost of the "Two Islands" at the McKenzie Summit. So much lava issued from the Little Belknap vent that a subsidiary shield was formed. Collapsed lava tubes diverge radially from a chaotic heap of cinders and blocks in the crater. In the Little Belknap area is a vertical conduit which remains choked with snow even in mid-summer. Through this conduit, with its glassy sides, poured lava into an underground tunnel. Lava from Little Belknap spread east to within a mile of Windy Point and southeast to the McKenzie Highway.

Blue Lake Crater

Controversial for many years was the origin of a well-known body of water, Blue Lake, in the western Cascades near Suttle Lake, and only a good stone's throw from the Santiam Highway.

Because nearby Suttle Lake is of glacial origin, with a terminal moraine across its drainage, it was generally presumed that Blue Lake was of similar origin. However, as early as 1903, H.D. Langille of the U.S. Geological Survey voiced an opinion that Blue Lake might occupy a volcanic crater.

In 1965, Dr. Taylor, in connection with his studies of recent volcanism in the Cascades between Three Fingered Jack and the North Sister, reported: "Blue Lake, as seen from the Santiam Pass Highway, is 3 1/2 miles east of the Cascade crest. It is 0.5 of a mile long and 0.2 of a mile wide and set in a deep pit formed by recent volcanic explosions of great violence. The Blue Lake eruptions resulted in at least three overlapping craters."

This apparently was the first and only suggestion that Blue Lake might occupy a volcanic crater since Langille's report in 1903. Dr. Taylor ascertained that the southern half of Blue Lake is rimmed by a crescentric ridge which, in places, stands 300 feet above the water and 150 feet above adjacent topography. The outer slopes are covered with basaltic cinders, bombs, and accidental fragments of older, underlying lavas. Some of the bombs are 6 feet long. It was noted that upper slopes of the rim generally lead to cliffs which disappear into great depths. It is estimated that the lake is 300 feet deep.

Possibly, some of the lakeshore cliffs were formed by the collapse of overhanging, steep crater walls. The north crater wall, now largely submerged, was blasted through pre-existing bedrock. It appears, Dr. Taylor said, that Blue Lake Crater was the result of upward explosions rather than interior subsidence. No recent lavas have been recognized in the area.

The field study revealed that bombs and blocks were ejected in all directions from the crater. Most of the scoria and ashes drifted southeasterly. Charred wood from the limb of a conifer was excavated from the sharp interface between the scoria and ash. The wood provided a C-14 reading indicating the eruption of Blue Lake occurred about 1500 B.C.

There is a chain of spatter cones, about 1 mile long, between Blue Lake Crater and Mt. Washington. The northernmost vent is a circular crater. Volcanic rocks in a spatter-cone chain overlie ash deposits that are correlative with the deposits of fine ash near Blue Lake Crater.

The studies by Dr. Taylor appear to have settled for all time the Blue Lake origin question. The deep pit occupied by Blue Lake was not gouged out by a glacier: The pit was formed "by recent volcanic explosions of great violence."

THE MT. MAZAMA STORY

Geologists agree that no event in the long volcanic history of Oregon was more dramatic and awesome than the loss by giant Mt. Mazama, ancestral to Crater Lake, of its glaciated dome. Atop the southern Cascades, Mazama was not in the Deschutes forest region, but its frightful pumice blast largely shaped the outlines of the Deschutes timberlands, with a possibility that far-reaching, lodgepole-covered flats of the present would now be covered with yellow pine.

The Mt. Mazama blast, which apparently occurred around 6,600 years ago, covered much of the southern Deschutes National Forest and spread into the Silver Lake country before a prevailing southwest wind.

The Mt. Mazama explosion possibly was seen from afar by the early tribesmen of the region. In the Odell Lake area, an old encampment was found under Mazama ash. Some of the ash drifted into the Fort Rock cave, home of hunters over 9,000 years ago. There is a strong possibility that some of these first Oregonians died under pumice showers, especially if their wickiups were on or near Mazama or in the valleys to the west, down which swept flaming clouds of pumice from the shattered mountain.

Indians of ancient Oregon undoubtedly were acquainted with the giant mountain of the high southern Cascades prior to the destroying blast. The ice-capped cone of the peak rose to a height of around 12,000 feet, a full mile above its present ruins that form the nucleus of a national park. At the culmination of the last glacial advance, the mountain was completely covered with ice. Ice tongues filled canyons to their high rims, and one glacier extended for 17 miles down the Rogue River Valley. The great ice sheets dwindled as the climate moderated. There is evidence, on the exposed rim of the crater, that showers of ash and pumice were erupted from the summit crater. A number of parasitic cinder cones and mounds of glassy dacite were built over vents on the flanks of the growing volcano.

Some 6,500 years ago, the once-bulky, rock-shod glaciers had shrunk so far that none stretched from the mountaintop beyond the present rim of Crater Lake, except for some thin tongues on the south slope of the massive mountain. The ice tongues occupied the Monson, Sun, and Kerr valleys of the present. Lower slopes of the mountain were timber-covered.

The stage was being set for the climatic eruption: but, before the blast occurred, at least a century, short in the geologic column, had passed. During that interval, Dr. Williams noted in his report on "The Ancient Volcanoes of Oregon," the volcano gathered strength. Liquid magmas in the feeding chamber far under the great mountain slowly crystallized until the gas pressure became too great for the roof to withstand. Cracks opened. The hot lava pressed upward, shouldering aside the rocky walls. Most of the animals, it is presumed, fled. Undoubtedly, the Indians, hunting on the slopes or living in the shelter of the giant, white-capped volcano, moved to camps where the earth did not tremble so violently. Dr. Williams wrote, in his University of Oregon lecture series:

"Finally, a plume of white vapor rose from the summit. Within a few hours, it changed to a towering column, becoming darker and more ominous as the content of the ash increased. At first, the eruptions were mild, and the fragments falling from the cloud were no larger than particles of sand. But, day after day, the intensity of the explosions mounted.

"Huge cauliflower clouds rose higher into the sky, to be drifted eastward by the wind. Night after night, the clouds were more brightly lit by incandescent ejecta describing fiery archs in their flight. The roars from the crater grew louder, and frenzied streaks of lightning multiplied in number... In lands thousands of miles distant men marveled at the brilliant colors in the sky as rays of the setting and rising sun shone through dust laden air.

"After several weeks, these preliminary eruptions came to an end. The scene was one of utter desolation. Over thousands of square miles, a gray-white mantle of ash covered everything, like newly fallen snow. On the mountain itself, the banks of pumice were more than 50 feet deep; 70 miles to the north, on the present site of Bend, the sheet of ejecta (fine pumice) was 6 inches deep. All that remained of the green forests on the mountainside were gaunt charred stumps."

(It was carbon 14 readings from these stumps which provided Dr. W.F. Libby, far-famed scientist, data to determine that the Mt. Mazama explosion occurred about 6,500 years ago.)

How was Dr. Williams able to provide such a graphic description of the Mt. Mazama explosion? He spent many months in the Crater Lake area, studying the geology, examining glacial debris and striations, looking over the rocks, observing pumice depths, and estimating the amount that poured from the crater. He had also seen volcanoes in violent action in many parts of the world.

Dr. Williams continued:

"During the few days of calm that followed, it seemed as if the fury of the volcano had been spent. But, fearsome as the first eruptions had been, they were only a prelude to the devastating blasts to come. The end came with alarming suddenness. Possibly a puff of vapor from the summit gave warning. Quickly it expanded, like a cluster of giant balloons, boiling and seething with incredible energy. Then came an awesome roar; part of the eruption-cloud spread sideways and settled over the top of the mountain in billowing folds. Almost immediately the cloud divided into many branches that surged down the canyons, racing with ever increasing speed. At the mountain base, the clouds hurtled forward at hurricane rate. Some traveled 50 to 100 miles an hour. At the bottom of each there was an avalanche of glowing ash and pumice... Some of the avalanches went down the Valley of the Rogue 35 miles; others poured over the plateau, now crossed by U.S. Highway 97, as far as Chemult, carrying lumps of pumice up to 14 feet across. Still others raced across Diamond Lake into the canyon of the North Umpqua."

Dr. Williams' imagined picture of the "glowing avalanches" that swept down the quaking slopes of ancient Mt. Mazama was borne out by avalanches he had observed in other parts of the world. What gave these fiery avalanches their speed and strength? Chiefly, Dr. Williams said, it was the great momentum of the heavy loads as they plunged down from the steep, upper slopes of the volcano; in part, it was the mobility imparted to them by the abundance of hot, compressed gases they contained. Their internal energy was tremendous, for the glowing bombs were continually bursting, Dr. Williams noted.

By the time the first avalanches had come to rest, the glacial canyons on the mountainsides were filled to depths of from 200 to 300 feet. At night, it must have seemed that the canyons were occupied by streams of glowing embers. In following days, more avalanches rolled down from the summit. Dr. Williams, in his Condon lecture at the University of Oregon, concluded:

- "The activity ended almost as quickly as it had begun. Several days later, when winds had cleared the air, the mountain was again revealed. The change in its shape was one to stagger the imagination. The ice-clad peak that had formerly risen in grandeur above all its neighbors had vanished. In its place was a stupendous caldron, between 5 and 6 miles across wide and 4,000 feet deep, enclosed by precipitous walls... Outside the caldron, the slopes of the mountain were dreary wastes of ashen gray. Each of the pumice and scoria filled canyons was a 'Valley of Ten Thousand Smokes,' from which rose dense clouds of acid gas.

"Secondary action eventually followed in the yawning crater. Lava deep in the reservoir gained new power, came to the surface and spilled over the crater floor. Quiet effusions eventually gave way to explosions that formed the cone of Wizard Island. It is estimated that the Wizard Island buildup occurred about 1,000 years ago. Water, years later, covered the lava floor, forming beautiful Crater Lake, with inflow balanced by evaporation and seepage."

The "glowing avalanches" described by Dr. Williams in his discussion of the Mt. Mazama explosion and engulfment were not a phenomenon confined to that part of the Cascades. Near Bend, for instances, flaming pumice spilled from some yet-undiscovered vent in the Deschutes National Forest east of the Cascade crest, filling old valleys and sending a flow into the Deschutes Canyon at the present site of Bend.

The pumice west of Bend has been extensively quarried in recent years, with the old volcanic ash shipped out in carload lots, for the making of building blocks.

THE NEWBERRY VOLCANO

East of the Cascades in the upper Deschutes country was a giant Ice Age volcano, Mt. Newberry, that shaped the topography of the region and produced more interesting features than any other volcano of the region. These features range from lava tunnels to long fissures, numerous parasitic cones (at least 150) and lava flows, a towering rim, and twin craters in which are cradled two of the best-known lakes of the Deschutes National Forest--East and Paulina.

Flows from Newberry's vent spilled through stands of pines, to leave spectacular tree molds such as those in the Lava Cast area. In some areas, magmas pushing from deep reservoirs failed to reach the surface and breached the sides of cones, such as Mokst Butte and Lava Butte.

It was ancient Newberry that played a major part in the creation of the Lava Lands region of the Deschutes Forest. The geologic story of the once-mighty mountain is more interesting than that of those of the Three Sisters family on the Cascade skyline directly west. Newberry was a sister mountain of Mt. Mazama to the southwest, a great dome that once towered over the Crater Lake Basin.

Newberry was a volcano of the shield type--a great, white inverted saucer on the skyline south of the present site of Bend and east of La Pine. Newberry took its place on the Central Oregon skyline, close to the western edge of the High Desert, about the same time Mazama was growing in the south. When the mountain reached its maximum size, it stood at least 1,000 feet higher than the present peak, Paulina.

Old Newberry was long building, with basalts and rhyolites as its cornerstones. Until the volcano was about 2,000 feet higher than the plateau, only basaltic flows were erupted. Thick sheets of rhyolite were then spilled down the mountain slopes, and were succeeded by explosions of basaltic ash. It was a bulky, well-welded mountain--but the mountain soon lost its head.

Following the catastrophe, there remained on the skyline the deeply-dented mountain of the present. The dent was on top. On the sides were many knobs, parasitic cones. Across the base, the mountain measures some 20 miles. The summit cauldron is 4 by 5 miles across, hemmed in on all but one side by precipitous walls up to 1,500 feet in height. It is within that depression that Paulina and East Lakes rest side by side, separated by some cones and a volcanic ridge.

How was the summit depression formed? Dr. Williams, who had studied the Crater Lake caldera and those in other parts of the world, asked that question. The summit of the old mountain, contemporaneous with Hood, Jefferson, Mazama, and other composite cones of the High Cascades, could not have been destroyed by a catastrophic explosion: There are no piles of ejecta around the rim.

Dr. Williams decided that the giant mountain actually "swallowed" its top. He noted that the quiet, rapid outflow of basaltic lava from fissures low on the flanks of the volcano drained the central feeding pipes, and so withdrew support beneath the summit. "The result was inevitable: the top of the mountain collapsed along concentric fractures," Dr. Williams said, adding: "As far as can be judged, this event occurred about the end of the Ice Age, perhaps 20,000 or 25,000 years ago. How long an interval of rest ensued, there is no means of telling, but after a pause new eruptions began on the floor of the cauldron and on the outer slopes of the beheaded volcano."

Fissure-riddled, crater-pocked, quake-shaken Newberry of the late Ice Age apparently rested for a time after losing its top, but there was still plenty of power and fire deep in earth magmas. After a quiet spell, rhyolitic lava spilled from fissures high on the wall of the caldera and cascaded to the floor. Many mounds of glassy lava rose on the shores of Paulina Lake, and cones of basaltic ash were built close to East Lake. Then, a north-south crack opened across the middle of the caldera, and cones were built along it, some by explosions of basaltic ash, some by blasts of pumice. Some of this cone building apparently occurred about 9,000 years ago, judging by ash that drifted into caves to the south. However, final eruptions of pumice from Newberry vents occurred not more than 2,054 years ago, plus or minus 230 years, as dated by the radio-carbon clock.

While volcanism was still brewing in the caldera of the mountain, domes of rhyolitic lava and more than 150 cinder cones were built on the lower slopes. From some of them, flows of lava stretched west toward the present U.S. Highway 97 route, tumbling through pines to create the Lava Cast Forest. The Newberry volcanism indirectly built well-known Lava Butte, on U.S. 97 about 9 miles south of Bend. This butte was created on a vent that reaches to and across the Newberry rim.

Some of the post-glacial flows from Newberry apparently spilled to the north past the Bend site, to tumble into the Crooked River Gorge near Smith Rock, then flow down the canyon to the Cove. These flows created some of the most spectacular intracanyon lava flows in western America.

The amount of lava that flowed from "leaks" on Newberry's slopes was huge. If the old mountain had been able to "hold" its liquid lava, it would have been one of the most imposing volcanoes of the Northwest, possibly even rivaling beautiful Mt. Jefferson in splendor.

One of the most interesting volcanic features created by earth fires of old Newberry Crater was the Big Obsidian Flow, a tourist attraction in the caldera, which covers a square mile and has its own plug dome of pumiceous obsidian. The Paulina-East Lake road skirts this spectacular lava field, with its black, glassy chunks of obsidian resting at high angles. There are two smaller obsidian flows south of East Lake that straddle a northeast-trending fissure from which they were erupted. There is another flow between the two caldera lakes. Most interesting feature of the Big Flow is the cataracts of frozen rock glass.

Overlooking the caldera at a height of 7,985 feet is Paulina Peak, location of a satellite radar station for a time after World War II, and also the temporary location of a Deschutes National Forest lookout. Expansion of the summit area to serve as a visitors center is planned. Interpretive signing would tell the complete story of the formation of Newberry Crater.

From the top of Paulina Peak is a view unsurpassed in the west, with Cascade peaks from southern Washington through Oregon to northern California visible. The lookout point can be reached over a good mountain road branching from the Newberry Crater paved road just west of Paulina Peak.

Lava Cast Forest

One of the major tourist attractions of the Mt. Newberry slopes is the Lava Cast Forest--rocky molds shaped around trees, some standing, some prone, when molten rock from a fissure spilled into a stand of pines. The lava raced into the grove of trees from a high elevation, flowing, in one place, like a cataract. The lava spilled widely through the trees, tumbling some in its wake, breaking others and covering pines that had been felled. As the lava touched the trees, it chilled, to provide a protective covering. The trees burned out, but the molds remained. In some "casts," even the imprint of bark can be seen. A common occurrence is to find chunks of charcoal gripped in lava vices. Rings of annual growth are plainly visible in some of the broken trees.

The Lava Cast Forest country was crossed and recrossed by timber cruisers and lumbermen in early years, but apparently few paid much attention to the tree molds. Most timbermen thought they were lava gas "blowouts." The molds remained unidentified until a Deschutes National Forest lumberman, the late Walter J. Perry, naturalist, poet, and careful observer, noted the lava "holes," investigated and found the bark imprints on the lava and charcoal in lava vices. The story of the discovery of the Lava Cast Forest spread over the west, and the attention directed to the features resulted in the discovery of other "cast" areas in the Deschutes woods.

Publicity also brought its problems. Vandals visited the areas of lava molds and, using dynamite, destroyed some of the best casts. The area has been set aside as a place of geological interest, and an attempt is being made to protect the casts. Persons tampering with, or stealing, portions of the molds are warned of legal action.

There is a small lava mold area near Lava Butte, just south of the highway, and another extensive area in the Sugarpine Butte country, east of the Vandeventer Ranch.

Rocky molds of trees exist in only certain flows that spilled down the slopes of Newberry Crater. To form molds, the moving lava had to flow slowly and at the right temperature through stands of trees. Apparently, the lava was near the congealing point when coming into contact with the pines and "froze" to form a lava coating before the tree could burn out. When the charred or partly burned wood rotted away, the hole formed a fine mold of the upright trees, and of those that had toppled before the onrush of liquid rock. Molds that are horizontal are known as tunnels. Some are 50 or 60 feet long.

The stark, rocky forms standing in the Lava Cast Forest mark places where lava splashed against the base of trees, congealing into molds as the tops of the pines burned away. In Hawaii, there are molds 30 and 40 feet high. These represent thin shells of lava splashed against trees.

During the eruption of Mt. Etna in 1865, observers witnessed the formation of molds as the fiery rock entered a pine forest. In that eruption, the lava flow tumbled trees, then sheathed the prone timber with rock.

In the Lava Cast Forest, there is much evidence that lava dripped from newly formed molds, possibly as the pitchy wood burned in sealed chambers. These formations, grotesque and twisted, are known as "drippings."

Some of the finest molds in the Lava Cast Forest had been damaged or removed by vandals before the area was set aside as a site of special geological interest.

Recently, charcoal was recovered in the Lava Cast Forest and carbon-dated to about 6,000 years. It has also been determined that the Newberry Crater rift, which reaches from Lava Butte to the crater, occurred about 6,000 years ago. All radio-carbon dates so far obtained from lava flows on the slopes of Newberry indicate that the outpouring of lava occurred about the same time. It is presumed that Lava Butte will be given a similar date, but this will not be determined until charcoal is found under the apron of lava.

Lava Butte

Certainly one of the best known volcanic cones in the Deschutes country is Lava Butte, close to U.S. Highway 97 about 9 miles south of Bend. Now the location of a visitors center that attracts close to 50,000 persons a year, the Butte is apparently part of the Mt. Newberry complex, although well removed from the bulky mountain. Absence of Mazama ash from the butte's lava fields definitely indicates it is younger than the explosion that created Crater Lake some 6,600 years ago. In pioneer days, it was believed that the butte was only a few hundred years old, but this belief was abandoned when carbon 14 dates gave ages ranging around 6,000 years.

Lava Butte, 500 feet high, overlooks a region of spectacular volcanism. To the south is Newberry Crater, a giant of ancient days. To the west are the majestic Three Sisters and their satellite volcanoes. Off to the east are High Desert rims, and to the north are the photogenic Smith Rock pinnacles with their story of ancient Central Oregon.

Reaching west and north from Lava Butte is one of western America's most awesome lava fields, covering 6,117 acres. All of this lava flowed from a vent in the south wall of the cone. Huge gutters through which liquid rock once coursed, jagged lava ridges, radiating flows, and the ruptured cone tell the story of the lava. All of the lava, however, did not escape in one turbulent week, month, or possibly year. There is evidence of five different flows. Weathered surfaces indicate that a considerable period elapsed between the first and final flows.

The downgrade, westward movement of the lava carried it into the old gorge of the Deschutes River at different places. Behind the lava barriers formed shallow lakes. These included Lake Benham, which for a long time covered the present Sunriver site.

Actually, the surge of lava from Lava Butte was not the first flow of fiery rock to tumble into the Deschutes Gorge. This was revealed in the various probes for a reservoir proposed on the river near Benham Falls. Geologists drilling at the site discovered that, long ages ago, the ancestral Deschutes had scoured a channel at least 137 feet below the present river valley.

Geologists speculate that the first blockade of the Deschutes in the Benham Falls area occurred possibly in the middle of Tertiary times. This lava came from the Cascades to the west of the river. That flow apparently accounts for the rhyolites in the area. It crowded the river to the east, in an era when Mount Newberry still dominated the southern skyline and Lava Butte was absent from the landscape.

When the old Deschutes was well settled in its channel, a new surge of lava welled from the east. This was a coarse-grained diabase with pink and black tuff in layers. Andesites and basalts were also deposited by other flows.

Test drilling at the Benham Falls site revealed that lakes formed upstream from the falls following the various lava blockades. Over long ages, sedimentation continued until the deep channel of ancient days was well filled. Marshlands spread around the lake margins. Vegetation in turn was covered by new sedimentation or deposition of ash. Decaying vegetation resulted in the accumulation of marsh gas in various areas. A considerable flow of marsh gas was struck near La Pine and close to the river in well drilling operations in 1967. When touched with a lighted match, this gas burst into flame.

The lake that formed upstream from Benham Falls following the outpouring of molten rock from Lava Butte apparently was not deep, and possibly did not last for many years. Much of the water behind the new lava barrier must have escaped into the porous rock. Also, the river found an easy escape in spilling over old lavas, to create a series of falls, cataracts, and white water which are far famed for their good fishing.

The various lava blockades resulted in the creation upstream from Benham Falls of extensive meadowlands, such as the Shonquest Meadows. Through the upper reaches of the prehistoric lakes meandered the Deschutes, creating some of the most spectacular channels in the western States. Downstream, the released river cut a deep gorge to the present Bend site. The lower portion of this channel is occupied by the Brooks-Scanlon, Inc., logging pond.

Flow of rock from Lava Butte, on tumbling into the old Deschutes River channel, created a topography that was to create, a few thousand years later, irrigation problems in the Deschutes valley, result of a costly loss of water. In the Benham Falls and Lava Island areas, a portion of the Deschutes flow seeps into the jagged rocks, possibly finding its way to buried portions of the old river bed. However, little of this flow

finds its way back to the river for diversion into canals in the Bend area. Greatest loss of water occurs when heavy storage is being released from un-river reservoirs, at Crane Prairie and Wickiup.

Central Oregon irrigationists have long recognized the heavy loss of precious water at Benham Falls. Under study is a plan to save water by building a diversion dam just to the south and carrying the water over the lava fields in a concrete canal. This proposal has been the basis of considerable controversy, due to the fact that the diversion would take most of the water out of the Deschutes channel in an area noted for its fine fishing. Also affected would be the proposed Lava Lands development in the Lava Butte area. This development calls for camp areas and nature trails along the lava-hemmed Deschutes River west of Lava Butte.

Northwest Rift Zone

In 1938, a Tufts College geologist, Dr. Robert L. Nichols, who later studied the geology of the South Pole, found that a fissure eruption of very recent date, and marked by at least five basaltic flows, dumped out a great volume of "spatter" as fiery rock. Found along the eruption zone, which extends from the Deschutes River near Lava Butte to the Newberry Crater rim, are many collapse features, ridges, and cones. The fissure eruption was traced across the Newberry caldera to Devils Horn, a short distance south of East Lake.

"Nothing in the Craters of the Moon (Idaho) appears any fresher or younger than certain parts of this fissure," Dr. Nichols wrote. He noted that not all the spatter and lava was extruded at the same time. He found that the freshest and youngest material lies between Mokst Butte and East Lake.

Later, high-altitude photographs became available for the study of the region. These were made by the Oregon Department of Geology and Mineral Industries. In the new study, the fissures observed by Dr. Nichols and new features were referred to as the "Northwest Rift Zone."

The studies revealed that at least eight different basaltic flows were erupted from the rift zone. The flows are not mantled with Mt. Mazama ash, so it is assumed that they are all younger than the Mazama blast of some 6,600 years ago. Charcoal found in a horizontal tree mold in the Lava Cast Forest flow has been dated as 6,150 years, plus or minus 210 years, "a surprisingly old date considering the fresh appearance of the lava."

MT. NEWBERRY LAVA CAVES

Mt. Newberry, with a history that possibly dates to the eons when Mesozoic oceans swept over Central Oregon, mothered caves, as well as other spectacular volcanic features that make the remnants of the old mountain an important cornerstone of the Deschutes Lava Land. On the Newberry slopes and in lower rocky aprons of the huge mount are found some of the finest lava caverns in continental America.

Lava caverns of the region received their first serious study in 1923, with Ira A. Williams, the geologist for the Oregon Bureau of Mines and Geology, submitting a report that received national attention. That study concerned Lava River Tunnel, now site of a state park, on U.S. Highway 97 a short distance south of Lava Butte. That cave was formed in one of the older flows from Newberry Volcano. The tube is a mile long, but visits by tourists are limited to the first half mile because of a rocky blockade.

The geologic story of these lava-sculptured caverns is not complicated. In the Lava River Tunnel area, for instance, there obviously existed a gently sloping canyon in ancient days, when Newberry began to take bulky shape on the southern skyline. From a vent, or possibly the central cone, a flow of viscous rock moved through the canyon. It was not a swift-moving flow, and slowly it cooled on the valley sides and on the bottom. The top was chilled by the air.

But, inside the encased flow, the lava remained molten. Eventually, there was a breakthrough on lava snouts, possibly not far from the Deschutes River channel. From these ruptures, lava flowed and drained from the high country. The drainage resulted in the long tubes and, in some instances, side tubes. The Lava River Tunnel is easy of entry because of a roof cave-in. This is the entrance to the tube.

In these caves, the flowing lava left its imprint on tube walls. There is some evidence that lava surged through some of the tubes several times, leaving their "terrace" lines on cavern walls. In the Lava River tunnel, there is considerable sand. How this sand got there is a mystery. Williams long ago noted there is no evidence that water once flowed through the tunnel. Possibly the sand was squeezed from below by seismic action. Possibly it sifted through ceiling cracks.

Residents of Bend in pioneer days were much interested in lava caves of the Newberry foothills, especially ice caverns. One of these was the Arnold Ice Cave, some 12 miles south of Bend. Shortly after the turn of the century, the hamlet of Bend got its ice from the Arnold Cavern. In 1910, when a warm summer followed a mild winter, ice sold in Bend for \$40 a ton. Much of the ice was obtained from the Arnold Cave, where it was sawed into huge chunks and hauled into Bend by wagons drawn by four horses. In the cold winter that followed the 1910 shortage, ice in Bend sold at \$5 a ton: It was harvested from frozen irrigation canals.

Not all lava tunnels hold ice. Before ice can form in a cave, there must be some moisture. Generally, the ice cave is oriented to the north, a protection from hot summer sun. Also required is favorable circulation. On hot summer days, cool air issues from caves, chilling areas where ice forms.

In some of the caves, there are miniature glaciers, which sweep back from steep cavern entrances. This is true at the Arnold Cave. Early-day homesteaders in the Fort Rock country harvested their ice from certain lava tunnels, such as the East Ice Cave.

On the low southern and southeast slopes of Newberry Crater are scores of lava tunnels, only a few of which have been mapped. One of the most interesting caverns is the Charcoal Cave, 12 miles south of Bend in an old Paulina flow. In this cave was found a heap of partly burned wood-- lodgepole pine that had been cut with stone axes several hundred years ago. Reason why the lodgepole pine was cut, thrown into the cave opening, and then dragged to an inner chamber to be burned remains a mystery. Possibly, ancient hunters burned the wood to melt cavern ice. Possibly, it was burned for ceremonial purposes.

One of the most fascinating of the many caverns of the Deschutes region is the Lavacicle Cave of the Fort Rock country, discovered by chance in 1959 when a fire crew was "mopping up" following the 21,000-acre Aspen Flat conflagration. This tube is of primary interest because of its many "lavacicles" which hang from the roof, protrude from the floor and, in some areas, form rosettes. Because of the delicate formation, entry to the cave is by permit, under the supervision of a guide. The cave has been set aside by the Deschutes National Forest as a place of scientific interest.

There appears a possibility that the cave was sealed by lava when the interior was still fiery hot and "dripping," but state geologists believe this may be only a secondary factor. They believe that lava raced through the conduit several times after it was shaped by drainage. It appears that one of the later flows choked the tunnel to capacity, then rapidly drained away to leave hot rock dripping as stalactites and, on the cavern floor, forming stalagmites. In some areas where the secondary flow chilled against the old walls, it formed a veneer, parts of which have fallen into the tube.

Caves have been found not only in the Newberry apron lavas, but in old lavas that spread from the volcano over the surrounding country, as far north as Redmond. There are many caves in the immediate Bend area. One of the best known is Skeleton Cave, about 10 miles south, which in early days yielded bones of creatures long extinct. One was a giant bear. Incidentally, in prohibition days, moonshiners set up a still near the mouth of this cave.

A list of the more important caves of the Paulinas can be obtained from the Fort Rock District Office in Bend. There are quite a few caves in the Bend District.

There are several "Charcoal Caves," all in the same area, in the Deschutes National Forest or close to its boundaries. The original Charcoal Cave, mentioned earlier, was discovered in 1928 by the late Walter J. Perry of the Deschutes National Forest staff. It was Perry, working with Dr. L.S. Cressman of the University of Oregon, who found in this cave, some 12 miles south of Bend, partly burned small pines that had apparently been cut with a stone axe. Some of those trees had started their growth prior to 1370.

In 1963, Bob Greenlee, Bend "spelunker," while exploring little-known lava caves of the area, found another cave holding a huge amount of charcoal. In the same general area were two other so-called charcoal caves. In late 1963, James O. Anderson, then of the Oregon Museum of Science and Industry in Portland, reported he had noted a mass of charcoal in a huge lava tunnel southeast of Bend and east of the original Charcoal Cave. In all four areas, it was evident that wood had been cut hundreds of years ago, carried to the openings of the caverns, and burned.

Skeleton Cave

Three thousand feet back from the opening, in the utter darkness of a cavern known as Skeleton Cave, 12 miles southeast of Bend, were found bones of extinct animals, including a species of horse that ranged over the Pacific Northwest ages ago as the Ice Age settled over the region. Presence of the bones so far back from the entrance presented a mystery not yet solved. It is unlikely they were carried there by carnivores, and there is no evidence they were rafted in by flood water. The horse bones and others were studied by a world-known paleontologist, Dr. J.W. Gidley of the Smithsonian Institution.

Oregon "cavers" referred to Skeleton Cave as "a death trap of the ages." It was noted that the entrance to the tunnel, a local cave-in of a lava roof, forms a steep-walled natural trap, into which animals racing through sagebrush might have fallen. Their senses numbed by starvation, it is possible that these animals might have wandered into the cavern darkness to die.

In a restudy of the cave, Central Oregon "spelunkers" found, in a side-cavern, the ashes of an entire skeleton of a giant bear, one-third larger than any living species. Only the teeth of the animal remained intact, and it was from these that Dr. Gidley made the identification. Above the bone ash and teeth, the cavern ceiling was unbroken. No bones could have penetrated that rocky roof. Skeleton Cave is in a semi-arid area, and there is no evidence that water ever ran through the rocky conduit. Packrats had carried some material into the cave, but not far beyond the daylight zone.

Other bones found in Skeleton Cave represented a large hyena-like dog and a Townsend fox of more recent times.

A new ice cave that was added to the growing list of refrigerated caverns of the Deschutes Country is in the eastern Cascades of the upper Deschutes River country. This was discovered by loggers in 1958, and given the name

Cleveland Cave. It is in the vicinity of the well-known Edison Ice Cave. The first explorers of the cavern reported they had found within the cave, not only glacier-like masses of ice, but a "frozen waterfall" and stalactites and stalagmites of ice. One of the delicate ice cataracts was about 6 feet high, formed when water tumbled into the cavern from a side cave. Entrance to the cave was through a skylight hole.

The June temperature in the cave was 30 degrees at noon.

Derrick Cave

Out in the Reuben Long country of northern Lake County, where recent lavas are spread over a lunar-like landscape in the region called Devils Garden are some features that are of more than casual interest in geology.

These features include a long lava tunnel, the Derrick Cave, with the timbered Paulinas of the Deschutes National Forest visible in the north. It was visited in 1962 by a group of scientists, one of them Dr. Jack Green of North American Aviation, who were making studies preliminary to man's attempt to reach the moon. Also in the group was Hollis M. Dole, director of the Oregon Department of Geology and Mineral Industries.

Derrick Cave proved to be one of the most interesting features studied in the area by the earth scientists. The cave is northeast of Fort Rock and close to the southeastern boundary of the Deschutes National Forest. The cave is not a new discovery. It was known to early-day stockmen of the area and was named for H. E. Derrick, one of the pioneer ranchers of the lava wilderness area known as Devils Garden. Dole described Derrick Cave as a huge tunnel in the rocky earth that may play an important role in the interpretation of other lava caves of the region.

Henry Tonseth, long-time Fort Rock Ranger, had ascertained that the cave is about half a mile in length, with a sand-covered floor at the entrance. Far back in the old lava mass, the cavern, large enough to accommodate a diesel engine and a string of box cars, holds features unknown in other lava conduits of the region. There is some evidence that lava not only flowed through the tunnel from one great subterranean pool, but that molten basalt was squeezed up from cracks on the cavern floor. Plainly visible in the tunnel are the recession lines left by the ebbing lava lake as it drained. The subterranean stream of lava apparently was joined by other flows.

Scientists in the group examining the cave noted that, if the lunar surface is volcanic, lava tubes will be found. The role these caves could play as temporary abodes for lunar explorers was stressed.

Ice Caverns of West

Long before man perfected refrigeration, nature provided its own mid-summer ice in the warm lands of western America. But, the manner in which this ice is formed, deep in lava tunnels and preserved through torrid summer weather, still holds elements of mystery.

Nature's refrigerators, many of them in the Deschutes National Forest, are known as ice caves. In pioneer days, Bend received its entire supply of ice from a cavern 12 miles to the south. Other ice caves are found in Idaho, on the lower slopes of Mt. Adams in Washington, and in great numbers in the Modoc and Siskiyou Country of Northern California.

Oregon's best known ice caves are the Arnold, Edison, and East Caves. It was the Arnold Cave that supplied Bend with ice in pioneer days. In later years, South Ice Cave, near Fort Rock, supplied a logging camp with ice in hot summer weather.

Two earth scientists, E.R. Harrington and Carl R. Swartzlow, several years ago published articles on the formation and preservation of ice caverns. Harrington maintained that the angle of sun rays was the governing factor in the creation of cavern ice. Swartzlow disputed this theory, cited instances where ice has been found in caves facing in other directions, and said that air circulation was the key factor. Swartzlow said that, in the Modoc region, one of the best known ice caves, Skull Cavern, faces west. In this cave, ice exists at the extreme end, one half mile back in the lava beds. However, both scientists agreed that the crux of the whole explanation of ice in lava caverns is the fact there is an active circulation of air in winter and little in summer.

In the Arnold Ice Cave south of Bend, a miniature glacier has its source near the entrance. This ice mass is so thick that it blocks the cavern, not far from the mouth. Dead air in vesicular basalt acts as an efficient insulator, surrounding the ice on at least three sides. In the Arnold Cave, ice has moved back into the cavern for long ages. Its extent has never been determined.

Some scientists note that more factors than air circulation must be considered. A south-facing cave apparently would be a poor place for ice because of the sun. Primarily, it is noted, there must be water. In most caves, this drips in from the entrance ceiling. There is ice in many caves in the early spring, providing there is moisture, and that freezing conditions exist at the entrance.

And, basically, there must be a longer period of refrigeration than melting if ice is to accumulate.

Hole-in-the-Ground

Just south of the old Newberry Volcano and fringed by woods of the Fort Rock District, Deschutes National Forest, are many spectacular landforms of comparatively recent age. They include Fort Rock, a landmark unique in Oregon; the Devils Garden; Hole-in-the-Ground; Big Hole; and Crack-in-the-Ground.

Hole-in-the-Ground is a near replica of the world-famous crater in Arizona believed to have been caused by the impact of a giant meteor. Because of the similarity of the two, it was long believed that Hole-in-the-Ground was meteor caused. It is a large, almost circular bowl-shaped crater in the northwest corner of Lake County south of Newberry Crater. It has a

slightly elevated rim of rocks, much like the Arizona crater. It covers an area of about a quarter of a mile, and its floor is 300 feet below the surrounding land level.

The meteor-impact theory for the origin of Hole-in-the-Ground was abandoned following a field study and report in 1961 by Norman V. Peterson and Edward A. Groh, of the Oregon Department of Geology and Mineral Industries. They determined that the giant hole is of volcanic origin. Energy for the explosion came from a hot magma making contact with water-bearing rock. A suddenly enormous pressure of steam and gas punched its way through the overlying rock in one or two powerful bursts. The explosive energy needed to produce a crater of this size with a buried nuclear charge would be over 5,000,000 tons, TNT equivalent, Peterson and Groh determined.

The formations resulting from hot magma coming in contact with water are known as "maars." Crescent-shaped Fort Rock had a similar origin, but the resulting formation was markedly different. Fort Rock at its highest point rises about 325 feet above the sandy plain. On that high point, in early days, was a lookout post to provide summer protection for the Fort Rock woods.

Big Hole, a large depression across the Fremont Highway, also had an origin similar to that of Fort Rock. It is a broad, shallow crater with walls and rim made up of dark gray and brown lapilli explosion tuffs and Breccias. Big Hole is a much better developed tuff ring than Hole-in-the-Ground. Moffit Butte, on the Fremont Highway 10 miles southeast of La Pine, is another formation of the tuff ring type.

One of the unique formations of the Fort Rock area is Crack-in-the-Ground. It is southwest of the Four Craters lava field and can be approached by road. The "crack" is a narrow rift about 2 miles long and has remained open perhaps a thousand years. R.A. Long, old-time resident of the Fort Rock valley, recalls that, when he was a boy, homesteaders went there to hold picnics and make ice cream, using ice they found in caves in the chasm. The "crack" is a tension fracture in basalt. The "crack" is closely related to the nearby Four Craters lava field.

In the Fort Rock area, perhaps the most interesting and spectacular volcanic features are those that emerged in prehistoric Recent time, as black lava erupted from many vents. The largest of these flows is the Devils Garden lava field, where about 45 square miles was covered by thin flows of pahoehoe lava. "For the student of lava-flow features, the Devils Garden is rich in excellent examples," Geologist Peterson of the State Department of Geology said. It is believed that the Devils Garden lava spilled over the area prior to the explosion of Mt. Mazama. In this area is a well-known lava cavern, Derrick Cave.

Not all of the story of the country south of Newberry is volcanic. In Pleistocene times, a huge lake spread over the present Fort Rock basin, spilling into the Christmas Lake Valley and covering Thorne Lake (now dry) and flooding the entire Silver Lake country.

THE STORY OF FIRE AND ICE

"Glaciers and the great peaks that bear them are natural wonders to enjoy, to be inspired by, to live with, to make it really worth while lifting up one's eyes to the hills."

David Brower, executive director of the Sierra Club, wrote these words in 1960. Others have expressed similar thoughts. All who have made their way into the grand Cascades of Central Oregon, west of the Deschutes country, have been inspired by the great masses of ice which cling to the steep slopes of old fire mountains.

Most visitors to the high country sense that ice, as well as earth fires, played an important role in shaping the region's alpine scenery.

Sculptured by storms and moving fields of ice after being formed by fire, the Three Sisters mother a fine cluster of glaciers. Nowhere in North America is so much glacial ice found at so southerly a latitude. Bob Frazier, writing in the Eugene Register-Guard on February 6, 1952, noted: "Nineteen of the 37 glaciers in the Oregon Cascades are on the slopes of the five mountains making up the Three Sisters-Broken Top region of the mid-state Cascade range."

Collier Glacier is the largest of the glaciers on the Three Sisters. It is the largest at or south of its latitude in the United States. A U.S. Geological Survey report a number of years ago showed Collier Glacier to be about one and a half miles long by three-fourths of a mile wide. It has shrunk since then. The glacier lies between the North Sister on the east, the Middle Sister on the south, and Cirque Rock and Little Brother on the west. Collier flows north-northwest from an altitude of about 9,000 feet to one of about 7,400 feet. Collier Glacier may be seen from the summit of the McKenzie Highway or from Scott Lake and other points along the highway where the North and Middle Sisters areas are visible.

Collier is believed to be a post-Pleistocene glacier, dating back about 4,000 years, Dr. Ruth Hobson Keen mentioned in her 1960 Collier Glacier photographic record in the Mazama Magazine. Previous to 1939, it was believed that glaciers on the mountains were remnants of the Pleistocene. Now it is assumed that mountain glaciers represent a new occupation of cirques, valleys, and depressions created by Pleistocene glaciers.

Dr. Hodge and others making Cascade studies noted there is abundant evidence of extensive glaciation above 4,500 feet extending at least from Crater Lake on the south to Mt. Hood on the north. Numerous peaks, even small ones like Olallie Butte, bear large cirques once occupied by glaciers. Most of these are on east slopes. Dr. Hodge said "the larger peaks are badly dissected and, in the case of some of them, like the North and Middle Sisters, are more than half destroyed... In the vicinity of Diamond Peak, Three Sisters, Mt. Jefferson, and Mt. Hood, the evidence points to a continuous mass of ice covering the entire upland surface..."

"One evidence of a great ice cap is found about Mt. Jefferson. Here the evidence is clear that the valleys were filled to overflowing by one immense and continuous glacier which moved eastward and westward over the entire surface. In the early Pleistocene, instead of many individual glaciers surrounding Mt. Jefferson, one great glacier entirely mantled its slopes and extended outward to a distance of 10 miles and down the valley for 20 miles."

However, only a few of the highest of the surrounding peaks were overtopped by this ice.

High winds blowing storms over the Cascade divide played a part in forming glaciers east of the summit, Dr. Hodge noted in an article. "Late Tertiary Climatic Changes in Oregon," in October 1930. He wrote:

"...The presence of glacier at present is determined by the fact that moist winds striking the Cascades come from the west. During the Ice Age, the prevailing winds were undoubtedly from the same direction, and a controlling factor in that glaciation was the superior altitude of the crest of the Cascade Mountains. Much of the snow falling from the chilled winds rising over the Cascade Range must have been carried by these same winds over the crest.

"Snow, unlike water, falls to the ground as a light, fluffy solid and for this reason may be picked up by the winds and drifted over the crest of divides. Thus, for instance, along the peak of a house we find that the heaviest snow is on the leeward side of the roof. On a mountain in a similar fashion, most of the snow is drifted to the leeside. Further, the higher the mountain, the farther leeward the cloud banner will soar. Hence, if a range is high enough so that all precipitation occurs in the form of snow, much of it will drift over the divide.

"One would expect, therefore, that during the Glacial Period great glaciers must have been on the east side of the mountains of the Cascades. Existing evidence on such mountains as Hood, Olallie, Jefferson, Three Fingered Jack, Washington, and the Three Sisters, indicate that this was so."

Dr. Hodge estimated that nearly one-third of Mt. Jefferson was cut away from its east side by great Pleistocene glaciers. He said that, on the east side of the Sisters and Broken Top, an immense glacier extended far to the east beyond the present timber line.

The great white mountain on the southern Cascade skyline, Mazama, that mothered Crater Lake, bears much evidence of extensive glaciation. Huge glaciers not only spread out from the limits of the present park but obviously existed on the flanks of the growing volcano at an early age. The building of Mazama took place almost entirely during the Ice Age.

