# THE LEGACY OF ANCIENT LAKE MODOC:

# A HISTORICAL GEOGRAPHY

# OF THE KLAMATH LAKES BASIN

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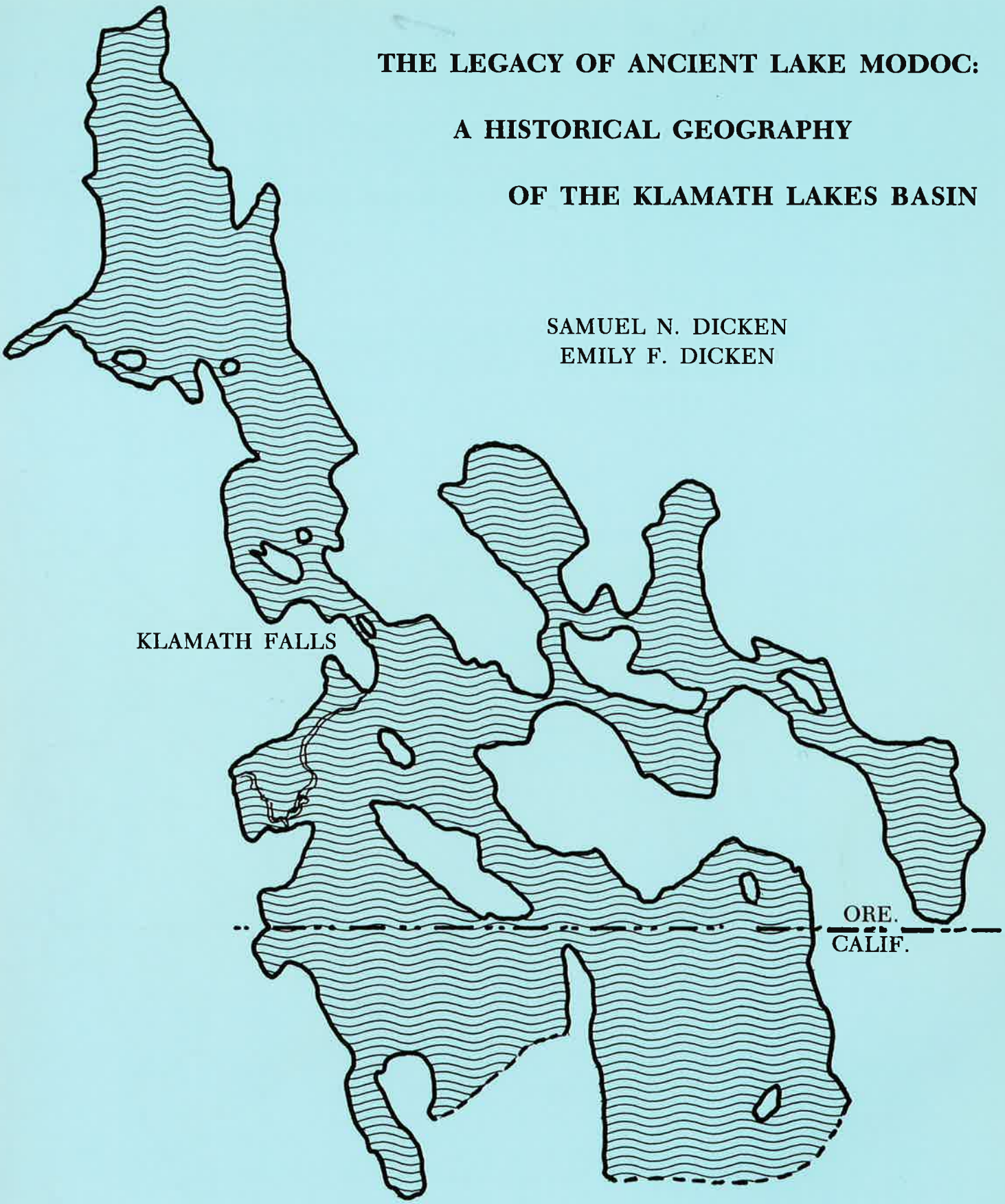

Jack Remington

# THE LEGACY OF ANCIENT LAKE MODOC: A HISTORICAL GEOGRAPHY OF THE KLAMATH LAKES BASIN OREGON AND CALIFORNIA

SAMUEL N. DICKEN
*Emeritus Professor of Geography*
*University of Oregon*

And

EMILY F. DICKEN

With a Foreword by
FRANCIS S. LANDRUM

# FOREWORD

If one examines a present-day contour map of the Klamath Lakes Region, he can easily see that an increment in the lake levels would cause the lot to coalesce into one large amoeba-shaped sheet. Others have observed the ancient geological shorelines along the dry hills but it remained for Sam Dicken to point out, limit, define, and name this pluvial sea, Lake Modoc. His trained eyes have seen the correct topography as it existed eons ago, together with the summation of changes to the present.

Lake Modoc never had the pristine loveliness of a Lucerne or a Louise, although its waters did wash the sylvan south toe of Mount Mazama and the Cascade salient. Much of its shoreline was rocky, bare, and semi-sterile, not unlike the present beaches of Abert Lake or Clear Lake. As the recession of waters began, those flatter or near dead-level shores emerged first as marshlands, the customary littorals of Klamath's non-mountain lakes.

But marshland can be beautiful. It all depends how one looks at things, not at all unlike viewing a scrawny three-day old pelican. Creation's chain-of-life in the wetlands is manifest from the most minute spore to the great "swanny white wing." The ooze is full of wigglies; so is the water; creepy crawlies inhabit every stalk. Birds nest whenever they can find a rough snag on a tule staff from which to hang a haven. Ducks, geese, cranes, storks, herons, loons, mud hens, mergansers, all the lesser shag, and native tweety birds of all shades and shapes begin their lives here.

Originally native Indians recognized the vast larder Mother Nature so conveniently provided and gathered a vitamin-rich, protein-rich harvest of fish, birds, snakes, frogs, lizards, wigglies, and tubers enriched with a seasonable supplement of eggs. The last--mainly duck eggs--regardless of age were a prize delicacy.

Nelson Reed's infinitely valuable Klamath River Interstate Compact generously affords the entire remaining flow of the Klamath to South California, but with the minor proviso that possession be taken at the mouth. With the river (which drains the lake) Klamath will prevail forever, but only as a home for the hardy, well accustomed to an attitude of apathy and a diet of crumbs returned and intended as full and equal measure for the treasure yielded as taxes. Oddly, Klamath was populated and pioneered from the west, not the east. A goodly measure of immigrants to the lowland dales were not sure they had found the Garden and they, with the more hardy landsmen, brought with them the genesis of their herds, their plow, and their muscle. It was no easy task to combat the elements but those who so elected--and won--became the herd sires of the highlands. Giles French said it, "Eastern Oregon is he-man country. We raise wheat and beef, and alfalfa hay. Our cousins left in the valley persist to exist on a sub-culture of lettuce, prunes, and long-tailed sheep."

And the locale has always demonstrated an atmosphere of fierce independence. During the early days of Altamont many, many people existed--not lived--in the most basic of shelters. Cardboard, box slats, and canvas. And they suffered, but still managed to smile and, more important, to hope: Mud, bib overalls, bare feet, chickens, pigs, cow manure, gardens, more mud, loos with views and last year's Sears, bare light bulbs, and no curtains. The look of absolute despair on my mother's face when she dug up the keepsake coin which Uncle Bulgy had brought her from the Carson City mint years before and sent me to the little store. The need was now. It wasn't for seeds nor flour. It was for a loaf of bread and it was her last money--a dime. All that was left were string beans and eggs.

And still the archetype southeastern Oregonian remains subservient to

no one, nor will he be. He is willing to give his last measure of effort if the deal is above the table, is friendly, compassionate, and as proud of his sweat as he is of his net. He breathes clean air, yet his country is now almost without immigration, as sadly, most Americans have become accustomed to fear breathing air which they cannot see. He knows not floods, hurricanes, tornadoes, typhoons, sandstorms, earthquakes, nor AIDS. He gets hot in summer. We are a friendly, provincial, somewhat backward colony and, in many ways, a cultural desert. We're happy, we enjoy life, we have as much freedom as any, and much more than most. We have learned to cope with the adversities of both nature and politics, are accustomed to hard work and disappointment. We're anticipating a future of unknowns, containing who knows what roadblocks, firmly convinced that we or our offspring will continue to prevail...and with a smile, thank you!

FRANCIS S. LANDRUM




## ACKNOWLEDGEMENTS

One of the greatest rewards in writing a geography book of this sort is meeting with and learning from local people who, collectively, know more about the area than any one person will ever know. We have known the Klamath Basin, superficially, for more than thirty-five years. In 1950 we wrote a short description of it for the first edition of OREGON GEOGRAPHY. The present book is the result of four years of leisurely study in field and library.

Many agencies and individuals have contributed to this book. Klamath County agencies include the Planning Department, the County Museum, the County Surveyor, and the County Engineer. The Comprehensive Plan for the City of Klamath Falls and the Comprehensive Master Plan for Klamath County were very useful. Jonathan Chudnoff was especially helpful. James A. Allen read part of an early draft of the manuscript and reviewed the short paper, "Pluvial Lake Modoc," in the Herald and News. State Departments involved were the Oregon Institute of Technology and the University of Oregon. The Oregon Collections of the University Library were especially useful. The report of the Oregon Water Board was consulted frequently. Several Federal agencies were helpful: the Bureau of Reclamation, the Soil Conservation Service, the U.S. Geological Survey, the National Weather Service, and the U.S. Forest Service.

Many individuals have helped. Francis S. Landrum read all the manuscript, critically, some of it more than once. He also provided additional information. KLAMATH ECHOES, by Devere and Helen Helfrich, was frequently consulted. The sixteen volumes of the work provide a wealth of detail on the history and geography of the area. James Kerns guided us on field trips on the ground and in the air, explaining the complications of the irrigation system in the Basin. Jessie Puckett read all the manuscript and guided us into some of the remote parts of the area, including the site of old Pokegama. Priscilla Knuth of the Oregon Historical Society read the manuscript critically and suggested some additional sources. The files of the Oregon Historical Quarterly which she edits were consulted and cited. Karen M. Seidel furnished useful material from the files of the Bureau of Governmental Research and Service.

My colleagues in the Geography Department, University of Oregon, offered encouragement and suggestions. Professor William Loy read the manuscript and offered suggestions for the maps. The staff of the Map Library, Susan Clark and Peter Stark, were most helpful with maps and airphotos. Georgette Bozovich and Teresa Benedict typed parts of the manuscript with great care.

We have studied in the field and in libraries in various areas, Kentucky, Minnesota, Mexico, and, most of all, in Oregon. The people of Klamath County have been most helpful, cooperative, and encouraging. And none asked the question: "What is the good of this study?"

These and many others, too numerous to mention, have contributed useful facts and ideas.

In spite of all the assistance and criticism there are undoubtedly some errors of fact and interpretation in the book. We would appreciate having them called to our attention, preferably with documentation.

Samuel N. Dicken
Emily F. Dicken

## PROLOGUE

The earth shaking events which combined to form the Klamath Lakes Basin and the surrounding ridges began a few million years ago when the Cascade Range was uplifted, faulted, intruded, and covered with lavas. Displacement of huge blocks produced a basin-range surface which extends over a vast area from southeastern Oregon through California, Nevada, Arizona, and as far south as Mexico, D. F. In the Klamath Area the ridges have various names--hills, rims, ridges, and mountains. Some are broad, some long and narrow. Examples: Modoc Ridge, Hogback Mountain, Klamath Hills, and High Rim. The basins (or valleys) represent down-dropped parts of the earth's crust, partially filled with sediment, some of them containing lakes. Examples: Upper Klamath Lake Basin, Lower Klamath Lake Basin (now partially drained), and Tule Lake Basin (also partially drained). Basins formerly filled with lake water include Langell Valley, Poe Valley, Yonna Valley, and Swan Lake Valley.

This complex of basins and ranges has been subject to many changing forces. Lavas intruded the ranges, adding to the uplift, and poured out on the surface, forming peaks, cinder cones, and broad mesas. The materials include flow lavas, volcanic ash, pumice, and cinders. As the climate was humid during the last Ice Age, the basins filled with water to overflowing and the lighter materials were redistributed by waves and currents.

The most spectacular event was the eruption of Mount Mazama (to form Crater Lake) 7,000 years ago. The crater spewed out large quantities of ash and pumice which, carried by strong winds, covered a wide area. Much of the material which fell on the ranges was washed into the Basin by torrential rains, eroding deep canyons on the slopes.

Even before Mt. Mazama erupted, perhaps 13,000 years ago, the climate slowly became warmer and drier, but not as dry as it is today. At this time all the basins in the Klamath Lake Area were occupied by a single large lake, which I have named Pluvial Lake Modoc.* This lake covered an area of over 1,000 square miles. Its long, irregular shoreline can be seen in various parts of the Klamath Lakes Area at an elevation of approximately 4,200 feet. After the eruption of Mount Mazama, the drying and warming trend continued and the level of Lake Modoc (and various other pluvial lakes in eastern Oregon) continued to shrink. The level declined and some of the arms of the lake, such as Langell Valley and Poe Valley, became dry. As the level declined further, Upper Klamath Lake, Lower Klamath and Tule lakes were separated. All of which created an environment favorable for human occupation. Evidence shows that people have been living in the Basin for at least 3,000 years, probably longer. The level floor of the Basin has deep soils and an abundant water system of lakes and streams, a variety of vegetation and wildlife.

Ancient Lake Modoc left a legacy for the people of the Basin; for the Indians who lived for many centuries along the river banks and lake shores; and for the thousands of white people who have occupied the site for a little more than a century. In the following chapters the main features of the region are presented in historical perspective, too briefly perhaps, and with too much generalization. No one person and no single book can tell the whole story of this complicated and fascinating region.

*Reference: Samuel N. Dicken, Pluvial Lake Modoc, Klamath County, Oregon, and Modoc and Siskiyou Counties, California. In Oregon Geology, v. 42, No. 11. November 1980. pp. 179-187.

Frontispiece. A view of Klamath Falls looking to the southwest. The Business District is in the center; to the left is Lake Ewauna and a part of the Industrial Area. On the right, middle distance, is the Ewauna Heights Residence District, beyond which is Link River. The Main Irrigation Canal meanders from right to left through the city. (Author's photo)

# 1. AN OVERVIEW

From the air (or from a satellite) on a clear day, or from airphotos, the essential features of this unique and interesting region can be clearly seen. The focus is the city of Klamath Falls (fig. 1.1), near the lower end of Upper Klamath Lake, the largest in Oregon. To the west is the forested Cascade Range, presenting a steep front to the Basin. To the north is Crater Lake; some of the water seeping through its porous rim flows into Upper Klamath Lake. To the east are numerous wooded ranges and intervening basins, a part of the vast Basin Range Region. To the south, in California, sparsely vegetated recent lava flows mark the southern end of the Basin. Dome Mountain stands up like a sentinel over the lava beds and, far to the south, Mt. Shasta shows its snow-covered profile. This small basin, only 75 miles long, is home to most of Klamath County's 58,000 people and a few thousand more in the California part of the Basin. It is quite distinct from other settlements in the area, but it is not isolated; it is served by railroads, airways, and a network of roads.

In this book on historical geography the main purpose is to describe and explain the geography of the Basin, period by period, from the time of the first explorations to the present. It involves the study of natural features such as basins, ranges, lakes, rivers, soils, forests and human features such as population, production, housing, and transportation. In explaining the geography of the Basin, attention is given to the perception of the region by the explorers and settlers.

In this first chapter a general overview is presented, including both natural and human features. Chapter Two, exploration, describes the land as it was before white settlement, up to 1860. Chapter Three protrays early settlement, from 1860 to 1900. Chapter Four is concerned with expanding settlement and the introduction of large-scale irrigation, 1900 to 1930. Chapter Five, depression and recovery, covers the period 1930 to 1950. Chapter Six follows the continuing slow growth from 1950 to 1980. Chapter Seven is mainly concerned with the urban areas, Klamath Falls and Altamont.

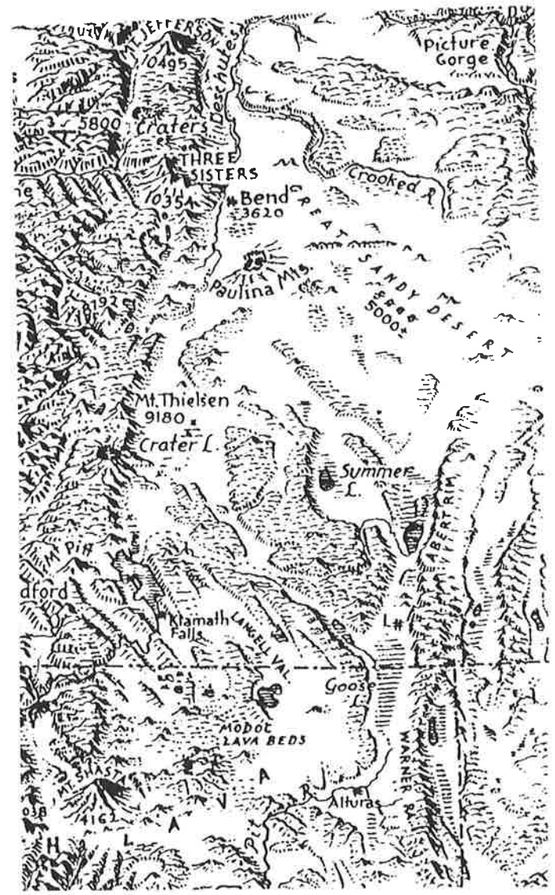


Fig. 1.1. The Klamath Lakes Area in Oregon and California is part of the rugged Basin and Range Region. (Map from Erwin Raisz)

## NATURAL FEATURES

The floor of the Basin is the bed of an old Pleistocene lake, Pluvial Lake Modoc.[1] The meandering shoreline of the old lake is shown by a black line in figure 1.2. All that is left of Lower Klamath Lake (B) and Tule Lake (C) today are small remnants in the form of sumps, usually well-populated with wildfowl. In Oregon the trend of the ranges is northwest-southeast; in California the ranges are more widely spaced and trend north-south. Lava flows from the south covered parts of this area in very recent geologic time, completely obliterating parts of the old shoreline. Letters indicate the various basins and the principal places. Williamson River, the largest, enters the map area on the north and empties into Upper Klamath Lake. Sprague River flows westward and joins

Figure 1.2. Map of the shoreline of old Lake Modoc (opposite page) and the location of many of the places mentioned in the text. In the south lava flows encroached onto the beds of Lower Klamath lake and Tule Lake (dashed lines), covering the old shoreline.

LEGEND

A. Upper Klamath Lake
B. Lower Klamath Lake
C. Tule Lake
D. Swan Lake Basin
E. Yonna Basin
F. Poe Valley
G. Langell Valley
(K.) Klamath Falls

(Al.) Altamont
1. Modoc Point
2. Williamson River
3. Plum Hills
4. Link River
5. Lake Ewauna
6. Olene
7. Lost River
8. Spring Lake Valley
9. Klamath River
10. Keno
11. Miller HIll
12. Turkey Hill
13. Malin
14. Stukel Mountain
15. Klamath Hills
16. Bryant Mountain
17. Big Tableland
18. Modoc Lava Beds
19. Clear Lake Reservoir
20. Hovey Point
21. Gerber Reservoir
22. Oregon California Boundary



THE SHORELINE OF OLD LAKE MODOC

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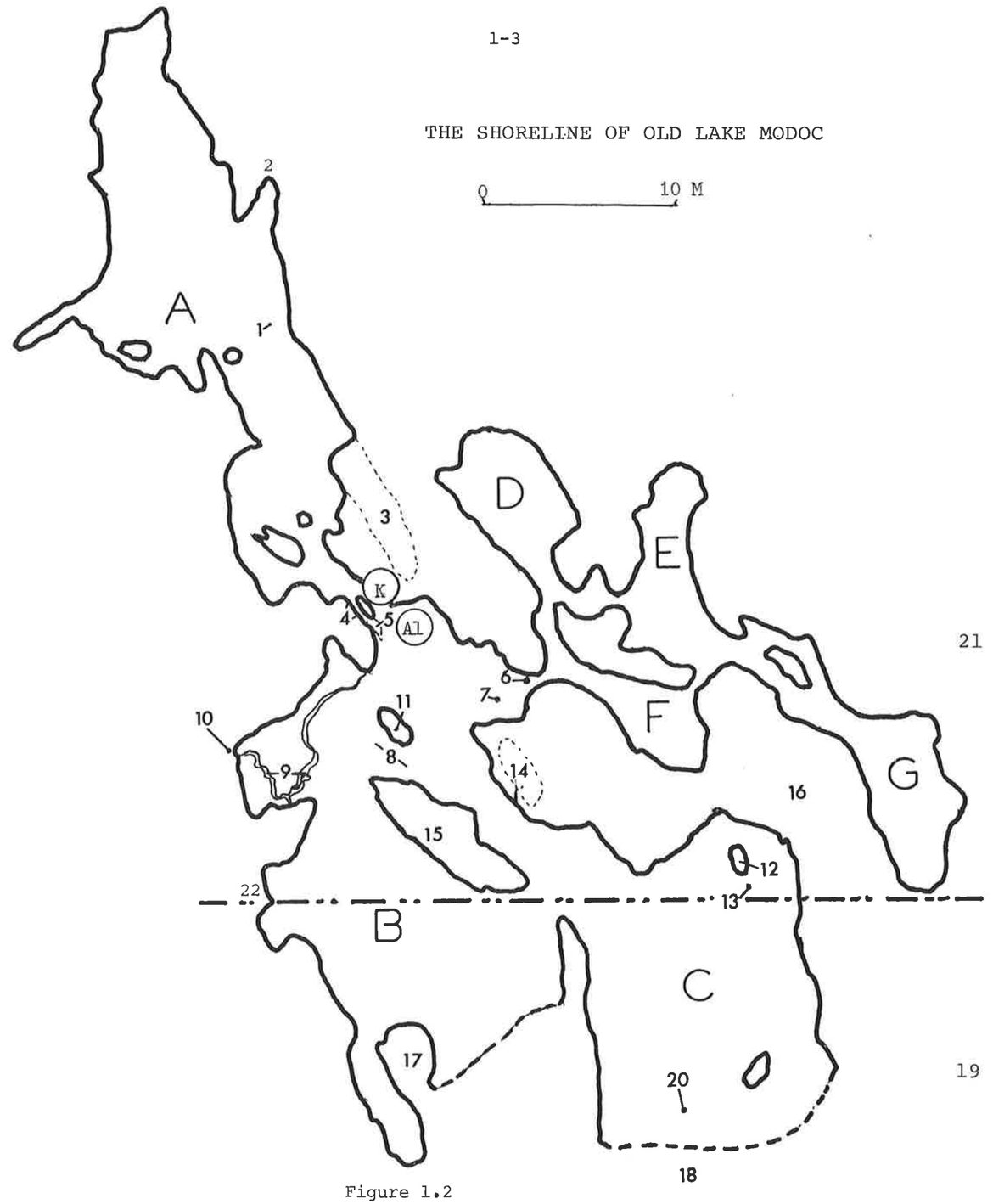


Figure 1.2

Williamson River. Lost River rises in Clear Lake in California, flows in a roundabout course into Oregon, through Langell Valley (G) and Poe Valley (F), than back again into California before emptying into Tule Lake Basin. A part of the Lost River drainage has been diverted to Klamath River. The old pluvial lake at its highest stage had an overall length of 75 miles, an area of more than 1,000 square miles, and a shoreline of over 400 miles. The old shoreline, at 4,240 feet above sealevel, shows almost no warping. It is, perhaps, slightly higher in the north. The various basins were formed by block faulting and igneous activity, both intrusive and extrusive. Large quantities of ash, cinders, and pumice were deposited in the basins and peat and diatoms were added. Numerous wells show that the depth of sediment reaches hundreds of feet in some areas. Only Upper Klamath Lake has a large body of water at present, with an area of about 90 square miles at low water, about 140 square miles at highwater stage. It is the largest lake in Oregon but is slowly filling with sediment and vegetation; irrigation engineers are worried about the diminishing storage capacity.

On the margins of the Basin numerous fault blocks in the form of hogback ridges, hills, and mountains rise above the lake plain (fig 1.3); some of the smaller ones were islands in the old lake.[2] The larger and higher elevations are called rims, scarps, hills, or mountains, according to their size, shape, profile, and the whim of the person who named them. The highest ones rise more than 2,000 feet above the lake plain. The peaks of the eastern scarp of the Cascade Range rise over 9,000 feet. In Modoc and Siskiyou counties in California, some of the elevations have the form of conical hills, including cinder cones and dome mountains. A few elevated lava-capped mesas occur, such as Big Tableland, southwest of Lower Klamath Lake Basin. On the south side of the Basin the Modoc Lava Beds extend into the lake area, completely covering the old shoreline. It is probable that the lava flows blocked former surface outlets of Lower Klamath and Tule lakes, south to Pitt River.

After the close of the Pleistocene, perhaps 10,000 years ago, the climate gradually settled into its present semiarid, fluctuating, and unpredictable state and Lake Modoc began to shrink. The decline of Upper Klamath Lake was accelerated by the entrenchment of Link River and that of Lower Klamath Lake by the downcutting of Klamath River. By 1905, when the first accurate survey was made of lake levels,[3] Upper Klamath Lake was down 98 feet from the old shoreline; Lower Klamath Lake was down 156 feet; and Tule Lake was down 184 feet. All the lakes are now shallow. In 1905 Upper Klamath Lake was 47 feet deep; Lower Klamath Lake, 15 feet deep; and Tule Lake, 25 feet deep. Tule Lake no longer had a surface outlet, although it was partially drained by seepage, and became, by definition, a part of the Great Basin. It had become separated from Lower Klamath Lake except at a high water stage. By the time settlement began, about 1867, the other basins were dry, except for a few small lakes and marshy areas. It was obvious that the general situation was favorable for large-scale irrigation once Upper Klamath Lake was stabilized by a dam on the upper end of Link River.

Such are the major natural features of the Klamath Lakes Basin. Only gradually did the early explorers, traders, and settlers become aware of the essential character of the region. At first only a few routes were traveled and observations were limited; some features were unknown for many years. Early explorers, like Ogden and Frémont, passed very near Lower Klamath Lake without noticing it. Early perceptions of the Basin were



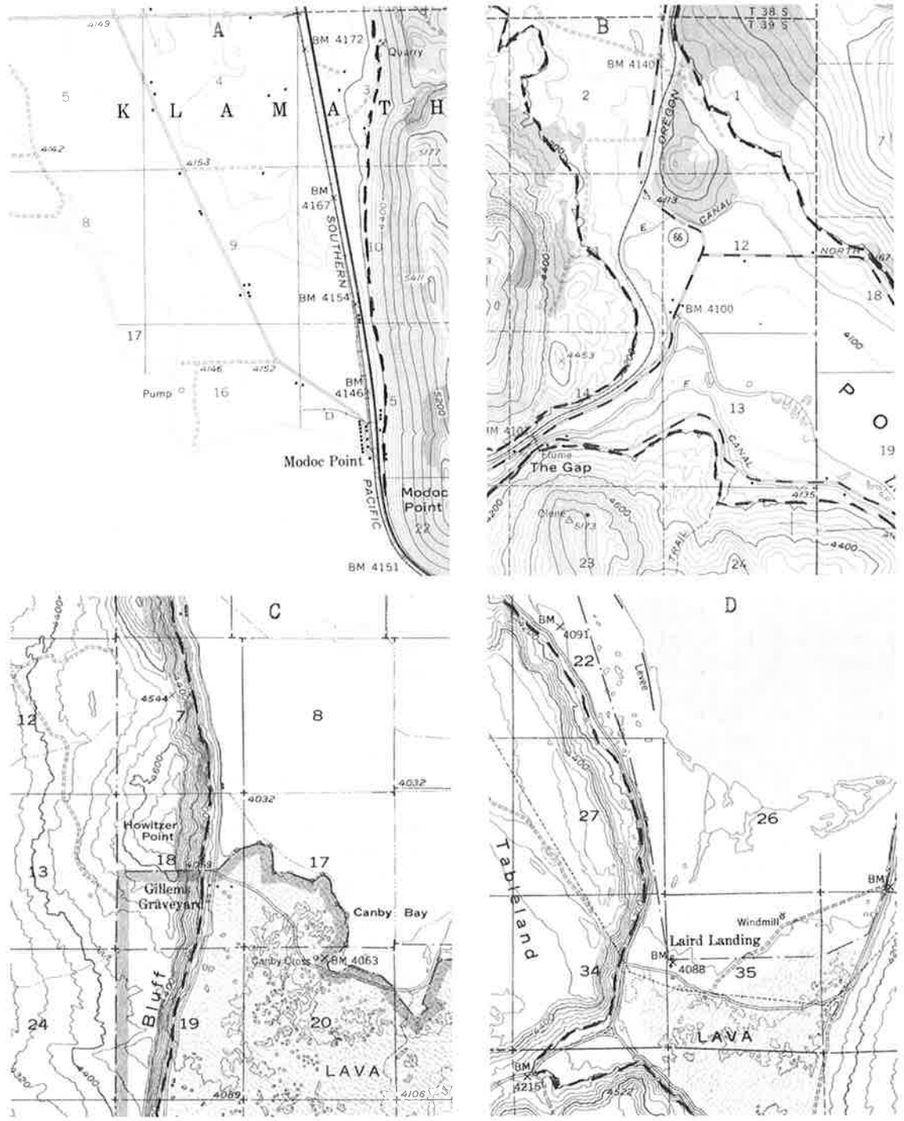


Fig. 1.3. Parts of Topographic Maps showing the shoreline of old Lake Modoc (dashed lines). A. Modoc Scarp on Upper Klamath Lake. B. Poe Valley, southeast of Klamath Falls. C. The shoreline south of Tule Lake marks the north edge of a lava flow, a part of Modoc National Monument. D. Laird's Landing on the south side of Lower Klamath Lake. (From the Modoc Point, Merrill, and Mount Dome Quadrangles of the U. S. Geological Survey).

colored by the background of the observers. But, as knowledge increased, the perception changed. Today a huge mass of information reveals the opportunities and limitations. Thousands of books, reports, maps, ground and airphotos reveal the features and their meaning, not only as they are today but as they were in years gone by. A good way to see some of these features in relation to each other is to observe them from the air.

## FROM THE AIR

From a low-flying plane and from stereoscopic airphotos, the detailed features of the Klamath Lakes Region stand out with the three dimensional quality of a model and with a perspective not available to an observer on the ground. It is a landscape with great variety in shape and color, in both physical and cultural qualities; nevertheless, it has a definite unity; it is a mini-region. Flights over the area are necessarily brief, but hundreds of airphotos make it feasible to see all parts of the region, leisurely, and in three dimensions. Maps, old and new, make it possible to identify various places and to note significant changes. This is not to belittle field and library studies; one approach is just as essential as another. After all, many excellent studies in history and geography had been published before man learned to fly.

From the air the unity of the Klamath Lakes Region is clearly apparent and the unifying feature is the lake plain, the bed of old Lake Modoc. Included are the basins of Upper Klamath Lake, Lower Klamath Lake, Tule Lake, also the basins of Swan Lake, Yonna, Poe, and Langell valleys. In wetter times, a few thousand years ago, the huge lake, with a meandering shoreline 400 miles long, covered them all. Today in this extensive basin are most of the cultivated fields, irrigation canals, roads, railroads, factories, and other works of man. Outside of the lake plain the population of Klamath County is very sparse.

The flight plan is generally from south to north, following a part of the route of Indians, fur traders, and explorers from the Modoc Lava Beds in California to the Columbia River. Before the coming of the whites, Modoc and Klamath Indians traveled this route on their way to trade with Columbia River Indians who had earlier access to trade goods. Peter Skene Ogden, with a party of fur traders, traveled the route from north to south in 1826, searching, with little success, for beaver and a navigable river to the ocean. John C. Frémont traveled the route from The Dalles to Klamath Marsh in 1843 and in 1846 approached from the south and reached the upper end of Upper Klamath Lake. Lieutenants R.S. Williamson and H.L. Abbot in 1855 surveyed the entire route from south to north, seeking a possible route for a railroad. Their report was unfavorable. In 1846 Levi Scott, Jesse Applegate, and a party from the Willamette Valley marked out an east-west wagon road for immigrants, near the 42nd parallel. These two routes, one north-south, one east-west, made the Klamath Lakes Region an important crossroad for early travel.

The flight begins near Dome Mountain in Siskiyou County, California, and as the plane circles for altitude, a general view of the Klamath Lakes Basin is obtained. Looking northward from an altitude of 10,000 feet above ground, the main features of the region can be seen. A dozen miles to the north are the remnants (sumps) of Lower Klamath Lake and Tule Lake. To the east is Clear Lake Reservoir, the source of Lost River, which flows into Oregon in a wide arc and back into California. In the middle distance is the broad pattern of irrigated and cultivated fields and the concentration of houses and people on the



southern margin of Klamath Falls. Upper Klamath Lake stands out as the largest body of water; its outlet, Link River, flows into Lake Ewauna, then into Klamath River which meanders to the southwest and disappears among the ridges of the Cascade Range. The most conspicuous feature of all in our view is the Cascade Range with its conical peaks, such as Mt. McLoughlin (Mt. Pit) and Pelican Butte. The dark coniferous forest contrasts with the lighter shades of the basin-ranges to the east. It is evident that the combination of the Cascade Range with its water supply and the plain of old Lake Modoc with its large area of flat land makes the Klamath Lakes Region unique in eastern Oregon.

Eastward of Mt. Dome are a variety of lava surfaces, some are black, rough, and hummocky; other areas are lighter in color, smoother with a thin scattering of sagebrush and junipers. On the older lava beds a few intermittent stream channels appear. Early travelers on horseback found north-south travel fairly easy (Williamson and Abbot made 25 miles in a single day), but east-west routes have to cross faulted lava ridges, with steep scarps, called bluffs. At the foot of the bluffs are a few intermittent lakes or ponds; some have names on the map: Sheepy Creek Lake, Panhandle Lake, Gillem's Lake, and Boozey Lake; some of them are little more than water holes. Sheepy Creek is fed by a spring but the others are usually dry. There are few signs of human occupation, only a few abandoned sheep camps. Red Rock Road crosses the lavas east-west, looping over one of the scarps in Gold Diggers Pass, suggesting that this was one of the routes branching from the Applegate Road to the California goldfields. The recent lava flow in the northern part of the Lava Beds National Monument shows almost no signs of human occupation. In detail the surface is rough and hummocky, with many pits and sharp ridges. Here Captain Jack and his Modoc Indians defended themselves in the Modoc War of 1872-73. The lava flowed into the southern part of old Lake Modoc and covered the original shoreline. An old outlet to Pitt River, located near California Highway 139, was dammed by the lavas. In the early days, before and after the settlement of Klamath Falls, travelers found it relatively easy to cross the lava. Before the railroad reached Klamath Falls people, goods, and cattle moved across the lava beds to railheads in California, at Yreka, Bieber, McCloud, and Alturas. Today U.S. Highway 97, State Highway 139 (39 in Oregon), two lines of the Southern Pacific Railroad, and the Burlington Northern Railroad find easy routes across the lava beds.

Beyond the steep, shattered edge of the lava beds is the southern sump of Tule Lake, a wildlife refuge, and a little farther to the north irrigated fields in an area called the "Frog Pond," suggesting that this also was sump in recent times. To the west is the steep scarp of High Rim (Sheepy Ridge) (fig 1.5). This 10-mile long ridge is a barrier to travel and no roads cross it. A tunnel under it allows water to be pumped from Tule Lake sumps up to Lower Klamath Lake sumps, from which it drains into Klamath River. But for this pumping, water would accumulate in the Tule Lake Basin and flood the irrigated fields. Tule Lake's only natural outlet is by seepage. In the southeastern part of the basin a high ridge called "The Peninsula" rises 500 feet above the highest historic lake level. This ridge was an island when the lake was high. On the mainland to the east the old shoreline of Lake Modoc is clearly visible.

Farther north a small ravine on the eastern margin of Tule Lake marks the point where the Applegate Road descended to the shore and joined the Oregon-California Trail. The Applegate

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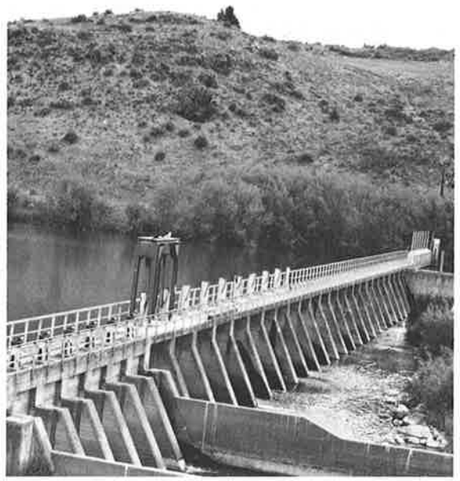

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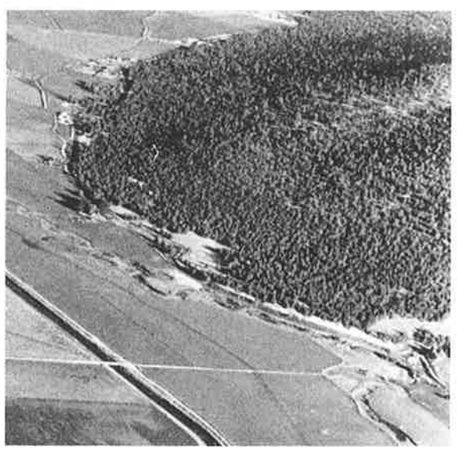


Fig. 1.4. Four aspects of the Basin margin. A. The dam on upper Link River. B. Fractured lava marks the shoreline of Tule Lake. C. The waters of Old Lake Modoc washed against the cliffs of the "Peninsula" near Newell. D. The old shoreline runs along the edge of the wooded area in Poe Valley. (Author's photos).



Road branched from the Oregon Trail near Fort Hall in Idaho. In the Klamath Lakes Basin it passed to the north of Clear Lake, around the north end of Tule Lake and then skirted the south end of Lower Klamath Lake. The old road has been mapped in detail by Devere and Helen Helfrich in "Klamath Echoes."[4]

The flight is now over the 42nd parallel, the boundary between Oregon and California (fig 1.2)[5] This boundary of Oregon was defined on paper in the Treaty with Spain in 1819, but the line was not surveyed until some 60 years later. Whether by human or instrumental error, the boundary and the 42nd parallel do not coincide in the Klamath Lakes Basin. The boundary, followed approximately by the State Line Road, is a significant line. On the Oregon side are many irrigated fields; on the California side fewer fields, many small marshes, and areas of sagebrush. A few large fields are used for dry farming. Most of the marshland is reserved for wildlife.

Near the north shore of old Tule Lake is the site of the stone bridge on Lost River, near the town of Merrill. This "bridge" was described in various ways in the early days. Ogden thought it was a rock dam constructed by the Indians to trap fish. Abbot thought that is was a natural bridge with water flowing under it. One of the immigrants described it as a "singular bridge." Actually it was a rock ledge, usually covered with one or two feet of water, sometimes more. Today a modern steel bridge and irrigation dam cover the old rock ledge. Since many people crossed the bridge and noted the depth of water over the rock ledge, the variations in lake level were recorded. The river level here was nearly the same as the lake level. At the stone bridge the road divided, the Oregon-California Trail continued north on the east side of Upper Klamath Lake to the Columbia River, the Applegate Road turned west and then south around the south end of Lower Klamath Lake. In effect, the stone bridge was at a crossroads of the two main routes and it might have been expected that a town and later a city would be located here. The town of Merrill is located near the bridge but it was not laid out until 1894. The site lacked water transport and furthermore, as noted later, Klamath Falls has a much better site for a city.

Once across Lost River, the flight is above the Applegate Road over a low divide and along the west side of High Rim (Sheepy Ridge) and (fig 1.3) reaches the south shore of Lower Klamath Lake. The lake was generally low in the early days of immigration, now all that remains are a few shallow sumps and marshes. Lieutenant Robert Williamson with a part of the Railroad Survey party and a detachment of dragoons followed this route in August, 1855.[6] He found the lake very low and the shoreline so soft and "miry" that is was difficult to water the horses. Nevertheless, he mapped the lake as if it were full, thinking, perhaps, that the low water was merely seasonal. Fortunately other sources of water were available to the immigrants near the route. A half century later Lower Klamath Lake was full and shallow-draft steamboats connected the south shore with Klamath Falls. Several landings were established on the shore of the lake with access roads to Yreka and other California points. As the plane flies over Laird's Landing at the southern end of the lake, a few collapsed roofs of the old buildings and a stone corral are visible; also a dredged channel, enabling the boats to approach the landing at low water stage.

From Laird's Landing the main route of the Applegate Road crossed the gap between Little and Big Tableland, crossed Willow Creek and continued along the margin of Mahogany


Fig. 1.5. Landforms of the Klamath Lakes Area in Oregon and California, showing the ranges, scarps, and basins. For locations see Figure 1.2. (Author's photos of models by the U.S. Army Map Service).



Fig. 1.6. A general view of Klamath Falls showing the relation to Upper Klamath Lake and Lake Ewauna (lower left). The valley of Link River (left center) shows up as a wooded area. The Central Business District and the Industrial area (lower right). (Author's photo).

Mountain to the Klamath River at the site of Keno (fig. 1.3). Here the river flows over a rocky reef which formerly controlled the level of Lower Klamath Lake. In wet periods Klamath River began at Keno; in dry periods it began at Klamath Falls, 20 miles upstream. Later the channel was dredged from U.S. Highway 97 to Keno and a control dam constructed at Keno to regulate the Klamath River level.

East of Keno the flight route is over the Main Valley, also called Klamath Valley (fig. 1.2) and Lost River Valley. The plain is mostly under cultivation with rectangular fields and an overlay of irrigation ditches. A part of the flow of Lost River is diverted to Klamath River, to lessen the flow to Tule Lake. Most of the irrigation water for this plain comes from Upper Klamath Lake. The western part of the plain was covered with water at high water stages.

Farther east is Poe Valley and Langell Valley (fig. 1.2). These two basins are quite similar in appearance. Both are quite flat, most of the surface is between 4,120 feet and 4,200 feet in elevation, and Lost River flows through both. In Langell Valley pumping stations lift water from Lost River to the adjacent fields, since the gradient is too low to permit gravity diversion ditches. In the early days part of the course of Lost River in Langell Valley was underground.[7]

To the north are Yonna Valley and Swan Lake Valley; both were arms of old Lake Modoc. Swan Lake Valley is the most isolated and is not irrigated from Upper Klamath Lake. A part of it is irrigated by small tributaries and part from wells, using center-pivot irrigation; a large part is not cultivated. The large, circular, dark green patches stand out in contrast to the dry land.

To the west is Upper Klamath Lake, the largest in Oregon (fig. 1.1 ). A general view shows that except for the southeast end the shores of the lake are generally sparsely populated and that cultivation is less intensive than in the southern and eastern basins. Three reasons are indicated; less level land, available level land is above the present lake level and irrigable only by pumping, and, third, much of the eastern shore of the lake was included in the Klamath Indian Reservation for almost a century, thus limiting white settlement. At any rate, aside from the expansion of the city of Klamath Falls toward the southeast corner of the lake, few towns and farms are to be seen on the shores of Upper Klamath Lake(fig. 1.6).

The importance of the upper lake is as a reservoir, to collect and store the water used to irrigate the southern and eastern basins. The numerous steep valleys on the slopes of the Cascades, the creeks and rivers entering the lake from the north and east are visible. The chief rivers show up as meandering ribbons, Wood River and Williamson River from the north and Sprague River from the east. The growing marshes and the deltas, building at the mouths of streams, indicate that all lakes are temporary. Upper Klamath Lake is slowly filling with sediment and vegetation. Only the resistant rock ledge at the lower end at the outlet where Link River begins preserved the lake into historic time. Today, a low dam controls the level.

To the north, the plane flies over the route followed by Ogden, Frémont, Williamson, and Abbot, all on horseback (see Chapter 2). The hills come down in steep slopes to the water's edge, making it difficult for men and horses to follow the lake shore, impossible for wagons. The first obstacle, Cove Point, is easily bypassed to the east, but Rattlesnake and Modoc points were real barriers (fig. 1.3). Apprised of the difficulty, early travelers detoured to the nearby ridges, some of which are nearly flat on top, and



returned to the lake plain farther north. The old wagon road is still visible from the air. Today, notches are carved in these points for a highway and railroad.

West of Modoc Point is the beginning of an extensive lake plain, only a few feet above lake level. Williamson River flows across the plain and enters the lake in a small delta. The course is lined with low levees to protect the adjacent fields from flooding. Fields are large and many show signs of recent cultivation. Some of them probably produce only a crop of wild hay. The main body of the lake now lies to the west of the flight; the shore is low and swampy; a large part of it is in the Wildlife Refuge.

The flight follows up Williamson River to the confluence with Sprague River and the town of Chiloquin (fig 1.2). This was the focal point of the Klamath Indian Reservation on a main line of travel in the early days. After the Southern Pacific Railroad arrived in 1911 the town grew rapidly. To the north of Chiloquin the valley of Williamson River is one mile wide, formerly a part of old Lake Modoc. To the east of Chiloquin are several north-south basin ranges, through which Sprague River meanders. A few miles upstream, Sprague Valley opens up onto an old lake plain, more than a mile wide, with several scattered ranches. Today a paved road from Chiloquin leads up Sprague River and joins Highway 140 near the town of Sprague River. This was the route followed by the Oregon Central Military Road, from the Willamette Valley to the eastern border of the state.

Northwest of Chiloquin is old Fort Klamath on the east edge of Lake Modoc Plain. The fort was established in 1863, ostensibly to protect the immigrants on the Applegate Road from the Indians, but for some curious reason it was located 50 miles to the north of the road. Some said it was really intended to protect Indians from Indians, the Klamaths from the Modocs. In the vicinity of the fort, settlers began to move in and establish ranches, the first permanent settlements in the region. From the fort an alternate road was laid out across the Cascades to the Rogue River Valley. Today a part of this route is followed by State Highway 140; the road climbing the east slope of the Cascades to Lake of the Woods and heading for Medford is visible from the air.

Turning south and following the west shore of Upper Klamath Lake, the steep slopes of the Cascades come into view. Only a few flat marshy places occur on the Basin floor, some of which have been drained and placed under cultivation. When John C. Frémont described this area in 1846, he found traveling difficult because of the thick timber and deadfalls. Later Pelican Bay had a landing for lake steamers when logs were transported to the mills at the lower end of the lake. A number of other landings were used but very few settlements were established. At the lower end of Upper Klamath Lake is the upper end of Link River, the outlet. When the lake is at a low stage, the basalt ledge is clearly visible, also the low dam which reinforces the ledge and diverts water into the irrigation canals. The main ditch enters a tunnel, flows through a hill, then through the city of Klamath Falls.

Flying in a descending spiral over the city of Klamath Falls and environs (fig 1.6 ), the essential features are clearly visible. When George Nurse established his trading post here in 1867 he could not have chosen a more favorable site for a city. The city began on a low terrace well above flood level, on the shore where Link River flows into the wide part of Klamath River, called Lake Ewauna. To the north is a low hill which limited the early growth of the business

district in that direction, but there was plenty of nearly level land to the east and south, the direction of major growth. In effect, Klamath Falls was the head of navigation of the lower lake system when water transportation was important.

The site has good access to north-south and east-west roads. To the southwest is the connection with the Applegate Road, now route 66, at Keno. A ferry, later a bridge across the lower end of Link River made this route accessible. To the east, an easy route led through Olene Gap to Poe Valley, Langell Valley, and on to Sprague River Valley, connecting with the Oregon Central Military Road. The north-south route, in spite of some difficult points such as Modoc Point (the Modoc Point handicap was first overcome by a ferry) was soon improved and became U.S. Highway 97. A highway map of 1930 showed this road, ambitiously, as the California-Banff Bee-Line Highway. At this time U.S. Highway 97 did not continue south of Klamath Falls, as it does today. Instead, it crossed the Cascades with State Highway 66 and joined U.S. Highway 99 near Ashland. Klamath Falls does indeed qualify as a crossroad location, but another fact overrides this. The waters of Upper Klamath Lake are the lifeblood of the region and the controlling point is on the upper end of Link River. Here the major ditches take out to irrigate thousands of acres on the lake plain to the south. Once through or around the intervening hills, the water divides and subdivides and reaches even into California. To be sure, water comes from other sources, from Clear Lake Reservoir by way of Lost River, from a few other streams, and from wells, but Upper Klamath Lake is the major source.

From the air the essential features of the site of Klamath Falls and the functional parts of the urban landscape are easily identified (fig. 1.6). The restrictions to growth of the various parts - business, residence, and industrial - are both natural and man-made. To the north of the original settlement on the east bank of lower Link River is a steep hill, limiting commercial growth but not residential. To the south is the shore of Lake Ewauna, so the central business district grew to the northeast in a narrow belt. As the CBD grew beyond the hill slope, it spread out both to the north and south. This situation gave the core of the city a rectangular street pattern, oriented northeast-southwest and northwest-southeast. The coming of the railroad in 1909 restricted the growth of the city on the southeast. The original street pattern persisted for the older parts of the city long after the Land Office maps had established the township, range, and section system. Some streets were laid out parallel to the railroad and some followed the meandering course of the main irrigation canal. In the newer parts of the city, including the large suburb of Altamont (fig. 1.3), the orientation is north-south, east-west. The chief industrial area, mostly woodworking establishments, begins on the shore of Lake Ewauna and extends to the southeast along Highway 39, where a variety of light manufacturing establishments are located. Large sawmills and plywood mills are located along Klamath River south of the city. For these establishments Lake Ewauna and Klamath River serve as log ponds for storing rafts of logs.

Flights over the Klamath Lakes Basin and study of airphotos reveal the chief features of the region. Field and library studies have suggested their geographic and historic meaning. Of great significance is the plain of Lake Modoc with its thick, nearly level alluvial deposits. Of equal importance is the nearness to the Cascade Range with its supply of water, partly from melting snows, all the more important because of the low



annual precipitation in the Basin. The lakes - Tule, Lower Klamath, and Upper Klamath - have played a changing role. In the early days when roads were few, the lakes were widely used for transport, first by canoes and rowboats, later by small steamers. Still later large areas of Lower Klamath Lake and Tule Lake were drained, put under cultivation, or converted to wildlife refuges. Upper Klamath Lake continues as the chief reservoir for a large part of the Basin. Clear Lake and Gerber reservoirs also supply water for irrigation via Lost River.

