

AN ABSTRACT OF THE THESIS OF

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The purpose of this thesis is to examine the problem of the increasing competition between recreation and irrigation at Wallowa Lake. Originally Wallowa Lake was an abundant source of fish for the Indians but the advent of irrigation in the area by the early settlers eliminated the blueback salmon (^oAncorhynchus nerka) run that spawned in the lake. This was caused by the establishment of unscreened irrigation ditches in the Wallowa River below the lake and the construction of a concrete dam in the outlet of the lake by the Associated Ditch Companies. The dam raised the natural level of the lake 28.4 feet, creating an irrigation reservoir. The use of this water for irrigation purposes has caused considerable erosion along the steep banks of the east and west moraines, reducing the desirability of the beaches and hampering the use of boating facilities. The Pacific Power and Light Company used a considerable amount of water from the lake for their generating plant in Joseph from

1929 to 1956. This limited the number of times the lake was filled to capacity, lessening the amount of sloughing of the relatively undeveloped shoreline property around the lake since the greatest damage occurred when the lake was full.

After 1950, many more people purchased lots and built cabins on the west moraine and became increasingly aware of the erosion of their property. The erosion problem increased sharply after the Joseph power plant was abandoned in 1956, enabling the Associated Ditch Companies to fill the reservoir to capacity nearly every year since that time. Increased dissatisfaction by the cabin owners with the management practices of the Associated Ditch Companies resulted in a lawsuit in which the ditch companies were found guilty of trespass of private property by exceeding their storage rights. Although the fine in this instance was negligible, future confrontations appear to be inevitable due to the increasing influence of recreationists in an area once considered the exclusive domain of agriculture and power interests. Future cooperation between these conflicting interests is vital in order to realize the full potential of the multiple uses of the lake.

Conflicts in the Multiple Use of Wallowa Lake

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CONFLICTS IN THE MULTIPLE USE OF WALLOWA LAKE

INTRODUCTION

Wallowa Lake has been one of the most important resources of Wallowa County (see map). Men have competed for use of this resource since the days of the Indians. The lake provided a valuable source of fish for the Nez Perce Indians before the coming of the white man. Although the Wallowa Country was set aside for the Nez Perce in 1855 by the United States Government, the Wallowa Valley with its abundant feed and water was soon coveted by the white man.

As the first settlers entered the valley, forcing out the Indians, they saw the lake not only as a source of fish, but also as a valuable source of irrigation water for the rich farm lands below. The irrigation farmers and the fish interests were the next competitors for the use of the lake, however, the agricultural interests won this early conflict, and the fish run was destroyed. The farmers were then challenged by the development of hydroelectric power. These two interests reached an agreement, however, and cooperated in the use of lake water for many years. But after power generation was discontinued in 1956, the Associated Ditch Companies, who now represented the farmers of the area, became the dominant user.

Recreation has presented a growing challenge to the interests of agriculture. Although the Associated Ditch Companies were little

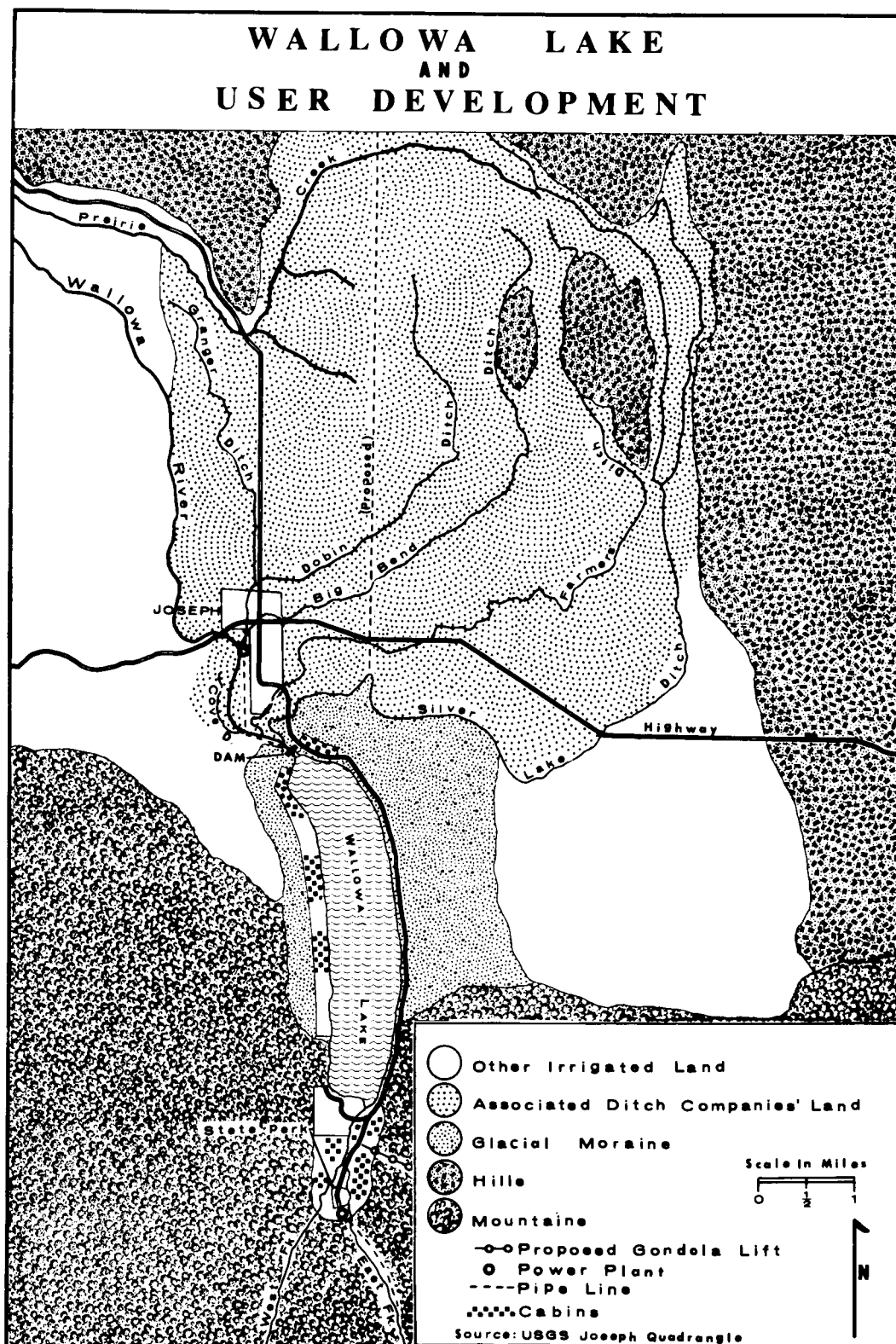
affected by it in the early days, the last ten years have shown a markedly increasing demand by the fish interests, property owners, and other recreationists for the use of the lake and its waters. This demand coupled with the gradual shifting of political influence from private to public interests, has created a controversial issue today.

The purpose of this thesis is to examine the background as well as the present development of the multiple uses of Wallowa Lake. Hopefully, this will provide a better understanding of the many problems that have developed in the past as well as those that may arise in the future. Currently, the most critical issue is the erosion and sloughing of the private shoreline around the lake caused by the storage of water for irrigation. Although this is a direct result of the necessary raising and lowering of the lake by the Associated Ditch Companies for irrigation purposes, the management practices of the ditch companies can have a direct bearing on the amount of damage that might occur. Therefore, several proposals for achieving better water management are discussed at length in respect to their feasibility.

The author was raised in the Wallowa Valley, has owned and operated a ranch there for many years and as a member of the Associated Ditch Companies, has an intimate knowledge of the problems of that organization. His grandfather settled in the valley in 1878 becoming one of the first cattlemen in the area and established

the Craig-McCubbin Ditch Company, one of the early members of the Associated Ditch Companies. The author currently owns and irrigates much of the original land once owned by his father and grandfather. Therefore, he not only has had access to pertinent history but has had practical experience concerning irrigation and Wallowa Lake. In addition, he has also actively participated in the recreational activities at Wallowa Lake and is personally acquainted with many people concerned with recreation and its development.

Personal knowledge of both sides of the conflict has been an advantage to the author in obtaining source material and presenting an objective analysis of the problem. Source material was obtained from the "minutes of the meetings" and various legal documents of the Associated Ditch Companies. Other pertinent information was obtained from the Fish and Game Commission and from various interviews, particularly with the commercial recreation interests at the lake, cabin owners, the Soil Conservation Service, the State Engineers Office, and the Parks and Recreation Division of the State Highway Commission.



WALLOWA LAKE PRIOR TO 1905

Background

Wallowa Lake is located in Wallowa County, situated in the northeast corner of the state of Oregon. During the years prior to the coming of the white man, this area was in the coveted territory of what was called the Joseph Tribe of the Nez Perce Indian Federation. These Indians summered in "the high country" and the Wallowa Valley where there was abundant game and feed for their many horses. The main focal point of this area was the beautiful lake at the head of the valley, now called Wallowa Lake. The reason for this was the existence of the "blueback" salmon (Ancorhynchus nerka) also known as "sockeye" salmon. The salmon, red in color and small in relation to other species, were considered a delicacy both by the Indians and later by the white man. These fish were unusual in that after migrating to the ocean for four years, they returned to spawn only up the rivers whose headwaters originated in a lake. Wallowa was the only lake in Oregon containing these fish (21, p. 3). The Indians built fish traps in the spawning streams at the head of the lake and in the outlet, as well as in other areas in the river below the lake. It is thought that this is the origin of the name, "Wallowa," which refers to fishtraps in the Nez Perce language (6, p. 6). The

fish were dried in the sun, providing food for the Indians in summer months and were then transported to their winter quarters in the canyons to the north for winter provisions.¹

The Physical Description of Wallowa Lake

Wallowa Lake has been the focal point of the Wallowa Country since the days of the Indians and continues to be so today. The first name given to it by the white settlers was "Silver Lake" and after it became a storage reservoir it was known as the "Eagle Cap Reservoir." However, it was fitting that the name, "Wallowa" finally endured (6, p. 29).

Wallowa Lake is located at the southeast end of the valley nestled in the northern edge of what was once a huge granodioritic batholith, now called the Wallowa Mountains (21, p. 6). These mountains were once covered by an immense glacier, part of which moved down the drainage channels forming two parallel lateral moraines and a terminal moraine. The latter caused a damming section which formed the lake, approximately one million years ago. Wallowa Lake is considered by geologists to be one of the most outstanding examples of glacial lakes in the United States. The lake is

¹As told by the author's uncle, Frazier Craig, who was an early settler.

about four and one half miles long with a maximum depth of 283 feet (16, p. 4). The crests of the moraines extend 1200 feet above the bottom of the lake. As a storage reservoir, it has a capacity of 42,750 acre feet.² Below the terminal moraine, a glacial outwash plain extends beyond the town of Joseph to the north. On this plain are some 16,000 acres of fertile land which are made productive by the waters from the lake (see map).

The Coming of the White Man

The Wallowa Country was not settled until 1871, much later than many other parts of Oregon. This was due in part to its remoteness resulting from the surrounding rugged mountains and canyons. Moreover, the United States Government prohibited white settlement by the Treaty of 1855 which set aside the area as Nez Perce Indian territory. In 1867, however, the government in effect abrogated the treaty and opened it up for white settlement (6, pp. 5-7).³

² Taken from the Capacity Tables of the State Engineer's Office. Before 1966, the capacity was considered to be approximately 37,000 acre feet because the natural level of the outlet was 3.4 to 4.0 feet above the bottom sill of dam gates. In the Fall of 1966, the channel was dredged permitting the use of 42,750 acre feet of storage water.