"It is impossible to unravel the stages of advance and retreat of the earlier glaciers, since their deposits can only be seen in cross section on the caldera walls," Dr. Howel Williams mentioned in the 1942 Carnegie Institution report on Mt. Mazama. "All that can be said is that from

time to time both in response to climatic changes and as a result of volcanic activity, the glaciers were partly or wholly destroyed and then re-advanced."

Glacier "trails," marks left on rock by moving masses of ice, help the geologist picture the shape and the bulk of the original mountain. Had Mt. Mazama been perfectly symmetrical cone, all glacial striae on the caldera rim would be radial with respect to the former summit. But this is not the case. Geologists believe that the striae point not to a single center of dispersal but to two, one approximately above the center of the lake and the other above Wizard Island. It is assumed that, toward the end of its growth, the main cone bore on its western flank a parasitic cone, "Little Mazama," just as Shasta bears on its western side the parasitic cone, Shastina.

North of the great volcanic dome that was Mt. Mazama, another Cascade peak, Mt. Thielsen, reared its rocky head into the sky, to catch heavy snows of the Pleistocene and reduce the frozen precipitation into cutting tongues of ice. The mountain is one of the most remarkable in the State because of a towering, rocky spire that forms its summit. Its elevation is 9,173 feet. In early days, Thielsen was known as Big Cowhorn, in contradistinction to Little Cowhorn farther north, now called Cowhorn. About 1872 it was named Mt. Thielsen, in honor of Hans Thielsen, early-day railroad engineer and builder. Lewis A. McArthur in "Oregon Geographic Names" said the Indian name for the pinnacled peak was His-chok-wol-as.

Horned Thielsen rears its high pinnacles over beautiful Diamond Lake. Its story is similar to that of Three Fingered Jack, Mt. Washington, Broken Top, and Diamond Peak to the north. It was a mountain that gained its bulky heights in the epoch known as the Pliocene; then faced the world's long age of ice, the Pleistocene. Thielsen emerged from the Ice Age in its present condition--a mountain that was deeply cut by glaciers, with probably as much as a third of its original mass gnawed away by ice that sent lobes down both sides of the Cascades.

Thielsen has been called the "lightning rod of the Cascades" because of the many times it has been hit by bolts as electric storms passed over the Cascades. Melted and, in places, shattered rocks at the summit partly tell the story of the manner the high pinnacle of Thielsen has served as an attraction, or originating point, for bolts.

Diamond Peak, 8,750 feet high on the line between Klamath and Lane Counties, is another Pliocene mountain that was cut and scoured by the great mass of ice that covered the Cascades in Pleistocene times. It was named in 1852 by John Diamond, a pioneer settler from Coburg who was a member of a party of road viewers opening a route from Eugene City, via Middle Fork of the Willamette River, with Idaho as its intended destination. The glaciated peak bears no resemblance to a diamond, unless its many finely cut edges are considered, but it does serve as a monument for the work of pioneer road builders. The Diamond party was attacked by Indians after getting east of the Cascades, but finally completed most of its mission. The story of the early day railroad survey can be found in Scott's "History of the Oregon Country."

Few Cascade peaks, even those born as the Pleistocene neared its chilly end, escaped sculpturing. But, apparently no part of the Cascades was as extensively cut by ice as the Three Sisters and their great family of smaller volcanoes on both sides of the mountains. The old glaciers, and some of those of the present, fed both the McKenzie and Deschutes Rivers.

Names given glaciers of the Three Sisters family have not pleased all Oregonians. "One of the natural phenomena in our own back yard, and one which most of us know almost nothing about, is the cluster of glaciers in the Three Sisters region," the Eugene Register-Guard commented on February 6, 1958, adding: "We point to them with pride, but we rise to object to the names of these ice sheets that feed the McKenzie and Deschutes Rivers all the year long. With a couple of exceptions, the names are ill-chosen, not nearly so well chosen as the names of the glacial tiaras on Mt. Hood and Mt. Jefferson and the isolated glaciers on Oregon's other snow peaks.

"Largest glacier in the state is Collier, a mass of ice shared by the North and Middle Sisters. And that is a fine name for a glacier, honoring Professor George H. Collier, a University of Oregon professor who poked around up in the Sisters in the '80's when it was a major undertaking to get into that country. Similarly, we approve of the naming of Renfrew on the Middle Sister. P.C. Renfrew was a pioneer promoter of a road over the McKenzie Pass.

"Diller and Hayden, on the east side of the Middle Sister, are named for geologists who explored them and suffered a tragic accident there... Unfortunately, Diller is almost a lost figure in Oregon history. But his contribution was great. And, upon his first visit to Oregon he played a part in one of the harrowing adventures that comes under 'Winning of the West.'

"He and a Navy ensign, E.E. Hayden, were sent west by the Geological Survey to report on water resources of the Sierra and Cascade Ranges. They reached the Three Sisters in early September 1883. While prowling around those mountains, Hayden suffered a bad fall. In the rescue attempt, Diller was struck on the head by one of those big boulders that roll down the slopes of the Sisters with such frightening speed. Packers took Diller back to camp, leaving Hayden to lie out all night. Later they got Hayden to Prineville, where he was put on a stage for the hospital in Portland, which he reached 14 days after the accident. His leg was amputated at the thigh. (Hayden eventually become a rear admiral on the retired list.)...

"On the South Sister is Prouty Glacier, named for H.H. Prouty who in 1910 made the first fully documented ascent of the North Sister. So, of the 19 glaciers in the region, only five were named for men who explored in that beautiful part of the world...

"Lost Creek Glacier, on the South Sister, is a geographic name indicating the area of melt-off. Similarly, Bend and Crook Glaciers (named by Dr. Edwin T. Hodge) on Broken Top, and Dutchman on Bachelor, are named for prominent local features. Crater, on Broken Top, describes its position.

"That means that 10 were named either for prominent persons in the region, for geographical features, or descriptively. Nine others were named for persons who had little or nothing to do with the Sisters Country.

"On the North Sister are Linn and Thayer Glaciers, named for men who never saw Oregon, and Villard, named for a man who is known for many things but not for his interest in the Sisters. Irving Glacier, a remnant on the south side of the Middle Sister, is named for Washington Irving, who didn't know the Sisters existed.

"Lewis and Clark on the South Sister, and Eugene and Skinner on the South, honor noteworthy people, but people who are better remembered in more appropriate ways. Carver, also on the South Sister, was named for the man who first used the word 'Oregon' in a book, which is hardly justification for naming the glaciers after him...

"Renaming a glacier is like renaming a town. Always with us will be persons who prefer the old name, partly because of habit. So we won't suggest renaming those nine ill-named glaciers that hang on the sides of our favorite mountains. But we do protest, submitting that so distinguished a batch of glaciers so far south should have been more appropriately named."

Glaciers clinging to the high slopes of the Sisters are mere remnants of alpine ice fields of prehistoric times. There is abundant evidence that glaciers long vanished played important parts in shaping the Deschutes Cascades and in bulldozing volcanic debris into the lowlands. Upper Tumalo Creek, west of Bend, bears evidence of being cut by a glacier. Huge glaciers from ancient Mt. Mazama shoved debris into the Beaver Marsh country.

In the Ice Age, glaciers blanketed the Three Sisters and sent lobes down canyons. No proof has yet been found that glaciers reached the present site of the town of Sisters, but there is plenty of evidence there that glacial debris spread over the area where Sisters now stands.

On grounds of the Sisters school are a number of huge boulders, so large that it is doubted they were swept in by glacial outwash. A belief is held by some that the present Sisters site was once under water, result of a Squaw Creek blockade. Over that temporary lake possibly drifted huge chunks of ice that broke away from glaciers to the west. Possibly on some of these icebergs were Cascade boulders that were drifted to the areas where they are now found.

Dry Canyon, crossed by U.S. Highway 126 a short distance east of Sisters, on the route to Redmond, was cut into the volcanic terrain by melt from Cascade snows and Ice Age glaciers. In the vicinity of Tumalo, near the Deschutes River north of Bend adjacent to U.S. Highway 20, are many glacial boulders deposited by outwash from melting ice to the west. Near roadside on the Tumalo-Cline Falls rural road to Redmond are many glacial water-rounded boulders.

DESCHUTES WATERS REGION

Draining the Deschutes National Forest in the volcanic country east of the Cascades is a strange stream. It is the Deschutes, which gives its name to the forest it serves.

Called the Des Chutes by Hudson's Bay Company trappers traveling the Columbia, known as Fall River by pioneers, the Deschutes actually does not "drain" the woodlands east of the high Cascade crest. There is little direct runoff from the timbered hills. The Deschutes primarily is a river fed by giant springs, some of them large enough to be known as headwaters of small rivers.

Source of the main Deschutes River is in Lava Lake, close to Elk Lake. Another tributary, Little River, reaches south into the high Walker Mountain basins. From the highlands over a mile above sea level, the Deschutes plunges north to pour into the Columbia, at a point east of The Dalles where cataracts churned the river into white water in the era prior to construction of dams. It was the cataracts of the Columbia that gave the Deschutes its name as the River of the Falls. Upstream, the Deschutes has its own falls, where the north-plunging river roars over lava barriers or squeezes through gorges at Sherar Bridge.

The Deschutes has been described as a tree with all its branches on the same side--the west. Virtually all drainage is from the snowfed and rain-drenched high Cascades and their big springs. The one major exception is Crooked River, which flows from the east. Born in the high plateau country where weak streams reach to desert edge and the timbered John Day divide, Crooked River bears a name that tells its story. It is a stream that winds through some of the oldest lands in the Pacific Northwest. Crooked River loses its identity when it flows into Lake Billy Chinook at the Cove, to merge with the Deschutes and, eventually, Metolius River water. Crooked River originates in large springs about 70 miles southeast of its junction with the Deschutes.

Through its eons of existence, the Deschutes River experienced turbulence that frequently changed its course, or temporarily slowed its wild race north to the Columbia. The story of the Deschutes is largely one of a struggle for rights of way against molten rivers of rock. Lava flowed into old channels both from the volcanic Cascades to the west and giant Mt. Newberry to the east. A comparatively small volcano, Lava Butte, 11 miles south of the present site of Bend, caused the Deschutes much trouble in recent geologic times.

In the Cove country long ago, a mighty flow of molten rock came down Crooked River from the Smith Rock area to obstruct the area where the Deschutes and Crooked Rivers merge. Lava piled into the dual gorges to a height of nearly 1,000 feet, and even flowed upstream several miles after reaching the Deschutes gorge. This was the result of a high gradient created by the pile-up of lava that swamped Crooked River.

Both rivers were dammed by that great flood of molten rock, with a lake reaching upstream in the Deschutes gorge and even covering the present site of Prineville in the Crooked River valley.

There is evidence that the Deschutes River suffered even greater lava blockades in earlier eons, when fiery Newberry was active on the south-east skyline. Apparently, the Deschutes was shoved out of deep channels many times. At the Benham Falls site, the Deschutes had cut a channel 137 feet below the present land level before lava flows blocked the river's ancestral course.

Although the Deschutes River has many strong springs as feeders in the upper country, it is the Metolius River that serves as its most important western tributary. In turn, however, the Metolius is also spring fed, and has its source in huge springs on the Sam Johnson homesite near the base of 6,415-foot high Black Butte, one of the most important landmarks in the Deschutes country.

✓ The Metolius River apparently flows from the base of giant Black Butte, but geologists say the appearance is deceptive. The big headwater springs and those immediately downstream are believed to drain an ancient, glaciated faulted land that leads up to the high country to the west where the Three Sisters rule the skyline. One of the Metolius feeders is Lake Creek, which serves as an outlet for Suttle Lake.

A weak upstream feeder of the Deschutes, Paulina Creek, flows from the east. It is an outlet of Paulina Lake, and its flow does not always reach the Deschutes. The Walker Mountains southeast of the Deschutes send some small tributary streams into the Little Deschutes. These streams flow over ground deeply covered with pumice from exploding Mt. Mazama.

Fall River and Spring River are short streams that serve as Deschutes feeders from the west in the upriver region. There is a possibility that these streams also come from underground in valleys scoured by ancient glaciers. These valleys were probably covered by debris from volcanoes and drift of pumice from Mt. Mazama. Attempts to trace the source of the big springs back to mountain lakes have proved futile. However, it is recognized that there is a great loss of water seasonally from high lakes, such as Elk, Davis, and others.

A downstream feeder of the Deschutes, important because one of its tributaries provides Bend with its domestic water and yields some flow for the Tumalo Irrigation District, is Tumalo Creek, west of Bend. It is a cold, mountain-born stream whose drainage lands reach into the high Broken Top and Three Sisters country.

The Deschutes River drains an area of some 6,000 square miles on the east slope of the Cascades. The average precipitation of the area ranges from 10 inches along the main stream north of Bend to over 100 inches on the Cascade summit.

The Deschutes River is characterized by its uniformity of flow. There was one exception: The Pacific Northwest record precipitation of

December 1964 flooded the Deschutes over its entire course, from the lake country of the high Cascades to the Columbia. Bend that month measured 8.74 inches of moisture, most of which fell in less than a week. Bend's annual moisture is 12.05 inches.

Early-day engineers who made studies of the Deschutes said it was a stream remarkable in the entire United States because of its uniform flow. Much of the uniformity was attributed to sponge-like lava masses in the channel near Benham Falls which absorbed much of the high water.

Because the river is largely spring fed, the entire supply of timber on Deschutes slopes could be removed without affecting the flow of the stream. This was noted by engineers who said that there is virtually no direct drainage from the hills into the river or its tributaries because soil is deeply covered with volcanic debris and pumice.

Floods in the Mountains

Floods born of glaciers, as well as moving banks of ice bulldozing mountains of volcanic debris down valleys, have had a part in shaping alpine scenery of the Cascades. One of these floods occurred in July 1942 following a hot spell. This was the White Branch Flood in the McKenzie drainage west of the Sisters.

White Branch has its source in the terminal lake of Collier Glacier. It is a typical glacial stream which, Dr. Ruth Hobson Keen notes, "becomes a raging torrent in the later afternoon of summer days and shrinks to a small trickle at night and to nothing during winter. It carries a heavy load of rock flour in suspension."

White Branch breached its terminal moraine a number of years ago, in the northwest part of the area. Before 1940, the lake below the terminal moraine merely spilled over at this point and spread among the rocks, leaving a few stones above water. By 1941, the overflowing water had eroded to a depth of 1 or 2 feet. Pressure from increased meltwater, following the July 1942 hot weather, caused a sudden outbreak. This cut a gorge several feet deep at the outlet and as much as 30 feet a few hundred yards downstream. The Mazama Magazine of December 1960 continues the story of this flood:

"Farther along White Branch changed its course in a few places. As much as a mile and a half below the glacier, it spread boulders over outwash plains. It covered the lowest outwash plain with white sediment, and generally changed the picture of upper White Branch valley."

Through the ages, similar floods apparently occurred in this area and in other parts of the Cascades. Such glacial floods and other glacial phenomena, early attracted scientists to the Three Sisters country. Dr. J.S. Newberry was probably the first to be interested in Collier Glacier. The geologist, I.C. Russell, noted in his 1883-84 Central Oregon report:

"The group of peaks known as the Three Sisters is considered by J.S. Diller (of the U.S.G.S.) as probably affording the most

interesting field for glacial studies in the United States, with the exception of Alaska. The glacier amid this group of peaks attracted the attention of Dr. Newberry while he was connected with the Pacific Railroad Survey of 1855."

Dr. Newberry obviously visited the big glacier but made no mention of it in his report. Incidentally, Dr. Newberry's name was given to the huge dacite-obsidian flow on the South Sister near Green Lakes.

On October 7, 1966, a torrential flash flood swept 5 1/2 miles down the east and south sides of Broken Top. Flood waters carried mud, logs, and boulder debris from this High Cascade peak west of Bend across the Cascade Lakes Highway into Sparks Lake Meadow. The highway was temporarily blocked. Irrigation structures near Broken Top Crater were temporarily damaged, and considerable timber was carried down the gorge.

First reports blamed a cloudburst for the sudden surge of flow along the lower part of Soda Creek. But weather records kept in Bend showed that the Cascades were cloudless when the flood occurred. This writer deducted that the source of the flood lay in a high Cascade lake. An investigation, headed by Dr. Bruce Nolf, Central Oregon College, Bend, resulted. Ranger David Rasmussen of the Deschutes National Forest traced the route of the flood backward to its head in a small, unnamed lake, 11 acres in extent, at an elevation of 8,000 feet on the east side of Broken Top. This seldom visited lake lies at the foot of Crook Glacier and also receives some melt water from a part of Bend Glacier, two masses of ice named by Dr. Hodge in his 1925 study of the Cascades. A very recently abandoned terminal glacial moraine, averaging 100 to 150 feet high, acts as a gravity dam.

The exact cause of the sudden flood is uncertain, Dr. Nolf noted in the October 1966 issue of the Ore Bin, State Department of Geology and Mineral Industries publication. But, Rasmussen suggested that sudden breaking of glacial ice into the lake may have created a wave which overtopped the lake outlet, rapidly increasing downcutting by the outlet stream. Whatever triggered the action, within a short time the lake level dropped 14 1/2 feet, releasing about 50 million gallons of water into the small channel below the lake.

The destructive flood waters dropped 2,600 feet in elevation down the east fork of Crater Creek and along Soda Creek before spreading out in the broad basin at Sparks Lake. The small lake on Broken Top was only partly drained by the flood, and the moraine still impounds a large volume of water.

A similar flood occurred on the north slope of Mt. Jefferson about 35 years ago. Dr. Nolf noted that mud flows and glacial breaks are also common in the Wallowa Mountains of Eastern Oregon.

L A V A L A N D S I N T E R P R E T I V E A R E A

A Lava Lands Interpretive Area in volcanic Central Oregon has been proposed. Already designated by the Secretary of Agriculture as an important part of the region is the Lava Butte National Geological Area.

It is noted that major highways bisect or offer access to this volcanic wonderland... Many textbook type examples of volcanic landscape are evident in the stark lava flows--some of which appear to have poured from the earth only yesterday. Many various stages of volcanism are apparent. From the "sleeping" Three Sisters to the recent volcanism of the Fort Rock Country, there are many features of popular and geologic interest.

The full interpretation of the Lava Lands would require the following facilities:

Lava Lands Visitor Center: To be located adjacent to U.S. Highway 97 at the base of the south paring of Lava Butte. The basic interpretive theme will be to explain the overall volcanic story of the area.

Lava Lands Observation Point: An excellent volcanic panorama to be viewed from the top of 500-foot high Lava Butte. The station was opened in 1962 and used by some 40,000 visitors in 1968. There was a slight drop in 1967, possibly due to the haze from burning forests late in the season.

Newberry Crater: Spectacular is the word for this geological wonder. An observation point to view the spectacular area is planned at Paulina Peak, elevation 7,897 feet. That point is presently accessible over a good dirt road. The trail and parking area at Big Obsidian Flow will be enlarged. A nature trail from Paulina Creek Falls to the lake is planned.

Lava Cast Forest: Rivers of lava originating from the flanks of Newberry Crater spread over this area, with some of the fluid rock flowing into pine groves to leave fine molds of trees in its wake. It is proposed to improve the road, provide parking facilities, and erect interpretive signs.

Cascade Lakes Highway: It is planned to provide facilities along the "Century Drive" portion of this route, from Bend west to Elk Lake and back through the upper Deschutes country, that will make possible for visitors the self-interpretation of geological features of the region.

McKenzie Pass: The Deschutes National Forest will work with the Willamette in the expansion of interpretive facilities at the McKenzie Pass.

Fremont Highway: Features to be marked will include Hole-in-the-Ground, Fort Rock, Katati Butte.

"Cave Tour:" Proposed is a marked route that will make possible a tour of outstanding lava caverns of the area.

Benham Falls Loop: Construction is expected to be finished on this 30-mile loop road in 1973. Major interpretive features will be two overlooks on the Deschutes River where Benham and Dillon Falls are direct results of lava flows.

In 1967, the Deschutes and Willamette National Forests issued a cooperative report titled "Lava Lands." The introduction read:

"Many volcanic and geological features are prominent throughout the National Forests of Oregon and Washington. The Regional Plan designates for interpretation of these and other features as the primary theme for each individual area. As an example, the Oux-kanee Overlook on the Winema National Forest will interpret the history of the Klamath Indians and settlers and will also introduce the visitor to Lava Lands and the volcanic story. The Timber Story of the adjacent Willamette National Forest will interpret timber and land management enhanced with history. Geology will be a part of the story as it influenced history and land management today.

"Each interpretive complex will concentrate on a specific theme but maintain a continuity from one complex to the next. Upon final completion of the project, a forest visitor touring the National Forest System will have a complete experience, similar to reading a book; each interpretive area, like a chapter, covers one part of the story and leads the reader to the next."

The age-long story of the Deschutes Lava Lands, already taking shape, will be fully told. The "Lava Lands" report, prepared by Robert C. Stevens, Mt. Baker National Forest recreation planner, continued:

"Over the years, the Lava Lands of Central Oregon have been the subject of many a research paper, geological field trip or newspaper article. Many field reports and publications have been authored by the Deschutes and Willamette National Forests, State of Oregon Departments, colleges and universities, rock and gem clubs, and individuals.

"To illustrate this scientific interest: The University of Oregon Geology Department has established a Volcanology Center; Oregon State University has added a volcanologist to its staff; in 1964, the National Aeronautical Space Administration, as part of its lunar research program, conducted on-the-ground testing of men and equipment on the lava beds and cinder cones: the Lunar Geological Field Conference in 1965, organized by the University of Oregon Department of Geology and the New York Academy of Science, centered its activities on volcanic features of Central Oregon.

"The purpose of this Lava Lands Interpretive Area Plan will be an attempt to digest the great body of material written concerning the volcanic features of the area and condense them into a convenient package for the interested reader who may not be familiar with the area...

"Up until a few years ago, the volcanic country of Central Oregon represented an almost completely untapped opportunity for high-level interpretation. It is our hope that this Lava Lands Interpretive Area Plan will lay some of the groundwork necessary to accomplish the quality of story-telling the area deserves."

The Lava Lands Interpretive Area is near the geographic center of Oregon and is bisected by U.S. Highway 97, one of the two major north-south routes in the Pacific States.

Location of the proposed Lava Lands Visitor Center and parking area will be within an oblong area close to the south side of Lava Butte. The Center will tell the volcanic story in general terms, to introduce to the uninformed visitor the very basic facts about volcanism. Interpreted will be earth forces responsible for the various volcanic features in the Lava Lands area--lava caves, tree molds, cinder cones, spatter cones, lava flows, pressure ridges, faults, hornitos, and the dominant Three Sisters Peaks, Broken Top, and Bachelor Butte on the western skyline.

Told at the center will be the story of the creation of Lava Butte. Close by, near U.S. 97, will be a section of the Great Fault on which volcanic forces erected impressive Lava Butte.

PREHISTORIC TIMES

There is evidence that ancient hunters were in the Deschutes country while volcanic smoke still plumed from high mountains and glowing avalanches of pumice raced down valleys to spread over flat areas such as the Crescent country.

These first Oregonians lived in caves of the Fort Rock basin when summit eruptions were still active in nearby Mt. Newberry. In the Wickiup country of the upper Deschutes River, they cached obsidian knives later covered by ash from exploding Mazama.

Students of the trails of ancient man through the Deschutes region have not yet been able to give a date for the arrival of the first hunters, but they are sure it was more than 10,000 years ago. There is a possibility that the old hunters came to Central Oregon after wandering along the numerous valley embayments of ancient Lake Lahontan, which spread an arm into Oregon from northern Nevada. In that epoch, huge lakes, some more than 100 miles long, existed in southeastern Oregon and northern California. One, mentioned earlier, was the great body of water ancestral to Fort Rock Lake of the Ice Age. This lake spread from the Newberry Crater foothills into the southeast and south, to inundate the far-reaching Christmas Lake Valley and cover to considerable depth the present Silver Lake area.

Nationwide attention was directed to the Fort Rock Cave when Dr. L.S. Cressman, then University of Oregon anthropologist, and his students in 1938 found sandals in this cave that were given a radio-carbon date of some 9,000 years. The cave yielded 75 sandals. At the time, one of the sandals was the oldest directly dated artifact in the New World. There were older dates, 13,300 years, but these came from charcoal of campfires or some material not an artifact itself. Pictures of the sandals appeared in books and papers in this country and in Europe. Story of the manner the sandals had been dated was told in connection with the work of Professor W.F. Libby and his colleagues at the University of Chicago. In 1962, Dr. Libby was given the Nobel Prize for his work in dating by the C-14 method. In accepting the award, Dr. Libby spent a substantial part of his address describing the Fort Rock sandals and the condition of their discovery. The story of the Fort Rock sandals was told in an issue of Life Magazine.

Dr. Cressman again told the sandal discovery story when on June 22, 1963, he took part in the dedication of Fort Rock Cave as a national historical landmark, given to the Nation by Mr. and Mrs. Reuben A. Long, on whose land the cave exists. The dedication was at the cavern mouth. Dr. Cressman noted:

"The people who lived in this cave and in the surrounding country more than 9,000 years ago looked out on a landscape strikingly different from that which we see today. About 11,000 years ago, the glacial ice which lay on our mountains and covered the British Columbia area from the sea to the Rocky Mountains, as well as most

of the rest of the northern part of our continent, had started to recede as the weather became warmer. During the glacial period, these now dry valleys held lakes as shown by gravel beaches, the wave-cut terraces such as the one at this cave, those on the remains of the old volcano and on the distant Connley Hills in front of us.

"With the warming of the temperature, the rain and snowfall became progressively less and the glaciers retreated. These lakes began to lose their water by excess of evaporation over the amount received from rain and snow. Eventually, about 7,500 years ago, the lakes dried and for 3,500 years there was a period of greater aridity than anything we have known in recorded history.

"About 4,000 years ago, the climate again changed, becoming cooler and more moist. Rainfall increased. Glaciers on our mountains which had disappeared during the long dry period were reformed. Those we now have are the small remnants of them. The dry lakes were reformed, but on a smaller scale. About 2,000 years ago, the climate became about what it is today. Conditions of the landscape developed to what they were like at the time of the coming of white men.

"The people who wore these sandals which we dug up looked out on a vast lake filling the valley, but a lake probably not as large as it had once been. Under the housekeeping remains left in the cave was a gravel beach on the floor of the cave. Before the cave could be used for a habitation, the water had to recede, or the lake level drop... Some of the sandals had mud-caked soles, indicating that these people had walked either in mud caused by rain or along muddy shores of the lake."

To hunt and fight, the Fort Rock people of eons ago used a throwing stick, a weapon in use before the invention of the bow and arrow which came to the area with migrants about 4,000 years ago. The throwing stick or spear thrower had a hand grip at one end and a hook at the other.

Around the shores of the lake that lapped the southern Paulina foothills were willows, reeds, tule, and cattail. Yellow pine would have been in evidence. Pollen of the pine has been found on old bog sites. On tablelands there would have been bunch grass, providing fine grazing for herds of animals. Around the lake and on the tablelands, the old hunters would have found the horse, camel, mammoth, and the animals found by white men when they came to the country. The large animals were probably hunted by driving them into bogs or mud around their watering places, then killing them with any weapon that came to hand. The horse, camel, and mammoth became extinct, probably as a result of a change in the environment brought about by the long dry period beginning 7,500 years ago.

Ancient people of the area of now dry lakes were not only hunters but gatherers of roots, nuts, seeds, berries, and wild fruits. Life of the ancient hunters was rugged. "The life expectancy for Fort Rock people and their contemporaries was probably about 18 or 20 years," Dr. Cressman said in his dedicatory address at the cavern once known as the Cow Cave, because it provided shelter for those animals against cold northern winds.

It is presumed that people of the Fort Rock Basin lived in small groups of three or five families--no family was large. The size of these caves as homes prevented any larger groups. Probably friends from one cave joined those from another to hunt and to fight.

Life in the Fort Rock cave, especially in northern Great Basin winters, must have been severe. Prevailing winds, judging from the drift of pumice, were from the southwest. These blew directly into the sloping cave, with its wide, high opening. There was no way of blocking that opening, except by erecting barriers of rocks covered with hides.

"The Fort Rock people had neighbors," Dr. Cressman added. "In the caves of the Summer Lake shoreline, along the ancient lakes further east, around the Klamath Lakes, at Lower Klamath Lake, along the mountains at Odell Lake, and along the Deschutes River upstream from where it is joined by Crooked River and among other places, we have excavated the mute but expressive remains of the ancient ones. In general the ways of life were pretty much the same with two exceptions: First, the people in the Klamath Lake country soon learned to exploit the food resources of the lake and rivers and then gave little attention to hunting; and, second, the people in the Columbia Basin became more fishermen than hunters.

"Our Fort Rock people not only saw the changing climate, the springs running with less water, the lake level dropping, but they saw the last fiery history of the Cascade volcanoes. The pumice in this cave came from an eruption of one of the vents of Newberry Crater. They saw the last great eruption of Mt. Mazama which formed the caldera in which Crater Lake was born. A radio-carbon date from near East Lake shows that the last eruption of the Newberry volcano was just over 2,000 years ago.

"Try to imagine what these experiences must have meant to these people: the fear, terror, and even death. There must have been many lives lost when the terror overwhelmed them. Think what myths and ancient folk tales they must have created to explain these monstrous events! What magic and religious rituals were called upon to avert further disaster!

"Try to picture in your minds now and when you are moved to think about these ancient ones, what life must have been like for them as the world about them changed with changing climate. Hunters came back in silence more often with no game. Children hunted rabbits, rats, lizards, and anything edible to stave off the hunger which they knew more frequently and which made their eyes big and full of hurt."

Something strange was found on examining the 75 sandals excavated from the Fort Rock Cave. Virtually all had holes in the bottoms. Apparently they had been worn to that point, then tossed into a corner of the big cave. The sandals were made from sagebrush.

Ancient hunters of the Fort Rock area wore the sandals to protect their feet from the sharp rocks over which they walked, especially on the talus slopes of cliffs and on tablelands. Some of the sandals from the Fort Rock Cave, including those that were caked with mud, had bark ropes over the soles that could have served to prevent slipping in the wet mud along the lakeshore.

What other clothes the ancient people of the Fort Rock basin wore, anthropologists do not know. There is almost no evidence of leather in even the driest localities excavated in the basin. There is a possibility that the rest of their limited clothing was fashioned from grasses and bark the country provided. Sandals were mostly made from sagebrush, but some bark and tule were also used.

The cave people are believed to have painted their bodies, as they did their weapons. Hematite for red paint is often found, as is a yellow pigment and sometimes a white. Some of the painting possibly was for ceremonial purposes. Two of the spearthrowers found in the Fort Rock cave were painted. They were painted red. One has several rows of white mark arranged along the upper surfaces. Were these notches in an ancient weapon indicating the prowess of the owner?

The old tribes of the cavern culture were hunters and gatherers of roots, seeds, and berries. They were at the mercy of the changing climates over the years. They had to make adjustments or move to other areas.

Dr. Cressman in his studies of the Fort Rock people noted that these dart hurlers and spearmen at some time in their history were faced with an astounding threat, immediate and drastic in its implications. "We can easily imagine a party of hunters or fighters meeting an enemy whose weapons were new and strange--they were weapons, bows and arrows, that killed before the men with the spear throwers were within range," Dr. Cressman said.

The cavemen had their first acquaintance with the bow and arrow, which apparently they quickly adapted and battled their enemies on equal terms. However, spear throwers were retained for a considerable time. Eventually these disappeared: Only bows and arrows, tipped with obsidian, remained. These were the weapons of the Indians when the first white men came.

Tragedy faced the ancient people in many forms. They died from malnutrition; disease took a heavy toll; so did accidents and enemies. Men hunted dangerously and bravely and died in the hills or on lakes.

"Tragedy was not alone their lot, but it must have stared them starkly in the face many times," Dr. Cressman said. "How they dramatized it in myth and folklore and religion we shall never know, for these are not among the remains the archaeologist finds." Dr. Cressman painted this word picture of the hunters' ways of life:

"In one cave, we have a record that any modern hunter would understand. Several thousand years before Mt. Mazama exploded and Crater Lake was born, hunters sat at this shelter on a beach above Summer Lake where they could keep an eye on what happened in the valley and cooked the pieces of horse, camel, bison, and such, which they brought from the kill, and threw into the campfire the bones after all the meat had been eaten. Some whittled with stone knives on pieces of bone to kill time and then threw the bones into the fire. Hunting knives and points were checked over and broken pieces thrown along with the bones into the fire.

"This is a place where men 'hung out.' There is no evidence here of housekeeping tools. They are in another cave, 100 yards away."

The Wickiup Knives

On September 13, 1934, John F. Isackson while working in the Deschutes National Forest in connection with a Bureau of Reclamation study for the Wickiup Reservoir discovered two Indian knives, shaped from obsidian. Such discoveries are not rare, but this one was. Evidence was found that the knives were deposited in the late glacial or post glacial period, prior to the explosion of Mt. Mazama on the southern Cascade skyline. The knives, it appeared fairly certain, were used by hunters more than 6,600 years ago, the Carbon 14 date given for the Mt. Mazama volcanism.

Isackson had found the stone knives in a test pit. The knives were under a thin layer of humus, 30 inches of pumice, 15 inches of old yellow soil and scattered pebbles, and 15 inches of yellow sandy soil and unsorted gravel. The last stratum was over a cemented hardpan. The scrapers were found just above the hardpan. A stratum of diatoms and clay indicates presence in the area, long ago, of a lake.

Dr. Cressman reported on the discovery in "American Antiquity." It was listed as an important anthropological discovery and provided evidence that the upper Deschutes country was the home of hunters when giant Mt. Mazama still ruled the southern Cascade skyline and glaciers blanketed the highlands. Dr. Cressman wrote:

"Knives from eastern Oregon represent some of the most beautiful stone products in North America. The use of obsidian favored this development. Scrapers and points show technical skill in their production worthy of admiration. The commonest form of knife is of an ovate shape which is beautifully chipped on both sides until it is symmetrical. The shape is produced by pressure chipping which removes long, often narrow flakes, sometimes producing a ripple-like surface. Others have been made by removal of progressively smaller flakes under carefully controlled pressure, until the entire piece is a beautifully shaped, symmetrical instrument. The edges are finally retouched by the removal of minute flakes and, when entirely treated in this manner, the knife is complete.

"The product is quite different from the Wickiup knives, which still retain striking platforms, are shaped by removal of large flakes only, but are only partly retouched both on surface and edge and are not symmetrical in any dimension. The character of the knives suggests an early type, before development of controlled technique which is such a striking trait of historic times for the region.

"They are, however, more suggestive of late Paleolithic forms than anything else... The general nature of the knives fits well with the probable geological period assigned."

Dr. Cressman accepted the Wickiup knives as "a strong conviction that we have here one more piece of evidence to add to the rapidly accumulating series on glacial or early post-glacial man in the New World."

Old campsites, lake bottoms once hunting areas, caves, and areas once marginal to ancient lakes have yielded thousands of artifacts in the past century. Some of the finest arrowhead collections in America were obtained from the northern Great Basin. All these artifacts plainly point to the fact that arrowhead makers of ancient days were skilled artisans.

Not all artifacts found in the region were scattered over ancient campsites or hunting grounds. Some important caches of artifacts have been discovered. A number of these were in the immediate area of Bend and included a cache of nearly 200 found in early days in a rock fissure near Brooks-Scanlon, Inc., mill. They had apparently been placed there by an ancient hunter who left the area never to return. Old campsites along the Deschutes have been the source of some fine discoveries. But the most outstanding discoveries were along the shores of vanished lakes in south-central Oregon. Artifacts are now hard to find in the area, but occasionally some outstanding discoveries are made.

Most of the artifacts of the Deschutes country are shaped from volcanic glass, some of which apparently was obtained from the obsidian flows in Newberry Crater or obsidian outcroppings on Glass Buttes. There is evidence in some areas that the ancient hunters carried obsidian into camp in chunks and shaped their artifacts from those chunks.

Occasionally intermingled with the obsidian artifacts are ones from localities as distant as the Columbia River. The ancient arrowhead makers were not prone to try their skill on agate material, difficult to work compared with the easy-flaking obsidian, or on other showy minerals found in the region. Only recently there was discovered in the hills east of Burns a scraper that had been shaped from material holding the imprint of a fossil plant.

Obsidian chips in various areas mark the old camps of tribesmen. In early years, there was evidence of such a camp a short distance east of Fort Rock. The area was strewn with thousands of pieces of chipped obsidian. Another such area is found on the shore of East Lake, in Newberry Crater near the resort area. Many of the obsidian pieces there bear evidence of having been chipped. The obsidian, it is presumed, was collected at the nearby Big Obsidian Flow and taken to a lakeside camp.

When in the summer of 1961 the Pacific Gas Transmission Company constructed its 36-inch line through Central Oregon, from Alberta, Canada, to California, workers found many artifacts just east of Lava Butte, 10 miles south of Bend. There, it appeared, ancient hunters, using stone-tipped arrows and spears, camped on a lava ridge overlooking a deer runway of the upper Deschutes country--and left plenty of evidence of their stay.

That evidence included hundreds of artifacts shaped from Newberry Crater obsidian. Washington State University archaeologists, working under a summer sun, unearthed many hundreds of artifacts from the site. Drills shaped from the volcanic glass, scrapers, stone knives, arrowheads, mortars, pestles, choppers, and other articles were discovered. These were carefully prepared as part of the story of the occupancy of the areas by tribesmen, some of whom possibly witnessed the earth-shaking explosion of Mazama on the southwestern skyline. Pumice intermingled with dust

blanketing the artifacts was possibly from ancient Mazama, but the volcanic ash might have been wind-drift of a later age.

The site was discovered when the pipeline crews excavated a deep trench through the earth-fault area just south of Lava Butte. The archaeologists excavated a trench to bedrock. All material shoveled from the trenches went through a sifter. In the second week of work, students made a spectacular find of large obsidian knives, apparently a cache. Much of the material was found in a branch fracture of the main fault.

Deer, in moving to the Deschutes from the dry timber country on the northern slope of Newberry Crater, followed a course that took them around a rocky apron of lava. The course led the deer through a ravine, close to two ridges. To the south was a spatter cone ridge, to the north a lava hump. The ancient hunters are believed to have set up a stalking camp on the lava ridge. Nearby was a small cave which held snow and ice well into the spring. This cave may have provided water for the hunters.

When the exploration of the old camp site was completed, all trenches were carefully covered, to prevent accidents to stock grazing in the area. The surrounding area was carefully scouted by the students, and chances of finding more artifacts there were reported slim, with new excavation not advised.

The excavation was handled under a Deschutes National Forest permit. Obsidian used by the ancient hunters was of the Newberry Crater type, and apparently was obtained from the crater's big obsidian flow.

Nomadic hunters of ancient Oregon must have looked on smoking mountains of the upper Deschutes basin as the abode of friendly spirits. It was these great fire peaks that provided the tribesmen with the black, glasslike material from which they shaped scrapers, knives, graters, and points. Obsidian is the name mineralogists gave this volcanic rock which hunters and warriors of old delicately shaped into penetrating points for arrows and spears.

Obsidian from Newberry Crater was extensively used by aborigines of the Deschutes country. Some of the obsidian artifacts found in the Deschutes country have been tentatively assigned ages close to 10,000 years.

The first Americans, some of whom lived in the old Deschutes country and Great Basin areas of Central Oregon, were wasteful of their ammunition, artifact hunters are prone to conclude. In the past century, tens of thousands of artifacts have been found, especially in the old lake country stretching into the south from Newberry Crater. Some private collections of earlier years, all collected by the same person, held as many as 7,500 artifacts.

Why were the ancient hunters so careless with ammunition so tediously shaped from volcanic glass or other material? Archaeologists advance several reasons for the apparent waste of artifacts. The fact that part of the region was once covered by large, shallow lakes accounts for the fact that many of the arrowheads, especially the "bird points," were

found in good condition. These were shot at birds in flight and dropped unbroken in lake water, eventually to be covered with silt and sand. When the great Pleistocene lakes dried, the artifacts came to light, generally in the wake of drifting dunes.

Some of the aborigines stalked their game as animals came in from the hills to graze along lakeshores. Presumably some of the "points" missed their mark and were lost in the nearby water. Around camp, artifacts were lost in the dust and brush. Some found in the open range country were probably dispersed by wounded game, into whose flesh the barbed points had been shot.

Apparently the hunters occasionally cached big supplies of artifacts and never returned from hunts, or war, to claim their ammunition. White men, excavating for homes and cities, found the caches centuries later.

"Rock Writings"

Scattered over the old range country east of the Cascades, a land long the home of wandering tribes, are many "rock writings," some painted on canyon and cavern walls, others cut into rocks. Those inscribed with pigments are known as pictographs; those that are cut into rocks are petroglyphs. Prehistoric art of the Old World, depicted on cliffs and on the walls of caves, has been long the subject of scientific interest and has attracted the attention of many distinguished scholars. Oregon's Indian art has been the subject of many reports, with Dr. Cressman in 1937 issuing his "Petroglyphs of Oregon," a University of Oregon publication.

Sites listed in the report include a number from the Deschutes National Forest or adjacent areas. One of the best known "rock writings" of the Deschutes region is that close to the highway at Devils Lake near Sparks Lake. In early days, there were two groups of figures on the smooth wall of a huge dacite boulder, but one has been destroyed by vandals. Dr. Cressman believes this was an ancient trail marker pointing to something represented in the adjacent design.

There are other writings about 20 miles west of Bend in the wooded Cascades, on the Tumalo Creek Trail. They were inscribed on a sloping rock near an old beaver dam. East of Bend in the Dry River Gorge an entire wall of basalt, facing the bed of the ancient stream, was once covered with Indian writings. Most of these were destroyed by vandals. These inscriptions were painted in red. They covered a surface 25.5 feet long and about 12 feet high. Figures include the form of a small horse, indicating that the writing occurred after the ancient hunters of the region were acquainted with horses, first brought into the southwest by the Spaniards.

There are Indian writings on a boulder near Tumalo, north of Bend. Some of the best-known rock writings occur just south of the Fremont Highway between Silver and Summer Lakes. Others are found north of the highway at the bottom of the first grade going toward Summer Lake after crossing the summit. These designs consist of human figures, concentric

circles, rectangular gridirons, horned humans, mounted humans, and a horse and coyote. There are also some complex signs.

Dr. Cressman, in referring to writings found in all parts of the state, noted:

"In a number of cases, the artists have been distinctly successful in depicting action."

Some show hunters in the act of drawing bows. There are also paintings apparently illustrating combat between warriors. Some of the many figures may be intended as phallic designs. Lizards, especially east of the Cascades, obviously attracted the attention of the rock artists at many sites.

"Few things in aboriginal American life have so intrigued popular fancy as the so-called rock writings which are to be found in some form throughout the length and breadth of the western hemisphere," Dr. Cressman wrote. "With few exceptions living Indians deny knowledge of their meaning... Various writers have attempted to arrive at some interpretation of these rock inscriptions. Popular writers, drawing freely upon their imagination with little or no regard for facts, have propounded many patent absurdities. Competent writers, on the other hand, have been very reluctant to offer interpretations. All scientifically trained men agree in seeing a certain amount of symbolism in the art. The interpretation of it, however, is difficult; for, until it can be recognized beyond a doubt either by relating it to known cultures or by submitting it to contemporary Indians, we still have the question: 'What symbolism.'"

Some anthropologists hold that petroglyphs and pictographs are meaningless figures made in idle moments by some primitive artist. Facts of distribution, however, show that this is hardly possible. Since design elements and style are grouped in limited areas, the primitive artist must have made the inscriptions with something definite in mind. The artists, it is noted, generally executed, not random drawings, but figures similar to those in other parts of the area. Some of the writings hold a quality of sacredness, possibly imposed by tribes ignorant of their meaning.