Rivers were, from the beginning of settlement, the chief source of water and travel by boat or by land followed their banks. Most rivers, Wood, Williamson, Link, and Klamath, flow generally southward. Sprague River flows westward and was an alternate route to the Willamette Valley. Of special significance in the drainage system are the hard rock reefs at the lower end of Upper Klamath Lake and in the Klamath River below Keno. These rocky ledges or reefs helped to maintain the levels of the lakes. The reefs were removed by dredging and a dam controls the river level.

The various basins (there are seven main ones) are filled with hundreds of feet of porous sediment, pumice, ash, cinders, and diatomite and constitute a huge aquifer for storing groundwater, a resource which is just beginning to be utilized. Igneous bedrock, underlying the sediment or exposed in the adjacent hills, furnishes, in some places, hot (geothermal) water sufficient to heat many buildings, including those at Oregon Institute of Technology.

# 2. EXPLORATIONS AND EARLY PERCEPTIONS: 1826–1860

The first explorers of the Klamath Lakes Basin were Indians who passed much information to the early white explorers. Collectively, at least, the Indians knew every trail, lake, stream, every hill and mountain, every fish, game animal, and useful plant. Indians furnished food to the explorers, acted as guides, provided canoes and boats at ferry points. The role of Indians in delaying settlement has been fully recounted, perhaps exaggerated; positive contributions are less well known.

From 1826 to 1860 more than one hundred white people crossed the Basin but only a few left a record of significant observations. The visitors had a variety of backgrounds and purposes, fur traders, Army officers, ranchers, migrants, and gold seekers. They arrived in different seasons and in different years, some dry, some wet, so their descriptions varied, but together their recorded observations present a fairly adequate description of the Basin before settlement. The discussion below is limited to representative observers: Peter Skene Ogden, John C. Frémont, Jesse and Lindsay Applegate, Robert Williamson, Henry Abbot, John K. Lord, and Alexander Piper (fig 2.1).

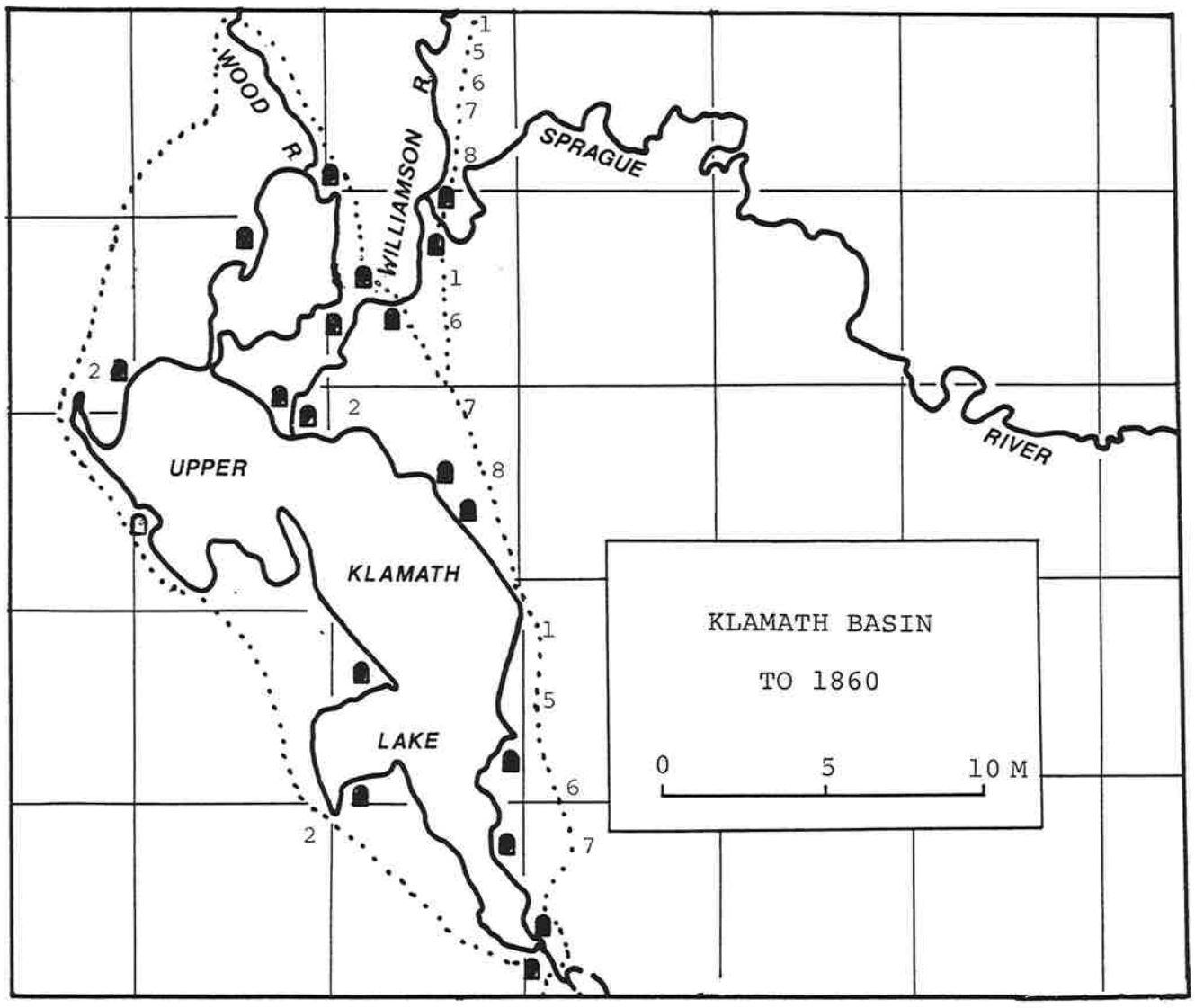
Early perceptions of the Klamath Lakes Basin varied with the background and purposes of the observers, with the season of observation, winter or summer, whether in wet or dry periods. Most of the early visitors, Ogden, Lord, and Piper excepted, made their observations in a period of prolonged drought. Few of the early visitors thought of the Basin in terms of possible settlement, either for themselves or anyone else. Diffusion of ideas concerning the Basin was slow and somewhat haphazard. Immigrants who crossed it and reached the Willamette Valley spread the word, most of it probably unfavorable. By 1860, however, reports were beginning to change, especially in the Rogue River Valley, the nearest settlement. First it was found that the Basin could furnish some temporary grazing; later a few hardy people began to see the possibility of permanent settlement. The effect of the increased precipitation in the more humid phase of the climate was an important factor in this change of attitude. One of the best indexes of precipitation variations in the period is a tree ring study.

## CLIMATE

In 1923 F.P. Keen began a study of tree rings in the Klamath Lakes Basin which was published in 1937 in the Monthly Weather Review.[1] Keen measured the annual growth rings on the stumps of recently harvested ponderosa pines in five areas: Clover Station, west of Klamath Falls; Bly Mountain, south of Beatty; Horsefly Mountain, south of Bly; at Pringle Falls; and on Watkins Butte, north of Fort Rock. Keen chose trees on well-drained sites and assumed that moisture (precipitation) was the major factor in the variation in thickness of the annual rings. He noted that other factors such as temperature and plant disease may also have been involved. Keen correlated his results with Weather Bureau records after they became available in 1904. L.T. Jessup made another tree ring study based on juniper trees in the Harney Lake Region, the curves correlating well with those of Keen and with Weather Bureau records.

Keen plotted growth curves year by year and also by five-year moving averages. From 1800 to 1838 precipitation was above average. During this period the years 1809, 1813, 1826 (Ogden's visit), and 1832 were quite wet. On the other hand, in the same period, the years 1823, 1829, 1830, 1831, and 1833 had below average precipitation. From 1839 to 1854 the climate was dry and there were few

Fig. 2.1A ROUTES OF THE EXPLORERS AND MAJOR INDIAN VILLAGES




1. Ogden, 1826
2. Fremont, 1846
3. Applegate, 1846
4. Williamson, 1852
5. Williamson, 1855
6. Abbot, 1855
7. Piper, 1860
8. Lord, 1860



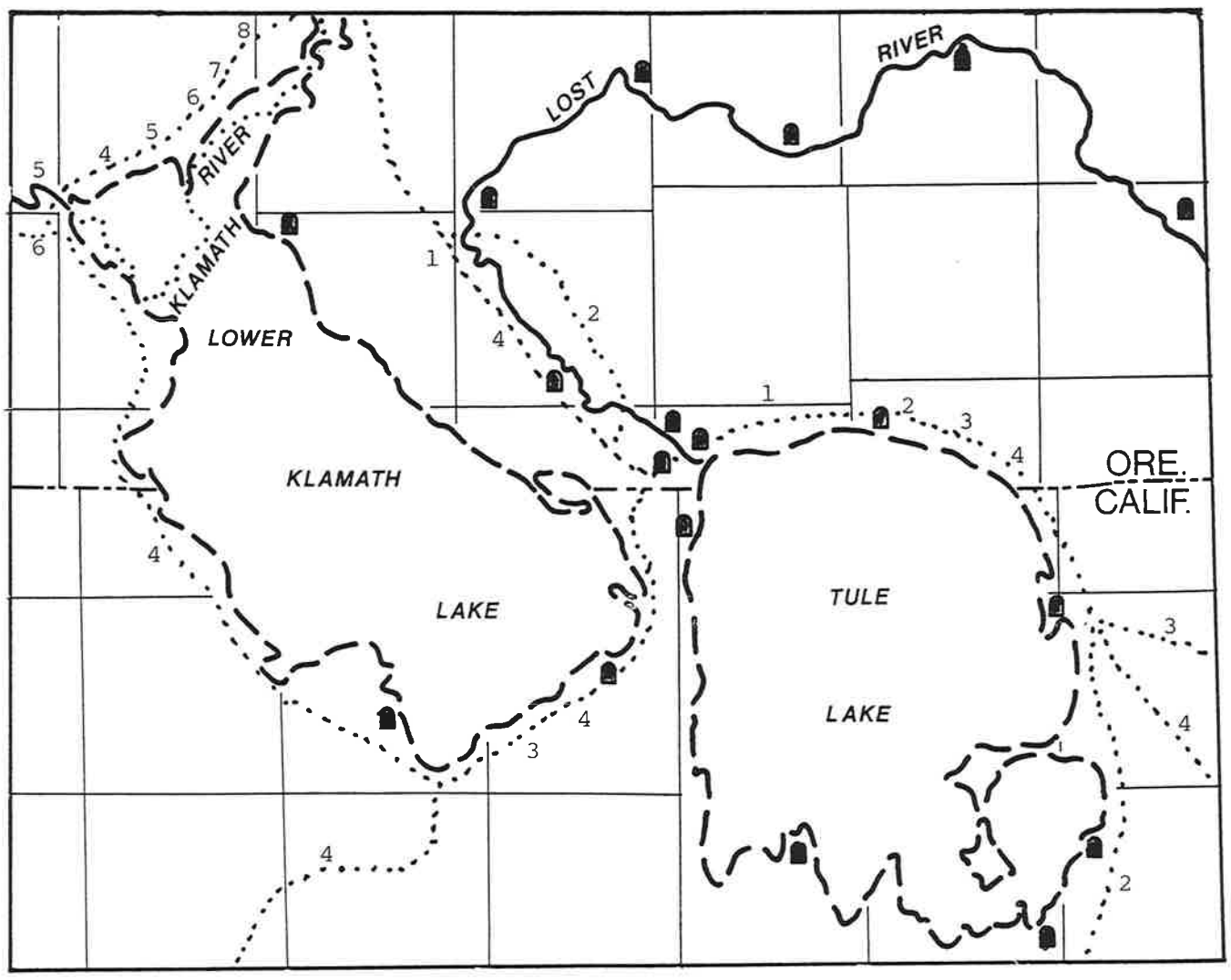





Fig. 2.1B

really wet years. From 1855 to 1869 precipitation was above normal. For 1861, the year of the great flood, Keen's chart shows the sharpest peak of the century.

## PETER SKENE OGDEN

Peter Skene Ogden was the first to describe the Klamath Lakes Basin and leave a record.[2] At the time of his visit, 1826, he was chief trader for the Hudson's Bay Company. His chief interest was beaver and the conditions favorable for them. He was interested in trapping and trading with the Indians for furs. He was also looking for a navigable river which might be used to transport furs and supplies to and from the southern Oregon coast, thus avoiding the long pack trip to Fort Vancouver. Ogden was a Canadian, of loyalist parents, born in Quebec in 1794, educated in Montreal until he was sixteen when he enlisted in the fur trade.

In late November, 1826, Peter Skene Ogden, two months out of Fort Vancouver, arrived at Klamath Marsh, November 30, 1826, with a party of 35 trappers and more than 100 horses. The roundabout journey, via the Deschutes River, Harney Lake, and the Paulina Mountains, had been a difficult and unprofitable one. Game was scarce and the party was on short rations and the horses were in poor condition. A camp was established on Williamson River at the outlet of Klamath Marsh. The following description of Klamath Marsh is from Ogden's Snake River Journal, November 30 and December 1 and 2, 1826.

> Nov. 30, 1826. We raised camp for 4 miles to reach the River or Branch of the Clammitt (Williamson) River running through a fine plain (Klamath Marsh) Course South. I compute the distance from this place to the sources of the River of the Falls to be 25 miles nearly a Southern Course. Course this day West after encamping Mr. McKay with a party proceeded to the Indian Villiage distant about three miles from us it was late in the evening ere he return'd and informed me that he found the Villiage composed of 20 Tents and strange as it may appear built on the water and surrounded on all sides by water and from its depth impossable to approach them on foot or on Horseback but with Canoes with which they are well provided--their Tents are well constructed for defence being built of large Logs in form and shape of Block Houses. The foundation of these Tents are made with Stone and gravel and made solid by piles sunk about six feet deep indeed the construction of their Tents evince great ingenuity from their accounts they have many enemies to apprehend and are constantly guarded and when they absent themselves from their Villiage they remain in the mountains, and altho they express themselves well pleased to see us on their Lands still they could not but regret we had open'd a communication, for many years past they informed us the Nez Percey, who were in search of us but did not succeed, but now they will have in future your road and altho we have no fire arms still we fear them not--so far as Bows and arrows will assist they are well provided--they have onely one Horse amongst them and the cause they assign for this is the winters are too severe and snow too deep. By their accounts in the month of January they have from five to six feet of snow and their Horses perish for want of Food. They subsist during the winter on Roots of an inferior quality but in the Summer the Plain is covered with Antelopes and from Lakes not far distant from this we obtain Fish.



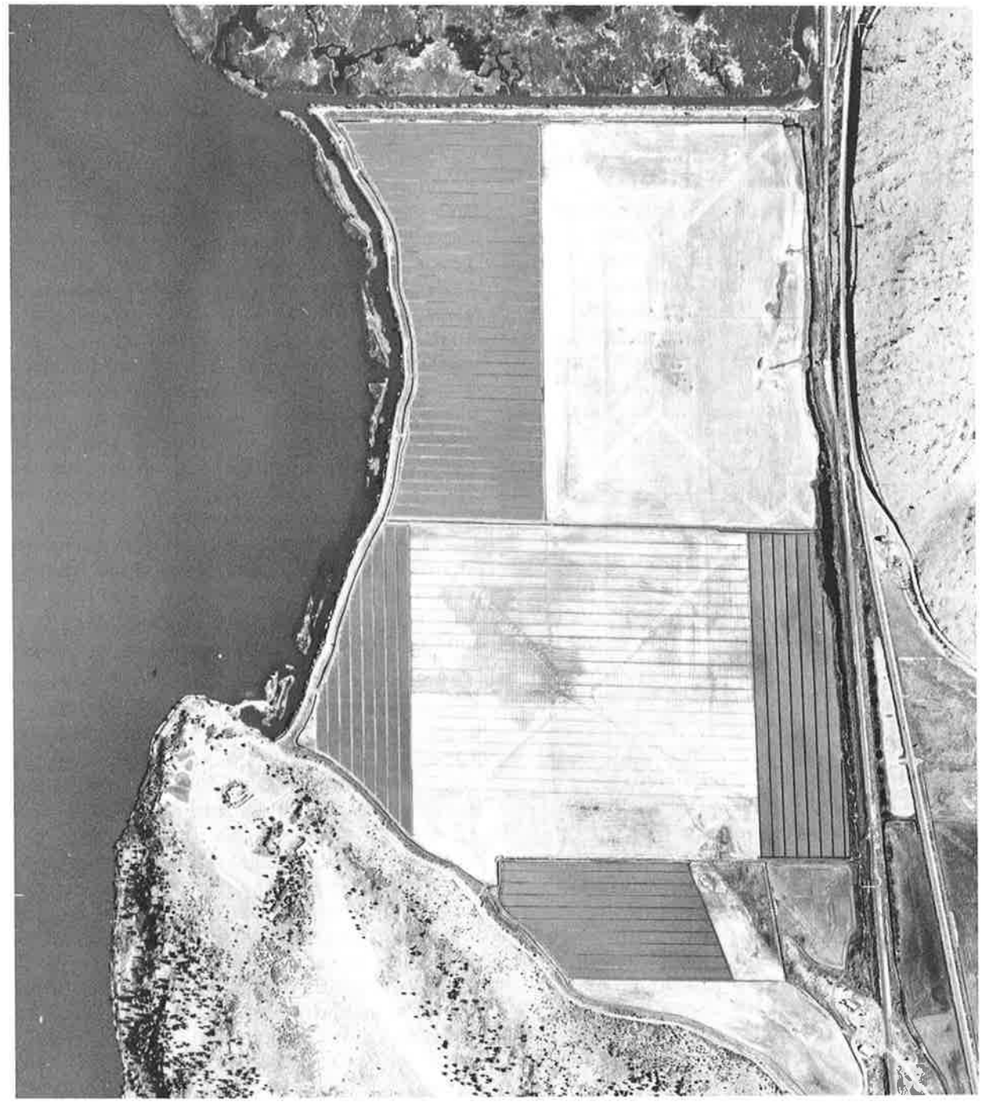


Fig. 2.2 A vertical airphoto of Cove Point on Upper Klamath Lake. The point was a favorable camping place for explorers, including Williamson and Abbot, and Lieutenant Piper. The lake supplied "tolerable" water and the Marsh (center, now drained) provided pasture. Scrubby trees on the point furnished fuel. The shoreline of Cove Point like that of Modoc Point was difficult for horses. (Production Marketing photo)

Dec. 1, 1826. At day light I started men in quest of the sick Woman and lost Horses. We had truly a stormy night for Wind and rain but this day we have fine mild weather and as the month has commenced so I wish not onely on our own accounts but also for our Horses it may continue so till it close, we certainly require it but at this season we cannot expect it will long remain so. A part of the Hunters who were in advance arrived starving, they have been in the Mountains but found nothing not a track of an Anamal. About thirty Clammitt Indians paid us a visit, fine looking stout men in good condition but wretchedly clad, they do not appear to be acquainted with the Country any distance beyond their own Lands and what they do know does not tend to raise our expectations. The river that discharges in the Ocean is far distant but this is all conjecture, as for Beaver it appears almost a stranger to them consequently give us no hope of finding any, but say the farther you advance the more numerous you will find the Indians,...[3]

At this stage in the journey Ogden was discouraged, even despondent. "Horses killed for food," he wrote in his diary and, "all looks gloomy, what will become of us." A severe snowstorm delayed the departure from Klamath Marsh; snow and rain alternated for the next few days. The party traveled south near Williamson River and reached Upper Klamath Lake, then continued near the shore to Modoc Point (fig 2.2). Here it was necessary to ascend to the upland since passage along the shore with horses was not feasible. Bad weather continued with snow, fog, and high winds. Arriving at the Indian village near the site of Klamath Falls, Ogden purchased a few furs and some dogs. Ogden considered following down Klamath River, hoping it would turn out to be navigable, but the Indians discouraged him. The party then traveled in a southerly direction through Spring Lake Valley, later known as "Main Valley," and along Lost River, which was forded with difficulty. The banks were steep and soft and the water deep. Ogden noted a rock barrier in the river, "made by the natives for taking small fish." Later travelers called it a "natural bridge," and as such it appears on some contemporary maps. It is, in fact, a rock ledge in the river, providing a comparatively easy crossing for immigrant wagons. The party passed along the east side of Tule Lake and then turned westward. Game was still very scarce and the party was forced to eat some of their own horses, and dogs purchased from the Indians. "Many in the party ill from the effects of eating too much dog," Ogden reported. The party continued westward, crossed the Klamath River at the hot springs near present Beswick, California, then over the Siskiyou Range to Rogue River Valley, still looking for favorable "beaver" country, but in vain.

Ogden's impressions of the Klamath Lakes Basin, generally unfavorable, were not published until many years later, when they ran to 17 book pages for the Basin. But some of the information was probably circulated by word of mouth. One of the results was that Klamath Lake, or lakes, began to appear on contemporary maps. Captain B. L. E. Bonneville's map of 1837 shows a single unnamed lake in the correct latitude, draining directly westward through the Cascade Range to the "Claymouth River." Abert's map of 1838 showed Klamath Lake draining south into California and then back into Oregon. Wilkes' map of 1841 (fig. 2.3) shows three Klamath Lakes, one of which is Klamath Marsh, draining into California.[4]

## JOHN C. FRÉMONT

In 1843, seventeen years after Ogden's visit, John C. Frémont traveled



A


B

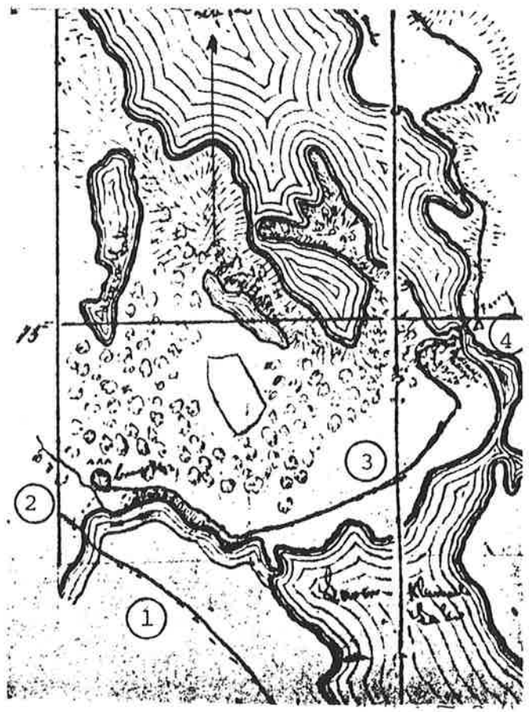



Fig. 2.3. Parts of two early maps of the Klamath Lakes. A. Wilke's Map,1841. was the first to show: (1) Klamath Marsh; (2) Upper Klamath Lake; (3) Lower Klamath Lake. B. Piper's Map, 1860, showed: (1) the Immigrant Road; (2) Piper's Camp Day; (3) the road to the Ferry; and (4) the location of the Ferry, now Fremont Bridge.

from The Dalles (of the Columbia) with a large party, including 104 horses and mules, also a small howitzer, to Klamath Marsh. Frémont hoped to find Klamath Lake and its outlet. He was also looking for the mythical Buenaventura River, which was supposed to flow from the Rocky Mountains to San Francisco. The existence of the river had been disproved years before by Bonneville, Jedediah Smith, and others, but apparently Frémont was not aware of it.

Frémont arrived at Klamath Marsh December 10, thinking it was Klamath Lake.[5]

> December 10th, 1843--The country began to improve; and about eleven o'clock we reached a spring of cold water on the edge of a savannah, or grassy meadow, which our guides informed us was an arm of the Tlamath Lake; and a few miles further we entered upon an extensive meadow, or lake of grass, surrounded by timbered mountains. This was the Tlamath Lake. It was a picturesque and beautiful spot, and rendered more attractive to us by the abundant and excellent grass, which our animals, after travelling through pine forests, so much needed; but the broad sheet of water which constitutes a lake was not to be seen. Overlooking it, immediately west, were several snowy knobs, belonging to what we have considered a branch of the Cascade range. A low point covered with pines made out into the lake, which afforded us a good place for an encampment, and for the security of our horses, which were guarded in view on the open meadow.
>
> The character of courage and hostility attributed to the Indians of this quarter induced more than usual precaution; and, seeing smokes rising from the middle of the lake (or savannah) and along the opposite shores, I directed the howitzer to be fired. It was the first time our guides had seen it discharged; and the bursting of the shell at a distance, which was something like the second fire of the gun, amazed and bewildered them with delight. It inspired them with triumphant feelings; but on the camps at a distance the effect was different, for the smokes in the lake and on the shores immediately disappeared.
>
> The point on which we were encamped forms, with the opposite eastern shore, a narrow neck, connecting the body of the lake with a deep cove or bay which receives the principal affluent stream, and over the greater part of which the water (or rather ice) was at this time dispersed in shallow pools. Among the grass, and scattered over the prairie lake, appeared to be similar marshes. It is simply a shallow basin, which, for a short period at the time of melting snows, is covered with water from neighboring mountains; but this probably soon runs off, and leaves for the remainder of the year a green savannah, through the midst of which the river Tlamath, (Williamson) which flows to the ocean, winds its way to the outlet on the south-eastern side.[6]

He supposed that the (Williamson) river "enters the Cascade Range on the west side of the lake." In fact, it flows southward some 10 miles and into Upper Klamath Lake. Frémont visited one of the Indian villages and noted that the Indians subsisted mostly on fish and most of their clothing was made of straw. They had a few horses and many wolf-like dogs. From Klamath Marsh the party turned eastward, visited and named Winter Ridge, Summer and Abert lakes, then turned south to California.

More than three years later, in May, 1846, Frémont visited Upper Klamath Lake, arriving from the south via Pitt River and Round Valley (now Big Valley) in California. The party skirted the east side of Tule Lake (which Frémont named Rhett Lake), crossed Lost River and arrived at the lower end of Link River, finding it unfordable. At the lower end of Upper Klamath Lake, they forded the river with the aid of Indian canoes and continued their journey northward on the west side of Upper Klamath Lake.



> Resuming our journey, we worked our way along between the lake and the mountain, and late in the day made camp at a run, near where it issued from the woods into the lake and where our animals had good feed. For something which happened afterward, I gave this run the name of Denny's Branch. Animals and men all fared well here.
>
> MAY 7.--The weather continued refreshingly cool. Our way led always between the lake and the foot of the mountains, frequently rough and blocked by decaying logs and fallen trees, where patches of snow still remained in the shade, over ground rarely trodden even by an Indian foot. In the timber the snow was heavy and naturally much heavier towards the summits and in the passes of the mountains, where the winter still held sway. This year it had continued late and rough. In the late afternoon we reached a piece of open ground through which a stream ran towards the lake. Here the mountain receded a little, leaving a flat where the woods, which still occupied the ground, left us a convenient open space by the water, and where there was grass abundant. On the way along from the outlet no Indians had been seen and no other sign of life, but now and then when the lake was visible a canoe might be seen glancing along. But in the morning, as we were about to leave camp, a number of them came in. I could not clearly find where they had come from, though they pointed up the lake. Perhaps from some valley in the mountain on this stream, or perhaps they had followed our trail. This was most likely, but if so they were not willing to tell. They would not have done so with any good intent, and they knew well enough that we were aware of it. They said that they were hungry, and I had some mules unpacked and gave them part of our remaining scanty supply of dried meat and the usual present which an Indian, wild or tame, always instinctively expects.
>
> We continued our route over the same kind of ground, rendered difficult by the obstructions which the wash of the rain and snow, and the fallen timber, the undisturbed accumulations of the many years, had placed in these forests. Crossing spurs of mountains and working around the bays or coves between the ridges or winding among the hills, it is surprising how a long day's march dwindles away to a few miles when it comes to be laid down between the rigorous astronomical stations.[7]

Frémont hoped to continue northward to connect with his Klamath Marsh trek of 1843, to map the upper Klamath (Williamson) River, cross the Cascades, and travel to the coast in hope of finding a good harbor. This was not to be. A messenger overtook Frémont with news of the threat of war with Mexico and he immediately started to retrace his steps to California. After a hard day's ride they camped in a meadow surrounded by forest (probably near Aspen Lake). Indians attacked the unguarded camp during the night and killed three men. The next day Frémont retaliated, killing several Indians. At any rate,

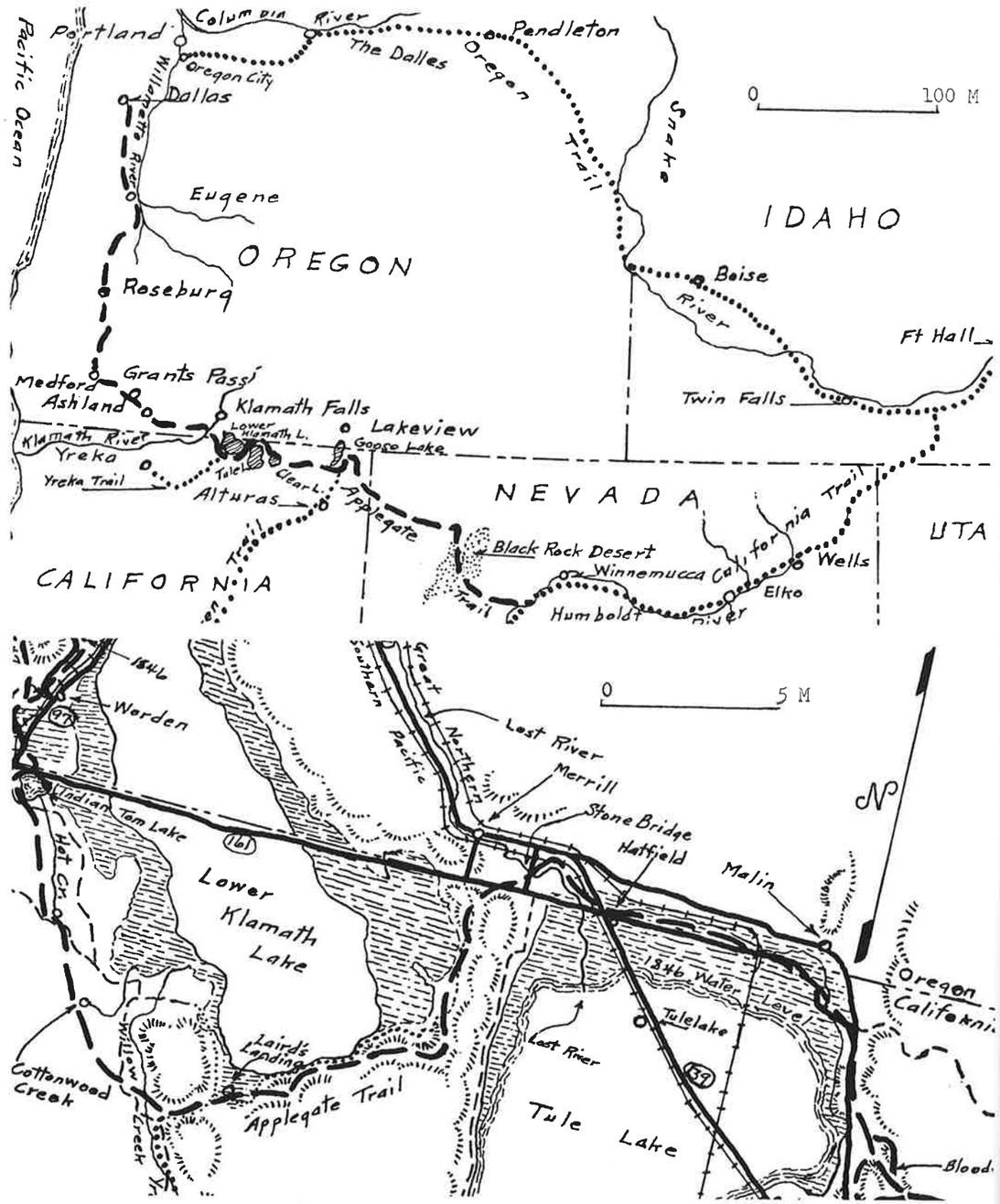



Fig. 2.4. Devere Helfrich's maps of the Oregon and Applegate Trails. The upper map shows the Oregon Trail from Fort Hall to Oregon City, also the Applegate Trail as a branch of the California Trail. The lower map shows the Applegate Trail (dashed line) and low stage of the lakes. (Helfrich Collection).



Frémont's brief observations in the Klamath Lakes Basin were over.

Frémont's great contribution to the Klamath Lakes Basin and to western North America was his map, drawn by his assistants, Charles Preuss and Edward Kern. Most of the map, now known as the Preuss Map, was compiled from other maps, but Frémont's traverses were also included. On this map (fig 2.3) Klamath Marsh was labeled "Little Klamath Lake." Lost River flowed into Tule Lake but its source, according to Frémont, was located near Summer Lake rather than in Clear Lake. On Frémont's map the main course of Klamath River led into California in a southwesterly direction, then turned to the northwest, entered Oregon, and joined the Rogue River. Many maps of this period confused Rogue and Klamath rivers. Frémont gave names to many places in the Basin; only a few survive.

## THE APPLEGATE ROAD

In June, 1846, Jesse Applegate led a party from the Willamette Valley to the Rogue River Valley and across Green Springs Pass to the Klamath Lakes Basin.[8] Their purpose was to lay out a wagon road which might tempt immigrants to leave the Oregon Trail and take a southern route. In this they succeeded and a few hundred immigrants used the road beginning in 1846. This road was also known as the Southern Immigrant Trail, from a point near Fort Hall, Idaho, through northern Nevada, northern California, the Klamath Lakes Basin, and into the Willamette Valley.

Requirements for a satisfactory wagon road were quite different from those of a pack trail. Terrain was more critical; smooth steep slopes could be managed by doubling the teams, but rocky slopes were difficult and damaging to the wagon wheels. Ox-drawn wagons did not travel very far in one day, so more sources of water and grass were needed. Immigrant wagon trains usually included large numbers of loose livestock which called for additional pasture and water. One disadvantage of the Applegate Road was the lack of trading posts along the way.

The Jesse Applegate party on their eastward exploratory journey crossed the Klamath River near the present site of Keno and traveled along the western and southern shores of Lower Klamath Lake (fig. 2.4). They found willows growing along the shore and found it easy to water their horses. (This was not always true, as later travelers learned; the lake margin was too miry.) The party crossed Lost River on the rock bridge and learned that Fremont had recently passed this point on his way north. The party traveled along the north and east shores of Tule Lake, then turned eastward over a low upland to Clear Lake.

The effect of the exploration of the Applegate Road was immediate. Even before the party returned to the Willamette Valley immigrants were passing through the Klamath Lakes Basin. In 1846 nearly 100 wagons with 500 people made the journey. Then the numbers declined; only 45 wagons in 1847. The discovery of gold in California diverted many immigrants who otherwise would have continued to the Willamette Valley. This resulted in some reverse migration; gold seekers from the Willamette Valley crossed from Jacksonville by Green Springs Pass, turned south on the south side of Lower Klamath Lake, to Yreka. Peter H. Burnett who traveled this reverse route compared the Applegate Road with the Oregon Trail. Burnett arrived in the Willamette Valley in 1843; in a long letter to James S. Hughes in Liberty, Missouri, he wrote, "the emigrants who travel it (the Applegate Road) are not agreed on it(s) quality...they suffered much losing most of their cattle...the greatest hazard was the Indians who seized every opportunity to destroy the

stock, thus causing numerous delays." Burnett later migrated to California and became the first governor.

The immigrants who traveled the Applegate Road reported in detail the conditions of the road, the water and wood supply, and the availability of grass. But with very few exceptions, they had nothing favorable to say about the Klamath Lakes Basin. It was a time of prolonged drought. One exception was a statement by Lester G. Hulin who arrived on the east shore of Tule Lake, October 7, 1847. The Lake, he said, "was a broad rich bottom." Hulin may have been the first to use the name "Lost River." Virgil K. Pringle the year before thought that Lost River was the headwaters of the Sacramento River.[9]

## THE RAILROAD SURVEY

In 1855 Robert Williamson and Henry Abbot, Army engineers, were directed to survey two possible routes for a railroad from San Francisco Bay to the Columbia River, one route to the east of the Cascades, one to the west.[10] In August, 1855, the party arrived at the Klamath Lakes Basin from Pitt River in California. The party included one hundred mounted soldiers, packers, guides, engineers, a botanist-geologist, naturalist, physician, and an artist for landscape sketching. They made a compass traverse of the route, measuring distances with an odometer mounted on a small cart drawn by a mule.

The Survey party approached the Klamath Lakes Basin from the south (fig. 2.1). Traveling up a tributary of Pitt River ,they emerged from a canyon onto a rocky plain. For six miles they followed an old wagon road through an open pine forest, then across a sagebrush plain. They passed low sandstone hills, capped with basalt, and turned east to Clear Lake. The lake was low and the shoreline "miry," making it difficult to water the horses and mules. From Clear Lake they traveled to the northwest, over sagebrush-covered hills and descended abruptly, 200 feet, to the shore of Tule Lake. At this point they joined the Applegate Road.

On August 13, 1855, they crossed Lost River on the "natural bridge;" here the party divided. Williamson continued on the Applegate Road around the south and east shores of Lower Klamath Lake. He noted the turnoff for Yreka, which he had traveled in 1852. The lake was low, making it difficult to water the horses. Thinking that the low level was seasonal, perhaps, the lake shore was mapped at the vegetation line, as if it were full. The party crossed Klamath River near the site of Keno (fig. 2.5) and followed the west bank of Klamath River to Link River, then continued to Upper Klamath Lake and joined Abbot's party.

Meanwhile Abbot's party continued north up Lost River. His description follows:

> My party left camp first. We followed up the eastern bank of Lost river, through a dusty sage plain almost destitute of grass, to the Natural Bridge. The river was here about eighty feet wide and very deep; but it was spanned by two natural bridges of conglomerate sandstone from ten to fifteen feet in width, parallel to each other, and not more than two rods apart. The water flowed over both of them. The top of the most northern one inclined down stream, but it was only covered to a depth varying from six inches to two feet. The other was nearly horizontal, but the water, being unusually high, was too deep for fording. There are probably hollows under both arches, through which the river flows. Emigrants cross here with



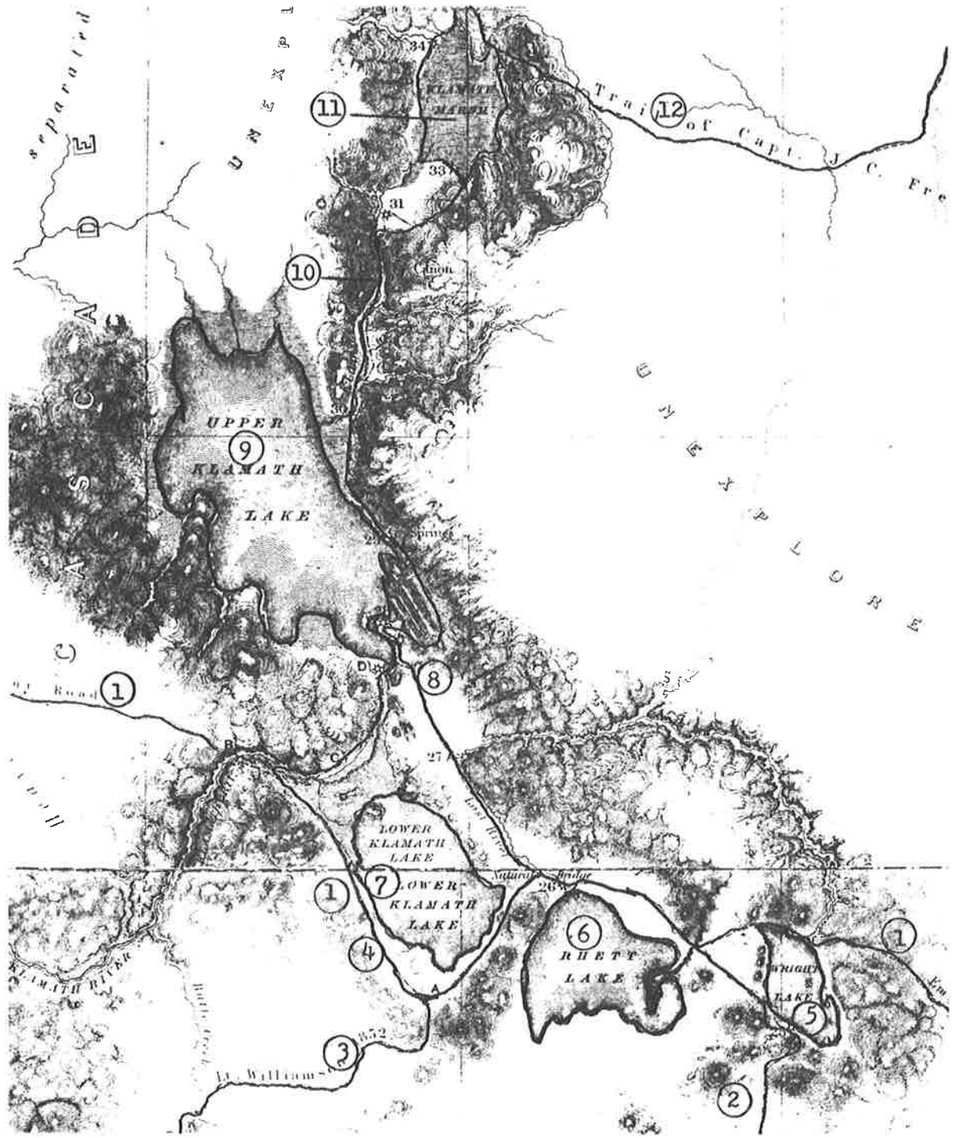



Fig. 2.5. Abbot's Map of the Klamath Lakes. 1. The Emigrant Road. 2. Williamson and Abbot's approach from California. 3. Lt. Williamson's Route in 1862. 4. Lt. Williamson's Route in 1855. 5. Clear (Wright) Lake. 6. Tule (Rhett) Lake. 7. Lower Klamath Lake. 8. The site of Klamath Falls. 9. Upper Klamath Lake. 10. Williamson River. 11. Klamath Marsh. 12. Fremont's Route in 1843. (From the Railroad Surveys).

their loaded wagons. There is no ford for a considerable distance above, and none below. We passed over without difficulty, and followed a well marked Indian trail towards the north, through a level valley dotted with sage bushes and a few clumps of bunch grass. The river, which was full of short bends, was often sunk as much as thirty feet below the plain. There was apparently a good ford 4.5 miles above the Natural Bridge. The valley was about three miles wide, and bordered by high hills; those on the east being well timbered with pine, and those on the west nearly bare. The bunch grass became more abundant as we advanced, and the sage bushes fewer in number. After travelling twelve miles from the Natural Bridge, we reached a place where the river issued through a cañon (Olene Gap) from the hills to the eastward; and, although the valley continued towards the north, it was entirely destitute of water. As the distance to Klamath lake was unknown, we left the trail and encamped near the mouth of the cañon. The general surface of the plain was here about forty feet above the water; but it was connected by a bench, about 200 yards in width, of not more than half that height. This formed a good camping ground; being covered with fine bunch grass, while bushes and small trees for fuel were found in abundance near the edge of the stream.

August 14.--...Our course lay towards the north, through a narrow valley thinly covered with sage bushes and clumps of bunch grass. It was bordered by timbered hills which gradually closed in upon the trail. We crossed several dry beds of streams, and also the bottom of what, in the rainy season, was undoubtedly a small lake. It was now dry, and covered with a white efflorescence. After travelling 9.5 miles we reached a low line of hills, which formed the northern boundary of the valley. Klamath (Link) river forced its way through the ridge by a narrow canon, and, after flowing along the western side of the valley for a short distance and spreading out into a small lake, disappeared among the hills towards the west. On reaching the summit of the very low divide, composed of trap rock, we saw outspread before us Upper Klamath lake. It was a fine sheet of water, thirty miles long and twelve miles wide, bordered by timbered ridges with an occasional narrow belt of tule. Light clouds of smoke rising from signal fires upon several of the hills satisfied us that watchful eyes were measuring our advance. We had struck a small arm of the lake, from which Klamath river issued. Following along the eastern side, we crossed a grassy meadow, and encamped at the extremity of a hilly promontory (Cove Point) which projected into the lake (fig. 2.2 ). Excellent bunch grass, with bushes and small trees for fuel, abounded in the vicinity. East of the promontory, a wide field of tule prevented approach to the water; but the western shore was rocky and bold.

On August 18, 1855, the combined party continued northward but, finding the Indian trail near the shoreline too difficult for the little cart, detoured to the southeast around the south end of Plum Hill, then continued to the northeast through Plum Valley and back to the lake. They camped near Barkley Spring at the foot of Modoc Scarp.

August 18.--The ridges on the eastern side of the lake, which were composed of vesicular trap, appeared to run parallel to each other in a northeast and southeast direction, and to terminate abruptly at the water's edge. A well-marked Indian trail followed along the shore; but members of the party who had explored it for a short distance reported it very rocky, and impassable for "the little cart," as the odometer wheels still continued to be termed. Lieut. Williamson had observed several Indian trails diverging to the right on his last day's march; and he therefore determined to follow a southeast course, hoping to discover some good pass by which he could cross the ridges, and thus avoid the rocks and bends of the shore. After travelling about three miles in this direction through a wooded country, he thought it best to cross abruptly a steep and rocky ridge to the east. "We thus reached a narrow valley, lying between two steep ranges of hills, and filled with open pine timber. There was a large Indian trail in it, which conducted us to the lake. A precipitous and rocky ridge rose abruptly from the water, leaving barely sufficient room to pass along the bank. After travelling a short distance, we reached a point where several springs gushed from the hill side, and disappeared among thick bushes surrounded by luxuriant grass. The water was clear and pure, and Lieut. Williamson at once encamped. Elder and service berries were found in abundance. A thick haze prevented astronomical observations, and concealed the western shore of the lake. Snakes, as usual in this region, were very numerous, and one of them glided suddenly among our dishes, as we were sitting down on the ground to eat."[10]



North of Modoc Point the party crossed a dry plain and entered an open pine forest. Along the east bank of Williamson River part of the forest was on fire. The grassy areas were burned also, so Williamson decided unwillingly to push on. Arriving at Klamath Marsh, Abbot described tules, meadows, and patches of open water. Wildfowl were abundant but Abbot considered it useless to shoot them since they could not be recovered--the marsh bottom was too miry. But like Frémont, they had no difficulty in riding to some of the Indian villages. The Indians fled in canoes as the party approached, shouting angrily. Abbot described the summer and winter houses of the Indians, as well as the large council house, and sketches were reproduced in the report as woodcuts.

Dr. John S. Newberry was the doctor, botanist, and geologist of the Railroad Survey. His report described the zonation of the vegetation; tules and pond lilies in and around the lakes, a few cottonwoods and willows near the lakes, grass and sagebrush on the exposed part of the lake plain. Junipers and grass grew on the lower foothills, grass and pines on the higher slopes. He noted wild plums and cherries growing on the hill slopes, "loaded with fruit which the bears were busily harvesting."[11]

SURVEYOR GENERAL'S REPORT 1858

The Surveyor General's Report for 1858 noted the completion of land surveys (Township, Range, and Section) in Klamath Lakes Basin. The survey of the Basin at this time is surprising in that there had been no real attempt at settlement, and land surveys were supposed to be limited by law to lands already settled or capable of settlement. The Surveyor General evidently felt it was necessary to justify the survey and, in doing so, made some remarkable statements. "since the disappearance of hostile Indians from the entire southeastern portion of

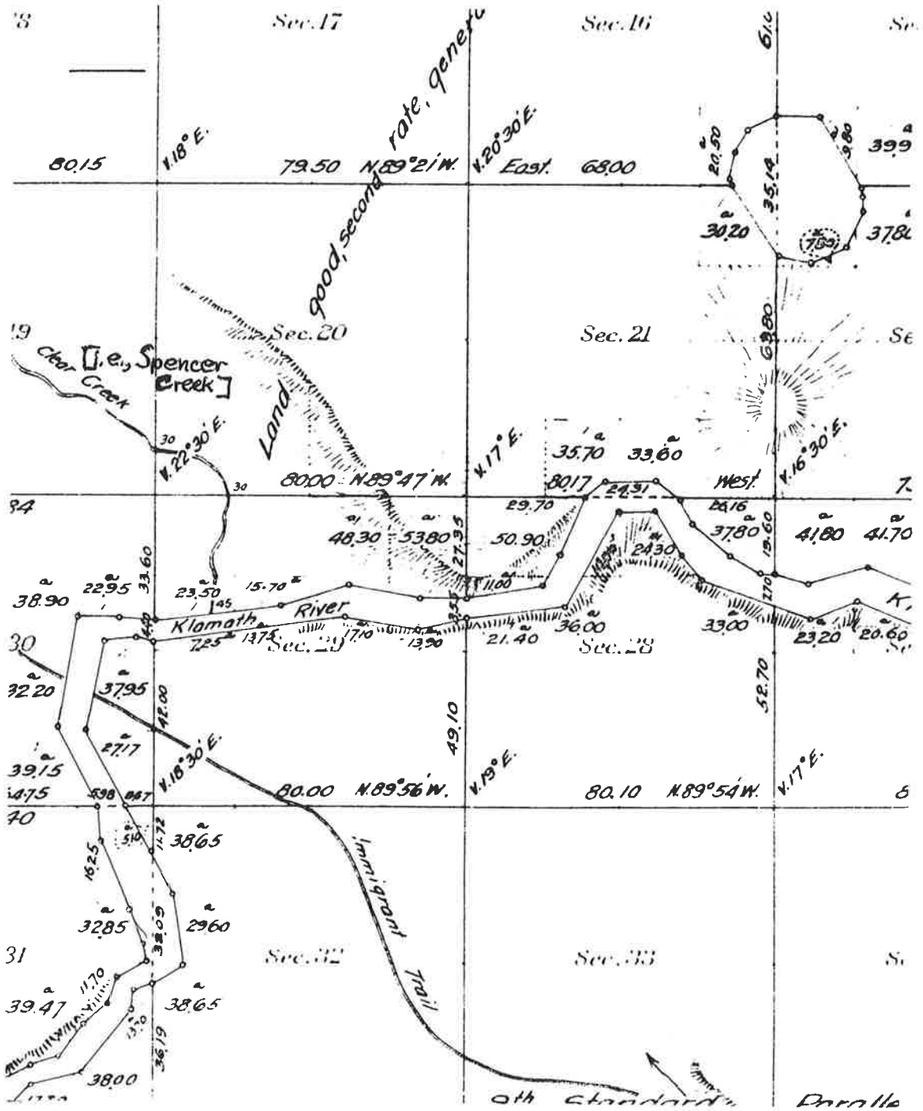



Fig. 2.6. Part of the first survey of Township 39S, Range 7E, made in 1858 by David P. Thompson. Although the early surveys were supposed to be on potential farmland, this township is in hilly land and has remained in woodland to the present day. (The map is an IBM copy of the original, reprinted from the Oregon Historical Quarterly, September, 1968).