³ Chief Lawyer, another of the Nez Perce Chiefs, signed a treaty in 1867, giving all Nez Perce Lands to the U. S. Government. Joseph, a Chief of equal status, refused to recognize the treaty.

Settlers began moving into the Wallowa Valley in about 1871, being attracted by the numerous grassy meadows and fertile soils that produced an abundance of green feed during the summer months. This abundant grass was made possible by high water table and overflow along the many streams in the area. These early settlers also found good fishing, especially in the Fall when the annual run of "red fish" (as the early settlers called them), moved up the Wallowa River to spawn in Wallowa Lake and its headwaters. These fish were so numerous that the various channels appeared as a solid red band. In fact, as the Nez Perce crossed these streams, their horses were sometimes seen to actually kick these fish out on the bank.⁴

The Joseph Tribe of the Nez Perce lived side by side and fished the lake with the white settlers for a few years. In 1877, however, a dispute between two white men and two Indians resulted in the killing of the latter. Because the white settlers were afraid the Indians would avenge the incident, an army detachment was brought in and ordered the Indians out of the country and on to a reservation at Lapwai, Idaho. The Indians finally did so, but not without a struggle which is a well-known saga beyond the scope of this paper (6, pp. 5-7).

After the Indians left, the white settlers had Wallowa Lake and

⁴Craig, loc. cit.

its abundant fish resources to themselves. By 1894, there were two commercial canneries in operation. One of these was located at the head of Wallowa Lake and was operated by James McCall for five years. The blueback was considered a delicacy and sold in markets in the Pacific Northwest and elsewhere (21, p. 2).

The Advent of Irrigation

As was mentioned previously, one of the chief attractions that brought the early settlers into the Wallowa Valley was the bountiful supply of water in the area. From the beginning these first settlers practiced irrigation where possible. This was feasible because of the numerous streams which were fed by the snows in the extensive watershed of the high Wallowa Mountains. This area has a high rating as a water storage area because of the high mountain lakes and storage basins, the eight to ten foot annual snowfall, and the relatively cool summer temperatures which usually permit the existence of some snowfields the year around. Many of the peaks in these mountains are over 9,000 feet and two are over 10,000 feet (25, p. 23). These early settlers also found it quite easy to divert water from the many streams in different areas because of the shallow stream channels which only required low diversion dams of simple construction.

The largest block of relatively level land was found in the upper

valley below the lake encompassing the glacial outwash plain and areas beyond. This area is referred to as upper and lower Prairie Creek today. The natural level of Wallowa Lake is at least 150 feet above most of the valley floor of the Prairie Creek area. The early settlers were quick to recognize the possibility of diverting water out of the Wallowa River below the outlet of the lake and transporting it through contour ditches to the farm lands below (see map).

Irrigation was being practiced from the natural flow of the Wallowa River below the dam at least as early as 1880, as is evidenced by the first natural flow water right which was filed in the State Engineer's Office in that year--known as the "Mitchell Right" (3). Several farmers cooperated and organized ditch companies in order to finance, construct and maintain ditches out of the Wallowa River. As these companies were organized, they filed on natural flow rights (Table 1). Gradually more farms came under cultivation and the ditches were extended out into the valley (see map). More ditch companies were organized causing a greater demand for the natural river flow.

The amount of water available for irrigation depended upon two factors: (1) The total depth and the water content of the snow pack in the mountains; (2) the variation in the amount and the rapidity of the runoff from the melting snows. In addition the chinook wind, a common climatic phenomenon in the area, affected the snow melt. A

strong chinook in January or February tended to settle and crust the snow into relatively hard snow banks which resisted melting and a rapid runoff in the early spring. This permitted irrigation later in the summer season. Thus the chinook often meant the difference between one and two crops of alfalfa.⁵

Table 1. Original Natural Flow Right Applications

Company	Inches of Water	Year
Mitchell Right*	---	1880
Creighton Ditch Co.	250	1883
Big Bend Ditch Co.	1200	1884
Granger Ditch Co.	1068	1889
Cove Ditch Co.	410	1890
Silver Lake Ditch Co.	1930	1893

* The Mitchell Right was assumed by the other ditch companies.

1 CFS equals 40 inches of water

1 CFS equals 2 acre feet (2 acre feet equals two acres covered by one foot of water)

Source: Wallowa County Water Master's Office Records.

The usual snow melt reached its peak during May and June resulting in a rapid runoff, albeit there was usually a respectable stream flow the year around. Since there was no storage facility at

⁵ Most farmers believe this to be true although it may not be scientifically proven.

the lake, the great bulk of the water ran down the rivers into the ocean in the spring and early summer, leaving a limited amount of stream flow during the latter part of the summer. It soon became apparent due to the increasing demand for irrigation water, that a dam needed to be built in the outlet of the lake in order to hold more of the early spring runoff to provide storage water for irrigation later in the season.

THE FORMATION OF THE RESERVOIR

The Associated Ditch Companies

By 1904, there were several individual ditch companies using the natural flow from the lake. There were only three or four diversion dams in the river below the natural outlet, however, since more than one company was sharing at least part of the same ditch. Because of the need for improvement of the irrigation canals as well as a dam for storage purposes, in 1905 the various ditch companies organized into an association called, "The Associated Ditch Companies." The same year, the Associated Ditch Companies elected to build a low wooden dam in the outlet of the lake. Since this dam was quite low, it did not prevent the blueback salmon from passing in and out of the lake (21, p. 6). This structure only raised the lake four feet above the natural level and created no problem of trespass around the lake since there was little or no recreational development. The farmers managed to get by for a few years, but this small amount of storage proved to be inadequate and the ditch companies decided to build a new concrete dam in 1916.

Construction of the Concrete Dam

This 1916 dam was 18 feet above the bottom sill of the dam gates. This prevented the migration of the blueback salmon to and

from the lake. The Associated Ditch Companies anticipated that this dam might also prove to be inadequate and their plans provided for the dam to be raised if deemed necessary at a later date. In order to meet these limits legally, they filed for and were granted a water right for 44,000 acre feet of storage water in 1915.⁶ By 1920, it was evident that more water was needed and the dam was raised three more feet with an overall height of 21 feet. As more and more land was put under irrigation, storage water again proved to be inadequate and the dam was raised an additional six feet in 1929, bringing it up to its present height of 26.8 feet from the bottom sills of the gates to the spillway. It should be noted here that the ditch companies present 26.8 foot dam will only store 42,750 acre feet--some 1250 acre feet less than their legal storage permit allows.⁷ The basic 1916 dam was built approximately 200 yards downstream from the natural outlet and was constructed so that the bottom sill of the dam gates was 3.5 to 4 feet below the natural level of the lake (Figs. 6, 8) (2, pp. 4-6).

In 1915, the various ditch companies filed on water to irrigate a total of 14,639 acres. Today, the members of the various associated ditch companies irrigate a total of 16,116 acres from the lake (see map). The increase is generally due to additional land put under

⁶ Oregon State Department of Engineers, Permit no. 2696 & R 347

⁷ Ibid.

sprinkler irrigation, mostly above the ditches (3). The present members of the Associated Ditch Companies and their adjudicated acreage is shown on Table 2.

Table 2. Associated Ditch Companies 1966

Member Companies	Acres Irrigated
1. The Dobbin Ditch Co.	1,161
2. Silver Lake Ditch Co.	3,370
3. Big Bend Ditch Co.	3,131
4. Craig-McCubbin Ditch Co.	180
5. Wrenn & Dobbin Ditch Co.	1,960
6. Farmer's Ditch Co.	4,268
7. Creighton Ditch Co.	978
8. Granger Ditch Co.	1,068
Total	16,116

Source: Wallowa County Water Master's Office Records (3).

Flood Rights and Easements

The construction of a dam in the outlet of Wallowa Lake converted it from a natural lake into a storage reservoir. With the anticipation of this project, the ditch companies needed to acquire deeds to land or easements to permit the flooding of private lands around the shoreline of the lake. Since the Associated Ditch Companies were not a legal corporation, they could not legally own

property, therefore the Dobbin Ditch Company, a legal corporation, was delegated to purchase land and obtain easements for the flooding of private lands around the shore line. Extensive acreages were purchased both at the head and at the foot of the lake. Much of this property was sold at a later date to private individuals and the proceeds were used to pay for the construction of the dam, but the flood rights to these lands were reserved by the ditch companies.

An example of the flood rights obtained on private lands was an easement known as the "Stanley Deed" which granted the Dobbin Ditch Company the right to raise the water 25 feet from the low level of the lake. This deed also recognized that the dam was approximately four feet below the natural level of the lake and provided that the ditch companies could lower the natural outlet of the lake four feet in order to utilize the maximum amount of storage possible (Fig. 8) (2, pp. 4-6). This fact and the question of whether the Dobbin Ditch Company was acting for itself or in behalf of all the Associated Ditch Companies proved to be a point of contention in later years (2).

Water Shortage Problems

With the building of the 26.8 ft. dam in 1929, the ditch companies assumed that they would have adequate water to irrigate the lands in cultivation under the lake ditches. Unfortunately, this did

not prove to be the case. Almost immediately afterward, a series of dry years occurred, resulting in an insufficient snow pack in the mountains followed by hot, dry summers. The lake did not fill to capacity, the spring runoff was low in intensity and of short duration. The farmers soon found themselves being restricted on irrigation water. The Associated Ditch Companies were forced to reduce each farmer's "head of water" on some occasions by 25 percent and to shut them off entirely on Sundays (29).

The farmers of the Associated Ditch Companies have an abundance of water, however, compared to other regions and obtain it at relatively low cost. The irrigating farmers pay nothing for their water as such, contrary to most other areas. Since the Associated Ditch Companies have paid off the cost of the dam construction, their only expenses have been dam up-keep, ditch repairs, a care-taker and several "ditch walkers."⁸ A liberal estimate of water cost would not be over two or three dollars per acre for the average year.⁹ In contrast, farmers in other areas such as Moses Lake, Washington and Ontario, Oregon pay approximately eight dollars per acre and must pay an additional fee for water used in

⁸ The ditch-walkers regulate the water and manage the ditches.

⁹ This is based on the author's own experience.

excess of their allotment.¹⁰ The farmers in the Associated Ditch Companies probably use at least one and one half acre feet of water per month for a four month season (3). By contrast, the Ontario, Oregon, farmer gets only a total of four acre feet for approximately a five month's season.

This seems to suggest two things: (1) There should not be a water shortage; (2) A vast amount of water is being wasted. Since the bulk of the farms are still being flood irrigated, it is probable that a significant amount of water does get away from the average farmer, especially when fewer people today know how to flood irrigate or are willing to do the work required. The main loss of water, however, stems from the gravel ditches which permit excessive downward drainage through which the irrigation water must flow. The Soil Conservation Service has made a conservative estimate that 50 percent of the water is lost enroute in many ditches over a distance of two to three miles. It must be pointed out that although this water may be lost to the farmer on Prairie Creek, it has not been wasted since most finds its way back into the drainage channels down stream for later use.

During the 1930's, a serious study was made to enlarge and extend the existing "Moonshine Ditch" by tapping the flow out of

¹⁰ This is based on interviews with farmers from both areas.