In the Deschutes country, rock writings are frequently found on or near good camping sites, close to springs or streams. The numerous writings on the Dry River gorge walls near Millican in early years were obviously near a campsite. A sampling of the earth indicated this. There were charcoal strata and layers in which bones of creatures of the area were found.

Most of the Dry River inscriptions were in red. Down the gorge about half a mile, over the canyon wall, was found a deposit of reddish mineral, apparently an iron oxide, that had been excavated. It is evident that tribesmen camped in the Dry River gorge for many years, probably in the epoch when a small river, fed by High Desert streams, flowed into the gorge long after Lake Millican was drained.

Dr. Cressman said even in contemporary cultures pictographs and petroglyphs are associated in some way with adolescent ceremonies, certain shamanistic activities or clan designations.

How old are Indian writings of the Deschutes country? Age might be reckoned by weathering, superimposition, association with animals known to have become extinct, or association with elements of known cultural age. However, weathering is a poor criterion to age. It varies in different climates, and in different exposures to storms. Also, the resistance to weathering of different rocks must be considered, and superimposition may indicate only the relative age of related designs.

In design of animals known to have become extinct, as for example the mastodon or in more recent times the mountain sheep in south-central Oregon, may be used, Dr. Cressman concedes. In such time figuring, the design might be considered representing a period prior to the extinction of the mammals.

"Association with elements of a culture, the age of which is known, is the only dependable method," Dr. Cressman said. Designs may appear much later than the introduction of the known element, but not before. Horse designs, for instance, might conceivably be of a period in the Pleistocene before the animal became extinct. But, when cultural traits indicate the Spanish influence, it can be taken for granted that the horses depicted on canyon walls were descendants of those introduced by the Spaniards.

In some areas, the new C-14 of datings is proving of value in fixing the age of campsites and of the writings found on rocky walls overlooking such areas.

Outside of the Klamath basin, the pictograph art of the interior region seems to be intrusive—that is, it appears to have come from the east. Dr. Cressman said its most marked development is in a fairly wide area across the high plateau of the north-central part of the state, centering on upper reaches of the John Day, Crooked, and Deschutes Rivers and their tributary streams.

TRAPPERS BLAZE DESCHUTES TRAILS

The first record of white men in the present Deschutes National Forest was entered in a diary on November 16, 1826.

Peter Skene Ogden, with Hudson's Bay Company trappers, started on his second trip into Central Oregon from the Columbia River on September 19 that year, following in part the route of his first expedition the previous year, when he crossed the Deschutes River in the present Warm Springs area and cut across to Crooked River via the later site of Prineville. That trip did not take him into the upper Deschutes basin.

On his second trip, Ogden and his big party of fur seekers, many of them Canadians, made his way southeast from upper Crooked River to the Silvies of the later Harney country. Disappointed in finding that the Silvies ended in the Malheur Lake rather than the Pacific Ocean, Ogden led the party west to trap on the Deschutes and in the Klamath country and other then unexplored regions beyond. The trappers reached Newberry Crater from the east, following a long, waterless trip over the volcanic lands from Lake Malheur. Ogden noted, in this first written mention of the region that was later to become a unit of the Deschutes National Forest:

"We ascended a divide, descended, and had the pleasure of finding two lakes... It was a consolation to see our poor horses quench their thirst."

That first contact with water in the Newberry caldera apparently was made not far from the East Lake Resort of the present. The party continued westward across the crater and reached the Little Deschutes in the vicinity of Paulina Creek on November 18.

Although Ogden was the first to make written reference to an exploration of the upper Deschutes country, it is presumed by some historians that Finan McDonald had been in the area before. It was McDonald who crossed the Cascades from the west and met Ogden in the Warm Springs area late in 1825 on Ogden's first trip into Central Oregon. McDonald was in the Northwest as early as 1809-10 with David Thompson. Ogden's guide across Newberry Crater and into the upper Deschutes region in 1826 was McKay, an Indian scout.

Highlands of the upper Deschutes country were white with pre-Christmas snow and a storm was brewing over the Cascades to the west when another explorer came out of the north to add a new chapter to the story of the region now embraced in the Deschutes National Forest. He was Nathaniel J. Wyeth, trader and patriot. The year was 1834. His wintry expedition into the Deschutes basin south of the present site of Bend has been virtually overlooked by historians. Purpose of his trip is not definitely known. Possibly he was seeking beaver pelts or maybe he was hunting Hawaiian Islanders who had left one of the Wyeth construction camps on the Columbia River. Wyeth failed to find the islanders, but he left a fine account of his journey upstream from the Bend area. The Wyeth diary indicates that he and his party picked a poor time of the

year for the upper Deschutes adventure. On December 22, as they moved into the upper river country on the west bank, a winter storm was increasing in severity. The party encountered deep snow, and Wyeth sent some of his men back to the lower country with horses. No feed was available in the snow-covered land above Benham Falls. Wyeth and three of his men remained to build canoes for use in exploring upper reaches of the Deschutes River. The canoes were launched 5 miles below Benham Falls. The rapids at Benham Falls blocked attempts to get upriver. The Wyeth men made a portage of the falls and continued upstream to Pringle Falls, where an overnight camp was made. Wyeth entered notes in his diary with chilled fingers. He made side trips up Deschutes tributaries where the land was covered with 4 feet of snow.

Boats were abandoned by Wyeth on his return trip at a point just south of the Bend site. The explorers' larder was low. "Killed one deer just in time," Wyeth noted in his diary. Wyeth met his party at the head of Squaw Creek, ending a 2-month trip.

There is little in history about Wyeth's perilous adventure into the upper Deschutes country in the Christmas season of 1834—yet his diary constitutes the first recorded history of the area from Crooked River south to the Pringle Falls country. No geographic features in the area bear his name. His campsites are unmarked.

Fremont and Kit Carson

Eight years after Nathaniel Wyeth braved a fierce winter storm to explore the upper Deschutes country as far south as Pringle Falls, other trail blazers entered the country just east of the Three Sisters. They were John C. Fremont and Kit Carson, members of the same party. Heading the group, on an exploration mission, was Fremont, a 30-year-old lieutenant of the Topographic Engineers, U.S. Army. The year was 1843, and the season was late. It was November 25 that the start up the Deschutes from The Dalles area was made. Toting a cannon that was to win a niche in American history, the group eventually reached the upper meadows on Tumalo Creek, just west of the Bend site, then journeyed south past Benham Falls to Klamath Marsh, where Indians were found in established villages. There, for the first time, Fremont discharged the cannon. The Indians had not attacked, but Fremont feared trouble was brewing. None developed. Instead, the frightened Indians sent a brave and his squaw to the Fremont camp bearing gifts.

From the marsh, the explorers turned directly east, to the rim overlooking Summer Lake. A snowstorm had enveloped the high country, now known as Winter Rim, but below the sun was shining. Fremont named the great body of water in the basin Summer Lake.

Kit Carson, whose name blazes on distance horizons of American history, was guide for the party, which eventually crossed the Sierra Nevada in a bad winter storm to reach sunny California. Also with the upper Deschutes explorers of 1843 was a figure little-known to the present generation—Thomas "Broken Hand" Fitzpatrick. His nickname has been given a landmark on the Broken Top plateau in the Cascades west of Bend.

The name was approved by the Oregon Geographic Names Board in 1967. "Broken Hand" Fitzpatrick is epitomized in a book dealing with adventures in the far west in pioneer days. Historians said no other man was so representative of the fur era epoch. "Broken Hand" Fitzpatrick was one of the little party that in March 1824 made the discovery of South Pass, the future gateway to Oregon.

Speaking about Fitzpatrick, Hiram M. Chittenden, historian of the fur trade, wrote:

"His comings and goings are lost behind the scenes, and all that is known of him is from transient glimpses while he is passing across the page before us."

One of those passages brought Fitzpatrick across the Deschutes National Forest stage, to leave his name in the glaciated ridges of the Broken Top country of the Cascades.

Immigrants Blaze Trails

Trails used by Fremont and his men through the Deschutes Forest were cold, except where used by Indians traveling the Klamath-Dalles route, when the next whites entered the area. Two years after Fremont rode to the south through the upper Deschutes basin, survivors of the far-famed Blue Bucket Mine wagon train crossed the area; but, with one possible exception, the route of that group was over the High Desert, into the Crooked River Valley to The Dalles from the present Prineville area. There is some indication that a "splinter" from that party reached the Bend location before heading north.

The second wagon train to visit the Bend area apparently was composed of a few men and women who survived the Clark massacre on the Snake River in 1851. This was the group headed by Thomas Clark. Family historians said the survivors, including a girl, Grace Clark Vandever, who had been shot and partly scalped by Indians, camped for several days on the Deschutes at Bend. Some historians say the camping spot was Farewell Bend on Snake River, not on the Deschutes.

The largest of all immigrant trains to cross Central Oregon was that of 1853. This was the Elliott Cutoff Party, leaders of which mistook the Three Sisters for Diamond Peak and reached the Deschutes River in the Bend area. From Bend, the party moved south for a tortuous crossing of the Cascades and a journey into the Eugene country via the Middle Fork of the Willamette. A few traces of the wagon trail slashed through jack-pines are still visible in the Crescent District of the Deschutes National Forest.

Actually, the story of the Elliott Cutoff Party had its beginnings in 1852 when a group of seven men took part in a road-viewing expedition up the Middle Fork and continued on to the east after being attacked by Indians in the present Bend area. One member of that party was John Diamond, who gave his name to Diamond Peak, a high landmark of the Cascades. A road was "constructed" over the route blazed by Diamond and

his companions, and Elijah Elliott of Lane County went east, met his family, and guided a large group from the Oregon Trail to the Middle Fork, through the Deschutes National Forest of later years.

There is some evidence of considerable travel through the upper Deschutes country even before 1865. Some of that travel represented gold seekers, en route to Canyon City on the John Day, where golden nuggets were being washed from creek bottoms.

In the fall of 1867, a caravan of wagons laden with supplies for Indians on the Klamath Reservation made the first recorded passage of vehicles over the full length of the region now traversed by U.S. Highway 97, which cuts through the Deschutes National Forest from north to south. Heading that wagon train was J.W. Perit Huntington, superintendent of Indian Affairs in Oregon. The wagons circled into formation for a night camp at the present Bend site on November 4.

Working ahead of the wagon train was a company of men, who slashed a wagon route through lodgepole thickets in the upper Deschutes country. Winter whitened the Klamath Basin when the train, composed of U.S. soldiers, teamsters, and a group of Klamath and Modoc scouts, pulled into Fort Klamath. That train blazed the route of The Dalles-California Highway through the Deschutes woods in later years.

So far as history records, none of the many travelers through the upper Deschutes country remained to homestead or build a cabin in the forest wilderness. That came later when the first stockmen arrived.

" N A M E S O N T H E L A N D "

Geographic features of the Deschutes country were slow in acquiring names.

On his way into Central Oregon in quest of beaver ponds on the middle Deschutes, Crooked River, and other streams, Peter Skene Ogden, heading a group of Hudson's Bay Company trappers from Fort George (now Astoria) on the Columbia, was possibly the first white man to note, in writing, some of the spectacular geographic features of the Deschutes country.

But Ogden gave the features no names. The Ogden diary makes little mention of the region through which the trappers passed. Ogden was seeking furs and game for food. The scenery was of little interest.

But, on December 5, 1825, from the top of Tygh Grade in the present Highway 97 country, Ogden made this entry:

"Started this morning about 8 o'clock. Our guide informed us there were some small deer to be seen in this quarter. I dispatched my three hunters. At 12 o'clock came to the end of the hills. Here certainly was a grand sight.

"Mt. Hood bearing due west and Mt. St. Helen and Mt. Nesqually (Mt. Adams) northwest covered with I may say eternal snow, and in the S.W. direction a number of other lofty mountains in form and shape of sugar loaves."

One of the grand mountains viewed by Ogden was Jefferson. It already bore a name, Mt. Jefferson. It was seen and named by Lewis and Clark on March 30, 1806, from a point near the mouth of the Willamette. If Ogden recognized the snow-blanketed volcano, he did not indicate this in his journal.

One of the peaks, just south of Jefferson, probably viewed by Ogden and his men, was Three Fingered Jack, with Mt. Washington to the south. They were to get names years later. Also visible to the fur seekers on their wintry ride into the old Indian country of Central Oregon were the Three Sisters.

No one knows how the Sisters got their names; but, it is noted by geographers, it was a "natural" to call the trio of peaks the Three Sisters. Geographer Lewis A. McArthur wrote:

"These peaks are among the most interesting in Oregon... Together with Broken Top, they comprise the most majestic group in the Cascades Range of Oregon."

In the absence of any specific mention of the Three Sisters in the Ogden journal of 1825, earliest mention of the three mountains was by the explorer-botanist David Douglas as follows:

"Thursday 5th (October 1826.) After a scanty breakfast, proceeded at nine o'clock in a south course. Country more hilly. At one o'clock passed on the left, about 25 or 30 miles distant, Mt. Jefferson of Lewis and Clark, covered with snow as low as the summit of the lower mountains by which it is surrounded. About twenty miles to the east of it, two mountains of greater altitude are to be seen, also covered with snow in an unknown tract of country called by the natives 'Clamite.'"

From certain positions, the Three Sisters appear as two mountains, and Douglas' mistake was natural.

But, Douglas, intent on his study of new plants and trees of the mid-Oregon country, did not give the white peaks names. Not until 1856 were the old volcanoes officially recognized on Preston's "Map of Oregon." There they were listed as the Three Sisters.

Old-timers, one of them the late W.P. Vandever of Bend, say the mountains were recognized and named by members of the Methodist Mission in Salem in the early 1840's. The Mission people, the old-timers said, called the three peaks Mt. Hope, Mt. Faith, and Mt. Charity.

Eventually, it developed that the stately Sisters, born from earth fires and shaped by giant glaciers, were to play a role in the naming of other features of their immediate area. A great "family of mountains," spread over the Cascade crests in the Three Sisters area, received names. Naturally there was a Little Brother. This is west of the Three Sisters. The Wife is nearby and, of course, the Husband was recognized. All these are west of the crest.

East of the Cascade divide, the Sisters' influence was felt in the naming of a grand peak, Bachelor Butte, the Fujiyama of the Cascades and now center of a rapidly developing ski area. Old-timers say the cone was generally known in early days as "The Bachelor," making it eligible for membership in the family of peaks to which "Mount" was never applied.

Although close to the South Sister, Broken Top appears to be an outcast in the great family of mountains.

First to apply names to the lesser peaks of the Three Sisters area were hunters, stockmen, timbermen, alpinists, hikers, and winter sports enthusiasts. Names for geographic features of the Three Sisters country received a big boost when Dr. E.T. Hodge, then a geologist at the University of Oregon, made a detailed study of the region. Newly named features were listed in his report on "Mount Multnomah," a study which held that the Three Sisters are remnants of a giant mountain of ancient epochs.

One of the many names applied to features of the area was "Ahalapam," to designate a big cinder field north of the Three Sisters. In this little-known area, mostly in the Deschutes National Forest, are many spectacular features, including the Red Rock Plateau. This is an area where twisted, dwarfed whitebark pines reflect their stern environment in many artistic shapes against the bare red and black lavas and cinders.

In the high country adjacent to the Three Sisters are many names of Indian origin--but these were applied by white men, not by Indians. One of the prominent landmarks is Kwoh Butte, about 2 miles south of Bachelor Butte. It has an imposing height, 7349 feet. The butte bears the Chinook jargon name for "aunt," possibly to fit into the Three Sisters family picture. It was named by Forest Service men, to assist with map work in fire fighting. Nearby is Tot Mountain, which also fits into the family picture of volcanic peaks. Even Wanoga Butte, about 8 miles southeast of Bachelor Butte, appears to have won a place in the alpine family. Wanoga is one form of the Klamath Indian word meaning son or male child. That extends the great family of old volcanoes to the Three Sisters, the Brother, the Wife, the Husband, the Aunt, and the Son. And there may be others.

Surpassing Dr. Hodge as a namer of geographic features in the Cascades and Deschutes National Forest was the late W.O. Harriman, a former Deschutes staff member who later served as supervisor of the Ochoco and Fremont National Forests.

In the early 1920's while a resident of Bend, Harriman recognized the importance of having well-known landmarks to assist in dispatching men and equipment to fires. These landmarks, he decided, should have names. He decided on Indian names, and many of Chinook or Klamath origin were given to small volcanic cones of the Paulina Mountain region. Six of the cones received Chinook names for numerals. They were Ikt (one), Mokst (two), Klone (three), Lokit (four), Kwinnum (five), and Taghum (six). For nearly half a century, foresters, stockmen, and others have been using these names, which have places on maps of the Fort Rock and other Districts.

Lolo Butte, southwest of Bend, is one of the landmarks receiving an Indian name. "Lolo" apparently means "to carry" and had reference to the fact that, in early days, supplies to that point must be taken in on a packhorse. Even Wake Butte of the upper Deschutes basin has a name of Indian origin and means "no" or "not." One of the first landmarks of the Deschutes National Forest to receive an Indian name was Cultus Lake. Nearby are Little Cultus Lake and Cultus Mountain. In earlier years, Little Cultus had another name, Deer Lake. "Cultus" is from the Chinook Indian word Kaltas and was variously spelled as Kultus, Kultos and Kultis. It means bad or wholly worthless. It appears poorly applied to the scenic Cultus Lake region and can only be explained if a legend of the area is given credence. The legend is that an encampment of Indians in the area long ago had been stricken with an ailment, believed to have been smallpox.

Another butte bearing an Indian name is Kaleetan, near Devils Lake in the high eastern Cascades of the Deschutes country. "Kaleetan" means arrow. Some of the names given buttes and other landmarks by the Forest Service were selected arbitrarily. It would be difficult to explain how Kawak Butte in the Paulina Mountains earned its name, which means "to fly."

The manner in which names became attached to features of the Deschutes National Forest is interesting. Consider Edison Ice Cave in the Bend District. In the early summer of 1910, a big fire raged in that area. A transient firefighter, Jack Edison, and George Vandever, son of a pioneer family of the area, were returning to camp one evening from the fire when Edison found a cave. This became known as the Edison Ice Cave, and the forest blaze went into the records as the Edison Ice Cave Fire.

The Lava River Cave, now site of a state park just south of Lava Butte, is a cave that lost its name and was renamed. Named for an early-day rancher of the area, the cavern was known in pioneer times as Dillman Cave. Occasionally hunters cached their venison in the cool confines of the mile-long tunnel. The cave became known as the Lava River Tunnel in the era when geologists studied the proposed Benham Falls Reservoir site, and Ira A. Williams of the Oregon Bureau of Mines and Geology gained national attention through his detailed, illustrated report on the cave. That report, "Lava River Tunnel: A subterranean Conduit in Deschutes County, Oregon," was published in 1903.

One of the most impressive of all lava river tunnels in the Deschutes area bears the name Skeleton Cave. It was named in 1923 after bones of prehistoric creatures, including a huge bear, were found there. It must have had an earlier name. The explorers of 1923 found near the mouth of the cave, 12 miles south of Bend, remnants of a moonshine still and a volume of sour mash. It could have been named "Moonshine Cave."

Not far from Skeleton Cave is Charcoal Cave. It was given its name because of a mass of charcoal found in the cavern, back a short distance from the opening. Found in the half-burned charcoal was a piece of jackpine that had been cut, apparently, with a stone axe several hundred years ago. The Arnold Cave received its name from a pioneer rancher of the area, and Wind Cave, a skylight opening of a cave, was named because of the rush of cold air from the opening on hot summer days. South and East Ice Caves were named for their locations in the Fort Rock District. One of the most recently named caverns is the Cleveland Cave southwest of Bend, named for George Cleveland who discovered it.

The Deschutes National Forest gets its name from the river that drains much of the forest's area. Strangely, this name carried upstream from the Columbia River and was not applied by trappers or explorers visiting the inland region. Lewis and Clark discovered the Deschutes at its mouth on October 22, 1805. They referred to the big stream by its Indian name, Towonehlooks. On their return up the Columbia, the two explorers called the stream Clark's River. Neither of the names prevailed. In the fur-trading period, the stream was known as the Riviere des Chutes or Riviere aux Chutes, meaning river of the falls. The trappers applied the name because the stream poured into the Columbia near the falls of that area in the pre-power dam era. For years, the river was known as the Des Chutes. It became one word prior to the creation of Deschutes County on December 13, 1916. A town, on a site about halfway between Redmond and Bend, was named Deschutes, as was the federal forest that covers the upriver country and reaches to the Cascade crest to the west.

If the present tendency to use Indian names for the land had prevailed in pioneer days, the stream would be known as Towornehiooks River. However, the Klamath Indians also had a name for the north-flowing stream. It was Kolamkeni Koke. For a time, the Deschutes was referred to in pioneer literature by a much shorter name, Fall River.

The Deschutes gave its name to a region, a forest, a county, and an early day town, but it was a renegade Indian chief, Paulina, who became the inspiration for far more geographic feature names. The Paulina Mountains were named for him, and a high peak overlooking the awesome Newberry Crater bears his name. Paulina Creek, plunging from Paulina Lake, further honors the renegade who met death in a rocky cove of Trout Creek, now Jefferson County, in 1867. Paulina Prairie carries his name, as does the little town of Paulina in southern Crook County. Nor can Paulina Marsh be overlooked. There are some variations of the name, such as Paumina, a station on the Cascade railroad line.

Early explorers played only minor roles in giving names to the land that was to become the Deschutes National Forest. Peter Skene Ogden and his tired, chilled trappers came over the eastern rim of Newberry Crater on November 16, 1826, to water his horses in icy East Lake. But he did not recognize the basin as a volcanic caldera, nor did he give names to beautiful East and Paulina Lakes. Nathaniel Wyeth, facing a heavy snow-storm in late December 1834 passed close to the Bend site on his way up the Deschutes but left no names for geographic features that included Benham Falls and Lava Butte to the east. John C. Fremont, Kit Carson, and "Broken Hand" Fitzpatrick hurried through the Deschutes woods late in 1843, toting a cannon, but left no geographic names. However, to the south, Fremont did give important names to the region. From the high top of a blizzard-swept ridge which he named Winter Rim, he looked into a broad, sun-bathed basin and called the lake far below Summer Lake. To a spectacular scarp in the distance, some 2,500 feet in height, he gave the name Abert Rim, honoring his commanding officer, Colonel J.J. Abert of the U.S. Topographical Engineers. Summer Lake and Abert Rim are south of the Deschutes National Forest.

The Fremont Highway (Oregon 31) which passes through Deschutes, Klamath, and Lake Counties in its swing into the Abert Rim and Lake country bears the name of the "Pathfinder," as do other geographic features of the area. It was Robert W. Sawyer, early-day publisher of The Bulletin in Bend and long a "follower" of Fremont's trails through the west, who suggested the naming of the inland Oregon highway for the explorer.

A little natural meadow on Tumalo Creek, west of Bend, also bears Fremont's name, but it is seldom used. The term "Upper Meadow" is more common. Captain Fremont and his exploring party camped in this vicinity on the night of December 4, 1843. A canyon northeast of Sisters bears Fremont's name. It is on the route of the Fremont party in the 1843 exploration of the inland region.

Members of the Williamson Railroad Survey Party of 1855 passed through the Deschutes country, pinpointing many places with compass and geographic accuracy, but left few names. Lt. Henry L. Abbot, whose name was to be given to the Camp Abbot site on the upper Deschutes River in

in World War II, was a leader of the survey party. On a side trip to Fort Dalles, he was intrigued by the appearance of a high, conical, timbered butte facing the Mt. Jefferson and Three Fingered Jack Cascades from the east. In his field notes, Abbot referred to the timbered, cloud-touching dome as Pivot Mountain. That peak is Black Butte of the Deschutes National Forest in the Sisters area. Apparently, the butte carried its present name prior to the visit of the Abbot party, but no one knows who named it. Although Abbot knew the peak as Pivot Mountain while in the field, he called it Black Butte in the manuscript he prepared for publication. This imposing butte, 6,415 feet high, is one of the most symmetrical in the Deschutes Forest. A fine drawing of Black Butte appears in the Pacific Railroad Surveys Reports, Volume VI, page 90. It is apparent that the fine cone bore its present name prior to 1855.

"Metolius" is another name which appears to have been long on the land and possibly was used by Indians in prehistoric times to describe the river that seemingly gushes from the western base of Black Butte. With the Deschutes (Towornehiooks), the Metolius is probably the oldest named geographic feature of the region. Early explorers heard Indians pronounce their name for the river and attempted to spell it. First mention of the river appears in the Pacific Railroad Surveys Reports of 1855. In those reports, the name is spelled Myto-ly-as. Other early spellings of the river included Metoluis and Matoles. The approved name is Metolius. Warm Springs Indians say the word means white fish, but some hold it means spawning salmon.

Immigrants who slowly moved across the High Desert in 1845 and 1853 noted the white Cascade peaks in the west but apparently provided few, if any, names for the inland region. Probably it was best that the immigrants did not attempt to assign names, for members of the Elliott Cutoff Party of 1853 were highly confused. Some of their leaders thought the Three Sisters comprised one of their sought landmarks, Diamond Peak. It was well to the south.

Names given geographic features of the Deschutes country cover a wide range. Some of the names found in the Sisters District and the Metolius country follow:

Walker, Muriel, Candle, Bean, Fly, Six, First, Davis, Bridge, Rivers include Metolius and Spring. Lakes are many: Booth, Scout, Link, Four O'Clock, Hortense, George, Demaris, Chambers, Golden, Tam, Rim, Tum, Lucky, and others. Buttes include Dugout, Graham, Fourmile, Henkle, Overturf, Bachelor, Edison, Dry, Anns, and Pistol. Also on the Sisters map are Wizard Falls, Douthit Spring, Thorn Spring, Osborne Canyon, Cache Mountain, Glaze Meadow, Stevens Sage Flat, Steamboat Rock, Yapoah Crater, Dee Wright Observatory, Scott Camp, Lost Creek Glacier, Tam McArthur Rim, Broken Hand Rock, Happy Valley, Red Crater, Wire Meadow, Katalo Butte.

The Fort Rock District apparently is a land of buttes--and, incidentally, the name "butte" is one that mystifies most eastern visitors. Following is a list of most of the buttes on the Fort Rock District map:

Horse, Cabin, Bessie, Luma, Kelsey, Sugarpine, Lava Top, Fuzztail, Swamp Wells, Hunter, Company, Lowuilo, Groundhog, Mahogany, Weasel, Pumice, Topso, Box, East, Kelly, Firestone, Rogers, Plot, Ko, Watkins, Crater, Green, Rim, Tom, Jack, Triangle, Horseshoe, and Wigtop. Also on the Fort Rock map are the Arnold Canal, Green Mountain, Wind Cave, Horse Ridge, Skeleton Cave, Harper Bridge, Lava Cast Forest, Evans Well, Tepee Draw, Cinder Hill, Pumice Spring, Surveyors Cave, The Dome, Red Hill, Lava Pass, Quartz Mountain, Jones Well, Buzzard Rock, and the Mortimer Wells. Other landmarks on the Fort Rock District are Burnt, Quarter, Watkins, Short, Long, Katati, Hogback and Ludi Buttes; The Pyramid, Cook Well, Flat Top, Steigleder Well, Pinelake Waterhole, Derrick Cave, and Gebhardt Well.

Strangely, the Bend and Crescent Districts, although with a more active history than the other Districts through the years, hold fewer names. Lakes include Teddy, Comma, Brahma, Pocket, Redside, Kinnie Kinnie, Phantom, Sundew, Strider, Harlequin, Merle, Raft, and Jay. Buttes are Wuksi, Skukash, Cruiser, McKay, Wright, Eaton, Haner, Finley, Ranger, McCool, Saddle, Cryder, Ringo, Ipsoot, Black, Moffit, Spring, Beales. Other Bend and Crescent District features are Benz Spring, Robideaux Landing, Twin Lakes, Dillman, and Dorrance Meadows, Beal, Hooligan Hill, Rosedale, and Sellers Creek. There is also a Stams Mountain. More detailed maps hold many other features.

One of the major landmarks of the alpine borderlands between the Deschutes and Willamette National Forests is Diamond Peak, 8,750 feet high. It was named not for any resemblance to a diamond, but for a Lane County pioneer, John Diamond, member of a party of surveyors authorized to trace a new route over the southern Cascades in Oregon. The viewers found a pass just south of the large mountain. Diamond scaled the peak in 1852 and named it for himself. Across that route moved the Elliott Cutoff Party of 1853, as a heavy storm broke over the Cascades.

Another Deschutes National Forest landmark is Newberry Crater, in the summit of the isolated Paulina Mountains south of Bend. It cradles two far-famed trout lakes, East and Paulina. Early-day stockmen apparently named the great volcanic shield the Paulina Mountains "honoring" Chief Paulina. In 1903, I. C. Russell looked over this part of Oregon for the U.S. Geological Survey and attempted to name the Paulina Mountains and lofty Paulina Peak "Mount Newberry" for Dr. John Strong Newberry who, as has been noted, was with the railroad survey party of 1855 as physician, botanist, geologist, and zoologist. Russell's proposal was never accepted in local practice. However, the great caldera, with its two noted lakes, is known as Newberry Crater. The volcanic uplift is still called the Paulina Mountains but, geologically, Newberry Crater is far-better known.

Newberry Crater played a role in the study of Oregon's "moon country" by the astronauts in early 1960's. Dr. Newberry's name was also applied to other geographic features of the area, including the huge flow of dacite lava near the northeast base of the South Sister.

Name Recalls Alpine Tragedy

Between the Middle and South Sisters, in a high alpine saddle, nestle several beautiful lakes. Officially, they are the Chambers Lakes. But, as it was noted in the Eugene Register-Guard in 1962 by Robert Frazier, there are those who will always think of them as Ferry and Cramer Lakes. Cramer and Ferry were names everyone in the state knew in that stormy September of 1927.

The weather over the Labor Day weekend was terrible. Rain poured from low clouds in Eugene and western points. Snow fell in the high Cascades, and strong winds whipped the snow into drifts and sent it eastward in streamers over the Cascades.

That storm, however, did not dampen the alpine spirits of two youths from The Dalles, Guy Ferry and Henry Cramer. At Frog Camp on Labor Day, September 5, they met a forest ranger, Prince Glaze, and reported they had climbed the North Sister. Despite the storm that was gaining headway, the youths told Glaze they were going to climb the South Sister.

They failed to come out of the Cascade storm, and a major search was started on September 8. Foresters, officers, alpinists, and winter sports enthusiasts headed into the hills. Base for the search was at Frog Camp, drenched with cold rain. No trace of the boys was found. On September 10 came the first real clue. E.A. Britton, then of Roseburg, joined a Bend group to climb the Middle Sister to see if the boys were at the top. There, in a summit box which Dean Jonn Straub of the University of Oregon had left on the top of the mountain in 1892, they found a register. The last entry in the book read:

"We left Frog Camp at 11 a.m. and reached the summit at 3:35 p.m. We were up here yesterday in such a blizzard that we could not find the register box. Stormy and cold today."

That was the last word from the youths. The search officially ended on September 13, 1927.

Two years later, on August 25, 1929, a Salem party near the Chambers Lakes came upon a body. Around the skeleton was a belt, bearing on the buckle the initial "H." It was recalled that one of the missing youths was Harry Cramer. A week later, the skeleton was taken to Eugene. Shortly later, Dot Dotson of Eugene found the body of Ferry 63 paces from that of Cramer. It was apparent that the boys, trapped in the mountain blizzard, died from exhaustion and exposure.

Incidentally, two alpine groups still in existence were formed in connection with the search for the two boys in the 1927 storm. One group was the Skyliners of Bend and the other was the Obsidians of Eugene.

There are still some alpinists who believe the basins which now cradle the Chambers Lakes in the high, exposed saddle between the glacier peaks should be known as the Cramer and Ferry Lakes.

Three Fingered Jack

High on the Cascade skyline, equally shared by the Deschutes and the Willamette National Forests, is one of the most picturesque peaks of the crest country. It is Three Fingered Jack, 7,845 feet high. Spectacularly visible from the Metolius River summer home area, the jagged mountain, remnant of a glaciated volcano, has attracted much attention through the years.

Who was the first person to give the peak its name? No one knows, but it is obvious as to why the mountain received its name. The name is descriptive inasmuch as the peak has three main spires. Sometime in the 1870's it was known as Mt. Marion because of the activities of a Marion County road locating party under the leadership of John Minto. He investigated passes over the Cascade range, hopeful of finding a new route into Central Oregon and lands east of the Cascades. The proposed route never became a highway. It yielded in time to Hogg Pass a short distance to the south. In time, Hogg Pass became known as the Santiam Pass. Overlooked by the name makers was Andrew Wiley of Linn County who, with companions, went through Santiam Pass as early as 1859 and beyond the summit, viewed the broad expanse of the Deschutes country in the east and southeast.

Mt. Washington

Astride the Oregon Cascades, Mt. Washington shares its bulk with the Deschutes and Willamette National Forests. In elevation, it is one of the lesser peaks of the Cascade Range, but it is a challenging mountain because of its pinnacled peak. It was not climbed until August 26, 1923. The ascent was made by a group of Bend youths, who also climbed Three Fingered Jack that month.

Geographer L.A. McArthur in his "Oregon Geographic Names" expressed the belief that it presumably got its name because of its proximity to Mt. Jefferson. Who applied the name and when? These questions are unanswered. Of course, it was named for George Washington but was not a mount of the Presidential Range naming of earlier years.

Some early day Central Oregon stockmen, who daily, in clear weather, viewed Mt. Washington on the western skyline, maintained that the glaciated remnant of the ancient volcano presents a profile of the first president. Others gave it a "teton" name because of the nipple-like appearance of the peak from certain angles.

NAMES FOR LAKES

There are hundreds of lakes, of many sizes, in the Deschutes National Forest, and there are many and varied names. Virtually all lakes, including some that are deeply covered with Cascade snow in the winter months, have names.

Few forests of the American west present such a medley of lake names. The names honor men and mules, animals and pioneers, historical events, surveyors, and explorers. Larger bodies of water apparently were the first named. No information exists as to Indian names for the lakes, although a few have been given Indian names.

In the high Cascades, especially the region tributary to the Mink Lake and other basins, numerous small lakes have been assigned names, strange in some instances. It will be recalled that U.S. Forest Service officials gave names to landmarks, especially peaks and buttes, to expedite fire control efforts. In the high Cascades, crews that packed trout into the isolated mountains for the Oregon Game Commission attached names to many small bodies of water, primarily for record purposes--names of the lakes, years in which plantings were made, and type of trout released. In earlier years, prior to drops from low-flying planes, trout were moved into the high country over mountain trails on pack strings.

The strings were composed of mules or horses, and the animals had names. Mountaineers say that when the fish-planting crews, mostly young men from western colleges, used up names of girl friends, they applied the names of their animals to the lakes. Of course there were exceptions, including the Rosary Lakes, in the extreme northwest corner of Klamath County, close to the Cascade summit. The lakes are in a series, somewhat simulating a string of beads. The string of lakes are popular with summer residents of the Odell Lake area.

Largest of the Deschutes National Forest "lakes" was man-made and given an Indian name, Wickiup. It is definitely the forest's biggest lake when it holds capacity storage, approximately 200,000 acre feet. In some seasons, at the end of irrigation, Wickiup loses much of its lake characteristics and at times is marked only by a stream meandering through mudflats.

The name of the big reservoir goes far back of the days when the U.S. Bureau of Reclamation constructed the "lake" to impound water for the North Unit Irrigation District in Jefferson County, nearly 100 miles distant. Originally the basin was known as "Wickiups," named by early day stockmen who grazed their cattle in the area. Wickiups Basin was just south of Crane Prairie. The place obviously was a campground for Indians through the centuries. They gathered there in the fall to hunt and fish. The tribesmen left their wickiup poles standing which gave the place its name. Typically elliptical in form, the wickiup huts apparently were of Algonquian origin and spread west across the plains long ago.

Some wickiups were still standing in the basin when the big reservoir was filled and water was released into the Deschutes River in 1946 to make Madras the "green spot" of the old range country in Jefferson County.

Near the upriver basin is Wickiup Butte, which got its name from the old locality of "wickiups."

One of the most imposing lakes of the Deschutes National Forest is Odell, fed by melting snows on Diamond and Maiden Peaks. The 6-mile long lake occupies a depression scooped out by an ancient Cascade glacier. That glacier piled up a terminal moraine behind which formed the big lake.

The lake was named for an Oregon pioneer, William Holman Odell, farmer, teacher and surveyor. He was associated with the construction of the military wagon road up the Middle Fork of the Willamette River and, in 1871, was named surveyor general for Oregon. His name was applied to the lake by B.J. Pengra in 1865. Pengra and Odell visited what is now known as Odell Butte on July 22, 1865. On July 26, Odell climbed the butte "and discovered a fine lake to the northwest." It was the lake that now bears the name Odell.

Crescent Lake, named because of its shape, is considered one of the most impressive mountain lakes in Oregon and is wholly in the Deschutes National Forest. Its south shore is skirted by the old Oregon Central Military Road. The Southern Pacific's Natron Cutoff line passes a little to the east of the lake, which has a normal elevation of about 4,837 feet. Crescent Lake was named in July 1865 by B.J. Pengra and W.H. Odell, while making a reconnaissance for the military road. Immigrants of the Elliott Cutoff Party passed close to the lake in 1853.

Davis Lake, which straddles the Deschutes-Klamath County line in the southern part of the Deschutes National Forest, has been described as one of Oregon's most important mountain lakes, but there have been dry seasons when it was little more than a "mini-lake," with waterfowl sticking and dying on mudflats one season. Normally, the lake covers about 4 square miles, fed principally by Odell and Moore Creeks. The north end of the lake, in the outlet area, is dammed by a spectacular lava flow which has been pictured in national geology textbooks. The outlet is subterranean for about 4 miles. Prior to the construction of the Wickiup Reservoir, which backs to the lava when full, giant springs issued from the area. The lake was named for an early-day Prineville stockman, "Button Davis." Davis Mountain, just east of the lake, was named for the same man. The new Cascade Lakes Highway skirts the area on its swing south toward Diamond Lake.

Crane Prairie, in the upper Deschutes country, is another man-made lake which impounds storage for irrigation districts. In early days, Crane Prairie was a natural meadow, with several channels cutting across the area. The main stream flowing through that grassy area, with its cow camps, was the Deschutes River. When a dam was constructed at the south end of the old prairie, water backed up and timber, mostly lodgepole pine, was killed. When flooded, the basin covers about 7 square miles. The area got its name because of the occasional appearance in the basin in early days of many cranes. Various birds, including ospreys, still nest in the area.

One of the most important lakes of the high mid-Cascade country west of Bend is Elk, named in 1906 by Ranger Roy Harvey of Eugene. Seasonally, many elk from the western Cascades came over the summit to graze in the area. Northwest of Elk is Sparks Lake, named for "Lige" Sparks, a pioneer Central Oregon Stockman associated with the Black Butte Ranch in early days. This lake has greatly dwindled in size in the past 50 years.

Slightly southeast of Elk Lake is Hosmer Lake, named for the late Paul Hosmer, humorist, author, and editor, who frequently visited the area, known in early days as Mud Lake. Approval of the name change was made by the U.S. Board on Geographic Names in the early 1960's. Hosmer served as editor of the Brooks-Scanlon "Pine Echoes" in Bend for many years and was author of "Now We're Logging."

Most important lake in the north end of the Deschutes National Forest is Suttle, entirely in Jefferson County, just east of the Santiam summit. The lake was named for John Settle, a pioneer of the Lebanon District, and was variously known as Settle's Lake, Suttles Lake, and Suttle Lake. Settle was one of the organizers and directors of the Willamette Valley and Cascade Mountain Military Wagon Road project in 1866. Settle found the lake which now bears his name, in a varied form, while on a hunting trip. Settle also found nearby Blue Lake, of special geologic interest because it apparently formed in a crater, following a volcanic blast that spread rocky bombs over the area. Suttle Lake was formed when glaciers piled up terminal moraines at its outlet.

Names of many of the lakes of the Deschutes country are descriptive. These include Big Lake at the Santiam summit where a costly forest fire, spreading east from the Willamette National Forest, occurred in 1967. Nearby are Round and Square Lakes. Contrasting with Big Lake, there is a Pygmy Lake in the southwestern part of the forest, with a variant spelling, "Pigmy," frequently used.

The first lakes ever viewed by white men visiting Central Oregon were not named by their discoverer, Peter Skene Ogden, and his trappers. Those lakes were East and Paulina. But, Ogden in his journals left a record of his visit to the area on November 15, 1826:

"Raining and blowing. We descended from a height of land (east rim of Newberry Crater) and had the pleasure of finding two lakes. We consider these lakes a godsend. Foot of snow on rim, none at lakes. Morning of November 16: Fine and clear, half an inch of ice on lakes. Reached the River of the Falls on November 16."

The road locators Pengra and Odell named various geographic features of the high Cascades in the Middle Fork and Odell Lake areas. One is Summit Lake, which drains eastward into Crescent Lake. It is very close to the Cascade summit but is wholly in the Deschutes National Forest. It must have been known to early-day emigrants, but apparently a name was not applied until Pengra and Odell described it in an 1865 report. Part of Pengra's early-day report is on file at the Oregon Historical Society in Portland.

Of much interest to motorists driving over the new Cascade Lakes Highway of the upper Deschutes country in the vacation season is a grave in the

Quinn River area. The stream, two lakes, Upper and Lower Quinn, were named for William E. (Billy) Quinn, pioneer stockman of the Grizzly area, Crook County. On a Cascade hunting trip in 1894, he was accidentally shot and died at a camp near where he is buried before a doctor could arrive from Prineville. He was born in the Antelope country, the son of William H. Quinn, a cattleman who sold 4,000 head in Wyoming Territory in 1880. Father and son were partners in sheep raising in later years and organized huge sheep drives from Oregon into Idaho, Wyoming, and Montana. The aged grave is protected by split criss-cross timbers.

Strangely, pioneers did not attach the names of the first whites to make recorded visits to the Deschutes region. They were Ogden and Wyeth, already mentioned. Reason for this is the fact that the pioneers were not in touch with the Ogden and Wyeth expeditions. Trails of the pioneers were traced in later years when records of the Hudson's Bay Company became available.

W A R M S P R I N G S I N D I A N R E S E R V A T I O N

Facing the Deschutes National Forest from the north over a frontage of some 25 miles, partly across the Metolius River, is the Warm Springs Indian Reservation, original size of which was 569,717.82 acres. Over the years, the tribal confederation has worked closely with the Deschutes Forest in fire protective and control work.

The Metolius arm of Lake Billy Chinook, behind the Round Butte Dam, is bordered over part of its distance, from the Fly Creek area upstream several miles, by both the Deschutes National Forest and the Warm Springs Reservation.

The reservation had its official beginning in 1855 when General Joel Palmer, superintendent of Indian Affairs, Oregon Territory, called a council of confederated tribes and various bands residing in Central Oregon. Purpose of the council was to purchase lands for the Indians and, on those lands, establish a reservation. The tract was to be selected for the Indians by the President of the United States. The treaty was drawn up following a 3-day council. The treaty was signed at The Dalles on June 28, 1855.

The Warm Springs Indians remained in their native haunts along the Columbia River until 1858 when they moved to have the reservation set aside for them and described as follows:

"Commencing in the middle of the channel of the Deschutes River opposite the eastern termination of the range of high lands usually known as the Mutton Mountains; thence westerly to the summit of said range, along the divide to its connection with the Cascade Mountains; then to the summit of said mountains; thence southerly to Mt. Jefferson; thence down the main branch of the Deschutes River; heading in this peak to its junction with the Deschutes River and thence down the middle of the channel to the place of beginning."