Oregon, it has been found that there is more land suitable for farming and grazing purposes. Settlers will soon be making their homes in that region. The land is among the most desirable in Oregon...affording a most practicle route for a railroad." The deputy surveyors did not mention the aridity of the Basin, nor the cold winters and summer frosts. If farming and grazing lands were in the minds of the surveyors, it is surprising that many of the townships surveyed lie in the forested foothills of the Cascades and not on the floor of the Basin. The townships surveyed were Twp 36S through 41, Range 7E and 8E; Twp 38S through 41, Range 9E; Twp 39, 40, 41S, Range 10E; Twp 41S, Range 11E (fig. 2.6).[12]

JOHN K. LORD

In May, 1860, John K. Lord, an Englishman, reached the Klamath Lakes Basin, arriving from California with pack mules, a guide, and Indian helpers. He was on his way to British Columbia to work with the International Boundary Commission. His chief interest was zoology and his chief worry was Indians who often harrassed him. He was astonished and pleased with the variety of wildlife: wildfowl, game animals, and fish. At Lower Klamath Lake he noted the abundance of beaver. (How Ogden, who did not see Lower Klamath Lake, would have been pleased!) Lord wrote:

> I should think this place must be the centre' of the entire beaver population of Oregon; in some of the patches of open water, there certainly was not room to jam in even a tiny beaver cottage of the humblest pretensions, although the open space occupied by the town was many acres in extent. The trees, although a good half-mile from the water, were felled in all directions, as if busy emigrants had been making a clearing. The branches, lopped from the fallen trees, had been dragged by these busy animals along the well-beaten roads, that led in all directions, from the timber to the rushes, through which roads were also cut, to gain an easy access to the water.
>
> The branches, many of them large and heavy, are dragged by the beavers--backing along the roads, two or three often assisting in tugging a single branch--until the water is reached; then they seize it with their chisel-like teeth, and using their powerful tails, both as rudders and screw-propellers, float it out, to be employed in building their dome-shaped residences.

Lord continued northward to "the south end of the great Klamath Lake," which he crossed with the aid of Indian canoes.

> ...(We) keep close to the shore of the lake, which for the first fifteen miles is shut in by high mountains. The trail winds along the side of this mountain, in some places over bare rock, at others loose rolling stones render it very dangerous and difficult to get over. Emerging on an open sandy plain, about seven miles in width, we cross it, still close to the lake. Then hill again, but not so steep. Reaching an open prairie covered with grass, camp on a small stream, with decent wood on its banks.[13]

Lord visited a Klamath chief at the village on Williamson River, presented him with flour and threatened him with King George, if he were not allowed to pass safely. Lord continued northward along the Williamson, through the canyon and arrived at Klamath Marsh, which he detoured because of high water. He noted abundant beaver around the marsh. Lord's descriptions

of wild life, especially the prong-horn antelope and the rough beaked pelican, are excellent.

ALEXANDER PIPER

In the summer of 1860 Lieutenant Alexander Piper arrived in the Klamath Lakes Basin with 66 soldiers. He established a military post near Keno on Spencer Creek near the Klamath River, designed to protect the immigrants from the Indians. The troop had crossed the Cascades by Green Springs Pass. At Jacksonville several people told Piper they were interested in settling in the Klamath Lakes Basin as soon as it was safe to do so, and "if settlements are made before an arrangement is made with the Indians, there will undoubtedly be trouble." Some drovers who grazed cattle in the area prior to 1860 paid the Indians for the privilege. Lieutenant Piper drew a map of the Basin with some improvements over Abbot's map (fig. 2.3). His map showed vegetation, streams, lakes, and trails. As Piper described the Basin, he was especially concerned with wood and water for his camps, grass for his animals, and, of course, the Indians. He recommended that a permanent fort be established, either on the north side of Upper Klamath Lake or to the east of lower Lost River. The background of Piper's expedition is described by Priscilla Knuth in the Oregon Historical Quarterly, which also includes a reproduction of Piper's map of the Klamath Lakes Basin.

> The reasons for Piper's expedition into the Klamath country had gathered over some time. Ever since the southern immigrant route had been pioneered by the Applegates and Levi Scott in 1846 and 1847, there had been difficulties with the Indians along the road. On a number of occasions before 1858 California and Oregon volunteers and even a few regulars traveled through or over parts of the route east of the mountains in efforts to discourage or punish Indian attacks on immigrants. As early as August 1854, Oregon Superintendent of Indian Affairs Joel Palmer visited the Klamath for talks. In 1855 he tried unsuccessfuly to get an agent to explore and secure the good behavior of the Indians "in the vicinity of the numerous lakes east of Klamath" because of "yearly predatory incursions along the middle and southern immigrant roads," "contemplated negotiations for the extinguishment of the Indian title to the country...and the selection of proper reserves..."[14]

Nothing had been accomplished toward a treaty by December 27, 1858, when the then Indian superintendent, J.W. Nesmith, wrote to Brig. Gen. W.S. Harney, commander of the Department of Oregon, asking that a military post be established near Klamath Lake. The following spring five Jacksonville men were reported killed by Indians at a location identified as "Rancheree Prairie on the head of Butte Creek near Mount McLaughlin," and a party of 40 Jacksonville volunteers and sub-Indian agent G.H. Abbott investigated. The latter reported that two of those who had participated in the killings were among the Klamaths, though most of the latter were friendly. He also noted that the Indians were willing to dispose "of the greater part of their country by treaty, reserving part at the lakes for themselves."[15] John Whiteaker, governor of Oregon, reported the killings to both General Harney and General Clarke, and asked for military protection. Abbott, too, recommended a military post, and declared that the most eligible site for an Indian agency



was the valley of the Klamath River "between the lakes known as the Big (i.e., Lower) lake and the Upper lake...." Not only was this a central point for the Indians, but The Dalles-Yreka trail passed through the valley as well as two trails to Jacksonville, which was about 75 miles from the projected agency site.

In the fall of 1859, again there were Indian-white clashes on the southern route and Abbott went out to Klamath Lake with ten men. He learned from the Klamaths that the Snake Indians had proposed that the Klamaths and Modocs join them in a war against the whites, and that the Klamaths were divided on the subject. While he was in the lake country he explored the valley at the north end of "Big Klamath Lake." and found it "most beautifully situated, of good soil and well watered," with grazing lands he felt would be inhabited by whites as soon as protection was provided.[15]

INDIANS

Travelers who passed through the Klamath Lakes Basin in this period, 1826 to 1860, made contact with Indians. Some contacts were friendly, others hostile, and some were bloody. Ogden in 1826 found the Indians generally friendly. Indians welcomed traders, who brought in trade goods the Indians wished to have and who did not threaten a take-over of their lands. Also, it was to the advantage of the traders to purchase pelts from the Indians to supplement their own trapping.

As Lieutenant Piper's report indicated, the Klamath Lakes Indian question was one of increased interest to the people of the Rogue River and Willamette valleys. The principal Klamath villages were around and in Klamath Marsh, along Williamson River, at Chiloquin, and around Agency Bay (fig. 2.1) other sites were on the upper lake and at both ends of Link River.[16]. Modoc villages were located along Lost River, lower and upper sections, and around Lower Klamath and Tule lakes. Estimates of Indian population in this period ranged up to 2,000. In all probability there were more Indians in the Klamath Lakes Basin at time of settlement than in the Willamette Valley when that region was settled.

The Klamath and Modoc Indians were essentially stream and marsh people. Most of their permanent villages were along streams and on the borders of marshes, usually near but not on the lake shore (figs.2.1A and 2.1B. Most of the streams were open all year for fishing, a year around activity for the men. In winter the margins of the lakes were often frozen. Although fish was the staple food, both Klamaths and Modocs depended on a great variety of animal and plant life for subsistence, food, clothing, and shelter. The seeds of the water lily were a staple food, as was the ipos (a tuber). Hunting was of less importance than the gathering of seeds and plants, but a variety of animals were taken--wildfowl, deer, antelope, mountain sheep, black bear, porcupine, beaver, groundhog, mink, and others. Some animals were not eaten, such as wolf, coyote, fox, cougar, skunk, and badger. The Indians did not eat dogs which were used in hunting. The Klamaths traded many dogs to Ogden and his hungry trappers.

The Klamath and Modoc Indians had contacts with neighboring tribes in warfare and in trade. The main line or trade route was north-south from the Pitt River on the south to the Columbia River on the north. An important item of trade was slaves, usually captured from the Pit Indians by the Modocs, then passed along to the Klamaths and then to the Warm Springs and

Columbia River tribes. Slaves were exchanged for horses--three horses to a slave, according to one account--also for blankets, guns, knives, beads, and various other articles of white man's trade goods. Once the Klamaths acquired horses, about 1840, trade with the Columbia River tribes increased.

Both the Klamath and Modoc Indians followed a definite annual cycle in their search for food. In March, after the snows had melted, the villages moved from the winter houses to the summer camps for fishing, an activity which continued at an accelerated pace for about a month. Again the villages were moved to the areas of ipos-digging. The women dug while the men continued to fish. In July another move was made to the camas beds. In August the major hunting season began, which called for organized hunting parties. Hunting was important until December. Hunting methods were not very efficient and venison and other game meats were often in short supply. In early December it was time to rebuild the winter houses, to collect soft tules for bed mats, skins for clothing, and fuel for the winter fires. Fishing continued by cutting holes in the ice, if necessary.

The Indians acquired many things from the whites, some good, some bad. On the other hand, the whites learned many things from the Indians. The Indians furnished food to the explorers, especially fish and dogs. They pointed out the easiest routes of travel, the condition of the rivers, the best hunting grounds, especially for beaver (of which there were very few). After settlement began the Indians helped in various ways, running pack trips to Jacksonville and helping to herd cattle. But for segregation on the reservation, the Indians might have contributed even more.

It is evident that the Klamaths and Modocs were reasonably well adapted to their surroundings and that the environment was hospitable to their way of life. Every animal and plant had doubtless been considered as possible use for food, clothing, shelter, and medicine. The resources of the Basin were varied and every advantage was taken within the cultural limitations of the peoples. Agriculture was unknown to them and, until they got the horse, the dog was the only domestic animal. In spite of the abundance and variety of resources, there were times of shortages and hunger; when, for instance, in dry years the lake levels declined and marshes became dry. Even so, the local Indians were more fortunate than some of the neighboring tribes. They were also fortunate that in their comparative isolation, they suffered less from white man's diseases in the pre-settlement period than some of the neighboring tribes.

Indian perceptions of the whites, and vice versa, changed as more contacts occurred. When the Indians perceived the first signs of permanent white settlements, their hostility increased. Soon the whites began to look on the Indians as an impediment which had to be removed to make way for settlement. This attitude developed only near the end of this period. In 1854 Joel Palmer, Superintendent of Indian Affairs, visited the Klamath Lakes Basin to explore the possibility of moving some of the Willamette Valley Indians to the Klamath Lakes Basin.[16] Palmer reported that complaints had been made of the "thieving propensities" of the Klamaths but he apparently had no thought that the Klamath Lakes Basin would soon be open for settlement. In 1857 Indian Agent G.H. Abbott visited the Klamath Lakes Basin to arrange a treaty and to select a site for an agency.[15] The demand to place the Indians on a reservation was growing. After 1860 the hostility was intensified, as noted in the next chapter.



## SUMMARY

As the period of exploration ended about 1860, how much was known about the Klamath Lakes Basin? The main routes of travel and the general outline of the lakes and streams were known, but few had ventured very far from them, excepting the survey parties. The general character of the vegetation was also known. Early grazing had distinguished the areas of grass, sagebrush, and wild hay on the Basin floor and the general character of the forest on the slopes. Most of the many springs in and on the margins of the Basin were known only to the Indians. The largest hot springs were located within the present city limits of Klamath Falls, near the High School. There were springs along both sides of Main Street and another series of springs occur on the west side of the Klamath Hills, to the east of Lower Klamath Lake. The explorers were aware of some of the springs along the routes of travel, but had little idea of the many hot springs which were to become an important resource in later years. The Indians knew the hot springs well, used them to cook food and for bathing, no doubt. From the Indians the explorers had learned of the fish and game in the Klamath Lakes Basin and the major Indian foods, particularly wocus and camas. These items did not become important to the settlers.

By 1860 a few hundred people had crossed the Klamath Lakes Basin and the general features had become known, at least to some of the residents in the Rogue River and Willamette valleys. The Basin was a part of Wasco County, which at that time included all of Oregon east of the Cascades. The total population of the County was 1,689, few if any of whom lived in the Klamath Lakes Basin.

By 1860 the drainage features were fairly well known, and several false ideas had been corrected. It was known that there is no water connection between Upper Klamath Lake and the Rogue River; also that Klamath River reaches the ocean in California, not in Oregon. Lost River rises in Clear Lake and flows into Tule Lake which has no surface outlet. Some place names were confused, especially of lakes and streams. Most map makers favored Frémont's names, but some maps showed Lower Klamath Lake as "Little Klamath Lake," as indeed it was at low stage. Most visitors to the Basin did not have time to form an adequate opinion of the climate. But it was known that some winters were mild enough to permit grazing. However, the hazard of heavy snows and the consequent loss of livestock was yet to be learned.

By 1860 the two main lines of communication were well established (fig. 2.1) but the amount of use varied. The Applegate Road was still difficult for wagons and Lieutenant Piper reported that when he crossed Green Springs Pass in 1860 no wagons had crossed in the previous five years. Most goods were still transported by pack animals. The north-south route from the lava beds to The Dalles was still in use by the Indians, also by occasional parties of whites. A by-pass had been established to avoid the steep, rocky lake shore at Rattlesnake and Modoc points, since these points were not passable at lake level by horses. On the whole the north-south route, following the old Indian trail, was not difficult, but it was long.

In the last five years of this period, from 1855 to 1860, it was evident that perceptions of the Basin were beginning to change. At least two factors were involved: a period of higher precipitation average with improved forage and the scarcity of pasturage in the Rogue River Valley which led ranchers to consider pasturing their livestock at least for part of the year in the Klamath Lakes Basin.

As early as 1852 Wallace Baldwin had pastured 50 head of horses for nine months in the area between Keno and Klamath Falls. In 1856 Judge F. Adams grazed 2,000 head of cattle in the same area. In the winter of 1858-1859 Wendolen Nus pastured stock in the Basin. It was easier to drive cattle from the Klamath Lakes Basin to the gold mining areas of California, than from the Rogue River Valley.

Some changes were also taking place in the land. The beginning of a long humid period, with above normal precipitation, affected the vegetation, also the lake and stream levels. Observations of lake and stream levels were limited in the period, but in numerous crossings of the rock bridge on lower Lost River the depth of water was reported from one to fifteen feet. The level of Lost River was almost even with the surface of Tule Lake.

John C. Cleghorn studied changes in the level of Tule Lake from old shorelines, terraces, and early topographic surveys. He found that in 1858 the level was 4,045 feet above sea level. A few years later the level had risen 15 feet. Upper Klamath Lake today is quite stable; the hard rock ledge in upper Link River, plus the large inflow from streams tend to maintain the nearly uniform level. Lower Klamath Lake varied in a sort of cycle over a period of years. When the lake was high, water covered all of Klamath River from Klamath Falls to Keno. When the lake was low water flowed from Klamath River into the lake basin. By 1860 perceptions were changing with respect to the variations of the climate and related phenomena. It was known that lake and stream levels changed, seasonally and from year to year; also that the seasons and severity of frosts were variable.

# 3. EARLY SETTLEMENT: 1860–1900

By 1900 the Klamath Basin had been transformed (fig. 3.1). Settlers had spread over much of the Basin plain, towns and post offices had been established and many new roads laid out. Farms were acquired by homesteading or purchase, land cleared, and ditches dug for drainage and irrigation. A good measure of the growth is the increase in population from near zero in 1860 to 3,960 in 1900. Gone were the Indians from their villages on lakeshore and river bank; most of them were confined to the Klamath Indian Reservation, where they and their descendants were to remain for almost a century. The 1900 U.S. Census counted 1,040 Indians in Klamath County. Klamath Falls had become the central place of the Basin, with a population of 457 in 1900. It was the largest town and in the best location. Klamath County, once a remote part of Wasco County, was separated from Lake County in 1882.

By 1861 perceptions of the Klamath Lakes Basin had changed as more people became aware of the qualities of the area. A more humid phase of the climate, which began about 1855, was undoubtedly a factor. To the first immigrants who crossed it in the dry years, the Basin must have looked like a worthless desert, but by 1855 the increased rainfall made the area much more attractive. Grass was greener on the plain and in the hills. Ranchers from the Rogue River Valley were looking for additional grazing land, as their herds increased. At first the Basin was perceived only as a seasonal grazing area and livestock were driven to the Basin for a few months only. Then came the period of permanent ranching which called for a supply of hay for winter feed, especially in times of heavy snows. The marshes provided wild hay for harvesting and grass was good on the Basin floor and on the lower hill slopes. Water for domestic use and for livestock was to be found in lakes, streams, springs, and, if needed, in shallow wells. Timber from the nearby hills was used to construct log houses until sawmills appeared, after which frame houses were built. As settlement advanced and as people became better acquainted with the area, it became apparent that dry farming of grains was feasible and that potatoes would grow well on lower hill slopes where the frost hazard was less than on the floor of the Basin. After some years the people became aware of the possibilities of irrigation which was to transform the Basin in a most dramatic way.

Early settlers gradually became aware of the location of most of the hot springs but made little use of them. They were more concerned with the numerous cold springs as a source of water for household use and livestock. The hot springs were used for scalding hogs, but there was little idea that the hot springs were indicators of a great geothermal resource under the Basin and the adjacent hills. A few springs were used for power, as at Klamath Agency when the Government built a grist mill.

## EARLY VENTURES

Before the wet years began, enterprising ranchers from the Rogue River Valley began to graze the Basin.[1] In 1852, Walter Baldwin pastured 50 horses in the Keno area with no trouble from the Indians. In 1856, Judge Frank Adams grazed 2,000 head of cattle between Keno and Link River. The cattle were then driven to Yreka and sold for $80 per head, destined for the California goldfields. Later, in the beginning of the wet years, Wendolen Nus grazed cattle in the area. The preferred location for grazing was in and near the wet lands on the margins of the lakes and rivers; land away from the lakes and rivers was considered desert

Fig. 3.1 Part of the original Klamath Falls Quadrangle, surveyed in 1882, printed in 1889, reprinted in 1909 with little revision. Lower Klamath Lake was at a low stage and Link River (L) is shown continuing through the old bed of the lake. Williamson River (W) is shown flowing into Upper Klamath Lake. Roads followed, in general, the routes of the Explorers (See Fig. 2.1). Post offices founded before 1900 were a good indication of the spread of settlement. Some of the more important ones are shown on the map:

1. Klamath Agency
2. Chiloquin
3. Modoc Point
4. Naylox
5. Klamath Falls
6. Altamont
7. Keno
8. Plevna
9. Bonanza
10. Merrill
11. Tule Lake
12. Olene
13. Lost River
14. Dairy

Other post offices founded in Klamath County before 1900 included: (not shown on map):

Fort Klamath
Crystal
Pelican
Merganser
Colson
McCurdy
Hildebrand
Sprague River
Yainax
White Lake
Bly
Royston
Olete
Loraton
Haynesville
Lorella
Bedfield
Morton
Clear Lake
Langell Valley

Some of the post offices were temporary; others were moved from house to house as the postmaster changed. By far most of the post offices were south and east of Klamath Falls. (See note 9)

The Central Oregon Military Road (MR) ran through the Klamath Indian Reservation, slightly to the east of Williamson River and along Sprague River.



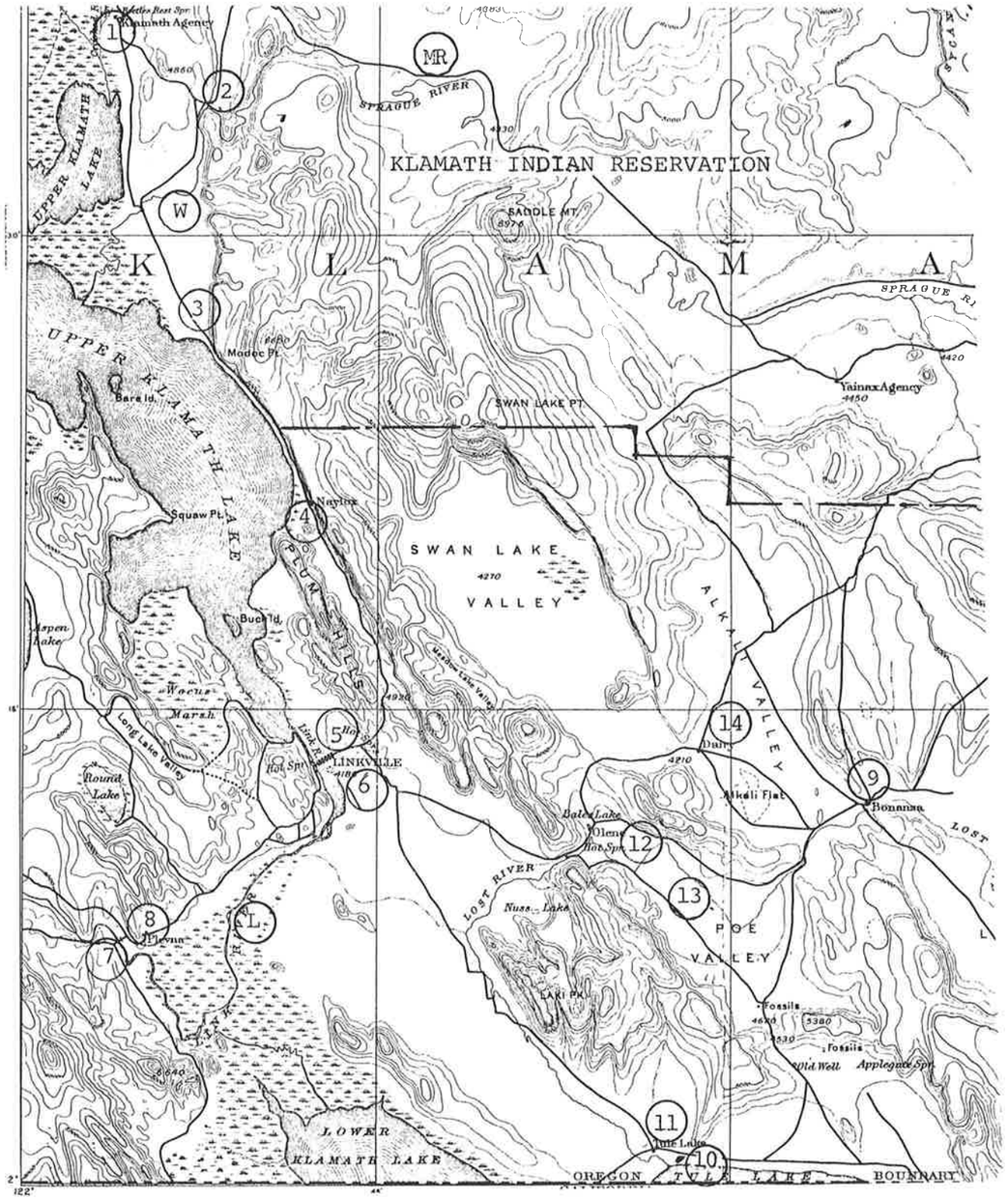



Fig. 3.1

and useless.

Apparently the Indians were not too concerned by the temporary, seasonal use of the land, although some demanded payment for the privilege; permanent settlement was another matter. But prospective settlers were very much concerned with the Indian problem. In 1860, Lieutenant Alexander Piper set up a military camp in the vicinity of Keno to protect the immigrants on the Applegate Road.[2]

Potential settlers continued to demand military protection so that the Basin could be settled and, in 1863, Fort Klamath (fig. 3.2) was built on a tributary of Wood River, north of Upper Klamath Lake. The stated purpose of the fort was to protect the immigrants traveling on the Applegate Road from the Indians, but the nearest point on the road was 50 miles to the south, a strange choice indeed. One story suggested that the Army officer who chose the site was more interested in protecting Klamath Indians from the Modocs, rather than guarding the immigrants or encouraging settlers. The road was also designed to foster trade with Jacksonville. In any event, a few settlers took advantage of the protection of the fort to locate permanent ranches in the area.

The first settler to establish a permanent ranch in the Wood River area was John Loosely who moved in with his family in 1871 and filed for a homestead (fig. 3.2). The site is opposite the fort on Fort Creek, a tributary of Wood River. The ranch included flat land on the bed of old Lake Modoc and slightly higher wooded land to the east. The site had all the requirements for settlement -- wood, water, and level land for cultivation; grass and wild hay in the nearby marsh supplied feed. John Loosely built up his herd of beef cattle over the years, but in the severe winter of 1889-90 with heavy snow his herd was almost wiped out. He also built a grist mill and a creamery, and marketed butter and cheese in the Rogue River Valley. He, and his son, dug an irrigation ditch, diverting water from Wood River to irrigate hay and grain fields. This was the first irrigation in Wood River Valley; today more than 38,000 acres are under ditch in this area (fig. 3.3).

## THE KLAMATH INDIAN RESERVATION AND THE INDIAN PROBLEM

The establishment of the Klamath Indian Reservation (fig. 3.1) in 1864, with an area of more than a million acres, was expected to solve the Indian problem and open the Basin to settlement. The Reservation included a rectangular area, extending eastward from Upper Klamath Lake to the middle part of Sprague River.[3] Most of the area was timbered, hilly land, little suited to agriculture, but usable for grazing, hunting, fishing, and logging. Timber proved to be the most valuable resource on the Reservation and lumber production began with the construction of a sawmill near Fort Klamath in 1863 (see below) and another at Klamath Agency in 1870. The Indian Agent attempted to make farmers of the Indians, but with little success; livestock raising--cattle and horses--was more successful. The Indians had acquired horses many years previously and they had some experience driving cattle "obtained" from the immigrant trains.

However, Fort Klamath and the Reservation did not solve the Indian problem. The Modocs, removed from their homeland, became discontented on the Reservation, went back to their old homes on Lost River and the shore of Tule Lake, and reverted to their old ways, gathering roots and seeds, fishing, and hunting. To which, as settlers moved in, they added thievery and heavy-handed begging.

Dr. Aaron Waters, geologist, has provided a fresh look at the Modoc War, from the point of view of both history



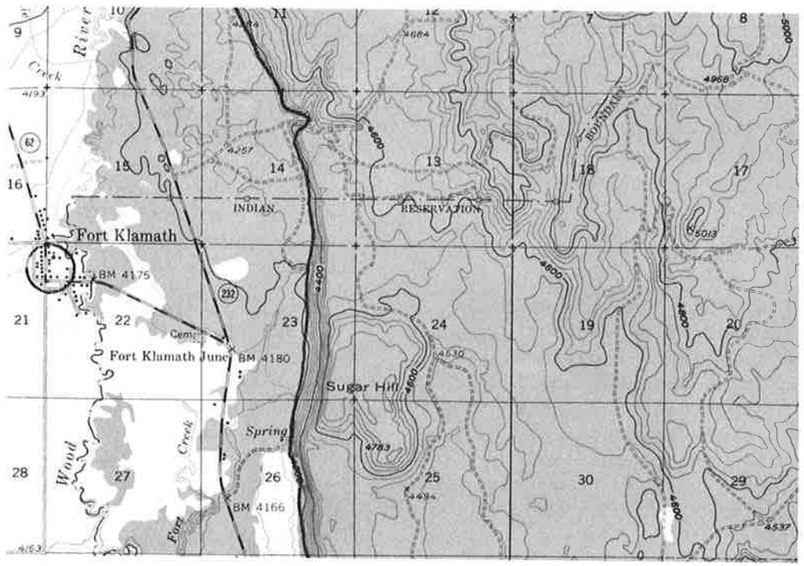



Fig. 3.2 Photo and map of Fort Klamath. The original fort was made of logs and was located on Fort Creek to the southeast of the present location. When the sawmill was brought in, frame buildings were constructed, well spaced on a grassy plain. On the map the heavy black line marks the shoreline of old Lake Modoc. (Photo from Klamath County Museum, map from U. S. Geological Survey, Chiloquin Quad.)

and geology (fig. 3.4). A part of this essay is quoted below:[4]

The Modoc War

The Stronghold. Examine the map and note the nature of the natural fortress which was to be the home of the Modocs for the next 5 months. Here the northern tip of the plateau surface overlooks a bay in the south shore of Tule Lake. The part of the plateau closest to the lake is a rounded table approximately 150 meters in diameter - about the size of a modern football stadium. It is bordered on three sides by a field of large schollendomes; to the south a neck about 50 meters wide connects it with a larger remnant of the plateau.

Within the area chosen for the Modoc's living quarters the plateau surface is dimpled by 8 collapse pits, each a vertical-walled hole 2 to 15 meters in diameter and 3 to 8 meters deep. They formed where parts of the plateau's crust caved into small underground lava tubes. Floors of these pits are covered with large angular boulders tumbled from the roof and walls. In places one can burrow around between these boulders, especially beneath the overhanging walls of parts of the pits, and find small chambers each of which would give protection for 1 to 5 individuals against the rain or snow, and also from the strong cold winds that sweep the plateau in winter and spring. Three of these collapse pits are easily visited from the inner trail constructed by the Park Service: Captain Jack's Cave, Schonchin John's Cave, and Family Cave (see map). Nearby a small mound of pahoehoe lava served as a rostrum from which the Modoc leaders could address their people.

Loose rocks picked up from the surface of the plateau were piled into low dry-walls, forming a partial breastworks around parts of the camp. (These fortifications were later rebuilt into much thicker and higher walls by Army soldiers after the Modocs had withdrawn from the Stronghold). The main defense positions used by the Modocs, however, are the deep natural cracks and crevasses along the top of the turndown edges of the plateau, and similar fissures along the tops of high schollendomes which ring three sides of the Stronghold. The more strategic and important of these Modoc defense trenches are labeled on the map. Note that they form a sinuous line along the entire northwest margin of the plateau, and that they curve into a natural U-shaped ambush line which bars access to the Stronghold from the nearest point of the lakeshore. The floors of these natural defense trenches were cleared of loose debris so that the defenders could pass rapidly along them. Short radial routes by which one can walk to various parts of the trench system from the central Stronghold without encountering difficult crevasses were well known to the Modoc defenders.

Beyond this natural trench system lay scattered Modoc outposts - high isolated overlooks with unimpaired views of the surrounding country. Most such outposts are located in the central cracks of the highest schollendomes, and were further camouflaged by piling loose fretworks of rock through which a sniper's rifle could be extended unobserved. No doubt additional Modoc outposts within the area of the map have gone unrecognized during our mapping (see the description of Modoc



Fig. 3.3 Airphoto of marshland adjacent to Wood River (upper right) and Agency Bay. Parts of the marsh have been drained and diked. Before drainage the marshland provided wild hay. (photo Production Marketing Adm.)

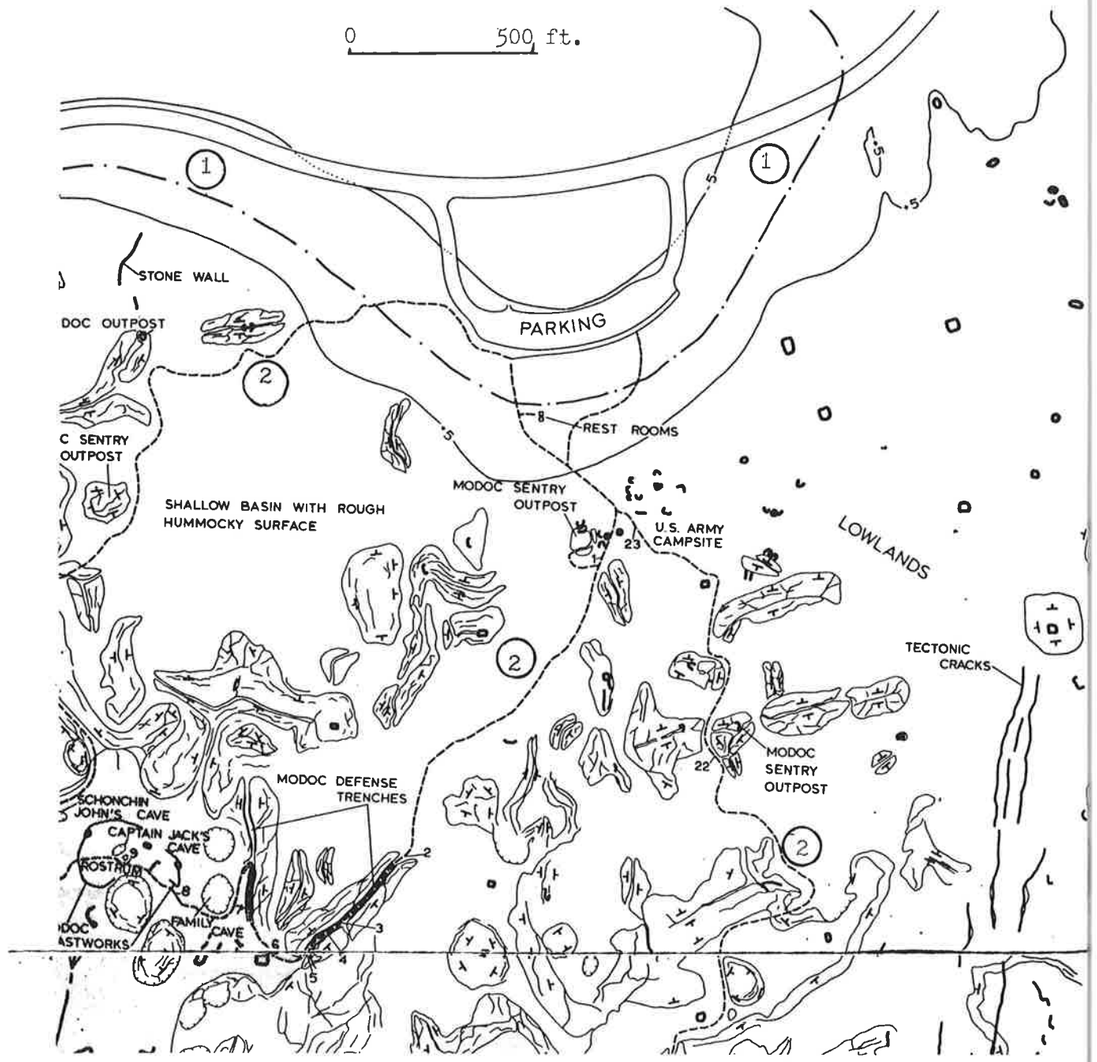



Fig. 3.4. Part of a detailed map, by Aaron Waters, of the lava beds south of Tule Lake. The lava domes uplifted and split, providing excellent defense positions for the Indians during the Modoc War: (1) the shoreline of Tule Lake in 1873; (2) trails used by the Indians. (See note 4).



Fortifications on the map).

Contrary to the statements of several writers, these natural defense features of the stronghold are not unique. Many other table-like remnants of the lava plateau have even more formidable and deeply-crevassed turndown edges. The unique value of the stronghold chosen by the Modocs was its proximity to the shoreline of Tule Lake. A constant supply of water, and of some food from wocus root, waterfowl, fish, and freshwater clams was thus assured. Also its location denied communication for an enemy using the easily traversible route along the lake shore. Moreover, the Modocs were well aware of an easy escape route to the south over the flat surfaces of scattered remnants of the lava plateau, whereas one unfamiliar with that terrain would flounder painfully and slowly across the heavily fissured and schollendomed country that surrounds these plateau remnants.

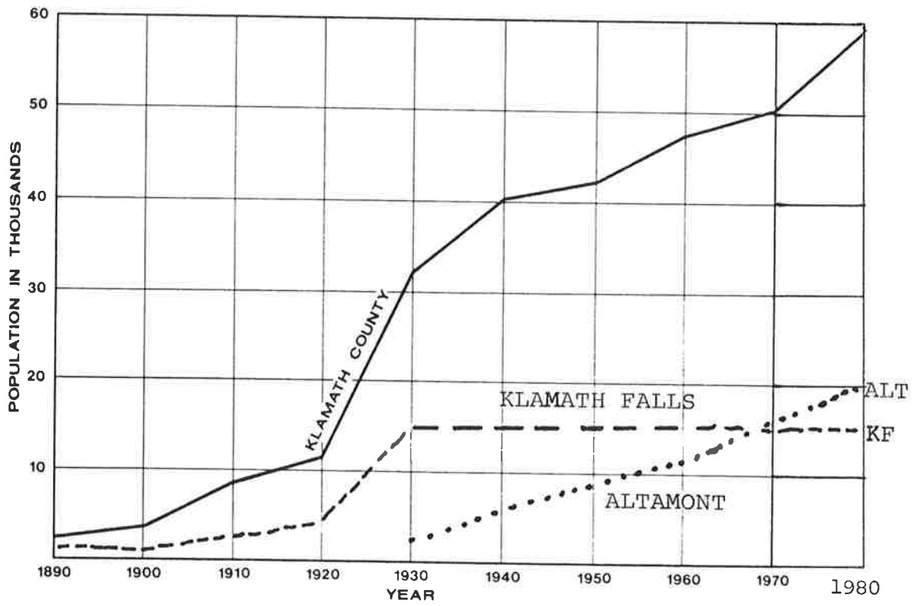
Still another unusual topographic feature, a natural cattle corral, was vital in helping the Modocs withstand the winter siege. Just west of the Stronghold encampment is a small and deep collapse basin, bounded on three sides by the steep and heavily crevassed sides of three large schollendomes, and on the fourth (east) side by the steep and deeply fissured turndown flap of the plateau. Miraculously, these bordering fissures along the edge of the plateau die out about 200 meters to the south. Here a smooth and easily traversed slope leads down off the surface of the plateau and northward through a narrow "gate" across the end of the southern schollendome into the natural cattle corral. Stray cattle on the southern plains, and others captured in Modoc raids, were driven north across the plateau remnants and into this natural corral, where they could be securely penned in by piling a wall of rocks and brush across the narrow gate (see map). Thus an adequate supply of beef was available throughout the winter.

## LAND OWNERSHIP

When the first settlers came to the Klamath Basin the land lay open and it was almost free. With Indian rights set aside by the Treaty of 1864, settlers were moving in, hoping to obtain a title to their land. Some simply squatted on the land expecting to get a title later by one means or another. The Homestead Act of 1862 granted 160 acres to each settler, but to obtain a title he had to live on the land and make certain improvements. Or, by paying $1.25 per acre, the title could be completed at once.[5] Land was also offered for sale by federal and state governments in a variety of ways. The Swamp Lands Act of 1850 was extended to Oregon in 1860; marsh land was offered at $1.00 per acre, with 10 percent down and with the requirement that three crops of hay be harvested before the title became final. Large blocks of marsh land were purchased by speculators and many of the claims extended far beyound the marsh land. Some of this land later was resold to individual settlers.

Land was also available from land companies who received grants for road building. In 1864, a grant was made to the State of Oregon to pay for the construction of the Oregon Central Military Road (fig. 3.1), reaching from Eugene across Willamette Pass, up the Little Deschutes River, over a low divide to Klamath Marsh, and through the Klamath Indian Reservation to and beyond Sprague River.[6] The grant awarded alternate sections of land near the route to the land company. In 1876,

POPULATION GROWTH FOR KLAMATH COUNTY




U.S. Census of Population, 1890-1980

Fig. 3.5 Graph showing growth of population in Klamath County, Klamath Falls and Altamont, 1890 to 1980. (Modified from the Master Plan of Klamath County, 1980; data from the U. S. Census of Population, 1890 - 1980)



the Military Road Grant rights were sold to the Pacific Land Company for $1.25 per acre, who, in turn, sold parcels of land to settlers and others. Much of the land was not suitable for agriculture although it was advertised as such.

In early days the hill and mountain slopes adjacent to the Basin were considered of little value, but the Timber and Stone Act of 1878 made timber land available for $2.50 per acre in 160 acre lots. Almost immediately these lands were sold to timber companies at higher prices. The land grants were disappointing in two ways; the grantees did little to improve the roads and, by fraudulent advertising, they were able to sell large areas of land not suitable for agriculture to gullible settlers. When settlers failed to make a living the land was abandoned.

## PEOPLING THE BASIN

In this period, 1860 to 1900, the expansion of population of the Klamath Basin was accompanied by changes in county boundaries (fig. 3.5).[7] In 1861, the Basin was in Wasco County,[8] Oregon, and in the adjacent parts of Siskiyou County in California. In 1865, Jackson County boundaries were extended across the Cascades to include the southern parts of present Klamath and Lake counties. In 1870, Jackson County had 4,778 people, most of whom lived in the Rogue River Valley. Klamath Basin was in Jackson County for only 10 years, but its proximity to the Rogue River Valley created a strong commercial bond. After all, Ashland and Jacksonville were the only towns within 100 miles of the Basin. In 1874, Lake County was formed to include the present area of Klamath County and, in the 1880 Census, 2,804 people were counted, about half of whom lived in the Basin. Most of the Basin's population lived in or near Linkville which counted 250 in the town and 757 in the precinct. Lost River precinct had 374 people and Sprague River precinct, 138.

Klamath County was formed from Lake County in 1882 with an area of 6,100 square miles and 2,444 people, most of whom lived in the following precincts: Dairy, 231; Klamath Lake, 39; Linkville, 787; Lost River, 363; Plevna, 340; Poe Valley, 141; Sprague River, 119; Tule Lake, 104; and Wood River, 210. Most of the early expansion of settlement from the Linkville nucleus was to the east and south; growth to the north was limited by the Klamath Indian Reservation and rugged terrain. In the next decade the population continued to grow slowly, reaching only 3,970 in 1900. Most of the precincts grew in proportion, except Dairy, Klamath Lake, and Plevna which lost population. The apparent losses were probably due to relocation of precinct boundaries. In 1900, Dairy precinct had 221; Klamath Lake, 32; Linkville, 852; Langell, 195; Plevna, 229; Poe Valley, 186; Sprague River, 165; Tule Lake, 336; and Wood River 278.

## EARLY POST OFFICES

Early post offices provide an index to the expansion of settlement (fig. 3.1). The first post office was at Fort Klamath in 1863 and the next at Klamath Agency in 1866.[9] For the next few years there was no other regular mail service. By 1871, Linkville, Langell Valley, and Yainax had offices but the last mentioned survived only one year. In 1872, Tule Lake (later moved to California) and Merganser were founded as towns, the latter had a short life. Sprague River had a post office by 1873; the name of the town was changed to Bly in 1883. Lost River got an office in 1875, Keno, Dairy, and Bonanza in 1876, Naylox in 1881, Olene and Clear Lake (California) in 1884, Lorella in 1887, Loraton in 1888, Morton in 1889, and Hildebrand in 1890. Olete and Agness became post offices in 1892, Altamont in 1893, and Merrill

in 1896. Most of the early post offices were located in the residence of the postmaster and were moved when a new postmaster was appointed. And as the system of mail delivery changed, some of the smaller offices were discontinued.[9]

In California, Siskiyou County was formed from a part of Shasta County and Modoc County was separated from Siskiyou in 1874.[10] During this period, 1860-1900, very few people, probably less than 100, were living in the Basin portion of these counties but settlement was substantial in the Pitt River district of Modoc County and in the Yreka-Weed area (Shasta Valley) of Siskiyou County.

LEARNING TO LIVE WITH THE CLIMATE

Early settlers had to learn about the climate, the advantages and hazards, the hard way--by experience. There were no records of temperature and precipitation until 1884 and no continuous record until 1904. The Basin was and is subject to alternations of drought and humid years, to floods and heavy snows, often accompanied by high winds and severe cold wave. The settlers made many qualitative observations, of floods, droughts, heavy snowfall, river and lake levels, all of which contributed to a limited understanding of the climate. Selected observations from "Klamath Echoes" are:[11]

| | |
|---|---|
| 1867 | Lower Klamath Lake overflowed into Tule Lake (very rare). |
| 1871 | Tule Lake high, ten feet over the Stone Bridge (normal depth over the bridge, one or two feet). |
| 1872-73 | Severe winter, another in 1879-80. |
| 1880-81 | Severe winter, Lower Klamath Lake high. When the lake was high it overflowed into Klamath River; when the lake was low the flow was reversed. At high-water river stage, the river began near Keno; at low water it began at Lake Ewauna, near Linkville. |
| 1884-85 | Rainy winter, total precipitation, 17.94 inches. |
| 1887 | Heavy snowfall. |
| 1889-90 | Extremely severe winter, heavy snowfall, thousands of livestock died. |
| 1890 | Klamath River flooded, bridge and dam destroyed. |
| 1892 | Klamath River very low, no record. |
| 1895 | Heavy snow, crusted over in Wood River Valley. |
| 1897 | Very dry year. |

From these and other observations the settlers learned to assess the range of the climatic hazards, even if they could not predict them. They learned to expect frost even in the summer and to provide large quantities of hay for the livestock and fuel for their homes in the winter.

TRANSPORTATION

Isolation and poor transportation delayed the settlement of the Klamath Basin and hindered its growth. The Basin needed good transport over the Cascade Range to the Rogue River Valley and to the Willamette Valley, and also to railroad points in northern California. Prior to settlement two main roads were in use, the Applegate Immigrant Road over the Cascades to Jacksonville and the north-south route from Pitt River in California, through Klamath Basin, then along the Deschutes River to The Dalles on the Columbia River. The Applegate Road, west of the Basin, is followed approximately by State Highway 66; the north-south route is now U.S. Highway 97 (roughly) north of the Basin, and along Oregon



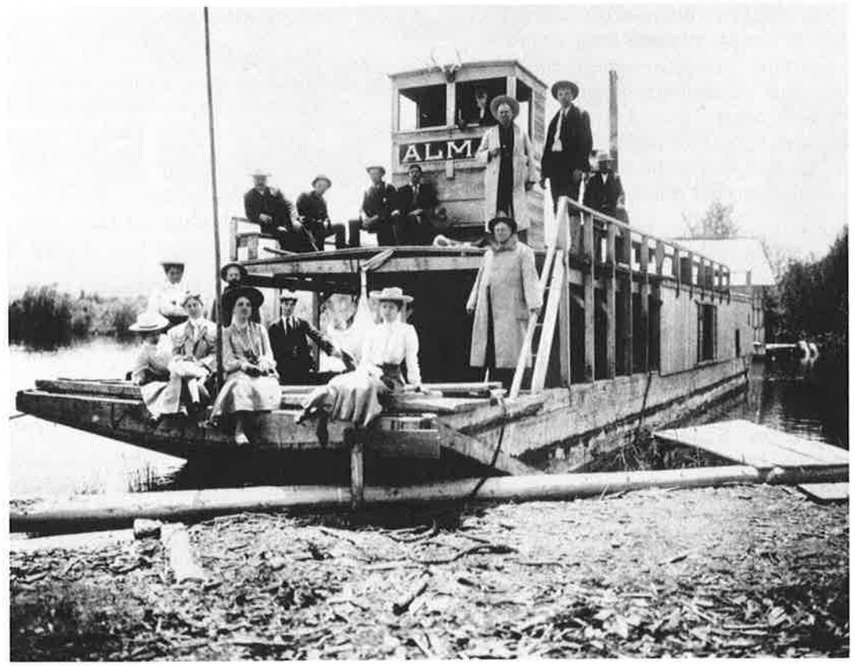



Fig. 3.6. Connecting with the roads were a number of lake boats designed primarily for carrying freight. The ALMA, shown in this view at Odessa Landing, also doubled as an excursion boat on Sundays and holidays. (Helfrich Collection).

Highway 39 and California Highway 139 to the south. The route across the Willamette Pass is now State Highway 58. These early roads were re-routed and slightly improved in this period. The Applegate Road was improved "so that a two-horse wagon could haul a ton of freight over even in the most difficult places." Previously some of the steepest places had to be double-teamed. Originally in the days of Ogden, Fremont, and the railroad surveyors, the north-south road (then merely a trail) followed the west side of the Deschutes River; it was re-routed to the east side which made it a little easier for wagons. One of the most difficult places was Modoc Point where the fault scarp drops so steeply to the shore of Upper Klamath Lake that not even pack animals can pass. At one time (about 1872) a ferry was in use to take wagons and stage coaches around this point(fig. 3.6).

Two additional roads were opened across the Cascades from Fort Klamath in 1863, one, the Rancheria Trail via Lake of the Woods, and another, the Union Creek Road up Annie Creek almost to Crater Lake, thence southward to Rogue River Valley. The Oregon Central Military Road, subsidized by land grants, led from Eugene over Willamette Pass, along present State Highway 58 and U.S. Highway 97 to the Klamath Indian Reservation, thence eastward through Sprague River Valley. Part of this route led through the Indian Reservation which led to a long-time dispute, since the land grants for the road were in conflict with the treaty for the Reservation. The dispute was settled eventually by an exchange of land.

By the end of this period in 1900 a number of wagon roads radiated from Klamath Falls like the crooked spokes of a huge wheel (figs. 3.7 and 3.8). Clockwise the main roads were:[12]

1. North along the east shore of Upper Klamath Lake and up the Williamson River, now Highway 97.
2. East through Olene Gap to Sprague River Valley and Lakeview, now State Highway 140.
3. Southward (and a little east) along Lost River, and the east side of Tule Lake, thence to upper Pitt River, Oregon Highway 39 and California Highway 139. The Applegate Road crossed this route near the Stone Bridge on Lost River, but was little used to the east after the immigrants stopped using it, except during the Modoc War.
4. The Yreka Road left the Applegate Road at the south end of Lower Klamath Lake and by a roundabout route reached Little Shasta Valley and Yreka.
5. The Klamath-Ager Road through Keno and paralleling the lower Klamath River but a few miles to the east.
6. The Topsy Road which followed the tortuous intrenched meanders of Klamath River.

All of these roads were used by wagons at one time or another and some were used by stage coaches.

In the California part of the Basin, the road pattern was changing during this period as described by Robert W. Pease:[13]

> After the decline of westward wagon migration, the Applegate Road across the Devils Garden continued to connect Surprise Valley with Yreka, until the formation of Modoc County in 1874 rendered such use no longer necessary. Not only did this development leave the road across the lava platform unused, but it made Fandango (Lassen's) Pass far less important for crossing the Warner Mountains



Fig. 3.7 Photos of a stagecoach and freight wagon in use during this period. (Helfrich Collection)

than Cedar Pass, which directly connected Alturas and Cedarville.