Hurricane Creek to the west and diverting the water into Wallowa Lake during the winter months and during the peak runoff in the spring. It was to have been a Public Works Administration project during the depression years, but strangely the project was not initiated because of the lack of available labor. The ditch companies did not think they could afford to finance the project themselves and so it was abandoned, although it was discussed in later years (29).

In general, the water supply has been adequate for most irrigation seasons with the use of good management and conservation practices, although there have been several years when some farmers, limited by a relatively late "storage right," were unable to irrigate all of their second crop and pasture. This was also true in 1966, another dry year, when the storage water in the lake was gone by the 15th of August (3). Farmers having only storage rights were shut off and the only ones who could irrigate were the holders of the natural flow rights (Table 1). This meant that the farmers with the natural flow rights could use the water that was flowing into the lake and subsequently flowed out of the lake, since they had a prior right. Because of these periodic shortages, the Associated Ditch Companies have endeavored to store the maximum amount of water in the lake at all times.

COMPETITION FOR THE USE OF THE LAKE

Power Generation and Domestic Use

Irrigation was not the only use made of the water coming out of the lake. Other competitors with the ditch companies were the city of Joseph and various power generation companies.

In 1910, the city of Joseph filed on a water right amounting to 12 cubic feet per second (hereafter referred to as CFS) for domestic use (7). A pipe system was installed in the outlet and extended into the lake before the concrete dam was built in 1916 (2, p. 4). The presence of this pipeline presented a few construction problems for the ditch companies during the construction of the dam, but since the city remained a small community, the volume of water withdrawn from the lake never was significant as far as the ditch companies were concerned.

In addition, a number of applications for water rights for power generation were granted in the natural flow of the river immediately below the outlet of the lake and at other points on down the river.

One of the first to apply in the upper valley was the Enterprise Electric Company in 1905. This company built and operated a plant located just below the present city of Enterprise, approximately six miles below Joseph. The McCully-Rumble Land and Power Company

filed on 500 CFS in 1911. This company became known as the Joseph Power Company by 1915 (7). The Enterprise Electric Company purchased the Joseph Power Company in 1916. In 1924, the Associated Ditch Companies became embroiled in a conflict with the Enterprise Electric Company over the maintenance of a minimum flow of water downstream in the Wallowa River to its power plant. The Associated Ditch Companies were finally successful in negotiating with the Enterprise Electric Company which allowed the ditch companies to store the power company's water in the lake as long as it maintained a required amount of stream flow. In 1924, the Pacific Power and Light Company (hereafter referred to as PP&L Co.) purchased the Enterprise Electric Company and built a small hydroelectric plant above the head of Wallowa Lake (7). This plant was powered by water coming out of the East Fork (see map). According to the State Engineer's Office, this plant produced 1,247 H.P. Since the demand for power in Wallowa County was quite limited in those days, the plant was sufficient to supply practically all of the power needed in Wallowa County except for certain peak demands when an auxiliary plant supplemented the power flow. The old Enterprise plant was used for this purpose, but PP&L Co. apparently decided that it would be to their advantage to build a new plant in Joseph and take their water out of the lake (see map).

The PP&L Co. then negotiated with the Associated Ditch

Companies to obtain the latters' permission to put a pipe line into the dam. The ditch companies were quite reluctant to allow this in the beginning, but finally agreed to do so subject to a payment of \$15,500 when the dam was rebuilt in 1929. The PP&L Co. also agreed to pay \$100 annual rent for a 30 year lease (29). In one sense, it did not deprive the ditch companies of any water during the summer season as the tailrace of the Joseph Power Plant ran back into the Granger Ditch (see map). During the non-irrigating season, most of the water was emptied back into the river as it could not be used for irrigation.

The ditch companies and the power company were often at odds, however, especially during the non-irrigating season as the ditch companies wanted to store the water and the power company wanted to use it. The power plant at Joseph was allotted 15 CFS to be withdrawn from the lake (7). This plant was used a great deal, although as an auxiliary plant it did not run constantly. The records during the storage season (October to April) for the period from October 1950 to April 1954 indicate that the power plant used an average of approximately 15,000 acre feet per storage season (21, p. 6). This is 35 percent of the total storage capacity of the lake. Therefore, it is not surprising that at times there was some conflict of interest regarding the use of the storage water.

A management problem also developed concerning the power

company water among the ditch companies themselves. The tailrace of the power plant was constructed so that it could be diverted into the river during the winter months, but flowed into the Granger Ditch during the irrigation season. During some of the dry years, when the use of water was controlled more closely, the Granger Ditch was charged with the power company water in calculating its maximum allotment.¹¹ Since the auxiliary plant operated rather erratically, the Granger Ditch Company felt that it was not receiving the total amount that it was credited with getting. Therefore, it insisted that all of its water should be turned out at the intake at the dam. Some of the other companies charged that with the addition of the power plant water, the Granger Ditch was getting more than its share.

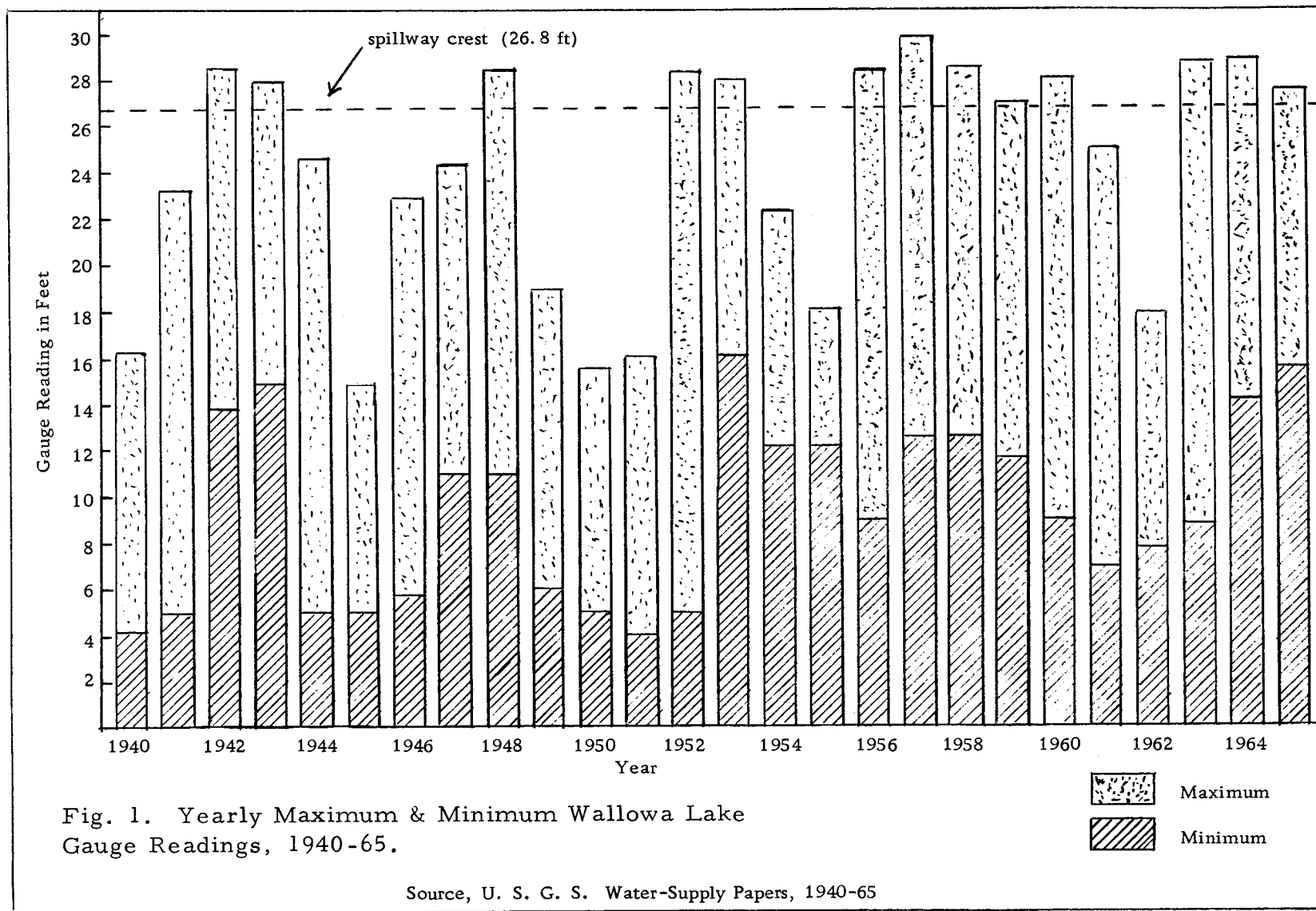
The Associated Ditch Company and the PP&L Co. cooperated in the use of the water through the dam for many years. The power company also paid its share of the dam upkeep as well as the repair of the screen above the dam. Gradually, the demand for power increased in the valley, due in part to the conversion to electric power by the sawmills in the area and the installation of electric powered sprinkler irrigation. In the 1950's, the demand for power

¹¹ When the Granger Ditch ordered 2000 inches of water, only 1400 would be turned down the ditch since 600 inches (15 CFS) was added below the power plant.

increased to the point that existing power installations of the PP&L Co. were inadequate to supply the demand and power was brought in from outside the county. In 1956, the auxiliary plant at Joseph was struck by lightning putting it completely out of operation. Since the generating equipment was becoming obsolete and the outside power was adequate, the plant at Joseph was abandoned and their water right cancelled in 1958 for lack of use (7). The power company did, however, maintain its power plant at the head of Wallowa Lake.

The abandonment of the Joseph plant was a definite advantage to the ditch companies since the water that had been required to run the auxiliary plant during the non-irrigation season could now be stored for use by the ditch companies during the irrigation season. This greatly increased the possibility of filling the reservoir each year. With the exception of 1954, the records show that it has been full or nearly so ever since (7) (Fig. 1). In spite of this, however, there was insufficient water to supply the irrigation needs in the summer of 1966 and the prospects for filling the reservoir in 1967 appear rather slim.

The Associated Ditch Companies tried to obtain the abandoned water right of the power company in order to prevent anyone else from obtaining it. It was not successful, however, because a power generation right is classed as a non-consumptive right. This means, although the water is used, it is returned to the stream for other



uses. An irrigation right, on the other hand, is classified as a consumptive right since the bulk of this water is not returned to the immediate stream. According to Oregon Law, a non-consumptive right cannot be usurped for consumptive purposes and visa versa (7). This indicates that another individual or concern could file on the 15 CFS that had been allotted to the PP&L Co. for any non-consumptive use in the future. Any new applicant would be subject to the new priority date of the application, however, since any cancelled water right loses its original priority (7). The ditch companies would theoretically have an advantage now during a short water year since they now have all of the old priority rights to the water. This does not necessarily guarantee, however, that the companies will have use of this water in the future as will be shown later.

Conflicts with the Fish and Game Commissions

The blueback or sockeye salmon (Oncorhynchus nerka) were in great abundance after the first white settlers entered the country. The advent of irrigation and the diversion of water out of the Wallowa River did great damage to this salmon run. This was because the first ditches were installed without screens over their intakes and thousands of young migrant salmon were diverted out into the fields and perished. The farmers in the beginning did not realize the

seriousness of the situation because these fish were so abundant that they believed there was an inexhaustible supply. Many people gathered these fish by the tub and gunnysack, although most of these fish could not be used.