Obviously this description held little legal significance but closely described boundary lines, in fine print, took care of that. This reservation was held as tribal property until 1896, at which time allotments were made to individual members. A total of 137,046 acres were allotted to 943 Indians; 1,278 acres were set aside for administrative and school purposes; and the remaining 431,392 acres were held as tribal property. Some additional allotments were made later. One of the early superintendents of the reservation was William Logan, who served from June 13, 1861, to November 3, 1865. Transportation and mail were slow, and he decided to visit Washington, D.C., to obtain implements and supplies needed by the Indians. He made the trip to Seattle, Washington, by team. His trip to the Nation's capital was by boat, traveling on the "Jonathan" down the western coast. The return up the coast was on the same boat, which went down, drowning some 400 passengers. Persons lost included Superintendent Jonathan and his wife.

Captain John Smith was named agency superintendent in 1866 by President Andrew Jackson. Under the guidance of Captain Smith, who was at the Agency when the first settlement of the Ochoco Valley was attempted, a sawmill, grist mill, blacksmith shop, stockade, and church were erected at the Agency. Eight boys and seven girls attended that first school, but attendance was poor when hunting was good or certain edible plants were ready for harvest.

Gathered on the Warm Springs Reservation were people from three tribes: the Warm Springs, also known as the Tiahs; the Wascos; and a small group of Paiutes, whose hunters and warriors had long ruled the interior country. The Wascos were described as peace-loving people. The Warm Springs tribes were friends of the whites and frequently joined forces with them in raids against the Paiutes.

Superintendents and tribal leaders serving the Reservation through the years have always looked to their schools as a means of bringing the people out of their long-established tribal ways. Schools were constantly improved.

There have been some who have criticized the Government for the selection of Warm Springs land for the home of the people who once claimed all of Central Oregon. It was held that the lands were rugged, shallow, rocky. But General Palmer, who played an important part in the selection of the lands, said he considered the area the choice of all acreage then available in the area "because of various roots found in such abundance, the well-stocked streams, the deer, and other game, and the fine berries of the mountain sections."

Largely overlooked in early days were the fine stands of timber, mostly ponderosa pine, on the Reservation. This timber, in recent years, has provided the Reservation with a fine industry that has greatly changed the lives of the people.

In the past few years, a new timber complex has taken shape, with logs being milled on the Reservation. Timber is not limited to pine. Fir, spruce, incense cedar, and other varieties are also found in commercial quantities.

Still another enterprise is the Kahneeta Resort development on the Warm Springs River. The resort and recreation area is gaining national attention.

FIRST SETTLERS

Trails of early explorers were growing cold when first settlers arrived in the area to establish ranches and graze cattle and horses in the Deschutes woods south of the curve in the river to be known as Farewell Bend. But, despite lush meadows, abundant water, and plenty of mountain pasture, there was no rush of settlers to the Deschutes River lands directly east of the Three Sisters in pioneer days.

Information about the area was not lacking. Captain Fremont and his men crossed and camped in the Deschutes country upstream from the Bend site of later decades. The Fremont expedition was in 1843. Then came the Williamson survey party, to make camp one night on the Deschutes adjacent to a fine meadow (later the Camp Abbot, and still later the Sunriver area). Horses of the explorers grazed there, on fine lands later to be homesteaded by F.A. Shonquest.

The "lost" Elliott Cutoff Party, seeking a road that presumably had been made for the immigrants, wandered through the upper Deschutes country in 1853, but left few reports of the Deschutes basin and its attractive meadows and streams. The immigrants were headed south, after bumping into the rugged Cascades at the Bend site and determining that the white peaks in the west were not Diamond Peak, their pilot point near the Middle Fork of the Willamette.

Meadows of the upper Deschutes basin, now part of the Deschutes National Forest, were to "rest" for decades before settlers came.

Actually, the tide of immigrants, beginning in 1843, had swept past Central Oregon in two mighty floods. The main stream of westward immigration poured over the Oregon Trail along the Columbia, past The Dalles or, in later years, over the Barlow Pass. Lighter streams moved through southern Oregon. In 1845, the Lost Wagon Train immigrants, who apparently had found and lost the Blue Bucket gold mine, surged into Central Oregon, divided near Prineville, and sent one "splinter" toward the Bend site of the future. In their passage through the Crooked River Valley, the 1845 immigrants noted that broad meadows crowded into the curves of Crooked River, with fine mountain range extending into the Ochoco timber. The immigrants were headed for western Oregon. Some were to return in later years to establish homes along Crooked River and Ochoco Creek, and to set up the foundation for some of the great stockspreads of future years.

But, when the immigrants of the 1840's and 1850's had moved on into the west, the inland region later to be recognized as a fine range country was again quiet, with its trails used only by Indian tribes seeking food or moving north and south between the Klamath Basin and the Columbia River.

One of the reasons the Deschutes basin and adjacent Central Oregon rangelands were not occupied early in the pioneer period was the fact that the government at first strongly discouraged settlement east of the Cascades because of the trouble with Indians. On August 7, 1856, General

John E. Wool, commander of the Department of the Pacific, U.S. Army, issued an order forbidding immigrants to locate east of the Cascades. Colonel Wright considered the Cascades, with their old volcanoes, "a most valuable separation of the races." This no settlement order was revoked on October 31, 1858, by General William S. Harney. Revocation took place when it became apparent that it would be more difficult to keep whites out of the high range and timber country than keep the Indians under control.

Through the early pioneer years, the Cascades were truly a formidable barrier to settlement of the Deschutes country. By that time, the upper Willamette Valley was becoming well settled, and stockmen were already complaining of crowded range conditions. Some yearned for the open range country east of the mountains, but the task of getting supplies and stock over the Cascades from the Eugene and Albany areas presented a problem.

In their crossing of the McKenzie lava fields in 1862,63, Felix and Marion Scott made a bold start in the conquest of the Cascades. A wagon road was crushed into the McKenzie lavas south of the present highway; and over that route the Scotts moved their vehicles, cattle, and horses, touching the Deschutes National Forest first just east of the divide. The task of crushing the lava for wagon wheels and stock took longer than expected, and the Scott party spent that winter on Trout Creek, now in Jefferson County. That has been called Central Oregon's first "settlement," but it could hardly be considered a community. It was little more than a winter camp, with a cabin and a cave for shelter. But stock were grazed in that area over the long winter, giving the Central Oregon stock industry a temporary start. From Trout Creek, the Scott ox-drawn train moved to the gold mines in eastern Oregon.

The Scott trail over the McKenzie divide and down through the Deschutes woods to the Sisters area was marked on maps. It has been proposed that portions of the route in the high McKenzie country be marked as places of historical interest.

First parts of Central Oregon claimed by home seekers were in the Clarno country of the John Day Basin, Antelope on the gold trail to Canyon City, and Mitchell, also on the route to the gold fields. Near the present Mitchell site, Christian W. Meyer and Frank Huat founded a small ranch to provide supplies for persons traveling The Dalles-Canyon City road.

Immigrants with the 1845 train, most of them with farm backgrounds, noted, when passing through the present Prineville country, the fine range country and some vowed to return. Some did, joined by others from Linn, Benton, and other counties west of the Cascades. The first attempt to settle the Ochoco country was in the fall of 1867. In the advance group were five men who spent the winter hewing logs for frontier cabins, only to see their first cabin, that of Wayne Claypool, going up in smoke during an Indian raid. But the raid did not stop the backsweep of migration over the Santiam divide. Land seekers came in increasing numbers to homestead the Ochoco and Crooked River bottom lands and, in later years, to move some of their stock seasonally into the south to graze on Deschutes pastures.

Stockmen moved closer to the Deschutes timber when, in 1878, Andrew Jackson Tetherow and his wife, Sophronia, came to Central Oregon from Polk County and built a home on the edge of the Deschutes River, near the main crossing of the stream on the Santiam route. Tetherow operated a cable ferry at the site. Not until 1885 was a bridge constructed. That bridge in later years was to be used by a number of Central Oregon sheepmen in trailing their flocks to summer range on the Deschutes National Forest and on allotments west of the McKenzie Pass on the Willamette National Forest.

The route of the pioneers moving from the Lebanon, Albany, and Corvallis country east to new ranges in the Prineville country soon became well-worn. Its traces can still be seen in the Fish Lake area and in the Deschutes National Forest on Cache Creek, site of a toll station.

A Corvallis man, Guy W. Jordan, in later years held vivid recollections of the rugged Santiam route. He recalled that his father had erected a cabin at the Cache Creek toll station that stood until it was blown down in a 1961 storm. Jordan wrote:

"It was common in those days for settlers to go to the Willamette Valley from Central Oregon to trade, and especially to get fruit. It was a journey of three and a half days, either by the McKenzie or Santiam routes. My travel from Sisters was over the Santiam Pass, and it was a big day's drive to Fish Lake. The second day we passed such landmarks as Tombstone Prairie, and Seven Mile Hill, with the second night stop either at Mountain House or Upper Soda. Sand Mountain was one of the rough spots... The third day out on our trip west from Sisters, we followed the Santiam River over a dirt road. The third night was spent in the Lebanon area."

Over that route, many of the new settlers east of the Cascades obtained their supplies. Some, however, braved the hazards of the jagged McKenzie lava fields up through the Deschutes Forest to the summit and down into the McKenzie country.

Deschutes Pastures Used

First use of upper Deschutes range country possibly was made by stockmen who moved their herds of cattle over the Cascade divide from the Willamette Valley seasonally. Some of the cattle were moved over the Scott Trail and permitted to graze into the south, east of the Cascade summit. There is a possibility that some of the herds found their way into the lush pasture country later known as Sparks Meadows. Other herds came over the Willamette Pass, from the Eugene country, to graze on Crescent and Odell meadows and browse over the lands along the head of the Deschutes River.

First use of upper Deschutes River meadows to graze stock was made in the early 1870's. Sam and George Connolly apparently were the first to winter cattle on the river upstream from the present Bend site. They trailed their stock over the Cascades from Lane County, then returned

to the Willamette Valley the following year, after deciding Deschutes winters were too severe. The Connolly brothers and other early arrivals found the Simms brothers, trappers, already well established in the upriver country. In three winters of trapping, the brothers "harvested" some \$3,000 worth of furs but lost them, apparently in a fire, en route north to The Dalles.

Ed Sanderson brought in a band of horses to the high country in the Deschutes basin about the time the Simms were there. But the winter was hard. Most of the horses died. The rest were trailed back to Willamette pastures.

One of the real Deschutes pioneers, Joel R. Allen, a Missourian, brought cattle over the Cascades in about 1875, grazed the stock in the Deschutes country that summer, then went back to the valley. But he returned, as did his son, Cortley D. Allen, who filed on an upriver homestead in 1877. It was the first homestead formally filed in the area, when much of Central Oregon was still in Wasco County.

Before the creation of Crook County from Wasco in 1882, the younger Allen made many trips to The Dalles, county seat, to pay taxes and transact other business. He was joined on some of those trips by Lawrence Perry, whose ranch was near that of the Allens, at the "Meadows."

On October 21, 1874, a rangeman filed on a homestead that was within the present city of Bend. Name of the homesteader was not listed, but his General Land Office number, 2896, was. On March 10, 1874, S.S. Splaun believed to be representative of a Crooked River stockman, filed on practically the same land. Three years later, another range man rode into the Deschutes country. He was John Y. Todd, who was to play an important role in the pioneer history of the region. It was Todd who built the first bridge, at the Sherar site downstream, across the Deschutes River in 1860.

Todd came to the Deschutes country in 1877 to look over the range. He liked the region, with its spacious meadows upstream, its abundance of water, and its ideal grazing lands stretching out into open pine forests. Todd purchased the relinquishment of Tom Geer on land near the southern edge of the Bend site, a place that was becoming known as the Farewell Bend Ranch. For the ranch rights, Todd gave Geer \$60 in cash and two saddle horses.

That transaction might be considered not only the founding of Bend but the start of the cattle industry in the Deschutes country. In a major fall roundup in 1877, Todd and his riders gathered some 1,200 head of cattle from the Wapinitia range in Wasco county and leisurely moved them to the south. The cattle were permitted to range widely, but always they were headed for the Deschutes country with its great white mountains on the western skyline. The cattle grazed through the Grandview and Metolius River areas, now a part of the Deschutes National Forest. Eventually, headquarters of the riders was the Farewell Bend Ranch.

But the Todd cattle ranged no farther upstream than the Big Meadows, primarily because Joel Allen was in that area. Already a little range war had developed as the Todd cattle, moving upstream, encroached on the Allen range. Mostly, it was a war of words, an attempted stampede through "spooking" and a lawsuit. Actually, both men were fighting over government range.

Todd, his grip on range between Farewell Bend and Big Meadow secure, built a cabin on the forks of the Big and Little Rivers in the upper Deschutes basin. The old building, long a landmark, later became known as the Dorris cabin. Felix Dorris was Todd's cattle foreman in the Big Meadows district.

Barney Springer and Douglas Strobe brought a herd of cattle over the Cascades from the Willamette Valley in 1879 to get some of the fine range of the upper Deschutes country. Todd eliminated that competition. He bought the cattle. Then he hired Springer to ride for him.

Todd's son, John C. Todd, for many years a member of the Bend Post Office staff, recalled shortly before his death:

"John Y. Todd made quite a place of the old Farewell Bend Ranch. He raised feed for the horses and milk cows, furnished hay for teams and saddle horses, and kept a man on the ranch at all times."

The Farewell Bend ranch, so-called because it was near a Bend in the Deschutes where northbound travelers got their last look at the river before heading out over the "desert" to Prineville, gave the City of Bend its name, through a pioneer post office. It was petitioned that the new post office be known as Farewell Bend. Postal officials dropped the "Farewell" part because a community on Snake River, in eastern Oregon, had already preempted the name "Farewell Bend." In the summer of 1881, John Sisemore, a Kentuckian who had spent most of his youth in the west, unpacked his mule and pitched camp at the Farewell Bend Ranch. Before he left, he purchased Todd's relinquishment and became the new owner of the Farewell Bend Ranch.

Sisemore had been pasturing a herd of cattle in the Fort Klamath area. After buying the Bend ranch, he moved the stock north through the upper Klamath country to the Deschutes woods, assisted by Jack Pelton, Pete Barneburg, and Henry Ward. But Sisemore never reached the Farewell Ranch that season. On the drive, the herd was hit by a near blizzard in the Sun Mountain highlands. Assisted by Indians, Sisemore drove the scattered animals back to Fort Klamath for the winter.

In 1882, Sisemore moved his depleted herd to the Deschutes range. But "free range" was rapidly disappearing. More homeseekers were moving into the upper basin. Some filed on the big meadows. One was F.A. Shonquest, who acquired the fine meadows where the Sunriver development is now taking place. This was the site in World War II of Camp Abbot.

One of the early settlers of the upper Deschutes basin was W.P. Vandever, three of whose sons, all raised on the ranch, became physicians. Eventually, a community, Lava, took shape and a post office was established.

But the long drive between Bend and Silver Lake was still long. Only break between Bend and Lava was at Wet-weather Spring, about halfway between Bend and Lava Butte. There, in winter months, travelers and freighters changed from wagons to sleds to make the trip south through the high country.

Although the upper Deschutes country early lured stockmen, it was a severe area in winter. Abundant hay was harvested from natural meadows, but frequently this was not sufficient to tide cattle through snowy months. In earlier years, most cattlemen moved their herds into the Ochoco country or back over the Cascade divide to western hay and pastures. Some of the hard winters took heavy tolls of cattle and sheep. In the early 1880's, snow fell to a depth of 4 feet over virtually all of Central Oregon, trapping bands of sheep in corrals. Some 200 sheep in one band died on Upper Willow Creek, east of the Madras site of a later day.

Another part of the Deschutes National Forest that early lured ranchers was the Metolius River country. Apparently the first person to settle on the river, which appears to burst in full stream from the western base of Black Butte, was David Warren Allingham, described by old timers as "a short whiskery man known to all as grandpa." There were river-hugging ranches well down the stream, with entry to some through the Fly Creek area.

Also on the fringe of the Deschutes Forest in the Sisters country of the present was Camp Polk, location of a military outpost occupied in the winter of 1865-66, with Captain Charles LaFollette in command. With him were 40 men from Company A, 1st Oregon Volunteer Infantry. They were in Oregon's "Indian Country" in that long winter, but they never fought a battle, nor did the troops go into the desert in any move to capture the renegade chief, Paulina. In 1870, the site of the camp was homesteaded by Samuel M.W. Hinman. He established a store at the site and was the community's first postmaster. In 1888, the post office was moved 3 miles to the southwest and given the name Sisters, from the nearby trio of peaks, the Three Sisters.

Sisters through the years played an important part in Deschutes National Forest history as the location of the Sisters Ranger District and the short-lived Metolius Ranger District. Sisters serves as the gateway to two important roads, the Santiam and the McKenzie.

RANGE WARS -- 1902 to 1906

With the exception of the Todd-Allen skirmish in the Big Meadows area, there were comparatively few conflicts between cattlemen grazing herds in the upper Deschutes country. This was partly the result of homestead entries and acknowledged control of adjacent range. Also, a practice of moving herds into the meadow areas seasonally, and turning them loose to intermingle and graze, was common. The old Crane Prairie meadows were among the favorite areas. Cow Camp in the upriver country was a name symbolic of pioneer days when great herds of cattle grazed over the area now flooded by a big reservoir.

Even before the turn of the century, the upper Deschutes basin was in heavy use in the summer months. Late summer frequently found families from home ranches moving into the high, cool country to camp, fish, and hunt. When storms of approaching winter broke over the not-distant Cascade crest, the herds were moved back to home ranches.

There was some use of the high Cascade ranges west and southwest of the Bend site years before the U.S. Forest Service was organized, but the use was not heavy and there were few conflicts between cattle owners and sheepmen. Frequently, Central Oregon flocks of sheep were moved from the inland region west over the Cascade divide to lush, rain-dampened ranges on the Willamette slopes. Some flocks were trailed over the McKenzie lavas to summit ranges. Others were trailed seasonally over the Santiam divide to the Browder Ridge country and adjacent areas. Sheep peacefully grazed on the present Hoodoo Ski Bowl slopes and nipped lush feed from the shores of Big, Square, and Round Lakes.

But the rangeland peace of the upper Deschutes basin and the Santiam divide did not prevail in other parts of Central Oregon. Early in the century, range trouble flared in the inland country, at times reaching to the pine region that was to be the Deschutes National Forest.

Just east of the Deschutes National Forest of later years, close to the flanks of Pine Mountain and stretching east into the Harney basin, an imposing stock empire, that of Bill Brown and his brothers, took definite shape by the mid 1880's and lasted into the new century. As early as 1885, the Browns owned some 4,000 sheep and erected a cabin near a coveted waterhole near Wagontire Mountain. In that area, over the decades, several fatal shootings took place. In 1885, Bill Brown and Johnny Overstreet met in a blazing battle, and Overstreet died. Brown won acquittal in a trial at Canyon City.

The Browns continued building up their sheep flocks until the winter of 1888-89. That winter was so severe that the Browns emerged with less than 1,000 sheep. Bob and George Brown, two of the brothers, returned to Oregon City. Bill Brown remained to build up one of America's biggest spreads of horses. In World War II, when he sold fine horses to the cavalry, Brown was known as "America's Horse King."

The Brown-Overstreet shootout might be considered the opening phase of the Central Oregon range war, but that was largely a Harney County affair.

Not until 1902 did the costly range trouble flare in the big county. Crook, that spread over much of the interior in early days. The war also reached south into Lake County and was felt across the Ochocos in the Mitchell area.

Events leading up to the outbreak of the range war in Central Oregon had their start many years before the slaughter of sheep started. Early settlers, especially those who made homes in the Ochoco Valley and along the meadowlands of the upper Deschutes River, found that the grassy country and the open forests were well adapted to the raising of cattle, sheep, and horses. Cattle greatly increased in the early 1870's on the reverse sweep of immigration over the Santiam and the McKenzie. It was inevitable that sheep should eventually appear in the same areas claimed by stockmen as their cattle range.

The competition for range and the hatred of cattlemen for sheep increased, with spreads becoming larger. One spread, that of the Hay Creek Ranch, was to become nationally known for its fine sheep.

Some stockmen specialized in cattle, others in sheep. On the open range, cattle and sheep did not mix. Cattlemen charged sheepmen were destroying the range, tramping out native bunchgrass. It was charged that cattle refused to graze on land over which sheep had passed.

Great herds of cattle and many flocks of sheep wintered in the lower country at or near home ranches. As weather and grazing conditions permitted, the animals seasonally were moved into the high country. to the open timberlands and fine meadows. Most of the stock of the Ochoco Valley grazed in the Ochoco timber, and a conflict over grazing areas developed early. Eventually, a "deadline" was established north and northeast of Prineville, across Mill Creek and adjacent streams. These deadlines were posted, and sheepmen virtually were dared to cross into the land claimed by the cattlemen. Most of this was "government land," but the U.S. Forest Service had not yet entered the picture to set aside grazing areas.

The Central Oregon range war gained national prominence near the turn of the century. There was a flare-up even before the end of the old century when cattlemen of the Izee area organized to offset the inroads of sheepmen. The cattlemen formed a group they called the Crook County Sheep Shooting Association. It was that group that set the pattern for the Crook County Sheepshooters Association of later years.

Under a lone pine tree in the Paulina community of eastern Crook County, a group, augmented by a delegation from Grant County, organized a secret group, pledged to kill sheep. The meeting was about 6 miles from the hamlet of Paulina, on Beaver Creek. Should any of the group's members fall in a range battle, it was agreed he was to be taken home--but nothing was to be said about the manner he died. Deadlines were set. It was agreed that sheep found over these lines would be slaughtered and that herders would face possible death.

Deadline trees were marked with "blazes," still visible half a century later when the harvest of pines was started in the Ochoco woods.

One of the most costly slaughters of sheep occurred in the Benjamin Lake area on the High Desert east of the lands that were to be included in the Deschutes National Forest. In July, 1903, Silver Lake stockmen were grazing some 2,700 sheep on greening uplands when masked riders struck. Before the riders left, more than 2,400 sheep lay dead in the sage. The herder was blindfolded prior to the slaughter and left tied to a tree where he was later found.

In February 1904, some 3,000 sheep owned by Guy McKune had been placed in a corral for the night near Silver Lake. In the night, five masked men rode into camp. One man grabbed the herder while the others killed the sheep. In May 1904, more than 2,300 sheep owned by Grube and Parker were killed south of Silver Lake.

The slaughter of sheep also occurred in other communities, but not a single attack on sheep occurred in the present confines of the Deschutes National Forest, although residents of the area were greatly alarmed on one occasion when a rumor spread that a small army of masked men had been seen riding toward the country south of Bend. Apparently it was only a rumor.

The era of range wars in Central Oregon came to an end in 1906 when masked men drove part of a band of 2,300 sheep over a steep cliff. That was in Lake County. Salem investigating officers charged the sheep killers had obtained ammunition from the Silver Lake store. A short time later, the operator of that store, Creed Conn, was found shot to death.

The slaughter in Lake County, not far south of the present Deschutes boundaries, was to end the short era of range wars in Oregon. "Their termination was directly due to the action of forest officials in assigning summer range in the federal reserves," it was noted in "East of the Cascades." Not only was summer range assigned, but boundaries were marked. Up until the time of the creation of the forest reserves, stockmen used the high, timbered ranges seasonally, feeling it was their right to use the federal lands if the stock industry was to continue and prosper. However, the killing of sheep pointed to the need for close supervision of grazing and the allotment of rights on forest ranges.

From the national forester in Washington, D.C., the U.S. Forest Service supervisor in Prineville on April 11, 1906, received a letter outlining provisions that had been made for grazing permit allotments. Then followed a meeting in Canyon City, on November 15, 1906, at which each stockman with prior history of grazing in the Blue Mountains was assigned an allotment, with boundaries shown on maps. Assignments of grazing permits were also effective in the Deschutes woods about the same time.

Prior to the summer grazing seasons, campenders in charge of flocks were provided with the boundary maps.

Stockmen estimated that between 1902 and 1906 in Central Oregon the range wars claimed more than 10,000 sheep. Also, many sheep sheds, including some fine shearing plants, were destroyed by fire. Haystacks were also burned and, in some areas, hay wasted in stacks after owners were cautioned that no sale of hay must be made to sheepmen.

Formed in those grim days was the Crook County Sheepshooters Association, whose leaders and members were never made known. But the association was vocal. Frequent letters were sent to The Oregonian in Portland as "annual reports." These listed the number of sheep killed and the property destroyed.

Statewide and in Salem, a strong resentment against the stock killers developed, and this resentment was made known to federal officials. The range wars, in their grim way, made it easy for the U.S. Forest Service to become an accepted organization in the Central Oregon woods.

DESCHUTES WATER DIVERTED

Deschutes River Utilized

The need for the irrigation of cultivated lands in Central Oregon was seen by pioneers who settled along river basins and creek bottoms. There was plenty of water in adjacent rivers and streams, and the problem of getting that water on lands was not difficult.

First irrigation in the inland country was along the John Day River in the Clarno community, on Bridge Creek near Mitchell, and along stretches of Crooked River, Ochoco Creek, and the Deschutes River.

The efforts of pioneers to water their growing crops were puny compared with those that followed. These later projects not only used the direct flow of rivers and streams, but impounded winter runoff for summer use. The Deschutes and Crooked Rivers were the great providers of water for the reservoirs that were eventually built.

Bend, metropolis of the Deschutes River basin, had its start as an irrigation town. Alexander M. Drake, hearing of irrigation possibilities in a little-known Oregon frontier, the upper Deschutes country, came west in a horse-drawn, covered wagon to look over the situation. He found the present Bend site, then Farewell Bend, ideal for the diversion of the river flow. He parked his wagon near the river bank. He built a mountain lodge on the Bend site, facing the swift-flowing stream.

The site Drake selected for his lodge was close to the point where, in later years, water was to be diverted from the Deschutes to irrigate thousands of dry acres of the Deschutes country.

First actual use of Deschutes water for irrigation in the immediate Bend area was a short canal along the east bank of the stream, a short distance south of the present city. This was the "Dutch John" canal. Then came W.H. Staats, at the south edge of Bend, who dipped water from the Deschutes with a bucket wheel to irrigate a garden. But even before these irrigation efforts, water had been diverted from the Metolius River, a short distance downstream from the present Camp Sherman, to water gardens and small fields.

First irrigation interest in the Deschutes River was the use of the direct flow of the stream. In the present Tumalo community of Deschutes County, the pioneer Columbia Southern Irrigation District farmers tapped the Deschutes south of Bend and moved it in canals to croplands.

Other districts followed and, in time, it became evident that the direct flow of the river would not be sufficient to meet the needs of lands. Two large reservoirs, both in the Deschutes National Forest, were constructed south of Bend. One is in the Crane Prairie Basin, where early-day stockmen grazed their cattle, and the other is at Wickiup, where a 200,000-acre foot lake was created for the North Unit Irrigation District by the U.S. Bureau of Reclamation.

Earlier plans called for the construction of even larger upper Deschutes River reservoirs with sufficient storage to care for more than 300,000 acres in Deschutes, Crook, and Jefferson Counties. First plans called for a reservoir at the Benham Falls site holding as much as 350,000 acre feet. But geologic studies indicated that the basin might not hold water, and the plan for a reservoir at that site was abandoned. The location was shifted to the upriver Wickiup basin site.

The pioneer Tumalo district ran into difficulties when it attempted to obtain storage. With state cooperation, a reservoir was built west of the town of Tumalo in 1914, but it failed to hold water. On completion of the structure, water was diverted into the big basin, but it soon became evident that there was a heavy loss. A study revealed huge cracks in old lava on the east side of the basin. Attempts to seal the cracks failed.

When the Wickiup Reservoir was constructed, a huge crack developed in the basin. Into this gaping underground fissure ran a small river of water. But Bureau of Reclamation engineers, with experience from other areas, soon filled the hole. Upstream at Crane Prairie Reservoir, however, there is a heavy leakage when the reservoir is near full. Storage is now shifted from the Crane Prairie to the Wickiup basin seasonally to conserve the water.

Through the years, reservoir sites studied in the upper Deschutes country included Davis and Crescent Lakes, Big Marsh, Odell, and Waldo Lakes and Gold Lake.

Known to few is the fact that one of the earliest sites considered for a reservoir in the Deschutes National Forest was at Suttle Lake. This project, which called for a dam at the outlet of the lake, was taking final shape when World War I called Americans to arms. Water from that reservoir would have been moved in a long canal into the Grandview country. Interest in construction vanished at the end of the war.

Pioneers even considered tapping East Lake, in Newberry Crater, for water, this to be taken to the High Desert through a rim tunnel and a long canal. The project never got beyond the planning stage.

There was interest in power development on the Deschutes even before impounding dams were constructed in the upriver region. But, with the exception of small power developments at Bend and at the Cline Falls site west of Redmond, dams to generate Deschutes power did not take shape until recent years. Portland General Electric completed its Pelton Dam, west of Madras, in 1958, and its Round Butte hydroelectric projects in 1964. Behind the Pelton power project formed Lake Simtustus, and behind the Round Butte dam Lake Billy Chinook took shape.

Incidentally, man-made lakes on or near the Deschutes National Forest have proved popular with anglers. Recreation development has taken place even on the Metolius River arm of the Round Butte Dam. The Deschutes National Forest took the lead in this development, which includes camping areas and landing sites.

The Deschutes River flow serves five different irrigation districts. They included the Central Oregon Irrigation District, largest of the group; Swalley Irrigation District, with the oldest water rights; Tumalo, Lone Pine, and Arnold.

Bend, with water rights in the middle fork of Tumalo Creek in the Deschutes Forest, impounds its storage in a series of reservoirs on Overturf Butte, Awbrey Heights, and the slopes of Pilot Butte.

Long before Drake, and his wife halted their little covered wagon on the banks of the "River of the Falls," water from the cold Deschutes River was being used to raise crops and gardens.

First diversion of water from the river was in the lower Deschutes country, on the roadside ranch of Andrew Jackson Tetherow, downstream from Redmond of the present. Tetherow established a home on the Deschutes in 1878 near the river edge. There, on a flat in front of the house, land seekers came over the Santiam Pass seasonally, headed for the Crooked River Valley and land beyond.

On their riverside ranch, with canals diverting the direct flow of the river to gardens, Mr. and Mrs. Tetherow grew vegetables used in preparing meals for migrants to the Ochoco. Some traces of the old diversion canals are still visible.

In the Metolius River country, D.W. Heising and others founded ranches in the early 1880's. The earliest rancher there, D.W. Allingham, was to give his name to a well-known home on the Metolius River. He apparently preceded Heising in the use of river water for the watering of crops and gardens.

On the Metolius, giant springs bubbled from the earth to spill into the Metolius River and race north to Lake Billy Chinook.

Irrigation Districts

In the immediate Bend area, the first diversion of water was through what was generally known as the "Dutchmans Canal." A mile or so south of the present townsite, a squatter had laboriously dug a ditch in the rocky slopes to divert water to lands on the Brooks-Scanlon mill site of later years.

Another small irrigation tract in the Bend vicinity was that of W.H. Staats, a pioneer of the area. He had built a home and established a small store east of the Deschutes a short distance below the present Brooks-Scanlon plant and competed with the Farewell Bend operators for trade. That trade was represented by occasional travelers and by stockmen moving their sheep and cattle into the mountains. Staats soon found there was a fine demand for fresh vegetables he grew on his small acreage near the bend in the river. Water was raised from the river through use of a bucket mill. Circling buckets on a big, rotating wheel dipped into the river, carried water to the level of the garden, then dumped the water into irrigation ditches. It was the second garden on record on the upper Deschutes River other than the Tetherow garden downstream.

First irrigation developments, on a district-wide basis, at the fringe of the Deschutes National Forest in the Bend area were those of the Swalley and Three Sisters Irrigation Districts and, later, A.M. Drake's Pilot Butte Development Company. All operated under the new federal Carey Act. Also in the field, competing for Deschutes water, was the Oregon Reclamation Company. West of the Deschutes River in the Bend country, first diversion of water was through the Wimer Canal, named for the George W. Wimer family. The project diverted a part of the flow of Tumalo Creek into a canal. Faint traces of this old canal can still be seen near the forest boundary west of Bend. Succeeding the Three Sisters Irrigation Company, the Columbia Southern came into existence under terms of the Carey Act in 1902, with a 27,000-acre segregation set aside.

It might seem that this pioneer rush for water would call for more flow than supplied by the spring-fed, cold Deschutes. But, not yet tapped was the possibility that a huge amount of winter runoff could be impounded in upriver reservoirs. This eventually occurred and, even as canals were being blasted across the lava terrain to deliver water to fields in old Crook County, plans were taking shape for big dams on U.S. Forest Service lands upstream from Bend.

Around 1920, the Central Oregon Irrigation District built a dam across the Deschutes in the Crane Prairie area, where cattle had long grazed in summer months. Then followed construction of the huge Wickiup Reservoir and the impounding of water from springs of the high Deschutes country for the reclamation of 50,000 acres of land in the Madras country. Water from the upper Deschutes basin spread out over North Unit lands in the Madras area in 1945.

Earlier, the Tumalo Project, finding its state-built dam worthless, sought another storage basin. The district filed for and obtained rights to store water in high Crescent Lake, with the U.S. Bureau of Reclamation cooperating in the project. The federal bureau also built the North Unit project for the settlers and assisted with the renovation of the Crane Prairie dam.

Since water for the projects in Deschutes, Crook, and Jefferson counties is diverted into canals at Bend, it is apparent that virtually all this irrigation water had its origin in the upper Deschutes River and its tributaries within the Deschutes National Forest.

Lava Butte, which long ago spilled a rocky barrier of spongy lava across the Deschutes River at Benham Falls, presents a serious problem for Central Oregon irrigationists. All water stored in big reservoirs of the upper Deschutes basin must pass over Benham and Dillon Falls and through lava rocks. As a result, there is a high loss of water in the area. Means of salvaging some of this loss have been under study for several years. One plan called for the construction of a concrete-walled canal across the lava fields, taking much of the flow out of the river. Sportsmen, interested in the fine fishing of this stretch of the Deschutes with its challenging falls, have objected to the plans.

Objections to diversion of Deschutes water have been voiced in the past, notably in 1905. In that year, an irrigation district revealed a plan to

erect a diversion dam on the Deschutes just south of Bend and turn the flow into a large canal, virtually drying the river at the Bend site. Such diversion of the full flow of the Deschutes would have ruined the village's hopeful mill pond site and the basin in which the beautiful Mirror Pond was to take shape in 1910.

Eventually, all diversion canals tapped the Deschutes near the North City Limits of Bend. Through Bend seasonally rolls not only the natural flow of the clear Deschutes, but water impounded in the upstream reservoirs.

Deschutes flow impounded in the Wickiup Reservoir and released into the main channel during irrigation seasons travels approximately 100 miles to reach the rich farlands of the Madras country.

It has been said that "few rivers have spread so little so far." Much of this water would not be available if the winter runoff were permitted to race through the gorge as natural flow.

All flow of the Deschutes was appropriated years ago. Still active is the Benham Falls reservoir site withdrawal, but the possibility that a man-made lake may take shape there someday, to provide auxiliary storage for existing irrigation districts, appears remote. Such a reservoir would flood upriver developments.

The amount of water stored in the Deschutes Reservoirs varies seasonally. Storage depends primarily on the snowpack, and the runoff from the high Deschutes National Forest. Only when upriver reservoirs are filled or nearly full can irrigationists be assured the normal flow of water for their crops.

But, through the years, there have been few seasons when crops suffered any great damage from short water supplies. The river has been faithful to its ranchers, farmers, and gardeners.

DESCHUTES FOREST CREATED

Early-day ranchers of Central Oregon primarily looked on the vast area of timberlands in the Deschutes, Ochoco, and Fremont country as public domain that made the stock industry possible. Without summer range in the mountains, the industry, it was felt, could not exist. The value of a ranch was largely determined by its availability of free summer range in the cool hills.

Also, timber was available for the established ranchers and homesteaders of the inland region. Under the Timber and Stone Act of 1878, ranchers could purchase 160 acres of nonmineral land at \$2.50 an acre. This act was intended as a help to settlers who needed timber and stone for construction. Some claims were filed, mostly in marginal timber. But generally, few homesteaders went to the trouble of buying 160 acres at \$2.50 an acre. They could find all the stones they needed close to their homes. The timber they required was hauled in as lumber from early-day mills, some on the fringe of the Deschutes.

But near the turn of the century, it became evident that timber claims were gaining in value. Lumbermen in the east became increasingly aware of the great forest of untapped pine in the region--along the Deschutes, on upper Crooked River, south of Silver Lake, and in other areas. Around 1904, there was renewed interest in the Timber and Stone Act. Much of this interest was by persons who did not have homesteads to improve. Under federal law, applicants for timber and stone claims greatly increased, although applicants were required to pledge they would not transfer title to the 160 acres they could get at \$2.50 an acre. This small print was overlooked. "Entrymen" came from the east by trainloads, generally their way paid by persons seeking big stands of timber in the inland pine country. The entrymen filed on claims and frequently transferred the title to others.

Growing out of this procedure were the Oregon land fraud cases that attracted national attention. The rush for timber ended in 1905 when the previously created "forest reserves" were placed under the administration of the Department of Agriculture.

However, the story of the withdrawals of huge stands of public domain dates to September 28, 1893, when President Grover Cleveland set aside the area now included in the Deschutes National Forest. It was known as the Cascade Range Forest Reserve and included the area west of the Deschutes River and between Jefferson Creek on the north and Cottonwood Creek on the south, not far from Crater Lake.

The balance of the original forest land now in the Deschutes Forest, east of the Deschutes River and in the area now known as the Fort Rock District, was withdrawn by President Theodore Roosevelt on July 31, 1903. Some of the original land was later released. The largest parcels were near Fort Rock, in January 1905, and near La Pine, on March 12, 1914.

The Deschutes National Forest was created on July 1, 1908, and included the area east of the Deschutes River (then in the Fremont National Forest), and the present Ochoco National Forest. Headquarters were in Prineville, with A.S. Ireland as the first supervisor. It was natural that Prineville was to serve as headquarters. There was much stock activity in the area. There were many big stock spreads, some dating to the early 1870's. And the costly range wars, which largely centered around the Ochoco country, had only recently ended.

At the time the Deschutes National Forest was created, the area west of the Deschutes River was divided into three forests. That portion north of the McKenzie Road, approximating the present McKenzie Highway, was the Oregon National Forest, with headquarters in Portland under Supervisor T.H. Sherrard. The area between the McKenzie Road and Crescent Creek (then considered the Deschutes River) was in the Cascade National Forest with headquarters in Eugene. Claude Seits was supervisor. The area between Crescent Creek and Cottonwood Creek was placed in the Umpqua National Forest. Headquarters were in Roseburg, with S.C. Bartrum as supervisor.

But the original boundaries of the Deschutes National Forest, which swept east to encompass the Ochoco woods, did not remain unchanged very long. Only 3 years elapsed before President Howard Taft on June 30, 1911, signed a proclamation changing the boundary on the south to the Deschutes-Klamath-Lake line (then the Crook-Klamath-Lake line) and extending the western boundary to the summit of the Cascades and north to Jefferson Creek. This absorbed the Oregon and Cascades Forests east of the Cascades.

In this major change of 1911, the Ochoco was separated from the Deschutes, with Bend as Deschutes headquarters and Prineville as headquarters for the Ochoco.

The area south of the Deschutes-Klamath-Lake line, including the area then in the Umpqua Forest, was formed into the Paulina National Forest. Headquarters were at Crescent, with W.W. Cryder the first and only supervisor.

The boundary of the Deschutes remained unchanged until, with the official proclamation of July 19, 1915, the short-lived Paulina Forest was dissolved and divided between the Deschutes and Fremont Forests. Actually, the transfer of districts from the Paulina Forest took place in 1914, a year before the official proclamation. By transfer of the area, the southern boundary of the Deschutes National Forest was extended to a location south of the Deschutes-Klamath-Lake line. The boundary of the Deschutes thus established remained unchanged until a proclamation by President Franklin D. Roosevelt on December 5, 1938, set up lines that were to remain until the Winema National Forest was created. There have also been some Deschutes boundary changes resulting from land acquisition and cutover land exchanges. The largest land exchange, in later decades, was with The Shevlin-Hixon Company and involved 89,760 acres.

Ireland was Deschutes supervisor from 1908 until 1911, when the Ochoco was eliminated from the Deschutes. At the time of the elimination of the Ochoco area from the Deschutes Forest and the addition of the Cascade and Oregon National Forest areas to the west and north, headquarters were established in Bend, on July 1, 1911, the year in which Bend was connected with the outside world by rail.

First supervisor of the Deschutes following the separation from the Ochoco was J. Roy Harvey. He had been transferred to the position from deputy supervisor of the Cascade Forest in Eugene. The Deschutes headquarters in Bend were set up in a small wooden building that housed The Bend Company, Bend Abstract Company, and The Bulletin. The forest offices were upstairs.

Twelve supervisors and one acting supervisor have served the Deschutes National Forest from the Bend headquarters. They follow:

1911, J. Roy Harvey, transferred to Bend from Cascade Forest in Eugene.

1912, M.L. Merritt, who later became regional chief of operations.

1916, W.G. Hastings, with Vernon Harpham serving for a year as acting supervisor. Hastings resigned in 1917 to become chief forester in Vermont.

1917, Norman G. Jacobson, who served until August 16, 1920, when he resigned to go lava bear hunting with Irvin S. Cobb.

1920, Herbert L. Plumb, who served until 1926, when he was transferred to the Olympic National Forest.

1926, R.L. Fromme, who served until fall of 1929. W.O. Harriman, later to serve as supervisor on the Fremont and Ochoco National Forests, was acting supervisor until March 1930.

1930, Carl B. Neal, appointed supervisor in March and served until 1937.

1937, T.H. Burgess, who served 2 1/2 years.

1939, Ralph W. Crawford, who transferred to Flagstaff, Arizona, and later to Prescott, Arizona, in 1956.

1956, James A. Egan, who was named supervisor in June 1956 to succeed Crawford. Supervisor Egan, who launched the move to develop the Bachelor Butte ski area, died in office on March 18, 1958.

1958, Ashley A. Poust, named supervisor on April 14 to fill the vacancy created by death of Mr. Egan.

1969, Earl E. Nichols, named to succeed A.A. Poust, transferred to Regional Office.

Ranger Districts

Five U.S. Forest Service ranger districts were set up when the Deschutes was organized in 1908. Actually, some of the station sites were organized well in advance of 1908 and were in operation when the Forest was part of the segment operated out of Prineville. Some of the Deschutes districts operated under the old Cascade North National Forest.

The five original districts were the Metolius, with headquarters at Allingham; Sisters, with a station on Squaw Creek southwest of Sisters; Big River, with headquarters at the Big River Ranger Station on the site of the General Patch Bridge of later years; La Pine, based at the Rosland Ranger Station about 2 miles north of La Pine; and the Pine Mountain Ranger District, with headquarters at Antelope Springs.

Perry A. South, who received his appointment as forest guard in 1906 and assistant Ranger on the Cascade North National Forest on November 26, 1907, was the first ranger in charge of the Metolius District. Later, he replaced Ranger Earl Austin at Crescent in the years that District was in the Paulina Forest. The Metolius District was combined with the Sisters District shortly before South's transfer to the Crescent. South was the first and last ranger on the District until the Sisters and Metolius units were reformed in later years; then, in the early 1960's, recombined into a single District, the Sisters.

First Ranger of the Sisters District, in 1909, when it was in the Cascade Forest, was M. Thurman Cannon, who was replaced by John B. Curl, who served until July 1911, when he was transferred to the La Pine District. Curl's place at Squaw Creek was taken by H.E. Vincent, who served as Ranger of the combined Sisters-Metolius units in 1918. In that year, Perry South came back to Sisters from Crescent, to replace Vincent, and remained as Ranger there until 1936, except for 2 years in the Supervisor's Office in charge of grazing. During that period, Kenneth McReynolds was Sisters Ranger. South was transferred to the Bly District on the Fremont in 1936. Other early-day Rangers at Sisters were John Sarginson, Lawrence Chapman, Harold Nyberg, and Harold Gustafson.