Only minor roads extended to the northwest. The old California-Oregon Trail served to connect settlements near Tule and Klamath lakes with the settlements in Big Valley. The intersecting Tichnor Road connected the Upper Pitt River valleys with Shasta Valley across the rough lavas flanking the northern side of Medicine Lake Highland.

Roads that joined the new county with major outside population centers were of prime importance, because over them moved new settlers and much-needed commodities. Particularly important were routes to the Sacramento Valley, for here were not only important population centers but the nearest railroad as well. By 1880 a subsidiary of the Central Pacific Railroad had reached as far north as the new railroad town of Redding, and wagon roads that made the best rail connection were most used.

The other route crossed the volcanic ridge by way of Nobles Pass just north of Lassen Peak.

Once roads were put in a barely passable condition, and as settlements expanded, a number of stage and wagon routes were established. The stages carried passengers, mail, and light freight; the wagons hauled heavier, bulkier goods. The chief purpose of the various routes was to connect Linkville with points of the Southern Pacific Railroad, namely, at Ashland in the Rogue River Valley and at Ager, Thrall, and Montague in California. Other routes reached Lakeview, via Bonanza and Bly, and Dorris and Alturas in California. Typical routes are listed in "Klamath Echoes" with dates:[14]

1870 A stage line from Linkville to Lakeview via Bonanza and Bly

1871 Three routes listed: one from Yreka; one from Portland via Eugene and the Oregon Military Road; one from Portland via The Dalles. The last mentioned was reported as being very rough and difficult.

In 1875 the stage from Ashland to Linkville ran twice a week. (Fig. 3.7 & 3.8)

In 1898 a stage ran from Ager, California, to Klamath Falls.

Routes for wagons and stages changed rapidly as new roads were opened or old roads improved. However, the greatest development of stage and wagon routes occurred after the turn of the century, as population expanded, as roads were improved, and before the coming of the railroad and automobile.

Settlers took advantage of the lakes and rivers for cheap and easy transport. Indian dugouts and reed boats gave way to larger and sturdier craft--row boats, sail boats, steam boats, and even a boat powered by horses on a treadmill. Water transport, mainly on Williamson River, Upper and Lower Klamath Lakes, and Klamath River was used for logs, lumber, farm produce, miscellaneous freight, and passengers. Numerous landings on the lakes connected the lake boats with wagon roads (Fig. 3.7). For example, Laird's Landing on the south side of Lower Klamath Lake connected with the Yreka Road, Keno Landing served several wagon roads. Until the coming of the railroad, water transport played a major role in the Basin. The following descriptions and map are from Harry Drew.[15]

> The Indians skillfully, and rather easily, made rafts of tule which were good for immediate and short-lived use. These rafts could either be towed or paddled and squaws often used them in gathering wocus pods along the marsh.

In 1857, Martin Frain described



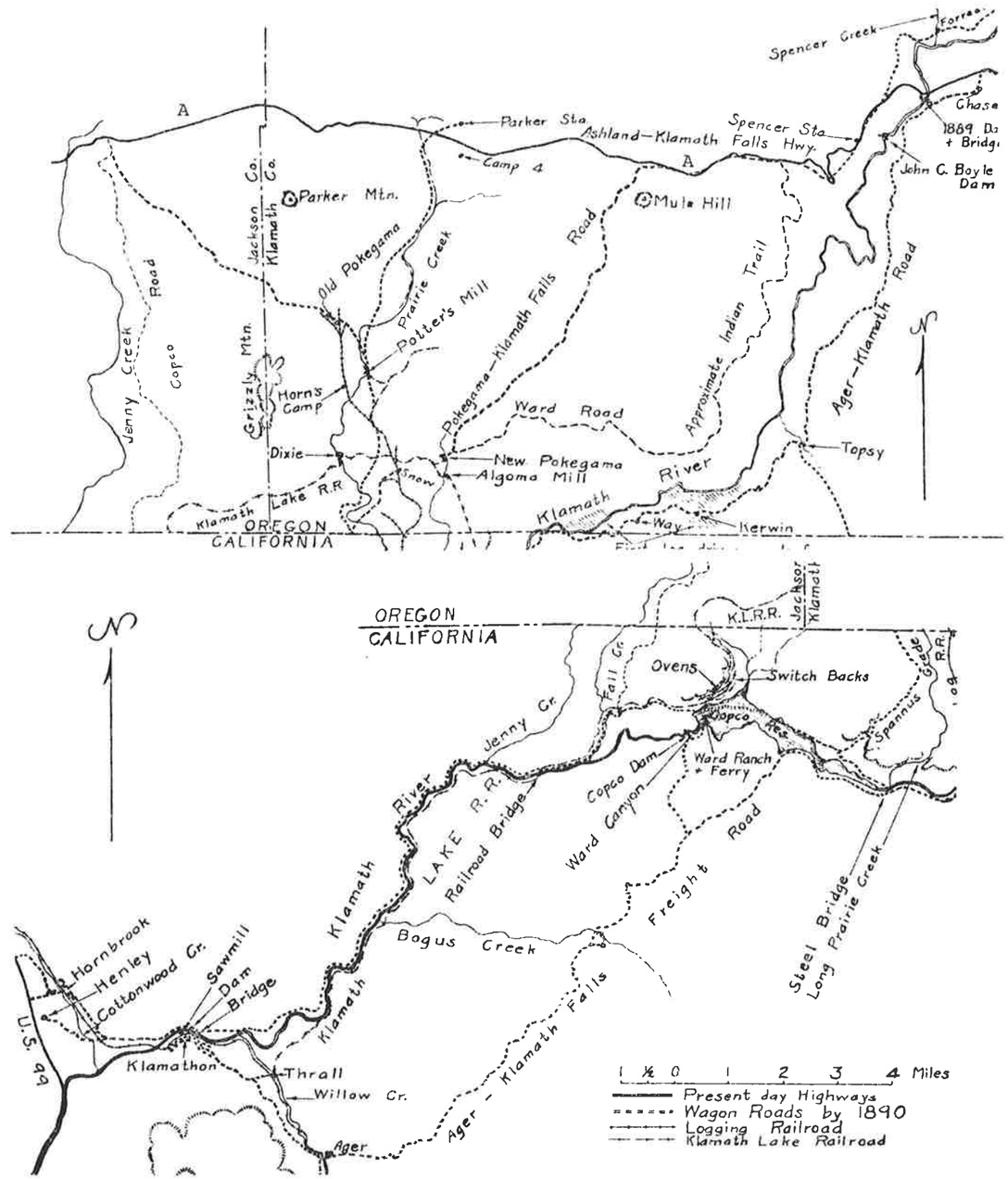



Fig. 3.8 Two maps show wagon roads connecting Klamath Falls with California points. The Upper map shows roads branching southward from the Applegate Road (A). The Lower map shows connections in California (Helfrich Collection).

a raft used as a ferry across the mouth of the Link River. A squaw took his load of trade goods across the river, as she sat in the middle of the raft with her legs in a hole, and paddled with her feet.

The early settlers were quick to capitalize on the practical uses for the many bodies of water in the area, as road systems were poor and inadequate. The natural routes available by waterway became a most compelling alternate. In a short time it was found that foodstuffs, merchandise and other cargo, could be transported by barge or ferry quickly and competitively when compared to freight wagons.

It was on May 1st, 1867 that George Nurse applied for a license from Jackson County to establish a ferry across Link River (near the present location of Link River Bridge). A carpenter by the name of Nelson Stevenson constructed the ferry under the supervision of Edgar Overton. Upon completion Edgar Overton became the operator of the ferry.

In 1869 the first wooden bridge was built over Link River. The lumber for the bridge was furnished by the mill at Spencer Creek. This mill also supplied lumber for the ferry established at the Ozro Brown homestead at the mouth of Spencer Creek on Klamath River.

It was about 1871, when Samuel Grubb, an employee on the Reservation, built a flat-bottomed scow some 16 feet by 40 feet in size. This boat was intended as a freight transport, hauling freight from Pelican Bay to Kowasta (Agency Lake). The type of propulsion system used on this boat remains unclear as descriptions of a two horsepower treadmill, and sails and oars have been used.

In 1872, a former salt water sailor named Moody, ran a boat on a fairly regular run from Eulalona (Head of Link River) to the Klamath Agency or Agency Lake. This was a keel-bottomed boat about 10 feet by 40 feet in size and made use of a small sail. The boat was named the Mary Moody, probably after Moody's Indian wife Mary.

In the spring of 1881 the first steam powered boat on Klamath waters, the General Howard, was put into service towing logs, from Pelican Bay to the W.S. Moore and Sons sawmill on Link River. The General Howard, with its forty horsepower motor, was built for H.M. Thatcher and Sykes Worden at a cost of $8,000.00. Mechanics were brought from San Francisco to build the boat, the boss ship carpenter being the man who made the patterns for the Merrimac, of Civil War fame.

From the earliest times of settlement the people of the Basin began to think of the possibilities of rail transportation, realizing that until this occurred it would be difficult to market heavy, bulky products. The completion of the Oregon-California Railroad from Portland to San Francisco in 1887 stimulated the discussion even more. The first railroad in Klamath County was built in 1901-02 from Thrall, California, on the main line of the Oregon-California Line (Southern Pacific) to Pokegama (see chapter 4). the southwest corner of Klamath County, for the purpose of serving the lumber mill. However, passengers and freight from California and even from the Rogue River Valley used this route, continuing by stagecoach, wagon, and lake steamer on Lower Klamath Lake to Linkville.



Fig. 3.9 A small steam circular sawmill in the Klamath Area (Helfrich Collection, exact location unknown).

## TIMBER

Gradually, as the Basin was settled, the extent and value of the forest resource became known. Early observers had been content to describe the vegetation as "sage brush and grass on the plain, junipers on the lower slopes, and pine on the mountain." Following an Act of Congress in 1891, the Cascade Reserve was set aside, extending along the east slope of the Cascade Range from California to Crater Lake. And, in the closing years of the century, studies were made of the forest resources of Klamath County. Henry Gannet estimated the total timber stand of the county at 11,822 million board feet, of which three fourths were ponderosa pine. Also John Leiberg and associates mapped the density of stands in part of the county, from Townships 28 S to 37 S, Ranges from 2 W to 14 E. His map was based on the old Klamath and Ashland Sheets (topographic survey maps) on a scale of four miles to the inch. Leiberg mapped several categories, ranging in density from non-forest land to a density of more than 50,000 board feet per acre. Large areas of moderate to heavy density, 5,000 to 10,000 board feet per acre were shown in several parts of the county. One very large area in the Klamath Indian Reservation reached from Wood River eastward almost to Sycan Marsh. Other large areas of this density were located in the general vicinity of Saddle Mountain, also on Yainax and Bryant mountains. The southwestern part of the county was also densely timbered. On the east slope of the Cascade Range, the densities varied from the highest, more than 50,000 board feet per acre, to areas with very little timber. Some of the low density areas were probably the result of fires, others were on poor soils, such as pumice which would not support dense stands. Large parts of the county, of course, such as marshes, recent lava flows, and agricultural land, had no timber.

Timber was available on all sides of the Basin but the largest stands were on the west side, on the Cascade foothills. The preferred location of sawmills was near timber or water transport, and on a stream large enough to float logs and to supply water power. Some of the early mills used steam power (fig. 3.9). Some were "up and down" mills but "circular" mills soon became the most important. The favorite timber tree, ponderosa pine, was relatively easy to saw and was used for lumber, millwork, and shooks, which became important specialties of the Basin when rail transportation became available.

W. E. Lamm described most of the early sawmills:[16]

> In 1870 the Government built a circular mill powered with a water turbine at Klamath Agency about a quarter of a mile down stream from the big spring adjacent to the present Highway. The capacity was probably three thousand feet per day. In October of that year Captain O. C. Knapp, Sub-Agent, reported the completion of this sawmill, stating. "... today cut from a log 18 feet long and ten inches in diameter, 10 planks in four minutes."
>
> The following year Mr. J. N. High, the new Sub-Agent, in one of his reports stated:
>
> "The completion of the saw-mill has worked a great reformation and inspired them (the Indians) to extraordinary exertion to amass various kinds of property. Savages in skins, paints, and feathers, as they were two short years since they have donned the white man's costume, taken the ax and cross-cut saw and hauled to the mill a half-million feet of lumber and today are lumber merchants with stock in trade constantly on hand evincing shrewdness and business integrity that make an agent's heart strong to work with and for them."



The United States Army brought the first sawmill into the county from Jacksonville in 1863, that being the year "Old Fort Klamath" was established. It was a steam driven circular mill erected on the east side of Fort Creek opposite the site of the fort and probably had a capacity of two or three thousand feet per day. It is reported that the machinery was privately owned and that it was operated, either under lease or contract, until 1870. The mill was built to furnish lumber to the Indians and for various buildings in connection with the fort, which itself was constructed of logs.

In 1870 the army brought in from Vancouver a fire box boiler and upright engine which had been taken out of one of their boats on the Columbia River and, with this equipment for power, built a new circular mill on the west side of Fort Creek at a point approximately east of the present Fort Klamath Junction. The mill did not operate very much at that location, probably because the one built at Klamath Agency the same year was more efficient and supplied the requirements of the Indians. The mill was moved to Yainax in 1893, where it operated until 1899, when it burned.

The treaty establishing the Klamath Indian Reservation was concluded October 14, 1864. One of the considerations of the treaty was that the Government would provide a sawmill for the use of the Indians and for a period of twenty years would keep it in repair and furnish all tools and supplies as well as a sawyer. The Reservation being under the supervision of the army in those early years.

W.E. Lamm's description and history of early sawmills continues (excerpts only):

### EARLY PRIVATE SAWMILLS

#### Keno District

> The first privately owned sawmill in the county was, no doubt, the sash mill with overshot water wheel located about one-half mile up Spencer Creek from the Klamath River. This operation was very well written up in the July, 1928, issue of THE TIMBERMAN, which is here quoted:
>
> "The manufacture of lumber in the great Klamath Basin, in south central Oregon, had its inception in the late sixties. Available records indicate that the first sawmill to be built in the Basin was erected by Naylor & Hockenouse, on Spencer Creek, 18 miles west of Klamath Falls, in 1869. It was a "muley" rig, the sawing unit being similar to a gang saw, and was propelled by water power. This mill could cut about 1,200 feet of lumber per day...."

The better early mills had the usual circular head saws and were run by water turbines. These mills were much more efficient, since the turbine developed a great deal more power than a water wheel with the same amount and head of water, and since the circular saw was cutting all of the time it was in the log, whereas the sash saw was cutting less than half of the time. Later, when mills were located where water power was not available, steam traction engines were used for power. Still later,

stationary steam boilers and engines came into general use.

Most of the very early mills sawed logs from homesteads or just helped themselves to Government timber. Logging was done at the start with oxen skidding into the water, then with oxen and wagons. In the eighties oxen were being replaced with horses.

The lumber was sold almost entirely right at the mill. In the early years $10.00 per thousand feet was considered the standard price for log run of grades. Some mills close to a good market averaged $12.00 per thousand feet, whereas others farther away received only $8.00.

"Grandpap" (Daniel Gordon) built the second private sawmill in the county in 1874 on the south side of the Klamath River, about one mile west of Keno, on probably the best site south of Linkeville. It was a sash mill powered by an overshot water wheel and had a capacity of 1,500 feet per day. In 1875 or 1876 he sold it to his son-in-law, Newton W. Pratt, who in turn sold it to Charles Withrow three or four years later. R. E. Dusenberry, in 1888, bought the mill from Withrow.

Sometime before 1880 Cooper Brothers, Herbert E. and Elbert H., built a circular mill, run by a water turbine, on the north side of the Klamath River near Cooper Stage Station, about three miles west of Keno. This mill could cut three or four thousand feet of lumber per day, but was greatly handicapped by insufficient water because of a long, small canal.

In 1888 Herbert Cooper and R. E. Dusenberry went into partnership and moved the better equipment of the Cooper mill to the better site of Dusenberry's purchase. They borrowed a fairly large amount of money from Dan Van Bremer, on notes secured by a mortgage, to build the mill to a capacity of 10,000 feet per day.

In 1877 William S. Moore built a sawmill on the west side of Link River, about half way between Linkville and Upper Klamath Lake. A canal was built from the lake to the mill to provide water for the turbine and also to float the logs to the mill. This was the finest site in the county since ample water power and an unlimited supply of timber were available. The mill equipment consisted of a water turbine, circular head saw, friction-driven carriage and a push feed ripsaw to edge the lumber. The capacity of the mill was eight to ten thousand feet per day with a crew of ten to twelve men.

In 1887 William Moore sold the mill to his two sons Charles S. and Rufus S. Moore, after which it was known as the Moore Brothers' Mill. Later a planer was installed on the ground floor of the mill building in order to furnish surfaced lumber, flooring, and siding to the customers. This was the first planer installed in conjunction with a sawmill in the county. Lumber was sold right from the pile and loaded on the wagons of the customers, as was the general custom in those days. This mill, the fourth private sawmill built in the county, had by far the steadiest and longest run of any of the early mills. The operation was unusually successful and continued until 1907, covering a period of thirty years.

At first logs were skidded into Shoal Water Bay with ox teams, and the rafts of logs were towed down the lake with a mule tread mill and a sail. Later horses and wagons supplanted the ox teams, the towing being done with a steam boat.



In this period several additional mills were built in the Basin. A few are listed:

1876 Daniel "Grandpa" Gordon built the first sawmill in the Bonanza district.

1880 Herbert E. and Elbert H. Cooper built a circular mill three miles west of Keno.

1885 James B. Colohan built a circular mill on Bly Mountain, north of Bonanza.

1888 Jesse D. Carr financed a mill on Bryant Mountain, 10 miles northeast of Malin.

1894 Al Fitch built a steam-driven circular sawmill near Hildebrand.

Before 1900 most of the sawmills in and around the Basin were located primarily close to timber supply, secondarily close to water transportation, and definitely not in Klamath Falls. Later this changed as larger and more efficient mills were built on the lakes and major rivers, many of them close to the city. The mills were gradually improved and enlarged, the "up and down" saw eliminated, and steam power substituted for water power.

As the timber industry expanded the "log shed" of the Basin came to include most of Klamath County and part of western Lake County. Large quantities of Douglas fir, lodgepole pine, and other species are found in the log shed, but ponderosa pine was, and is, the most important resource. Another estimate stated that, at the time of settlement, the timber resource was nearly 30 billion board feet. Losses by fire have been small as compared with western Oregon; losses from the pine beetle were much higher. The timber cut in the period, 1860-1900, was comparatively small. A rough estimate of the cut in the 40-year period was 90 million board feet. Only after the coming of the railroad did the Basin begin to export large quantities of wood products.

## AGRICULTURE

From a simple ranching economy, depending on native grasses and wild hay, the crop system of the Basin began to slowly evolve.[17] And as settlement expanded the character of the land use changed. Rye, dry farmed and cut for hay, was one of the first crops. Later wheat, barley, and oats were added, but so little wheat was grown in the early days that the first miller had to import wheat from the Rogue River Valley. Potatoes were an early crop, grown on the lower slopes of the hills where the frost hazard in summer was not so great. The first census of Klamath County, for 1890, listed 332 farms (or ranches) with a total acreage of 137,841, averaging more than 400 acres per farm. Hay was the most important crop, with 18,000 acres, followed by wheat with 3,043 acres; oats, 1,013; rye, 777; and barley, 571 acres. Only 115 acres were in potatoes and the total production of apples was 300 bushels. The Basin had 15,592 beef cattle, 1,688 dairy cows, 5,056 horses, 1,104 swine, and 301 sheep. Horses were on the decline, sheep and swine were increasing.

In the decade 1890 to 1900 the growth of agriculture was somewhat greater than the population increase would suggest. The number of farms increased to 453, wheat acreage quadrupled, rye tripled, and potatoes doubled in acreage. Expansion of the potato crop had to wait for rail transportation, otherwise the market was limited. Barley and oats showed little increase. The livestock pattern changed; sheep became important for the first time, reaching 5,294 head; beef cattle, dairy cows, and swine showed

slight increases while horses declined.

Meanwhile the Indians on the Reservation and off of it were being introduced to agriculture and new ways of life. Previously they had depended on hunting, fishing, and gathering for their subsistence. With the advent of white settlers and restriction of the Indians to the Reservation, old ways of life were no longer feasible. The Indian Agent made plans to teach the Indians farming methods and supplied them with implements and seed. Fifty farms were laid out in plots from 30 to 100 acres in size and all able-bodied men were required to do some agricultural work. Indians were also encouraged to raise livestock and by 1879 they were producing cattle for market. In the severe winter of 1880-81, however, three-fourths of the cattle and 40 percent of the horses perished. Three hundred yearling cattle were issued to help replenish the herds and ranching again prospered. Indians preferred ranching to crop agriculture; they had years of experience in raising horses. The Indians continued to rely partly on native foods, including fish and game. Lost River was a favorite fishing stream and it was used for many years until the farmers in the vicinity objected. Huckleberries were picked in the Cascades, roots were still harvested but, in spite of the various sources of food, it was necessary to supply annuities in the form of flour and meat and, in times of severe shortages, additional rations.

## Irrigation

During the first decade of settlement, 1861 to 1870, there was little thought of large-scale irrigation in the Basin. Few settlers had experience with irrigation in their humid homelands. And irrigation farming requires special skills and much labor in preparation of fields, construction of ditches, control of water, and the evaluation of soils suitable for irrigation. The Basin, however, is almost ideally suited to irrigation, either on a small scale by individual farmers, or by large organizations. So it was almost inevitable that in due time, given the natural reservoirs and the semi-aridity of the Basin, that irrigation would play a major role in its agriculture. Furthermore, ground water is available in most parts of the Basin at shallow depths. Hundreds of feet of porous sediment act as a huge sponge to store much more water than the lakes.[17]

The first irrigation projects were small-scale and did not require much equipment or elaborate construction. A horse-drawn scraper could be used to dig the shallow ditches. A weir or diversion dam called for a few tons of rock in the stream. But plans for larger projects were beginning to appear, involving the organization of irrigation companies and the use of dredges in the construction of ditches.

During this period, 1860 to 1900, many irrigation projects were started in the Basin. Ditches were also constructed to supply power to sawmills and grist mills. The list below is representative rather than all inclusive:[18]

1868 George Nurse and Joe Conger built a ditch to irrigate gardens on the east side of Link River. This later became a part of the Steele-Ankeny Ditch.

1877 Charles and Rufus Moore built a ditch to supply water to a log flume, 1,000 feet long, to transport logs from Upper Klamath Lake.

1878 Linkville Water Ditch Company built a canal from Link River to irrigate town lots in Klamath Falls. Known as the Ankeny-Henley Canal, it was extended to Klamath Valley, and divided, one branch paralleling



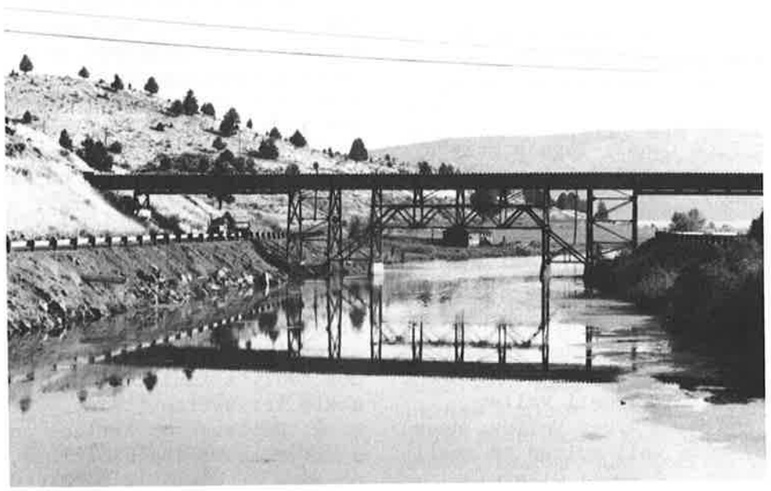


Fig. 3.10 Lyttle Gap (above) and Olene Gap, both on Lost River. These water level gaps made it easy to construct roads and irrigation ditches and to impound water. The bridge at Olene Gap carries an irrigation canal from Upper Klamath Lake to Poe Valley. (Author's photos)

Lost River on the west side, the other passing through Olene Gap into Poe Valley.

1882 Frank Adams built a small canal, six miles long, from Lost River to Adams Point, completed in 1886; extended to draw water from White Lake. Sold to the Government in 1904.

1882 to 1886 The Van Brimmer Brothers and Adams built a ditch to supply water for about 40,000 acres between Lower Klamath and Tule lakes, to irrigate a part of Lower Lost River Valley.

1884 William Steele began the construction of a ditch from Link River along the foothills to upper Klamath Valley. A branch was extended in the direction of Olene.

1884 Thomas Martin used Moore ditch for flour mill.

1887 to 1888 White Lake was so low that the canal became dry, after which a cut was made into Lower Klamath Lake.

1888 A new company, Klamath Falls Irrigation Company, enlarged the Ankeny Canal to 50 second feet.

1891 West Side Canal, Thomas Martin and Charles and Rufus Moore Company.

1897 John Loosely and sons built an irrigation ditch from Wood River.

Irrigation began in the Basin along the slightly intrenched streams with adjacent gently sloping land.[18] Upper Lost River in Langell Valley (fig. 3.2) and Wood River Valley, near Fort Klamath, were well suited to small-scale irrigation. A small diversion ditch, aided perhaps by a low weir, turned water to adjacent fields. Or, a large wheel mounted so that it was turned by the current of the stream, could lift water to the nearby fields. Once the water reached the fields, three methods of irrigation were practiced by the early irrigators. In the border method, fields were laid off in narrow strips, separated by ridges and following the slopes rather than the contours. In the check system, fields were laid out in squares which could be flooded from the ditch by judicious use of a shovel. The short lateral system led water to the field from the main ditch by many short ditches; it is still in use today with the aid of short plastic siphons. All three systems caused problems. A hardpan at shallow depths of two or three feet, in parts of the Basin, limits subsurface drainage and leads to water logging. The early irrigators had a tendency to over-irrigate and, since the soils of the Basin are high in soluble minerals, alkali accumulated at the surface. Such fields had to be reclaimed by the construction of better drainage ditches and by flooding the fields, allowing the surplus water to drain away with the dissolved minerals.

In 1871 Jesse Applegate, an engineer by training, and James Carr, a business man, proposed to construct a large irrigation ditch from Lost River near "The Gap" (Olene) (fig. 3.10) to the Klamath River, making it possible to irrigate 350,000 acres along the way. The ditch was to be wide and deep enough to accomodate small steamers and it would furnish power for small factories. The cost of the ditch and the land was estimated as more than one million dollars. This scheme never got off the drawing board, but it was widely discussed at the time and it undoubtedly stimulated interest in large-scale irrigation. Many years later the U. S. Reclamation Service constructed a ditch along the same line, the main purpose of which is to carry surplus Lost River water to Klamath River and thus prevent the flooding of farms on the margin of Tule Lake.



As plans for larger scale irrigation began to appear, opinions differed as to the best source of water. Obviously Upper Klamath Lake had the advantage of the largest watershed, the largest storage capacity and the highest elevation above the plain. But it did pose a more difficult engineering problem; the best diversion point at the head of Link River was bordered by high ground and was several miles from large areas of irrigable land. In fact, almost no one thought of it as a source of irrigation water. In the 1870s many people thought that Clear Lake in California, the source of Lost River, was a better site. A low dam at the outlet of the lake (one was completed in 1910) would control the water and diversion canals below the dam would, at least, irrigate most of Langell Valley. In the end, water was obtained from several sources - Upper Klamath Lake, Lower Klamath Lake, Clear Lake, Horsefly Reservoir, Lost River, and others.

Large-scale irrigation canal construction began in 1877 when Charles and Rufus Moore began a ditch on the west side of Link River. This led, eventually, to the southwest corner of Lower Klamath Lake, crossing Klamath River in an inverted siphon.

By 1900 irrigation had been brought to many parts of the Basin, especially to the Upper Klamath Valley, Lost River Valley, Langell Valley, and Poe Valley. Almost all of the water came either from Upper Klamath Lake or from Clear Lake by way of Lost River. Some small areas were irrigated from wells. Along with the construction of canals and ditches, it was necessary to provide drainage ditches to drain away the surplus water. And in the low lying, marshy areas dikes were needed to prevent flooding. Many short bridges were built where roads crossed canals. In some cases inverted siphons carried water under important roadways. Although there was no comprehensive plan for irrigating the whole Basin, at this time, the irrigated acreage made for a stable community with minimum risks from droughts which had been so disastrous to other parts of eastern Oregon.

Although much progress had been made by 1900, only 129 of the 453 farms in the county had irrigation and most crops were still grown by dry farming. Only three percent of the wheat acreage was irrigated, 27 percent of the oats, 17 percent of the barley, 26 percent of the potatoes, and 86 percent of the alfalfa. The total value of all crops was over three million dollars of which two million came from irrigated land. Less than 10 percent of the farmland was under irrigation.[19]

## MAPS

Prior to 1860 most of the maps of Klamath Basin were merely compass traverses, made by dead reckoning, with a limited use of surveying instruments and a few determinations of latitude and longitude. Such are the maps of Frémont, Piper, and the railroad surveyors, Williamson and Abbot. An exception were the township maps of the General Land Office (Surveyor General) of a small area in the Basin, showing township, range, and section, and a few other features. The state maps of the General Land Office showed townships, ranges, and sections; also county borders, roads, towns, streams, lakes, and a few elevations of peaks. These maps were revised annually and, together with the U.S.G.S. Topographic maps, formed a base for almost all of the other maps issued in this period. Some of the Land Office maps showed the lands open to homesteading, also the Land Grant lands. A number of military maps were made in connection with campaigns against the Indians. They differed from other maps in showing more roads, tracks, and trails; also the location of military camps. A number of privately printed maps were issued during this period, for example, the J. K. Gill Map of 1878. It showed the Cascade Range as a long, flat plateau;

the range crest had not been surveyed at that time.

The first topographic maps of the United States Geological Survey were surveyed in 1882-84 and the first sheet, the Klamath, was published in 1892 at a scale of four miles to the inch and a contour interval of 200 feet (Fig. 3.1 ). The Klamath Sheet shows most of Klamath County; the Ashland Sheet, on the west, shows a part of Upper Klamath Lake and the Cascade Range. The Modoc Lava Bed Sheet shows parts of Siskiyou and Modoc counties in California. These maps were preliminary in character and included some errors. For example, Upper Klamath Lake was labeled "Lower Klamath Lake" and Agency Lake was called "Upper Klamath Lake." Some of the elevations were in error; Linkville was marked at 4,126 feet; the correct figure is 4,137 feet. Major towns are shown - Linkville, Klamath Agency, Chiloquin, Sprague River Valley, Bly, Dairy, Bonanza, Langell Valley, Olene, Keno, and Tule Lake (then in Oregon).

SUMMARY, 1860 TO 1900

In this period the white population increased from zero to 3,970 (in 1900), while the Indian population remained fairly stable at nearly 1,000. By trial and error and with considerable effort, a number of farms and ranches had been established and several crops had been produced. The greatest handicaps were the remoteness of the Basin from a large market, poor transport within the Basin and to the outside, and the variable climate. The poor access to outside markets, such as San Francisco, limited the production of crops, livestock, and wood products. To be sure, a number of wagon roads were in use but the roads were poor, especially in winter. Klamath County petitioned the state for road funds but with little result. Unlike Portland, there was no strong movement by bicycle clubs to stimulate road improvement. Only with the advent of the automobile did road improvement get under way. Water transport was in wide use in limited areas but low lake levels at times reduced the steamboat traffic. The next period, described in Chapter 4, is a different story. The coming of the railroad and automobile and the work of the United States Reclamation Service were the chief elements in the accelerated growth.

# 4. A NEW ERA FOR THE BASIN: 1901–1930

The 20th century brought a new era to the Basin of old Modoc Lake; many changes occurred which, of necessity, must be described separately but are obviously interconnected in various ways. A new awareness of the very unique environment developed and was disseminated by maps, books, reports, bulletins, newspapers, and by word of mouth. Topics included were landforms, drainage, vegetation, geology, soils, roads, railroads, and availability of land for settlement. The U.S. Reclamation Service took over the lakes and adjacent land and brought about a great expansion of irrigation and agriculture. Some of the sites for hydroelectric power were developed, for domestic and industrial use, as well as furnishing power for pumping irrigation water. Logging and wood processing were greatly accelerated as transportation by rail and road improved, and as new techniques of logging and manufacturing were introduced. The coming of the railroad and automobile brought a new dimension to transportation, making it feasible to export and import heavy, bulky materials (fig. 4.1). The map of the Basin was changing too (compare figure 4.1 with figure 3.1).

In this period a good share of Klamath County's population changed from rural to urban. In 1900 the population of Klamath Falls was only 852,[1] not enough to qualify as urban and, according to the census, all the county was rural. By 1930 the population of Klamath Falls had exploded to 16,047, and for a brief period it was the fourth city in Oregon. This meant that the population of the county was 62 percent urban. At this time Klamath Falls almost ceased to grow, but growth continued on the level plain to the south, especially in an area which came to be called Altamont. By 1930 Altamont was, according to the census, an unincorporated rural area, covered by two precincts with a population of 2,246.

The effect of the eight-fold population explosion in the county (fig. 3.5) from 3,970 in 1900 to 32,407, was to be seen in the busier streets of the towns, in the heavier traffic on the roads, and in the logging camps and sawmills. Agriculture had boomed, thanks to homesteads, cheap land, cheap water for irrigation, and the diversification of crops. The composition of the population was changing from predominantly male and young to a more even balance of the sexes and a larger proportion of older people. The Indian population showed only a slight increase in this period. In 1930, five hundred and ten Mexicans were living in the county. Population growth was uneven. In the first decade, the increase was from 3,970 to 8,554. During the second decade, in spite of World War I, the increase was only 33 percent. In the last decade the population exploded to 32,407, mainly as a result of heavy in-migration to the region. The growth in agricultural and forestal production was similar to that of population only in some respects. Wheat acreage, for example, increased rapidly to the year 1919 to 9,807 acres, decreased to 2,446 acres in 1924, and expanded to 10,351 acres by 1930. The variations in acreage for other major crops was similar, except that barley and potatoes showed a substantial increase in the last decade.

World War I played a major role in the changes in the Basin. Even before the United States entered the war the increased demand for agricultural and forest products was felt throughout the nation, as well as in the Basin.

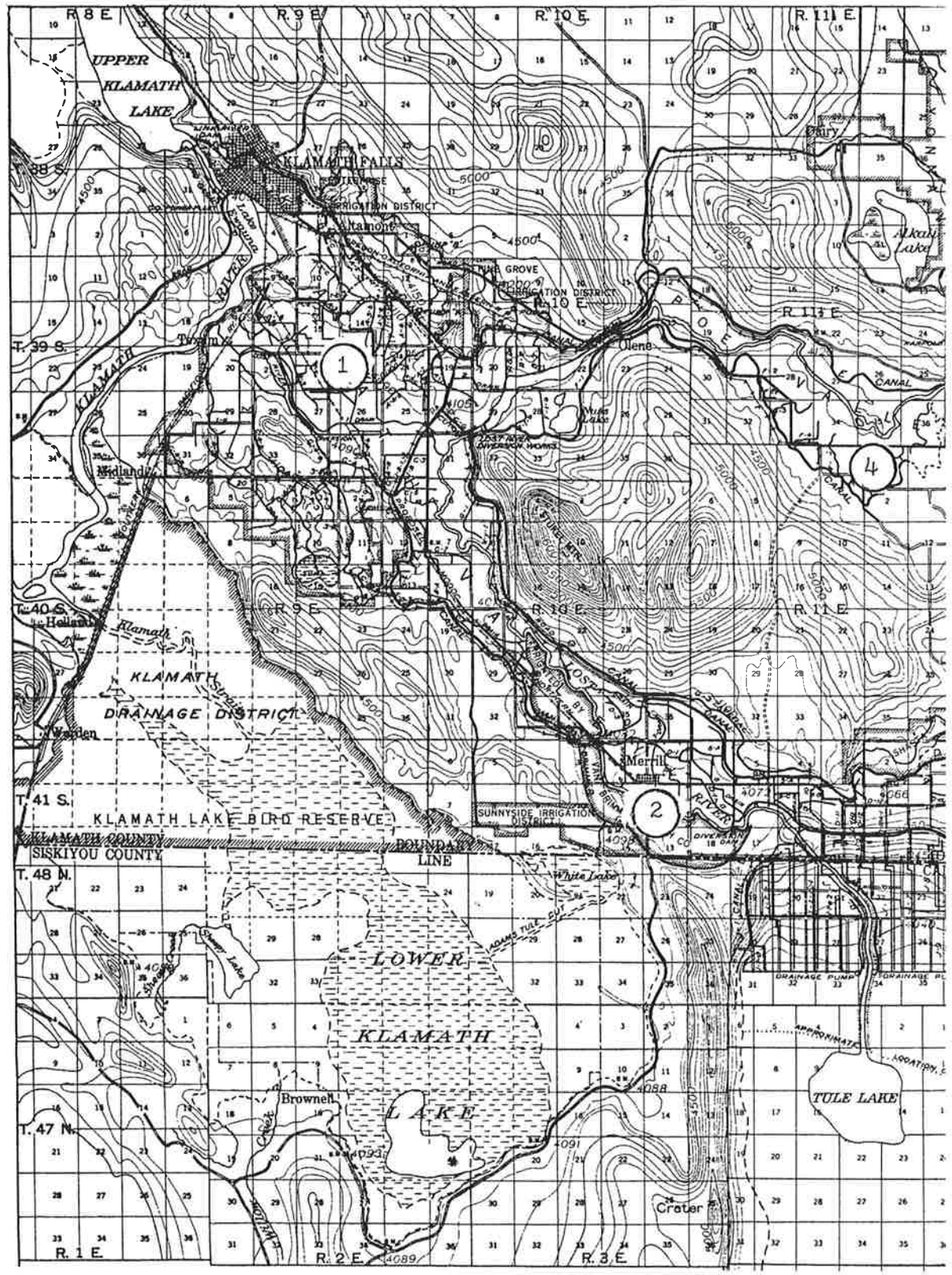



Fig. 4.1. Map of the Klamath Irrigation Project for 1926. The pattern of access roads, irrigation and drainage ditches marks out the major irrigated areas: (1) Klamath Basin; (2) Lower Lost River; (3) Tule Lake Basin, only one fourth was irrigated at this time; (4) Poe Valley; (5) Langell Valley.



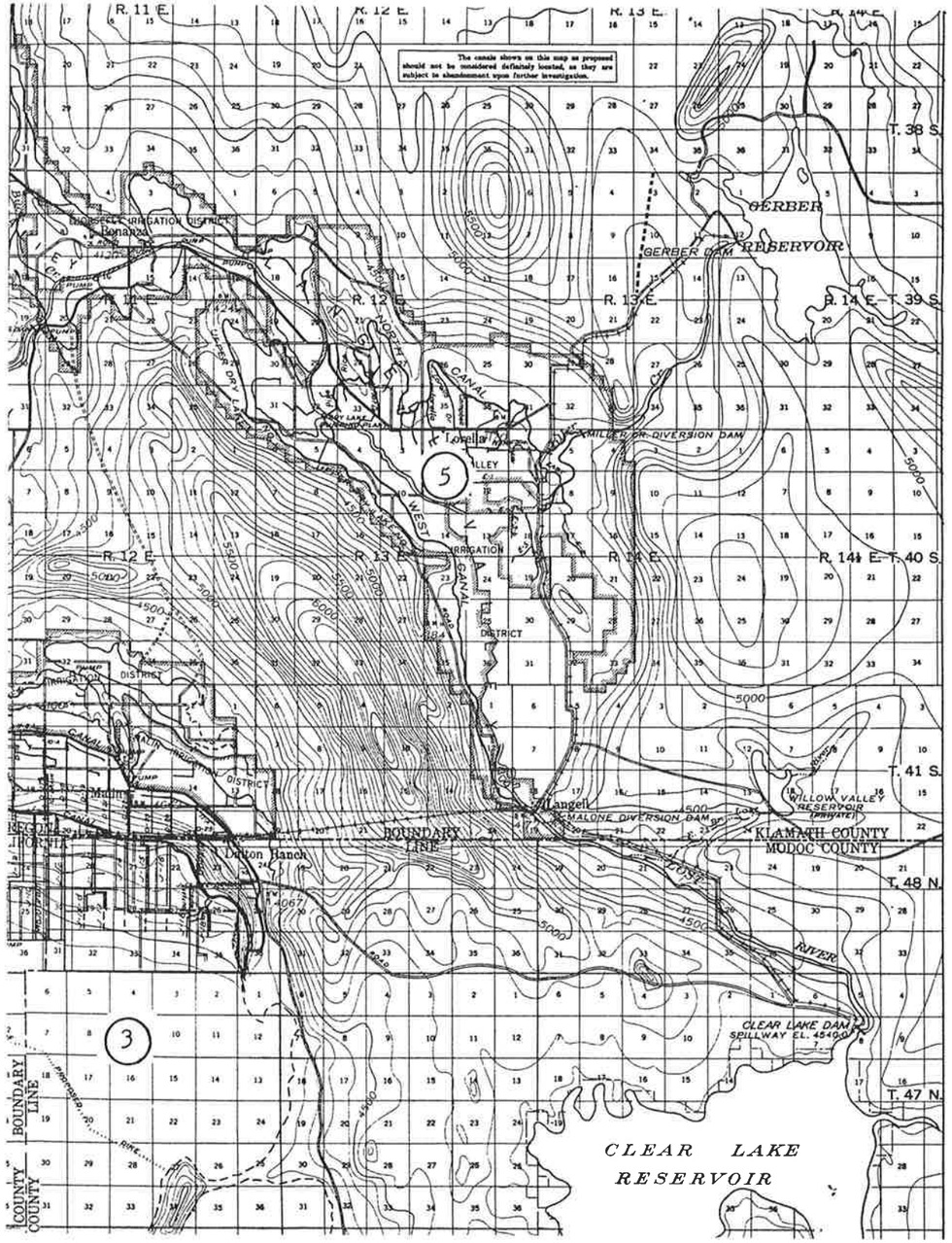



Fig. 4.1 (cont.). Lost River flows from Clear Lake Reservoir through Langell Valley, then westward through Poe Valley, southeastward through Klamath Valley to Tule Lake. A diversion canal drains some of Lost River water to Klamath River, resulting in the drying of Tule Lake. The railroad grade crossing Lower Klamath Lake, cut off Klamath River and reduced the lake to a large marsh.

The war period, 1914-1919, was a busy one. The forest industries of the Basin expanded. As noted above, the coming of the railroad, the improvement of roads, and the new technology, in effect prepared the industry for rapid growth. But, as compared to eastern forests, the region suffered from a shortage of shipping, as well as distance from markets. Rail cars and ships were in short supply. Furthermore, the normal market for west coast products in the Pacific was greatly reduced. The opening of the Panama Canal in 1914 was of some help, but the long voyage from the west coast to Europe did not favor the Klamath Basin.

Some of the many changes in the life and character of the Basin are shown in the chronology of significant events:[2]

1902

Survey of standing timber published by the United States Geological Survey. Heaviest stands on the Cascade slopes and in the Klamath Indian Reservation.
First telephone line reached Klamath Falls, coming from Picard, California, along the Topsy Grade.

1903

Reconnaissance trips and reports made by Reclamation Service engineers on the feasibility of the Klamath Project.
First notice of Klamath Basin potatoes on the San Francisco market.

1904

One million acres of public land withdrawn from entry, including power sites and irrigable land.
First city-owned rock crusher and street making machinery in Klamath Falls

1905

Act passed by the legislatures of Oregon and California, ceding to the United States rights in Upper Klamath, Lower Klamath, and Tule lakes.

1906

Keno Reef cut investigated to determine the effect on Klamath River and on the level of Lower Klamath Lake.
First automobile to reach Klamath Falls, shipped by rail to Ager, California, and driven over the Topsy Grade.

1907

First box factory built by Long Lake Lumber Company.
Main Canal ("A" and "B") completed to Olene.
First irrigation from Reclamation Project.

1908

Keno Canal completed.
First public notice of homesteading on the Klamath Project.

1909

Railroad completed from Weed, California, to Klamath Falls.
Lower Klamath separated from Klamath River by railroad grade.

1910

Clear Lake Dam completed.

1912

Lost River Diversion Dam and Channel completed.

1914

World War I began, stimulating the production of crops, livestock, and



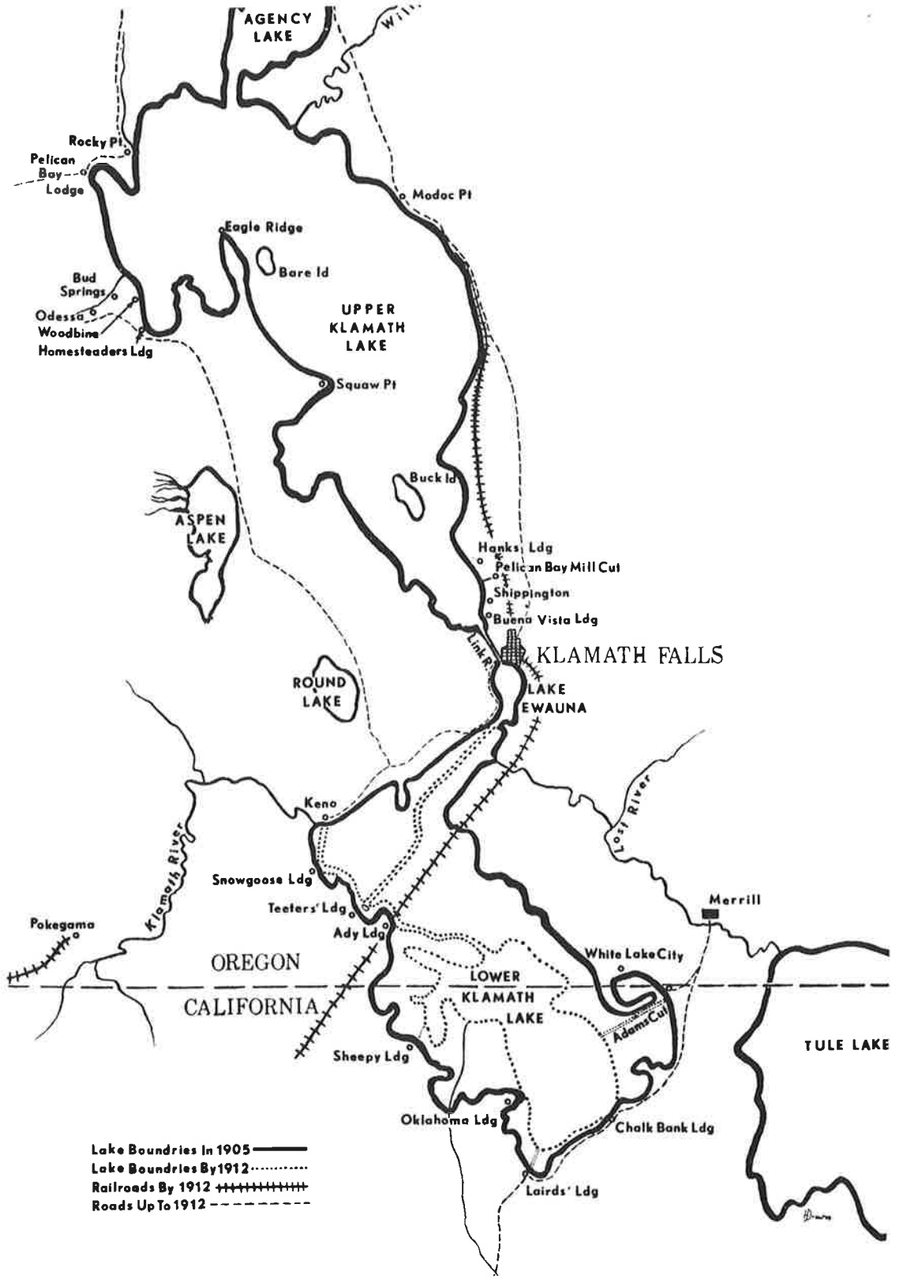



Fig. 4.2. Drew's Map of the Klamath Lakes, about 1905. Roads and railroads are shown to 1912. Lake landings are shown for this period of steamboating. (see note 18).

lumber in Klamath County.

1915

Van Brimmer Canal first received water from Reclamation Project.
Topographic survey of Upper Klamath Lake and Tule Lake shoreline.
Exploratory shafts dug to find the prehistoric outlet of Tule Lake to the south. The project was unsuccessful.

1917

United States enters World War I.
Lost River Diversion Canal overflowed for two weeks.
Clear Lake Reservoir filled to 0.1 foot of the spillway top.

1918

Labor shortage;daily wage rates increased from $2.70 to $3.50.
World War I ends.

1919

Construction of temporary dam on Link River.

1920

Debler Report on the reclamation of Tule Lake completed.

1921

Link River Dam completed by California Oregon Power Company.
Lower Diversion Dam on Lost River completed.

1922

Homestead entry of 9,680 acres in the Tule Lake Division.
First time Green Springs Highway open all the year.

1923

Malone Diversion Dam completed.

1924

Langell Valley West Canal completed.

1925

Gerber Dam completed.
Miller Creek Diversion Dam completed.

1926

Southern Pacific Railroad provides the first passenger service between Klamath Falls and Eugene, Oregon.

1929

Central Pacific (now Southern Pacific) from Klamath Falls to Alturas, California, opened to traffic.
First domestic hot water (geothermal) heating plant.