This situation was brought to the attention of the Oregon State Fish Commission as early as 1890. The first reference pertaining to unscreened ditches appears on page 21 of the 1890 report of the State Board of Fish Commissioners:

Another complaint was made by the people in that part of the state and we find it general where irrigating ditches are in use, that during April and May, when the streams are full of water, a great many young fish of all species, as they are descending the stream, are run into these ditches and carried out on the farms and left to perish. A law should be enacted requiring the owners of all ditches, both for mining and irrigating purposes, to put a screen of fine wire netting across the mouth of all such ditches where water is taken from a stream inhabited by fish and to keep it there during the months of April, May and June. This will not be a hardship to anyone, as but little water is used during these months and the screens can be arranged to interfere very little with the flow of water (16, p. 2).

Pressure was brought to bear by both Fish and Game Commissions to persuade the farmers and the ditch companies to install screens in the intakes of the various ditches not only at Joseph, but on down the river as well. The installation of screens in the ditches was resisted by the ditch companies because at that time there were no fish screens available that would effectively screen the water without seriously restricting the flow of water down the ditches.

The low wooden dam that was constructed in 1905, was passable to the bluback salmon (21, p. 6). Although the sea run of bluebacks was practically eliminated by that date, it is believed that small numbers of adult salmon returned to the lake until 1916 when the high concrete dam was built. It was impassable to the fish as no fish ladder was constructed at that time (21, p. 6). The Oregon State Department of Fisheries did construct a fish screen above the dam in 1905, which was part of an early attempt at artifical propagation activities (Fig. 3)

The 1905 fish screen was financed by the Fish Commission who apparently felt that it was their responsibility, not the farmers, to provide the fish screen (Fig. 3). The ditch companies cooperated with the Game Commission in later years by agreeing to keep the screen in repair. The screen was for the purpose of keeping the fish in the lake so that they could not go through the dam and into the ditches below. The result was that the remaining blueback have become land-locked salmon and seldom grow over 10 inches in length. These fish continued to spawn in the many meandering channels of the river flowing into the lake.

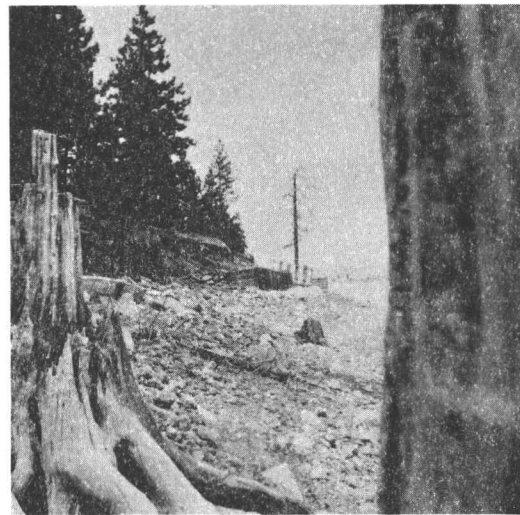
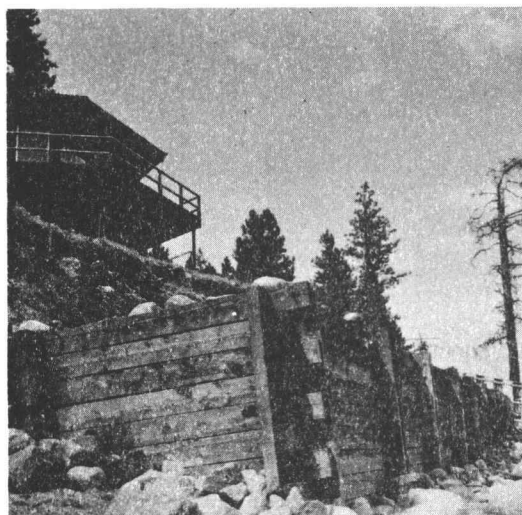
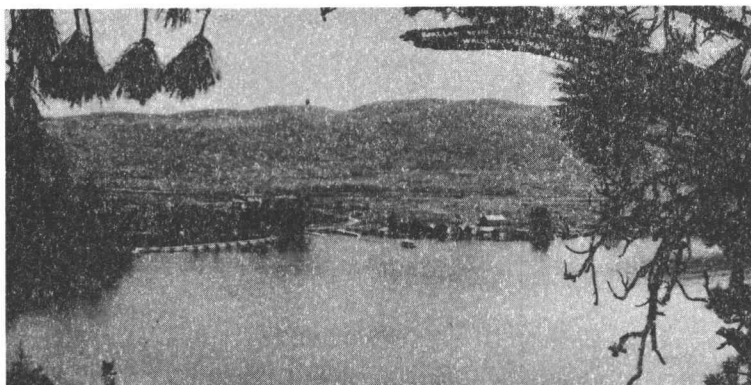
A serious blow was dealt to these fish after the state park was established in 1946. In order to improve and expand the park area, the incoming river was re-channeled into one stream which nearly destroyed the spawning area for the remaining blueback. This

Fig. 2. First Steamboat on
Wallowa Lake, 1888.

Fig. 3. Fish Screen and Boat
Landing, 1905.

Fig. 4. Cabin on west
moraine with wooden
retaining wall, 1966.

Fig. 5. Fluctuating water line
has killed many trees and
caused much sloughing of bank,
1966.



was later reflected by a great reduction in the land-locked blueback in the lake.

The fish screen proved to be a periodic problem for the ditch companies in trying to keep it in repair and prevent it from becoming a menace to the dam. In 1957, unusually high water damaged the fish screen so extensively that the ditch companies were forced to take it out in order to prevent it from floating into the dam (Fig. 6). According to Ken Witty, District Fishery Biologist, the Game Commission subsequently has not rebuilt it, believing that there were not enough fish escaping from the lake to justify it (30).

The Possible Reestablishment of the Blueback Salmon Run

In its efforts to improve the commercial salmon fishery as well as the sports fishing in Oregon, the Oregon Fish Commission has seriously considered the possibility of reestablishing the blueback run to Wallowa Lake. Since 1955, several preliminary investigations were conducted, the more recent by Richard C. Toner in 1959 (21). This report indicates that the reestablishment of the sea run is feasible, although many serious obstacles must be surmounted.

Toner recommended five conditions that would have to be met before the project would be feasible: (3, p. 12)

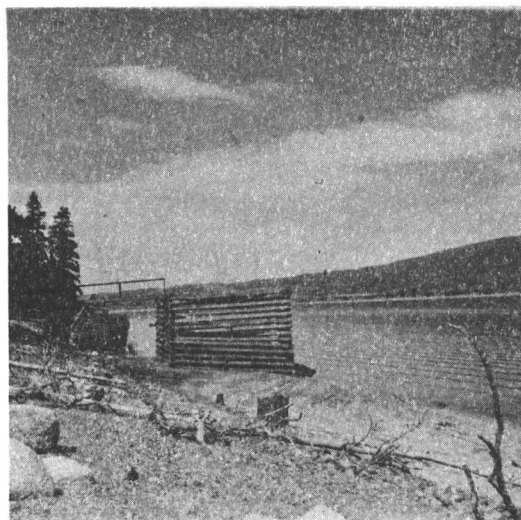
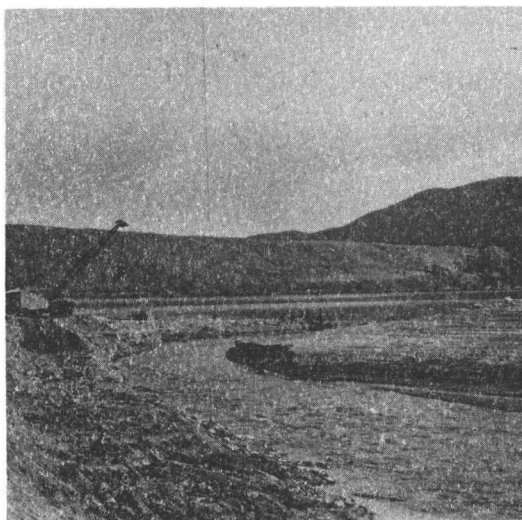
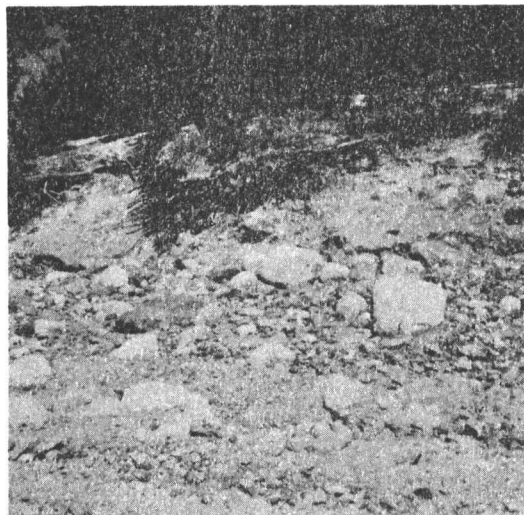
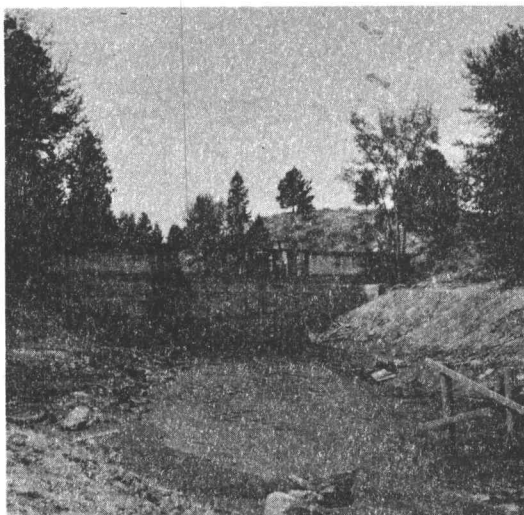
1. A suitable donor stock must be obtained.
2. All unscreened diversion ditches must be screened.
3. Provide additional summer flow in the Wallowa River

Fig. 6. Wallowa Lake Dam, 1966
(note remnant of fish screen in
right foreground)

Fig. 7. Trees are being
undermined and highway
threatened, 1966.

Fig. 8. The natural outlet
being lowered four feet in 1966.

Fig. 9. West side boat
dock illustrating extreme
water line fluctuation,
1966.



from the Consolidated Ditch downstream to a point two miles below Joseph.

4. Construct ladder diversion dams where necessary.
5. Maintain an egg-taking station in the river below the lake.
6. Maintain an egg-incubation station at some suitable site.

Two of these points, 2 and 3, would directly effect the ditch companies:

2. Screen all irrigation diversions not now screened. Toner states that there are 25 unscreened diversions in the Wallowa River from Wallowa Lake to Rock Creek below the city of Wallowa. Many of these ditches have been screened since 1959 except the larger ones from 10 to 30 feet wide. Three of these, the "Silver Lake," the "Consolidated," and the "Farmers" ditches have not been screened because of their size, the volume of water involved, and the cost of construction. He states that it is mechanically possible to successfully screen these large ditches, but the main problem lies in determining who should finance the construction, the fish commission or the ditch companies. This implies that the ditch companies may be asked to finance all or part of the screen construction if the reestablishment project materializes. The installation would be disadvantageous to the Associated Ditch Companies because, contrary to the claims of the Fish Commission, many farmers who have had experience with these screens maintain that they do restrict the flow of water.