Marion Hurd was first Ranger at the Big River station in 1910, when he was replaced by John Riis, Ranger until his place was taken by B.E. Oney on September 12, 1913. Oney was Ranger at the Big River station when the District was combined with the La Pine District.

Dennis Mathes was first Ranger at the La Pine District in 1908 when headquarters of the District were in Prineville. He was replaced by Ed H. Mahn, who served as La Pine Ranger until May 1, 1911, when he transferred to the Davis Lake District on the Paulina Forest. John B. Curl served until 1914. Then, in 1914, came Burton Oney, who served until 1922, when he was replaced by J. Roy Mitchell in 1925. Mitchell's successor was R.C. Burgess, who remained as La Pine District Ranger until 1933 when the District name was changed to the Bend District, with headquarters in Bend.

Harold E. Smith was the first ranger on the Pine Mountain District. He was detailed to the Columbia and Siuslaw Forests in 1912 and 1913, and the District was handled out of Bend until the Pine Mountain unit was combined with the Fort Rock district in 1919.

With the addition of part of the Paulina Forest to the Deschutes in 1914, three Ranger Districts came with it, making a total of seven Districts in the Deschutes Forest. The three new Districts were the Fort Rock, the Crescent, and the Davis Lake. J. Roy Harvey was the first Ranger in the Crescent area in 1907. One of the early-day Crescent Rangers was C.H. Overbay, named to the post on July 1, 1930. He later served in the Bend headquarters office in charge of timber management operations. Overbay was transferred to the Bend District in 1933, and his place at Crescent was taken by R.C. Burgess.

E.H. Mahn was Ranger at Davis Lake in 1911, having transferred from La Pine. He served as Ranger until 1917 when the Davis Lake District was divided, with part going to the La Pine and part to the Crescent Districts.

First Ranger of the Fort Rock District was Hubert E. Derrick, named in 1909 when forest headquarters were in Prineville. However, when the area was transferred to the Paulina Forest in 1911, the District was apparently not reestablished until 1914, when W.O. Harriman was assigned there as first Ranger. Harriman was transferred to Bend as assistant supervisor in 1920, and J. Roy Mitchell took his place at Fort Rock, serving until 1922. Other Fort Rock Rangers through the years were Harold E. Smith, when the Pine Mountain District was combined with the Fort Rock; J. Roy Mitchell, 1920-1922; Ben Smith, 1922-1929; Frank Folsom, 1929-1930, Fenton Whitney, 1934-34; Henry Tonseth, 1934-1968; Henry McCormick, 1968---

Tonseth served as Fort Rock Ranger just short of 35 years, establishing what is believed to be a Regional Ranger record. On his retirement in 1968, he was guest of honor at a dinner in Bend attended by more than 200 persons.

In early days, the Forest Service established a fire lookout on the high rim of Fort Rock, overlooking the Paulinas from the south.

"Use Book" Quoted

Rangers who watched over Central Oregon woods even prior to the creation of the Deschutes National Forest on July 1, 1908, had many exacting duties. These were carefully outlined in "The Use Book," prepared by the U.S. Department of Agriculture. A section of that pocket-filling book was devoted to the duties of Rangers. The little book noted:

"A ranger of any grade must be thoroughly sound and able-bodied. capable of enduring hardships and of performing severe labor under trying conditions. He must be able to take care of himself and his horses in regions remote from settlements and supplies. He must be able to build trails and cabins, ride, pack, and deal tactfully with all classes of people. He must know something about land surveying, estimating and scaling timber, logging, land laws, mining, and the livestock business."

Where saddle horses or pack horses were necessary in the performance of their duty, Rangers were required to own and maintain them. On some of the early Deschutes Districts, Rangers lived in house tents. Next came a barn for horses, and finally a house was built. Apparently Ranger A. R. Davis had few accommodations at Antelope Springs, serving the short-time Pine Mountain Ranger Station. Davis was sent there because of the land rush to the High Desert and the demand by early settlers for forest commodities to be used on farms taking shape in the sagebrush. Davis moved into the area in 1911, before a station had been set up at Antelope Springs. He was accompanied by his wife.

The pay of that early-day Ranger was \$900 a year. In addition to his horse, Davis had to provide a pack animal. The Forest Service provided the cabin, eventually, and fuel.

Old timers recall some of those cabins of early-day Rangers. Manner in which the cabins were to be built was outlined in specifications. Actually, walls of the cabins, even those on the wintry edges of the High Desert, were thin. The roof was heavy--so heavy that, at times, the cabin sides bulged under the weight. Cabins had an open lobby center. There was a small kitchen and a "living room."

On some Forests, men applying for Ranger positions were cautioned they must be experts in some fields, which varied with the economy of the different areas. Men moving into Deschutes National Forest ranger posts generally were well acquainted with the stock industry for, in the summer months, they were called on to deal with stockmen, both sheep owners and cattlemen.

Ranger examinations were along practical lines, and actual demonstrations, by performance. "Invalids seeking light out-of-door employment need not apply," it was stressed. "Experience, not book education, is sought," was another admonition. It was noted that "ability to make simple maps and write intelligent reports upon ordinary forest business is essential." The rule book said "the entire time of Rangers must be given to the Service. Engagement in any other occupation or employment is not permitted." Rangers were to execute work of the National Forest under the direction of a supervisor. Duties of Rangers included patrols to prevent fires and trespass; estimating, surveying and marking timber; supervision of cuttings; and similar work.

Rangers were to issue minor permits, build cabins and trails, oversee grazing business, investigate claims, report on applications, and make arrests for violations of forest laws and regulations. Frequently, Rangers were called on to serve as assistants to the Supervisor. Each Ranger or his deputy was assigned to a definite District. Many of the rules outlined in "The Use Book" of more than half a century ago are still effective.

Annual Ranger meetings were required, "in order to give the Rangers the benefit of each other's experience, to keep them in touch with the entire work of the Forest, and to promote esprit de corps." Time and place of these annual meetings were left to the discretion of the Supervisor.

Forest guards were listed as temporary employees "whose duties are the same as those of assistant forest rangers." Frequently, there were to be special studies of the federal forests, and the Bureau of Entomology was to be called on to prevent and control insect ravages. The "Use Book" added:

"To sum up, National Forests will be studied with reference to their best use for every purpose. These studies will not be limited to the present application for the use of Forests. They will aim to develop wider uses, as well as to meet the present demand in the most satisfactory way."

That was half a century before the Multiple Use Program became a well-known guide for the administration of National Forests.

Sites for Ranger Stations in the Deschutes woods were largely dictated by available forage for horses and occasionally mules. Some sites were never occupied. One was just north of Bend on the west side of the river opposite Sawyer State Park. When the Deschutes headquarters and the Bend and Fort Rock District Offices eventually were moved to Bend, few horses were in use. As roads were extended to all parts of the forest and automobiles came into general use, the last of the Ranger District horses disappeared.

All four Ranger Districts on the Deschutes are now in towns--two, the Fort Rock and Bend in Bend; one in Sisters; and one in Crescent. Oldest building on the Deschutes Forest, although worked over many times for many years, is the Allingham Guard Station on the Metolius River. The site was first squatted by Bob Pyett, who built a log cabin and fenced in a small enclosure in the 1880's. In 1888, he traded his improvements to D.W. Allingham for two horses. Allingham filed a homestead right and proved up as soon as possible. He lived in the log cabin until 1890. Rough lumber from a small mill on the Graham Ranch was used in constructing a new building, occupied by Allingham in 1890. The Allinghams lived on the ranch until 1900, producing hay for cattle and sheep, which during the summer were pastured in the Jefferson Park area. Ground was irrigated from Lake Creek through the Allingham Ditch, which dates back to 1888. In 1900, the Allinghams sold to a Mr. Alley, who, in turn, reconveyed the title of the land to the Government. Occupied by Ranger Perry A. South, the old house was the first Sisters Ranger Station in about 1906.

The site of the Sisters Ranger Station on Squaw Creek was selected in 1908, and the small, single box constructed house and barn were built on the north bank of the creek, southwest of Sisters, in 1909, when the area was in the Cascade National Forest. This District was abandoned in 1918 and headquarters were moved to offices in the George Aitken store in Sisters. The office and most of the property were destroyed by fire in 1923.

Site for the Big River Ranger Station was selected in 1907 when the area was in the Cascade Forest, and value of the building was set at \$375. This station was abandoned in 1917, and headquarters were moved to La Pine. The site for the Long Prairie Ranger station was picked in 1908, when the area was in the Fremont Forest. The house and barn were built in 1909. This station had a short existence. It was moved to Rosland.

The Long Prairie Station is of historical interest because it was under the administration of five different National Forests and Supervisors. The site, as noted above, was selected when the area was in the Fremont. It was, in turn, transferred to Cascade South (Umpqua), with headquarters at Roseburg. Then, the station was for a time in the original Deschutes Forest, with headquarters in Prineville, and later in the Paulina Forest, with headquarters in Crescent. Last move of the station was into the Deschutes, with headquarters in Bend.

The Odell Ranger Station site was withdrawn in 1907, when the area was in the Umpqua; but the house and barn were not built until 1911, when the District was transferred to the Deschutes. The Crescent site was acquired and the office was built in 1911. When the Odell station was abandoned as a summer guard station in 1926, the dwelling was dismantled and moved to Crescent for use as a Rangers' residence. The residence was first started on the west side of the highway, but the Great Northern Railroad had plans to build its tracks there. So, 12 men picked up the partly constructed building and moved it to the east side of the road.

The Fort Rock station was first located in a small house rented by Ranger W.O. Harriman. Later Harriman rented an old stage station for use as District headquarters. In 1921, the station was moved to Cabin Lake where a deep well had been drilled in 1916. The story of the short-lived Pine Mountain station has already been mentioned. The Davis Lake Ranger Station site was withdrawn in 1907, but the house and barn were not built until 1911.

Several other station sites were selected and withdrawn in 1907 and 1908 but never developed. Some of these were Swampy Lakes, Aspen, Deschutes (later named Swamp) at the end of the road at upper end of Big Marsh, Last Chance near Stage Station, and Willow. Sand Springs was also withdrawn as an administrative site in 1910.

The first lookout on the Deschutes National Forest was the one Harvey Vincent built on top of 6,415 foot high Black Butte, overlooking the eastern Cascades, Metolius River, and Sisters area. Vincent built that house of logs that were crooked and irregular. He called it a squirrel cage because of its appearance. The present structure on Black Butte dates to later years. The first lookout houses on Walker Mountain and Paulina Peak were built a short time later by Deputy Supervisor Vernon Harpham of the Deschutes.

Harvey and Ed Mahn in 1912 constructed a lookout on Maiden Peak, 7,811 feet high. From the high peak, the lookout could see smoke from the brickyard just west of the village of Bend.

Telephone Lines

The first telephone line on the Deschutes National Forest was built prior to 1912 of No. 12 hard-drawn steel wire which was tied to solid insulators. The wire broke easily, and the line was almost always out of order.

Many more lines were strung up during the years 1913 to 1915. This work was done almost entirely with ranger labor, and there was evidence that not too much engineering was used. Many miles of lines were often switched together, making talking difficult. However, by late 1915, the Supervisor in Bend could talk to any ranger at will, and rangers in turn could talk to most of their guards. Lines were later rerouted or rebuilt, but the Deschutes was already in the telephone age by 1916.

In 1914, the Fort Rock Valley was almost entirely occupied by homesteaders who had cabins and fences. These settlers combed the woods for pitch pine posts to string fences across the broad valley and up to the edge of the timber. Ranger Harriman used some No. 12 wire and connected up these fence wires into a telephone line between Fort Rock and Paulina Lake, with the line connecting at Cabin Lake. This line was rebuilt by Ranger Harriman and Roy Mitchell in the fall of 1917. The Paulina Lake line east from East Lake was built by Ranger Curl and a small crew in 1913.

The communications "explosion" was rather slow in coming to the Deschutes, although "wireless" voices were audible on crystal sets in the early 1920's. There were some attempts to use heliographs in early years, with tests made from Paulina Peak and Black Butte.

Two-way radios were in general use on the Deschutes even before World War II. The big communications explosion came in the early 1960's when virtually all parts of the Forest could be reached by radio, or through radio relays. This same decade found communication extended to automobiles and trucks, virtually tying in the entire Forest staff for call in emergencies.

The 1960's also found the value of lookouts on high peaks dwindling. Replacing most lookouts on the Forest were patrol planes operating mostly out of Bend.

INCIDENTS ON NEW FOREST

Recreation and Special Uses

Rangers early in the history of the Deschutes Forest were called on to assist with recreation matters and also to grant permits for special uses. Recreation use greatly increased with the coming of cars and the opening and signing of roads. In earlier years, rangers seldom saw visitors, other than hunters, anglers, and, in the late summer, families of ranchers who moved into the high, green country, mostly on wagons, to set up vacation camps, or join in berry picking.

But even in the era of poor roads, there was quite a bit of recreation travel. Forest officers tried to assist in every manner possible, suggesting camping sites, noting reports of good fishing, and telling of the movement of deer herds. Eventually, maps were prepared and distributed.

"All of this brought good will and was a very material factor in dissipating the early bitterness," an early-day Forest Service report mentioned. The bitterness had its origin in the era of open range country, restrictions on use of Government land, and the imposition of bag limits. However, there was little recreation development in early days. Actually, there was little real need for such development in a land still near its virgin state. The first simple facilities, such as tables, were placed at selected camp sites in the early 1920's.

No large scale development of recreation area was undertaken until the CCC program came in 1933.

Special use permits were not common in the early days, but a few were issued. One of the earliest was for a pasture of 100 acres to S.S. Stearns of Prineville in 1907. This included an area now in the Wickiup Reservoir. Another early special use permit was for the original survey of the Oregon Trunk Railroad through Townships 24, 25, 26, and 27 South. This was issued in 1910 when the Oregon Trunk was building up the Deschutes gorge to Bend, reached on October 5, 1911. However, the Oregon Trunk did not continue south at that time.

Another early permit was for the Oregon State Game Commission to establish a fish hatchery on Odell Creek in 1913. A permit for the Black Butte School House, a log building, was issued in 1919.

The first summer homes in the Deschutes Forest and believed to be the first in Region 6 were established on the west side of the Metolius River opposite the present Camp Sherman Store. The summer homes were established by a group of Sherman County wheat ranchers in 1916. The ranchers named the area "Camp Sherman," for their home county. Two of the original permittees were O.L. Belshe and William Hendricks. The Belshe family permit was the oldest in the Deschutes Forest. The Camp Sherman summer home tract survey was not made until 1921, 5 years after the first homes were established. This work preceded the first Forest Recreation Plan made in 1926.

The House Case

One of the duties of early-day rangers was to protect the new federal forests from trespass. Deschutes rangers had a few problems, notably that covered by "The House Case at Davis Lake."

A land seeker only known as "Mr. House" applied for a claim on the shores of Davis Lake. The application was rejected, appealed, and again rejected. But, despite the rejection, House moved onto the claim and built a fairly nice house of logs. Steps were taken to eject him, and a short time later the tract was added to the Deschutes National Forest. Soon, a U.S. Marshall arrived and took House to Portland to a federal court. House, however, managed to gain the ear of Senator Lane, who apparently told House to go back to his forest farm and stay there. House returned, and the U.S. Attorney dropped the case.

Next move by House was to refuse to let the L.L. Jones sheep pass along the lakeshore in front of his residence. He told Jones to backtrack through the lodgepole. This road had long been a stock driveway, as well as a pioneer wagon road. Supervisor Merritt at Bend and Ranger Ed Mahn visited the House ranch, looked over the situation; then, on advice from Portland went to the Klamath District Attorney, to seek redress. The District Attorney told the foresters that, if House were in trespass, they should take action to stop the trespass before coming to him. Merritt returned, apparently defeated. Jones made another try to get his sheep across the meadow, determined to disregard House entirely. But House was in the road with a rifle, valiantly backed by his wife. So, Sheepman Jones retreated and sent for Ranger Mahn, who arrived from his nearby station and argued with House relative to the passage of the sheep. Here, House made a mistake; he and his wife attacked the federal ranger. Mahn kept away from Mrs. House but gave House a real licking.

The sheep passed by, and the next morning House hitched his one horse to a wagon, loaded his household goods, put his wife on the seat beside him, and headed for parts unknown. That ended the House Case.

But there was another "Incident" at Crane Prairie.

One summer during the reign of Supervisor Hastings as Deschutes Supervisor, the Crane Prairie Ranger was amazed to find a small caravan of several families settling at Crane Prairie. They had traveled from some far place with horses, wagons, household equipment, dogs, chickens, and a cow or two, prepared to build their home on the green prairie. They were already cutting timber and clearing land when Supervisor Hastings hurried to the area, to see what was happening. District Forester George Cecil in Portland was notified. He turned the matter over to C.J. Buck, in charge of land. Forest officials were very apprehensive. The Homestead Era and the rush for lands were still in progress. It appeared that land seekers were about to crowd into the heart of the forest. A law clerk, Frank Law, hurried to Bend from Portland to assist Merritt.

The dignified law clerk, tall, impressive, with a fine command of words, appeared before the U.S. Commissioner in Bend, demanding that action be taken. It developed that the commissioner apparently had advised the land

seekers they could settle on Crane Prairie. Eventually, the Commissioner called on the settlers, explained they were in a horrible position before the law, and advised them to move on. The commissioner's panic apparently was transmitted to the land seekers, and they wanted to know how they could escape. The commissioner told them they should go back, pile up brush from trees they had cut, and leave immediately. They did.

Windy Point "Gold Strike"

The Deschutes National Forest in earlier years had its "gold problems," as well as those dealing with trespass. Consider the Windy Point "gold strike" in mid-September 1927, just east of the McKenzie Pass lavas. The wild quest for gold there, as cool autumn winds swept over the McKenzie lavas, attracted national attention.

Foresters of the Sisters District were greatly concerned with the reported strike, and the wild rush of prospectors to the high country.

Winter came early to the high Cascades that season. Cold, torrential rains a week or so earlier had washed the black McKenzie lavas. The storm dropped heavy snow on the Three Sisters. It was the storm which, over Labor Day that fall, had taken the lives of two youths from The Dalles.

As quickly as it came, the storm ceased, to be followed by cool but fair weather. Then followed news of the strangest "gold strike" ever reported in the State. It was strange because gold reportedly was being obtained from old lavas of the area, especially the andesites.

"Gold has been discovered at Windy Point"--this was the word that spread over the northwest and into Nevada, to lure some of the prospectors lured there by news of a big strike at Weepah.

Hundreds flocked into the high, timbered country west of Sisters. Mining claim notices, generally in tin cans placed in rocky mounds, were placed even into the McKenzie lavas on the Willamette side of the pass. In a few days, more than 500 claims were filed.

But there were some in Bend who doubted that McKenzie lavas were yielding gold. Paul Hosmer, author of "Now We're Logging," was one of the doubters. An assay plant had been set up near the heart of the "strike" at Windy Point. Two of the Bend doubters, Hosmer and Joe Hixon, broke some rock in a quarry at the north city limits of Bend, turned the samples into the assay office, and got the verdict they expected: "The samples are gold laden."

Not only were prospectors at Windy Point cheered by similar reports, but they were shown flaky gold reported obtained in the assay. But Hosmer and Hixon still doubted; they took samples identical with those obtained from the Bend quarry to the Department of Geology at Oregon State College. The samples were "brother pieces" of rocks the Windy Point assayer said yielded a return of from \$75 to \$80 a ton. Hosmer and Hixon also had bits of gold returned to them from their Windy Point assay. The gold was smooth,

bright, and glittering. But it wasn't of the type that could be extracted in the assay process. It became apparent that the assays were returning "salted gold."

Quickly, the Windy Point "gold strike" bubble burst. Overnight the assay office was abandoned. Tired gold seekers returned from the high McKenzie hills as a new storm gathered over the Sisters.

Gold Found Near Broken Top

There was also an earlier gold strike in the Deschutes National Forest, but it caused early-day foresters little trouble in supervising the activity. It was in the Broken Top area and mystifies geologists even to this day. There shouldn't be gold in that volcanic area, over which the Broken Top Mountain spread lavas long ago.

But it was definitely ascertained that gold had been found there.

News of the Broken Top gold strike raced through the village of Bend on August 8, 1911, just prior to Railroad Day, when the first Oregon Trunk train reached Bend through the Deschutes Gorge gateway. Bend was virtually deserted by that evening, as scores went into the hills to place location claims.

Heading the group that had quietly staked claims before the news was released were E.A. Sather, N.P. Smith, U.C. Coe (first mayor of Bend), John Steidl, and Thomas Tweet.

The gold-bearing ore was reported found a short distance south and west of headgates of the early-day Columbia Southern ditch. Assays revealed that gold content of the rock was low.

When it was determined that the gold content of the quartz would not pay for the cost of mining, interest in the area died.

Cy J. Bingham, Ranger

No history of the area now in the Deschutes National Forest would be complete if it did not record the story of Cy J. Bingham, first ranger to serve on any of the various forests that reached from the mid-Cascade summits to the High Desert of Central Oregon.

A native of Big Beaver, Michigan, Cy Bingham came west at the age of 20 and worked on stock ranches in eastern Washington. He remained on ranches until 1897, when he was married to Connie Bogan of Antone, Washington, and later engaged in placer mining in northern Idaho. From Pierce City, Idaho, he moved to the Mt. Reuben Mining District of Southern Oregon and became a quartz mill operator. In 1900, he took charge of 10 stamp mills in the Bohemia Mining District.

But, early day camp life and the open spaces were not forgotten, and he yearned to return to them. In May 1903, he received an appointment with the

U.S. Forest Service and left Bohemia for the chain of lakes on the Cascade Range, between Crater Lake and the McKenzie Highway. On that lonely mountain assignment, he was accompanied by his wife.

Boundaries of Bingham's district in the summit country are unknown. His scribing on trees can still be found throughout the vast area he patrolled. One inscription is on a tree at the head of Quinn Creek. It reads: "C.J. Bingham, F.R., June 15, 1904." The top log over the door of a cabin Bingham erected at Crescent Lake also bore an inscription. This has been salvaged and will be on display at the Deschutes Historical Museum in Bend.

Old timers recall that Bingham was a poet, as well as a woodsman and ranger. Bill Brock of Crescent, years ago, produced a poem written by Bingham. It read:

"In this grand state in which we dwell,
There is a place called Lake Odell;
No prettier lake was ever seen,
but the hunters killed the spotted fawn,
and speared the dollys as they spawned."

Bingham held the position of ranger until 1907. In those years, his assistant in the upper Deschutes country was the late W.P. Vandever, who frequently joined forces with Bingham to fight forest fires in the vast area reaching from Crater Lake north to the Mt. Jefferson country. Vandever, years later, related how the appearance of roaring fires in the eastern Cascades did not greatly alarm the two men. They looked over the situation from a distance, tried to get some help from the few ranchers in the area, packed their horses, and leisurely headed for the distant fire.

"Generally by the time we neared the fires, fall rains came and the fires went out," Vandever once remarked.

In November 1907, Bingham was named Forest Supervisor with orders to establish headquarters at John Day in Grant County. He was to take charge of a newly created forest in Grant, Harney, Baker, and Malheur Counties in the Blue Mountains. He held that position for 13 years.

Bingham resigned in 1920 and was elected sheriff of Grant County, a position he held for 3 4-year terms. Eventually he moved to southern California in 1935, locating in Pomona.

A memorial dedicated to Cyrus James Bingham, "mountain man of the high Cascades," was dedicated near Crescent on Sunday, September 10, 1967. The memorial, in a forest park, holds, in part, this inscription:

"BINGHAM PARK: In memory of Cyrus J. Bingham, forest ranger, whose life was dedicated to the preservation and development of our natural resources. Cy Bingham was the first forest ranger assigned to this area, in 1905. During his assignment, he was responsible for the discovery of the many recreation areas now enjoyed by the public."

Present for the dedication was the pioneer ranger's daughter, Mrs. A.J. Krechel of La Canada, California.

Bingham Lake, south of Crescent Lake in Klamath County, honors the pioneer who blazed the trail for rangers who have served the Deschutes through the years.

Death of a Guard

In the winter of 1914, Deschutes National Forest workers recorded a tragedy in the death of Guard Christiansen, who, on summer duty, had performed fine service for Ranger Harriman of the Fort Rock District.

In the winter months, it was Christiansen's practice to trap in the high Cascades. He lived in a cabin south and west of Crescent. He was covering his trap string in the exposed Cascade Summit area in about mid-winter when he was caught in a heavy, cold snowstorm. He headed for his cabin but hiked west instead of east. Before long he discovered his mistake and returned to the summit. This was later learned by searchers who followed his tracks. Apparently he was so chilled, he could not start a fire. Many broken but unignited matches were found. Finally, he gave up the attempt to start a fire and started for his camp. His course was direct. About a mile from his cabin, he stopped to drink at a small spring. He then went up on the bank and laid down on his skis. They found his body there, frozen in the bitter cold.

His clothing was unbuttoned, and there was other evidence that his hands had been frozen so he was unable to button up. Probably his hands were frozen when he attempted to start the fire at the summit. His course was straight for his cabin when he died.

Christiansen's body was found by Ranger Ed Mahn.

Trapper Charley George met a similar fate in a Cascade storm near Broken Top in the late 1920's. George had a trapline that reached over a shoulder of Broken Top, and frequently stopped at a cabin near Crater Creek. One winter he failed to return. Several attempts to locate the trapper were made. Early the following spring, two Bend men, this writer and the late Robert W. Sawyer, made their way into the Broken Top area, located the cabin virtually buried in a big drift, and excavated through snow to open the door. But the cabin, with the exception of a huge marmot, was not occupied.

A year or so later, the body was found, only about 200 yards from the cabin, and Trapper George's fate was evident. In covering his trap lines, he obviously reached the cabin area in a heavy storm and could not locate the little building. It could have been entirely covered with snow.

The elderly trapper is believed to have probed through the snow for some time until, exhausted, he died in the drifts.

The Lava Lake Murders

Most gruesome of all events in the Deschutes National Forest was the murder of three trappers as they stepped from the door of their mountain cabin near the shore of Little Lava Lake, near headwaters of the Deschutes River. The triple murder occurred in the winter of 1923-24. The exact date will never be known for the bodies were not discovered for weeks after the grim tragedy.

The three trappers, Roy Wilson, Dewey Morris, and Ed Nichols, had gone into the high country at the head of the Deschutes to spend the winter at a fox farm at Little Lava Lake. When they failed to return to their homes in Bend late in the winter, relatives grew fearful they had met with a mishap. On April 13, 1924, H.D. Innes and Owen Morris hiked over deep snow to Lava Lake. They found the mountain cabin vacant. Breakfast, with food still in containers, was on the table. There was evidence that the men had left the cabin hurriedly while eating breakfast.

Innes and Morris found marks of a sled leading to the nearby lake. In April, the lake was still covered with ice and snow. But, out a short distance from the shore, a hole had been cut in the ice. The sled marks led to that hole. Human hair was found on the jagged edge of the ice. There were blood stains on the sled. Attempts to probe the bottom of the lake through the ice were fruitless.

On April 23, 1924, ice on the lake broke and the bodies of the three men came to the surface. They were towed ashore, and it was determined all three had been shot in the back of the head. Officers presumed the triple murder had occurred after the three men had been called from their breakfast table.

All foxes had been killed in their pens and their pelts taken. The missing furs were traced to Portland where they had been sold. Immediately an all-points search was started for a suspect whose description answered those of the man who had sold the furs. He was identified as Charles Kimzey, alias Lee Collins, an escapee from the Idaho State Penitentiary. Soon the search for the suspect was extended across western America as the triple murders made national news.

Kimzey was also wanted on another count. When in the Bend area about the time the three trappers disappeared, he hired a Bend taxi driver to take him into the high desert east of town. There he bound the taxi driver with wire and dumped him into an old well. By chance, the taxi driver was found, after spending 3 days in the desert well. Kimzey was finally located and returned to the Oregon State Penitentiary on the taxi-driver abduction count. Witnesses and evidence were lacking directly to connect him with the Lava Lake murders. Kimzey spent the remainder of his life in prison.

Few of the thousands of anglers and campers who visit the quiet Lava Lakes and nearby Hosmer Lakes area these summers ever hear of the grim details of the murder of three men called to their death from a breakfast table long ago.

ROADS THROUGH THE DESCHUTES

Two high mountain passes, the Santiam and the McKenzie, dictated the routes of roads that were to pass through the Deschutes woods in pioneer days. In time, the roads became highways serving interior Oregon and the country beyond.

To the south in the Deschutes National Forest of the future was another high route that was to carry early-day travel and, in time, become a major highway, the Willamette.

Pioneers, seeking a route over the central and southern Cascades of Oregon, first probed into the Willamette Pass area, through the middle fork country. As early as 1853, road viewers said a route through that high, thickly timbered country was feasible and a sort of passage was cleared. This was first used in the fall of 1853 when the Elliott Cutoff Party, headed west, bumped into the Cascade foothills at the Bend site, decided that the Three Sisters were not Diamond Peak, and rerouted the wagons into the south. The passage over the divide, after crossing through the southern part of the Deschutes Forest, was a difficult one--and the route was far from a road.

The old immigrant route, coming in from the High Desert, skirted the southern edge of Diamond Peak. Later, this route was taken as a pattern for the Oregon Central Military Road, organized as a corporation by citizens of Lane County to shorten the distance to Fort Boise. In 1864-65, and again in 1867, surveying was done, along with some bridge work and construction. This apparently was the first road work in the south part of the Deschutes Forest.

As early as 1860, Major Enoch Steen left Fort Dalles with a company of hard-riding dragoons and 20 infantrymen, instructed to carve a wagon road from the wilderness between Harney Lake and Eugene City. They surveyed a direct line to Diamond Peak. Lack of funds, however, spoiled road development plans. Also projected, but not completed, was a road from the Klamath area by way of Catlow Valley and Steens Mountain to Idaho.

Despite its poor condition, the old Willamette route was considerably used in pioneer days. Eventually, the modern Willamette Pass Highway, U.S. 58, took shape, to link with U.S. 97 in the Chemult area. Both these highways pass through and serve the southern part of the Deschutes National Forest.

The McKenzie Route

In 1862 came the conquest of the high McKenzie summit and the movement of traffic, light in early years, through woods that are now in the Sisters District of the Deschutes National Forest. Cattle had been driven over the McKenzie divide in 1859 by Henry H. Spalding, the missionary, and by Jake Guilliford. At least one packtrain crossed the jagged lava divide in 1861, result of gold discoveries in eastern Oregon and the need of supplies. The conquest was by the Scott party, already mentioned. The

Scotts crossed over the summit lava fields and into the Sisters woods with eight or nine loaded wagons and 60 or more head of oxen. Trailing along were more than 700 cattle. That first use of the McKenzie divide did not, however, blaze the route for the highway of later years. The Scotts crossed the lava beds well south of the present McKenzie Pass. Years later, evidence of that first passage over the cutting lavas could be found on the trail. Areas where lava was crushed could be seen, and there were wagon wheel marks. After moving over the high lava beds, the supply train, moving downhill south of Black Crater, found easy going to the edge of the forest in the present Sisters area. The Scott brothers, with associates, had formed the McKenzie Fork Wagon Road Company to improve the road over the lava fields. Then followed a new group--the McKenzie River Wagon Road Company. This group proposed a road across the Cascades near the Three Sisters. The road was to cross the Deschutes River at the point known as the "Ford." Then came a third group that proposed to build a road over a more feasible pass north of the Sisters "to the crossing of the Deschutes above the mouth of Crooked River."

The original Scott Trail of 1862 had followed the McKenzie River up to the "Salt Springs," later to be known as Belknap, and then easterly along the north side of Deer Butte. From that point, the route swung south past Scott Lake to the high country south of the present highway pass.

A search for an easier route was made; and, in 1866, John Latta discovered the Lost Creek canyon route and easterly up Deadhorse Hill. The road over the lava fields was 1,000 feet lower than that of the Scott Trail to the south.

However, before the present highway was to take shape, various other road building groups were formed. One was the McKenzie River Military Road Company. Then came the McKenzie Salt Springs and Des Chutes Wagon Road Company. Heading that company was John T. Craig, who was to lose his life in a mountain storm while carrying mail over the exposed McKenzie summit in 1877 to the former Camp Polk neighborhood.

Crushed into jagged lava from summit flows, the McKenzie road was in general use in early days when settlement was taking place in Central Oregon and Prineville was becoming a sizable hamlet in the Crooked River Valley. Seasonally, many ranchers and others crossed the McKenzie divide to obtain fruit and vegetables before the high pass was closed by late autumn snow.

The McKenzie route became a part of the State Highway System in 1917; and, in the early 1920's, there were some attempts at development. In later years came the slashing into lavas on the Deschutes side of the McKenzie divide of the "big cut," which did away with the "ladders" of early years over which the first automobiles climbed to the summit from the east. However, the "big cut" had its disadvantages. Seasonally, it was choked with a huge mass of snow which kept it closed generally into early summer. It was opened earlier when highway snow removal was improved.

When a fine, modern highway was constructed down the McKenzie past Clear Lake after World War II, the McKenzie Highway became a little-used route. However, it still holds the designation of a "scenic highway," and seasonally

brings thousands of vacationists into the high country between the Deschutes and Willamette National Forests to view what has been described as some of the most spectacular volcanic scenery in continental United States.

The McKenzie Highway west from Sisters to the summit lava beds is through a fine forest of pine in lower areas. Near the summit, the highway fringes huge lava flows. At the divide, the Deschutes and Willamette Forests have joined in creation of an interpretive trail which traces the history of the great Cascade lava floods of long ago.

Santiam: Important Gateway

Used for centuries by Indian tribes before white man came to Central Oregon, the Santiam was a formidable barrier. Immigrants from the east "detoured" the rugged divide by heading north, as did the Blue Bucket Mine party of 1845, or by steering into the south, as did members of the Elliott Cutoff Party of 1853. Eastward passage over the Santiam was even more difficult because of the steep grades and, to the north, the rugged Santiam gorge.

But the Santiam was a comparatively low pass, and it was inevitable that it eventually would be used by wheeled vehicles, as well as by packstrings. The pass was known to early-day trappers, as well as to Indians who served as guides for explorers. Some believe that Stephen L. Meek, guide for the Blue Bucket lost wagon train, was actually headed for the Santiam Pass when he lost his bearing on the High Desert and in the upper valleys of Crooked River.

Andrew Wiley, as has been noted, was the first to describe the Santiam divide, which he found while on a hunting trip with companions. From a high tree in the pass country, the hunters looked east into the Deschutes pines and the tan hills of the High Desert well to the east.

On his 1859 trip to the Santiam divide, Wiley could see the Three Sisters, well to the south; pinnaled Mt. Washington, nearby; and jagged Three Fingered Jack. Wiley was the discoverer of the famed Hogg Pass of later years.

Residents of Linn County in the early 1860's became interested in a road over the Cascade barrier along the South Santiam River, closely following the Wiley Trail to the summit. The Willamette Valley and Cascade Mountain Company was formed on May 18, 1864.

Incidentally, both the road builders moving up the McKenzie Valley to the pass north of the Sisters and the Linn County builders looked toward a common crossing of the Deschutes River at the "Ford." This ford was on the Deschutes River in the Tetherow Bridge area of later years.

The Linn County company completed the trans-Santiam road in 1865 and 1866. There was a toll gate 2 miles east of Sweet Home. On completion of the road, it was announced in Albany that wagons could go "in ease over the mountains from Linn to the Deschutes River and on to Canyon City and Boise." In summer months, the road was used by herds of cattle, bands of sheep, pack trains, teams, and occasional wagons.

When a company of soldiers, mostly from Polk County, moved eastward into the Indian country in 1865, they found a crew at work on the new road at Fish Lake. The soldiers rested there for a few days, joined in some fine fishing, and then continued on to Camp Polk, to spend the winter.

The route, known at first as the Wiley Road, was cut through a dense forest on the west side of the mountains. The road was just wide enough for a wagon. Trees were removed from the route, but they were not cut at ground level. From Fish Lake, the road moved over the Cascade divide at Big Lake, skirted Blue and Suttle lakes to the south, went down Cache Creek, passed close to the base of Black Butte, extended east to Camp Polk, then headed for the "Ford" on the Deschutes River and moved into the Ochoco country. From the Cascade summit, the old road was in the Deschutes National Forest of the present until it left the pines near Camp Polk.

Practically all heavy work on the road ended at Cache Creek, now in the Sisters District. From there to the Ford on the Deschutes, the Willamette Valley and Cascade Mountain road virtually "wandered," following paths of least resistance on alternate sections of land.

It is still possible to trace the route of the old military road over the Santiam divide. Actually, it was used little by the military, but the route was of importance to trans-mountain traffic in the early settlement of Central Oregon. One of the buildings at the Cache Creek station stood until it was blown down by high winds in the early 1960's. Souvenirs from the old site include square nails used in the construction of the buildings that marked an important stopping place for travel moving east and west over the Santiam Cascades, through a part of the Deschutes Forest.

Actually, there was a double pass on the Santiam divide. The Santiam Pass was the one used by the old South Santiam road which came up Seven Mile Hill, crossed the divide just east of Big Lake, and moved down into the Cache Creek country. The second route was known in early days as Hogg Pass, selected by T. Egerton Hogg for his railroad location. As a result of the topographic mapping of the area by the U.S. Geological Survey in 1928-29, and also of the building of the Santiam Highway through the Cascade Range, the two passes were sort of "merged." The U.S. Board on Geographic Names on April 3, 1929, adopted the name Santiam Pass for both routes of travel. The name Hogg Pass, as applied to the location of the Santiam Highway at the summit, is now obsolete.

The name of Colonel Hogg is perpetuated in Hogg Rock. This is a prominent, rocky point just west of the pass and immediately north of the Santiam Highway. In later years, an effort was made to have the entire low place in the Santiam Cascade called the Wiley Pass, in honor of its founder, Andrew Wiley, who used the pioneer trail over the present highway route in 1859. West of the pass, Wiley's name was given to a creek.

The Hogg Pass "Railroad"

Near the Santiam summit is an Oregon History sign which bears this information:

"The old grade crossed by the Santiam Highway at this point was built as part of the Corvallis and Eastern Railroad by T. Egerton Hogg in 1888 and was to have connected Newport and Boise. Hogg Rock, the solitary eminence just west is named for Hogg."

That, briefly, tells the story of one of the most interesting railroad developments ever undertaken in the region. The exuberant Colonel Hogg, historians say, "dreamed a vast dream, but it was more daydream than practical vision--and so it failed before it was well started."

If the Hogg dream had materialized, travelers heading east could board a train at Yaquina Bay, cross the Santiam Cascades, and eventually reach the Atlantic seaboard. Hogg Rock, apparently the massive plug of an ancient Cascade volcano, stands as a reminder of the early-day attempt to build a railroad over the Santiam divide, not far from the route of pioneer wagons following the Wiley Trail.

During the 1880's, 143 miles of rails were laid from Yaquina to within 12 miles of the summit of the Santiam Pass.

Colonel Hogg's contract called for the operation of a train over the pass, where Chinese laborers had gouged out a grade in the andesitic rock and laid about 100 yards of track. A boxcar was hauled up in pieces to the high shoulder of the mountain, reassembled there, and drawn back and forth across the rails by mules. That operation presumably satisfied Colonel Hogg's franchise for the operation of a railroad over the Santiam Cascades.

For a few years, the project caused a considerable stir. On the Oregon coast, Yaquina and Newport were boom towns, anticipating trains rolling in from the east over the Cascades. The first train from Corvallis to Yaquina moved west on a March day in 1885. A train carried passengers from Corvallis to Albany for the first time on January 6, 1887. From the terminal on the coast, steamers offered cruises down the Pacific to San Francisco. Cost of the rail-sea excursion from Corvallis to San Francisco was \$14. So popular were those cruises that two new steamships, the "Willamette Valley" and "Eastern Oregon," were added to the fleet.

Then Colonel Hogg again looked toward the east and the low pass over the Santiam divide into Deschutes timber and on into Eastern Oregon and the Atlantic. After Hogg let contracts in 1887, his "rainbow finance" dream came to an end. Funds had run out by the time the track reached Idanha. Somehow the economy of the Willamette Valley had not flourished at the pace anticipated. Yaquina Bay, dug to 22 feet in 1880, was too shallow for large ships. Two steamers, the Yaquina City and the Yaquina Bay, were wrecked at the entrance. Besides, Portland had become a terminus for the Northern Pacific in 1883 and for the Union Pacific in 1887. There appeared little need for another line across the high Cascades and east through the "Great Desert" of Central Oregon.

Hogg persuaded eastern investors to sink big sums in his rosy scheme. Eventually, the company went bankrupt. In 1893, Hogg was removed as receiver. The company, which was bonded for \$15,000,000, was foreclosed for \$100,000. Eventually, in 1907, the line to Corvallis from the coast was purchased by the Union Southern Pacific and made part of its system.

Slowly, the dream of the Hogg Railroad over the Santiam divide is fading even from history. Just west of Hogg Rock, parts of the old railbeds are still visible but threatened by new highway construction. Some of the old railroad bed is also visible on the east side of the pass. But this is nothing compared with the amazing engineering completed in pioneer days through use of primitive tools and a tremendous amount of hand labor.

"The beautiful stone walls and Three Fingered Jack, framed by the remaining niche carved into Hogg Rock, are sights well worth viewing," Maynard C. Crawson noted in a 1966 letter to The Oregonian.

Visitors to the Presbyterian Lodge at the Santiam summit, on the old Hogg Pass route, say, in imagination, they can still hear the pounding of metal against rock as Chinese laborers carved the grade into the volcanic andesites.

And, so it is said, at times the dull roll of the boxcar moving over the summit rails can be heard in imagination.

Route of U.S. Highway 97

Indians, hunting in the eastern Cascades or en route between the Klamath Basin and the Columbia River, were the first to blaze trails through the Deschutes country. Later, trappers and explorers followed those trails. John C. Fremont, "The Pathfinder," closely followed one of the old Indian trails when he passed just west of the Bend site in 1843 on his way into south-central Oregon and California.

Possibly the first wagons to move over the approximate route of U.S. Highway 97 through the Deschutes National Forest south from Bend to the Crescent country were those attached to the Elliott Cutoff Party of 1853. Those immigrants had not planned to come to the Bend site. They were headed for Diamond Peak, well to the south on the Cascade skyline. When they failed to find in the Bend area of the present blazed trees that would guide them to a Cascade crossing, they headed south, virtually cutting their way through a forest of jackpines. The crossing apparently was immediately east of the rocky flows from Lava Butte. The volcanic butte remained as a traffic control point through the years.

Lava Butte not only crowded wagons to its eastern fringe but, in later years, it set the course of U.S. Highway 97 when it was made a part of the original Oregon Highway System in 1917. The butte also set the pattern, in later years, for telephone lines and the huge Canada-California gas line. Traffic east of the Butte was becoming a bit thick in the early 1960's, with only one break from the general pattern shown. In 1928, the Great Northern crushed a track over lava west of the butte when the Great Northern extended south to California.

Indians also used this "high pass" to the east of Lava Butte, as is indicated by an old camp site near a lava fissure about a fourth of a mile to the east. Deer from the Paulinas apparently trailed past the point on their way to water in the Deschutes. Ancient hunters stalked the deer where the lava crowds into the east.

First recorded passage of wagons over the U.S. 97 route of the future was in 1867, when J.W.P. Huntington, superintendent of Indian Affairs in Oregon, guided a convoy of wagons and a herd of cattle into the south to supply Indians who had been gathered into the Klamath Reservation. The army supply train stopped for a night in Bend, beside the river known to tribesmen of the area as Towornehiooks. The supply train encountered difficulties in moving south, and a company of men preceded the wagons to cut a path through the jackpines. This indicates that the supply train either followed a new route or found the road cut through the timber by the Elliott Cutoff Party 14 years earlier overgrown by the young lodgepoles. South of the Crescent country, where the Elliott wagons moved west to the Middle Fork, the supply train from Fort Dalles was apparently moving through a virgin country.