## MAPS AND REPORTS

This period was marked by expansion of published information on the Basin. Maps, books, and reports were issued by both government and private agencies. Newspapers reached an even wider audience and much information was circulated by word of mouth. The U.S. Geological Survey published books, maps, and bulletins on the geology, minerals, water supply, and forest resources. In 1905 the old topographic maps - the Klamath, Ashland, and Modoc Lava Beds sheets (fig. 4.3) - were updated as one map, by the Geological Survey and the Reclamation Service. On this map the lakes were shown at or near their maximum height in historic time. Upper Klamath Lake was at 4,142 feet above sea level, Lower Klamath Lake at 4,086. This difference in elevation is of great significance for irrigation and hydroelectric energy. The level of Tule Lake was at 4,056 feet, the lowest part of the Basin. The revised map showed a few new roads and the rail line from Thrall, California, to Pokegama in southwestern Klamath County. Also shown were most of the privately owned irrigation



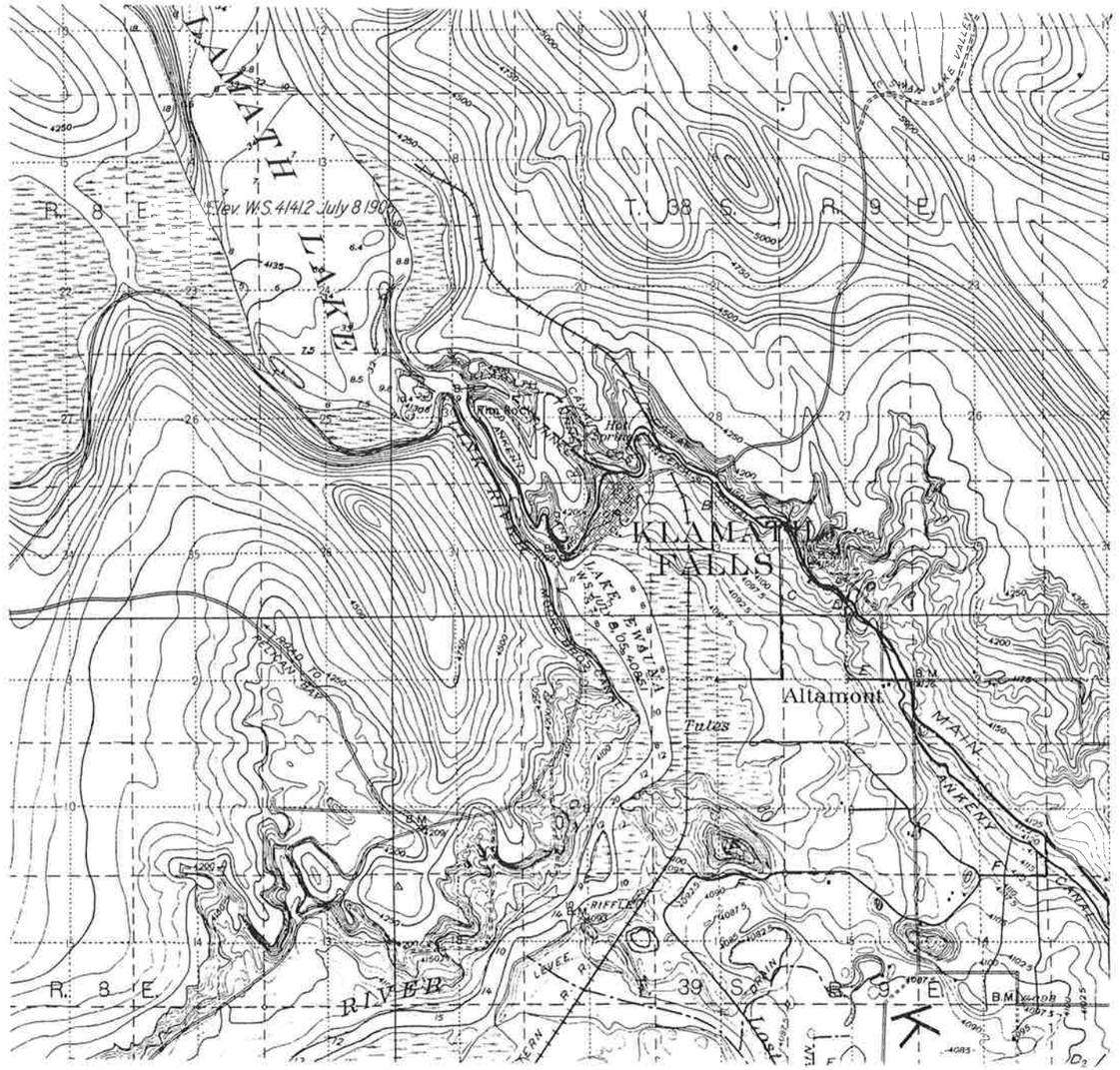



Fig. 4.3. A small part of the Reclamation map of 1906. This was the first map to provide detailed contours, lake levels, and lake depths.

ditches. This map, in effect, portrayed the conditions in the Basin before the Reclamation Service took over the lakes and surrounding land.

The 1906 map, published jointly by the Geological Survey and the Reclamation Service, is on a scale of one inch to 4,000 feet and with a contour interval of 50 feet (fig. 4.3). A variable contour interval was used on the floor of the Basin. Only the southern part of Upper Klamath Lake was shown, an indication, perhaps, that Upper Klamath Lake was not considered important at that time. Depths are shown by contours and figures, revealing that all the lakes were shallow. The deepest place in Lower Klamath Lake was 17 feet, that of Tule Lake, 26 feet. Lower Klamath Lake is shown on this map at a low stage, with less than half of the surface covered with water. This 1906 map was revised to show the progress of irrigation, the location of the railroad to Klamath Falls, also new roads and settlements. In subsequent years the Reclamation Service included maps in their progress reports but these maps were not generally published.[4] They are, however, on file in the office of the U.S. Bureau of Reclamation.

In 1904 the U.S. Weather Bureau began to forecast the weather and keep continuous records of temperature, precipitation, and frost for Klamath Falls. Keene's tree ring records indicated a wet period from 1900 to 1914 and a generally dry period for the next 16 years.[5] The Weather Bureau record shows a similar changing trend, but with less contrast between the wet and dry periods. It also shows the seasonal distribution of precipitation, including snowfall, which the tree ring record did not show. The average precipitation for the period 1904 to 1930 at Klamath Falls was 12.81 inches; the highest was 19.56 inches in 1912, the lowest, 8.32 inches in 1905. Later records reveal that Klamath Falls is at or near the driest point in the Basin and that annual precipitation on the Basin floor ranges from 12 to 20 inches. The wettest months are November, December, and January, averaging 1.87 inches per month. The driest are July, August, and September, averaging 0.37 inches per month. The average snowfall was about 42 inches. The temperature ranged from 29.8° F. in January to 68.0° F. in July. The extreme temperature range is from minus 24° F. to 105° F. The Basin is semiarid rather than desert. Most of the precipitation comes at the cool time of year and evaporation is therefore comparatively low. Even before the weather record became available, the residents had found that the summers were too short and too cool for some crops.

The period began in 1901 with a hard winter and also a wet one. Thousands of cattle perished. The winters of 1906 and 1909 also were severe with more than the usual amount of snow. Snow and cold delayed the construction of the Southern Pacific Railroad north of Klamath Falls. During this period Upper Klamath Lake was frozen. Lake levels were high, a favorable condition for steamboat operation. Beginning in 1913, several moderately dry years reduced the lake and stream levels. 1914 to 1917 were wet, but in 1928 the severe drought began which was to last until 1937.

## SOILS

When Mount Mazama erupted to form Crater Lake, 6,000 years ago, it spewed out large quantities of pumice, ash, and other fragments, some of which fell on the Basin. More fell on surrounding slopes and was washed into the Basin by the torrential rains of that period. From these materials the soils of the Basin were formed by centuries of weathering. Perhaps the most distinctive soil is the "chalk" (fig. 4.3), as it is commonly called, almost white in color and so light that it will float



on water. When steamers touched the bottom of shallow Lower Klamath Lake, some of this material was dredged to the surface in sufficient quantities to impede progress of the boat. Also washed into the Basin by running water from the slopes were particles weathered from the basaltic rocks, including gravel, sand, silt, and clay, contributing to the various textures of the Basin soils. Where organic material, derived from partially decayed plants and animals in the lakes, was abundant peat soils were formed. Altogether the character of the soil in a specific location is determined largely by the proportions from the various sources and the degree of weathering.

In the first official soil survey of the Basin, in 1910, A. T. Sweet and I. G. McBeth[6] classified the soils in two main series, the Yakima (type area Yakima, Washington, an area similar in many ways to the Basin) and the Klamath. The Yakima makes up most of the soils of the Basin, including sands, silts, and clays in various proportions. The Klamath series occurs mostly on floodplains of the streams and on the margins of lakes. This series is also divided into sands, silts, and clays, but with less coarse materials than in the Yakima series. Areas of adobe and peat soils are small, located in or on the margins of marshes.

When irrigation began a number of soil problems emerged, not noticed in dry farming. With plenty of water it was easy to over-irrigate, thus leaching out the soluble elements. Some soils, loose and porous on the surface, had a hardpan below, which prevented the irrigation water from draining away below the surface. In any case, drainage was just as important as irrigation. In some areas alkali accumulated, making the soil unfit for cultivation. The alkali problem was worst in low lying locations, where water stood on the surface until it evaporated. Alkali soil could be reclaimed by thorough flushing and draining. On the whole, soil conditions on the Basin floor and adjacent slopes - texture and mineral content - were favorable for irrigation agriculture, provided approved methods were used. (Additional material on soils is included in subsequent chapters, as more complete studies were carried out.)

## EXPANSION OF IRRIGATION

In 1903 John Whistler of the U.S. Reclamation Service began the investigation of the possibilities of large-scale irrigation in the Klamath Basin.[7] He traveled over the area and noted the large area of nearly level land at low elevation with respect to Upper Klamath Lake. He saw the upper end of Link River as a favorable site for a low dam to regulate the level of the upper lake. He also saw that Lower Klamath Lake could be partially drained to provide more level land for cultivation and that Tule Lake could be lowered by diverting part of the drainage of Lost River, its principal tributary, to Klamath River, thus providing more land for irrigation and cultivation. In addition to Upper Klamath Lake, a natural reservoir, two other reservoir possibilities were noted - Clear Lake in California, the source of Lost River, and Horsefly (Gerber) Reservoir on Miller Creek to the north of Langell Valley. These three reservoirs were to provide most of the water for gravity irrigation on the floodplains of Lost River, in Langell Valley, in Poe Valley, and in Klamath Valley.

Tributaries of Upper Klamath Lake, notably Wood, Williamson, and Sprague rivers are major factors in maintaining the level of the lake. Also many small streams from the east slope of the Cascades enter the lake. Water from wells is generally

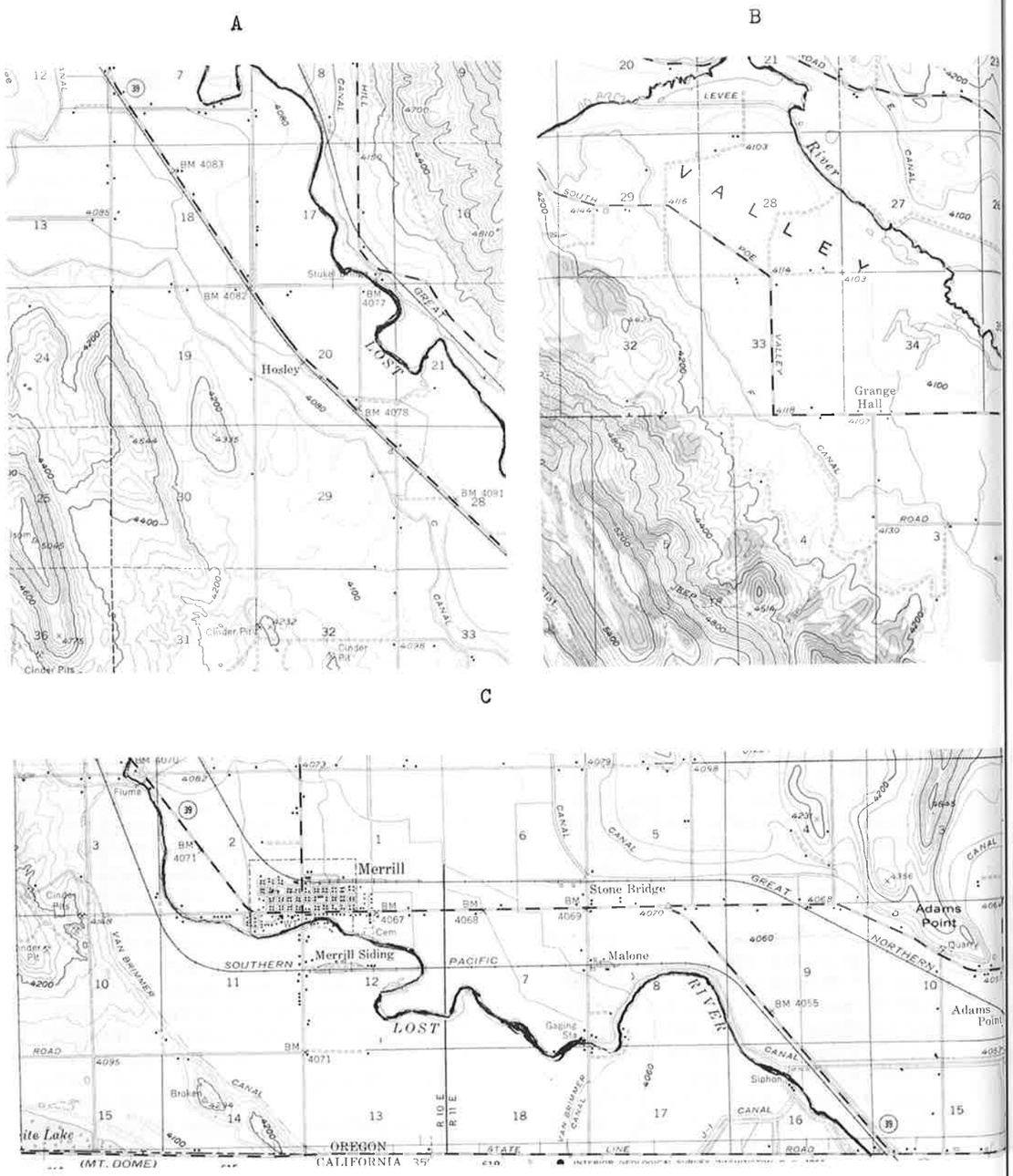



Fig. 4.4. Parts of the Merrill Quadrangle showing the course of Lost River (black line) through (A) Klamath Valley; (B) Langell Valley; and (C) Lower Lost River near Tule Lake. (U.S. Geol. Survey map).



available throughout the Basin at shallow depths. On the whole, the early studies indicated that the physical resources of the Basin - the terrain, soils, and water supply - were favorable for an extensive irrigation system.

Improvements for the Klamath Project (as it was now called) included many sub-projects. Existing canals were deepened and widened, new canals constructed, drainage ditches provided to carry off surplus water. Small dams were constructed to increase the storage and regulate the flow; inverted siphons to carry the canals under streams, roads, and other obstruction. Power plants were built on both sides of Link River to supply hydroelectric energy for domestic use and for pumping irrigation water. Small farms were laid out as homesteads and roads were built for access to them. The plan called for the irrigation of Klamath Valley from Upper Klamath Lake, while water from Clear Lake and Gerber Reservoir would supply Langell, Poe, and Yonna valleys, with a surplus for lower Lost River. More specifically, the area was divided into two projects, the upper which included Langell Valley, the upper part of Poe and Yonna valleys, and the lower part of Klamath Valley (fig. 4.4). The lower project included Klamath Valley, east of the Klamath River, lower Poe Valley, the reclaimed area of Lower Klamath Lake, and Tule Lake. The designation, "upper" and "lower," was based on the higher elevations of Clear Lake and Gerber reservoirs, as compared with that of Upper Klamath Lake. The irrigable land for the upper project was estimated at 48,000 acres, that of the lower project at 188,000 acres.

Surveys were continued and a comprehensive plan developed for extending the irrigated areas. The rocky bottom of Klamath River below Keno, known as "Keno Reef," was excavated in 1908, thus lowering the level of the river and of Lower Klamath Lake. The lake was reduced in area and the remainder, mostly marsh, was later used as a wildlife refuge. Drilling operations in the lava beds south of Tule Lake were designed to find the old outlet of the lake to Pitt River, which had been blocked by lava flows. The drilling project was not successful, so the level of Tule Lake was reduced by diverting part of the flow of Lost River to Klamath River and later by pumping surplus water up to Lower Klamath Lake and thus to Klamath River. The three large reservoirs, Upper Klamath Lake, Clear Lake, and Gerber Reservoir, were at elevations of 4,140, 4,500, and 4,800 feet above sea level with flow controlled by dams. This was sufficient to irrigate large parts of the Basin floor, which ranged in elevation from 4,040 feet on the north side of Tule Lake up to approximately 4,200 feet at the shoreline of old Lake Modoc.

The valleys of the Upper Project (better described as basins) - Langell, Poe, and Yonna - are remarkably uniform in surface and elevation. Elevations of all these basins range from 4,120 feet above sea level at the lowest, to the shoreline of old Lake Modoc at 4,200 feet. The old shoreline, marked by a sharp change in slope, forms the margin of all the basins. Langell Valley (fig. 4.4) is the largest of the three basins, approximately 20 miles long and four miles wide. The floor is nearly level except for a few rocky hills which rise above the plain. One of these hills, Dead Indian Hill, is one and one-half miles long and three-fourths mile wide. Lost River enters the Valley after emerging from a narrow basaltic canyon on its way from Clear Lake. In the Valley the river is sluggish because of its low gradient and in late summer, the driest season, the river flowed underground in the upper part of the Valley, even before water was diverted for irrigation. In the wet season it flowed through a

broad marsh. Before the Reclamation Service took over, an irrigation ditch, called the east branch, was diverted from the right bank and led all the way to Yonna Valley. The west ditch took out on the left-side bank, supplied water to a large area, and ran through Olene Gap and irrigated a part of lower Lost River Valley. Early settlements, also postoffices, included Lorella on the northeast side of the Valley, Bonanza and Langell (Ranch) on the southwest. A cluster of houses was near the Hot Springs on the southwest side; otherwise farmsteads were widely spaced. The population of Langell Valley precinct was 195 in 1900 and 346 in 1930.

Poe Valley is very similar to Langell Valley, only smaller. It is approximately nine miles long and four miles wide in the upper part, two miles wide in the lower part. Lost River enters Poe Valley through a narrow gap at Harrolds Dam and leaves by a gap at Olene. Lost River is even more sluggish here than in Langell Valley with many meanders and numerous cut-offs. Poe Valley was first irrigated extensively from a branch of the Main Canal from Upper Klamath Lake. The branch canal followed the northeast side of this valley and was called the "Highline." Canals were also taken out from both sides of Lost River near Harrolds Dam. Pumping was necessary to bring water to the margins of Poe Valley. By 1900 there were scattered farms and ranches at several points with postoffices at Olene, from 1892 to 1904, and at Bedfield, from 1892 to 1909.

Yonna Valley (earlier called Alkali Valley) is partly in a closed depression; water is lost only by seepage and evaporation. Alkali Lake is the lowest point, 4,102 feet, in the eastern valleys. A white crust of alkali accumulates on the margin of the lake and soils have a high mineral content. Irrigation was delayed in the Valley, although a canal was brought in from Langell Valley. Settlements were limited in this period, but a postoffice was established at Dairy (1876) on the northwest margin. Swan Lake, northwest of Yonna Valley, is similar with a remnant lake. Remote from both Upper Klamath Lake and Lost River canals, irrigation has been limited to water from small streams on the margin and from wells.

## Upper Klamath Lake

Upper Klamath Lake is the most important element in the Basin for irrigation, power, and water supply. It has a large watershed which includes a part of the east slope of the Cascades and reaches north to the vicinity of Crater Lake. Upper Klamath Lake provides the largest and most dependable surface water supply to the Basin, at an elevation well above most of the irrigable land. The lake is in many ways ideally located for irrigation but it is shallow and its use is complicated by numerous regulations of government agencies. The U.S. Reclamation Service is the dominant agency, but the Forest Service, the U.S. Biology Service, the Wildlife Service, power companies, logging companies, the Southern Pacific Railroad, and various private individuals were and are concerned.

Although a good map of the shoreline was published in 1906 and some soundings were made in the southern part, it was not until 1919 that a survey was made of the whole lake bottom and a depth contour map constructed[8] (1-ft. int.) This showed that the deepest place was near the west shore of the lake, running from Eagle Ridge to Squaw Point, reaching a maximum depth of 40 feet when the lake level stood at 4,142 feet above sea level. The mean depth of the lake is only a little over 13 feet. This map showed what boatmen already knew, that the lake level was too low near the shoreline to be used readily for



Fig. 4.5. Vertical airphoto showing Link River, a part of Upper Klamath Lake (upper left), Frémont Bridge, the intake of the Main Canal, and the controlling dam. Power plants are located on both sides of the river (lower right). Note the open space on both sides of the valley. (Prod. Marketing Admin. photo).

navigation or to provide log ponds for sawmills along the shore. It was also realized that the lake was slowly filling up with sediment brought in by tributary streams and by vegetation. Later it was estimated that the average annual fill amounted to 0.6 inches of sediment per year. All lakes are temporary features, slowly filling with sediment and cutting down their outlets. Although the outlet to the upper lake is held up by a ledge of hard rock, it is evident that enough erosion has occurred over a long period to reduce the level of the lake by approximately 60 feet from the old shoreline of Lake Modoc.

At the highest level, approximately 4,143 feet above sea level, the area, including Agency Lake, is 66,000 acres, approximately 10 square miles. At the high level, the length of the shoreline is about 130 miles. The lake contains about 440,000 acre feet of usable storage. In this period, 1901-1930, 1,400 second feet of water was taken by the main irrigation canal and 1,500 acre feet was assigned for power purposes in Klamath River below Keno. The higher stages of the lake were favorable for navigation and for the log ponds of the lumber mills, but they flooded out some of the marshland where farmers cut wild hay. To protect the marshland, many miles of dikes were built on the north and west shores of the lake and on the lower reaches of Williamson River. As first constructed, these dikes were subject to erosion by waves and currents but after they were built at some distance from the shoreline, this hazard was either eliminated or reduced. Dredging was also done to provide channels for the steamboats which brought logs to the mills.[9]

Link River (fig. 4.5), a little more than a mile in length, flows from Upper Klamath Lake to Lake Ewauna, with a drop of approximately 55 feet, depending on the variable levels of the two lakes. The channel of the river is intrenched in resistant basalt, which accounts for the more or less continuous rapids in the lower half of the river. The channel is in a straight line, running southward, the result of a fault which produced a line of comparative weakness. At the upper end a ledge of basalt holds up the channel and prevents rapid downcutting. It was evident that a low dam, resting on the basalt ledge, would control the upper lake level and regulate the flow of water to the irrigation ditches. Such a dam was constructed in 1919. Early residents were surprised when a strong wind from the south "blew the water out of the river." In fact, the wind produced a seiche in the upper lake, which caused the water level to fall at the lower end so that for a short time water did not flow from the lake to the river.

### Klamath (Main) Valley

Klamath Valley is the largest segment of the floor of old Lake Modoc, stretching as a corridor 25 miles from Klamath Falls to the northern part of Tule Lake Basin. The Valley, approximately 10 miles wide, is widest at the northern and southern ends, but is only one mile wide at Stukel Bridge in the middle. It has the shape of an irregular dumbbell. The naming of this valley varies: the northern part has been called the Main Valley, also the Klamath Valley; the southern part, Lost River Valley. The very southern end, the part reclaimed from Tule Lake, is called the Tule Lake Area. Elevations are lowest in the south, about 4,030 feet above sea level, the lowest land point in the Klamath Basin; the highest point on the valley floor is 4,200 feet at the shoreline of old Lake Modoc. By 1905, before the Reclamation Service had been established, a part of Klamath Valley was under ditch. Ankeny Canal took out from the upper part of Link River, flowed generally southward, and was divided into east and west branches, paralleling Lost River (fig. 4.6). Some water was



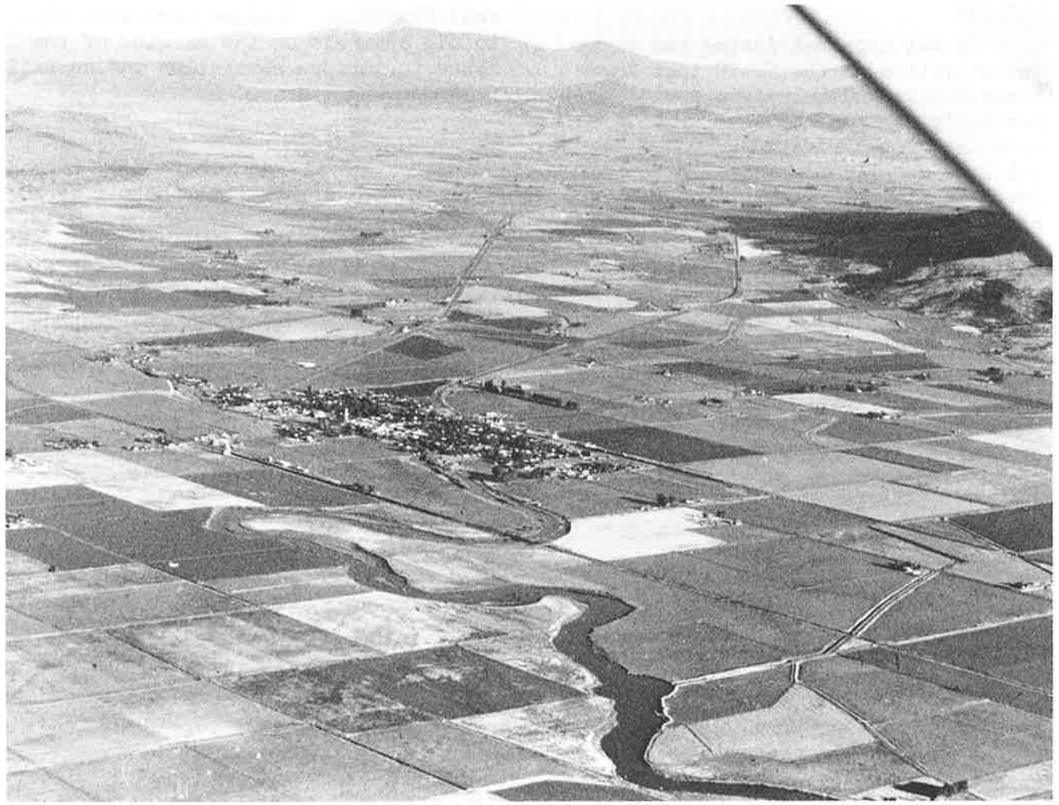


Fig. 4.6. Oblique airphoto of the lower Lost River area, looking to the northwest. Lost River meanders through the plain, along the south side to the town of Merrill and flows into the basin of Tule Lake. (Author's photo).

also derived from Lower Klamath Lake which was higher than Tule Lake and from Lost River by diversion and pumping.

It was apparent during the early investigation of the Basin that Lower Klamath Lake and Tule Lake could be partially drained and thus provide more land for irrigation. Lower Klamath Lake usually fluctuated with the level of Klamath River. When the river was high, water flowed from the river to the lake, when the river was low the flow was reversed; the river was the only major source of water for the lake. The lowest level of the river was determined by a rocky reef below Keno; after some debate this reef was lowered by dredging and, as a result, the northern part of Lower Klamath Lake became dry land. The Southern Pacific Railroad built a fill across the lake bed which effectively cut the river off from the lake, except for a small opening controlled by a gate. Only the southern part of the lake remained undrained and part of that became a wildlife refuge.

Tule Lake (fig. 4.1) posed a different problem. Located in a closed depression with no surface outlet, it lost water by seepage and evaporation and remained fresh, although with a fairly high mineral content. Two methods were suggested to lower the level; either by diverting part of the flow of Lost River, the chief tributary of the lake, or by pumping water from Tule Lake up to Lower Klamath Lake, about 30 feet higher. In the end both methods were used. Lost River was partially diverted, in the vicinity of Olene, to Klamath River by a drainage canal, with the aid of a low diversion dam; and water was pumped from Tule Lake up to Lower Klamath Lake. These operations lowered Tule Lake and provided a large area for cultivation. Eventually only small sumps remained in the southern part of the lake bed.

Large dredges (fig. 4.7), built locally, facilitated the construction of irrigation canals, drainage ditches, and dikes in the marshy lands, to prevent flooding. Dredges were also used to dig channels on the margins of the lakes to improve navigation and in railroad construction.

## SPRINGS AND WELLS

In addition to water supply from lakes, streams, and irrigation canals, numerous springs on the margins of the Basin were used. And where no spring was available, a shallow well, usually less than 10 feet, tapped the groundwater. Not all the water from wells was "good;" some was too warm, some too high in mineral content. However, water up to 80° F. was considered satisfactory for livestock. In 1915 a greenhouse was built over one of the hot springs in Klamath Falls and in 1928 a natatorium was in use, supplied by a hot spring.[10] And people were beginning to take advantage of deeper geothermal wells for domestic heating. As early as 1920 several such wells had been drilled but no specific records are available of their depths or temperatures.

## AGRICULTURE

As noted in the previous chapter, agriculture in the Basin, as the century ended, could be described as ranching rather than crop farming; emphasis was on grazing rather than cultivation. To be sure, near the end of the century irrigation was expanding and crops were playing a larger role in farm economy. The accelerated program in irrigation initiated by the U.S. Reclamation Service brought about great changes in the acreage and production of crops and livestock. With the influx of new settlers, land in farms was doubled in the period from 1901 to 1930.[11] The number of farms more than doubled, from 453 to 1,197, since many of the newer irrigated farms were limited to 160 acres.



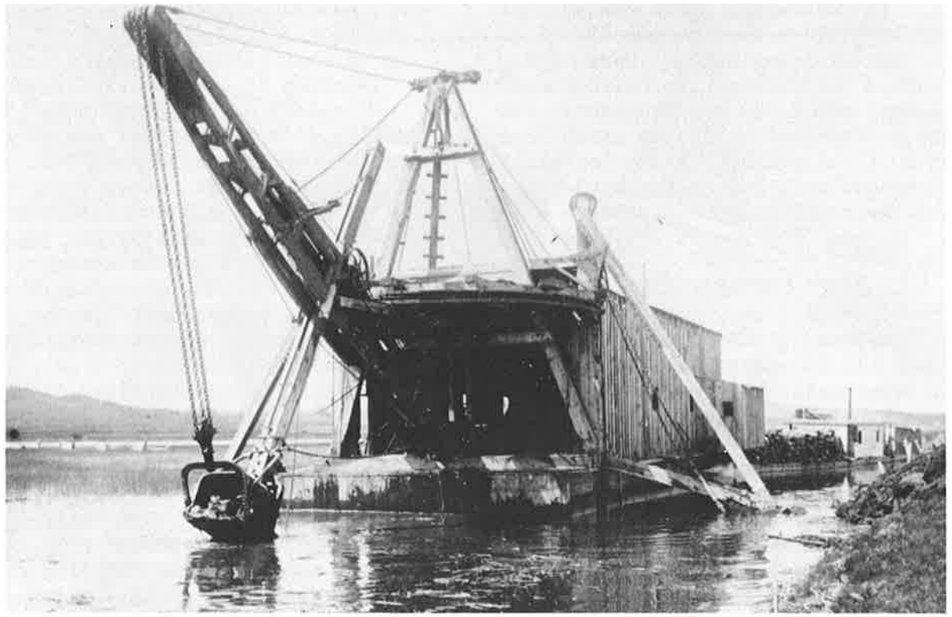


Fig. 4.7. The Adams Dredge and other smaller ones played a very important role in opening channels for the steamboats and in digging the main irrigation and drainage canals (Helfrich Collection).

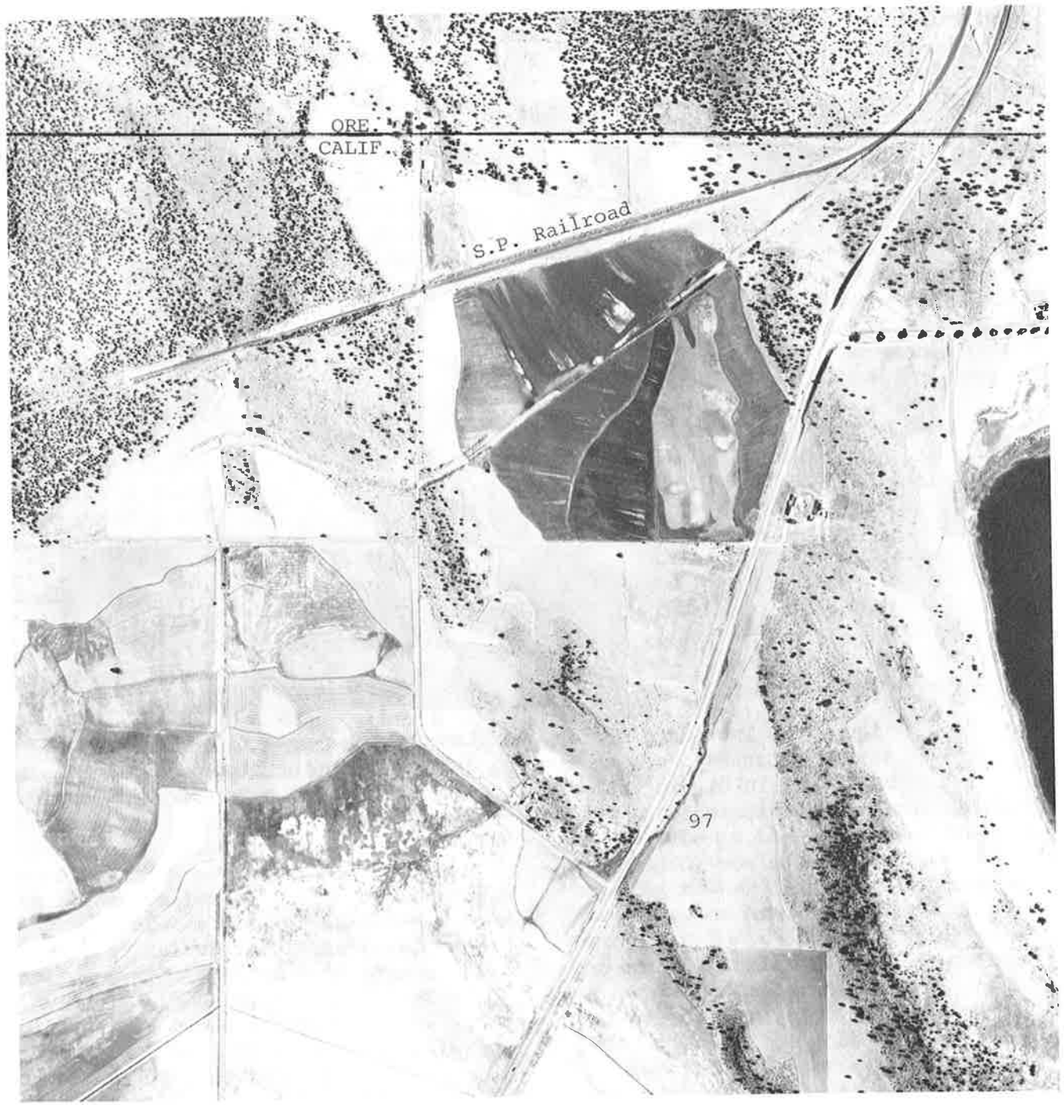



Fig. 4.8. This vertical airphoto on the border of Oregon and California shows a mixture of irrigation and dry farming. The border here (black line) is about one-fourth mile north of the 42nd parallel. The Southern Pacific Railroad and Highway 97 cross the area and a small part of State Line Road (dotted) is at upper left. (Production Marketing photo).



So the average farm size decreased from 489 acres in 1900 to 476 acres in 1930. In this period, as irrigated acreage increased, wheat and rye acreage increased three-fold, barley six-fold, and oats two-fold. With irrigation crop yields per acre increased the production figures even more strikingly. Yields per acre for wheat and barley were up to 40 bushels; oats up to 75 bushels. Dry farming continued on land not suitable for irrigation, with yields about half that of the irrigated crops (fig. 4.8). Alfalfa was the most important crop according to acreage, almost all of it irrigated. Potatoes showed the greatest percentage growth, from 278 to 4,367 acres. Potatoes were cultivated without irrigation on upland slopes; with irrigation on the Basin floor, the yields were up to 100 bushels per acre. Livestock increased in proportion; beef cattle from 15,000 to 40,000; dairy cows from 1,943 to 2,075. Sheep showed the greatest increase, from 16,000 to 171,000; horses from 6,000 to 7,300; with the advent of the tractor and automobile, horses were definitely on the decline.

The price of land continued to advance as good farmland became scarcer. In the early years of settlement, land could be purchased for a few dollars per acre or homesteaded for almost nothing. Early in this period unimproved farmland covered with sagebrush sold for $20 to $50 per acre, improved land with irrigation up to $100 per acre. This did not include the cost of leveling and ditching. As the sagebrush was removed and cultivation begun, it was inevitable that pests in the form of weeds and insects should appear. Poverty weed, foxtail, and Russian thistle were the worst weed pests.

The expansion of agriculture in this period was dramatic but uneven; most of the growth occurred in the last seven years. As the emphasis shifted from a dominant livestock economy to a more diversified system, crops began to play a major role. Potatoes, cultivated for many years on a small scale, became an export crop. The acreage was still comparatively small but the value was high; with better seed, yields per acre more than doubled. A new malting barley was introduced and became an important crop, as did grass seed, especially red clover. But alfalfa, for local feed and export from the region continued to lead in acreage and value.

## HYDROELECTRIC POWER

Early residents of the Basin were quick to take advantage of the potential water power.[12] At first sawmills and grain mills were operated directly by water power; later generating plants supplied hydroelectric energy for domestic use and for manufacturing. Good sites for power development in the center of the Basin are along Link River. Most of the requirements for cheap, efficient power were present; a large stable reservoir (Upper Klamath Lake), a good fall or head (about 48 feet), and a good rock foundation for a dam. In this case the dam in upper Link River diverted water into an aqueduct on the east side and into a canal on the west side. Two plants were built and both had the advantage of a ready market in the city of Klamath Falls and vicinity.

Two power plants were in operation in this period, called the East Side and the West Side of Link River. Their claims to water and power were prior to the takeover by the Reclamation Service. The static head of water is 49 and 48 feet respectively. The installed capacity of the East Side plant is 3,200 watts and the West Side, 600 watts. The power company has the right to re-

gulate the level of Upper Klamath Lake between 4,137 and 4,143.3 feet without specific permission of the Reclamation Service. By far the greater potential for power is in the Klamath River below Keno, where the river enters a gorge and drops hundreds of feet in Oregon and California.

## LOGS AND LUMBER

Logging and lumber production expanded rapidly after the turn of the century.[13] With improved transport it was easier to export heavy materials from the region and the expansion of agriculture and population created a much larger local demand for wood products. By 1903 the branch rail line of the Southern Pacific to Pokegama in the southwestern part of the county was completed. The main purpose of this railroad was to export logs and lumber, but the line also carried general freight and passengers. Wagons and stage coaches connected Pokegama with Klamath Falls. The Weyerhaeuser Company bought the Pokegama line in 1905 and planned to extend it to Klamath Falls. This plan was abandoned when it was learned that the Southern Pacific was building a line from Weed to Klamath Falls over a much easier route. The first train from Weed reached Klamath Falls in 1909 and the stage was set for an increase in trade and production.

At this time there was interest in assessing the amount of timber available. In 1902 A. J. Liebling made a study of timber resources and mapped them on the old topographic maps, the Klamath and Ashland sheets. He used six categories on the Klamath Sheet which covered timber stands up to 25,000 board feet per acre. On the Ashland Sheet, where stands were heavier, the upper limit was 50,000 board feet per acre. In addition to timber, the maps showed the areas of marshland, meadowland, and agricultural land. On the Klamath Sheet the best stands were in the Klamath Indian Reservation, and in the vicinity of Yainax Butte and Stukel Mountain. Almost all the higher elevations had some standing timber. The ratio of timber to acres was generally higher on the slope of the Cascades, in the areas of higher precipitation. Even here, some areas, including those underlain with pumice, had sparse stands or stands of spindly lodgepole pine of little or no commercial value.

With the expanded market many new sawmills were built in various parts of the Basin, some of them with greater capacity. The ideal location for a sawmill was in or near dense stands of timber, on level or gently sloping land, and with water transportation. Since local timber stands were rapdily depleted by large mills, lumber mills were moved frequently. Some of the later mills are listed below with dates of construction. The list is far from complete but it suggests the wide distribution (from W. E. Lamm, Lumbering in Klamath):[14]

Stukel Mountain, 1901
Modoc Point, 1902
Pokegama, 1903
Lake Ewauna, 1905
Long Lake, 1905
Algoma, 1907
Pelican Bay, 1909
Chiloquin, 1917
Upper Klamath Lake, 1917
Sprague River, 1919
West of Keno, 1920
Klamath River Weyerhaeuser, 1929

By 1923, a peak year, there were 39 sawmills and eight box mills in the Oregon part of the Basin with a capacity of 350,000 board feet, and a few mills on the California side of the Basin with about 500 workers. The combined capacity was about 545 million board feet. In 1930 the cut was down to 337 million board feet with 4,300 workers and in 1932 there were only 1,908 workers employed. The Great Depression had begun.



### Methods of Logging and Lumbering

During this period great technical progress was made in falling, bucking, and transporting logs and also in manufacuring of lumber and other wood products.[14] The long two-handled crosscut saw (the "misery whip," as the loggers called it), and the long-handled double-bit axe were standard equipment for falling large trees. Springboards, notched into the trunk, provided standing places for the fallers; old stumps still show these notches. This method left a tall stump with a considerable waste of timber. Introduction of the gasoline-powered (or electric) chain saw made both falling and bucking easier and faster. It also enabled the loggers to make the first cut only a few inches above the ground. For many years logs were dragged by oxen or horses on a "skid road," to the mill or to a waterway.

About 1900 the "stinger tongue" wheel method came into use. The wheels were six to eight feet in diameter and the axle had an inner eccentric wheel. A ten-foot tongue pointed straight up as the log was attached by a chain. When the tongue was pulled down by horses, the front end of the log was lifted. The stinger tongue was followed by the "slip tongue" about 1910, with wheels up to 12 feet in diameter, and with a tongue 36 feet long. Horses and oxen were replaced by 30-horsepower tractors, and later the horsepower was increased. This made it possible to transport longer logs, up to 32 feet in length. Soon automotive logging trucks were introduced and logging railroads constructed, thus providing a more extensive log shed for the larger mills. Most of the logs were harvested on the Indian Reservation, on O and C Land, and on various private lands. New methods were also introduced inside the mills. Band saws replaced the circular saws; multiple re-saws, conveyors, and mechanical loaders speeded up the production of lumber. Dry kilns and planers were added to many mills. Box shooks, moulding, sash and doors were added to the list of products.

## CONSERVATION

As logging expanded on the margins of the Basin, it became apparent that measures were necessary to protect the forests from fires and the infestations of insects, such as the pine beetle.[15] Although A. J. Liebling's map of timber resources in 1902 did not have a category for burned over areas, it was evident from the pattern of the map that some areas were burned over, probably before settlement. With the spread of logging and the increase in population, the fire hazard increased markedly on federal and private land. In 1908 private timber companies organized an association, including both large and small operators, to control fires. In 1911 the Oregon Legislature made fire protection compulsory. Fire crews were trained and supplied equipment, including bulldozers, as soon as they were available. Even the small bulldozers of that day could build a mile of fire trail in one hour which previously had required 100-man hours with hand tools. Much of the ponderosa pine forest fortunately was, and is, open and more readily accessible to vehicles than the denser forests of western Oregon.

It turned out, however, that the pine bark beetle was a greater hazard than fire. So the fire patrol undertook the task of eradicating (wishful thinking) the pest. The method then was to locate infected trees,

fall them, peel off the bark and burn it. By 1920, after 10 years of fighting fires and beetles, it was estimated that fires had destroyed 10 million board feet of timber, while the beetle had killed one billion board feet. Some of the killed trees, of course, were salvaged.

In later years, the Bureau of Entomology, the U.S. Forest Service, and the U.S. Indian Service cooperated in beetle-control work. Nevertheless, beetles continued to kill more trees than fire, on a ratio of four to one.

## TRANSPORTATION

The first three decades of this century, 1901 to 1930, was a period of great expansion in all types and methods of transportation and, as a result, Klamath Basin was no longer isolated even in winter.[16] Roads were extended and improved as the automobile came into general use. U.S. Highway 97, the first national road in the Basin (and still the only one), was laid out and improved by grading, rerouting, draining, surfacing, and, in some areas, by paving. West of Klamath Falls at this time, U.S. Highway 97 led over the Cascades via Green Springs Pass, to connect with U.S. Highway 99 (now I-5) near Ashland. Later the road was rerouted directly south to Weed, California, and the route across Green Springs Pass became State Highway 66. It was a measure of the optimism of the times that this road was called "The California-Banff Bee Line Highway."

Another road across the Cascades was improved, from Fort Klamath via Crater Lake, Prospect, and Trail, to Medford. This became State Highway 62. Another improved road led eastward via Olene and Beatty to Lakeview. Part of this road became State Highway 140. By 1930 all the towns in and near the Basin were connected by roads, many of them graded, drained, and supplied with bridges. Bridges were built at the upper and lower ends of Link River. The upper one is called the Frémont Bridge, since Frémont crossed here in 1846 with the aid of Indian canoes. Klamath River was bridged at Keno and later at the Emigrant Crossing downstream, where Highway 66 now crosses. Williamson River was bridged near Chiloquin on U.S. Highway 97. Several bridges were also constructed on Lost, Sprague, and Wood rivers and on many smaller streams.

In the first part of this period, stage coaches (fig. 3.7) and wagons played an increasing role in transportation, only to decline with the coming of the railroad and automobile. Although many roads were used from time to time, the chief function of the stages and wagons was to connect Klamath Falls directly or indirectly with key points on existing railroads. These key points were Keno, Pokegama, Ady, and Lairds Landing, and, in California, Thrall, Ager, Montague in Shasta Valley, and Bartles on the McCloud River Route of the Southern Pacific Railroad. Other routes, less frequently used, reached Lakeview, Alturas, and northward to Chemult and Eugene (fig. 4.9).

A railroad reached Pokegama in southwest Klamath County in 1903. It was primarily for logs and lumber but carried passengers and general freight and, with the building of a road to connect with the Green Springs Road, stage and wagon traffic was heavy. The daily stage from Pokegama to Klamath Falls sometimes carried as many as 30 passengers. At Keno Landing freight and passengers were often transferred to steamer for the trip to Klamath Falls. A few years later, as the new railroad construction advanced from Weed, California, stages began to run from the temporary terminus to Lairds Landing. When the railroad



Fig. 4.9. The locomotive, "Old Blue" was used in and around Pokegama. A recent visit to the site of Pokegama reveals only a few traces of the short-lived lumber town (Helfrich Collection).

reached Ady Landing goods were transferred from rail to boat.

Stagecoach and wagon transport was slow and hazardous. In the mountainous sections the roads had a steep cliff on one side and a steep dropoff on the other side and the unsurfaced roads were often slippery. Landslides and washouts were frequent; delays and breakdowns, and even wrecks, were common. "Klamath Echoes" has many details of stage and wagon travel.[17] A few samples: In 1905 a stage ran from Lairds Landing to Bartle on the McCloud River Railroad in California; another to Montague in Shasta Valley. In 1908 a stage ran from Klamath Falls to Dorris, California. In 1909 freight was still being hauled on a part of the old Applegate Trail to Clear Lake. East of Clear Lake there was little traffic. In addition to stages and wagons, cattle were still driven on the hoof to various rail points.

Water transport played a more important role in the early part of this period than previously; the increased population and greater activity in agriculture and logging demanded more and better transport (fig. 3.6). Improvements included larger and better steamers, the construction of new docks and the dredging of channels. Harry Drew in his book, "Early Transportation on Klamath Waterways," [18] describes in detail the boats and the traffic in logs, lumber, general freight, and passengers. He also mapped and described the various landings on Upper and Lower Klamath Lakes (fig. 4.2).

The landings listed below were constructed or rebuilt after 1900.

KLAMATH FALLS LANDINGS

The Klamath Lake Navigation Company, with their docks immediately south of the Link River Bridge, became the magnet of Lower Klamath Lake operations.

On Upper Klamath Lake, the number of landings were more diversified. The first regular landing was located near the present day Moore Park Marina and was used by the steamer General Howard in 1884.

By the early 1900s, the southeast end of Upper Klamath Lake was dotted with landings. Those sites included the Klamath Development Company and Buena Vista Docks (now the present day Pelican Marina), Shippington, by far the busiest of lake ports. Pelican Bay Mill Cut, used in the logging industry, and Hank's Landing with a railroad spur for bringing in logs.

UPPER LAKE LANDINGS

Agency Landing - Located on the northeast shore of Agency Lake about four miles from the mouth of Wood River. It served as a transfer point to Klamath Agency, Spring Creek, and points along the Williamson River.

Eagle Ridge Tavern - Established on the northernmost point of the Eagle Ridge Peninsula by Griffith, focused on tourists and vacationers.

Homesteader's Landing - Located about two miles south of Woodbine and served as a homesteader's landing.

Odessa - Originally the Harschbarger homestead. It was by far the most popular "tourist attraction" on the Upper Lake.

Pelican Bay Lodge - Built by G. Grant Crary in the 1890s, the resort consisted of a central lodge building and several furnished cottages. After Crary's death in 1902, the lodge was sold to J. D. Kendall. Kendall catered to tourists and vacationers until the lodge was sold to E. H. Harriman



in 1907. In 1912 the lodge was renamed the Harriman Lodge, and sold to W. P. Johnson of the Klamath Development Company.

Rocky Point - Located about one mile north of the Pelican Bay Lodge. The resort served the tourist trade.

Woodbine - M. H. Wampler's Woodbine Resort and Landing was situated one mile southeast of Odessa.

Wood River Landing - At a site near the Weed Bridge on Wood River. Upper Lake boats would take on freight, including baled hay, from the Wood River Valley.

LOWER LAKE LANDINGS

Chalk Bank Landing - First used as a landing during the late 1800s, Chalk Bank Landing was located five miles northeast of Laird's Landing. It served in the transfer of freight, and, on occasion, passengers.

Keno - Although the Keno Landing was first used during the Modoc War of 1872-73, regular passenger and freight service was not established until the 1880s. The landing, originally called Whittle's Ferry, operated in a mediocre fashion until Pokegama turned into a boom town; then business became brisk. The Keno facility operated at full capacity until 1907, then Teeter's Landing assumed the job.

Laird's Landing - After a channel cut was made by the Adam's Dredge in 1905, Laird's Landing became the transfer point for stages to the Lower Lake boats.

Merrill Landing - The Adams Tule Cut to White Lake in 1903 proved the initial access to the Merrill Landing. This landing was used to handle freight shipments and became obsolete when the railroad arrived in 1909.

Oklahoma Landing - This landing began operations about 1889 and was logistically situated three miles north of the later day Laird's Landing. The landing served to receive lumber and freight and transferred hay and other supplies upriver.