3. Provide additional flow in the Wallowa River from the

Consolidated Ditch downstream to a point about two miles below the city of Joseph. During the irrigation season, the Wallowa River carries very little water due to the large diversion by the Associated Ditch Companies. Toner suggests that in order to permit upstream passage of the adult salmon, the Fish Commission might obtain the 15 CFS of water which had been allocated to the PP&L Co. before it closed its power plant in 1956. Since this would be a non-consumptive use, the Fish Commission could qualify for the water right. The loss of this water, 35 percent of the storage capacity of the reservoir, would be a severe blow to the ditch companies.

With the constantly increasing demand for recreational activity today, there is a possibility that the Fish Commission may find it advisable to reestablish the blueback salmon run. If this is done, the Associated Ditch Companies will not only lose a portion of their present water supply, but may also be financially liable for at least part of the construction of the fish screens.

THE GROWING SIGNIFICANCE OF RECREATION

Early Recreation

Recreation began quite early after the coming of the white man. The lake acted as a magnet to many people in the surrounding country in need of recreation and diversion. Wallowa Lake was also the only large accessible lake of such beauty in a 150 mile radius.

There was a steamboat operating on the lake by 1888 which was used as an excursion boat and took people to and from the head of the lake (Fig. 1). This was the only means of getting there since no roads were built around the lake for many years due to the steep gradient along both sides. Although it was not recommended, some resourceful individuals did manage to take wagons around it and camped at the head. One of these was an early citizen of Joseph, F. D. McCully, who put both of the larger rear wheels of his wagon on the lower side and the smaller wheels on the upper side of the wagon. With this arrangement, he succeeded in making the journey to the head of the lake. The Indians, who were also camped there, told them that they could not stay, however, because the women would frighten the game (12).

There was little development at the head of the lake around 1900 with the exception of a simple boat dock and a dance hall.

Many people would drive buggys or cars to the foot of the lake in order to board the excursion boat which took them to the lake head to attend a dance and then returned them that same night. A store and bowling alley were added to the dance hall around 1915. This date is indicated by the fact that an application for a water right was made for power generation purposes at the head of the lake by the Power Generation Amusement Company in 1915 (7). This generating facility was never put into operation however.

Recreation Development Since 1920

The Associated Ditch Companies have contributed to recreation over the years. After the dam was raised to 21 feet in 1920, the reservoir flooded out the existing pier at the head of the lake and killed many trees. The Associated Ditch Companies elected to build a new pier for the benefit of the public and hired a crew of men to clear the dead timber from the area in 1924. They also sold the greater part of their land holdings at the head of the lake to private individuals for cabin sites or other recreational purposes (29). The ditch companies have also given free public access to the lake shore on their property at the foot of the lake. This area was not developed for many years, but in 1958 the ditch companies granted an easement to the Oregon State Game Commission to construct a boat ramp for the benefit of the public. The ditch companies also

allowed a private boat concession to operate on their property for two years, but because of mismanagement, they were forced to bring suit in order to remove the concession from the premises (29).

The ditch companies made further efforts to improve the beach at the foot of the lake and make the area more attractive to the public. Ironically these efforts resulted in a conflict with the Oregon State Board of Health, because of a lack of sanitary facilities. The easiest solution would have been to close the area to the public. The ditch companies did not want to do this, however, and in 1966 they entered into an agreement with the Game Commission and County to operate the area as a county park (29).

The original part of the Wallowa Lake Lodge was built in 1923 and a later section added in 1936. Many private cabins were built in the area at the head of the lake, but there was little or no development on the east and west sides of the moraines during that period.

In 1945, Irene Wiggins and Sons purchased the Wallowa Lake Lodge and other associated properties which included more than 100 acres on the west side of the river flowing into the lake. In 1946, the Oregon State Park Commission became interested in establishing a state park at the head of the lake and offered to buy the land on the west side of the river. Since the amusement area was quite old and run-down, the state gradually acquired 145.8 acres at a total cost of

\$71,600 by 1952 (11, pp. 2-3). Most of this land was sold to the state by the Wiggins family, but smaller acreages were also purchased from other individuals. The Wiggins family was willing to do this because they could not afford to develop the entire area themselves and the state assured them that a new highway would be built to the head of the lake which would be an advantage to their remaining holdings (28). The Associated Ditch Companies also gave their remaining land to the State Park subject to the flood rights between the high and low water lines. The state also leased 18 additional acres approximately a mile to the south of the main park area from the PP&L Co. making a total of 165.8 acres (see map). Improvements on the main park area began in 1947. They included a road to the lake, car parking area, boat channel improvements, boat facilities, public area with tables, benches, electric stoves, water and sanitary facilities. Today there is a large, 147 unit overnight camp which includes 106 camp tent sites and 41 trailer sites plus an additional group camp to accommodate 100 people (24, pp. 21-25). In 1954, the south picnic area was improved for day use (see map). Wallowa Lake became more popular after World War II. The new state park attracted many more people to the area and by 1955, almost 20,000 camper nights were recorded; in 1965 the park attendance reached 52,875 camper nights and 343,324 day visitors at the lake shore area (Table 3) (15). As the state park was

developed, the private summer resort area next to the park expanded also. A store, gas station, roller rink, two "go-kart" tracks, three horse rental corrals and various tourist rental units were established.

Table 3. Wallowa Lake State Park Attendance

	1955	1960	1965	1970	1975
Camper Nights (lake shore)	19,279	27,302	52,875	52,875*	52,875*
Day Visitors (lake shore)		278,292	343,324	425,000	500,000*
(south area)	---	---	133,548	---	---
Total	---	---	529,747	---	---

* This prediction for 1970 and 1975 of 52,875 was considered to be the maximum carrying capacity of the state park before the addition of the 90 camp trailer units in 1966. This figure could increase to 84,600 by 1975.

Source: Planning, District 7, State Parks Oregon State Highway Department, State Parks and Recreation Division.
Salem (15), Oregon, 1962-1966.

One of the more significant developments was the construction of many new cabins after 1950 both at the head and on the west moraine of the lake. By 1964, there were over 211 private summer or permanent homes at the head and around the lake (14, pp. 1-3). In 1915, there had been only two or three primitive cabins along the west moraine, but by 1966 there were 52 modern dwellings there.

In the 1950's, the Milton Box Company purchased a large tract of land on the west moraine. The shore frontage was sub-divided into 266 lots, each of which is valued at \$3,000 today (5). The Trout Haven Resort was also established on the west shore after 1950. The older area on the northern end of the west moraine was almost completely developed by 1966 (see map).

The east moraine of the lake is completely undeveloped at present except at the upper end. This is because it has always been basically a treeless area covered by native grass, and the highway has prevented cabins being constructed below the road, near the shore. In 1965, 600 acres of this land above the highway was purchased from the Peal Estate by the K. B. L. Land Company for development purposes. Although the area is still undeveloped, it has been scheduled for future sub-division (14, p. 3).

Another new development that has occurred mostly since 1950 is the Wahluna Terrace at the foot of the lake where some eight new permanent homes have been built. This land was once owned by the Associated Ditch Companies which they sold in the 1940's for \$1000 (29). Although the ditch companies sold all of the property comprising Wahluna Terrace, it kept the land between the highway and the lake which includes the land on the east side of the dam and the caretaker's home. The ditch companies allowed free public

access to the lake shore on the eastern portion of this property as they had also done at the head of the lake.

The Wilderness Area

Another factor that has greatly contributed to Wallowa Lake as a center of recreation is the "Eagle Cap Primitive Area" which lies directly south of the lake in the mountains. These 223,000 acres are regarded to be the most scenic portion of the highly picturesque mountain section of the Wallowa Whitman National Forest. Wallowa Lake is the nearest and most important entrance to this spectacular area of impressive mountain peaks up to 10,000 feet and some 60 lakes. Every year, hundreds of people hike or ride horses to see this scenery and the 25 lakes which are easily accessible from here (11, p. 7).

The Erosion Problem

Wallowa is a beautiful lake in a magnificent setting. Many people have written eloquently about it. Dr. Warren D. Smith says: "To give the dimensions and depths of Wallowa Lake would tell very little about it. It is not just another lake so wide and so deep. It is a symphony in form, light and shade, and deep brooding mystery and next to Crater Lake, it is Oregon's most unique natural feature" (20, p. 54).

Although the lake is highly praised in most publications, it does have one serious detracting feature that has seldom been mentioned. This is the shoreline which is eroding and sloughing due to the annual fluctuation of the water level. This is a process that has been occurring since the dam was built. An ample snow-fall in the mountains during the winter months usually has resulted in the filling of the reservoir in the spring. If the summer was hot and dry, the ditch companies, and the power company until 1956, drew the water down by late summer close to the natural level of the lake, a possible fluctuation of 28.4 feet. This annual fluctuation has resulted in the softening, the undermining and the eventual sloughing of the steep banks, especially along the east and west glacial moraines. Today, the greater part of the trees and brush have also been undermined and have fallen into the lake along both sides. At low water, the shoreline is an unsightly rock-strewn area with the steep, eroded bank fully exposed (Figs. 3, 4, 6, 12).

Boating and Swimming

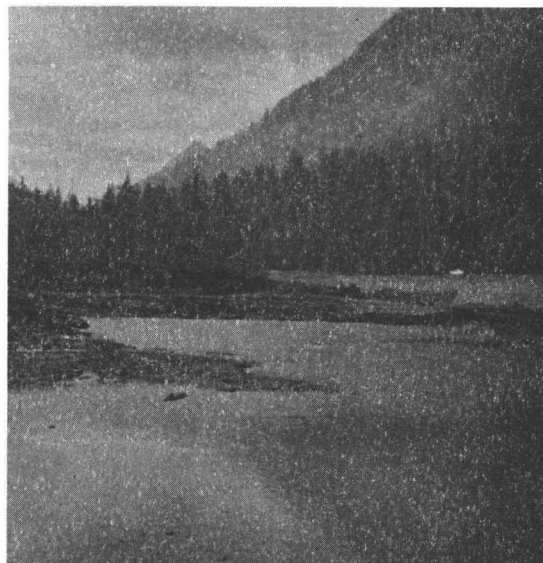
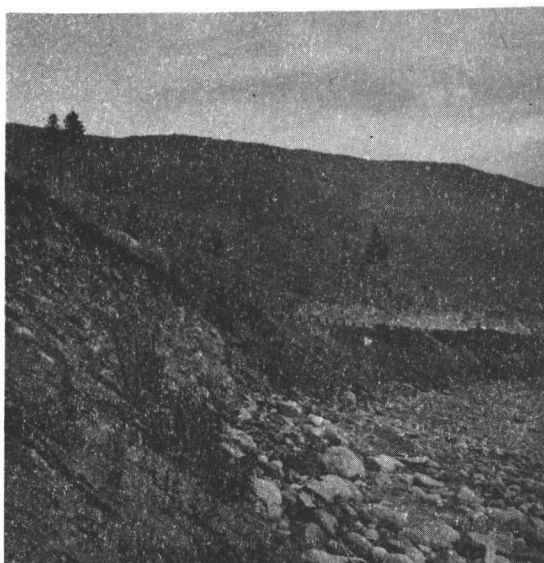
Another disadvantage of the large fluctuation of the water level is the problem of construction and management of boat docks on the lake. Permanent boat docks are inadequate in that they may be satisfactory during high water but a month later they may be completely out on dry ground (Fig. 8). Many floating docks are used

Fig. 10. Conley Bar 1940 (approx.)
Note extent of bar and trees along
shore.