After the turn of the century, that portion of the present U.S. 97 Highway from Bend south to Rosland (La Pine) and a short distance beyond was considerably used. However, a short distance south of the La Pine area, the main-traveled road swung into the southeast toward Silver Lake and Lakeview, over a line that was later to become the Fremont Highway. Over that old road, freighters moved supplies and ranch produce, including wool, north from the Silver Lake area through Bend and on to Shaniko, at first via Prineville.

Through the earlier years, following the settlement of the Central Oregon stock country, there was an excuse for a road south from La Pine to the Klamath country. But it was only a seasonal road, which wound through the lodgepole pines and was blocked in the long winters by deep snow on Sun Mountain just north of the Klamath Lake country. This condition existed into the 1920's when the route generally known as The Dalles-California Highway took shape through the Deschutes National Forest south from Bend. This was later improved into the present fast, straight, all-season route over approximately the same line.

Deschutes Roads

Wagon trails and roads in most of the level Deschutes country were easy to construct. Even before the Forest was created in 1908, these primitive routes led to most important points in the Forest--to trout lakes, to lookout points, to huckleberry patches, to ranger and guard stations, and to ranches. However, these were just "ways" through the woods and could be used by horses and wagons. They could be changed at the will of drivers. Few, if any, of the early day roads were surveyed. They were paths of least resistance between various points. Many are still in use, but generally along improved lines. In olden days, trees were seldom cut, rocks were infrequently moved to provide wagon roads.

But the advent of the automobile in 1913 saw a great upsurge in road improvement. Perry South, the pioneer Deschutes ranger, headed volunteers from the Crescent community who drove horses over the "roads," chopped roots, and smoothed or graded the worst places. Ranger Harriman did the same in the sandy Fort Rock area, as did rangers in other districts. Harriman, particularly, branched out and opened up many miles of new roads for automobiles, as well as wagons. Several of these still remain.

Most important ones were the China Hat Road from Fort Rock to the Bend-Burns Road, and Boundary Road along the southeastern boundary of the Fort Rock District.

A third road of equal importance was the route into Newberry Crater, constructed by Ranger Curl in 1913. The wagon road from La Pine to the Paulina Lake outlet was blazed by Ranger Curl, Fred Shintafer, George Craft, and Bill Rodgers (captain of the Portland Beavers' baseball team) in the spring of 1912. It was improved for car travel when the road was extended to East Lake. After World War II, the present road into Newberry Crater from U.S. Highway 97 was constructed over a new grade and surfaced. A side road, unsurfaced, was constructed from a point near the Paulina Lake outlet to the high top of Paulina Peak.

This first period of car use and road building, from 1913 to 1916, marked a real change in travel problems and methods of Forest Administration. Improvement has continued through the years; but, in that initial period, many miles of road were opened to auto travel, not only for forest protective and administration use, but for the public. Simultaneously with road construction came the erection of road signs with stenciled green letters on white painted boards. They were major factors in winning public approval for forest administration.

Most of the early-day forest road development was done, as already noted, by ranger and volunteer labor. A few hundred dollars was obtained for the China Hat Road. About 1914, an allotment of \$1,000 10 percent funds was secured to construct a road up Tumalo Creek, where a guard was stationed. Most of this was spent in grading one bad hill, just inside the forest boundary.

Many of the first roads were built with a team and two logs fastened together to smooth out ruts. First motorized road construction was obtained in 1920 after the first World War. That equipment consisted of a couple of artillery tractors and some army trucks. They had to be shipped to the Deschutes from points as distant as New Jersey, and the project took most of the road funds. The equipment had no blades or road graders, so anything available locally had to be used. An attempt was made to grade with a 10-ton artillery tractor pulling a Little Winner road grader--with disastrous results to the grader. Many miles of road were built, however, with this inferior equipment.

Mountain Lakes Lure

Trappers, early-day stockmen, hunters, and fishers were the first to note the beauty of the Sparks Lake area with its lake reflecting the outlines of nearby mountains, especially Bachelor Butte. Horse trails led into the high area early in the history of the Bend community.

As early as 1909, plans for a summer resort in the alpine area were projected. On August 9 of that year, the Forest Service granted to Hunter, Staats, and Edwards of Bend a permit to open a wagon road from Bend to Soda Springs on Soda Creek, a tributary leading into Sparks Lake from the high Broken Top country. The 21-mile long road was to lead up Tumalo Creek via the Spicer Ranch and follow Tumalo Creek "nearly to the springs."

Two of the three men interested in constructing a road into the high area were W.H. Staats and J.N. Hunter, early-day Bend developers. They had in mind the construction of a resort, not on the fringe of Sparks Lake facing Bachelor or beautiful South Sister, but on Soda Creek about 2 miles up from the edge of the Sparks Lake meadows of the present. It apparently was to be a health resort. Soda Springs gushed from the side of the creek as a brown, tasty flow. The water tasted somewhat like soda and gave the springs and the creek their names. But, in early days, as described by the developers, the springs were crystal clear. Hunter and Staats decided it would be a fine location for a summer resort, but it was never built.

Eventually, with major work undertaken about 1920, a road was constructed from Bend to Sparks Lake and beyond, over approximately the present line of the Cascade Lakes Highway. This road reached into the Elk Lake country and joined roads leading up the Deschutes country to Quinn River and the Lava Lakes. The roads finally joined to form a circuit known in earlier years as the Century Drive. The name was suggested by Judge H.C. Ellis of Bend because the circle route, from Bend into the high lake country, southeast to the Deschutes, and back to The Dalles-California Highway, and north to the starting point at Bend, was approximately 100 miles long.

The old Century Drive, as a segment of the north-south Cascade Lakes Highway, gained new importance with the construction of the ski area at Bachelor Butte by the Mt. Bachelor, Inc., under a Deschutes National Forest permit. Over a period of some 20 years, before and after World War II, the mountain highway was improved and modernized and is now open the year around from Bend to Bachelor.

Soda Springs, which provided the first impetus for a road into the recreation area, remained known to few.

Travel into the upper Deschutes country, especially by anglers, increased through the years, as did the rather involved road "system" which just grew from season to season.

The Deschutes road system, leading into areas inaccessible to cars only a few years ago, rapidly expanded after mid-century, partly the result of timber sales and the requirement for the building of certain roads which would remain usable after sales were completed. These roads fit into the fire protective system and, in many instances, made areas available for public use.

By the end of 1968, the Deschutes National Forest road system aggregated 2,499.5 miles. Of this total, 321.3 miles were of the primitive type, 1,145.2 miles were graded, and 910.5 miles were cinder-covered.

Paved roads in the forest, exclusive of the major highways, accounted for 122.5 miles.

Few forests in the Pacific Northwest have such an extensive road system. In addition, there were 436.5 miles of trail in the forest at the end of 1968, with the Skyline Trail, part of the Pacific Crest System, accounting for some 38 miles of this total.

Oregon Skyline Trail

Winding through the crest country of the high Cascades is the Oregon Skyline Trail, with 38 miles of the scenic route in the Deschutes National Forest. It dodges behind the white Three Sisters west of Bend, uses a Willamette route for a short distance, then, in the southwest, moves into the Deschutes in an alpine, scenic section of the Cascades.

Starting in the north, the Oregon Skyline Trail climbs out of the Columbia Gorge, follows the skyline of The Cascades at altitudes from 4,000 to 7,100 feet across the State of Oregon for almost 400 miles. It is part of the Crest Trail system which traverses the Cascades of the Pacific Northwest. The Oregon segment of the scenic trail begins at the Bonneville Dam on the Columbia.

The trail winds southward high on the flanks of Mt. Hood, past Mt. Jefferson, Three Fingered Jack, and Mt. Washington. After passing just to the west of the Belknap lava fields and south along the lava flanks of the Three Sisters, the trail, in places, swings into the Deschutes Forest. It skirts high lakes, Waldo, Odell, Crescent, and Diamond, in an alpine wilderness. Farther south it goes through Crater Lake National Park, then on south near Mt. Loughlin to the southern end of the Cascade range.

In places, the Skyline Trail uses paths first followed by animals and later by Indians whose folklore still clings to mountain peaks where they harvested huckleberries.

The Oregon Skyline Trail is extensively used by vacationists in the summer season. The trails are not designated for motor equipment, and motorcycles and scooters are barred from wilderness areas of the high nature trail. The trail traverses five such areas--Mt. Hood, Mt. Jefferson, Mt. Washington, the Three Sisters, and Diamond Peak. The trail is tapped by major highways in several areas, and mountaineers may enter the crest system at selected points.

In 1920, the route of the Oregon Skyline Trail was located and posted by the Forest Service from Mt. Hood to Crater Lake and was given formal recognition as one of the major scenic trail routes of the Pacific Northwest. It was made up of a combination of trails. It now occupies a location very close to the backbone of the Cascade Mountains, traversing a spectacular hinterland and venturing into scenic areas.

Eastern brook trout were planted in smaller lakes along the Skyline Trail as early as 1920. Blacktailed deer are common along much of the trail, while mule deer travel the country east of the summit.

To improve the system, a few minor changes were made in the trail in the Deschutes Forest high country southwest of Bend in recent years.

Available for interested vacationists are illustrated pamphlets, "Oregon Skyline Trail," with maps. They may be obtained from National Forest headquarters.

GRAZING ON THE DESCHUTES

The history of grazing in the lands at present administered by the Deschutes National Forest dates to pioneer days when ranchers pastured cattle herds on mountain meadows. As at present, first use of the forest for grazing was seasonal. Autumn storms forced stockmen to move their animals to the lower country.

There was no regulation of grazing in those early days. It was first-come, first-served. But, prior grazing "rights" apparently were observed by the stockmen. There were seasons, however, when stock of several ranchers grazed in the same area. Some sheep were moved in eventually, but sheep grazing was not extensive. Central Oregon sheepmen were more interested in the lush summer pastures just east of the divide than in the dry lands away from the Deschutes and its tributaries.

Grazing in the Deschutes woods was pretty well organized when Supervisor Roy Harvey took over the forest in the new Bend headquarters in 1911. He was raised in the Prineville area and had practical ranch experience--so he got along well with the stockmen. There were not many problems connected with grazing in early days. There was always pressure to authorize more stock.

Because of water shortage, much of the Fort Rock District was not usable for livestock for many years. This lack of grazing caused considerable concern because the unused grass and browse created a serious fire hazard. Several stockmen from Lakeview, one of them Jerry Ahern, asked for and received the area south and east of Paulina Peak as an allotment in 1914. They ran sheep there and prospered, and at the same time reduced the fire hazard. Ahern was assigned much of the same area 34 years later in 1948.

The Cabin Lake well was drilled in 1916 and opened up considerable new range in the arid Fort Rock area. Dominique Verges started hauling water to sheep from the Mortimer Well, which he had leased in 1924. This experiment of hauling water from wells to adjacent range area proved the feasibility of such operations and won regional attention. Water hauling soon became standard accepted practice on all dry sheep ranges and has since been used as the most important sheep management tool on the forest.

Water was not hauled to cattle until 1941, when it was tried on the Cabin Lake allotment. It proved successful for limited distances. Permittees on the Arnold and Pine Mountain allotments later took up the practice and drilled a number of new wells.

Ranchers who ran livestock in the area now included in the Deschutes Forest dated, in some instances, use reaching back to 1906. Mike Mayfield received his permit that year for 200 cattle at Crane Prairie. He operated cattle in that area for 41 years until his retirement. The pioneer permit was waived to other operators in later years. Another prior user of the Crane Prairie allotment was S.S. Stearns, who also received his permit in 1906. With the death of Mr. Stearns, the permit changed to the Stearns Cattle Company, which later used the Davis Lake area.

J.W. Fisher of the Shaniko country received his first permit on the Deschutes in 1912, for 4,200 sheep. Other early users of Deschutes forage were J.E. Hinton, 2,000 sheep; Farquar McRae, 1,800; Andrew Morrow, 2,400; Pat Reilly, 1,250; and A.P. Jones, 1,450. Through the years, thousands of cattle and sheep were grazed on Deschutes ranges. Sheep numbers greatly diminished even prior to World War II.

The first grazing reconnaissance on the Forest was made by W.G. Hastings, who was later supervisor. He did this in connection with his soil and type mapping work in 1912. Other early day work was by W.J. Nichols and A.F. in 1912 and 1913. Jack Horton worked up the first complete management plan after he became grazing assistant in 1918. Horton prepared one of the first herbariums used on the Deschutes Forest.

The first livestock association on the Forest was known as the Upper Deschutes Livestock Association, organized in May 1914. It consisted of the users of the Crane Prairie and adjoining cattle and horse ranges. R.E. Grimes was first president, and R.L. Noel was secretary. Harry Crampton was a member of the advisory board. The Metolius Association was founded in 1929, with W.H. McCoin the first president. The Arnold Association was founded in 1931 with Charles Griffith as president and Glenn Slack, secretary.

America's Great Depression late in the 1920's and the early 1930's hit the livestock industry, and many of the operators on Deschutes allotments went broke. Beef and lambs sold as low as 3½ cents a pound in 1934.

With sheep virtually disappearing from summer ranges, the pattern of grazing on the Deschutes Forest greatly changed after the depression. Carefully managed grazing, such as practiced at Sparks Lake, was successfully practiced

In the summer of 1940, there were some 50,000 sheep pastured on Deschutes summer range. This dropped to about 11,500 in 1968, with a further drop anticipated in 1969. There were 12,000 or 15,000 cattle on summer range in 1940 on the Deschutes. The figure dropped to 2,395 in the 1968 season.

SAWMILLS ON THE DESCHUTES

First settlers in the upper Deschutes basin, at the Bend site, in the Sisters Community, and in the stock areas upstream from Farewell Bend, got their building material the hard way in pioneer days. They cut small trees, generally at the edge of the forest, and shaped them into logs. These logs were used in building the first homes or cabins in the inland country.

This was also true in the Ochoco country, where pioneers settled after crossing the Santiam divide from the Linn-Benton community. The first cabin erected in the Ochoco area was burned by Indians in 1868.

The early settlers found the task of cutting timber, shaping trees into building logs, and hauling them to homesites was time-consuming and tough. Some yearned for the boards that could be cut from the timber. As a result of the need for lumber, a sawmill, first in the Ochoco-Crooked River area, was built by Ole Swartz on Mill Creek. This was not a commercial venture. It was a community service plant. The inland region's first commercial sawmill was established on upper Willow Creek, well east of Madras of the present. From the Mailing mill were produced boards used in building many homes and cabins in the region prior to the turn of the century. It was recalled that timbers for the first bridge over Crooked River at the Trail Crossing site were hauled from the Mailing mill in 1890.

In the Ochoco country, there was also a small mill on Foley Creek that, in 1906, was moved to a site near the present highway crossing of the Deschutes River at Warm Springs. Most of the homes on the Agency Plains were built with lumber produced at that mill, owned by Charles Durham and U.S. Cowles.

Timber from the Deschutes woods was drifted down the Metolius and Deschutes Rivers to the Durham-Cowles plant. Logs were also drifted down those streams, the Metolius and Deschutes, to a mill close to the mouth of Tygh Creek near Tygh Valley. This was the major river-run operation of any Central Oregon sawmill; but, in later years, there was to be a considerable run of logs down the upper Deschutes to the Pringle Falls area.

The little mill on the Deschutes near the Indian reservation at the highway crossing in pioneer days received an order that was unique. The order was for material for the construction of a still for the manufacture of whiskey. Cowles erected the distillation plant, but the operator never obtained a federal license and the still never opened for business.

Hailed as king of river drivers was Sol Masterson, who rode many logs down and through rapids of the Metolius and the Deschutes. Six or eight men served as log drivers in this little-known phase of the Deschutes lumber history.

Another small mill, also operated by Charles Durham, was up near the head of Trout Creek, then in Crook County. That mill provided lumber for many of the first homes constructed in Central Oregon north of Crooked River, and there is some evidence that some Trout Creek lumber was even hauled by team and wagon to Bend for use in homes built after A.M. Drake founded the town early in 1900.

When trains pulled up the Deschutes gorge to Bend in the fall of 1911 and stopped at the edge of the pines, there were no large sawmills in the Bend area. But the southeast, south, southwest, and west, as well as into the northwest, had a huge stand of timber--some 16 billion board feet, according to a preliminary estimate. This figure was increased in later years.

Although there were no big mills in Bend in 1911, the city's "Railroad Year" men who had financed the double trackage up the Deschutes at a cost of some \$25 million were willing to wait. They had fairly accurate figures on the potential stumpage of the area. History notes that James J. Hill and Edward H. Harriman, the railroad builders, had estimates on the timber potential long before their railroad builders battled for rights-of-way in the Deschutes gorge.

The early cruises indicated that 6½ billion feet of pine timber on the Deschutes plateau, the eastern Cascades, and the Sisters country, was in National Forests, mostly in the Deschutes Forest. To the east in the Ochocos was more timber, some 10 billion board feet. More fine stumpage covered the Fremont hills to the south.

Except in marginal areas, where pines had been felled and converted into lumber for local use, the wealth of timber in the Deschutes country was scarcely touched.

First Sawmills

Constructed in May 1901, the Pilot Butte Development Company's little plant was the first commercial sawmill in Bend. The original location was at the rear of the Pilot Butte Inn of later years. Steidl and Reed also set up a small mill in Bend in 1903. This was on the Deschutes River just below the Pioneer Park area. The mill was operated by water power. Machinery for that pioneer mill on the Deschutes was moved in with considerable difficulty. When the machinery was being hauled from Shaniko, a four-horse team ran away, scattering mill equipment over the low western flank of Grizzly Mountain and injuring the driver, John Tweet.

Several other small mills, one the Hightower and Smith plant northwest of the village of Bend, also served the little community and provided lumber for the first homes. But in the background, the newly-organized Deschutes Forest (September 17, 1906) was still untouched. Behind the scenes, however, the work of American lumbermen, most of them in Minnesota, was evident as large blocks of timber passed to private ownership, close to the edge of the new forest.

Much of the timber blocked out by lumbermen prior to the construction of big mills in Bend was obtained by land seekers who acquired a considerable stumpage prior to timber withdrawals. There were several big rushes for timber. One was on September 28, 1907, and most of the acreage was south of Bend. This was officially opened to filing and settlement.

For several weeks prior to the opening, the timber was full of cruisers and timber seekers. Federal ground rules were that there would be no filing until September 28 and that no buildings or fences could be constructed

prior to proof of legal filing. But many timber seekers believed they could make their claims hold under "squatter rights." Some of the squatters posted notices. Squatter shacks and notices were torn down by Forest Service field men.

The rush for timber was primarily the result of the Forest Homestead Act of June 11, 1906. This act provided that forest land chiefly valuable for agriculture could be listed, occupied, and eventually patented as a homestead. There was considerable land in the upriver country, south of Bend, which had been designated as acreage of agricultural value and was so classified.

The act resulted in most of the land that could remotely qualify for agriculture being claimed. The examination and reporting of the claims were the responsibility of the Forest Service. It took up most of the time of the forest personnel for several years before the U.S. Forest Service came into existence. Examinations had to be made carefully because protests could always be expected. Claimants vociferously held that their lands had great agriculture value. Claims, it was recalled, were even filed on the shores of mountain lakes, on pumice flats, and in riverside swamps.

The timber south of Bend opened for entry was "alive on the morning of September 28, 1907," old newspaper files reveal. The dawn of September 28 found a cold rain falling--and as many as 17 timber seekers on the same claim. Many were "soaked to the hide," The Bulletin said. A Bend man driving from Bend to Rosland that day counted 300 timber seekers in the area. Some 20 men were camped on one section near the John Atkinson Ranch upriver. Despite the competition for timber, apparently there was no trouble in the field.

Formal filings had to be made before the U.S. Land Commissioner in Lakeview. There, a long line formed in front of the commissioner's office. There was some "feeling" as a few timber seekers got out of line. Some timber claim applicants were given numbers in line and were not required to stand there throughout the day.

Claims were finally resolved, and a huge stand of timber adjacent to the Deschutes National Forest became privately owned. Later, this timber, or most of it, passed to the ownership of the big lumber firms that were to establish mills.

Bend Gets Big Mills

In 1915, 2 years before America entered World War I, the big news came that two of the world's largest pine mills were to be built in Bend. On May 10, the Shevlin-Hixon Company of Minnesota announced its Deschutes mill plans. Then came the announcement by Brooks-Scanlon, Inc., on August 18 of plans for construction of a large mill. The two firms were to manufacture billions of board feet of timber from the Deschutes pines and other species.

Actually, news that the two big firms were to build plants on the Deschutes was a bit old. The millpond had been surveyed by the Central Oregon Development Company as early as 1907. To protect millpond rights, the company purchased property from John Sisemore, the pioneer who lived on the historic Farewell Bend Ranch.

Some of the holdings on which Brooks-Scanlon was to cut timber was selected by M.J. Scanlon when he visited the pinelands in 1898. Assisting in cruising the Deschutes woods for the Shevlin-Hixon firm in early days was Thomas L. Shevlin, famous as "Tom Shevlin of Yale." He was president of the company when it entered operations on the Deschutes. Earlier he spent 6 months in the Deschutes timber, working with Mike Kelly in blocking out timber for the projected Bend mill.

Even in the first years of "shakedown operations," the two huge pine plants were nationally high in production of pine; and, when the plants got on normal schedule, they were milling around 200 million board feet annually. As more head rigs were added and the demand for lumber increased, annual production reached toward the 500 million board feet mark.

In 1950, 34 years after the first logs moved under ripping saws at the edge of the Deschutes in Bend, directors of the two plants reached a decision that directly affected the city. The directors decided that timber of the area, now virtually all on federal land, could be more advantageously harvested under one operation. The result was that Brooks-Scanlon purchased the plant and timber of the Shevlin-Hixon Company. The Shevlin-Hixon plant cut its last log on December 23, 1950.

When the two firms entered the Deschutes basin, logging was by railroad. Throughout the years, trackage was extended. Over those tracks, into distant woods, rolled big steam locomotives and long strings of flatcars. Eventually, Shevlin-Hixon track reached south into Lake County and into the southern Paulinas. Brooks-Scanlon steel skirted the northern foothill of Newberry Crater and extended into the Fort Rock area, a distance of some 80 miles. Later, Brooks-Scanlon pushed its logging tracks northwest into Jefferson County past Sisters.

Some 40 years later, logging railroads in the Deschutes country were to be replaced by wide, fast roads over which rolled fleets of trucks from distant woods. By the 1950's the last of the mill trains and their giant locomotives were to disappear from the Deschutes scene to join, in memory, the "big wheels" of pioneer days.

Old abandoned railroad tracks are still in evidence and, in some instances, used by trucks and cars in the Deschutes woods.

As the Bend mills cut their privately owned timber, purchases from the Deschutes National Forest, through auctions, greatly increased, as did the price of timber, which in pioneer days sold as low as \$1.50 per thousand feet. This compares with a high of \$58 in years following World War II. In competitive bidding, millmen who obtained stumpage agreed to develop roads under federal specifications. The result was that, by 1960, a fine modern road system was taking place.

Brooks-Scanlon modernized its entire operation in 1958 at a cost of more than \$3 million. Automation was primarily the goal of the modernization. For a number of years, Lelco, Inc., later purchased by Brooks-Scanlon, operated east of the river in Bend. In the early 1960's, the big Brooks-Willamette plant started operations, to change the production picture.

The total acreage of Deschutes National Forest commercial forest land has been placed at 1,373,799. The annual allowable sustained yield cut is 138,000,000 board feet. Value of timber sold in the Calendar Year 1967 was \$4,208,000.

It is estimated that some 3½ billion board feet of timber had been cut from the Forest in the 1922-68 period.

A "side crop" on the Deschutes Forest is the sale of Christmas trees. In the Calendar Year 1967, a total of 5,493 yule trees were sold.

Forest stumpage statistics are not all on the depletion side. In the 1968 fiscal year 436,000 trees were planted in the Deschutes Forest. Acres planted that year aggregated 1,353, with 1,364 pounds of seed used.

Preparing forests of the future, 698 acres of pine trees were pruned in the 1968 fiscal year.

It takes manpower for the administration of the huge Deschutes acreage and the sale of millions of board feet annually. At the start of the 1969 fiscal year, there were 179 permanent employees and 233 temporary employees on the Forest. The payroll for the 1968 fiscal year was \$2,092,600.

The figures reveal how the forest roster and the work involved in the administration of the forest have increased since those remote days at the beginning of the century when Cy Bingham and Bill Vandever comprised the staff not only of the forest that was to be the Deschutes but parts of adjacent forests.

DESCHUTES WEATHER

Through the ages and back into remote eons, weather has played an all important part in shaping the story of the Deschutes Forest--its glacier-carved mountains, its lakes and streams, its tree types and forage, and its fringe grasslands.

The story of Deschutes weather may be said to date to the Ice Age, when great glaciers sheathed the mid-Oregon Cascades and sent outwash into lower areas to level such basins as the one at Sparks Meadow. The glaciers also shaped alpine scenery, cutting into the North Sister, smoothing the snowy slopes of the South Sister, sawing into the old domes of Mt. Washington, Three Fingered Jack, and Broken Top, and dumping debris into the flats of the Sisters District near the town of Sisters. There, close to the high school, can be found huge rocks apparently rafted in on glaciers when the basin was temporarily dammed.

Weather not only dictated, through long ages, the tree types that would grow in the high, dry cool country, but, in "mini-cycles" in various decades, depleted some forest areas through prolonged droughts.

F.P. Keen of the U.S. Bureau of Entomology and Plant Quarantine in earlier years touched on the role of weather in the perpetuation of forests when he presented a paper dealing with climatic cycles in Eastern Oregon as indicated by tree rings.

Keen noted that, in the two decades prior to 1937, the pine forests of Eastern Oregon and Northeastern California were seriously depleted by drought and bark beetles. Billions of board feet of merchantable timber had been killed, and there had been a gradual encroachment of desert conditions into what were once thriving pine stands. Keen wrote:

"The question naturally arose as to whether this trend toward dryness and retreat of the forest was to continue over any long period or was merely a short cycle in a variable climate which would reverse the trend and give some hope for forest perpetuation in threatened sites."

After 30 years, the question has not been answered, with short climatic cycles somewhat clouding the issue. However, at the Bend weather station, the mean annual precipitation has dropped from 12.81 inches to 12.05 inches in recent decades. This might indicate that the moisture trend is still down.

In 1948, the Bend station measured 21.87 inches of moisture, second highest mark in the history of the station. And, in the "great flood year" of 1964, the Bend station measured 8.74 inches of moisture in 1 month--December. That was greater than the totals measured in the entire years of 1939 (8.29), 1949 (6.04), and 1959 (5.75).

The history of weather records for the Bend station begins with the establishment of a climatological substation there under supervision of the old Pilot Butte Development Company. The year was 1901. In early years, the

weather instruments, in a "cotton shelter" box, were exposed on an old stump in downtown Bend. Later, the instruments were placed on the roof of The Bulletin building. In 1939, the weather station was shifted to 1426 Harmon Boulevard in Bend. It has been at the same location since. The same observer has been in charge since 1923.

Relative to the climate of Bend, headquarters of the Deschutes National Forest, Gilbert L. Sternes, state climatologist, had this to say:

"Bend lies along the western border of Central Oregon's high plateau very near the geographic center of the State. The foothills of the Cascade Range begin immediately west of the city and terrace upward to a crest ridge generally between 5,000 and 6,000 feet elevation about 20 airline miles away. A number of peaks tower several thousand feet higher. The rolling plateau extends southward and eastward from Bend to respectively the California and Idaho borders, broken only occasionally by hills or chains of comparatively low mountains. The plateau to the north is cut by a number of canyons or narrow valleys of drainage streams flowing into the Columbia.

"Bend has primarily the continental climate of the Great Basin, along whose western edge it lies. Its proximity to the mountains materially moderates the more extreme temperatures of summer.

"Precipitation is generally light since most storms move from the west, with a large percent of their moisture intercepted by the Cascade Mountains. During the late spring, summer, and early fall, a number of thunderstorms occur. Most of the precipitation of that period is associated with these. However, seldom is either the rainfall or the hail that occasionally accompanies these disturbances heavy enough to cause significant damage. On an average, there is less than 1 day a year with rainfall of an inch or more.

"Slightly more than 50 percent of the annual precipitation falls in the 4 months of November through February, most of which is in the form of snow, whose annual total is approximately 34 inches. This is generally the result of light storms, rather than any considerable depth at one time...snow rarely accumulates to a depth of a few inches or lies on the ground for any extended period.

"Moderate days and cool nights generally characterize Bend's temperature the year round. While there is an average of 11 days a year with temperatures above 90 degrees, there is less than 1 when 100 degrees is reached. About half the nights have temperatures down to freezing or lower and, even in July, the warmest month, at least one minimum of 32 degrees can be expected. Temperatures of zero or lower can be expected about three times a year. January is the station's coolest month with an average daily maximum of 40 degrees."

Bend is on the eastern fringe of the Deschutes National Forest, about halfway between the southern edge of the forest and the northern tip. Weather recorded at Bend is generally typical of the forest at similar altitudes. To the south, as the elevation gains, snowfall is heavier.

The high mid-Oregon Cascades drain moisture from Pacific clouds moving over the mountains; but actually, it was noted by Dr. E.T. Hodge, geologist, a number of years ago, some of the snow that falls west of the Cascades eventually reaches the Deschutes watershed. This is snow that is whipped eastward over the divide by high winds. Occasionally on clear days when there are strong winds aloft, some of this shifting snow can be seen as long streams reaching out from the Three Sisters and other high peaks.

Cascade weather is also a factor in providing ideal skiing conditions at Bachelor Butte. There is considerable turbulence in the high Three Sisters area as storms, ocean-born, whip over the divide. This turbulence results in heavy snow falling on Bachelor's slopes. Also, moist snow that moves up the western Willamette slopes is somewhat "dried" as air mixes with that from the inland country and the Great Basin. The result is heavy, fine-skiing snow on Bachelor, frequently when other northwest areas are receiving damp snow and sticky skiing.

Snow in the Cascades is of great importance to irrigated areas because snow-melt is impounded in big reservoirs in the upper Deschutes country. An abundance of moisture in the hills also means fine streamflow for early irrigation use.

Big springs which pour their flow into the Deschutes from the west apparently have their origin in the snow-mantled high country. Seasonally, the Soil Conservation Service, assisted by other agencies and representatives of Central Oregon Irrigation Districts, make snow surveys in the high country to determine the depth of the mountain pack and its moisture content. From such information, forecasts of great value to irrigationists can be made.

Foresters also have need for information about the Cascade snowpack because of the bearing of snow in lowering fire hazards, providing moisture for mountain meadows, and filling lakes.

"Bottoms Up" Frosts

Among strange streams of the Pacific Northwest is Tumalo Creek, a Deschutes River tributary west of Bend. This stream originates in the high Cascades, yields some of its flow to the City of Bend water system and to the Tumalo Irrigation District, and then adds what water is left to the Deschutes River below Bend.

But, of special interest is the fact that, occasionally, in cold winters, Tumalo Creek freezes from the bottom up. There have been a few winters when the creek, its channel choked with ice reaching up from the bottom, left its bed in Shevlin Park, 3 miles west of Bend, to cut new channels through the area and uproot trees. The "bottoms up freeze" attracted wide attention and resulted in a report from the U.S. Geological Survey Water Resources Division. C.C. McDonald noted:

"Ice occurs in natural streams in three principal forms: Surface, frazil, and anchor. Frazil ice is a form composed of small particles floating in water or mixed with the water by turbulence or wind action." It has been called "rubber ice."

The heat loss from the earth by radiation during the night is believed responsible for the formation of anchor ice, the type that freezes from the bottom up. Anchor ice generally forms during the coldest part of the night. It seldom forms on cloudy nights even though the temperature may be considerably below that required for it to form on a clear night. It has not been known to form under the ice cover, but has been known to form under 40 to 45 feet of water, although its occurrence at those depths is rare. Generally, anchor ice does not form in water more than 6 to 10 feet deep. It forms more readily in clear water than in muddy, and in moving water more readily than quiet.

On a clear night, heat waves pass freely from the earth into space. Clouds and haze tend to reflect the heat waves back to the earth and reduce the heat loss, which would explain the absence of anchor ice on cloudy nights. Water transmits radiant heat, preventing the formation of anchor ice under an ice cover.

Anchor ice, U.S. Geological Survey technicians believe, is formed primarily by particles of frazil ice freezing in contact with rocks which are slightly below freezing and becoming attached to them. Flowing water may attain a temperature very slightly below the freezing point: and, when the water is in this condition, ice crystals will adhere readily to the supercooled rocks of the streambed. The gradual accumulation of ice particles forms great masses of slush ice, frozen firmly to the streambed or to rocks in the stream. These masses are only partly frozen together and yet are strong enough to resist the action of the flowing water.

Anchor ice may form in place by the water freezing into a layer of solid ice over the rocks in the bed of a stream. The occurrence of anchor ice in solid form is very rare, although it has been known to form a thickness of 2 inches. Usually, only a very thin coating of ice forms over the rocks which will catch and hold the frozen particles of frazil ice.

Anchor ice may cover the bed of a stream in a uniform layer or it may attach itself to rocks in a riffle, forming hummocks which partly dam and hold back the water. These accumulations of anchor ice may attain a thickness of several feet in a single night.

Anchor ice is seldom found in streams which freeze over early in the season and remain frozen until spring.

Tumalo Creek, cold and slowed a bit just above the entrance to Shevlin Park, meets most of the criteria advanced in the explanation of the formation of anchor ice.

There are several other "anchor ice" streams in the Pacific Northwest. They largely account for channeled meadows and other areas ripped by streams that left their ancient beds.

Winter of Brown Snow

One of the strangest of all winters in the Deschutes country was that which yielded a heavy fall of "brown snow." Residents, early on a March morning

in 1906, awakened to find a brownish coat over the entire area. Even after the snow disappeared, the brown stuff, a very fine dust, could be found under shingles, in old cabins, and even in the range country. The "brown snow" was traced to a fierce duststorm in the upper Columbia gorge. High winds whipped earth from the Arlington country and downstream, and the fine silt was carried into Central Oregon and dropped to earth with the snow.

Weather records have been kept in various parts of the Deschutes National Forest through the years, but most records have been seasonal, kept only in the fire season. Records at Sisters have provided considerable information relative to the weather of that area, and there have been some records from Crescent. But the Deschutes region has to depend primarily on the unbroken Bend weather records of nearly 70 years to interpret the area's varied weather.

Eventually, there may be an overall record of the Forest's weather through the decades and eons. This effort was partly accomplished when Keen made his tree-ring calendar study in 1937. He wrote:

"The ancient history of Eastern Oregon, as recorded in this tree-ring calendar, makes very interesting reading. The successions of fires, droughts, floods, and insect epidemics are all written in this record only awaiting a complete deciphering. So far, only some of the more outstanding events have been interpreted.

"Going back over the record, we find that the recent drought started in 1917, reached a low in 1924, and a second low in 1931, and now shows a trend toward recovery. Growth during the period 1912 to 1916 was much better than average and reflects the abundant precipitation during those years.

"During the period 1900 to 1919, average conditions prevailed; and we find, by summing the departures, that the average growth during this period is equal to the general average of the past 650 years. This is of great importance in indicating what can be expected as normal weather conditions in the future...

"The great flood of 1893-94 is clearly marked in this tree-ring calendar. As will be remembered, during this flood, the Columbia rose to its highest recorded stage of 33.0 feet and the Willamette flooded the business section of Portland. That such flood conditions were not unusual in early history is indicated in the tree-ring calendar, when peaks such as occurred in 1861, 1814, 1791, 1775, 1752, 1702, and 1673, are recorded."

Pioneer records reveal that the Deschutes River carried flood waters to the Columbia in 1861. "In 1861," Keen wrote, "we find an outstanding peak of growth which marks a high point in the ring pattern throughout Eastern Oregon." Incidentally, the tree record shows that between 1839 and 1854, when immigrant trains were trekking into Oregon, the country was suffering from a severe drought. Evidently Goose and Harney Lakes, and many others in the region, were dry at that time. When Goose Lake again dried in 1925, ruts of wagon roads were clearly seen crossing the bed of the lake.

Keen noted that "the normal distribution of ponderosa pine is limited to the zone where annual precipitation is in excess of 12 inches. This appears to be the tree's minimum requirement." An exception is the "Lost Forest" in Lake County near Christmas Lake. There, a fine stand of pine has defied annual precipitation of from 6 to 8 inches annually. Sub-soil water conditions are a factor in growth at the "Lost Forest," where in 1968 an artesian well was developed through shallow drilling.

Year of "Brown Belt"

A strange weather phenomenon, affecting trees in limited area, occurred late in January 1957, a season when the mercury at the Bend station dipped to 23 degrees below zero and was followed by another sub-zero chill in February. The January cold kept the mercury below zero for an entire week.

Later in the season, foresters noted a brown band circling Black Butte, old volcanic cone overlooking the Sisters country. An examination revealed that needles on pines were dying. All in the "brown zone" had been killed. Trees were also brown north along the tip of Green Ridge and at similar elevations in the region.

In many parts of the Deschutes National Forest, there was a heavy kill of Greenleaf Manzanita.

Apparently the solution to the "brown band" around the cone of Black Butte and nearby areas was due to a natural "burn" resulting from a lack of moisture from roots of trees. When the severe weather occurred, there was only a light snow on the ground. The zero temperatures penetrated deeply, and frost remained in the ground for some time. When warm weather came, the needles, lacking life-giving food and moisture from their chilled root system, desiccated. Eventually the leaves were shed, but there was no permanent damage to the trees.

That severe weather of late January 1957 killed thousands of acres of manzanita. Defoliated, spectral, gray limbs of the long-dead brush are still in evidence along the Cascade Lakes Highway about 8 miles west of Bend.

All time weather records at the Bend station, dating from 1901 to the end of 1968, follow:

- Lowest temperature, -26 degrees, February 1933
- Highest temperature, 104 degrees, July 1928 & July 1939
- Deepest snow, 55 inches, December 1919
- Greatest seasonal snowfall, 77 inches, in 1919-20
- Heaviest monthly precipitation, 8.74 inches, in 1964
- Heaviest annual precipitation, 25.75 inches, in 1907
- Greatest precipitation in 24 hours, 2.36 inches, in 1945
- Lightest annual precipitation, 5.75 inches, in 1959
- Average daily maximum temperature, 60.2 degrees
- Average daily minimum temperature, 31.6 degrees
- Average monthly temperature, 45.9 degrees

DESCHUTES "RECREATION" FOREST

Over the decades, even dating back to the past century, the Deschutes country has been a land of high recreation use. This use was light when the Deschutes National Forest (Prineville) was created on July 1, 1908, but it phenomenally increased through the years. In recent years, the Deschutes has been near the top in the entire Pacific Northwest, with major problems faced in providing accommodations for the ever-swelling tide of recreation seekers.

The Deschutes is a "recreation forest" partly because of its accessibility, its extensive road system, and the constant lure of its scenery, its fishing and hunting, and its many lakes and streams. Towering peaks of the Cascade lakes, spectacular geology, and the moon-like crater occupying the root of an old mountain in the Paulinas, have attracted their share of recreationists.

Even before the Deschutes country was made accessible by roads and trails, it lured many people. At first, they came from Central Oregon stock ranches, to camp at mountain lakes, fish, bag a few deer, and harvest some berries. In this early recreation group were big game hunters, some from eastern states, some from foreign lands.

In 1920, a nationally known figure, Irvin S. Cobb, author, humorist, and sportsman, came to the Deschutes country in search of a creature he called a "lava bear." That hunt, later reported in The Saturday Evening Post, attracted national attention. Cobb made Bend his jumpoff point in his trek into the Deschutes woods. His guide was the late W.P. Vandever, upriver rancher whose bear dogs were famed in the west. Before heading south from Bend, Cobb was guest of honor at a "big party" at the Pilot Butte Inn, which the author, in a national publication, called the finest hotel in all America. At the time, the big Inn was only 3 years old.

Planning to join the Cobb party in Bend in the nationally-publicized hunt for a lava bear was a Deschutes National Forest official, Norman G. Jacobson, supervisor. He notified the Regional Office in Portland of his plans. But the month was August, near the middle of the fire season. Regional officers vetoed Jacobson's proposal to accompany the bear hunters. He resigned on August 16 and joined the bear-hunting party.

The hunt for a lava bear proved futile, but a number of years later, a trapper, J. Andrews, caught a small, brownish bear in the Fort Rock woods and called the creature a lava bear. He toured much of America with the little creature. Eventually, Smithsonian authorities were asked to identify the small bear and others of its kin found in the Fort Rock woods. They said it was a common black bear, apparently stunted by its rigorous existence in the marginal pine country. It was also noted that some black bears are a bit brownish.

That did not end the lava bear story. Years later, Bend High School athletic teams, especially gridmen, were given the name Lava Bears. That name still sticks.

Many persons not bent on recreation were lured to the Deschutes country in early days by deer and various fur animals. When Nathaniel Wyeth of the Hudson's Bay Company went up the Deschutes River past the Bend site in 1834 he was in quest of beaver pelts.

Late in the past century, hunters seeking deer hides were in the Deschutes region. One important camp of the deer hunters was in the Bend area of the present. There they waited for deer to come in from the High Desert to water at the Deschutes. Deer were skinned, and their carcasses were left for coyotes and occasional wolves. One group of hunters recorded a fine harvest of hides, which were moved to The Dalles. There, the hides were lost in a warehouse fire.

In old campsites along the Deschutes, fish bones and gear used in catching trout indicate that fishing in the Deschutes was good even before white men came. But the Indians did not fish for recreation. They were in quest of food.

First settlers of the area were not adverse to take time out for fishing treks to the Deschutes. Some did not have to travel far. This was true of the pioneer residents of Farewell Bend and the village of Bend that followed. When The Bulletin was founded in a log cabin in Drake Park of the present, a printer, A.H. Kennedy, occasionally took time out to drop his job of type setting to fish in the Deschutes. He recorded the information that fishing was great.

Although fishing was good on the Deschutes and its main tributaries, spawning trout were not able to get over Paulina Falls to reach Paulina Lake. And beyond that lake was land-locked East Lake. Developers of a health resort at the East Lake hot springs saw need for trout in that lake to lure vacationists. They made arrangements to plant trout in the high lake.

Trout Carried To East Lake

Late in October 1912, a shipment of 60,000 rainbow trout fry were received in Bend and hauled to the outlet of Paulina Lake by Fred Shintaffer with team and wagon. Shintaffer was one of the developers of the early-day East Lake Resort. The trout were transferred to a live box anchored in the lake, and the next day towed across Paulina Lake. From there, they were carried in 5-gallon kerosene cans with the loss of only about 100 fish to East Lake. The packing job from Paulina to East Lake took 12 hours of real labor and was done by Shintaffer, Alfred A. Aya, Ivan Schultz, and Ranger John Curl. Each man carried two cans of fry each trip. Fry planted in late October averaged 2 inches in length; and, by August the next year, they had reached a length of 9 inches. They were 16 inches long in July 1914.

The Twin Lakes were also planted in 1912 by George Craft, Ralph Curl, and Ranger Curl. They caught the fish on hook and line from the Deschutes River and carried them in a tin dishpan to the nearby lakes. It was in that year that the first road was blazed from La Pine to Paulina Lake in the spring of 1912. One of the men working on the project was Bill Rodgers, captain of the Portland Beavers baseball team.

Planting of trout by the Oregon State Game Commission rapidly increased in the Deschutes National Forest before and after World War II, with special tankers used. Then came the release of trout in high, virtually inaccessible mountain lakes from low-flying planes. As a result of these "drops" many virtually unknown lakes in the crest country of the mid-Oregon Cascades hold fine trout.