Snowgoose Landing - Used extensively by the Long Lake Lumber Company in their logging and lumber business.

Teeter's Landing - Established in the late 1880s by the Harvey L. Teeter family. The landing was used primarily in wood and log transfer operations until late 1906. In 1907 Mark L. Burns purchased the landing and for the balance of 1907 and 1908 the landing, renamed Blidel, served as a passenger and freight terminal.

White Lake City Landing - Located on the northern shore of White Lake in 1905, this landing was used sporadically in accordance with available water levels.

Unfortunately Link River was not navigable because of numerous rocky rapids, nor was it feasible for the transport of saw logs. The coming of the railroads, the improvements of roads, and the introduction of automobiles and trucks marked the end of most water transport in the Basin. The draining of Lower Klamath Lake stopped all water transport in that area. Transport of logs in rafts continued in Upper Klamath Lake and on Klamath River.

The most important rail line was the Southern Pacific Railroad from Weed, California, to Klamath Falls, later extended northward to Eugene. This route connected the Willamette Valley with northern California, via Klamath Falls. After completion in 1926, it became the main line of the Southern Pacific, displacing the older route via Rogue River Valley. The new route, known as the Natron Cut-

off, was easier to operate and maintain, although it crossed the Cascade Range twice at elevations above 5,000 feet, once at Pengra (Willamette) Pass and again at Grass Lake Summit in California. Construction began for the new route at Weed, California, and moved slowly northward. The line reached Klamath Falls in 1909 and, after long delays, blamed partly on World War I, connected with the old line at Eugene. The Southern Pacific built a line from Klamath Falls to Alturas, California, in 1929, with a branch line running northward to Lakeview.

The Oregon Trunk Line (later the Great Northern Railway and still later the Burlington Northern) was built from the Columbia River, up the canyon of the Deschutes River. The line reached Bend in 1916 and continued to Klamath Falls in 1927. Later (1931) this route was continued southward to Bieber, California, to join the Western Pacific.

In addition to the "regular" rail lines which carried passengers and general freight, as well as logs, numerous short logging railroads were in operation from time to time in most of the timbered areas. The following list is representative but far from complete. The Kesterson Road ran northeast of Dorris and west from Worden into the Cascades. Several short lines brought logs to Pelican Bay and other points on the west side of Upper Klamath Lake. One logging railroad led northwest of Keno. The Weyerhaeuser Company built a line east and then north to Sycan Marsh, probably the longest logging railroad in the area.

The various lines of transport were often complementary, sometimes competitive. For example, a traveler from Portland or Eugene could travel by rail via the Rogue River Valley, across Siskiyou Pass to Thrall, California, then take the logging railroad to Pokegama in southwest Klamath County, thence by stage to Klamath Falls, or he could travel from Keno to Klamath Falls by lake steamer. Heavy goods in transit could be hauled by freight wagons from Pokegama, or from Thrall, California, over Topsy Grade by wagon to Laird's Landing on the south end of Lower Klamath Lake, then by boat to Klamath Falls. With the completion of several rail lines and the coming of automobiles and trucks, water traffic all but disappeared, leaving only the roads and railroads until the coming of the airplane. Although a few airplanes landed in the Basin in this period, it was not until the Naval Air Base was built that air traffic became important.

## SUMMARY

This was the period when Klamath Basin and Klamath County came of age. Not many communities, in such a short period, were ushered into the age of the railroad, the automobile, truck, modern logging machinery, large-scale irrigation, hydroelectric energy, and the airplane. The great changes in Klamath Basin in this period are difficult to comprehend and more difficult to describe. A comparison of two maps, for 1900 and 1930, brings out a few major changes. In 1900 (see Chapter 3) there were no rail lines in the Basin; in 1930 there was a net of lines connecting the major towns in the Basin with California to the south and with the Willamette Valley and the Columbia River to the north. Many roads had been improved to provide all-weather traffic; some stretches of the main roads had been paved. Increasing use of the automobile changed the life style of many residents. Irrigation had been expanded by the construction of new canals and ditches. Hydroelectric energy, from Link River, provided energy for domestic use and to pump water for irrigation. The resource of geothermal energy was just beginning to be tapped. This



period, however, marked the decline of the stagecoach and wagon, replaced by the auto stage (later the bus), and by the truck. But the most important change of all was the great increase of population, in itself a great resource for production and commerce, providing a much larger local market for consumer goods.

# 5. DROUGHT, DEPRESSION, WAR, AND RECOVERY: 1930–1950

The period 1930 to 1950 brought many changes and new experiences to the Klamath Basin. Growth continued but at a slower pace than in the previous period. Population of Klamath County increased from 32,000 to 42,000, 31 percent in 10 years.[1] Several events and conditions affected the rate of growth. The Great Drought began in 1928 and lasted nine years; its full effect was not apparent until 1932. Although irrigated lands in the Basin suffered less than non-irrigated areas, water supplies were reduced by the succession of dry years. The Great Depression began in 1929 and lasted until the preparation for World War II stimulated the timber and agricultural industries. The depression curtailed but did not stop the expansion of irrigation and the growth of agriculture. The growth rate of population, so rapid previously, declined in this period. But immigration continued and the "baby boom" following World War II brought the natural increase, temporarily, back to normal or even above it. The increase in population was accompanied by growth in the economy; wood products, which had reached a low point in 1932, expanded during and after the War to new levels of production. Irrigated land was increased from 83,000 acres in 1930 to 192,000 acres in 1950. And sprinkle irrigation was replacing flood irrigation in many parts of the Basin. The use of geothermal energy began to be important.

Many of the changes in the Basin appeared on maps (fig. 5.1), such as the extension and improvement of roads, streets, and railroads. Others were noted in the newspapers, books, and government reports of the period. Some of the events are listed below:[2]

1930 By this time the effects of the drought were felt in many ways. Clear Lake water was entirely depleted and again in 1934.

1936 Lots were sold on the new townsite for Tulelake in California and a new town was born and was incorporated in 1937.

1937 The drought was interrupted by heavy rains and Malone Diversion Dam was washed out.

1939 Clear Lake Dam was raised, increasing the capacity of the reservoir. World War II began, stimulating productivity.

1941 U. S. entered World War II. Many workers left the Basin for the Armed Services or were attracted to large industrial centers by high wages. Construction of the Naval Air Base began. (After the War this became Kingsley Airport).

1942 The Japanese Relocation Center at Newell, California, was completed.

1945 World War II ended.

1948 Continued expansion of the irrigated area; the "M" Canal System in the southeast part of Tule Lake Basin was completed.

1949 Crater Lake froze over for the first time of record.

1950 Tule Lake Irrigation District formed.

## THE DROUGHT

Fluctuations in climate for this period were, in general, similar to those of previous periods, except for the long drought. Droughts had occurred before but this one was more severe and lasted longer. The driest years were from 1928 to 1932, after which precipitation increased slowly


Fig. 5.1 A. Part of the Klamath Falls Sheet shows progress up to 1950. The railroads are shown as they are at present: Southern Pacific Main Line (1), is paralleled by Highway 97; a branch line (2) runs to the southeast; The Great Northern (now the Burlington Northern) (3) also runs to the southeast; The Oregon and California Eastern (4) runs eastward then to the north. Elevations are shown by contours. The scale is four miles to one inch. (Map from the U.S. Geol. Survey).



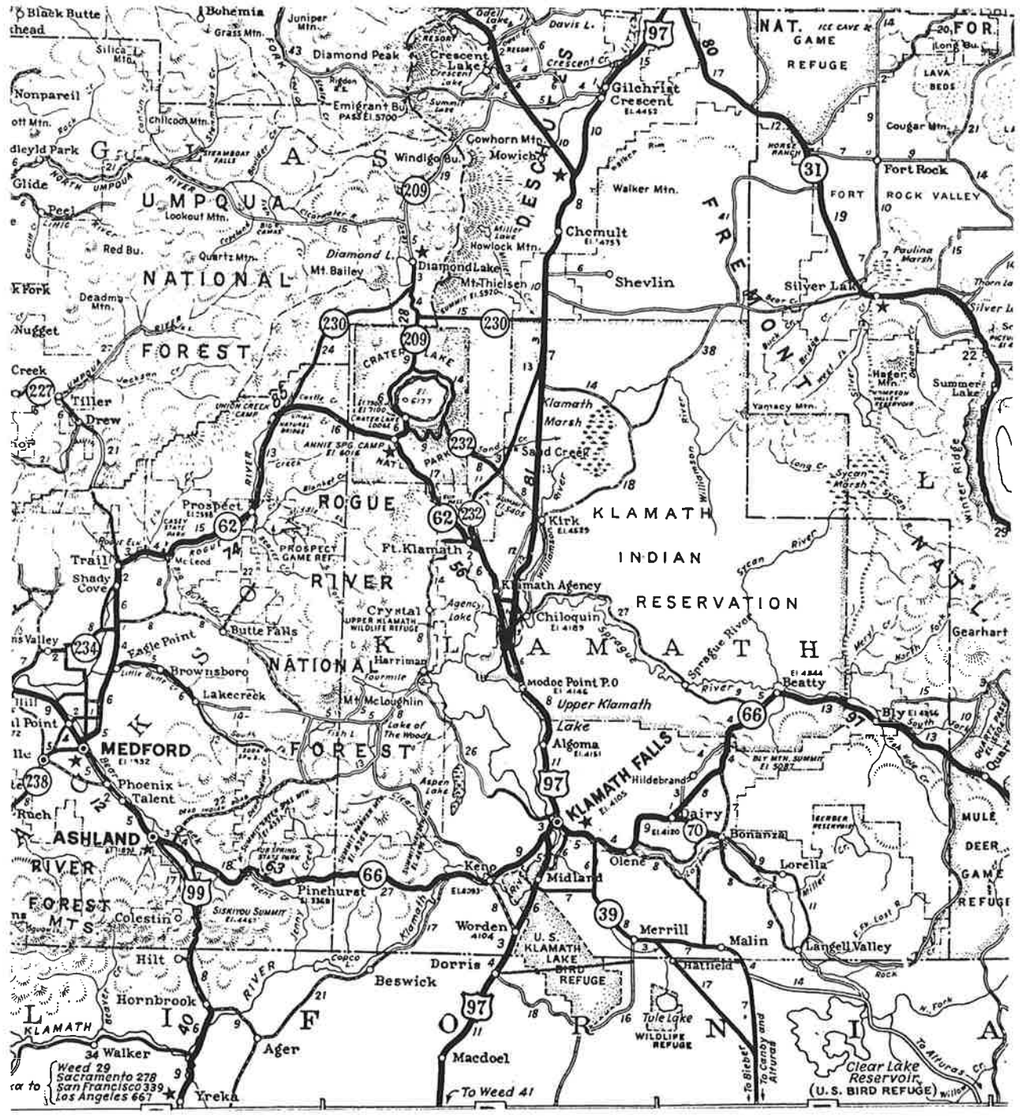



Fig. 5.1 B. This map from the Official Road Map of Oregon shows the network of main roads. Map B shows the Klamath Indian Reservation; Map A does not. Map A shows Altamont; Map B does not. The scale of Map B is 16 miles to one inch.

to the very wet year of 1937. The annual amounts, as compared with the annual average of 13.83 inches, are shown in the table below. [2]

| | P | D |
|---|---|---|
| 1928 | 11.65 | 2.18 |
| 1929 | 8.56 | 5.27 |
| 1930 | 9.44 | 4.39 |
| 1931 | 9.50 | 4.33 |
| 1932 | 9.84 | 3.99 |
| 1933 | 11.0 | 2.82 |
| 1934 | 10.47 | 3.36 |
| 1935 | 11.25 | 2.58 |
| 1936 | 12.04 | 1.79 |

The second column, "P", gives the annual precipitation in inches, the third column, "D", lists the deficiencies. The accumulated departure from normal for this period was 30.71 inches, equivalent to more than two years of rainfall. Snowfall in this period averaged 36 inches, representing about one-third of the precipitation. Most of the snow normally falls in December and January.

In 1937 when the drought was broken by 19.41 inches of rainfall, floods took the place of the drought. A flood in Lost River washed out the Malone Diversion Dam and the flow of Lost River exceeded the capacity of the diversion canal (fig. 5.2). This was repeated three times in 1940 and, as a result, the diversion canal was deepened and its capacity increased. The heavy rainfall of 1937 and following years marked the end of the drought.

Temperatures varied much less than rainfall. The average annual temperature for 1940 was 50.9° F; in 1948 it was only 46.2° F. Individual months varied more widely; in January, 1940, the average was 35.9° F; the same month in 1949, only 18.0° F. [3]

## THE DEPRESSION

The Great Depression began with a jolt on October 29, 1929, with the stock market crash. Shortly, the economy of the Basin was affected; commodity prices fell and the demand for lumber and agricultural products, crops and livestock, declined sharply, and unemployment increased. The effect was heightened by the drought. Several businesses failed, as did some banks. Although irrigation continued to grow, there was a general slowdown in new construction and expansion of irrigated acreage. The U.S. Bureau of Reclamation was handicapped by lack of funds and many farmers were unable to meet payments on land they had purchased. Some specific examples:

1932 All project construction by the U.S. Bureau of Reclamation stopped for lack of funds. A repayment moratorium was granted to financial failures.

1933 Additional moratoriums were requested and many projects were amended "due to economic conditions."

1936 The Shasta View Irrigation Project did not operate, "due to financial conditions."

1937 Construction of the Tulelake Division was discontinued, "lack of funds."

Nevertheless many changes were made, especially after the depression eased, and more funds became available.

## POPULATION GROWTH

The growth of population in the




Fig. 5.2. This vertical airphoto shows the reservoir and the diversion dam (1) on Lost River near Olene Gap. The diversion canal (2) runs westward to Klamath River. Lost River (3), greatly diminished, meanders southward through Klamath Valley. A large irrigation canal (4) runs southward along the edge of the hill land. (Production Marketing photo).

Basin in this period was uneven and at variance with that of the state as a whole. The chief difference was the relative rate of in-migration to the Basin, as compared to the state. From 1930 to 1940 the state increase was 14.2 percent, that of Klamath County 9.39 percent. From 1940 to 1950, thanks to the influence of war industries and the "baby boom," the state showed an increase of 39.6 percent, while the gain for Klamath County was only 4.1 percent. However, the difference between the state and the county can be explained mainly in the varying rate of migration in and out of the two divisions.

The pattern of growth was as follows:[4] The depression and drought, accompanied by declining birth rate, definitely slowed down the growth rate. Also, since the population was growing older, it was expected that the death rate would rise; this was a minor factor. In the middle 1930s a population expert predicted that Oregon's population would become static in 1940 at about 1,000,000 persons. He assumed that the low birth rate of the early 1930s would continue. Instead, war-generated industry resulted in increased in-migration and the birth rate increased.

Neither Oregon nor Klamath County has ever had large minorities of population. In this period, however, there was some increase in the number of Indians and Mexicans, but a decrease in the number of Chinese and Japanese. The U.S. Census counted 1,133 Indians in 1930, 1,249 in 1940, and 1,222 in 1950. Since the Indian birth rate was fairly high, it must be assumed that there was a net out-migration of Indians from the county. Also, during this period, many Indians probably "went over the line" and became, as far as the Census was concerned, Caucasian. Somewhat higher death rates of the Indian population was also a factor. Some Indians who left the reservation migrated to the cities at this time. Portland showed a sharp increase in Indian population, from 174 to 592. Over 500 Mexicans were counted in the 1930 census for Klamath County. The population of Blacks, Chinese, and Japanese was very small.

The age and sex characteristics of the county's population was slowly changing. From a young population with a majority of males, the pattern was changing to what would eventually be a slight majority of females and an older median age. Perhaps the most significant factor in this change was the increase in the number of persons over 65. But Klamath County population was still young, with a median age of 29.3, as compared to the state, with 31.6.

## KLAMATH FALLS

By 1930 the City of Klamath Falls had virtually stopped growing but only within the restricted city limits. 5 Suburbs continued to expand and flourish. In 1930 the population of the city was 16,093, in 1940 it was 16,497, and in 1950 only 15,875. Two major factors were involved - the limitations of the site, especially the terrain, and the reluctance of the suburbs to be annexed to the city. Although expansion was hindered by hills to the north of the early settlement and to the east by the slopes of Hogback Ridge, some houses were built in these areas. In the first instance, houses were built along the streets to the north of Main Street, namely Pine, Washington, and Jefferson streets, because of the nearness to the business district (fig. 5.3). Later some houses were built on the lower slopes of Hogback Ridge because of the availability of geothermal energy. To the south and southeast the land lay open, the plain of old Lake Modoc, affording miles of easy building sites,




Fig. 5.3. Two views in the Ewauna Heights Residential District. The upper view shows houses at Tenth and Lincoln streets; the lower view is along the Main Canal. (Author's photos).

and here the unincorporated urban area of Altamont encroached on agricultural land (fig. 5.4). Altamont is functionally but not legally a part of Klamath Falls.

The expansion of Klamath Falls and its suburbs was mainly along lines of transportation. The easy crossing of lower Link River, with good access on both sides, determined the location of the central core. The crossing at upper Link River, now Frémont Bridge, was actually easier. Captain Frémont crossed here as did Williamson of the Railroad Survey and others who had traveled along the west side of Upper Klamath Lake. But the country to the west of the upper crossing offered little attraction to settlers. So the city grew along the main lines of travel, to the north along the road that became old Route 97, to the southeast along the road to California, now Route 39. A somewhat scattered growth occurred on the west side of Klamath River, along the road to Green Springs Pass and the Rogue River Valley, now State Highway 66.

As the city grew, as cities will, it developed different parts with different functions. From a simple trading post, in little more than a half century, was derived an urban complex. The main commercial core was along and near Main Street and along the main traveled routes. Most of the early residences were near the original nucleus and now have the highest density, but as the automobile came into general use outlying residential areas developed and subretail commercial centers appeared to serve them. Manufacturing, mostly woodworking, was concentrated along the shores of Lake Ewauna (fig. 5.5) and the railroad, while lighter industries, and service industries, developed between the railroad and the commercial core. In various parts of the city land is set aside for parks and schools and a very large park, Moore Park, is located on the west side of the city.[5]

Since the city of Klamath Falls was restricted in its growth, the principal growth in population in this period was in the unincorporated suburb of Altamont.[6] The nucleus of the suburb was Altamont Ranch. By 1940 Altamont was made up of four precincts, with a population of 6,558. By 1950 Altamont had been reclassified by the Bureau of the Census as an unincorporated urban community with a population of 9,415. Over the years Altamont had successfully resisted attempts at annexation by Klamath Falls. Like many suburban communities of this period, Altamont grew haphazardly, with a great variety of house types, most of them single family detached dwellings on lots up to one acre in size. Irrigated gardens and small pastures were common. Few streets had sidewalks or gutters. The community was dependent on the automobile for transportation. Many of the working people commuted to the mills, offices, and other establishments in Klamath Falls.

By 1930 educational services in Klamath County had come a long way from the one-room schoolhouse, 12 by 18 feet, built in 1876. The first large school was built in 1911 and replaced in 1919. As the city grew in population and area, schools were constructed in various parts of the city and in Altamont. By 1950 the area was served by nine public schools with a classroom capacity of more than 3,000. Some Altamont students attended high school in Klamath Falls. As educational facilities improved, the average time of school attendance increased to 11.8 years and almost half of the population had finished high school. There were four private schools in the Basin, all of them with religious affiliation, providing elementary and high school courses; also five kindergartens.



Fig. 5.4. This photo shows Altamont's growth southward toward the airport and encroachment on agricultural land. (Author's photo).

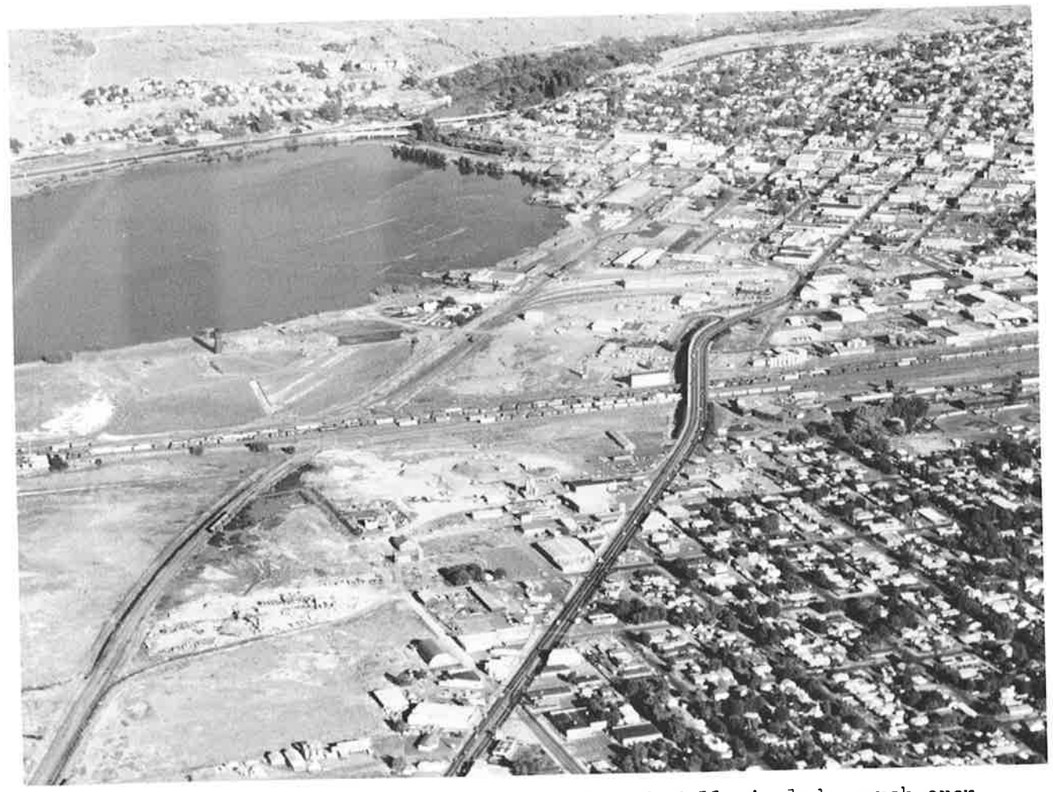


Fig. 5.5. The Industrial District of Klamath Falls includes much open space along Lake Ewauna. The Commercial Core and Ewauna Heights Residence District are at upper left; a part of the Mill Addition at lower right. (Author's photo).



The Oregon Technical Institute began during World War II, and by 1947 it was giving courses in auto mechanics and repair, also cooking. It did not offer degrees until 1951. A discussion of the Institute in the development of geothermal energy is included in the following chapter.

## WATER SUPPLY AND IRRIGATION

In spite of the drought and depression, land under irrigation continued to increase and some improvements were made in the system. In this period irrigated land increased from 83,000 acres in 1930 to 197,000 acres in 1950. Improvements included an enlargement and deepening of the Lost River Diversion Canal [7] in 1930; increasing its capacity nearly five times. This was necessary to prevent flooding of the reclaimed portion of Tule Lake. Also in 1930, construction began on the Clear Lake Reservoir channel and a culvert was built under the Adams ditch. But on the whole several projects intended for the early 1930s were delayed. By 1938 conditions had improved and homestead entries were made for 69 farm units in the Tulelake Division, but construction of the greater Tulelake project was further delayed. In 1939 the Clear Lake Dam was completed, increasing the storage capacity of the reservoir. And in 1941 the Tulelake tunnel was completed under Sheepy Ridge (also known as High Rim), making it easier to pump water from the Tule Lake Basin up to Lower Klamath Lake and thus into Klamath River. By diverting some of the Lost River drainage to Klamath River and by pumping through the tunnel, a large area, formerly lake, was opened up for farms.

In 1937 the town of Tulelake (fig. 5.6), formerly a small settlement in Oregon, was incorporated in a new location in California on land reclaimed from the lake. In 1942 agreement was reached with the U.S. Fish and Wildlife Service to reserve parts of Tule Lake and Lower Klamath Lake for wildfowl. And in the same year the Japanese Relocation Center was established at Newell, California, on a terrace remnant of old Lake Modoc. The year 1945, like 1941, was very wet and it was necessary to shut water out of canals "A" and "J" until June 7, for the first time in project history. Some years were wet and some were cold. In the severe winter of 1949 Crater Lake was frozen for the first time in its history. [8]

### The Irrigation Districts

In this period many of the irrigation districts were expanded and changed in some way. To the north of Upper Klamath Lake, most of the irrigation is in the marshes, just a few feet above lake level, where pumping is feasible. (Some of the marshlands were harvested for wild hay and much of it had been set aside as a Wildlife Reserve). In the north, the marshland was irrigated from Annie Creek, Crooked Creek, and Wood River, also by pumping from Williamson River and from Upper Klamath Lake. On the southwest side of Upper Klamath Lake, Wocus and Caledonia marshes were drained and put under irrigation. Dikes were constructed to protect the marshlands from flooding. South of Klamath Falls the main body of irrigated land extended from the urban area down Lost River Valley. It included most of the old bed of Tule Lake and additional land to the north of Tule Basin, known as the Shasta View District. The northern part of Lower Klamath Lake was reclaimed and irrigated from Lost River.

To the east, Langell, Poe, and Yonna valleys were supplied with

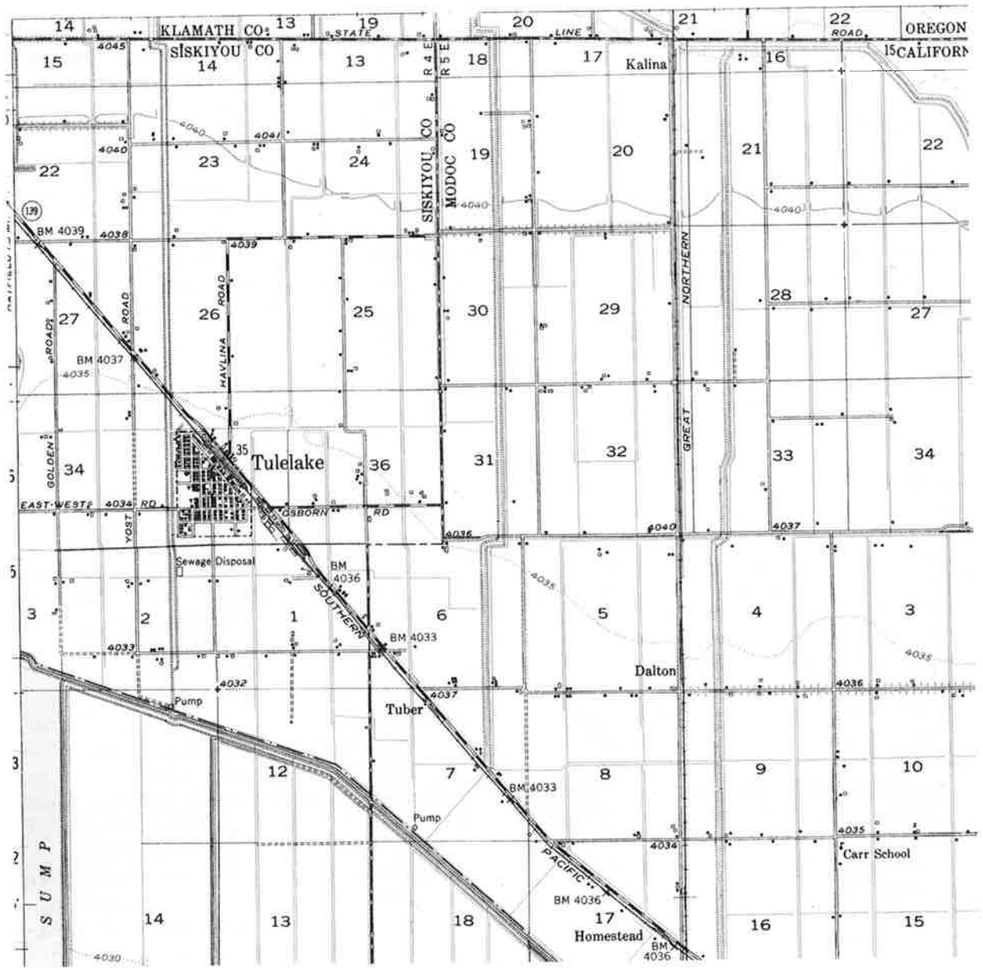



Fig. 5.6. Part of the Tule Lake Quadrangle showing the town of Tulelake, California, and the pattern of roads and irrigation ditches about 1950. Only two contour lines appear on this map, the 4,035 foot and the 4,040 foot.



water from Clear Lake and from Gerber Reservoir; Poe Valley (fig. 5.1 B) received additional water from Upper Klamath Lake by a ditch which passed through Olene Gap, parallel to Lost River but flowing in the opposite direction. In parts of the Basin, especially in the areas above ditch, wells provided water for irrigation. Sprinklers were used for these areas and for rough land not suitable for flood irrigation. Sprinkler systems of various kinds were gradually taking the place of flood irrigation, even on level and gently sloping land. As pointed out in a previous chapter, the Basin is ideally suited for flood irrigation. It is just as favorable for sprinkler irrigation which has the advantage of applying the water more evenly to the land; furthermore, the drainage problem is reduced and less manpower needed.

## AGRICULTURE

In the period from 1930 to 1950, agriculture in the Basin made steady progress. It is a measure of the stability of the Basin that, even in the drought and depression years, there was no great fluctuation in the number of farms. The number of farms increased only slightly, from 1,197 to 1,295. [9] Since many additional homesteads were added in this period, it must be assumed that some small farms were combined. The average farm size increased nearly 500 acres. Land in farms increased from 569,000 acres in 1930 to 1,341,000 acres in 1950 for Klamath County. A part of this was non-irrigated but included irrigated areas, such as Sprague Valley, outside the Basin. Harvested land increased from 94,200 acres to 288,000 acres.

There were some substantial changes in crop acreages in this period. (Figures are for Klamath County.) Wheat expanded from 2,400 acres to 21,700 acres; barley from 3,200 to 52,600 acres. Rye acreage declined slightly. Potato acreage grew from 4,300 to 11,700 acres. Census data for hay is a little confusing. In 1930 all types of hay were grouped with 65,500 acres harvested. In 1950, the varieties of hay were listed separately; alfalfa, 15,600 acres harvested, clover, 3,100 acres; wild hay, 2,100 acres.

Changes in livestock were mixed. Beef cattle increased from 40,000 to 59,000; milk cows declined from 4,100 to 3,100. Although draft horses were used less and less as tractors and trucks increased, the number of horses declined only slightly. Sheep decreased from 171,500 in 1930 to 58,800 in 1950. This was part of the general shift of sheep from the ranges of eastern Oregon to humid farm areas, especially in the Willamette Valley. Mechanization of agriculture continued in this period. In 1930 there were 1,161 automobiles on Klamath County farms, almost one to each farm. There were also 360 trucks and 222 tractors. By 1950 almost every farm had a truck, a tractor, and many had more than one automobile.

## WELLS FOR IRRIGATION AND ENERGY

In addition to the surface water in lakes, streams, and flowing springs, the porous sediments of the Basin have a large storage capacity of groundwater; and more and more this resource is being utilized for irrigation and domestic supply. Groundwater in most areas is near the surface, so that shallow wells, in some places only a few feet deep, provide varying amounts of groundwater. To be sure, some of this water is high in mineral content and not suitable for domestic use. Deeper wells supply large quantities of good water for Klamath Falls and suburban areas.

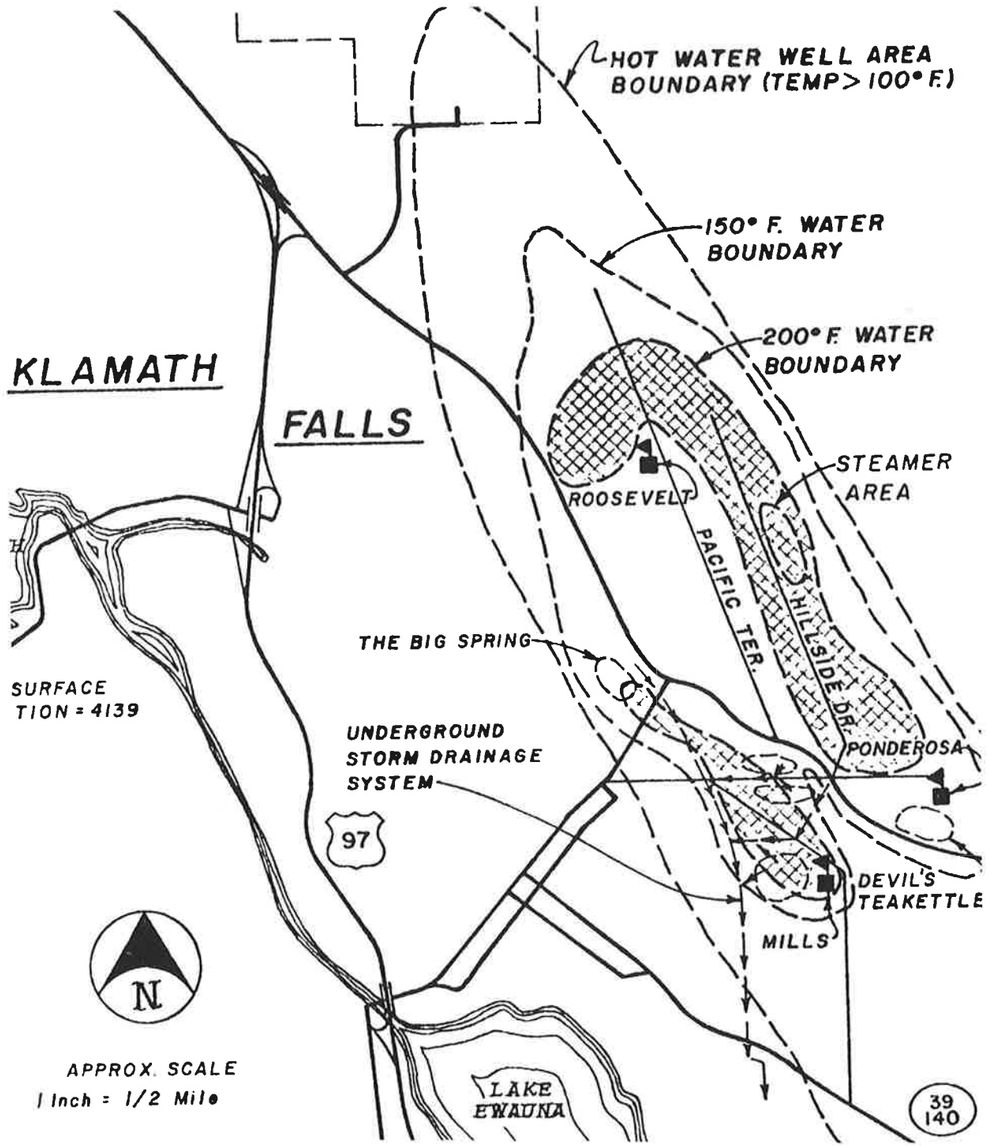



Fig. 5.7. A map of the geothermal zone of Klamath Falls, showing the temperature belts. (From the Final Report of The Geo Heat Center, Oregon Institute of Technology, 1978).



A part of the Basin and some of the surrounding hills have a unique resource in geothermal water (fig. 5.7). The setting is described by Norman V. Peterson and Edward A. Groh.[10]

The Klamath Falls geothermal area is near the center of the graben in slightly tilted fault blocks that are elevated a few hundred feet above the valley floor. These tilted blocks are made up of impure diatomite, thin beds of tuffaceous sandstone, clayey tuff, and minor intercalated basalt flows. The tilted blocks have, in turn, been complexly faulted into elongate ridges that generally trend northwest. Because they are so easily eroded, they are now seen as low, rolling hills.

Well logs indicate that the diatomaceous tuffs and layered sediments are at least several hundred feet thick and in most places are impervious to the flow of water and act as a cap at the surface. Broken lava flows and zones of scoria and cinders are encountered at various depths and in most cases in the thermal area these horizons yield large quantities of live hot water. At least one strong northwest-trending fault is present on the east side of the geothermal area, and the brecciated rocks associated with this fault could provide the conduit for the rise of hot water from a deeper reservoir. Although the heat source is not known and no surface rocks of Recent age are present, the Pliocene-Pleistocene dikes and sill-like masses that are intercalated in the lacustrine deposits may indicate the presence of a larger intrusive rock mass cooling at not too great a depth.

As noted in the previous chapter, numerous hot springs were known and utilized to some extent in early times. A few wells designed to heat residences were drilled in the 1920s but no records were kept. Large-scale use depends on fairly elaborate installations, including heat exchangers, since the geothermal water is too corrosive to be used directly in ordinary radiators. The first well of record was drilled in 1936 and in the following years many wells were drilled to supply heat to residences and commercial buildings. Drilling is usually by the cable tool method; the wells are generally 10 to 12 inches in diameter and are cased in the upper part to avoid cave-ins and also to prevent the entrance of cold water near the surface. Some of the early wells were only about 100 feet deep but later wells were generally drilled until the temperature of the water exceeded 200 degrees Fahrenheit. Then a heat exchanger was installed by piping city water into the well to be heated by contact with the geothermal water (fig. 5.8).

An example of a geothermal installation is located at Klamath Union High School. Geothermal heating was installed in 1946. Waste water is pumped from the well to the field house and used to heat it. Some of the geothermal wells produce steam which is also used to heat city water by means of a heat exchanger. The use of geothermal energy was given a boost by the establishment of Oregon Technical Institute in a geothermal area north of Klamath Falls. All the buildings of the Institute are heated by geothermal energy and the Institute has a program of research in the use of this unique resource (fig. 5.9). Geothermal water in the Klamath Falls area,

## TYPICAL HOT WATER DISTRIBUTION SYSTEM

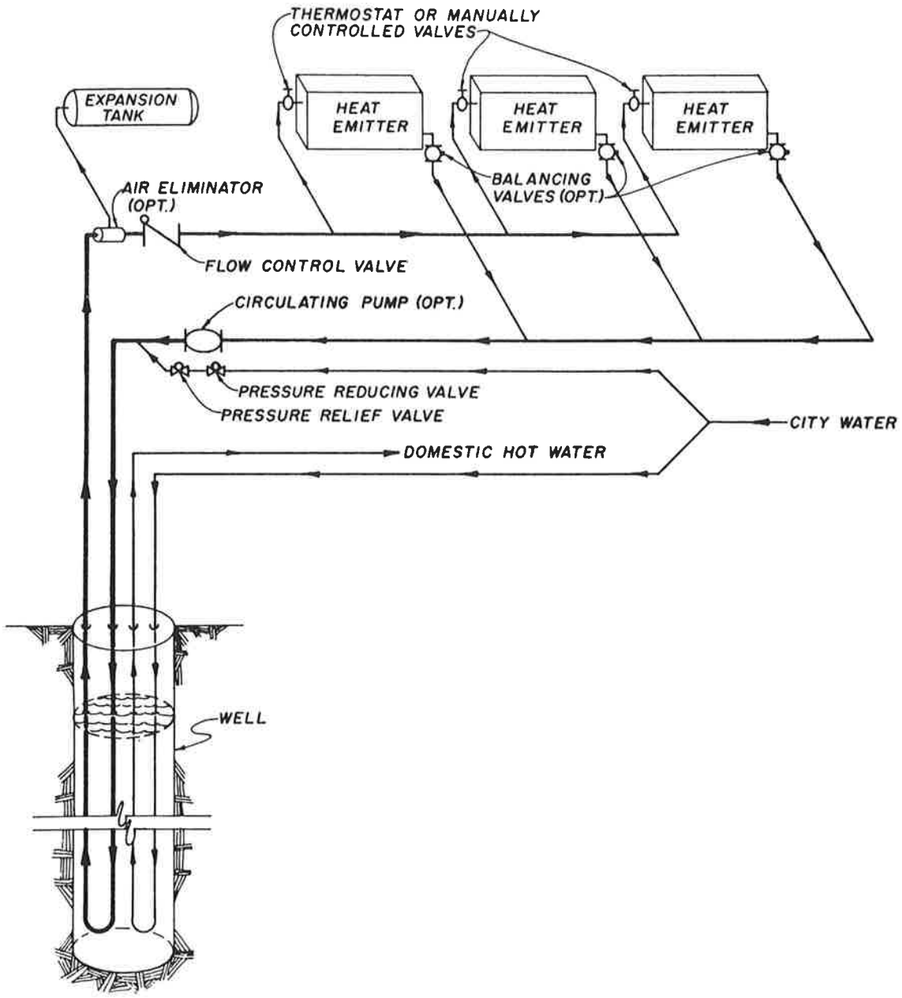



Fig. 5.8. Diagram of the water distribution system from a geothermal well. City water is piped in two separate systems, into and out of, the well. One system is used for domestic (household) purposes, the other is used for heating. (From the Oregon Institute of Technology). (See note 10).



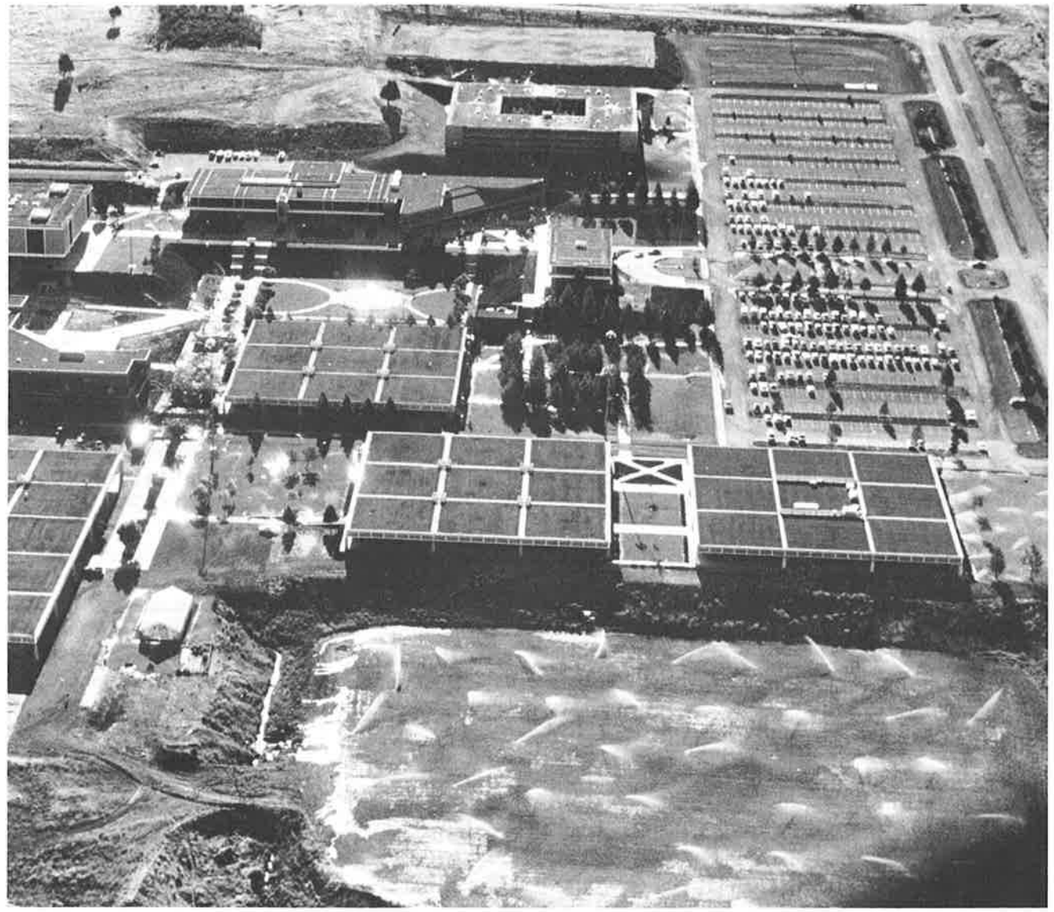


Fig. 5.9. The Oregon Institute of Technology in North Klamath Falls is heated entirely from geothermal wells. The Institute has a continuing program of geothermal research. (Author's photo).

far developed,is not hot enough for the generation of electric power.

LOGGING AND WOOD PROCESSING

Logging and wood processing, especially the manufacture of moulding, plywood, and box shooks, reached a peak in 1929 when 445 million board feet were harvested. With the depression, production declined sharply, reaching bottom in 1932 with only 191 million board feet harvested. Then production gradually increased to a new peak of 856 million board feet in 1942, followed by a slow decline as the best stands of timber were cut-over. Meanwhile the character of the industry was changing with improved roads, larger trucks, and other types of machinery. Better transportation extended the logshed of an individual mill so that larger mills were more efficient. The number of mills declined and some of the remaining ones moved to more central locations in and near Klamath Falls.

W. E. Lamm, mill owner, described some of the changes during this period in a booklet, "Lumbering in Klamath." (no date).[11]

After purchasing a great deal of timber in Klamath and adjacent counties over a long period of years, the Weyerhaeuser Timber Company in 1929 built a large modern plant on Klamath River, four miles south of Klamath Falls (fig. 6.3). The sawing equipment consists of four double cutting band head-rigs and a gang saw; the mill cuts as much lumber as all of the next four largest mills in the county. In connection with the mill are sheds, a large battery of kilns, a planing mill, and a box factory. Ralph R. Macartney is manager with Hugh B. Campbell as assistant manager. The company built a railroad west into Jackson County, and for a number of years obtained all their logs from their own timber holdings in western Klamath County and eastern Jackson County. Later they built a railroad north from the O. C. & E. Railroad near Beatty to tap their timber in eastern Klamath County and western Lake County. For the past number of years the company has been logging in both districts. The timber holdings are sufficient to operate the plant for thirty years and are being cut on a selective basis, leaving approximately 20 per cent of the timber standing.

Harry J. Drew in his book, "Weyerhaeuser Company: A History of People, Land and Growth" (1979)[12], gives an excellent detailed description of all phases of the operation, construction of the mill, building of logging railroads westward to Jackson County and eastward to Sycan Marsh, development of new products such as hardboard, the beginning of tree farming, and many others.

Mr. Lamm's description continues:

Early in 1930 Kesterson Lumber Company formerly of Dorris, California, completed construction of a modern saw mill plant on the Klamath River, two miles south of Klamath Falls. The mill consists of a single band head-rig and a resaw; in conjunction are a battery of kilns, a planing mill, and a box factory. In 1933 the company was re-organized and since that time has been known as the Kesterson Lumber Corporation. Logs for the first year's production were supplied from the Long-Bell Lumber Company's holdings in northern Klamath County and were transported over the Lamm Lumber Company's railroad and the Southern Pacific Railroad to the mill. Since 1930, logs have been supplied from Walker & Hovey's timber holdings at Scarface, California, and from the Klamath Indian Reservation units - the Modoc Point, the Five Miles, the Antelope Valley, and the Whiskey Creek units. Logging has been done principally with the company's own logging equipment by its subsidiary - the Klamath Timber Company. In 1943 all logging equipment was sold to G. C. Lorenz, from whom logs are now being purchased.



Harold Crane and Walter Beane organized the Crane Mills in 1931 and built a semi-portable small band mill at Bly, with Mr. Crane as manager. Some years later a planing mill was installed. Logs were obtained from a number of small purchases of timber within trucking distance. In 1934 this company built a circular mill about ten miles northwest of Bly, which was managed by Mr. Beane until 1936, when this mill was sold to the Ivory Pine Company, Ed Ivory being manager. In 1937 Ivory Pine Company installed a band mill; in 1938 it built a planing mill, and in 1940 the plant was electrified. Logs for this mill have been obtained from small purchases of private and Reservation timber in the vicinity.

"In 1934 W. E. Lamm organized the Deschutes Lumber Company, which with R. G. Watt as manager, built a small band mill on the Little Deschutes River about one mile east of Mowich, where a planing mill was built two years later. This operation continued until the fall of 1943, logs being obtained from private and National Forest timber. The mill was dismantled in 1944.

After holding large tracts of timber lands in northern Klamath and southern Deschutes counties for many years, the Gilchrist Timber Company completed construction in 1939 of a fine modern mill plant on the Little Deschutes River, two miles north of Crescent. The plant consists of a sawmill with a single band head-rig and resaw, modern power plant, dry kilns, and planing mill, all complete in every respect. For the care of the employees the company built a complete and modern town which they named Gilchrist. Their own timber holdings assure very long life for this plant.

The smallest and most portable sawmill ever in the county was one brought in from the Bend district in 1941 by Nick J. Meyer consisting of a small circular saw and a small push feed carriage mounted on an old automobile truck. By jacking up one wheel of the truck, the saw was run by the truck engine. It was designed and built by Mr. Meyer to saw lodgepole timber into railroad ties. The mill was placed in lodgepole timber, and logs about eleven to sixteen inches in diameter, eight feet long, were snaked in by

horses, not over 200 yards. A log was rolled up on the carriage by hand, and one inch side lumber was taken from the four sides to leave an 8 x 8 tie, which was placed on a pile beside the truck. Since it required only twenty minutes to move the rig, a few hundred yards and start sawing at the new location, the sawmill was moved from once to three times in a day to shorten both the log haul and the hand transportation of the ties. This little mill averaged better than 300 ties per day (12,800 feet besides the side lumber) and saved more than 50,000 ties in a season.

In 1943 the E. D. Hamacher Lumber Company moved its small circular mill from Lake of the Woods to their present location on Klamath Lake about a mile north of Shippington.

Affiliated Industries

While a number of concerns have at various times been established in Klamath for remanufacturing forest products for the outside market, only those now operating are mentioned here.

In 1923 Claude Caldwell, Albert Schultz, and Albin Lundell started the Klamath Moulding Company on South Sixth Street, with Claude Caldwell as manager. Later Caldwell left the company, and Schultz took over the management. The company has been the largest remanufacturing concern in the county since organization, obtaining practically all of their lumber from the mills in Klamath and Lake counties. The original plant was sold to Metler Brothers in 1937, and a larger more modern moulding plant was built which has used about ten million feet of lumber annually. This second plant was sold to the Klamath Lake Moulding Company in 1944.

Other than wood processing, manufacturing has played a minor role in Klamath County. The census of 1947 listed 55 manufacturing establishments, of which 22 were wood processing, 16 were food processing, and four were printing plants. Others include the modification and repair of machinery. In terms of persons employed, 27 percent were in wood processing, 23 percent in agriculture, 46 percent in services, and the remainder in various miscellaneous occupations.