Fig. 11. Conley Bar at low
water in 1966. Note how
bar has eroded away and
lack of trees compared with
Fig. 10.

Fig. 12. State Highway has
riprapped this section of
bank to save highway.

Fig. 13. New boat marina
being constructed in 1966.
Note height of fill to allow
for water fluctuation.



by necessity but even they are a problem in that they must be periodically moved and adjustable approaches provided. The Oregon State Park Commission in the fall of 1966, began construction of a new boat marina and parking area at the head of the lake in an effort to solve the problem at the boat concession area (Fig. 12). This \$175,000 project will provide a permanent boat concession facility, guaranteeing at least three feet of water at the minimum water level.

The periodic fluctuation of the water level also handicaps the state park in providing a clean, attractive beach and swimming area. During the high water period, the natural beaches are completely inundated while unsightly mud flats are exposed during the low water period.

Management Problems of the Ditch Companies

The principal concern of the ditch companies has always been to store as much water as possible whenever there was an opportunity. In order to guarantee the maximum amount of irrigation water every year, it was desirable to keep the lake filled to the maximum legal limit of 25 feet above the low level of the lake. However, it proved difficult for the ditch companies to correctly anticipate the amount of snow melt and the time of the greatest runoff in the spring. Consequently, the ditch companies exceeded their legal limit on at least one occasion and were blamed for the flooding of

private property around the lake as well as downstream (2).

After the dam was built in 1916, the flow of water was greatly reduced in the many channels of the Wallowa River between Joseph and Enterprise after the initial spring runoff. Consequently, the capacity of these channels tended to become restricted, increasing the possibility of overflow.

Although the dam was not built for the purpose of flood control, it did in fact unintentionally serve this purpose. If the lake was not full at the time of a sudden spring runoff, the dam did effectively check the flow of water in the river below. On a few occasions, however, the lake was nearly full before the spring runoff and resulted in most of the water flowing over the spillway and escaping downstream.

Potential Conflicts Between Recreation and Domestic Use

The city of Joseph was using water out of the lake before the dam was built in 1916. Since there was little development around the lake, Joseph was able to use this water for domestic purposes without a purification system. It was not until 1956 that the city of Joseph put in a chlorinating system. According to a recent survey of water supply and sewage disposal systems by the Oregon State Board of Health, the water in Wallowa Lake meets their quality standards and no pollution problem exists at present. However, it is

questionable whether this water will meet these standards in the future. In order to meet sewage standards set by the state, all septic tanks and cess pools must be 50 feet from any body of water, but because of the erosion around the lake, many of these existing facilities are no longer 50 feet from the water today (14, p. 4). Moreover, this report estimates that only one-fourth of the area has actually been developed.

The city of Joseph has been enjoying a good source of water for its domestic use for many years but further recreational development on and around the lake could reduce the quality of this natural resource, especially if sewage standards are not rigidly enforced. It is also apparent that the management of the storage water by the Associated Ditch Companies may have an indirect bearing on the problem as well.

Snow and Water Measurement

Between 1925 and 1930, the Oregon State Engineers with the cooperation of the various Oregon counties, established snow survey stations in the mountains at key locations in order to measure the depth and water content of the snow. This was to predict the amount of stream flow for the following spring and summer season. One of these stations was installed about six miles up the east fork canyon above the PP&L Co.'s Power station, near Aneroid Lake (see

map). At first, the county assumed the responsibility of taking the readings at the Aneroid station, but in 1933, the county became short of funds and was unable to finance it. The Associated Ditch Companies realized the necessity of obtaining these snow readings for their own purposes and assumed the responsibility for these surveys until about 1950 (29).

In order to better facilitate these snow surveys, the ditch companies built a cabin at a cost of \$900 near Aneroid snow survey station. Supplies were packed in to the cabin by horses in the fall. Volunteers would make the trip on snow shoes to the cabin and snow station to take measurements the first of every month during the winter. By 1950, the Soil and Conservation Service had assumed the responsibility from the ditch companies. In 1936, the Associated Ditch Companies also put a permanent water recording station in the river at the head of the lake to obtain a more accurate record of the water flowing into the lake. This was especially important in allocating the water in times of low water in regard to the natural flow rights.

The Associated Ditch Companies have been criticized for their management of the storage water in the lake, but it is obvious that they have tried to improve their management practices. In spite of these efforts, it has not always been possible to correctly predict how much water will runoff. One of the most difficult variables to

predict is the time that the runoff will occur. These factors depend upon the weather, which is seldom predictable. The Associated Ditch Companies often found themselves walking a tight-rope between the storage of an adequate supply of water for irrigation purposes and the risk of exceeding their legal storage limit in the lake with the additional hazard of flooding downstream.

Lawsuits

Very soon after raising the dam to 21 feet in 1920, the Associated Ditch Companies found themselves embroiled in lawsuits concerning illegal trespass of private property around the lake and mismanagement of storage water. In the case of "Louis Anderson et ux. vs. The Dobbin Ditch Company" in 1921, the Associated Ditch Companies (plaintiffs) were forced to sue the defendants for the right to flood their property on the lake shore. The ditch companies obtained the right but were forced to pay \$1500 for the privilege (1).

The following year they were sued in the case of "H. N. Williams et al. vs. The Associated Ditch Companies" (2). In this case, the ditch companies were accused of mismanagement of the storage water causing flooding of property near Lostine, approximately 17 miles downstream from the lake. The ditch companies found themselves with a full reservoir and water going over the

spillway of the dam. Although the details are not clear, they probably felt it necessary to turn additional water through the dam gates to help relieve the pressure in the reservoir.

The ditch companies were involved in minimal litigation during the following years because their storage rights were not only well established but also there were only a few years that the lake actually filled to capacity (Fig. 1). This was particularly the case after 1929 when the PP&L Co. installed their generating plant at Joseph and put their pipe into the dam. The water demand of the power company was a significant factor making it more difficult to fill the reservoir.

After the auxiliary power plant was struck by lightning and deactivated in 1956, the ditch companies had more water to fill the reservoir and to use for irrigation (Fig. 1). Although the additional water was a benefit to the ditch companies, it also presented new problems in respect to the markedly increasing number of property owners around the lake who were rapidly made aware of the erosion and sloughing of their property into the lake during periods of high water.

The Milton Box Company vs. The Associated Ditch Companies

During the winter of 1957, the lake was filled to a greater extent than was normal for that time of year. This was due to a

large water carry-over from the previous irrigation season. A large snow pack in the mountains coupled with an unusually warm rainy spell occurred, resulting in a very rapid snow melt and runoff that reached flood proportions. The lake rapidly filled to capacity and the water flowed over the spillway and down the restricted river channels causing much damage and flooding, especially in the city of Enterprise. The ditch companies diverted as much water as possible down the various ditches in order to reduce the river flow. Since the ground was frozen the effort did little good, as the water continued to return to the Wallowa River through the Prairie Creek drainage system (see map). The water level of the lake rose to over 29 feet on the dam gauge, exceeding the ditch companies' legal limit of 28.4 feet for a period of ten days (2). The ditch companies might have avoided this by fully opening the headgates of the dam, letting more water out of the lake, but to have done so would have only increased the flooding downstream.

During this period of high water, high winds were also prevalent which caused considerable wave action on the lake. These waves compounded the damage caused by the high water.

By 1957, Trout Haven and the Lake Shore Tracts subdivisions were well established and a number of new cabins had been built. The high water coupled with the action of the wind and waves did considerable damage to these lots on the west shore. Mr. Clyde

Harris, in the name of the "Milton Box Company," and as owner of the Lake Shore Tracts, sued the Associated Ditch Companies for \$12,000 damages. The Milton Box Company not only attempted to gain compensation for damages but also attempted to establish the legal storage limit at 25 feet on the dam gauge instead of 28.4 feet claimed by the ditch companies. The ditch companies maintained that the sill of the dam was at least 3.4 feet below the natural level of the lake and that their storage limit was to be 25 feet above the natural level of the lake making a total of 28.4 on the dam gauge (2).

The first trial was held in Pendleton in 1960 and the case was retried in the Supreme Court at Salem, Oregon. The Court ruled in favor of the ditch companies in that their maximum limit was 28.4 feet on the gauge instead of 25 feet. The Court did rule, however, that the ditch companies had exceeded their legal limit, as the water was in excess of 28.4 feet for a period of ten days and therefore were guilty of trespass. The Court ruled that the ditch companies were only liable for the damage done by the water flooding the plaintiff's land in excess of their legal limit and were not responsible for the wave damage. Since it had been established that most of the damage was caused by the action of the wind and waves, the Associated Ditch Companies were only fined \$1000 for damages plus court costs (2).

Both parties felt they had been victorious. The ditch

companies had established their desired maximum limit and the Milton Box Company felt it had proved mismanagement and liability on the part of the Associated Ditch Companies. Although the Milton Box Company was the only plaintiff involved in the lawsuit, many other lake shore property owners and recreationists were quite sympathetic with the plaintiff and watched the proceedings closely to determine if the decision would benefit their interests. One noteworthy observer was the State Highway Commission which had suffered considerable erosion and sloughing of its right-of-way threatening the highway itself (Fig. 4, 9, 10, 11). If the Court decision had been more favorable to the Milton Box Company, the State Highway Commission would have initiated a damage suit of its own, according to reliable sources (7).

PROPOSALS FOR IMPROVED MANAGEMENT

Improved Management of the Reservoir

Since the flood of 1957, many of the property owners and recreationists around the lake have been critical of the Associated Ditch Companies management of the storage water. The factor that created the most concern is the general increase of water in the lake since the abandonment of the power plant at Joseph in 1956 (Fig. 1).

The concensus of the people who have observed the erosion problem around the lake is that at least 75 percent of the sloughing occurs when the water level is within the final six feet of capacity (from approximately 22 to 26 feet above the natural level of the lake). At this level, the water tends to reach the tree roots and soften the remaining soil that has not been previously eroded. In addition to this, the wind and wave action is more damaging to the unconsolidated material near the surface than it is to the rocks below. Therefore, the property owners and other recreation interests around the lake feel that the extremes in water level fluctuation should be kept to a minimum and that the lake should only be filled to capacity just prior to the irrigation season. They correctly maintain that to fill the lake to a near capacity much earlier would often result in water being lost over the spillway anyway.

In order to achieve this desired situation, several proposals have been suggested to the author concerning the management of irrigation and the storage water. These will be discussed separately.

Increase the Efficiency of Irrigation

It has been suggested that since the farmers managed to "successfully" irrigate before the Joseph Power Plant ceased to operate, they should be able to do so today. This suggestion is made because the Associated Ditch Companies have use of the additional 15 CFS which was being used by the power company during the average year.

Many non farmers have felt the ditch companies have always had ample irrigation water during the period that the power plant was operating. This was not true since the ditch companies were forced to restrict the use of water many times in the past. Another factor that must be considered is that during the irrigation season at least, the tailrace of the power plant was diverted into the Granger ditch and was also used for irrigation. It is correct however that the ditch companies do have more water to irrigate with now, but it is not always adequate. The summer of 1966 is a good illustration of this, since the storage water was gone by the 15th of August which disallowed the irrigation of much of the second crop of alfalfa. It is

apparent that the additional 15 CFS does not guarantee adequate water for irrigation at all times.