Fishing in the Crane Prairie basin was exceptionally good in a year or two after the dam was built and the reservoir was filled. Fish developed rapidly, probably due to the abundance of insects and other food from the newly-killed timber. Catches of trout 20 to 24 inches in length were common. On the urging of the Deschutes Rod and Gun Club, the reservoir was closed in 1925 and was not opened until 1949. The closure was imposed as a trout propagation move.

In early years, an extensive game refuge was created in the Paulina Mountains. It circled the high country and extended well into lower areas. Following a long closure, the area officially known as the Paulina Game Refuge was reopened.

Early-day recreationists found their way into the high Deschutes woods over dusty, rutted roads. The road into Newberry Crater, now surfaced over its entire length as a result of a joint Deschutes County-Deschutes National Forest effort following World War II, was terribly dusty, very winding, and badly rutted in early days, but it was extensively used. This was also true of the old route into Elk Lake known as the Century Drive.

Camping in the high country in summer months was a favorite recreation; and, in pioneer times, there were plenty of sites. Then came the great rush to the forests after World War II and the increasing demand for campsites, and space for trailers. There was also a need for water, and this need became acute in the summer of 1968 when a number of important wells went dry.

It was estimated that, in the vacation season of 1968, some 2,408,000 people visited the Deschutes National Forest, fished in its streams, climbed its glacier peaks, camped along streams and meadows, and hunted in its forests. This was an all-time record for visitors to the Deschutes--but, through the years, it was noted, use of the forest has been ever increasing.

Adding to the lure for vacationists are various wilderness areas on or adjacent to the Deschutes National Forest. Semi-wilderness trail trips lure many. Girls from four continents and several ocean isles in August 1960 joined in their greatest adventure with their base camp at Todd Lake in the Bend District. They were the Senior Girl Scouts of America. Grouped into small patrols, the girls hiked into the high country once glazed by lavas and later cut and scoured by great glaciers.

A huge harvest moon, just short of its full phase, moved into a cloudless sky over Tumalo Mountain as the girls held their first night meeting. Campfire songs echoed through firs and hemlocks. Light from a dancing fire brought into relief the faces of 116 Girl Scouts and Girl Guides. The occasion was an all-wilderness encampment, and the Deschutes was selected because of the fine campsite at Todd Lake and the white Three Sisters high on the Skyline, with Bachelor Butte across the way. The encampment, followed by a smaller outing a few years later, was declared the most outstanding in the history of the organization.

Assisting with encampment arrangements were Deschutes and Bend District personnel. Also held in this same general area in the summer of 1967 was the Western Rivers Girl Scout wilderness encampment, with base camp on Crater Creek facing jagged Broken Top. The girls were told:

"This is wilderness--created by God, molded by nature; the province of wild creatures, the far retreat of man."

Deschutes recreation, visitors agree, is varied. Hiking is a recreation offering; and, for those who do not want to walk, there are horse trails leading into alpine spots. So heavy has been the use of horse trails in the Deschutes woods that some problems are being faced. Campsites for riders is one of the problems, and trails used so heavily they become dusty is another. State groups have held outings in the Deschutes Cascades with horses moving over mountain trails.

Winter brings a new form of recreation to forest users; and, in the Deschutes country, this interest is largely directed to the skiing field, with some of the finest facilities in the entire region. Providing a new form of winter sports and some problems is the rapidly growing use of motorized equipment on snow fields, at times through forest openings. Owners have been cautioned that motorized equipment must not be taken into wilderness areas.

There were 172 campgrounds and picnic areas on the Deschutes Forest at the end of fiscal year 1968. Recreation visitor-days use in the previous fiscal year aggregated 4,300,000. Winter sports visitors were estimated at 135,000. Resorts under special use numbered 9. There were 305 recreation residences on the forest.

DESCHUTES FOREST FIRES

When various timber withdrawals were made and forest preserves were created, the federal government undertook the protection from fire of the vast stands of pine and other species of interior plateau and eastern Cascade foothills. That protection was inadequate--yet it was a beginning.

As at the present, lightning was the chief cause of fire. There was little the isolated rangers and their few field assistants could do, other than to watch the progress of fires and smoke rolling up from the green woods. In the early years of the century, prior to the creation of the Deschutes National Forest, the fire control organization consisted of only two men--Cy Bingham, who patrolled north and south from the high Odell-Crescent Lake country, and Bill Vandever, subject to call from the "Old Homestead" in the upriver country.

Not only did that small organization of early days have to check on forest fires started from lightning but had to watch for fires started by people who believed that light burning was good for the woods, especially parts used for the grazing of thousands of sheep. Indians also received blame for some of the early day fires. It was said fires were started to get deer out of the thick woods.

There was no "fire consciousness" in those distant days, but it slowly grew after forest users discovered that burns frequently were covered in later years with nearly impenetrable brush, especially manzanita, with its horny snags and spreading branches. Through the early years, many of the larger fires were on the present Fort Rock desert. Some of those spread in from burning grasslands. Most were lightning caused.

The first large fire of record in the Deschutes occurred on August 1, 1908, and burned over all of East Butte, much of China Hat, and several thousand acres to the north. For a time, that fire raged on an unbroken 15-mile front. So serious was the fire as it raced through the Paulina foothills that Ranger E.P. Petit, stationed at Rosland, issued a call for 150 men. Coming from Shaniko, Moro, and other points along the Columbia Southern Railroad, they fought the wind-whipped fire for \$2.50 a day and board.

Hot, dry weather enveloped the upper Deschutes country when on June 6, 1910, smoke curled up from the Edison Ice Cave area. Flames quickly spread through the intermixed pine and lodgepole as erratic winds whipped through the parched timberlands. A week later, when the blaze was controlled, more than 7,000 acres had been blackened.

Even the Metolius River country felt the brunt of fires in early days. One occurred in July 1910. It covered an area from the mouth of Jefferson Creek down the river for 4 or 5 miles, jumped over the river, and raced to the top of steep Green Ridge.

In August 1914, a bad crown fire covered 7,000 or 8,000 acres in the lodgepole flats south of the Summit Stage Station, near the present route of the Fremont Highway. One year later, in 1915, a sagebrush fire from the desert spread over practically all of Pine Mountain and some timber to the west.

Because few men were available, most of the fires prior and shortly after World War I were stopped through the use of team-drawn plows, the only equipment available to build firelines. It was the practice to plow lines around the fires, then backtrack between the plowed zone and the spreading fires. Many of the teams used in the fire-trenching operation were obtained from High Desert ranchers. This was the era when virtually the entire High Desert was homesteaded, with some of the fenced lands reaching to the timber edge.

Several major fires blazed over and around Fox Butte of the Fort Rock District. In 1920, a Fox Butte fire covered 1,830 acres. Then, in 1926, Bend residents, looking into the south, viewed with alarm a great cloud of smoke. It was from a Fox Butte area fire that covered 9,872 acres.

Some of the other large Deschutes fires were the Lost Man blaze, which covered 9,000 acres in August 1918; Wasco Lake fire which spread over 2,400 acres after starting on August 10, 1924; the Spring River fire of May 9, 1924, which burned some 2,200 acres; and the Arnold Ice Cave fire, 2,500 acres in July 1924. There was an 880-acre fire on Cultus Mountain on August 12, 1926.

The Deschutes Forest in July 1930 suffered several bad fires, all of which burned at the same time. One was the Big Springs fire, 4,370 acres, and another was the Dugout Lake fire, 1,070 acres in a difficult area. At the same time, the Maklaks fire, seriously threatening, burned through 116 acres. At the peak, about 1,000 men were fighting those fires. Jack Campbell and Walt Perry were in charge of the Big Springs fire, C.H. Overbay and Cleon Clark headed the crew fighting the Maklaks blaze, and Perry South and Bud Burgess worked on the Dugout Lake fire.

The largest fire in the recorded history of the Deschutes region was the Aspen Flat conflagration of July 23, 1959. It spread over about 21,000 acres of U.S. Forest, Bureau of Land Management, and other timber near the edge of the federal forest northeast of Fort Rock. Equipment brought into use to control that fire, raging in the hot days of a very arid summer, was unknown to early-day firefighters--big tank planes that flew low over the spreading fronts to drop borate slurry. Smokejumpers from the Redmond Air Base joined in the attack. Hundreds of men were on the firelines.

What a striking contrast with the distant pioneer days when Cy Bingham and Bill Vandever occasionally watched smoke curl into the sky from distant lands, kept an eye on the smoke for a few days to determine whether the fire looked dangerous--then, if the situation appeared serious, "took action" with their axes and shovels!

In some areas of the Deschutes, there is evidence, mostly in old scars and weathering stumps, of big fires that raced through the region in prehistoric days. They were fires that spread before prevailing winds and remained uncontrolled until they reached forest margins or rain fell.

Foresters long recognized that lightning, in warm summer months, was an all important factor in the start of fires. Years before weather forecasting was developed to its present stage, the Deschutes Forest set up a device that would register static in the air with a needle that jumped erratically when lightning weather neared. But the device was of little value in charting the course of anticipated electric storms, or their intensity.

Lookouts in pioneer days played major roles in detecting forest fires and spotting thunderheads as they pushed up over southern horizons. Holding lookout posts in early days were many women, who occupied lonely lookout points through entire summers.

In the early 1960's, great changes started taking place in the detection and control of fires in the Deschutes woods. Planes, placed on close, routine patrols in days of fire danger, started replacing lookouts. Dismantling of a number of the high stations started.

Planes also played vital roles in the control of fires by dropping retardants. It soon became evident that time was vital in attacks on forest fires. Early detection and quick control were factors that gave the Deschutes Forest many fine marks in recent years.

There have been seasons on the Deschutes Forest when not a single fire spread over more than 5 acres. But, foresters agree, the danger of a conflagration is ever present.

Some of the bad fires that flared through the Deschutes woods in earlier years started in adjacent forests or in grasslands. One of the most disastrous was the one that swept from the Airstrip area on Big Lake in the Willamette National Forest, in the arid summer of 1967, moved over the Cascade divide when fanned by a strong, westerly wind, and blacked 2,040 acres in the Deschutes National Forest. Three timber sales totaling 20.2 million board feet were promptly made that same fall, to salvage fire-damaged trees.

Rehabilitation of the fire area was carried out that same fall. Grass seed was spread to prevent erosion, and tree seed was sown to supplement natural regeneration.

REDMOND AIR CENTER

Activated in 1964 with Kenneth Evans as manager, the Redmond Air Center serves as the hub of U.S. Forest Service aerial firefighting in the entire Pacific Northwest Region. The center, just east of Redmond near the Ochoco Highway, is the home base for smokejumpers, air tankers, and a specially trained 25-man fire suppression crew, the regionally famed "Hot Shots," later known as the "Roadrunners."

The Redmond Air Center, in part of an area that served as an important air base in World War II, also bases a warehouse containing fire equipment for 5,000 firefighters and a specially equipped shop to maintain and repair approximately 300 fire pumps. In the summer months, some 100 persons are regularly employed at the Center and, during periods of heavy fire occurrence, this number is augmented as necessary.

All buildings and facilities, with the exception of the Air Tanker Base, are situated on a 70-acre complex adjacent to Roberts Field, Redmond's airport. The big field was reclaimed from an area of junipers, jagged rock outcroppings, lava humps, and basins, in World War II, with most of the material for fillings and runways moved from nearby Tetherow Butte by a fleet of trucks.

The Air Tanker Base is on the airport proper, near the FAA flight station. The plant has a storage capacity of 12,000 gallons of liquid aerial fire retardant and a 4,500 gallon per hour mixing capacity.

The Air Center complex consists of the fire warehouse, administrative office, combination training room and 25-man barracks, two other 25-man barracks, 100-man messhall, parachute loft, smokejumper training area, air tanker base, and residence.

Manager of the regional complex in Redmond is James C. Allen, who came to the Deschutes from the Siskiyou National Forest. He served as manager of the Cave Junction smokejumpers base before coming to Redmond to take over the post vacated when Evans transferred to Albuquerque, New Mexico, to enter Forest Service audit work.

Smokejumpers of the Pacific Northwest, trained at the Redmond air base, have had a remarkably accident-free record.

The 25-man fire suppression unit is a highly specialized crew on a constant alert for large fires any place in the Western United States. In the hot summer months, these men, moving generally by plane, may be found on a blaze near the Canadian border one week and on blazing firelines near the suburbs of Los Angeles the next. The men operate as a single unit. On the fireline, their specialty is handling the tough assignments. Their secret--planned attack, crew coordination, and fireline discipline.

Carl Rader headed the "Hot Shots" in their first year of intense activity in the western states. He then transferred to the Cache department of the Redmond Air Center, with Wayne Linville taking over the duties of foreman of the fire control unit.

Privately-owned air tankers are based at Redmond and are contracted to drop chemical retardant on fires. A 2-engine plane used in recent years carried 1,000 gallons and a 4-engine tanker carried 2,000 gallons. Tanks are designed with 500-gallon compartments that can be emptied individually or in any combination. Aircraft based at Redmond include both Forest Service owned and privately owned planes. The DC-3 used in recent years hauled 25 personnel, 16 fully equipped smokejumpers, or up to 5,000 pounds of paracargo or air freight. Smaller planes are also used. A small single-engined plane is assigned primarily to lead and direct air tankers to the hot fronts of advancing fires. These small planes are also used for reconnaissance.

The fire warehouse at Redmond maintains tools and equipment for 5,000 firefighters. This is the main Forest Service fire cache for all forests in Oregon and Washington. The cache was in great demand, especially in the 1968 fire season when numerous fires, most of them lightning caused, blazed in the region. Replacement firefighting tools and equipment are shipped to smaller interforest caches serving their respective areas.

After the fire season is over and most of the men have returned to home or to school, the Center is utilized for classroom training and conferences. The 100-man training room, with its stage and projection rooms, is the center of this activity.

Visitors are welcome to the Redmond Air Center, a facility of great importance in fire control in western America.

LAND EXCHANGES

First activity in timber management on the new Deschutes Forest chiefly consisted of getting information relative to stands. Representatives of eastern lumber firms had already made tentative estimates. The Forest Service did not get down to the business of making estimates until 1912 when Supervisor Roy Harvey had in the field a timber survey party that cruised the area west and south of Sisters as far as the Allingham divide. This party consisted of W.G. Hastings, chief; Frank Heintselman, later Regional Forester in Alaska; R.M. Evans, later Regional Forester in Region 7; Allen H. Hodgson, George A. Bright, and a Mr. Underwood. There were also several others whose names did not appear on work sheets. Ranger H.E. Smith helped for a time.

Also in 1912, K.P. Cecil, later Supervisor of the Columbia Forest (now the Gifford-Pinchot) had a land classification cruising party that covered the area south of Crescent in the old Paulina Forest. With this party was W.O. Harriman, later Ranger and Supervisor; Fred Matz, chief of party, ran a timber survey crew on the Sisters District west of the Metolius River in 1913. Some of the area was resurveyed by Matz 32 years later in 1945, following the Minto Pass fire. G.W. Hult led parties that did timber survey work southwest of Bend in 1919. Will Sproat, as forest assistant, started cruising in the Wickiup-Pringle Falls area in 1913. He obtained the information that saved this big area to the National Forest when the La Pine-Crescent elimination was made in 1914. With only two assistants, Sproat examined nearly all the area on the old Deschutes east of Paulina Mountain.

There was an unfortunate incident on the east Paulina survey job. One day, in mid-summer, Sproat and his men left camp for work as usual. On their return, they found the entire camp, maps, and papers, destroyed by fire. They had left a well-trenched campfire, but smouldering embers from the previous night were fanned to life and lifted over the trench line when the men were in the woods. Fortunately, survey sheets had been placed in a metal box and were usable, although badly charred around the edges. Sproat was a top violinist. His violin was lost in the fire.

Timber sales were of little importance in early days of the Deschutes Forest. However, free use of timber was high. One typical free-use permit was issued to the City of Sisters to provide logs for a schoolhouse. The logs were sawed into lumber in the small mill near Gist on the old road between Bend and Sisters.

Although the Shevlin-Hixon and Brooks-Scanlon firms built their first big mills in Bend in 1915, it was not until 7 years later that the first recorded sale of timber was made to either company. The first sale was made to the Brooks-Scanlon Company on May 23, 1922. First sale to the Shevlin-Hixon firm was a year later. From then on, sales rapidly increased.

Old records show that the first Chief's sale of timber was to Brooks-Scanlon on April 21, 1936. It was in the Fort Rock District. Another of these sales was made to the same company in the Flat Top area on September 16, 1939. The sale covered 66 million board feet. Ponderosa pine sold at \$1.50 a thousand board feet. This was in striking contrast with the \$58 per thousand paid for pine in the Boundary Sale at a Deschutes Forest auction in Bend in 1968. That sale held 4,100,000 board feet.

From 1922, when the first sale was made, to the end of 1968, a total of 3½ billion board feet of timber had been cut from the Deschutes National Forest.

The first exchange in the forest was made to Anton Aune for 160 acres in 1924. Numerous other exchanges were made in succeeding years. As early as 1944, an exchange of 89,760 acres was made with the Shevlin-Hixon Company.

The Deschutes Forest was the first in Region 6 to initiate a program of acquiring roadside strips along all major highways. First acquisition in the area was along U.S. Highway 97 north of Lava Butte from Brooks-Scanlon. This was completed on March 21, 1930.

Some of the exchanges covered roadside strips along U.S. 97 south of Crescent, land along the Willamette Highway near Odell Butte, along the Fremont and U.S. 97 south and southeast from La Pine, and along the Santiam Highway and the McKenzie route.

As a result, highways through the Deschutes National Forest are fringed with virgin pine or, as between Bend and Lava Butte, with half-century old pines flourishing in old cutover areas.

Crusade to Save Scenery

Playing no little part in the move to save roadside timber strips was the chance visit to Bend in the later summer of 1919 of Stephen T. Mather, who organized the National Park Service, and Madison Grant, an associate in the scenic preservation move. The two men had attended a meeting of the Oregon Newspaper Association at Crater Lake and, on their way north, stopped overnight in Bend. Arriving in the evening, they dropped in unheralded at the office of The Bulletin, the community's daily newspaper. There they met the late Robert W. Sawyer, a young editor recently arrived from the east.

The two men told Sawyer they were shocked at the "wasteland" of stumps and trash they had driven through, from California north. Had a growth of pines been left along the roadsides, Mather insisted, the beauty of the region would have been preserved and tourists attracted. The young editor "caught the spark" and set to work. It was a crusade that was to last through the rest of his life.

Thomas R. Cox, professor at San Diego State College, told the story of "the lighting of the spark" in the May 1968 issue of The Pacific Historical Journal. Joining Judge Sawyer in the crusade was Governor Ben W. Olcott.

Governor Olcott proposed to the 1921 Legislature several measures for the preservation of highway beauty. With statewide support, a bill was passed to give the commission authority to enlarge rights-of-way for preserving scenic strips. State park acquisition was authorized in 1925 under a different governor.

In the Deschutes country, Editor Sawyer found federal forest officials eager backers of the move to save roadside strips. Working with Sawyer for a

number of years in this effort was C.H. Overbay of the Deschutes National Forest staff. It was largely through the efforts of Overbay, working with Sawyer and others, that resulted in the preservation of the virgin pine forest adjacent to the Santiam Highway west from Sisters, as logging crews were making ready to move in. The roadside tract was saved through an important timber exchange. Editor Charles A. Sprague wrote in the Oregon Statesman in 1968:

"This generation enjoys the beauties of Oregon. We rave about Oregon scenery and use pictures of our natural wonders in tourist promotion. The parks and rest spots are well patronized. Very few know the debt they owe to the pioneers who fought the early battles for scenic conservation. Governor Oswald West is recognized as the savior of the Oregon beaches. Governor Ben Olcott deserves praise for his leadership in the cause of roadside beauty.

"Robert W. Sawyer was a vital force in all conservation causes to the end of his long and busy life."

Judge Sawyer was a man of many interests--he served for several terms as president of the National Reclamation Association, he was a member of the Oregon State Highway Commission, he was a student of history and traced trails of pioneers through the Deschutes woods, and he served as a member of the Oregon Capitol Reconstruction Commission in Salem.

It was Judge Sawyer, working quietly behind the scenes, who persuaded officials of the Shevlin-Hixon Company to donate to the City of Bend a tract of timber threatened with immediate logging. This is Shevlin Park of the present, on Tumalo Creek west of Bend. It memorializes the late Thomas Shevlin, company president in early years, ardent outdoorsman and sportsman. Not only did company officials set aside the Tumalo Creek strip as a park but they also agreed to preserve from cutting company timber within 600 feet of U.S. Highway 97 and some timber around Dillon Falls on the Deschutes River.

Through the years, strips of timber were set aside to preserve the natural beauty of the area. Only recently at the head of the Metolius River, Sam Johnson, member of the Oregon State Legislature, set aside a tract of timber close to the north base of Black Butte, where the Metolius River gushes from the earth as a giant stream. Cooperating in this effort was the Deschutes National Forest.

DESCHUTES SKI SLOPES

About the time the American public learned to say sitzmark and located Lake Placid on the map during the Winter Olympics of 1932, snowy slopes across America came alive.

But, even before 1932, there was some limited winter sports activity in the Deschutes country as cumbersome snowshoes went into attics and skis made their appearance. In the winter of 1923-24, there was a display of a pair of skis in a hardware store window in downtown Bend. So far as known, it was the first display of this type of winter gear used by a few hardy couples that hiked into the snow-blanketed McKenzie Pass area west of Sisters to glide down timbered slopes or over the snow-blocked highway.

Shortly later came the development of a winter sports area adjacent to the McKenzie Highway some 8 miles west of Sisters. Ski jumps were developed there, and there was a fairly good toboggan slide. There was some downhill skiing, but little slalom competition. Cross-country skiing rapidly developed, and later there were "races" over the McKenzie divide from the Alder Springs area on the McKenzie slope to the vicinity of Sisters. This was virtually the same route covered in part by John Templeton Craig on snowshoes in 1877, in an attempt to carry the mail from the west side to the Camp Polk Post Office. Craig died in a winter storm in a cabin at the summit.

Under a Deschutes National Forest permit, winter sports enthusiasts, to be known as the Skyliners after 1928, played in the snows east of the McKenzie Pass. There was plenty of activity there over winter weekends, with Sisters serving as the gateway to the McKenzie ski area, first developed in Central Oregon. Eventually, however, the skiers looked for a location closer to Bend and shifted to Tumalo Creek and "Swede Hill" on upper Tumalo Creek. Winters when snowfall was above average indicated that this area would be fine for a ski center. A good ski jump was built on a steep slope and the road into the area was improved. A fine lodge was constructed and was generally known as the Skyliners' Lodge on Tumalo Creek. It eventually passed to the Oregon State Grange under lease by the Forest Service.

Skyliners went ahead with the development of the steep ski hill on the north face of "Swede Ridge" and constructed a number of buildings, not far from the bottom of an improvised lift. Then, on January 31, 1957, a fire destroyed three buildings and much equipment. Virtually all the work of the Skyliners in developing a ski area in the Deschutes National Forest only 10 miles west from Bend was wiped out in one morning.

New Center Sought

With their buildings and equipment on Tumalo Creek destroyed, the Skyliners decided to look the situation over carefully before rebuilding. Several problems were faced. One was the lack of snow in the area, low in the Cascade foothills, in some winters. Another problem was the fact that the big fill made in building the ski jump was slumping away from the jump point and slowly moving down hill.

Interested in ski area development and in assisting the Skyliners, Deschutes National Forest officials, with James A. Egan as supervisor, joined in the quest for a new ski site. One of the officials heading the move was Don Peters. Egan and Peters had a site in mind: Bachelor Butte, only 21 miles west from Bend on the newly developed Cascade Lakes Highway, known in earlier days as the Century Drive.

Bend, through its Chamber of Commerce and other groups was also interested in a new location for a ski center. On February 28, 1958, a group from Bend, traveling in a vehicle towed by a large snow tractor, slowly moved up the highway to Bachelor Butte. They found a grand, white mountain, its slopes deeply covered with snow.

The snow excursionists were not only pleased with the prospective ski slope but with the spectacular view of the Three Sisters and Broken Top. One member of the group was Norbert Schaedler, Skyliner president. Also with the slope viewers were Ed Parker and Don Peters of the Deschutes forest staff, Pat Metke, Vince Genna, Bob Norby, and, among others, Gene Gillis.

All members of the group were unanimous in their opinion that "Bachelor Butte would make a thrilling location for a winter sports center, with its fine snow and its grand view of the Cascades and the interior plateau." Predications were made that the area would, when developed, attract national attention.

But the group interested in the development of a new ski center faced other major problems: The financing of the undertaking and the know-how to build a new ski area. Gene Gillis, who had considerable experience on western ski slopes, was asked to get in touch with various centers, even as far east as the Rockies, to see if any group could be interested. In Bend, Skyliners were eager to continue the project they had started on the McKenzie slopes and continued on Tumalo Creek, but finances were lacking.

Then came the proposal that a local group be formed to finance the huge project of developing a new ski center on Bachelor Butte. To undertake this imposing project, Mt. Bachelor, Inc., locally developed and financed, was formed.

There was little delay in getting the project under way. A Deschutes National Forest permit was obtained. The new ski center, to attract attention throughout the west, went into operation in the 1958-59 season. An estimated 10,000 people used the center that season. Developers thought that was great--but they had seen nothing. Less than 10 years later, in the 1966-67 season, a total of 154,740 persons were checked into the Mt. Bachelor, Inc., new ski center. Skiers came from many parts of the west.

In the 1966-67 season, Bend District Snow Ranger Dave Rasmussen planned for 168 days of operation. Facilities operated every day that season.

A major factor in the success of the Mt. Bachelor, Inc., operation was the decision of the Oregon State Highway Commission to place the 21 miles of road between Bend and the ski center in the road system calling for year around use. Replacing push plows and other small units used in earlier years, rotaries were made available by the state for use in heavy snow periods.

As the 1968-69 season at Bachelor started, three chairlifts, one Pomalift, and two rope tows were available. A new lift was in the planning stage.

Lifts are also in limited use in the summer months to move tourists and other sightseers onto the high slopes of Bachelor for spectacular views of the Oregon Cascades.

Chairlifts on Bachelor Butte reach to a point of 7,700 feet above sea level. Information relative to the three major lifts follow:

Chair Lift No. 1: Length, 4,200 feet; Vertical rise, 1,200 feet; Elevation Range, 6,500 to 7,700 feet; Capacity, 800 per hour; Date Installed, 1961.

Chair Lift No. 2: Length, 3,700 feet; Vertical Rise, 1,140 feet; Elevation Range, 6,340 to 7,480 feet; Capacity, 1,000 per hour; Installed 1964.

Chair Lift No. 3: Length, 1,900 feet; vertical rise, 460 feet; Elevation Range, 6,340 feet to 6,800 feet; Capacity, 1,200 per hour; Date Installed 1967.

The ski development at Bachelor Butte quickly changed the economy of Bend. No longer was the city in the doldrums through long winters when tourist traffic disappeared from highways. The ski development seasonally brings thousands to the area. Most of the skiers make Bend or Redmond headquarters while using the high slopes of Bachelor or the fine ski development at Hoodoo Bowl in the Willamette National Forest just west of the Santiam divide.

When Bachelor was placed in use as a ski center, it soon became evident that there would be need for a day lodge. This, given the name of the Egan Memorial Lodge, honoring the late James A. Egan, Deschutes National Forest Supervisor when the new ski center was started, is near the foot of the ski hill. In later years, a fine overnight lodge was constructed lower on the slope.

Safety has always been a basic consideration of the National Forest in administering its ski areas. This is true of the Mt. Bachelor, Inc., area, and National Ski Patrol men were on the job by the time the first skiers came down the steep slopes. Several of the Bachelor patrolmen, notably Dr. John N. Say, Prineville, and Don Peters of the Deschutes Forest Staff, won national recognition for their work.

Ski patrolmen, and some patrolwomen, mark hazards such as rocks and holes on the slopes and trails, help skiers in trouble on the hills, and reform the schussboomer who careens down hills out of control.

B I G E Y E O N M O U N T A I N T O P

The Deschutes truly is a forest of many uses. One such use is a site, on Pine Mountain 35 miles southeast of Bend, for the study of stars.

On the mountain at an elevation of 6,340 feet is the University of Oregon's Astronomical Observatory housing a fine 24-inch telescope and a 15-inch scope once used on the campus at Eugene and later used in testing sites for the new, sophisticated reflector.

Both telescopes, each in its own observatory, are on a Pine Mountain knob of about 4 acres made available to the University of Oregon through a special use permit.

The Observatory was dedicated on September 9, 1967, with several hundred persons present for the program in which the State of Oregon, the University of Oregon, the National Science Foundation, and the U.S. Forest Service took part. Guest speaker was Dr. Geoffrey Keller, from the N.S.F. headquarters in Washington, D.C.

Heading the move to find an observatory site in the Deschutes country and to obtain funds was Dr. E.G. Ebbighausen, University of Oregon astronomer. Using the smaller 15-inch glass, Dr. Ebbighausen, over a period of several years, tested sites. He spent several summers on the Cascade divide at Cache Mountain and in the flatlands a short distance south of Sisters. At Pine Mountain, he found a site free from dust stirred by winds and well above the haze of a city or the adjacent plateau.

The Pine Mountain Observatory is unique in that it has a communications system that instantly links it with the University of Oregon's statistical laboratory and computer center.

Electronic data from observations of the telescope are punched on tape and sent from a teletype in the Observatory via microwave towers to a similar microwave antenna in Bend. From Bend, the information goes by regular long-distance telephone to the University of Oregon computer center, which immediately analyzes the data and returns the information to Pine Mountain.

Ideal observing conditions were reported from Pine Mountain in the first full season of use. However, the prolonged winter of 1968-69, with overcast skies and many storms, handicapped observations. In charge of the observatory as custodian in its first two winters of use was Martin McCoy. Dr. Ebbighausen spent the first summer at the observatory, training McCoy in the use of the very sophisticated, electronic equipment.

The big telescope on Pine Mountain is primarily used in the study of remote, eclipsing stars, with photometric equipment installed. The smaller telescope is frequently available to the public. Visitors are welcome at all times, but they are reminded that astronomers generally work through the night hours and do not awake early.

Many groups have visited the Observatory, in the Fort Rock District, since it was placed in service. Interestingly, the Observatory is only a short distance from the now abandoned Deschutes National Forest lookout station on Pine Mountain.

The Pine Mountain 24-inch telescope is the largest in the Pacific Northwest.

Water From Rock

What will astronauts do for a drink of water when they establish a base on the moon?

That was a question asked in 1966 when astronauts and their instructors came to Central Oregon for their far-publicized trek through the "moon country" of the Deschutes National Forest.

As a phase of studies in connection with the astronauts' visit to the area, the Oregon State Department of Geology and Mineral Industries decided to come to the Bend area and "squeeze" water out of rocks.

On a cold morning in October 1966, Ralph Mason and Tom Mathews of the State Geology Department came to the Bend country to set up equipment in a pumice pit west of Bend and proceeded to "milk" the volcanic rocks of water. Watching the experiment and assisting was Dr. Jack Green, lunar geologist.

Equipment included a small oven, electrically heated. Packed into the oven were pumice rocks, weighing some 77 pounds. The heat was turned on and, after a time, out came more than a pint of potable water.

The rock was first heated to evaporate all "earth water" that might have collected in rocky pores. When the rock was as dry as that surmised to be on the moon, the electric heat was turned up to 1,400 degrees. Even that moderate heat was sufficient to break down the silicate and release molecules of hydrogen and oxygen, which chemically combined to produce "new" water. The steam from the arid rocks was condensed in a crude still.

Results of the test were precisely as predicted by Dr. Green, who had helped organize and conduct Oregon's International Lunar Geological Conference in August 1965.

Movie Sites Provided

The Deschutes National Forest has not only provided a site for an astronomical observatory, with a weather-recording station on the same grounds, but many locations for movie producers—including a Fort.

This stockade, generally known as "Fort Benham," was on the Bend Ranger District a short distance northwest of Benham Falls. It was erected in 1955, through the cooperation of the Bend Chamber of Commerce with a Hollywood production company.

"Fort Benham" was a fine replica of a frontier stockade, with big spiked top jackpines used for exterior walls and with platform for riflemen constructed. There were even officers' quarters. A huge gate, typical of forts in frontier America, faced toward Bend.

In and near that fort, site for which was provided by the U.S. Forest Service, many "battles" raged, with Indians and soldiers "biting the dust"--and one summer the dust was really deep. Some scenes for "The Indian Fighter" were filmed in that area, as were "takes" for Tonka, starring Sal Mineo. Starred in "The Indian Fighter" were Kirk Douglas and Elsa Martinelli.

Following considerable movie action, the make-believe stockade, on a timbered slope overlooking Benham Falls and the westward bend in the river at that point, "Fort Benham" was abandoned--but it still had many visitors. One summer it narrowly escaped destruction when an angler-caused fire on the river just above Benham Falls swept up the steep slope. But the flames stopped just short of the stockade.

In time, the stockade started going to pieces, largely as the result of vandalism. Soon there was a danger for visitors, and the U.S. Forest Service ordered its destruction. After being in existence for a decade, the fort was razed and the ground was cleared.

But Fort Benham remains as a point of interest for visitors to the area. Many who visit the Lava Butte Visitors Information Center in the summer months ask about the fort, its story, and its location.

Actually, the story of movie making in the Deschutes woods dates back to the first World War, when a scene requiring a forest fire and a burning cabin was required. The Forest Service provided an old cabin upstream from Benham Falls. There, long ago, a carefully-controlled fire swept through the woods and enveloped a cabin as cameras of an early era recorded the action.

About the time "Fort Benham" was in use, there was also some movie making near the scenic head of the Metolius River. There, in a dramatic scene of "The Indian Fighter," Kirk Douglas struggled with a girl in the icy cold water of the Metolius, while a stand-in for Elsa Martinelli escaped into the stream. Some Warm Springs tribesmen joined Central Oregon residents in providing background.

Movie action spread to other parts of the area--Smith Rocks, spectacular over Crooked River; Dry River Gorge, east of Bend, and the Deschutes River.

With Richard Boone of "Have Gun, Will Travel" fame, a series of sequences for that picture were made in the Deschutes country.

"Golden Earrings" was partly filmed in the Deschutes country and in Bend.
(1947) stars = Ray Milland and Marlene Dietrich

Dutchman Flat Movie "City"

In the late fall of 1958, a movie city took shape on Dutchman Flat, close to the base of Bachelor Butte. The city was "Blizzard, Wyoming."

In shaping the make-believe town at the lodgepole pine fringe near the northwest edge of Dutchman Flat, the movie makers expressed hopes for a "good storm." They got it.

The city was a typical western town, with only building fronts constructed and with boards well braced against the wind. There was one building for inside scenes.

In the star-studded cast was Burl Ives, singer, actor, and troubadour of movie and stage fame, well-known for his folk songs and winner of an Academy Award for his work in "The Big Country."

When the make-believe western city was completed, the movie makers looked toward the west. Clouds were gathering. Soon deep snow spread over Dutchman Flat.

In that snow, the movie people went into action, producing a western film that was to entertain people in all parts of America.

VISITS BY THE ASTRONAUTS

American astronauts, some of whom were to live and "walk" in space and circle the moon, trained in volcanic areas of the Deschutes National Forest in the late summers of 1964 and 1966.

They tested space gear on the jagged McKenzie lavas, then moved into the "moon country" south of Bend, to walk around the rocky rim of Lava Butte, look over pumice fields to the south, view the great Newberry from the high top of Paulina Peak, then swing into the region of old volcanic blowouts (maars) in the Fort Rock basin.

Just west of Bend, the astronauts walked into deep pumice pits, to hear from geologists the story of glowing avalanches which long ago broke from high Cascade volcanoes to cover much of the Bend area and, in places, tumble into the Deschutes River.

In the final phase of the training, held in late August 1966, the astronauts visited "The Hole in the Ground" near Fort Rock. Geologists told the astronauts that it and other craters of the Fort Rock basin were not created by meteor impacts but by terrific volcanic blasts. Some of the astronauts later were to visit Arizona's Meteor Crater and compare it with the Fort Rock features.

Purpose of the visit of the astronauts to the volcanic Deschutes region was to acquaint them with topographic features, some caused by meteor impact (in Arizona) and some by volcanic blasts, in Oregon's "moon country."

While in the area, the astronauts one hot afternoon walked into Lava River Tunnel, just south of Lava Butte, to acquaint them with caverns which may be similar to ones on the moon. While in the area, the spacemen visited the dissected volcanic cone just across U.S. Highway 97 from the Sunriver location. This cone was deeply cut in World War II for material used in the development of the Camp Abbot site.

One of the instructors was a world-renowned geologist, Dr. Aaron Waters of the University of California.

Newberry Crater won the major attention of the astronauts with Dr. Waters lecturing to groups who made the side drive up the old crater rim to the peak for a spectacular view of East and Paulina Lakes. Working with Dr. Waters was Dr. Ted Foss of the NASA Manned Space Center in Houston, Texas. He headed a group of five geologists that included Dr. Alfred Chidester from the U.S. Geological Survey center at Flagstaff, Arizona.

In the process of training the astronauts, geologists also took the spacemen to areas of recent volcanism near Flagstaff. Deschutes National Forest staffmen assisted with arrangements for tours through the Oregon "moon country."

The Bend area was selected as the base for the training, in which three groups of astronauts visited in a 2-year period, because of the varied type of volcanic terrain found here.

The spacemen walked on lavas to get the feel; they climbed craters and lowered themselves into caves, and they were told of ice that accumulates in some of the caves.

The visits of the astronauts to the Deschutes National Forest "moon country" attracted national attention.

Lunar Geological Conference--1965

Unique in all America, a Lunar Geological Field Conference was held in the Deschutes National Forest and adjacent areas in late August 1965, with world-renowned scientists taking part. The conference was jointly sponsored by the University of Oregon Department of Geology and the New York Academy of Sciences, with the Bend Chamber of Commerce and Deschutes Forest staffmen assisting locally.

The scientists, from many parts of the world, visited much of the area studied by the astronauts who were in the region in 1964. Viewed and studied was volcanic terrain within the Deschutes Forest--Bachelor Butte, Cinder Cone, the Three Sisters stratovol canoes, Broken Top, Rock Mesa dacite dome, Devils Hill chain of dacite domes and flows. There was a demonstration of a gas analyser on gas vents at Bachelor and in Newberry Crater.

The scientists also visited the Fort Rock country, viewed the Devils Garden pahoehoe flows and the Hole in the Ground. Also examined was the Derrick Cave.

On one of the field trips, the international geologists drove up Paulina Peak for a view of the Newberry Caldera. The East Lake hot spring attracted attention, as did the Great Obsidian Flow.

The lunar geological conference was held in a move to identify certain earth features with some that might be found on the moon. Two years later, the first World Andesitic Conference was held in practically the same area, with the Deschutes Forest again providing most of the varied field that came under study.

CASCADE PEAKS CONQUERED

Mt. Washington, Jack Conquered

By the summer of 1923, all but two mountains of the Oregon Cascades had been scaled. Still challenging on the high Cascades as August of that year arrived were Three Fingered Jack and Mt. Washington.

Some alpinists said they would never be climbed. Their pinnacled peaks swayed in the wind and their lightning-shattered summit lavas were little more than death traps. The Mazamas of Portland, famed as alpinists, attempted the climb of Washington in 1922, but stopped 70 feet short of the summit.

Then a small group of Bend High School boys accepted the challenge of the glacial-cut peaks looming over the Santiam Cascades. Within a week, they scaled both mountains. The feat of the young alpinists won national attention.

The high school mountain climbers got ready for the conquest of the "unconquerables" by climbing Bachelor Butte, Broken Top, and the North Sister.

On Saturday, August 25, 1923, the young adventurers drove into the Mt. Washington area. After spending a night at Big Lake, the boys climbed Washington, a mere but shaky skeleton of an old volcano. Their only equipment was climbing boots and 275 feet of rope.

The conquest of Washington was dangerous but not too difficult. Making the historic climb were Phil Philbrook, Ervin McNeal, Armin Furrer, Leo Harryman, Wilbur Watkins, and Ronald Sellers. There was one near tragedy on that climb. Harryman lost his footing when 70 feet from the peak. Below Harryman was 800 feet of "open air." Harryman quickly regained his balance and moved on to the top.

Newspapers around the nation and the London Times in England carried the story of that first climb. Yet, Philbrook recalled years later, it was not too difficult. "Fresh" from that ascent, the young alpinists looked toward nearby Three Fingered Jack. After camping out two nights, the climb of Jack was made on September 3, 1923.

Four of the boys who were on the Washington climb were joined by Ernest Putnam and Elmer Johnson, also Bend High School boys, in the conquest of Three Fingered Jack.

In the final stage of the climb, the boys moved over a hogback about 24 feet long and 18 inches wide. The climb was from the west side.

The alpinists found Jack far more difficult than Washington, with shattered rocks at the very top. From their seat astride the hogback, the boys looked down on two glaciers and a panoramic view that exposed some 25 lakes.

The climbers could feel their hogback perch vibrate.

But news of the first ascent of Washington virtually stole the show. There was little mention of the climb of the more difficult peak of Three Fingered Jack.

The Bend boys blazed the way for others. Since 1923, the two Cascade pinacles, remnants of mountains that came through the Ice Age, have been climbed many times.

Washington and Jack are two of the most spectacular peaks on the Deschutes National Forest's western skyline.

FLORA AND FAUNA

The Deschutes country's flora, including a listing of trees, first received attention in 1855 when the Williamson survey party, seeking possible rail routes through the region, passed through the area. Collecting and studying the region's flora was Dr. John S. Newberry, for whom the Deschutes National Forest's Newberry Crater was later named. Dr. Newberry was geologist and surgeon for the survey party, as well as botanist and zoologist.

Yet he found time to collect and identify many plants, including some new genera and many new species. His detailed report can be found in the exploration reports on file in the Deschutes County Library in Bend.

In 1923, an early-day botanist, Kirk Whited of the Redmond area, compiled a list of Central Oregon plants. Whited's list was not complete, but it is recognized as one of the fullest reports dealing with flora of the region up until the time federal botanists, including such U.S. Forest Service rangers as Jack Horton, entered the field. Horton prepared a fine herbarium which has served as a reference for young foresters through the years.

Whited's plant listings can be found in the February 12, 1923, issue of The (Bend) Bulletin. Whited noted that his quest for Deschutes plants was not ended. He wrote: "I believe there is a cottonwood, *Populus balsamifera*, Hooker, growing in the mountains, but I have not yet found it." His reports were colorful: "Quaking aspen (he listed the scientific name): A small tree the leaves of which are always in motion, caused, it is said, because the cross of Christ was made from this wood." Whited died before his study of Deschutes plants was completed.

Whited had this to say of *Pinus ponderosa*, which at the time was being milled in Bend, at two of the largest pine plants in the world:

"*Pinus ponderosa*, Dougl. Large bull pine or yellow pine of the eastern side of the Cascade Mountains, extending to the western Dakotas...Some persist in claiming a distinction between the western yellow pine and the eastern bull pine--a distinction that is without a difference except its place and condition of growth."

Establishment in Bend of a silviculture laboratory serving the western pine-lands aroused a new interest in trees of the Deschutes country, with the spotlight for a time placed on the once-lowly lodgepole pine--its choice of soils, temperature conditions which apparently limit its boundaries, and its growth when freed from competition.

Much of the Deschutes plant study of recent years has been confined to the higher Cascades, with special studies in the Three Sisters area. In the summer of 1965, Mary L. Barr of Albuquerque, New Mexico, was granted a collecting permit in the Three Sisters Wilderness. The study by Mrs. Barr provided much interesting information about the flowering plants of the alpine and subalpine life zones of the area, including not only the Sisters but Broken Top.