TRANSPORT

By 1950 most of Klamath County was on wheels. Since 1930 the number of automobiles had doubled, to 18,389 (with an even greater increase in horsepower); busses increased threefold, and tractors and trailers, fourfold, although improvements in roads did not quite keep up with the traffic. Nevertheless many roads were paved, others graveled, so as to provide all-weather transportation to most parts of the county. Logging roads were extended to many parts of the forests, replacing the logging railroads. On the floor of the Basin roads were constructed along section and half-section lines to reach almost all farmsteads. Few points on the Basin floor were more than one-half mile from a road.

By 1950 U.S. Highway 97 had been rerouted directly to Weed, California, to connect with U.S. Highway 99, instead of tying in near Ashland.[13] The nickname for U.S. Highway 97,



"California to Banff Bee-Line International Highway" had been dropped and almost forgotten, but the route carried a large part of the traffic from the Willamette Valley to California by its connecting road over the Cascades, State Highway 58. The main east-west route, State Highway 66 from Ashland through Klamath Falls to Beatty and Lakeview, was paved. State Route 39 (California 139) was paved in the Oregon portion, leading southeastward to a connection with U.S. Highway 395. State Route 62 branches from U.S. Highway 97 near Chiloquin, approaches Crater Lake, then turns southward to Medford. The rim road around Crater Lake was paved, testifying to the increase of tourist traffic, some of which approached the lake via Klamath Falls. State Route 209 was paved north of Crater Lake to Diamond Lake. Many county roads were graded and graveled but few were paved.

Railroad mileage declined in this period as logging roads were discontinued, but the rail lines carried a large proportion of the heavy goods - logs, lumber, and heavy agricultural products.

In 1928 the City of Klamath Falls floated a bond issue to build an airport (fig. 5.4). At first the single runway was graded and graveled but not paved. For some years there was no regular airline service. During World War II the airport was operated as an Air Force training station, but after the war it reverted to civilian control and became Kingsley Airport. Public surface transportation was lacking in the city for this period.[14] A trolley line served the city from 1906 to 1911 but could not stand the competition of private automobiles.

SUMMARY

This period began very inauspiciously with a long, severe drought and a crippling economic depression. The decline in demand and prices for agricultural products made it difficult for many farmers to meet payments on their land. The shortage of funds slowed down the expansion of irrigation installations. The drought ended and the preparations for World War II, and the war itself, stimulated production of agricultural and forest products and produced a temporary prosperity. Meanwhile population continued to increase, although more slowly than in the previous period. After the war the birth rate increased temporarily, known as the "baby boom," but the population growth was uneven as migration into the Basin fluctuated.

Klamath Falls reached a growth plateau and actually showed a slight loss for the period, but the nearby unincorporated suburbs, especially Altamont, showed rapid increases. This period marked the first substantial development of geothermal energy and also the beginnings of large-scale sprinkle irrigation. A measure of the continued growth of the Basin is the increase in population of Klamath County from 32,407 in 1930 to 42,150 in 1950; a growth rate of 30 percent.

# 6. THE MODERN PERIOD: 1950–1984

At mid-century the Klamath Basin (fig. 6.1) was experiencing a slow but steady growth, measured by the increase in population and production. Irrigation was being extended and crop production increased by greater use of fertilizers and insecticides. Lumber mills were becoming more diversified, with greater production of plywood and hardboard, and the greater use of bark and chips. Tree planting, for the first time, included Southern Pine,a fast growing species. Important technical advances included center-pivot irrigation and increased use of geothermal energy. Some of the important events of the period are listed below:

CHRONOLOGY, 1950-1984

1951 Oregon Legislature passed law prohibiting diversion of water from State without special legislation.

The California-Oregon Power Company water right at Keno extended for 50 years by State Engineer.

Newell (California) town sites sold.

1952 Report on "The History of Tule Lake Division, including the Modoc Unit," prepared.

Tule Lake Irrigation District formed.

Construction of "N" Canal system on South side of Tule Lake Basin.

1954 Klamath Indian Reservation terminated. Most of the Reservation transferred to Winema National Forest.

1955 Lost River flood exceeds capacity of Diversion Channel.

Inflow to Project reservoirs set an all-time record, for 1955-1956 year.

1958 Water spilled over the spillway at Gerber Dam for first time.

1959 Bureau of Prisons land at Newell (formerly Japanese Relocation Center) sold.

Gerber Reservoir down to 2,700 acre feet of storage, the lowest since 1932.

1960 Median family income reached $5,022, higher than the average for the State of Oregon.

Ordinance passed controlling the drilling of hot water wells.

1964 (December) Heavy precipitation and run-off caused flooding and damage to Project properties.

Alfalfa acreage increased to 27% of the cropland.

Average farm value increased to $108,000.

Cattle increased to 55,000; sheep declined to 40,000.

1968 Klamath River lowered for hydrologic survey.

1973 State-wide Land Use Planning adopted.

Southern Pacific train, Shasta Daylight, discontinued.

1974 Detailed study made of 75 geothermal wells.

1978 Final report Geo-Heat Center, at Oregon Institute of Technology.

1979 Passenger automobile registration in Klamath County passes 50,000.

1984 Geothermal heat introduced to ten public buildings, federal, county, and city.

The increase in population, the best measure of growth, is shown below.

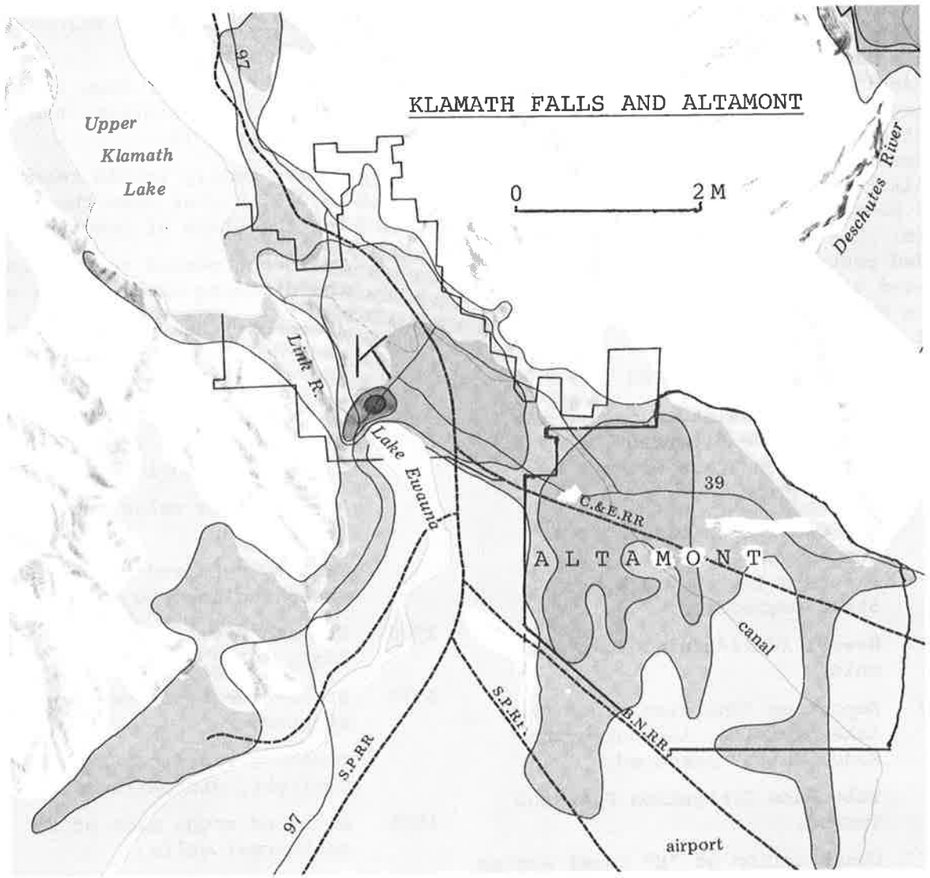



Fig. 6.1. This map shows the growth of Klamath Falls and Altamont from the original nucleus at Klamath Falls (K). Since 1930 most of the growth has been in Altamont. (Modified from a map in Oregon Atlas, to which the boundary of Altamont, taken from the U.S. Census map, has been added.)



(Population of the State, in 000s, is listed for comparison. Figures in parentheses represent the percentage increase over the preceding decade):[1]

| | 1950 | 1960 | 1970 | 1980 | 1950-1980 |
|---|---|---|---|---|---|
| State | 1,521 (39.6%) | 1,768 (16.3%) | 2,091 (18.2%) | 2,630 (25.7%) | 79.3% |
| Klamath County | 43,150 (4.1%) | 47,474 (12.6%) | 50,021 (5.4%) | 58,200 (1919%) | 34.8% |

Population growth from 1950 to 1980 was uneven, both in time and space; most of the growth occurred outside the city of Klamath Falls, in the unincorporated urban center of Altamont. The smaller incorporated towns - Bonanza, Malin and Merrill - were almost static. Natural increase (nine percent) and net in-migration (10.7 percent) shared almost equally in the growth. These factors varied, however, from year to year. Age composition continued to change; by 1980 ten percent of the population was over 65, as compared with 5.3 percent in 1960; 8.4 percent for 1970. The American Indian population was increasing also, with a total of 1,924 in 1980, of which 663 lived in Chiloquin and 1,135 in Klamath Falls. The growth and expansion of Altamont is described in the following chapter.

## CLIMATIC VARIATIONS

The variations in precipitation, year by year, followed a random pattern similar to those of previous periods, except that there was no extended period of drought.[2] On the whole, the rainfall was slightly greater than for the 1930-1950 period. There were dry years, such as 1959 with only 7.31 inches and 1976 with only 7.93 inches; also wet years, such as 1957 with 20.87 inches and 1964 with 19.78 inches. The average for the period was 14.06 inches. The period began with a series of wet years from 1950 to 1957, although the average between 1950 and 1984 was 14 inches. The heavy rainfall of December, 1955, with 6.42 inches and the following January, 1956, with 4.36 inches was unusual. This combination caused flooding in the Basin with damage to irrgation facilities, roads, and bridges. Lost River overflowed to Tule Lake sump, amounting to 8,440 acre feet, and the in-flow to project reservoirs set an all-time record. November and December of 1957, January and February of 1958 were very wet and water spilled over the dam at Gerber Reservoir for the first time.

There were also dry years; in 1959 with only 7.31 inches, Gerber Reservoir was at its lowest stage since the great drought of 1932. But 1960 was wet and a record of 66,750 acre feet was delivered by "A" Canal. October, 1962, set a record with 4.55 inches, most of it falling in a single day, on the 12th. Lost River Diversion Canal was at capacity for several days, but did not overflow. In December, 1964, a new record of 8.93 inches was set, with widespread flooding and damage to properties, roads, and bridges.

The effect of dry years is minimized by wet years immediately preceding, by the capacity of reservoirs; and by the fact that most of the rain falls in the winter months when evaporation is low. But even one dry year may be disastrous for dry farmers who depend entirely on seasonal rain. The variations in temperature in the Basin are minor as compared to the variable rainfall. The highest annual average temperature for this period was 49.2° F. in 1951, the lowest was 46.7° F. in 1962. The coldest January averaged 24.4° F. in 1950,

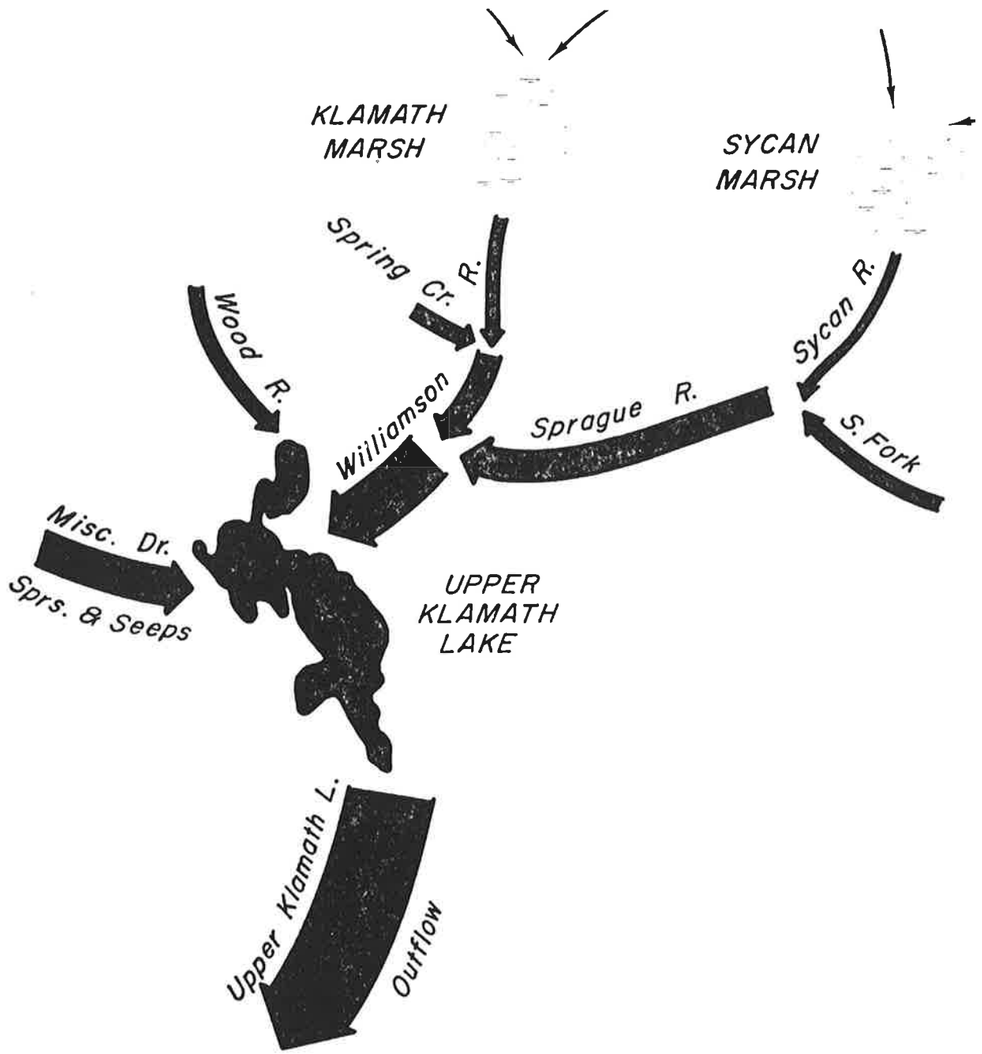



Fig. 6.2. This diagram shows the water supply system of Upper Klamath Lake. The width of the bands is proportional to the flow. (From the Oregon Department of Water Resources).



the warmest averaged 34.7° F. in 1959. The coolest July averaged 62.1° F. in 1965, the warmest was 71.6° F. in 1960.

On the whole, based on records of eighty years, the climate of the Basin can be described as subhumid rather than semiarid (a desert it is not!), with cool summers and a risk of frost and mild winters with about one third of the precipitation on the average in the form of snow. The Basin has a deficiency of moisture from March to October; in this period evaporation is greater than precipitation. For the rest of the year it has a small excess of precipitation over evaporation.

The distribution of precipitation in Klamath County is uneven, ranging from less than 15 inches annually in the southern part of the county to more than 60 inches in the vicinity of Crater Lake, which has 68 inches. This belt of heavier precipitation, about 15 miles wide, lies along the east slope of the Cascades with precipitation from 30 to 60 inches. This is a snowy belt and the slow melting of the snow, in spring and early summer, evens out the flow of streams during the dry summer. In other parts of the county precipitation is heaviest on the basin ranges. Although the watershed of Clear Lake and Lost River is less rainy than the northwest area, it is large and the water supply for irrigation is second only to Upper Klamath Lake.

## WATER SUPPLY

The problem of water supply in the county is to bring water from the more humid areas of high precipitation to the floor of Klamath Basin where most of the people live and where most of the land is irrigated.[3] The movement of water is complicated. Some of it soaks into the ground and moves slowly in irregular patterns. The run-off, however, is easier to trace. Gauging stations on the streams and lakes at various points indicate the amount of flow, expressed in acre feet. In Williamson River, the largest tributary of Klamath Lake, the annual flow below Sprague River averages 750,000 acre feet (fig. 6.2). Wood River at Fort Klamath averages 172,000 acre feet. The total inflow to Upper Klamath Lake (Including Agency Lake) is 1,420,000 acre feet. Water taken from Upper Klamath Lake for irrigation, and evaporation reduces the outflow at the head of Link River to 1,250,000 acre feet. This is before the canals take water from Link River for irrigation and power purposes. Most of the water used for power and some used for irrigation finds its way back into the system, so that at Keno the flow of Klamath River averages 1,205 acre feet annually. The maximum flow at Keno is 2,600,000 acre feet and the minimum is 395,000 acre feet.

In this period, 1950-1984, a number of additional wells were drilled for various purposes, but especially to furnish water for center-pivot irrigation in areas not under ditch. In many parts of the county groundwater from wells and, in some cases from springs, supplies water for irrigation and domestic use.

## LAND OWNERSHIP AND USE

Out of the basic resources of soil, forests, grassland, and water on Klamath County's nearly four million acres, the people have built a unique landscape with a variety of land uses. Two thirds of the county is in forest and grassland, an indication of the importance of forest products in the economy. Three tenths of one percent is in crops, pasture, and range land. In addition to forests, open spaces, cut-over and burned-over land, marshes, sagebrush, and open water cover large areas of the county. The non-productive (but necessary) items, houses, factories, public buildings, and transportation lines, occupy less than two percent of the surface. Percentages of the various kinds of land use in Klamath County are listed below (area of the

county is 6,151 square miles):[4]

| | |
|---|---|
| Residence | 0.26 |
| Commercial | 0.03 |
| Industry | 0.10 |
| Public | 0.94 |
| Transportation | 0.56 |
| Irrigated Farmland | 6.67 |
| Non-irrigated Farmland | 0.36 |
| Range Land | 7.38 |
| Commercial Forest | 16.28 |
| Open space, including Non-commercial Forest | 67.23 |

As indicated earlier, land ownership in Klamath County has undergone a slow evolution. When Oregon became a part of the United States all the land was in the public domain.[5] From 1818 to 1860 few people were interested in obtaining land in the area, but as settlement advanced, some of the land passed into private hands, by homesteading and by purchase. Purchases included farmland in the Inner Basin, ranch land, and timberland in various parts of the county. Today nearly 44 percent of the county is administered by the U.S. Forest Service, compared to 24 percent for the State of Oregon as a whole. The Bureau of Land Management controls nearly six percent, compared to 25 percent for the state. Private holdings amount to nearly 38 percent, compared to 45 percent for the state as a whole. Small amounts of land are owned by Klamath County and by the State of Oregon. If only timber lands are considered, the percentages are quite different; the Forest Service controls 65 percent of the forest land and BLM only three percent.

The character of land ownership in the Inner Basin is revealed by the field patterns. In areas acquired by homesteading, as in the Tule Lake area, the fields are quite small, often 40 acres, since many of the homesteads were limited by law to 160 acres. These fields are mostly square or rectangular. In older areas of settlement, as in upper Klamath Valley, fields are larger and more irregular in shape. Shapes depart from the rectangular pattern as they are affected by roads, railroads, canals, and by terrain. The largest private holdings are held by timber companies, some of which are discontinuous and scattered. The O and C Lands in the southwest part of the county have a distinctive checkerboard pattern; alternate sections are privately owned, and since privately owned timber is often harvested before Forest Service or BLM land, the checkerboard pattern is strikingly revealed from the air and from maps. Private land is cut over and Forest Service land remains in forest. As land ownership has changed over the years by inheritance and sale, many farms have become fragmented, with several pieces of land not adjacent to each other.[6]

## FOREST PRODUCTION

The forests of the Klamath Basin provide timber, grazing areas, recreational facilities, and a watershed. Forests are mostly publicly owned (74 percent); the privately owned forests (25 percent) are mostly in the hands of large corporations.[7] One National Forest, Winema, is entirely in Klamath County, parts of Rogue River, Fremont, and Deschutes National forests are also included. In California only a small part of the Basin is in Klamath National Forest. Logs come from all parts of the county, as well as parts of adjoining counties, since logs can be economically transported as much as 100 miles. In a recent year (1975) 553 million board feet of logs were harvested in Klamath County, 60 percent on private land. In addition to supplying logs for the mills, the county received about $13 million from the sale of logs on federal lands.

Logs move to 15 mills, most of them in the southern part of the county. The mills employ about 3,600 workers and have a capacity of 8,355 million board feet of forest products (fig. 6.3). The mills produce a variety of products--lumber, plywood, hardboard, particle board, molding, veneer, and railroad ties. Box shooks, formerly important, are no longer produced in any quantity.



## AGRICULTURE

Agriculture continued its steady growth in this period with some significant changes. The number of farms declined from 1,295 in 1950 to 906 in 1978. A part of the decline is related to the increasing size of farms, part to the changing basis of defining a farm by the Bureau of the Census. The average size of farms increased to 851 acres. Irrigated acreage in the Klamath Project increased to 221,000 acres, of which 83,000 acres were in California. Irrigation canals were extended and the amount of well irrigation on marginal areas was greatly increased. Sprinkle irrigation was established in many areas, taking the place of flood irrigation. This was climaxed by the installation of hundreds of center-pivot irrigation systems, some of them controlled by computers.

In general, crop acreage increased; hay from 53,000 acres in 1950 to 70,000 acres in 1978, but some crops declined in acreage but not necessarily in production.[8] Wheat declined from 21,500 to 4,200 acres; potatoes declined slightly, but continued to be the most valuable crop, $24 million, not even excepting hay. Livestock rivaled crops in value, $69 million in 1978, compared with $69 million for all crops in 1950. Cattle increased sharply from 59,000 head (one per person in the county) to 107,000 in 1978. Dairy cows increased only slightly, sheep and hogs declined. Poultry had a value of $814,000, while horses, rabbits, bees, and fur animals added lesser amounts.

An important part of livestock production is grazing in the forest, national and private, and on Bureau of Land Management forest and range land. Permits are based on the number of AUM units, which a given area can support. (An AUM unit is the amount of forage needed for one cow, one horse, or five sheep for one month). Permits average about as follows:[9]

| Ownership | No. of AUMs |
|---|---|
| Deschutes National Forest | 1,389 |
| Winema National Forest | 15,596 |
| Rogue National Forest | 1,070 |
| Fremont National Forest | 2,279 |
| Bureau of Land Management | 20,000 |
| State Forests | 261 |
| Weyerhaeuser Company | 8,328 |

In recent years large acreages of agricultural land, potentially irrigable, have been subdivided for housing developments. This is especially true of the Altamont area. In many cases small plots of land, 20 acres or less, unsuitable for farming because of the small size, have been subdivided for housing.

## IRRIGATION

Over the years from 1950 irrigation has expanded and changed.[10] The Klamath Project has expanded to 222,000 acres, 140,000 of which are in Klamath County and the rest in Modoc and Siskiyou counties in California (see fig. 4.1). In addition, many private projects account for many more thousands of acres. The chief irrigation districts are in the southern part of the county, where the low elevations make it feasible to use gravity irrigation. The districts are:

A. Enterprise
B. Horsefly
C. Keno
D. Klamath
E. Langell Valley
F. Malin
G. Modoc
H. Pine Grove
I. Poe Valley
J. Shasta View
K. Sunnyside
L. Van Brimmer
M. Willow Valley

The chief irrigation districts are related to rivers; Williamson River accounts for 13 percent; Wood River,

Fig. 6.3. Airphoto of the Weyerhaeuser Mill, from the northwest. This mill has a capacity of 850,000 board feet of ponderosa lumber a day. The mill also produces millwork, box shooks, plywood, particleboard, hardboard, and cabinet parts. (Weyerhaeuser Company photo).



13 percent; Sprague River, 14 percent; Upper Klamath Lake, 6 percent (by pumping); Swan Lake, 3 percent (by pumping); and Lost River, 45 percent. Upper Klamath Lake, Clear Lake, and Gerber Lake are major reservoirs. Lost River water, added to that from Link River, irrigates a large area in Langell Valley, Poe Valley, the Main Valley, and the Tule Lake area. Some water is pumped from Klamath River for irrigation of the west side of the Basin. In addition to streams and lakes, about ten percent of irrigation water is pumped from more than 100 wells, mostly on the margin of the plain. The irrigation season, that is the growing season, is only 120 days, and many of the canals are dry in the winter.

## TULE LAKE BASIN

The pattern of irrigated crops in Modoc County, California, part of the Tule Lake Basin, is described in detail and mapped by Robert Pease (figs. 6.4 and 6.5):[11]

> Patterns of more recently settled Tule Lake bed contrast markedly with those of other agricultural lands in the county. A fine mosaic of 80-acre rectangular farm plots is set with great regularity in a section-line network of roads. A section is divided into quarters by irrigation and drainage canals, and each 160-acre quarter section is divided into two of the 80-acre plots. The overall pattern is reminiscent of farm areas of the West and Midwest where the old General Land Office grid dominates property lines. Drainage canals are depressed below the level lacustrine surface, while irrigation canals and feeders are built above to gain gravity flow.
>
> The outline of the irrigated cropland area coincides with the old lake shore, the highline canal being located just below the old rocky beachlines. This causes an old lake promontory, known as The Peninsula, to divide the Modoc County part of the cropland area into the main body of the lake plain and Copic Bay. The drainage sump remnant of old Tule Lake lies west of the county boundary.
>
> Farmhouses are relatively new and well kept. They are usually single-story "ranch house" types currently popular in suburban California, unlike the older architecture of other parts of the county. Set close to roads and with front lawns, farmsteads look like typical suburban residences. Characteristic of the farmsteads are low gabled utility buildings, now sheathed in corrugated iron, formerly the tarpaper-covered structures of the Japanese relocation center that existed on The Peninsula during World War II.
>
> The Bettendorf farm is a typical Tule Lake agricultural enterprise. As is the case with most of the young and energetic agricultural entrepreneurs who homesteaded in the basin, John Bettendorf found it desirable for profitable operation to have more than one farm plot. His crop rotation includes a grain, potatoes, and a legume. As far as allotments permit, the grain is durum wheat; otherwise it is barley. The legume can be alfalfa for either hay or seed, or in the past, alsike clover grown entirely for seed. During harvest, he pools labor and hauling equipment with other local farmers with actual threshing carried out by migrant harvesters.
>
> The nature of the farm activity on the lake bed leaves considerable slack time for supplemental employment. The reclaimed lake bed is on wild fowl flyways,

Fig. 6.4. A vertical airphoto of the Town of Tulelake, California, and vicinity, 1980. By this time most of Tule Lake had been drained and put into cultivation. (From the U.S. Geol. Survey. Scale: three inches to one mile.)



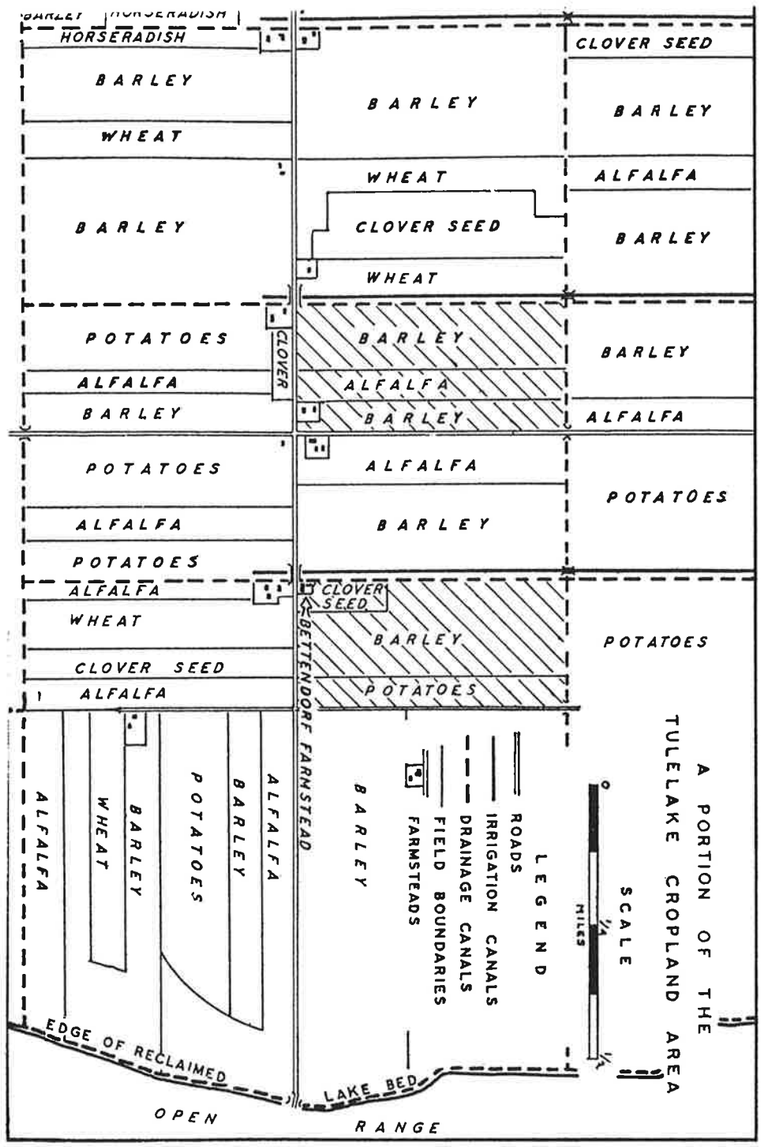



Fig. 6.5. Crop patterns in a part of the Tule Lake Basin, to the east of the town of Tulelake. The Bettendorf Farm, described in the text, is the shaded area. At the time this map was made, 1959, the farm was fragmented, that is, it was in two separate parcels. (Map and text from Robert W. Pease. See note 11).

and some farmers reap sizable supplementary income by renting prepared blinds to duck hunters during the winter season.[11]

On the east side of Tule Lake Basin are some fairly large dry-farmed areas which grow grain and hay without irrigation or, in some cases, with center-pivot irrigation. Dry farming crops are only successful if the winter precipitation is average or above. Forage crops, as well as the alfalfa of the irrigated areas, contribute to the livestock industry of northern Modoc and Siskiyou counties and usually equal or exceed the value of crops.

The most significant changes in irrigation in recent years has been the increased use of sprinkle methods, replacing flood irrigation, in large part. Sprinkle irrigation is adaptable to an uneven surface, it requires less water and less manpower. The problem of drainage is almost eliminated, since the light soils permit subsurface drainage. The risk of mineral accumulation is slight. Although the wheel-line sprinkle system is still used, center-pivot irrigation is taking its place (fig. 6.6). This system rotates around a point, sometimes a well; the smaller systems usually irrigate a quarter section, the larger ones sprinkle a whole section. Special devices are used to reach the corners, so that on a quarter section 155 of the 160 acres can be reached. One disadvantage of sprinkle irrigation is the great expense of installation and maintenance.[12]

## ENERGY

The chief local sources of energy in the Klamath Basin, hydroelectric and geothermal, have continued to expand. These are not sufficient for local demands so that additional power must be imported in the form of hydroelectric energy and fossil fuels. Hydroelectric energy is generated locally by power plants on Link and Klamath rivers (fig. 4.5 ). The imported electric power comes from the northwest power pool, which includes plants on the Rogue, Umqua, and Columbia rivers, fossil fuel stations in Washington and Wyoming, and the Trojan Nuclear Station in northern Oregon. Most of the natural gas comes by pipeline from Canada. Petroleum comes from Alaska and other sources, reaching Klamath County by pipeline, ocean tanker, and tank truck in the form of gasoline and diesel oil. Large quantities of petroleum products are used locally in transportation by automobiles, trucks, buses, and farm machinery. In addition, small amounts of energy are derived from burning firewood and wood wastes from sawmills.

## GEOTHERMAL ENERGY

The use of geothermal energy, described briefly in the preceding chapter, continued to expand in this period (fig. 5.7 ), when more wells were dug and heat exchangers installed. Several agencies made studies of the system, including Oregon Technical Institute, where all buildings are heated by geothermal energy. A number of reports have been made on geothermal energy in Klamath Falls. The quotation below is from the Final Report of the Geo-Heat Center for 1978:[13]

> Today most of the eastern portion of the City of Klamath Falls is heated by hot water. The principal heat extraction system is the closed loop downhole heat exchanger (locally called a "coil") utilizing City water in the heat exchangers.
>
> Most of the present wells for residences vary between 90 and 900 feet in depth with 200 to 300 feet being most common. Commercial establishments and schools, requiring a greater heat output, increase the well depth to over 1,800 feet with



Fig. 6.6. This center-pivot irrigation system, computer controlled, irrigates a circular area one mile in diameter. (Photo by James W. Kerns).

1,000 to 1,300 feet common. Depth to the water surface varies from artesian (surface) to 350 feet with 50 to 100 feet most common. Downhole heat exchangers will generally extend to near the well bottom with a minimum of 100 feet below the water surface.

A number of "steamers" are located along the middle of Hillside Avenue. These are sources of natural steam that were encountered during the course of drilling at very shallow depths (approximately 90 feet). Due to the high temperature gradient in this area, grass and wildlife (frogs and quail) can be seen all winter, and at one location, a subtropical Mimosa tree is growing. Very little water is present in these wells, thus the steam is used to heat the City water in the heat exchangers.

Present uses of the hot water heat include residences, almost all of the City schools, Oregon Institute of Technology, a creamery (for heating and milk pasteurizing), melting snow from a State highway pavement, keeping a floor from freezing and frost heaving in a cold storage plant, accelerated curing of concrete, direct use in a laundry, and for heating swimming pools. Several locations make use of waste hot water discharged into storm sewer lines.

The temperature of the shallow reservoir varies from slightly over 100° C (112° C maximum recorded) to 40° C with the cold water aquifers as low as 15° C. The extent of the near surface hot water can be fairly well delineated with the area with temperatures greater that 100° F (38° C). The temperatures of the near surface water appear to gradually diminish as the location gets farther away from this 100° F boundary. Based on well drilling logs and conversations with local residents, the temperature of the water outside this area decreases from 100° F to 70° F within half a mile to the east and west.

Several areas measured at over 200° F (93° C). These indicate probable areas of geothermal fluids upwelling along fault zones. These are located along the Hillside Avenue area and north to Roosevelt School. Hot water appears to flow up along these fault zones and then move horizontally to the west and southwest along a 2 percent hydraulic gradient in shallow aquifers. These shallow aquifers appear to terminate just north of the OIT wells and gradually dip to the west. This fault zone is also characterized by shallow wells (100 to 150 feet--30 to 50 m) and by steaming or boiling well water.

The water level and temperature of these wells appears to vary on a seasonal basis. During the winter months with increased temperature and fluid extraction, the water levels drop and temperatures increase. During the summer when use decreases, the water levels and temperatures return to their original values. Some long-term lowering of the water levels have been reported, but this was not observed during this study. Reports are that the well levels, especially the artesian ones have dropped during the past 40 years. Early newspapers report reduction in flows of artesian springs even before wells were drilled in the area. Besides the changes in water level due to the winter-summer cycle, variations in the level appear also to be caused by changes in rainfall. Periods of high or low rainfall will cause significant effects in the water level, as was noted during the fall of 1976. The water temperatures do not appear to vary with time, except for the winter-summer effect.



## TRANSPORTATION

The transportation system of Klamath County includes a variety of routes and carriers; roads, federal, state, county, and private; autos, trucks, trains, and airplanes. These routes are used by automobiles, trucks, buses, and commercial freight lines. Two rail lines carry mostly freight; only one passenger line, Amtrak, passes through the county. The main airport at Klamath Falls is supplemented by four other air strips.

More than 7,000 miles of roads serve the county.[14] About 2,100 miles are essentially "jeep" roads; 1,900 miles are dirt roads, some of which are graded and drained; 1,700 miles are gravelled or otherwise surfaced; 1,300 miles are paved. As for location, 4,000 miles of roads are in National Forest and 517 miles in BLM land. There are 440 miles of Oregon State Highways, 829 miles of county roads, and 929 miles of other public and private roads, including logging roads. Except for some mountainous and marshy areas, all parts of the county are well served by roads.

In this period, U.S. Highway 97 and State route 39, 58, 62, 66, 70, 138, 140, and 232 have been continuously improved by widening, straightening, and repaving. A notable improvement was the Freeway bypass on U.S. 97 through the west side of Klamath Falls, thus avoiding the congested traffic of the downtown area (fig. 6. 7). Highway 97 is the busiest, with an average of 2,650 trips daily at the California Line, and 3,300 at the northern boundary of Klamath County. Highway 58 is next, with 2,350 trips at the county line, followed by Highway 39 with 2,250 trips at the California Line. Highway 140 shows 1,500 trips at the west county line and 1,100 on the east. Highway 66 shows 1,500 trips at Keno. The heaviest traffic is in the city of Klamath Falls, reaching an average of 22,900 trips in the city center. The number of registered motor vehicles has constantly increased, passenger cars reaching 46,000, or about one and one half persons per car.(See figs. 7.4&7.5)

Two main rail lines, Southern Pacific and Burlington Northern, serve the county, providing freight service north to the Willamette Valley and the Columbia River, and south to various towns and cities in California, including Sacramento and San Francisco. The Amtrak passenger train provides two trains daily, one north, one to the south. Bus lines furnish daily service for passengers and light freight, north to Eugene, Salem, and Portland, south to California towns, and to Reno, Nevada. Much of the freight and some passengers are handled by 15 trucking companies.

## RECREATION

Recognizing the considerable resources for recreation, the facilities have been improved during this period.[15] The greatest attraction, of course, is Crater Lake National Park in the northwestern part of the county with an area of 130 square miles. It attracts more than a million visitors every year; in summer for scenery, camping, and hiking; in winter for skiing. One access to the Park leads from Klamath Falls via Highways 97 and 62. Klamath County has four state parks, the largest is Collier State Park, which is also a museum for old logging machinery and tools, and Kimball State Park, near Fort Klamath. Twenty county parks are located throughout the area; the largest is Eagle Ridge Park on the west side of Upper Klamath Lake. Chiloquin has three city parks, Klamath Falls has 15; the largest is Moore Park west of Link River with 425 acres. Bonanza, Merrill, and Malin have one park each; the Malin park, the largest, has 60

Fig. 6.7. Freeway Exchange and bridge across lower Link River. Lake Ewauna and Klamath Falls are to the right. The ridge in the background is part of the open space adjacent to Ewauna Heights Neighborhood. (Author's photo).



acres, In addition, most schools have recreational facilities, including playgrounds and sports fields. The U.S. Forest Service and BLM provide camps, hiking trails, and opportunities for hunters. On the whole, recreational facilities are unevenly distributed and some are undeveloped. Especially needed are more picnic areas, hiking and biking trails.

## SUMMARY

In this and previous chapters the historical geography of the county has been traced through a century and a half, from the time of the first exploration. Every part of the Basin and, for that matter, every part of the county has felt the hand of man. In some areas, the occupation has been brief, but the effects remain. For example, the logging town of Pokegama in the southwest part of the county had a very brief life, from 1903 to 1909. But the effects of the occupation are still visible in the old railroad grade, in the remains of log houses, and the uniform age of trees. The forest is growing back slowly; the trees are small and the growth is more open than in the original forest.

In the Inner Basin, human occupation has been so complete that the land has been transformed from a level plain covered mostly with sagebrush and grass to farmland. The impact of human occupation on the land can be considered under two heads; the productive use of the land, such as farming, grazing, and mining; and the non-productive use--houses, roads, railroads, streets, factories, stores, and public buildings, parks, and airports.

Agriculture has brought about widespread permanent changes on the floor of the Inner Basin. The land has been divided, by township, section, and range, drained, sometimes leveled, and supplied with water by a system of canals and wells. What was once a sea of sagebrush, grass, and marsh vegetation is now (in season) a checkerboard of alfalfa, potatoes, grain, and other crops. In winter, the irrigation system is suspended and many of the fields are brown and dry, but the marks of cultivation are still clearly visible. The dry farmed areas on the margin are also brown and dry after the crop (usually barley) has been harvested and the stubble disced in. The farm machinery leaves a typical geometric pattern.

The effect of grazing, the first type of land use at the time of settlement is less obvious than that of agriculture. Three types are present- grazing on semiarid grassland, grazing on forest land, and on irrigated pastures. The last mentioned is usually described under the heading of agriculture, and sometimes all grazing is so considered. In the dry lands overgrazing has changed the character of the grassland, and the livestock, driven from one region to another, have introduced new plants, some of them weeds, to the range lands. A part of the grazing operation is the harvest of wild hay as feed for livestock, though less important today than formerly. Cultivated hay is harvested for winter feed.

In the forests, logging road construction, fires, plant diseases, and grazing have changed the nature of the natural vegetation. In the earlier days of logging, little attention was given to regrowth, but fire and insect control received early attention. Today, elaborate systems of fire and insect control are in use; damages are reduced but not eliminated.

# 7. KLAMATH FALLS AND ALTAMONT, 1985

Why did George Nurse choose to locate his trading post on the site of the future city of Klamath Falls and thus, unwittingly perhaps, determine the location of the city? Why after four years at Fort Klamath, did he load his trade goods on a wagon and travel the difficult road over the hills to the new location? He was quoted as saying, "Fort Klamath as a trading post is about to peter out."[1] Perhaps he realized that the Fort was peripheral to the main Basin and not on a main line of travel. The new site made it easier to trade with the Modoc Indians and he was closer to his source of supplies in the Rogue River Valley and northern California. One might speculate that had George Nurse been able to drive his wagon southward along the east shore of Upper Klamath Lake, he might have located at the site of Pelican City. Instead he traveled inland, over the upland, and approached the new site from the east along a route which later was called the Old Fort Road (to Fort Klamath).

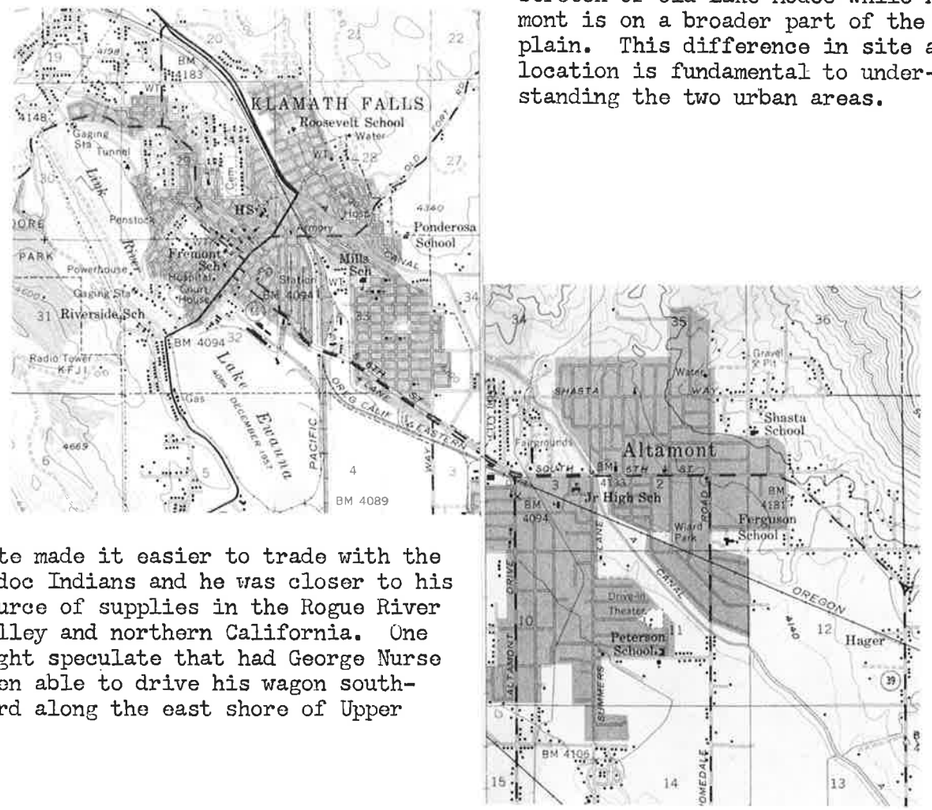



Fig. 7.1. Topographic maps of Klamath Falls and Altamont from U.S. Geological Survey, Klamath Falls and Merrill Quadrangles. Since the maps were made, 1957, Altamont has doubled in population and area.

George Nurse probably did not imagine that a city of 16,000 people would grow from his trading post nor that a suburban area to the southeast, Altamont, would surpass the parent city in area and population (fig. 7.1). Klamath Falls is located on a narrow stretch of Old Lake Modoc while Altamont is on a broader part of the lake plain. This difference in site and location is fundamental to understanding the two urban areas.

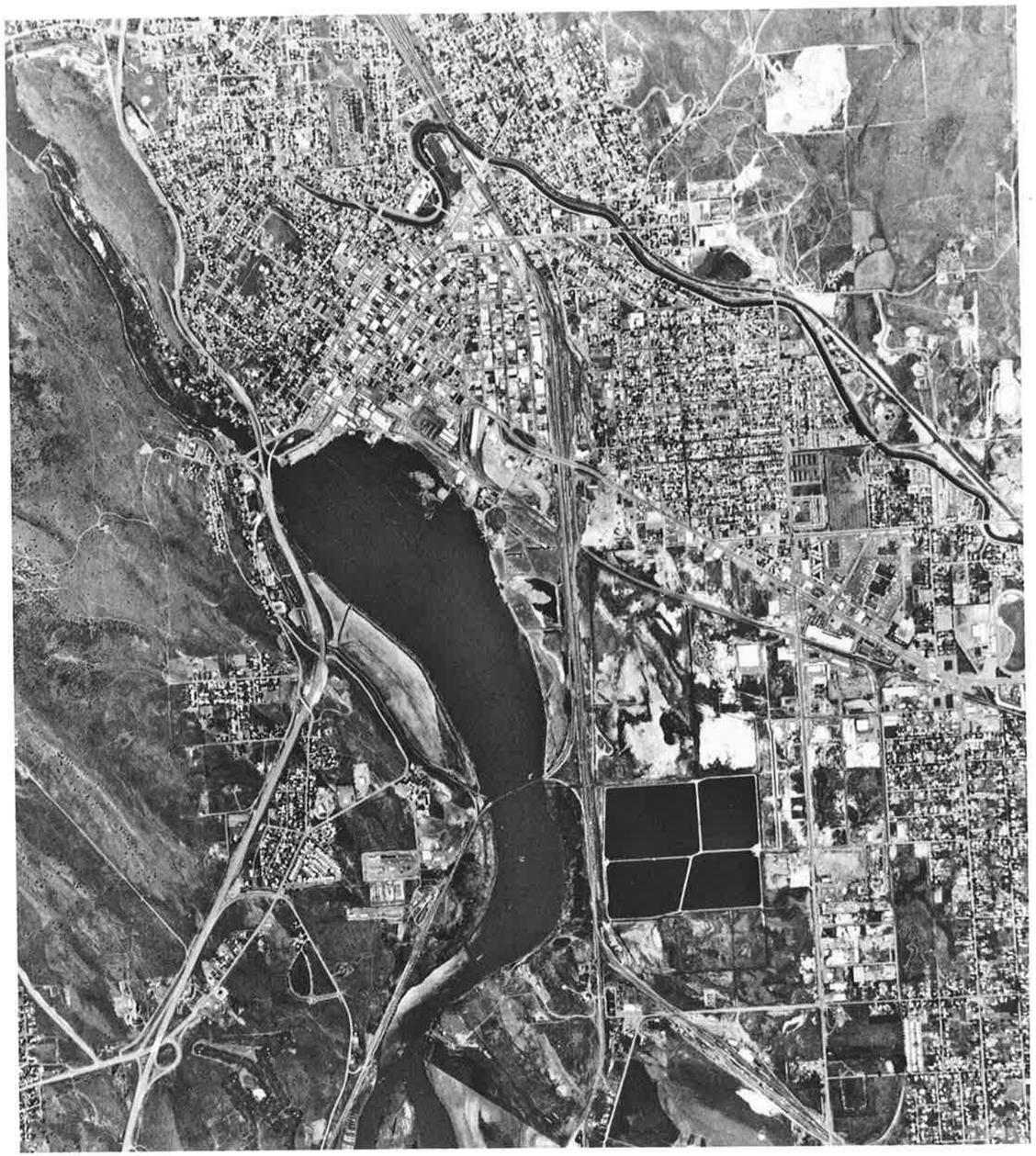


Fig. 7.2. Vertical airphoto of Klamath Falls (excepting the northern part) and a part of Altamont (lower right). This photo overlaps with Figure 7.10. (U.S. Geol. Survey photo)



## THE SITE OF KLAMATH FALLS

From the air, or from airphotos in stereo,[2] the major natural features of the Klamath Falls landscape are clearly seen (fig. 7.2); the lakes, rivers, hills, and the gently sloping, almost flat, floor of the Basin. The main drainage system on the west includes Upper Klamath Lake, Link River, Lake Ewauna, and Klamath River. This system furnishes water for irrigation, power, transportation, and recreation. The upper lake is approximately 55 feet above Lake Ewauna, so Link River drops rapidly for a little over a mile; irrigation and power aqueducts and a canal take out at the upper end. The upper lake formerly had another outlet when it stood at higher levels, approximately along the railroad route. Link River, the present outlet, follows a fault line which divides a low hill into two long, narrow ridges. Lake Ewauna is merely the wide upper end of Klamath River, from which the sluggish river meanders through the Basin plain before entering the foothills of the Cascade Range.

To the east of Link River (fig. 7.3) is an area of low, irregular hills with a number of separate summits. The highest hills rise 200 feet above Lake Ewauna and are bordered on the west by the Freeway; on the north by the upper part of the Main "A" Canal; on the east by the railroad; and on the south by Main Street. These boundaries are approximate only; in detail the boundary is quite irregular. The hills are composed of mixed sediments and igneous materials. They are mostly covered with streets and residences, but open spaces occur, especially in the northern part.

To the east of the hills is a low, gently sloping corridor, which is essentially a narrow part of the Basin plain. Only one-fourth mile wide in the north, the corridor widens to one mile in the middle part and to two miles in the southern part of the city. The corridor contains highways, railroad yards, industrial and commercial establishments, the Main Canal, and also residences.

To the east of the corridor are

Fig. 7.3. Link River Valley looking northward toward Upper Klamath Lake. The aqueduct carries water to the east side power plant; on the west side, Keno Canal supplies a second power plant. (Author's photo)

the foothills of the basin ranges, Hogback Mountain, and other lesser ones. The lower slopes, between 4,200 and 4,400 feet elevation are not too steep for residential building, especially since the main system of streets is laid out on the contour. A unique attraction of this area is the presence of geothermal water which is used to heat residences and some public buildings. The configuration of the hills and the corridor is responsible for the irregular shape of the city; it is elongated in a north and south direction, and is wide in the south. The locations of hills cause some problems for construction of streets, water lines, and sewers.