Conversion to Sprinkler Irrigation

It is generally accepted that sprinkler irrigation is a more efficient use of water than flood irrigation. Therefore, it has been suggested that the farmers should all convert from flood to sprinkler irrigation thus reducing the need for storage water in the lake.

According to Don Baldwin of the Wallowa County District of the Soil Conservation Service, recent calculations show that it takes 18 inches of water to irrigate one acre of alfalfa by flood irrigation compared with nine inches by sprinkler irrigation (4). Theoretically then, with a complete conversion to sprinkler irrigation, the present number of acres of the Associated Ditch Companies could be irrigated with half the volume of water. On this basis, it would seem that the Associated Ditch Companies would need only half as much storage water in the lake.

In practice, however, the conversion to sprinkler irrigation by itself using the present open gravel ditch system would not save as much water as the aforementioned figures suggest. This is because nearly half of the water is lost enroute by downward drainage and evaporation. Another factor that is seldom recognized is that sprinkler irrigation pumps must have 50 inches of water running past

them in order to guarantee an adequate water supply. The water flow tends to fluctuate, especially during the heat of the day. In addition, the total flow runs unused by the pump twice a day during the period when the pipes are being changed (8). A number of farms have been converted from flood to sprinkler irrigation today. This has resulted in a small reduction in the use of water, according to Walter Astwood, Wallowa County Watermaster (3).

The Soil Conservation Service believes that the only practical solution to the loss of irrigation water is to line the ditches with concrete or install a large sealed pipe system to carry the water to the fields. The latter system would prevent the loss of water by downward drainage and evaporation.

Mr. Baldwin also states that a study was recently made concerning the possibility of installing a large sealed pipe in the Silver Lake Ditch to operate as an elaborate gravity sprinkler system for most of the Associated Ditch Companies' lands (see map). Since the outlet of the lake is 150 feet above most of these lands, there would be ample fall to develop adequate pressure for sprinkler irrigation. It is estimated that it would require a pipe six feet in diameter to carry the 400 CFS needed for the project. The plan also included the enlargement of the Silver Lake Ditch (4).

This type system would have the advantage of requiring only half as much water as the present system, and would eliminate the

need for electric power to run the sprinkler pumps. This system might also solve most of the erosion problem around the lake since 15 to 20 feet of storage water would probably be adequate to supply the irrigation needs.

At first glance, the installation of this gravity sprinkler system would seem to be the obvious solution to the problem. But unfortunately, this project would require a tremendous investment on the part of the individual farmers as well as that of the ditch companies. Although exact cost can only be estimated, Mr. Baldwin feels that it would not be economically feasible at present as far as the Associated Ditch Companies are concerned, but would probably require a project involving the Bureau of Reclamation (4).

Improved Use of Snow Survey Data

The Associated Ditch Companies have also been criticized in their management of the storage water because their efforts to fill the reservoir do not adequately reflect the potential water content and runoff from the snow pack in the mountain. Many recreationists feel that the ditch companies fill the lake too full, too early in the season. Therefore, it has been proposed that the Associated Ditch Companies improve their snow survey techniques and make more efficient use of this data in regard to the time and the extent that the lake is to be filled.

The Associated Ditch Companies have either collected or cooperated in the collection of snow survey data since 1925 at the ground measurement station at Aneroid Lake. In recent years, eight other "fly by" stations were established by the Soil Conservation Service in order to improve the accuracy of the water predictions of the area for the summer season. In 1965, the Soil Conservation Service used a helicopter to fly into the snow survey stations to take measurements. This greatly facilitated the access to the area since it had previously been accessible only by volunteers on snowshoes. Ironically, these efforts toward the improvement of snow measurement have been hampered by a recent decision by the Forest Service. In January, 1967, it ruled that since the mountain area in question was a primitive area, helicopters could no longer be allowed to land (10, p. 2).

Nevertheless, the ditch companies do have access to a wealth of data concerning the snow depth and water content at the Aneroid Station, accumulated for the past 35 years. Other data concerning the stream flow of the Wallowa River and its tributaries and the minimum and maximum gauge readings at the Wallowa Lake Dam are also available. A detailed study of this data coupled with some statistical techniques, probably would show some informative correlations between the snow depth, the water content and the gauge readings on the dam at different dates. This data would be a

definite aid to the Associated Ditch Companies in making decisions as to the total amount of water that will be available for the irrigation season, the probable time of runoff and the storage capacity needed for flood control. It would also be an aid in keeping the level of the lake below the point where the maximum erosion occurs (approximately 22 feet above the natural level of the lake), when snow and storage conditions justify it.

These proposals should at least be reviewed by the Associated Ditch Companies, although several of these suggestions appear to be impracticable at present.

FUTURE OUTLOOK--AGRICULTURE AND RECREATION

A Limited Future for Agriculture?

Agriculture has been a dominant factor in the economy of Wallowa County. The development of irrigation in the Wallowa Valley was a vital step in the settlement and utilization of the resources of the area. Lumbering has fluctuated in importance over the years and has been on the decline since 1960.

The most important agricultural activity has been beef cattle raising. The cattle ranchers have always depended on the irrigated valley for much of their green feed and for most of their winter feed supply. The total cattle numbers increased between 1930 and 1960, but since that time they have decreased slightly (Table 4).

The Wallowa Valley was considered to be one of the more important dairy areas in the state from 1920 to 1940. However, because of the great distances to any large fluid market and the ever increasing encroachment of oleomargarine on the butter market, dairying in the county lost its competitive position and declined markedly, especially since 1950. Because of the short growing season in the valley, crop diversification has been limited and many dairy farms have been converted to beef cattle operations. Therefore, as dairy cattle declined, beef cattle increased (Table 4). It is

Table 4. Wallowa County Population and Livestock Trends

	1920	1930	1940	1950	1960	1964	1965
Population	9,778	7,814	7,623	7,264	7,102	---	6,050*
Number of farms	1,149	952	905	710	600	525	---
Average size of farms (acres)	456	598	585	879	1,215	1,215	---
Number of Dairy Cattle	6,182	5,001	6,520	4,448	1,786	---	1,000*
Total Cattle	36,050	28,223	33,171	42,496	47,051	45,700	47,000*

* Subject to revision (preliminary estimate)

Sources: Census of Population, 1920-1960 (21)
 Census of Agriculture, 1920-1960 (21)
 Oregon Crop and Livestock Reporting Service, 1966 (24)
 Oregon Economic Statistics, 1966 (14)

significant that although the county is now largely limited to beef cattle operations, there is apparently little room for expansion¹² (Table 4).

This decline in the number of farms has reduced the political influence of agriculture since there are fewer voting farmers today. The reduction of farms is reflected by a decline in total population. The population reached its maximum in 1920 and has declined ever since (Table 4). The decline in the sawmill operations has also contributed to the decrease in population. In 1955, there were six mills in operation whereas today, there are only two relatively small ones.

Although the county income figures for 1966 are not available, the latest income figures presented in the "Study of Oregon Income by Counties, 1960-1961," by Richard Halley of the Columbia Research Institute, indicated that in 1961 Wallowa County's personal income totaled \$14,150,000 (9). Since cattle numbers reached their peak in 1960 (Table 5) and the lumber industry has declined, it can be assumed that the total income would not exceed 15 million dollars in 1966. The total gross agricultural sales in 1966 was \$5,662,000, of which the gross value of cattle sold amounted to \$3,028,000 (Table 5). Crop sales grossed \$1,673,000, but a

¹² Many cattlemen believe the county may, in fact, be overstocked.

Table 5. Selected Wallowa County Income, 1966

Agriculture Sales:

Cattle Sales	(gross)	\$3,028,000
Other Livestock Sales	(gross)	1,162,000
All Crop Sales	(gross)	1,673,000
		<hr/>
Total Agricultural Sales	(gross)	\$5,662,000**

Recreation Expenditures:

Hunters and Fishermen	(estimated gross)	\$1,865,000
Park Visitors	(estimated gross)	243,444
		<hr/>
Total Recreation Expenditure	(estimated gross)	\$2,108,444*

* Based on estimates by the Oregon State Game Commission, 1966 Oregon State Parks and Recreation Division of the State Highway Commission, 1966, and the Forest Service, 1964 (8, 13, 24).

** Source: Value of Oregon Crops and Livestock Sales. Oregon State University Extension Service and United States Department of Agriculture, November, 1966 (16).

considerable amount of this figure was accounted for by the sale of hay and grain crops for cattle feed.

If is apparent that agriculture is the most important factor in the economy of the county today in terms of economics and political influence. Since cattle raising, the largest single agricultural activity, has apparently reached its maximum and agricultural diversification is unlikely, this influence is not likely to increase and might decrease in the face of growing significance of recreation.

The Increase of Recreation

Since 1950, the increase in the importance of recreation has been impressive at Wallowa Lake as well as in Wallowa County. For example, at Wallowa Lake State Park camper nights increased from 19,279 in 1955 to 52,875 in 1965. Day visitor attendance also increased accordingly and is predicted to continue to increase at an impressive rate through 1975 (Table 3). In the fall of 1966, a \$360,000 improvement project was initiated at the lake shore section of the state park. This project will add 90 more camp trailer sites to the park's present capacity of 106 tent camp sites and 41 camp trailer sites, which should increase the camper night attendance to 84,600 (60 percent). According to Mike O'Rourke (sub-contractor) this project will also include the installation of a new water system, two bath houses and a \$175,000 boat marina (19). The marina

project, an effort to improve the boating facilities and establish a permanent installation that will be effective at both high and low water, will be an added attraction to the area.

The private resort area may also expand as a new gondola tramway is being considered which will cost \$360,000 and will extend from this area to the top of 8,250 foot Mt. Howard (see map). Initially, this project is intended to serve summer tourists only, but winter skiing facilities are planned for a later date. Although this project is still in the planning stage, the Wallowa Scenic Development Corporation feels that it will become a reality in the near future and will draw many more people to the Wallowa Lake area (27, pp. 1-7).

Another potential area of recreational development is in the ten subdivisions and 800 lots that have been plotted around the lake. Only one-fourth of these have been developed at present and 300 are on the west side of the lake. This indicates that many more people will be concerned with the erosion problem around the lake in the future than there are today. In addition, there are 600 acres on the east moraine which will eventually be developed and add many more cabins to the present potential. Since these cabins would not have lake-shore frontage because of the highway, erosion would not be a problem, however, they would have to pump their domestic water supply from the lake and could conceivably have problems with the fluctuating water level.

Recreation's Increasing Share of County Income

Since it has only been in recent years that the economy has felt the impact of recreation, no dependable criteria for determining its value has been established. Various private and governmental agencies are endeavoring to do this. The Oregon State Game Commission made one of the first studies ever attempted in Wallowa County which was published in the Wallowa County Chieftain, January, 1967, concerning the gross expenditures by hunters and fishermen. The Game Commission estimated that these sportsmen spent \$1,865,000 in 1966 (13, p. 1). The State Highway Commission reported that a total of 496,508 people visited both the north and south areas of the Wallowa Lake State Park in 1966. The figure includes both day visitors and overnight campers, who spent a total of \$243,444 (8, p. 1). Since the park improvement project did not begin until the fall of 1966, the completion of this park project with its additional 90 camp trailer units (60 percent more than the present capacity of 147 tent and trailer sites) will obviously increase this income figure in the future. The \$1,865,000 spent in Wallowa County by hunters and fishermen added to the \$243,444 spent by visitors to the Wallowa Lake State Park in 1966, indicates that a total of \$2,108,444 may have been spent for recreational purposes in the county.