Mrs. Barr wrote to Supervisor D.R. Gibney of the Willamette National Forest and Supervisor A.A. Poust of the Deschutes, enclosing a list of species found in the alpine and subalpine life zones of the Three Sisters Wilderness:

"There are a few species which should probably be considered montane; the orchids are a few of such species. The dividing line between sub-alpine and montane is not always clear. Some interesting factors about the vegetation became apparent as I compiled my collecting notes. For example, there is one species which can be found only on Broken Top near the summit; this species is *Saxifrage caesptosaw*. *Draba aurola*, a small yellow-flowered member of the mustard family, was found only on the South Sister near the summit and on the southeastern side of the Little Brother. About 500 feet below the summit of the Middle Sister is the only place where *Polemonium elegans* can be found in the area.

"The orchids of course are hard to find; two locations of which I am certain are the Green Lakes Trail and the meadows on the south side of Broken Top."

Mrs. Barr made a fine collection of slides from pictures taken of the Three Sisters flora. She added: "I am much interested in the area and anything I can do to promote interest in and protection for the area I shall gladly do."

In her studies, Mrs. Barr listed plants in 20 different families. The compositae, Figwort, and Heath were among the largest of all families. Under the heading "Alpine and Subalpine Flora of the Three Sisters Wilderness," Mrs. Barr submitted a list by families. These lists are available in the Deschutes and Willamette National Forest offices in Bend and Eugene.

In her field studies, Mrs. Barr circled the Three Sisters, covering lava beds, glaciaded surfaces, and pumice flats. It was the first detailed study of high altitude vegetation undertaken in the Three Sisters region.

The isolation of the plant species in part of the high area attracted special attention. It was recalled that several of the species were found on only one peak.

Plants of the Three Sisters Area

In 1968, there was published a new study of plants of the Three Sisters region, from Windy Point south to the Sparks Lake area and east and west from the Three Creeks Lake country to the White Branch Creek region in the McKenzie slope.

This fine study was by Orlin L. Ireland of Eugene and was published by the University of Oregon's Museum of Natural History as Bulletin No. 12. Illustrated with colored pictures, it is considered the best study of the high area ever made. However, Ireland noted, there are many plants, especially the grasses and sedges, not included. All specimens on which the paper was based are in the Museum of Natural History herbarium at the University of Oregon. The late Professor L.F. Henderson, University of Oregon curator from 1924 to 1939, was one of Ireland's guides.

The Three Sisters are included in the study in a 19-mile segment of the Cascades that includes about 200 square miles of spectacular lava flows, forests, glaciers, and snow-clad volcanoes. From the divide, the range slopes gently to the high eastern Oregon plateau of the Deschutes country. Plans in lower areas of the Cascades, both east and west of the range, were excluded. Even the barren lava fields support some plant life, Ireland said. Precipitation ranges from an average of 69.91 inches at McKenzie Bridge to 16.65 at Sisters. Life zones ranged from the upper Austral to the Arctic-alpine.

Ireland found that the high Arctic-alpine zone, in the area above timberline, supports many plants which grow as well in timbered sections below. A few species are confined to the high zone, growing on slopes above the last prostrate hemlock. Large areas of the Arctic-alpine zone are found on the Sisters and Broken Top. Even Black Crater, 7,200 feet high, holds a few species characteristic of this zone. These plants grow at the crater's summit.

The Hudsonian zone, which in its lower sections includes a variable percentage of typical Canadian zone plants, covers a major part of the region. In his high area studies, Ireland found: A ridge is warmer than a draw down which the heavier cold air flows and, on warmer southwest slopes, the zone extends higher than on the colder northeast side.

The Canadian zone occurs sparingly in the Black Crater-Trout Creek section east of the Cascades. The arid transition zone is represented by a few square miles in the northeast section. This is a border area of extensive *Pinus ponderosa* forest.

In the Three Sisters country, Ireland found 5 families and 9 genera of Pteridophytes, two families and 6 genera of Gymnosperms, and 51 families and 173 genera of Angiosperms, or a total of 58 different families.

Plants in lower areas east of the Cascades and out to the desert edge vary greatly from those found in similar zones west of the mountains, because of moisture and temperature conditions.

Of much interest to travelers moving over inland roads of the Deschutes country are the varied penstemons, the warm-weather flower known as the Monkey Face, and, in season, the colorful Indian Paint Brush.

Greenleaf Manzanita

Typical of the Deschutes country and a source of concern because it is a fire hazard is the Greenleaf Manzanita, sometimes called buckhorn. It is a widely branched shrub, 3 to 8 feet high, with crooked, very stout limbs and smooth, dark red bark. It is so named because its leaves are green, in contrast with the dull green or whitish leaves of many manzanitas.

This manzanita, which bears the scientific name *Arctostaphylos patula*, chiefly inhabits dry slopes of old burns in full sunlight. The foliage usually has very little or negligible forage value for livestock or deer, except as a utility winter ration, or when nothing else is available. Most livestock and deer will lightly browse the tender shoots.

The shrub is of chief importance because of its abundance, especially in parts of the Deschutes Forest. The extensive brush fields of greenleaf manzanita often prevent the free movement of stock unless special trails are built.

Greenleaf manzanita, a natural fire hazard, is especially important in forest management plans. The ability of the species to withstand repeated burnings, make rapid new growth, and increase its stand, is phenomenal.

Visitors to the Deschutes Forest have found the dead, silvery, gnarled branches of manzanita of much interest and of value in home decorations, especially in the yule season.

Scores of visitors to the Lava Butte Visitors' Center in 1968 sought information as to area where they could cut this "buckhorn."

Western Juniper Natural Area

Not far from the eastern desert boundary of the Deschutes National Forest is the Western Juniper Natural Area. Recognized as a registered natural landmark, it is 16 miles southeast of Bend in the Horse Ridge country not far from U.S. Highway 20, where it moves over the high country to the Millikan basin.

The Western Juniper Natural Area was set aside as a registered natural landmark in April 1957 by the Department of the Interior. Action setting the area aside was taken by the Department's advisory board on national parks, historic sites, buildings, and monuments.

The Western Juniper Natural Area includes 600 acres owned by the Federal government and administered by the Bureau of Land Management adjacent to the Deschutes Forest.

The site holds a pure stand of Western Junipers, all in vigorous condition. Sagebrush predominates in the shrub area. Mule deer regularly use the site as winter range.

The Registry of National Landmarks is a program designed to establish an inventory of the nationally significant historical and natural properties of America and vigorously to encourage their continued preservation.

The program is voluntary, and landmark designation does not change ownership or responsibility for the property. Heading the action that resulted in setting aside the area was Wayne Morse, then senator from Oregon.

DESCHUTES WILDLIFE

Wildlife of the Deschutes country might be considered the first used of its historic assets. Indians hunted and fished in the area centuries before white men came. Peter Skene Ogden, in his trip over the Paulinas from the east and into the upper Deschutes basin in 1826 was seeking beaver. Nathaniel Wyeth, in his wintry trek into the region above Benham Falls in 1834, was in search of beavers. Hunters, in quest of hides, followed and killed hundreds of deer.

In early years, well before the Deschutes National Forest was established, big game hunters visited the timbered inland country, hunting deer, bear, or cougars. Early in the century, the Deschutes basin and the adjacent Paulinas were recognized as some of the best deer country in all Oregon, with antelope ranging fringes of the forest to the east.

Early in the history of the Deschutes Forest, it became evident that intensive management of wildlife was needed. This eventually was accomplished by the Forest Service in cooperation with the Bureau of Land Management, the Oregon State Game Commission, and the Fish and Wildlife Service. Habitat management was undertaken in all parts of the forest.

The Deschutes, it was soon noted, is an important recreation forest. In 1967, over 4,000,000 wildlife-oriented recreation days were accredited to the Forest. The Deschutes has some 617 miles of trout streams and about 35,000 acres represented by lakes and reservoirs. Area of the forest (gross) was 1,846,962 acres. Its elevation ranges from 10,495 on the snowy peak of the South Sister to 1,945 feet on the Metolius River arm of Lake Billy Chinook above the Round Butte Dam. Life zones range from a Hudsonian strip of about 80,000 acres in the high Cascades through the Canadian to the Transition.

Visitors to the Deschutes Forest may easily get the impression that there are few birds in the area, especially in higher areas. Many species visit the forested slopes in summer and are not easily seen or heard. Game birds and predators inhabit high crags and wooded canyons. A few of the birds remain the year around. A yearlong bird census on the Deschutes River in the Bend area in earlier decades noted some 130 different species. Many of these were migrants following the Deschutes waterway.

In the Deschutes country at lower elevations can be found the varied thrush, winter wren, pileated and Harris woodpeckers, sooty groups, Steller's and Oregon jay, nuthatch, and chickadee. The Oregon gray jay (camprobber) is familiar to most forest visitors because of its fluffy dress--and its bold habits in helping himself to camp food.

The varied thrush, called the Alaska or Oregon robin, nests at elevations where timber is densest. Frequently, it visits Bend yards, to mingle with the common robin. Chickadees and western evening grosbeaks are frequently seen with the gray juncos in the snowy forests of spring or early winter.

The Dipper, or water ouzel, is a resident of the area but is hard to see. It is a small gray bird with a wren-like tail. It is not webfooted but it is a fine swimmer. Summer visitors to high Crater Creek near the Broken Top Crater will find this little bird virtually dancing on the swift water. It is also at home on a calm lake. Hummingbirds are common in the area, especially in late summer. They follow the receding snow in higher elevations.

Old burns, bushy areas, and open meadows are hosts to numerous species of sparrows. Occasionally seen is the great bald eagle and the golden eagle. The Pacific night hawk is at home in the area, as are numerous other birds.

Game birds, ranging from members of the grouse family to the Chinese pheasant, are found in and adjacent to the Deschutes woods. A new game bird is the wild turkey, introduced several years ago with first releases in the high country north of Sisters.

Ranging in the four districts of the Deschutes National Forest in 1968 were an estimated 35,800 deer, with the take that year placed at 6,685. There are some Columbian black-tailed deer in higher thickets and moderate altitudes. In earlier years, there was a small band of white-tailed deer in the high Davis Lake area. There are also some elk in the forest. Seasonally, some of these move over the Cascade divide from the Willamette National Forest. Elk have been seen in the Swampy Lake meadow a few miles west of Bend.

Black bears also live in the Deschutes country but are seldom seen in the open woods. In some areas, especially at Newberry Crater, bears do some campground damage. Predatory animals include the coyote, an occasional mountain lion, wildcats, and, seldom seen, wolves and foxes. Martens, fishers, and badgers are in the area and on the Deschutes in Bend are a few beaver. These are generally trapped and moved to other areas because of damage to lawn trees.

S I L V I C U L T U R E L A B O R A T O R Y

Formally dedicated in Bend on May 2, 1964, was a U.S. Forest Service Silviculture Laboratory designed for research in the culture of forest timber species. The laboratory, located on the high south side of Awbrey Heights in Bend, was specifically designed to serve as:

- ..A headquarters for field studies of growth and yield of timber stands.
- ..A laboratory for investigating the influence of environmental factors on establishment and subsequent development of timber species.
- ..A base for assigned personnel from other projects. The Wildlife Habitat Project, headquartered in La Grande, is staffed in Bend for research in Central Oregon big game problems.
- ..Objectives of the laboratory, constructed on an acreage provided by the City of Bend, are to determine, for the major forest types of Eastern Oregon and Eastern Washington, the most favorable silviculture practices leading to:
 - ..Maximum yield of timber products in terms of both quality and quantity.
 - ..Coordination of timber productions with other forest uses.

The laboratory is maintained by the Pacific Northwest Forest and Range Experiment Station, U.S. Department of Agriculture.

Designed into the laboratory are several features that extend investigation possibilities and contribute toward a more effective job of research. A greenhouse and growth chambers are included in facilities. There are soil and plant laboratories and various other special laboratories. Laboratory facilities are provided.

The Silviculture Laboratory is the headquarters for a research team with the project assignment, "Silviculture of the Interior Conifer Types."

The Silviculture Laboratory had its start more than a decade ago in a "dream" of James Sowder of the U.S. Forest Service which eventually materialized in the fine laboratory. He served as first Laboratory Chief, followed by Carl M. Berntsen, who was project leader during construction. When Berntsen went to Washington, D.C., to continue his service in a specialized field, Walter G. Dahms, a research forester, became project leader. There were eight members on the staff early in 1969.

Formal dedication of the Laboratory was held on a cool, blustery May day in 1964, following occupancy of the new buildings in the late fall of 1963.

Present for the dedication were national figures, including Ed Cliff, Chief of the U.S. Forest Service, Washington, D.C. Senator Wayne Morse and Representative Al Ullman took part in the ceremony. Senator Morse was principal speaker.

Those taking part in the program touched on the future of the Laboratory and its role in technical studies of the pinelands of Oregon and Washington.

Operated in connection with the Laboratory is the Pringle Falls Experimental Forest in the upriver country.

Bend Pine Nursery

Occupying 234 acres that served as a ranch in early days, the Bend Pine Nursery, 3 miles northeast of Bend, was established in 1948, to produce seedlings for U.S. National Forest lands in Oregon and Washington.

About one third of the irrigated site is under cultivation. At the start of the fiscal year 1968, there were 9,545,000 seedlings in the Nursery. Trees lifted and shipped in the fiscal year 1968 numbered 3,975,000.

First manager of the Bend Pine Nursery, in 1948, was Wally Engstrom, who supervised the work of reclaiming the old ranch and transforming it into one of the most important nurseries in the National Forest system. When Engstrom retired, Charles A. Bigelow was named nursery manager.

Hundreds of people visit the nursery annually, with guided tours arranged when groups wish to view the manner giant pines get their start from little seeds and tiny trees. Cones are delivered to the nursery seed extraction plant. There the tours begin. Cones are dried prior to seed extraction. A bushel of pine cones yields about a half pound of seed. About 400 pounds are needed annually.

After extraction, seeds are stored at a zero temperature. Seeds are sown in the spring with drills. Beds are irrigated from overhead sprinklers.

Seedlings are grown at the nursery for 2 years, then lifted for shipment to National Forests for field planting. Trees are shipped to forests from which seeds were collected.

Mt. Jefferson Wilderness

Astride the Oregon Cascades north of the Santiam divide and south of the North Fork Breitenbush River is one of the region's largest and most impressive areas--the Mt. Jefferson Wilderness, created in 1968. The Wilderness is in three national forests--the Deschutes, Willamette, and Mt. Hood.

Ruling the Wilderness skyline is bulky, beautiful Mt. Jefferson, 10,495 feet high, which was sighted and named by the explorers, Lewis and Clark, on March 30, 1806.

The new wilderness encompasses 99,632 acres. There were some changes in boundaries from the Mt. Jefferson Primitive Area that had been established in 1930. Congressional action added two areas to the original lands. The additions include Long and Square Lakes in the Deschutes National Forest just north of the Santiam Highway, and Marion Lake in the Willamette National Forest.

The Mt. Jefferson Wilderness at one point reaches easterly to within 3 miles of the Metolius River below Camp Sherman. The easterly extension is a big bulge that includes the Jefferson, Cabot, and Candle Creek drainages, with their spectacular lava flows. A trail reaches into the area from the Metolius River.

The Jefferson Wilderness is an alpine region of rugged beauty holding two glacier-bearing peaks, Three Fingered Jack and Jefferson. The area extends some 25 miles along the Cascade Crest. The Mt. Washington Wild Area and the Three Sisters Wilderness are just to the south.

Mt. Jefferson is Oregon's second highest peak, yielding only to Mt. Hood, part of the same scenic picture frame. Organized wilderness clubs have made use of the scenic area since 1900. Most popular entry points are the Skyline Trail and Summit Trail from the south on U.S. Highway 20, and the Marion Lake, Pamelaia, and Jefferson Park Trails from northerly areas.

Although there are various entry points, provisions of the federal wilderness act of 1964 prohibit use of motorized equipment, including vehicles, motorboats, snow-traveling equipment, and other gear. Trails leading into the new wilderness are being signed. In keeping with wilderness provisions, facilities at Marion Lake will be phased out.

About 87 percent of the Mt. Jefferson Wilderness is covered with vegetation. It consists of conifer forests interspersed with small, scenic meadows. Wildlife values of the area are significant. The high, park-like country is the summer range of the black-tailed deer, mule deer, and Roosevelt elk. The area remains open to hunting and fishing. Small animals and birds are reasonably abundant. More than 50 lakes offer a wilderness fishing experience.

The Jefferson Wilderness offers a variety of scenery, as well as hunting and fishing, and trails leading over ledges smoothed by glaciers in ancient times. There are tranquil lakes, alpine meadows, and broad expanses of conifer forests. The region is well suited for wilderness experiences: and, except for trails and places where visitors camped, there is little evidence of man's activity.

Amateur geologists find much of interest in the isolated region. There are spectacular flows of lava, many traces of old glaciers moving from the slopes of Jefferson, several active glaciers, rugged canyons, and many small volcanic cones.

Lava flows in Jefferson and Cabot Creeks are some of the most recent in Oregon.

Balancing Rocks of the Metolius

Reaching up a deep, rugged canyon, an arm of Lake Billy Chinook has opened a little-known scenic area of the Metolius River. This is an area of grotesquely balanced rocks, first reported in 1855 by members of the Williamson Survey Party seeking possible railroad routes through the area.

Indian trails crossed this lonesome land long ago. The first recorded visit by a white man to the region was that of Captain John C. Fremont in 1843. However, he did not go far enough upstream to view the "hoodoo rocks." Anglers and timbermen reached the area early in the century but made little mention of the rocks.

Now a new Deschutes National Forest road reaches into the head of Lake Billy Chinook on the Metolius. There, boatmen and autoists can fish and camp and enjoy varied scenery.

With the Williamson party in 1855 was a man who was to win world-fame as a geologist. He was Dr. John Strong Newberry, physician, geologist, botanist, and zoologist for the part. He illustrated the area in Volume VI of the Pacific Survey Report, on file in the Deschutes County Library in Bend.

Dr. Newberry described the geology of the area in some detail, reporting on the volcanic formation. The "ghost rocks" are found in two different areas.

The grotesque pillars in the area, some more than 30 feet high, were formed primarily by wind erosion and storms. The comparatively soft formation was capped by a more durable volcanic stratum. The capping rocks sheltered the underlying tuft, creating the "hoodoos."

East Lake and Its Twin, Paulina

Of all the many lakes in the Deschutes National Forest, East Lake, high in Newberry Crater, is one of the most interesting. It has no visible outlet and no perennial surface inflow. Small thermal mineralized springs occur near and below the surface along the southeastern shore, and there may be many others at greater depths.

East Lake has an enchanting twin in the volcanic caldera, or possibly giant, complex fault, in the crater that is 5 miles in diameter. The twin is Paulina. It has an outlet, Paulina Creek, which tumbles over high falls in its westward race. Although the two bodies of water are side by side and only separated by shattered volcanic material, East Lake is some 45 feet higher than Paulina.

East Lake has a surface area of 1,030 acres at high level and 940 acres at average level. Its maximum depth is about 170 feet. East Lake has a volume at high level of about 68,000 acre feet.

Paulina Lake covers 2.10 square miles and has a maximum depth of 252 feet.

The geology of the ancient mountain in whose caldera the two lakes are cradled was described in 1905 by the pioneer federal geologist, I.C. Russell:

"Its summit, Paulina Peak, rises almost 4,000 feet above the encircling plateau. The volcano is of the shield type and has the shape of an inverted saucer, deeply dented on top and ornamented on the sides with many small knobs. Across the base, it measures 20 miles. On its flanks are more than 150 cinder cones."

Davis Lake and Its Lava

No lava flow in the Deschutes National Forest, with the exception of the vast spread of rock from Lava Butte, has received more attention, photographically, than the tongue of lava that impounds Davis Lake. Through the years, the Davis Lake flow has been pictured in geomorphology books used in colleges and in many monographs dealing with lavas.

From the air, the Davis Lake flow resembles a vast bear track implanted in the edge of the water. Most recent use of this picture was in a U.S. Geological Survey water supply paper, 1859-E, by Kenneth N. Phillips.

Davis Lake is an impoundment on Odell Creek, formed by a blocky, permeable lava flow of recent age that fills the channel and valley for a distance of 2 miles. In 1878, Lieutenant T.W. Symons visited the area and provided the earliest known description of the lake. He discovered the lake had no visible outlet.

"We saw water marks 20 feet above us on lava bluff," Lieutenant Symons wrote.

He found that the lava formed an impassable barrier.

"...and at their end we were surprised to find foaming out from underneath the giant boulders the clear, cold river that we had seen lose itself in the lake."

The lake was named for "Button" Davis, Prineville stockman.

The lake was mapped in 1934 with measurements made from an ice surface. The lake is very shallow.

Wickiup Reservoir at high water backs up to the Davis Lake lavas, submerging some of the springs to a depth of 25 feet. Topographic drainage of the area is 146 square miles.

Bend U.S. Forest Service Headquarters

First home of the Deschutes National Forest after it was established on July 1, 1911, was in a small upstairs room of a small building, generally known as the Bend Company building at the corner of Wall and Franklin. Also sharing that building was The (Bend) Bulletin, in downstairs quarters, and the Bend Abstract Company.

Since those distant days in Bend's "Railroad Year," the Deschutes headquarters have been shifted frequently. Generally, two or three rooms provided accommodations. For many years, the office was upstairs in the present Post Office building with more space.

On July 1, 1968, the Deschutes staff moved into its present home in the specially constructed Sahlstrom Building on Revere near East Third. The staff joined in an open house on September 20, with over a thousand visiting the building.

Consolidated in the same building with the supervisor and his staff were the Bend and Fort Rock District offices. Up until the consolidation, the districts had separate quarters in different parts of town.

J. Roy Harvey was supervisor when the Deschutes set up headquarters in 1911. Fifty-seven years and a dozen supervisors later, Ashley Poust was host, with his staff, when the 1968 open house was held. Permanent employees number 179, and temporary employees 233. Payroll for the fiscal year 1968 was \$2,092,600.

Dates on the Deschutes

- 1826 -- Peter Skene Ogden made first recorded exploration of upper Deschutes country; discovered Newberry Crater.
- 1834 -- Nathaniel Wyeth explored Benham Falls region; went upstream to Pringle Falls area in deep snow.
- 1843 -- John C. Fremont, toting cannon, crossed through upper Deschutes country; discovered Summer Lake and Abert Rim.
- 1845 -- Meek's Lost Wagon Train crossed westward over High Desert; segment apparently visited present Bend area.
- 1853 -- Elliott Cutoff Party reached Bend area; then headed south through Deschutes woods to Willamette Pass.
- 1854 -- Wasco County, including all Oregon east of Cascades, created.
- 1855 -- Williamson Survey Party, seeking railroad location, explored upper Deschutes basin and Cascades.
- 1859 -- Andrew Wiley discovered Santiam Pass, over which wagon road was constructed in 1866-67.
- 1862 -- Marion and Felix Scott made first recorded crossing of McKenzie Pass with wagons.
- 1865 -- Army volunteers crossed Santiam from west to occupy Camp Polk.
- 1867 -- Chief Paulina, who spent much time in Deschutes country, killed by ranchers near Trout Creek.
- 1877 -- John T. Craig died in summit cabin while carrying mail over McKenzie Pass.
- 1877 -- John Y. Todd rode into upper Deschutes country to establish Farewell Bend Ranch.
- 1877 -- Cortley B. Allen filed on first homestead in upriver country south of Farewell Bend.
- 1878 -- Bannock War touched fringe of Deschutes country to east with battle on Silver Creek.

- 1882 -- Vigilante strife in Prineville, county seat of Crook, comes to end.
- 1888 -- Sisters Post Office established at present location after being moved from nearby Camp Polk.
- 1903 -- Cy Bingham named first Deschutes ranger with headquarters in Odell Lake country.
- 1904 -- Bend platted by its founder, A.M. Drake.
- 1906 -- Redmond platted near center of big irrigation segregation.
- 1908 -- Deschutes National Forest created (Prineville).
- 1911 -- Deschutes headquarters moved to Bend.

Deschutes Geological Dates

Through use of the Carbon 14 method, a number of geological points in the Deschutes National Forest and adjacent areas have been given approximate dates. Some dated points follow:

Mt. Mazama eruption.....	6,600 years ago
Lava Cast Forest.....	6,500 years ago
Newberry Crater Fault.....	6,000 years ago
Little Bellnap eruption.....	930 B.C.
Final Eruption in Newberry Crater.....	2,000 years ago
Blue Lake Eruption.....	1,500 B.C.
Four-in-One Cone Eruption.....	600 B.C.

B I B L I O G R A P H Y

- Abbot, Henry Larcom: "Explorations for a Railroad Route, 1854-1855."
Vol. VI, 1857
- Antevs, Ernest: "The Great Basin, With Emphasis on Glacial and Postglacial Times," University of Utah Bulletin, 1848
- Baker, Gail C.: "Deschutes Historical Records," U.S. Forest Service, 1931.
- Baldwin, Ewart M.: "Geology of Oregon," 1959.
- Bell, Mimi; "T. Egerton Hogg Had a Dream," The Sunday Oregonian, 1968.
- Benson, G.T.: "The Age of Clear Lake, Oregon," The Ore Bin, 1965.
- Brimlow, George Francis: "Harney County, Oregon and Its Rangelands," 1951.
- Brogan, Phil F.: "East of the Cascades," 1964;
..."Watering the Wilderness," Bend Bulletin, January-June, 1931.
..."Farewell Bend and Its People," Bend Bulletin, March, 1933.
- Chaney, Ralph: "The Deschutes Flora of Eastern Oregon," 1938.
..."The Ancient Forests of Oregon," 1948.
- Clark, Keith, and Tiller, Lowell: "Terrible Trail: The Meek Cutoff, 1845,"
Caxton Printers, 1966.
- Cox, Thomas R.: "The Crusade to Save Scenery," 1968.
- Cressman, L.S.: "Petroglyphs of Oregon," 1967.
..."The Sandal and the Cave," 1937.
..."The Pioneers of 9,000 B.C.," Christian Science Monitor, April 11, 1962.
- Curtis, Ralph: "Central Oregon History," series in The Bend Bulletin, 1923.
- Edwards, Mrs. Charles S.: "Central Oregon History Scrapbooks," 1930-50.
- Ekman, Leonard C.: "Scenic Geology of the Pacific Northwest," Binforde
and Mort, 1962.
- Erickson, Sheldon D.: "Occupancy of the Upper Deschutes Basin, Oregon,"
1953.
- Farrell, Allie M., and others: "Jefferson County Reminiscences," 1957.
- Franks, Don: "Annual Narrative Fire Report," Deschutes National Forest,
1968.
- Frazier, Robert B: "Organization of Obsidians," 1958 in Eugene Register
Guard.

- Frazier, Robert B.: "Sleeping Monsters on Oregon Spine," Eugene Register Guard, March 28, 1963.
- Freeman, Orville L.: "Mt. Jefferson Wilderness," 1967.
- Fromme, Michael: "The National Forests of America," 1968.
- Hafen, LeRoy R., and Ghent, W.J.: "Broken Hand," story of man for whom Broken Top landmark named.
- Hinds, Norman E.A.: "Geomorphology," Prentice and Hall, Inc., 1943.
- Hodge, Edwin T.: "Geology of Mt. Jefferson," Mazama Annual, 1925:
..."Framework of the Cascade Mountains," Pan-American Geologist, 1928;
..."Geology of North Central Oregon," Oregon State University, 1942:
..."The Late Tertiary Climate Changes in Oregon," 1931;
..."Mount Multnomah," University of Oregon, 1925.
- Ireland, Orlin L.: "Plants of the Three Sisters Region," 1968.
- Jackman, E.R.; Scharff, John; and Conkling, Charles: "Steens Mountain."
- Keen, Mrs. Albert: "Collier Glacier, 1961," Mazama Magazine, 1961.
- Keen, F.P.: "Climatic Cycles in Eastern Oregon as Indicated by Tree Rings," Monthly Weather Review, 1967.
- Lucia, Ellis: "The Big Blow," 1963.
- McArthur, Lewis A: "Oregon Geographic Names," 1952.
- McBirney, Alexander: "Abstracts, Andesitic Conference, Bend," 1968.
- McCornack, Ellen Condon: "Thomas Condon, Pioneer Geologist," 1928.
- Menefee, Leah Collins: Manuscripts dealing with the lost wagon train of 1853.
- McNeal, William H.: "History of Wasco County," 1953.
- Perry, Walter J.: "Paleontologic Specimens from Skeleton Cave," in letter to Smithsonian Institution, 1928.
- Peterson, Norman V.: "Crack in Ground, Lake County," Ore Bin, 1964:
..."Diamond Craters, Oregon," Ore Bin, 1964.
- Phillips, Kenneth N.: "Our Vanishing Glaciers," Mazama Magazine, 1938:
..."Hydrology of Crater, East and Davis Lakes," U.S.G.S. Water Supply Paper, 1968.
- Pinchot, Gifford: "The Use Book, 1907," issued by U.S.D.A.
- Richards, Leverett: "Reborn Glaciers Move Down Slopes," Sunday Oregonian, 1958.

- Ross, Charles: "Trees to Know in Oregon," Oregon State University. 1950.
- Russell, Israel C.: "Geology and Water Resources of Central Oregon," 1905.
- Sawyer, Peggy: "Tourist Information," Bend Chamber of Commerce, 1968.
- Sawyer, Robert W.: "Beginnings of the McKenzie Highway, 1862," Oregon Historical Quarterly, 1930;
 ... "Henry Larcom Abbot and the Pacific Railroad Survey of 1855," Oregon Historical Quarterly, 1932.
- Shane, Ralph M.: "Early Exploration Through Warm Springs Area."
- Shuler, Ellis W.: "Rocks and Rivers," 1945.
- Smith, Warren D.: "The Scenic Treasure House of Oregon," 1941.
- Stearns, Gilbert L.: "Climatological Summary, Bend Weather," 1966.
- Stearns, Harold T.: "Craters of the Moon, Idaho," 1903.
- Stevens, Robert C.: "Lava Lands," Deschutes National Forest, 1967.
- Stewart, George R.: "Names on the Land," 1967.
- Strong, Emory: "Early Accounts of (Cascade) Eruptions," 1969.
- Taylor, Edward: "Recent Volcanism Between Three Fingered Jack and North Sister," The Ore Bin, 1965.
- U.S.D.A. Report: "Oregon Skyline Trail," 1965.
- Veazie, A.L.: "Pioneer Museum Dedication," Oregon Historical Quarterly, 1938.
- Whited, Kirk: "Plants of Central Oregon," series in The Bulletin, 1923.
- Wilkinson, W.D.: "Field Guidebook," geologic trip along Oregon highways, 1959.
- Whitwer, Donald H.: "Mt. Hood Area Reference Book," 1965.
- Williams, Howel: "Newberry Volcano of Central Oregon," 1935;
 ... "Crater Lake, the Story of Its Origin," 1941:
 ... "Volcanoes of the Three Sisters Region, Oregon Cascades," 1944:
 ... "The Ancient Volcanoes of Oregon," 1948.

Index

A

Abbot, Lt. Henry L., 61 ff
 Age of Reptiles, 4
 Airstrip fire, 13, 132
 Allen, Cortley D., 75
 Allen, Jack R., 75
 Allingham, D.W., 84
 Allingham Ranger District, 90
 Alpine Plants, 150
 Anchor Ice, 123
 Ancient Climate, 44
 Anderson, James O., Jr., 27
 Arnold Ice Cave, 26
 Artifacts, on gas line, 48
 Aspen Flat Fire, 26, 131
 Astronauts Visit Deschutes, 145 ff

B

Bachelor Butte, 3, 7
 Bachelor Butte Ski Area, 139
 Belknap Crater, 11, 13
 Bend Forest Headquarters, 159
 Bend, founding of city, 75
 Bend Pine Nursery, 156
 Benham Falls, 23, 37, 54
 Benham Falls Reservoir, 83
 Benjamin Lake, 80
 Bernsten, Carl M., 155
 Bigelow, Charles, 156
 Big Hole, 29
 Big Lake, 68
 Big River Ranger District, 90
 Big Springs Feed River, 122
 Big wheels disappear, 118
 Bingham, Cy J., 99 ff., 131
 Black Butte, 106
 Black Crater, 11
 Blue Bucket Mine, 55, 105
 Blue Lake, 14
 "Bottoms up" frost, 122
 Broken Top, 5
 Broken Top Crater, 8
 Broken Top Flood, 39
 Brower, David, 31
 "Brown Belt" Winter, 125
 "Brown Snow" Winter, 124
 Brown, William, 78
 Bulletin (Bend) founded, 127
 Burgess, R.C., 90
 Burgess, T.H., 89

C

Cabin Lake Well, 113
 Cache Creek, 106
 Camp Abbot, 9
 Camp Polk, 77
 Camp Sherman, 96
 Carey Act, 85
 Carson, Kit, 54
 Cascade Lakes Highway, 40, 111
 Cascade Range, 2 ff
 Cascade Range Forest Reserve, 87
 Cascades (High), 5
 Cascades (Western), 4
 Cave Dwellers, 43 ff
 Cavern fossils, 27
 Cayuse Cone, 9
 Cecil, K.P., 135
 Century Drive, 111
 Charcoal Cave, 26 ff
 China Hat Road, 110
 Chitten, Hiram M., 55
 Christmas Lake, 30
 Cinder Cones, 13
 Claypool, Wayne, 73
 Clear Lake, 11
 Cleveland Cave, 29
 Cliff, Edward, 155
 Cobb, Irwin S., 126
 Collier Glacier, 31
 Columbia Southern District, 82
 Connolly, George and Sam, 74
 Crack in Ground, 29
 Crane Prairie, 67
 Crater Creek, 6
 Crater Lake, 16
 Crawford, Ralph W., 89
 Crescent District, names, 63
 Crescent Lake, 67
 Crescent Ranger District, 90
 Cressman, Dr. L.S., 27, 43 ff
 Crook County Sheepshooters, 81
 Crider, W.W., 88
 Curl, John B., 90

D

Dahms, Walter G., 155
 Dates on the Deschutes, 160 ff
 Davis Lake, 67
 Davis Lake lavas, 159
 Death of a guard, 101

D
(Cont.)

Deschutes Canyon Cove, 36
Deschutes Fires, 130 ff
Deschutes Geographic Names, 57
Deschutes National Forest, 2,13,26,78,87 ff
Deschutes Forest Lakes, 65
Deschutes Sawmills (First), 116
Deschutes River, 23, 36 ff,60
Deschutes weather, 120
Deer hunters, 127
Derrick Cave, 28
Devils Garden, 30
Diamond, John, 55
Diamond Lake, 33
Diamond Peak, 33, 55
Dole, Hollis M., 28
Douglas, David, 2, 58
Drake, A.M., 82
Dry Canyon, 35
Dry River Gorge, 50
Dugout Lake, 14

E

East Lake, 19, 83
East Lake, discovery, 53, 68
Ebbighausen, Dr. E.G., 141
Edison Ice Cave, 28, 60
Egan, James A., 89, 139
Engstrom, Walter, 156
Elk Lake, 68
Elliott Cutoff Party, 55
Fall Creek, 9
Fall River, 37
Farewell Bend Ranch, 75 ff
Ferry and Cramer Lakes, 64
—Fish Lake, 106
Fitzpatrick, Thomas, 54
Floods in Mountains, 38
Flora and Fauna, 149
Forest reserves, 87 ff
Forest supervisors, 89
Forest visitors, 129
"Fort Benham," 143
Fort Rock, 26; Names, 63
Fort Rock Cave, 43; Sandals, 45
Fort Rock District, 26
Fox Butte fires, 131
Frazier, Bob, 31
Fremont Highway, 61
Fremont, John C., 54, 72, 108
Fromme, R. L., 89

G

Geer, Tom, 75
Gibney, D. R., 150
Gidley, Dr. J.W., 27
Girl Scouts Camp, 6
Glacier trails, 33
Glaciers, 7, 16, 31
"Glowing avalanches," 18
"Gold Strikes," 98
Grazing history, 113
Green, Dr. Jack, 28
Green Lakes, 8
Greenlee, Robert 27
Grimes, R.E., 114

H

Harney, General W.S., 73
Harpham, Vernon, 89
Harriman, W.O., 59
Harvey, J. Roy, 89
Hastings, W.G., 89
Heising, D.W., 84
High Desert, 19
Hinman, Samuel M.W., 77
—Hodges, Dr. E.T., 6,31,58
—Hogg Pass Railroad, 106
—Hogg, T. Egerton, 106
Hole-in-Ground, 29, 145
—Hoodoo Butte Ski Area, 13
Hosmer Lake, 68
Hunter, J.N., 111
House case, 97
Huntington, J. Perit, 56, 109
—Huntington Supply Train, 56
Husband, 6

I

Ice Age, 20, 32
Ice Caves, 26, 29
—Indian names, 57 ff
Irrigation along Deschutes, 82
Irrigation Districts, 84 ff
Isackson, John F., 47

J

Jacobson, Norman G., 89, 126
Jefferson Creek, 87
Jefferson, Thomas, 2

K

Keen, F.P., 120
Keen, Ruth Hobson, 31, 38
Kelley, Hall J., 2

L

Lake Billy Chinook, 70, 83
Lake Millican, 51
Lake Simtustus, 83
Land exchanges, 135
LaFollette, Captain, Charles, 77
La Pine, 23
La Pine Ranger District, 90
Lava bombs, 8, 9
Lava Butte, 19 ff, 22, 25, 85, 108
Lava Butte Visitors' Center, 22, 40
Lava Cast Forest, 21, 40
Lava cast trees dated, 24
Lava caves, 25 ff
Lavacicle Cave, 26
Lava fields, 22
Lava Lands Interpretive Area, 40
Lava Lake murders, 102
Lava River Tunnel, 25
Le Conte Crater, 7, 10
Lewis and Clark, 2
— Little Belknap Crater, 14
Little Brother, 6
Logging railroad abandoned, 118
Long Prairie Station, 94
Long, Reuben, 28, 30
Lookouts, 132
Lookout stations (first), 94
Lunar Geological Conference, 146

M

Mahn, Ed H., 90
Mathes, Dennis, 90
Mazama glaciers, 32
McArthur, Lewis A., 57
McDonald, Finan, 53
McKenzie (first crossing), 73
McKenzie Highway, 11, 104
McKenzie "islands," 11; pass, 11 ff
McKenzie lavas, 13 ff
McKenzie River, 14
McKenzie road, 103
"Medicine Mountains," 2
Meek, Stephen L., 105
Merritt, M.L., 89
Metolius balancing rocks, 157

Metolius Ranger District, 77, 99
—Metolius River, 37, 61
Mitchell (town), 73
Mitchell, J. Roy, 90
Mokst Butte, 8, 19
"Moon Country," 145
Morse, Senator Wayne, 155
Movie makers, 142 ff
Mt. Bachelor, Inc., 8, 11, 139 ff
Mt. Etna, 22
Mt. Jefferson, 2,3; wilderness, 156 ff
Mt. Mazama, 3, 16 ff
Mt. Multnomah, 6
Mt. Newberry, 8, 19 ff
Mt. Thielsen, 5, 33
Mt. Washington, 3, 5, 13, 65
Mt. Washington, Jack scaled, 147

N

Neal, Carl B., 89
Newberry Crater, 24, 40, 63, 110
Newberry lakes, 158
Newberry, Dr. J.S., 38
Nichols, E., 89
Nichols, Dr. Robert L., 24
Nolf, Dr. Bruce, 39
"Northwest Rift Zone," 24

O

Ochoco National Forest, 88
Ochoco Valley, 71
Odell Lake artifacts, 16
Ogden, Peter Skene, 55 ff
Olcott, Governor Ben W., 136
Oregon Museum of Science and Industry, 27
Oney, Burton, 90
Oregon Bureau of Mines, 25
Oregon Department of Geology, 28
Oregon Skyline Trail, 112

P

Palmer, Jack, 70
Paulina Lake, 19
Paulina National Forest, 88, 91
Paulina Peak, 21, 43
Perry, Walter J., 21, 27
Pine Mountain Observatory, 141 ff
Pine Mountain Ranger District, 90
Pleistocene Lakes, 30

P
(Cont.)

Plumb, Herbert L., 89
Poust, Ashley A., 89
—Prehistoric tribes, 43
Presbyterian Lodge, 109
Presidents Range, 2

Q

Quimper, Manuel, 2

R

Radios (first), 94
Ranger Districts, 90
Ranger examinations, 92
Ranger pay (1908), 92
Ranger station locations, 93 ff
Range wars, 78 ff
Rasmussen, Dave, 39, 139
Recreation areas, 126
Red Hill, 8
Redmond Air Center, 133 ff
Riis, John, 90
Rock cataract, 11
Roads through Deschutes, 103 ff, 109
Rock Mesa, 7
Rock writings, 50 ff
Round Butte Dam, 83
Rush for timber, 117
Russell, I.C., 38

S

—Santiam gateway, 105 ff
Save scenery crusade, 136
Sawmills, 115 ff
Sawyer, Robert W., 61, 136 ff
Scott Lake, 31
Scott Trail, 104
Seas, Cretaceous, 4
Settlers (early), 72
Shevlin, Brooks mills, 117
Shevlin, Thomas L., 118
Sierra Nevada, 3
Silver Lake, 30
Silviculture Laboratory, 155
Sisemore, John, 76
Sisters Ranger District, 77, 90
—Sisters (town), 77
Skeleton Cave, 26, 27, 60
Ski slopes, 138 ff

Slack, Glenn, 114
Smith, Captain John, 71
Smith, Harold E., 90
Soda Springs, 111
South, Perry A., 90, 109
Sowder, James, 155
Sparks Lake, 6, 8, 68
Spatter cones, 8, 9
Sphinx (lava cone), 6
Splaun, S.S., 75
Spring River, 37
Staats, W.H., 82, 111
Stearns, S.S. 96
Steen, Major Enoch, 103
Sternes, Gilbert L., 121
Stevens, Robert C., 40
Summer homes (first), 96
Summer Lake, 45
Sunriver, 9
—Suttle Lake, 68, 83
Swalley Irrigation District, 85

T

Taylor, Dr. E.M., 13
Telephone lines, 94 ff
Tertiary weather, 32
Tetherow, A.J., 74
Thorne Lake, 30
—Three Fingered Jack, 3, 65
—Three Sisters, 2, 3, 31
Three Sisters glaciers, 34 ff
Three Sisters Irrigation District, 85
Timber sales (first), 135
Todd Lake, 6
Todd, John C., 76
Todd, John Y., 76
Tonseth, Henry, 28, 31
Towornehiooks River, 61
Trappers' trails, 53
Trout planted in Paulina Lake, 127
Trout Creek Butte, 7
Tumalo Creek, 37, 54
Tumalo Mountain, 7
Tumalo Irrigation Project, 85

U

Ullman, Representative Al, 155
U.S. Bureau of Reclamation, 82
U.S. Highway 97, 108 ff
Upper Deschutes Livestock Association,
114
"Use Book," 91

V

Vancouver, George, 2
Vandevert, Grace Clark, 55
Vandevert, W.P., 76

W

Wagontire Mountain, 78
Warm Springs Reservation, 2, 70
— Warm Springs tribes, 71
Water from rocks, 142
Waters, Dr. Aaron, 145
Weather records, 125
Western Juniper Natural Area, 152
White Branch Creek, 38
Wickiup knives, 47 ff
Wickiup Reservoir, 63, 83, 85, 96
Wife (mountain), 6
Wilderness trips, 128
Wildlife, Deschutes, 153 ff
Wiley, Andrew, 105
Wiley Pass, 105
Wilkes expedition, 2
— Willamette Military Road, 68
Williams, Dr. Howel, 4, 13, 16
Williams, Ira A., 25
Williamson Survey, 61
Windy Point, 98
Winters (severe), 77
Wizard Island, 33
Wool, General John E., 73
Wyeth, Nathaniel J., 53

Y

Yapoah Crater, 11