To the south of Klamath Falls the broad plain, nearly ten miles in width, lies between the foothills on the east and Klamath River. The slope is gentle, about 20 feet per mile, to the southwest, providing good drainage and good conditions for gravity irrigation. A few low hills rise above the general level. On this plain the unincorporated urban area of Altamont has grown and continues to grow. The plain also contains Kingsley Field Airport and large areas of irrigated farmland.

## BY AIR, ROAD, AND RAIL

The major lines of transportation for Klamath Falls connect the city with areas to the north, east, south, and west (fig. 7.4).[3] The railroads, Southern Pacific, Burlington Northern, and the Oregon and California Eastern, near which most of the industrial plants are located, run together in the city in a north-south direction, following an old drainage channel. To the south, the lines separate. The main line of the Southern Pacific runs southward on the east side of Lake Ewauna, crosses the old bed of Lower Klamath Lake, and continues to Weed, California, where it joins the old Rogue River Division. A branch line runs southeastward near the airport to Alturas, California. The Burlington Northern runs almost due south from Malin to connect with the Western Pacific Railway at Keddie, California. A short rail line, the Oregon and California Eastern, used mostly for log transport, runs eastward to Bly on Sprague River. It also reaches north to Sycan Marsh. Most of the old logging roads have been discontinued.

One U.S. Highway, 97, and two State Highways, 39 and 140, run through the urban area and carry a large percentage of the vehicular traffic. U.S. Highway 97 from Weed, California, together with State Route 140, from Medford, cross the lower end of Link River (fig. 7.5) and enter the urban area. The Freeway bypass of Route 97 takes off to the north, paralleling California Avenue. The Business Route follows Main and Klamath streets, from which Route 140 turns southeastward on Sixth Avenue. Route 97 continues to the northeast along Esplanade Street, crosses the railroad and the Main Canal and joins State Route 39. The combined routes run northward and join the Freeway bypass near the northern city limits. To the southeast, Highways 39 and 140 follow the Main Canal, then Sixth Avenue through the northern part of Altamont. Route 140 turns eastward to Bly and Lakeview. State Highway 66 from Ashland terminates as it joins Highway 97 on the southwest part of the urban area. The flow of traffic on these main arteries is shown on Figures 7.4 and 7.5.

Kingsley Field, the Municipal Airport, is located in a broad plain to the south of the city. Originally constructed as a Naval Air Station, it is operated now by the City of Klamath Falls. It can handle large planes, up to 60,000 pounds weight, including Air Force planes. Four other air strips are maintained in the County,



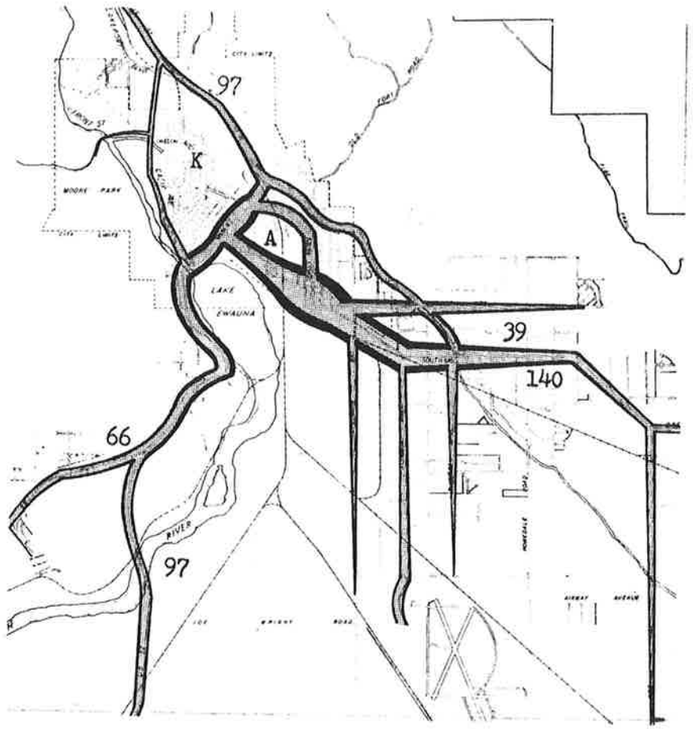



Figure 7.4. Traffic Density Map for Klamath Falls (K), Altamont (A), and vicinity. Highways shown by number. (From the University of Oregon, Bureau of Municipal Research).

at Chiloquin, Beaver Marsh, Crescent Lake, and Malin. These fields cannot handle large planes.

Internally the street patterns, in different parts of Klamath Falls, are related to early roads, railroads, terrain, and canals, but most streets are aligned north-south, east-west, along section lines. The first streets to be laid out - Main, Pine, and Klamath - are near the break in slope of the hills to the northwest, rather than along section lines. The "presidential streets" - Jefferson, Lincoln, Grant, and others - were laid out parallel to Main Street. Numbered streets cross these at right angles. This gives a rectangular pattern to the older parts of the city, but not related to section lines. Near the railroad some streets run parallel to the tracks, and a few parallel the Main Canal.

## THE HINTERLAND

At the time of settlement Klamath Basin was distinctly isolated, which accounts, in large measure, for its late settlement. Not only was the area distant from other settlements but the barrier of the Cascades to the west and

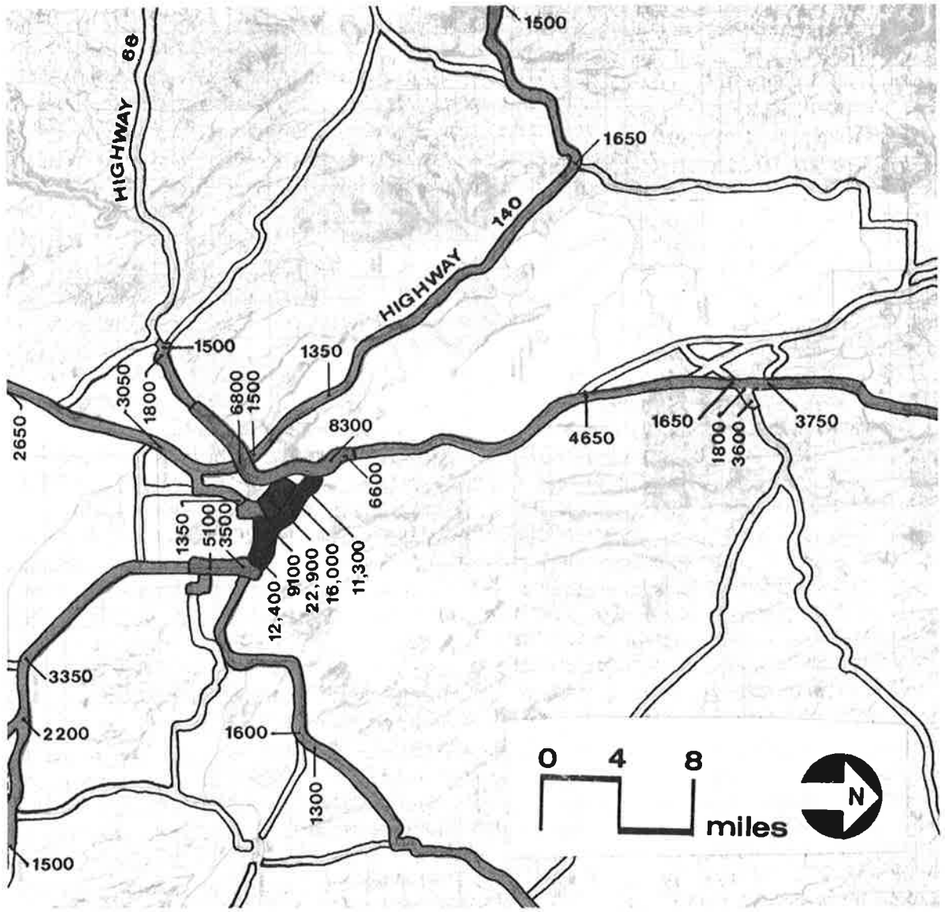



Fig. 7.5. This traffic map shows the number of vehicles per day at various points. The top of the map is to the west. (From a map in the Comprehensive Plan for Klamath County, 1980).

the large expanse of semiarid land surrounding it, discouraged many would-be settlers. Today the area has good roads, railroads, and air transportation but it is still a long way from other settlements. It is apporximately 50 air miles across the Cascades to Ashland and Medford; 140 air miles north to Bend; 90 air miles east to Lakeview; and 65 air miles south to Weed and Yreka. And none of these cities is larger than Klamath Falls and Altamont combined. So Klamath Falls is the trade center for a large area, simply because there is no other place to go (fig. 7.6).

Several methods are used to map the trade area or hinterland of a city. One of the simplest is to study newspaper circulation. If a majority of newspaper readers in a community read



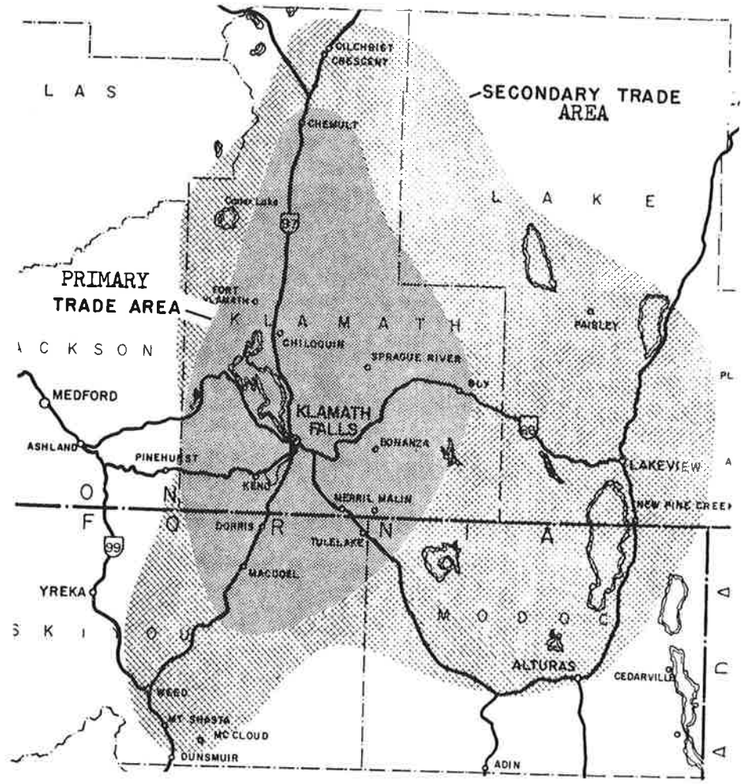



Figure 7.6. The Hinterland of Klamath Falls. The hinterland is large because of the great distance to other trade centers. (From the University of Oregon, Bureau of Municipal Research, The Klamath Falls Urban Area).

the Klamath Falls Herald and News, it is assumed that they belong in the trade area. Another method is to study highway traffic density. Density is greatest in the center of the city and decreases in all directions until another trade center is approached. That marks a point on the boundary of the trade area. Another method calls for the mapping of retail trade. The results of the various methods are similar but not identical. The hinterland of Klamath Falls is complicated a little by the state boundary and by the irrigated areas in Modoc and Siskiyou counties, California. Nevertheless, it is apparent that the hinterland of Klamath Falls includes all of Klamath County, part of Lake County, and parts of Modoc and Siskiyou counties in California. Furthermore, it is obvious that a very large part of the economic activity takes place in an inner hinterland, in the limits of Klamath Falls and Altamont and the fringes, including the irrigated areas.[4]

## KLAMATH FALLS GROWTH PATTERN

On the sites described above, the urban area, Klamath Falls and Altamont, grew unevenly; by 1930 Klamath Falls had almost stopped growing while Altamont continued to grow and expand. This means that people were moving out of Klamath Falls either to Altamont or elsewhere, since the birth rate and natural increase continued to be positive. Altamont passed Klamath Falls in population shortly after 1970.

From the nucleus on Main Street, the city of Klamath Falls grew first to the east on low ground, then more slowly upslope to the northwest. By 1930, thanks to the economic boom of the 1920s, there was some growth in all parts of the urban area. By 1940 the population explosion had ceased but growth continued in the outlying regions, on the plain of the corridor and along main roads. Streets were soon laid out to the east and growth reached the foothills in that direction. To the west of Link River and Lake Ewauna, hilly land discouraged residential building on a large scale, but streets were laid out on the lower slopes and along Highway 66. A sort of agricultural street village grew intermittently along the road to Keno. In the northern part of Klamath Falls, the corridor is narrow and growth was slow except at the Buena Vista-Pelican City area, where residential construction was stimulated by local industry.

By 1930 the population growth rate of Klamath Falls had declined, while the suburban area of Altamont continued to grow rapidly. In 1930 Klamath Falls had 16,047 people and Altamont had 2,246. By 1940 Klamath Falls' population had increased by only 450 persons, while Altamont grew to 6,648. The table gives the population by recent census periods with the percentage increase compared with the previous census. The overall change from 1950 to 1980 was 5.0% for Klamath Falls and 110.0% for Altamont.[5]

| | 1950 | | 1960 | |
|---|---|---|---|---|
| Klamath Falls | 15,875 | 3.7% | 16,949 | 6.7% |
| Altamont | 9,415 | 43.5% | 10,811 | 14.8% |
| | **1970** | | **1980** | |
| Klamath Falls | 15,775 | -6.9% | 16,675 | 5.7% |
| Altamont | 15,746 | 45.6% | 19,805 | 26.0% |

The second table compares the population and areas of the two units for 1980.

| | Klamath Falls | Altamont |
|---|---|---|
| Population | 16,675 | 19,805 |
| Total Area | 10,110 acres (17 sq. mi.) | 14,581 (23 sq. mi.) |
| Residential | 260 acres | 2,104 acres |
| Industrial | 211 acres | 888 acres |
| Public | 2.286 acres | 925 acres |
| Vacant | 5,862 acres | 8,802 acres |

## KLAMATH FALLS: THE NEIGHBORHOODS

For more detailed study, the urban area - Klamath Falls and Altamont - can readily be divided into neighborhoods, each with unique qualities of location, elevation, slope, street pattern, house types, and special uses (figs. 7.7a and 7.7b).

From a helicopter taking off from Kingsley Airport, or from airphotos, one can see the pattern and various parts of the area. Below is the un-



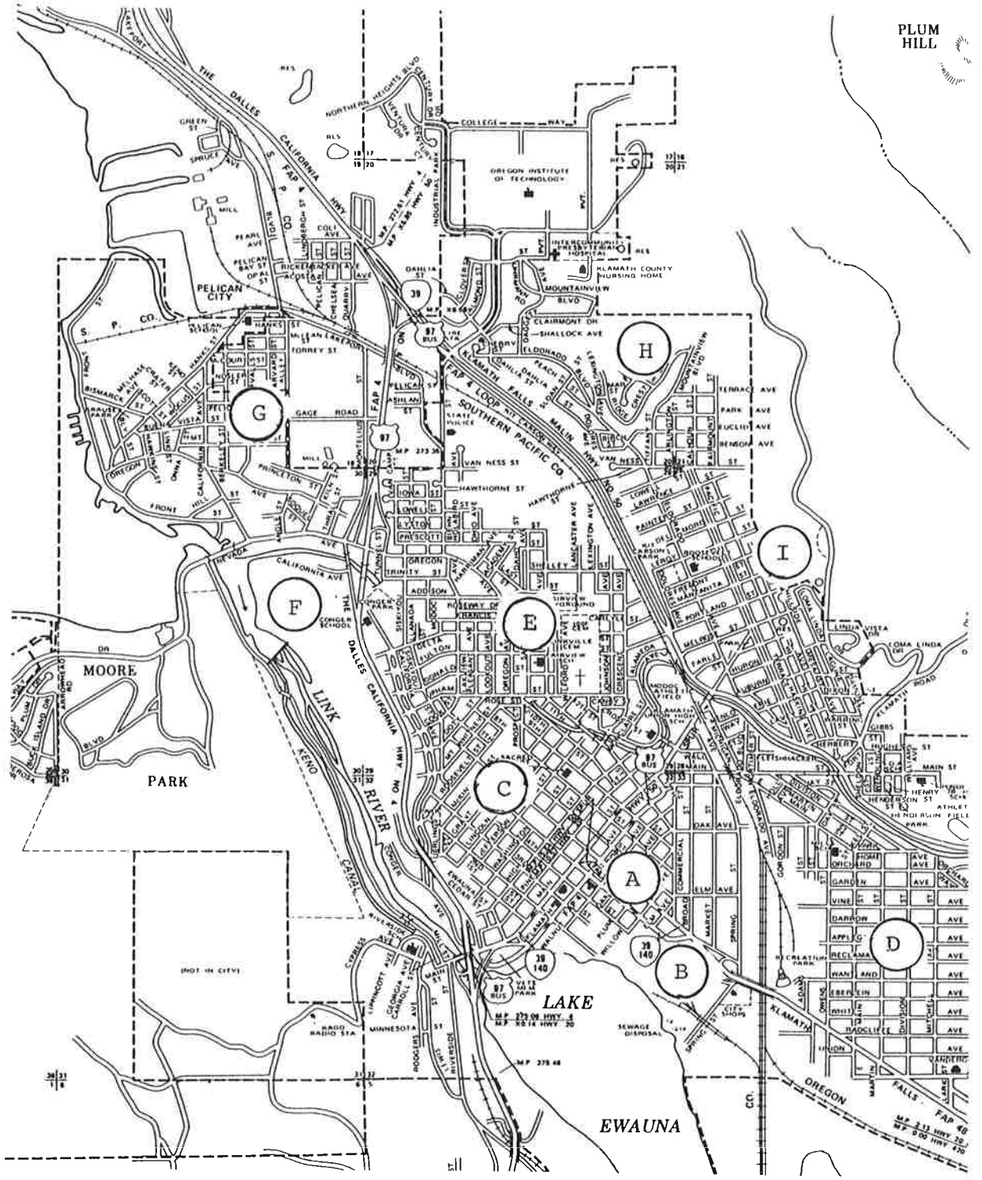



Figure 7.7a. Part of the map of Klamath Falls locating Neighborhoods; A. Central Business District; B. Industrial Belt; C. Ewauna Heights Residence; D. Mill Addition; E. North Central Residence; F. Link River Open Area; G. Buena Vista; H. Mountain View; I. East Terrace (Hot Springs). (Oregon Transportation Department Map).

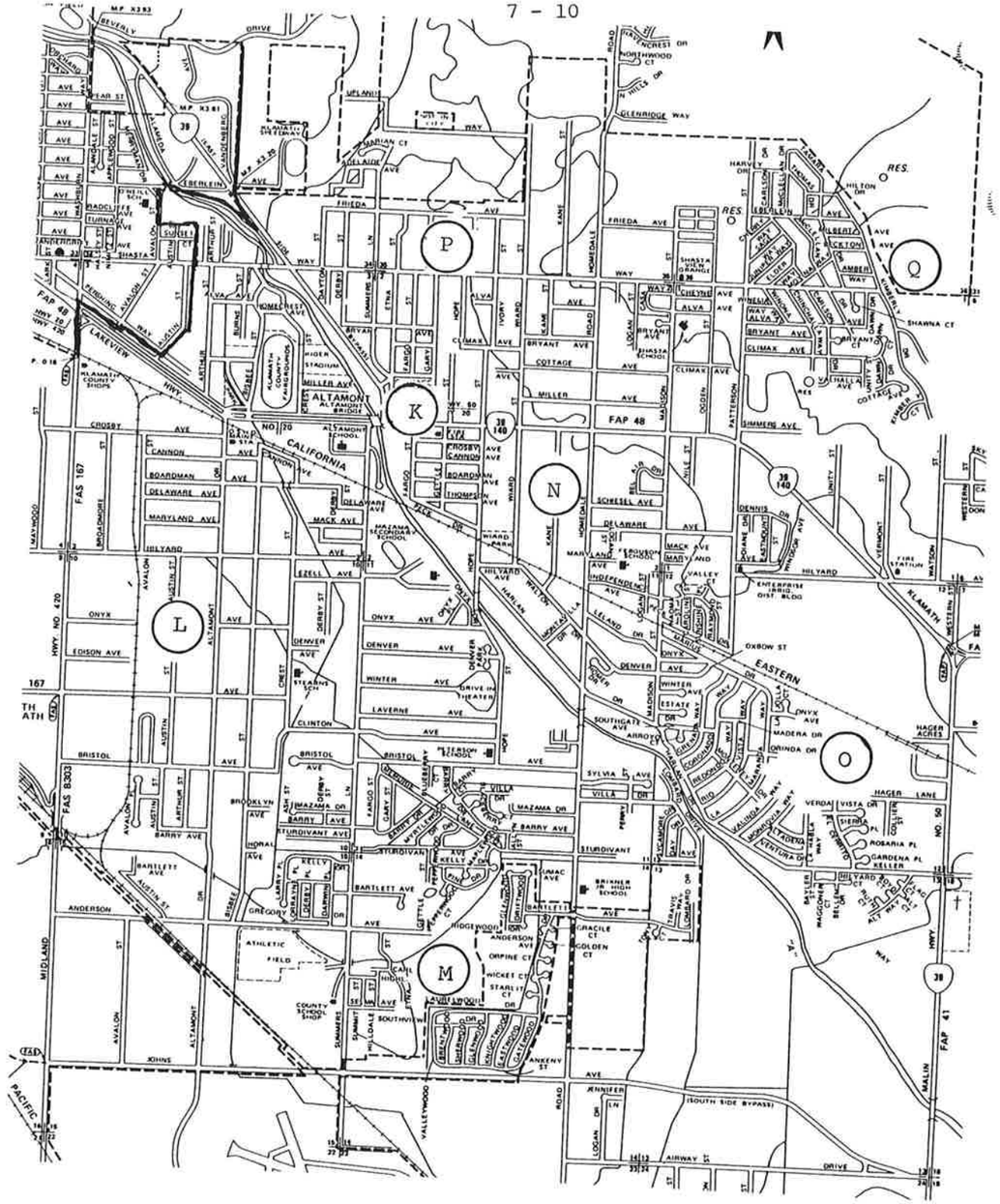



Figure 7.7b. Part of the map of Altamont locating Neighborhoods; K. The Commercial Strip; L. Altamont Acres; M. Gatewood; N. Homedale; O. Southeast Open Area; P. Fairacres; Q. Moyina Heights. The black line marks the boundary between Klamath Falls and Altamont. (Oregon Transportation Department Map).



incorporated urban area of Altamont, in which the principal function is residential, but with some commercial and light manufacturing along the main roads. Altamont appears as a broad area of urban sprawl on a gently sloping plain. Part of it is definitely rural agricultural land. Approaching Klamath Falls, a distinctive area of heavy manufacturing is seen on the shores of Lake Ewauna and along the railroad tracks. Beyond is the Central Business District (CBD) or Commercial Core with stores, banks, Court House, City Hall, schools, newspaper office, and state and federal office buildings. Peripheral to the central core are various residential districts, including a variety of houses and patterns, from mobile homes to apartment houses. Functions are mixed, the CBD has some residences and light manufacturing; every residential district has a few stores, a school, and other functions.

A. The CBD

Klamath Falls' commercial core (CBD), the heart of the city, extends as a narrow band between High Street on the northwest to Walnut Street on the southeast. It runs from Link River Bridge to the Main ("A") Canal (figs. 7.7a and 7.7b); thence along Klamath Avenue to Third Street. From the air the CBD is distinguished by large buildings with flat roofs, many light-colored, by the scarcity of trees (as compared with residential areas), and by the numerous large parking lots filled with automobiles. The heart of the CBD is the retail district (fig. 7.9) which is only two blocks wide and five blocks long. Included are retail stores, restaurants, banks, hotels, office buildings, and other offices, such as law and medicine. Two areas of government buildings are located in the CBD near the retail center. These house city, county, state, and federal agencies.

Adjacent to the retail center and various service agencies are the motels, hotels, the newspaper office, auto agencies, repair shops, and filling stations. In the southern part of the CBD there is some light manufacturing and also residences. Notably absent from the CBD are mobile homes and schools. Outliers of the CBD extend east on Main Street and East Main Street and to the north along Oregon Avenue. In addition, there are small outliers, consisting mostly of neighborhood grocery stores, in various parts of the city. Since Klamath Falls has grown very slowly in the last decades, the CBD has changed very little. In recent years population has declined and some businesses, Sears and Penneys, for example, have moved out.

B. The Industrial District

The Industrial District of Klamath Falls (fig. 7.8 ) and Altamont is mostly concentrated along the northeast shore of Lake Ewauna, along the railroad tracks in south Klamath Falls, and along Highway 39 through the northern part of Altamont. Outliers are located to the north of Klamath Falls' city limits and to the south along Klamath River. Manufacturing, as defined by the Census, includes a variety of productive activities, including wood processing, metal working, repair shops, bakeries, printing shops, and the harvesting of timber. A common method of measuring the importance of manufacturing is to list the number of persons employed, as compared with the total employment. In Klamath County, approximately 5,000 persons are normally engaged in manufacturing; 4,500 in wood products; 125 in food processing; 25 in transportation equipment; and 350 in other industries. By comparison, about 15,000 persons are employed in non-manufacturing activities: 5,000 in wholesale and retail trade; 3,200 in service industries; 4,300 in government; 700 in construction industries; and 800 in finance, insurance, and real estate.

Fig. 7.8. A part of the Industrial Area on the border of Klamath Falls and Altamont, looking eastward. Highway 39 is the main artery for industry and commerce. A part of the Oregon, California and Eastern Railroad is lower right. Klamath County Fairgrounds shows at upper left. (Author's photo).

C. Ewauna Heights Residential Neighborhood

This old residential area lies to the northwest of the CBD. Most of the area is hilly, with a basaltic core and marginal sediments, some of it with steep slopes. The highest elevation, 4,313 feet, is 208 feet above Main Street. Two parks afford recreational facilities, one at McKinley and Third streets, another at Eighth and Jefferson. There is very little commercial development. The street pattern is largely rectangular but, surprisingly, not oriented to section lines. The numbered streets, one to ten, are at right angles to Main Street and the cross streets, the "presidential" streets - Washington, Jefferson, Lincoln, Grant, McKinley - are parallel to Main Street. On the west side of the neighborhood, a few streets - California, Conger, and Cedar - follow the contours rather than the usual grid. Two streets, Uerlings and Prospect, run north and south.

D. Southeast Mill Addition Residential Neighborhood

This neighborhood is located entirely on the old lake plain which is nearly level. It is bordered by Owen and East Main streets on the west; on the east by the Main Canal and the city limits; on the south by Highway 39. The railroad yards on the west and the Industrial Belt form a partial barrier between this area and the CBD. There is an underpass on Main Street and an overpass on Sixth Street and there are no grade crossings.



With no restriction of terrain, the area is intensively occupied with residences, leaving very little open space. Most of the streets follow, or are parallel to, section lines, but in the north a few streets are on the diagonal. The blocks are north-south, east-west rectangles approaching squares. Houses are closely spaced, suggesting a dense urban population. Some blocks are double. Almost all blocks have east-west alleys and numerous driveways lead to detached garages. On the southern end of this neighborhood are two shopping centers, Tower and Shasta Plaza, which serve Altamont and Klamath Falls, as well as Neighborhood D.

E. North Central Neighborhood

This neighborhood is bordered on the west by the Freeway bypass, on the east by the Southern Pacific Railway, and on the south by Upham Street and the "A" Canal. This is a hilly area with rounded summits of basalt outcrops, grading into gentler slopes to the west but with a very steep scarp on the east. This scarp is so steep that only one street ascends it. The elevation ranges from 4,130 feet at the Canal to 4,266 feet at the summit. Many parts of the area are undeveloped, which the city plan indicates is due to steepness and rockiness. What this means is that construction is more expensive than on the Basin floor. Similar terrain in other areas has the usual pattern of houses.

Most of the streets run north-south and east-west, but Oregon Avenue, after running north from Upham Street, curves west and continues into the Buena Vista area to the west. Many streets are discontinuous because of steep slope and many platted streets have not been improved. The eastern part of the neighborhood is on the Basin floor; here short streets run from the steep scarp to the vicinity of the railway. In the southern part of the area some of the houses are old and, according to the city plan, defective.

F. The Link River Open Neighborhood

This neighborhood consists of two ridges, with basalt cores, on each side of Link River. It is bordered by the Freeway bypass on the east; the western boundary extends to the Moore Park residential area. The summits of the ridges reach 4,320 feet and the slopes on each side of Link River are steep. There are no bridges across Link River from the south end of the upper lake to the lower end of the river. The only developed street is Conger Avenue, a short street in the extreme south and immediately west of the bypass. Several fine houses are located on the banks of lively Link River. A gravel road follows the west side of Link River, as does the Keno Canal which supplies water to the west side power plant. The power plant on the east side is fed by a penstock pipe. A part of this area is owned by the Power Company, which may account for its lack of development.

G. The Buena Vista Neighborhood

The Buena Vista Neighborhood is north of the "A" Canal between the Freeway bypass and Highway 97 on the east and the lower end of Upper Klamath Lake on the west. The southern

Fig. 7.9. Two views of Klamath Falls. Panorama of Klamath Falls, looking to the southwest from East Terrace. Part of the Central Business District shows on the left; Ewauna Heights Residence is in the center, middle distance; and the North Central Residence Area is on the right. The houses in the foreground are in East Terrace. A view looking across the lower end of Upper Klamath Lake. A part of Pelican City, a suburban area, shows in the middle distance and Plum Ridge is in the background. (Author's photo).



part is hilly, slightly over 100 feet above the lake. The hills have a basalt core and some of the slopes are steep. Some of the streets run north-south and east-west; others are diagonal or curved along the contour. This residential area was built partly to serve the workers in the lumber mills which formerly were located just to the north, in an area called Pelican City. Only one mill remains. Along the low shoreline are two small marinas and another is located across the lake to the west of Frémont Bridge. This location near the lake is attracting new residents. A few houses and condominiums are under construction.

H. Mountain View Neighborhood

The western boundary is bordered by highways 39 and 97; the southern boundary is approximately at Van Ness Avenue; and the eastern and northern boundaries are at the Klamath Falls city limits. This is rolling hilly land, most of it between 4,200 feet and 4,400 feet in elevation. Above 4,400 feet is the steep front of Hogback Mountain. Basalt outcrops are common, partially covered with sediments. This is a new neighborhood, recently developed, and many parts are still open land. Most of the developed streets are in the south, where both rectangular and curved streets occur. An outstanding feature is Oregon Institute of Technology; also the Merle West Medical Center, the Klamath County Nursing Home, and the Campus Square Shopping Center. This area is in the geothermal belt and OIT heats all of its buildings with hot water from wells. To the north a large area has been set aside as an Industrial Park. As in other neighborhoods, some parts have been platted but do not have any houses or paved streets.

I. East Terrace (Hot Springs) Neighborhood

This area lies between Highway 39 and the steep slope of Hogback Mountain and south of Van Ness Avenue. The area is long and narrow, mostly between the 4,130 and 4,400 foot contours. The principal streets, northwest-southeast, are Eldorado Avenue and Pacific Terrace. The cross streets are short, running from the vicinity of the highway to the steep slope. In many ways this is the finest residential area in the city. Houses are large, well built, and extensively landscaped. In only one small section in the south are there many houses listed as defective, according to the city plan. This neighborhood is in the center of the principal geothermal body. Hot water for heating is found at relatively shallow depths. A large city park is located on the lower margin and a large high school, Ponderosa High School, is on the southern end (fig. 7.9).

Marginal Neighborhoods

1. Moore Park, on the south side of Upper Klamath Lake, is a fine residential neighborhood; the houses are built mostly on fairly steep slopes. The shoreline here is low and marshy and not suitable for building. Many of the houses are new and well built. Some of the short streets are on the contour with names like Buck Island (which is in the view) and Alley Wild.

2. Riverside Neighborhood, immediately to the west of lower Link River and Lake Ewauna, is an old area built on a steep slope. Some of the streets are unpaved. Some of the older houses are listed as defective by the city planners.

3. The Stewart-Lennox Neighborhood, or addition, is at the intersection of Highways 66 and 140. It is near the Weyerhaeuser Mill

and some of the residents work in the mill, which is a short distance to the southeast. The major streets are parallel to Highway 66; cross streets, named for minerals - diamond, emerald, flint, granite, and iron - run north and south. Most of the residences are near the 4,200 foot contour, on the nearly level land of the Basin floor. Because of sanitation problems, this neighborhood has been annexed to Klamath Falls and is connected to the city by a long, narrow corridor.

4. The Gatewood Neighborhood is on the south side of Altamont, immediately north of the airport. This is a fairly new subdivision with streets laid out mostly in curves and with several short dead end courts. This district has been annexed to the City of Klamath Falls and connected by a slender corridor which parallels the Burlington Northern Railway; and also connects the city with Kingsley Field, which is within the Klamath Falls City Limit (see p. 7-21).

KLAMATH FALLS - A SUMMARY

Klamath Falls gets a high grade overall from the authors, at least. It is a clean, well-ordered city with an adequate supply of good water from wells, distributed over the city and most suburban districts. Sewer service is good and the disposal system adequate. Streets are generally in good condition, although additional paving is needed in some areas. The quality of housing, commercial and residential, is good, although a few structures could be improved.

The large areas of vacant land within the main body of the city are somewhat surprising. This is not counting the large outlying areas like Moore Park. The City Plan describes some of these as too steep and too rocky for building. To be sure, the added expense of building and installing sewers on sloping and rocky land is an important item. The additional cost may be as much as 50 percent. It should be noted that many houses in the city are constructed on sloping and rocky land, where good view lots are obtainable. It is perhaps safe to say that some parts of the city are vacant because so much cheap, level land is available in the suburbs.

Finally, a word about the recent decrease in population. From July 1, 1982, to July 1, 1983 Klamath Falls lost 250 persons while the county lost 850.[6] These small declines are significant only when the natural increase is taken into account. Assuming a one percent natural increase by the excess of births over deaths, Klamath Falls should have gained 171 persons and the county should have gained 592 persons. This means that the net out-migration for Klamath Falls in one year was 421 and for the county, 1,442. The estimate also shows that the unincorporated areas of the county lost population.

ALTAMONT (The "South Suburbs")

Altamont, an unincorporated urban area with more than 19,800 people in 1980, is in fact almost a complete city. But as a unit it is almost ignored. There are no index cards in the Klamath County Library or the Library of the Oregon Institute of Technology for Altamont. Some people prefer to call the area "the South Suburbs," although the location is definitely to the southeast of Klamath Falls. The Comprehensive Plan for the City of Klamath Falls[7] includes the area but not by name. The map shows a sanitary district, irrigation districts, and school districts, but no boundary for the urban area and no name. The County Plan shows Altamont by name on a population graph and on a population pyra-



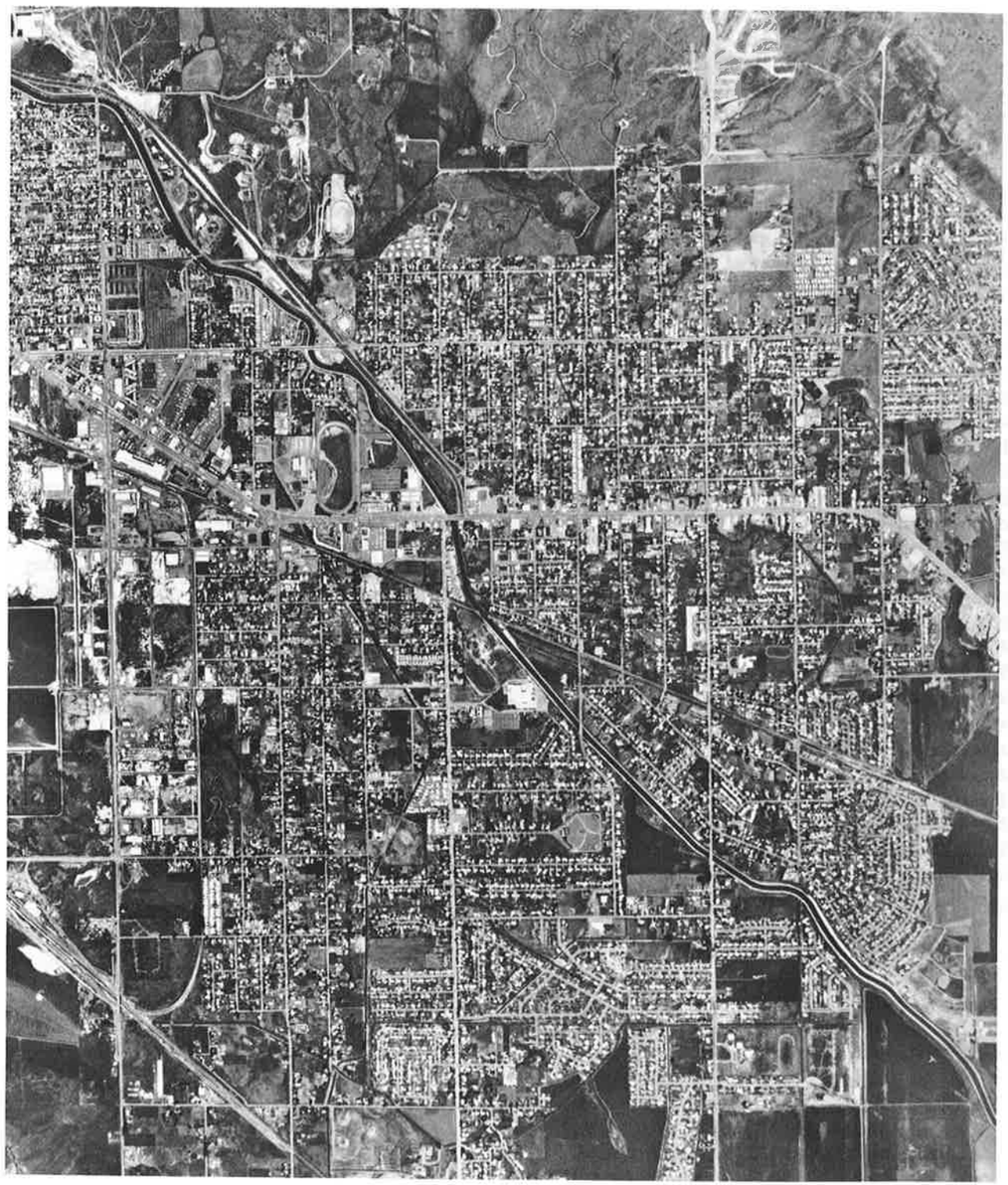


Fig. 7.10. This vertical airphoto covers most of the developed part of Altamont and a small part (upper left) of Klamath Falls. It overlaps with Figure 7.2. The Main Canal flows diagonally across the area as does the Oregon, California and Eastern Railroad. This photo shows many small open spaces and, in general, a low density of houses, as compared with Klamath Falls. (U.S. Geol. Survey photo).

mid. The United States Bureau of the Census, 1980, however, recognizes Altamont and provides a map of its limits. The United States Geological Survey Map, Merrill Quadrangle, 1957, names Altamont and shows the limits at that time by a red overprint. The Geological Survey, in cooperation with the U.S. Board of Geographic Names, is generally considered an arbiter of place names.

For the purposes of this study, the 1980 definition of Altamont by the United States Bureau of the Census makes sense and is used here. The boundary is in the shape of an irregular octagon and is defined by streets, drainage lines, and terrain. The northern boundary is the southern city limit of Klamath Falls. It is quite irregular and has evidently been decided by sporadic annexations to Klamath Falls. The eastern boundary is generally the edge of the Basin plain, although one subdivision, Moyina Heights, lies on the foothill slope at a slightly higher elevation. The southern boundary runs along Johns Avenue and Airway Road. The western boundary is Washburn Avenue and the Burlington Northern Railway. Most of the area lies on the floor of old Lake Modoc between the 4,100 and 4,240 foot contours. The gentle slope is to the southwest and to the Klamath River at approximately 50 feet per mile.

## GROWTH OF ALTAMONT

Altamont began as a ranch and by 1895 it was made a postoffice. By 1910 most of the area was still farmland. Then the area began to grow more rapidly and by 1970 the population equaled that of Klamath Falls and by 1980 had surpassed the central city. It is unusual, even unique, for a suburb to exceed the parent city in population. For Altamont is definitely a suburb, not a complete city. It lacks a city government and a hospital; all other urban services are provided. Altamont has a high school but some high school students go to Klamath Falls Union High School. Altamont has its own elementary schools and service organizations for water, sewers, and street repair.

Several factors contribute to Altamont's unusual growth. It occupies a broad, nearly level plain with plenty of room to grow ( fig. 7.10). Land is cheaper than in Klamath Falls and many of the first residences were built on 10 and 20-acre plots. Taxes are lower, although this is probably a minor factor; street construction and upkeep are cheaper. These and other less definite factors perhaps have prevented Altamont from becoming a part of Klamath Falls. So, until the population reached 2,500 the Census called Altamont "rural." Then it became an Unincorporated Urban Area and later simply an Urban Census Tract. Leo Huff, in his thesis (1974) describes details of Altamont's growth.

> Subdivision of land into lots for residential development began in Altamont in 1910 with the division of a 90-acre tract into 10-acre plots called Altamont Small Farms. Extensive subdivision activity did not begin, however, until the 1920s. Subdivision since 1920 can be classified into three periods.
>
> The period between 1920 and 1940 was a period of extensive land activity as a result of the lumber boom. Two thirds of the land ever subdivided in Altamont or about 2,100 acres were subdivided into one-acre and half-acre lots during this period.



An early resident of Altamont describes conditions in the 1930s: "When the Depression hit, everyone was afraid of taxes and everyone wanted a small piece of land. In 1930 my family bought a half acre of land and paid $600 for it. Most of the streets were dirt; only a few had some gravel on them. The school bus often got stuck in winter. Houses were board shacks with tin roofs. Many years passed before our house had siding and painting came even later. Many families had no income and had to depend on the relief system which did not work very well."

Leo Huff's account continues:

> The second period, 1940 to 1955, was one of modest activity. Only about 445 acres were subdivided, reflecting the lack of building activity during World War II and a slow growth period afterward.
>
> Beginning in the late 1950s there was a renewal in subdivision activity. During the 1960s 610 acres were subdivided as a result of Altamont's greatest decennial gain in population. Because the lots were usually only 10,000 to 15,000 square feet in area, nearly as many lots were added to Altamont during this period as in the 1920s and 30s.
>
> Prior to 1950 inhabitants of areas outside cities in the county were counted by election precincts. The two precincts that covered the Altamont area in 1930 had a total of 2,246 residents. By 1940 there were four precincts covering the area and the population was 6,558. The population gain in Altamont during those ten years was thus 190%. Klamath Falls on the other hand increased only two-and-one half percent from 16,047 to 16,497 during the same period.[8]

## ALTAMONT NEIGHBORHOODS

Aside from the commercial strip and some of the newer subdivisions, Altamont presents a remarkably uniform appearance. Most of the street patterns are rectangular, running north-south and east-west. The typical residence is a single story frame with a gable roof detached house. The type of house and the spacing varies; in the older neighborhoods the spacing is wide, the houses are traditional, and today a few of them are substandard. In the newer subdivisions most of the houses are modern, ranch style and closely spaced. Fences around the lots are common throughout, except for a few of the newer subdivisions (fig. 7.11).

## DESCRIPTIONS OF THE NEIGHBORHOODS

K. The Commercial Strip is almost a commercial core. Except for a bulge in the west, it extends as a narrow belt along Highway 39 from Washburn Avenue to the eastern limit of Altamont. On the western end it is a rough triangular area bordered by the City of Klamath Falls; on the north by the Main Canal; and on the south by Crosby Avenue. To the east the strip is a narrow band along Highway 39 (and 140). The "bulge" on the west (fig. 7.11) includes the Klamath County Fairgrounds and repair shops, a ball park, four supermarkets, mobile home parks, and individual mobile homes; also a maintenance station of the Oregon State Highway Department and an office of the resident engineer. In addition, there is the Altamont School and the large Shasta Plaza Shopping Center which is just across the line in Klamath Falls. At first glance it would appear that the strip is just a series of neighborhood commercial areas

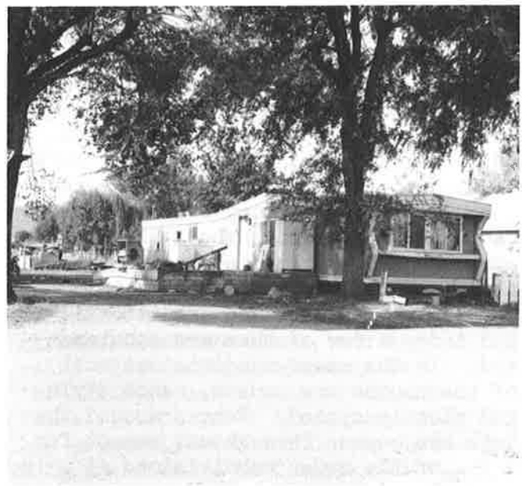


Fig. 7.11. Four house types in Altamont: in Altamont Acres (upper left) are many older houses, also mobile homes; in Moyina Heights (upper right) the houses are on slightly higher ground; the Tower Theatre (lower left) is on the commercial strip; houses in the Gatewood District (lower right) are on the south side of Altamont. (William Loy photos).



strung together. But, in fact, many of the businesses serve both Altamont and Klamath Falls. Most of the buildings are one or two stories, well spaced with parking lots in between. Included are branch banks, insurance agencies, automobile agencies, garages, filling stations, farm machinery outlets, motels, restaurants, clothing stores, bakeries, print shops, and more. In addition, there are several light manufacturing plants.

L. Altamont Acres, the oldest large residential neighborhood (fig. 7.11), is bordered on the west by Washburn Avenue, on the north by the Commercial Strip, on the east by the Main Canal, Hope Avenue, and Summers Lane, and on the south by the Burlington Northern Railway. This was the first large area of Altamont to be subdivided. Some of the original lots were 10 and 20 acres in size but most of them have been further subdivided and today many of the houses are closely spaced. Many of the blocks are long and have narrow strips of pasture behind the houses. However, livestock are less evident today than formerly. Most of the houses are single story frame with gable roofs. There are a few mobile home parks and numerous single mobile homes scattered through the area, but most abundant on the west side. Two secondary irrigation canals cross the area.

M. The Gatewood Neighborhood. The name "Gatewood" is sometimes applied only to the southern part of the neighborhood, which has been annexed to Klamath Falls (fig. 7.11). As a whole, it is bordered on the west by Altamont Acres, on the east and north by the Main Canal, Lombard Drive, and Madison Avenue, on the south by Johns Street. The street pattern varies - some rectangular, some diagonal, and some slightly curved. Some very short, dead-end streets are called "courts." There are a few fairly large open spaces in the southeastern part of the neighborhood. Most of the houses are new, many of them ranch style.

N. Homedale Neighborhood, named for Homedale Avenue which runs north-south through the western part. It is bordered on the north by the Commercial Strip and on the southwest by the Main Canal. The Oregon and California Eastern Railway runs diagonally through the area. North of the railway many blocks are elongated north-south; south of the railway some of the streets run parallel to the Main Canal, others are laid out in curves. Ferguson School is located near the center and Wiard Park is in the west. A special small subdivision, St. Francis Park, is near the western tip. The southeastern part is undeveloped, with only a few scattered houses.

O. The Southeast Open Neighborhood. This is sometimes called the Henley Area, but the hamlet of Henley is not in Altamont. It is mostly open farmland with scattered farm houses, but with clusters of urban dwellings along Airway Drive and Highway 39. This area will likely be developed and subdivided if Altamont's population continues to grow.

P. Fairacres Neighborhood is to the north of the Commercial Strip and between the Main Canal on the west and Patterson Avenue on the east. It extends north to the Altamont urban limit (where Klamath Falls has recently annexed a large, nearly empty area on the slopes of Hogback Mountain). Most of this area was subdivided and built up in the period 1930 to 1950, as is shown by the house types and the conditions of the houses. There are mobile home parks and many individual mobile homes, fairly evenly distributed. The area has an elementary

school, a fire station, and a park. The southeastern portion is sometimes called Yalta Gardens.

Q. Moyina Heights. This is a new, modern subdivision between Patterson Avenue and Highway 39 on the west and the steep slope of Hogback Mountain on the east (fig. 7.11). Unlike other Altamont neighborhoods it is on gently sloping land above the Basin floor. The street pattern is varied, conforming, in part, to the contours. The houses are large, in modern style with curbs and gutters, but mostly not sidewalks. The yards, one could almost say "grounds," are extensively landscaped with a variety of plantings. A few small condominium units, well-spaced, are included. This is perhaps the best building site in Altamont and there is ample room on these gentle slopes for expansion. Some of the people living here do not consider this a part of Altamont.

ALTAMONT - THE PROSPECT

Altamont: does it really exist? To be sure, there are a lot of people living there. But is it a unit or is it just an "Unincorporated Urban Area," as the United States Bureau of the Census calls it? To some people in Klamath Falls and Klamath County, Altamont is a sort of "invisible" suburb, consisting of several subdivisions with little relation to each other. The Klamath Falls Comprehensive Plan (1981) almost ignores Altamont. How can a city plan be comprehensive and give so little space to a suburb larger than the city? The Klamath County Master Plan (1980)9 gives it a little more attention. Lesser places are covered - Bly, Chiloquin, Keno, Merrill, and Malin - but Altamont as a unit is not.

But the Klamath Falls Chamber of Commerce is not ignoring Altamont. It would be advantageous to Klamath Falls to annex Altamont; it would more than double the population with a few strokes of the pen. But "annexation" is a dirty word to Altamontians. As this is written, seven committees are at work on the various problems of "unification." So Altamont has three choices. If they remain as they are, an unincorporated urban area, their taxes are low, but they do not receive the distribution of state taxes on liquor, cigarettes, and gasoline, which amounts to more than $60 per family, per year. If "unified" or incorporated they would have higher taxes and also lose police protection now provided by the county and state. The citizens of Klamath County outside of the urban areas would be the gainers.

The question of comparable regulations arises. Although the regulations concerning livestock, sidewalks, curbs, gutters, and fences are supposedly the same throughout the county, in practice enforcement varies. For instance, one can keep a goat, a cow, or a horse in the backyard in Klamath Falls if the neighbors do not object. Chances are they will. In Altamont, where the habit of keeping livestock is a custom of long standing, the chances are they will not object.

Note: On May, 21, 1985, the voters of Klamath County rejected a proposal to unify the two urban areas, Klamath Falls and Altamont. Klamath Falls voted in favor of unification, Altamont voted against it.



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INDEX