The estimated \$2,108,444 gross recreational income compares quite favorably with the \$5,662,000 gross agricultural sales for the county in 1966 (Table 5). Although the net personal agricultural income for that year is unknown, it would probably be \$2,500,000 based on the Halley report in 1961¹³ (9). On this basis, the \$2,108,000 estimated gross recreational income for 1966 appears to be almost equal that of agriculture. However, comparing this net farm income figure with that of recreation, tends to undervalue the true importance of agriculture to the economy of the county, since agriculture indirectly supports the salaries and sales of many nonfarm businesses in the area on a year around basis, whereas, at present, recreation is seasonal.

A noteworthy potential source of recreation income for the county is the proposed recreational development at the Mountain Sheep Dam on the Snake River to the north. This would be the highest dam in the United States, 670 feet, cost an estimated \$257,100,000, and when completed be a popular tourist attraction. In addition to this, a \$53,650,500 recreational development is to be constructed at the reservoir over a period of several years after the dam is built. The Forest Service predicts that the 1,150,000 people visiting

¹³The Halley study lists the net personal agricultural income at \$2,450,000 in relation to the total \$14,150,000 personal income for Wallowa County in 1961.

the Mountain Sheep development by 1975, will spend a total of \$2,500,000 (24, pp. 20-21). It could reasonably be assumed that 66 percent of this amount (\$1,650,000) would be spent in Wallowa County since half the development as well as the main access roads will be in the county. This Snake River recreational development is not expected to compete with Wallowa Lake's recreational attendance because of the excessive heat that occurs in the canyons during the peak summer season at Wallowa Lake.

The State Parks Division of the Oregon Highway Commission has predicted that there will be a 40 percent increase in day use attendance at the Wallowa State Park by 1975. By assuming that the hunters, anglers and park visitors will increase their expenditures by the same rate, the total recreation income for Wallowa County should increase to \$4,601,000 by 1975, more than double that in 1966.

It must be recognized, however, that these figures are based on estimates and assumptions by the aforementioned governmental agencies, one assumption being that the dam will be built on the Snake River before 1975.¹⁴ An examination of past predictions of park attendance as compared to the actual park attendance has

¹⁴The Mountain Sheep Dam project has been delayed by a dispute between private and public power interests.

proven that many of these predictions were conservative. In 1965, although 40,000 camper-nights were predicted for the park, the actual attendance proved to be 52,875 (Table 3) (15). These figures indicate that recreation will most probably play a much more important role at Wallowa Lake as well as Wallowa County in the future. This being the case, the Associated Ditch Companies will probably find recreational interests a considerably stronger competitor in the future.

Public Interests vs. Private Interests

Because of the increasing importance of recreation to the general public, there is some indication that the interests of the public may eventually take precedent over that of private interests in regard to government policy and the "best use" of water.

One of the recommendations made by Richard A. Toner in his report on reestablishing the blueback salmon run was that the 15 CFS once used by the power company might be obtained to augment the stream flow of the Wallowa River (21). But any new appropriation for this purpose would be subject to the new priority date of the application, because the old power company right is now invalidated according to the present state laws. Therefore, in low water periods there would probably not be sufficient unappropriated water to maintain this flow, but the present laws may be subject to change.

The State Water Resources Board of Oregon recently made a study of the Wallowa River Basin in which it examined present use and adopted a future water management program for the area (17, pp. 28-34). Some pertinent statements from this report are:

- No. 12. Full development of the fisheries potentials of the basin cannot be realized without the improvement of minimum and low flow conditions in many streams of the basin.
- No. 15. The basin has potential for expanded recreational use of water, but diversity in this category is limited. Plans for water resource development should attempt to maximize appurtenant recreational features.
- No. 28. The minimum perennial streamflows that can be established on the basis of existing rights and priorities, are substantially lower than the flows considered as minimums acceptable to the fisheries interests.

These statements indicate that the State Water Resource Board is aware that the present appropriation of the water available in the river system does not permit full development of the anadromous fish potential in the area. They also indicate that the policy of the state is to develop the water resources of the area for recreational purposes to the fullest extent. Another quotation states that any structures planned and constructed for the utilization of the water in the area will be declared prejudicial to the public interest which do not give proper recognition to the multiple-purpose concept (17, p. 34).

Presently, the power of the Water Resources Board is limited

in that it can only withdraw unappropriated water to maintain a stream flow. Any reallocation of appropriated water would involve a decision in the courts and action by the legislature today (7). Judicial interpretation of the present laws would no doubt honor the integrity of the individual water rights, but this may not be true in the future.

In a speech presented at the Oregon Reclamation Congress on October 24, 1966, Chris L. Wheeler, State Engineer of Oregon, pointed out some of the trends that are posing threats to state laws and individual water rights. Mr. Wheeler referred to a recent Forest Service manual No. 2500 which, he states, "threatens not only the future development, but the very existence of about 70 per cent of our operating development" (26, p. 2). The manual paragraphs in question are:

1. In reserving lands from the public domain for National Forest purposes, the United States impliedly reserved water sufficient for the future requirements of such lands (Arizona vs. California, supra). The water was reserved as of the date each land withdrawal was made. This implied reservation of water on the public domain by the United States is referred to as the 'reservation principle.' Under this principle the United States has the right to use all water needed for the present or future management of land reserved from the public domain for National Forest purposes. Both surface and ground waters are included in this principle (23, p. 4).
2. 2541.02--objectives. The objective of the Forest Service is to obtain sufficient quantity of water, in accordance with legal authority to provide for the development, use and management of National Forest System resources with due consideration for the needs of other water uses (23).

Since a large percentage of the watersheds in the United States are on Forest Service land (as is much of the Wallowa River Basin), a vast number of irrigation farmers and other users could be affected. Although 2541.02 states that "due consideration for the needs of other water users" will be investigated, this does not especially comfort the holder of a state water right, because a user that depends upon the generosity of an upstream user does not have a water right (26, p. 5). This Forest Service "reservation principle" is not the result of a change in the law by the Federal Government. According to Mr. Wheeler, this seldom happens. "Instead, they bend it slightly in each of several decisions until a 180 degree turn has been accomplished." This change in opinion by the U. S. Supreme Court (Pelton Dam Decision and Arizona vs. California) is significant because it casts serious doubt on the validity not only of individual water rights but also state water laws.

This shift in policy is partly the reflection of the booming and politically popular demand for recreation. Although this Forest Service directive may not effect the Associated Ditch Companies directly at Wallowa Lake, since the mountains are a wilderness area, it does illustrate that their water rights and management practices which are acceptable today may become less acceptable to the public tomorrow. It is therefore possible that the Ditch Companies may lose a portion of the water that they are now using if present trends continue.

CONCLUSION

With the coming of the white man and the advent of irrigation, Wallowa Lake evolved from a bountiful source of food for the Indians to an indirect source of food for the settlers. Today, 85 percent of the county's population is centered in the valley and because of the abundance of irrigation water there, a crop failure has never occurred.

Since the concept of multiple use of water resources was not strongly advocated in 1900, irrigated agriculture was achieved largely at the expense of the blueback salmon run. It was unfortunate that there were no provisions for a fish ladder over the dam and adequate screens in the early ditches. Were the dam and ditch facilities to be built today, the necessary screens and fish ladders would have been available and the ditch companies would have been assisted, if not compelled by the government to provide these extra facilities.

Many recreation and fishery interests would like to see the run reestablished. Although it could be done, Toner, author of the study to reestablish the blueback salmon run, does not necessarily recommend that the salmon be allowed to swim into the lake because other artificial spawning techniques could probably be used below the dam. In addition to this, there is some question if it is

economically feasible, although it may become politically desirable (30). However, the prospect does pose a future threat to the ditch companies since they might lose a portion of the water they are now using.

Power generation has played an important role at the lake for many years. The abandonment of the Joseph plant has been a definite advantage to the ditch companies because it allowed them to fill the reservoir more easily providing additional water needed for irrigation. Although the Associated Ditch Companies cannot file on this nonconsumptive right, they do have legal control of most of the water through the prior right principle of the Oregon State water laws. Although the State Water Resources Board cannot revoke these rights today, there is some uncertainty as to what it may be allowed to do in the future.

When the Associated Ditch Companies constructed the dam and turned the lake into a storage reservoir at the beginning of this century, recreation was of little importance. Agriculture on the other hand was the principle activity of Wallowa County, as well as the United States. Since that time, however, recreation, including summer cabins, park facilities, swimming, boating and fishing has become much more important in terms of use of the lake and income in the county.

One of the principle causes of conflict between the ditch

companies and recreational interests is the erosion problem around the lake due to the seasonal high water level and the fluctuating reservoir. There is no question that a great deal of damage has been done to property owners on the west moraine and to the highway right-of-way on the east moraine; and it would obviously reduce the erosion rate if the water level were kept below the top six feet of capacity. However, the ditch companies could not be expected to voluntarily take a loss in crop production in order to achieve this goal. In years of adequate snow pack and surplus water carryover in the reservoir, it might be possible to store less water until just prior to the irrigation season. If the lake must be filled to capacity, it should be kept at this level as short a period as possible. A detailed study of the snow pack and available storage water over the past years might well aid the ditch companies in managing the storage water in order to approach this goal.

The farmers of the Associated Ditch Companies have tended to feel that their rights in the management of the lake should remain superior to those of recreation. Their justification for this is that the ditch companies were using the lake long before recreation was developed. Moreover, they point out that the property owners should have been aware of the erosion problem before they purchased the property and if they have suffered damages, they have only themselves to blame.

In the United States we are living in an age of plenty as far as food and agriculture are concerned, but the demand for recreational resources exceeds the supply. As the urban population increases and the rural population declines, public opinion is becoming less sympathetic toward agriculture and more sympathetic toward recreation. This point is illustrated by some quotations from a recent editorial on lakes in the Cascades (26, pp. 5-6).

It comes as a shock to many people to learn that most big Cascade Lakes 'belong' to farmers down the hill. If you look hard enough, you'll find a little overgrown earth-dam at one end, complete with gates. Davis Lake, we understand was just a puddle until it was needed for irrigation. In other words, the farm need created the recreation use.

Farmers often haven't been using all the water they have legal claim to, and recreationists haven't been as plentiful or as vociferous. But now both are wanting more and more of these resources (26, p. 5).

Farmer's rights have appeared to be obvious and secure. But now, there is some new thinking. For the first time really, many people are beginning to believe that recreationists have 'rights.' These two interests are bound to collide along this string of Cascade Lakes.

In view of the trends, it might well behoove the Associated Ditch Companies to cooperate with the recreational interests whenever possible, if only to improve their image. Although the laws favor the Associated Ditch Companies today, they may not do so in the future.

The farmers have never been opposed to recreation at the lake

per se; this is evidenced by their own efforts in that direction such as donating their land along the shoreline at the lake to the state park and permitting public access to the shore both at the head and the foot of the lake. Their latest contribution to recreation has been the establishment of the new county park on ditch company property at the foot of the lake. The public has generally been unaware of these courtesies, however. The future relationship of the farmers, the fish interests and the recreationists should be one of mutual cooperation, not conflict.

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