

CRESCENT LAKE FISH MANAGEMENT PLAN

INTRODUCTION

Crescent Lake lies just east of the summit of the Cascade Range and south of Highway 58 in northern Klamath County (Fig. 1). The nearest large city is Eugene, 80 miles to the northwest. The lake is wholly on the Deschutes National Forest. Development around the lake includes a resort, three campgrounds, three day-use areas, a Boy Scout camp and a number of private homes. In addition to angling, this lake is popular for boating, sailing, water skiing and swimming.

Crescent Lake is a natural lake that has been enlarged by damming the outlet, Crescent Creek, to provide additional storage. Tumalo Irrigation District holds water rights for 86,860 acre feet of water which is used in the Bend area.

In October 1986, the Oregon Fish and Wildlife Commission accepted the Department's recommendation to manage Crescent Lake for wild and hatchery trout.

HABITAT

Description

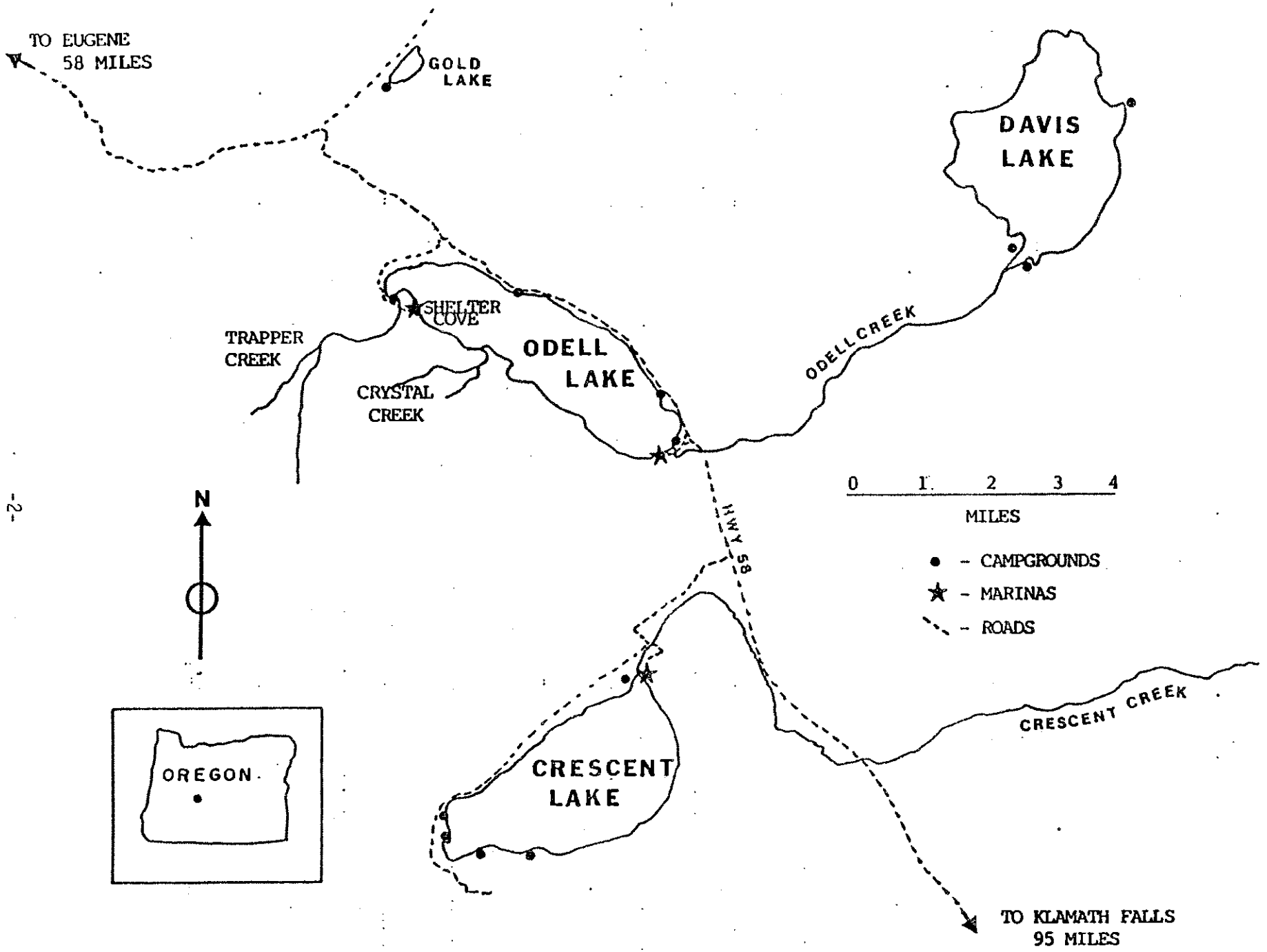
Crescent Lake has 4,008 surface acres when full at an elevation of 4,847 feet. The maximum depth is 280 feet (Fig. 2). About 5% of the area is 0-25 feet deep while 60% is over 100 feet deep. At minimum pool, elevation 4,823 feet, the surface area is 3,470 acres. Bottom materials are mainly fine sediments predominated by pumice. Much of the sand, gravel and rock is in shallow areas that are exposed at low pool.

Whitefish Creek is the largest tributary but its flow falls below 0.5 cfs by late summer. Windy and Cowhorn creeks are important tributaries during spring runoff. Many submerged springs near Spring Camp and Contorta Point are also important sources of inflow. Lower Whitefish Creek and the spring areas provide spawning areas for kokanee.

Lake water temperatures are cool with surface temperatures rarely exceeding 68F. A thermocline normally develops at 30 to 50 feet by late June or early July. The lake is oligotrophic with water clarity allowing visibility down to about 20 feet. Levels of dissolved oxygen are typically high; the pH is near neutral and total dissolved solids (TDS) averaged 15.5 according to measurements taken in 1975. In comparison, the TDS was 20 in Odell Lake and 395 in Paulina Lake.

Limitations

In years when the water level is drawn down, much of the shoal area in the lake is exposed and not producing food. At the lower pool levels, some of the spawning habitat is denied by exposure of the spring areas and blockage of the entrance to Whitefish Creek by a pumice delta. Spawning habitat is probably still a limiting factor even when the stream is accessible because of its relatively small quantities of rather poor quality gravel.



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Fig. 1. Crescent Lake and Vicinity.

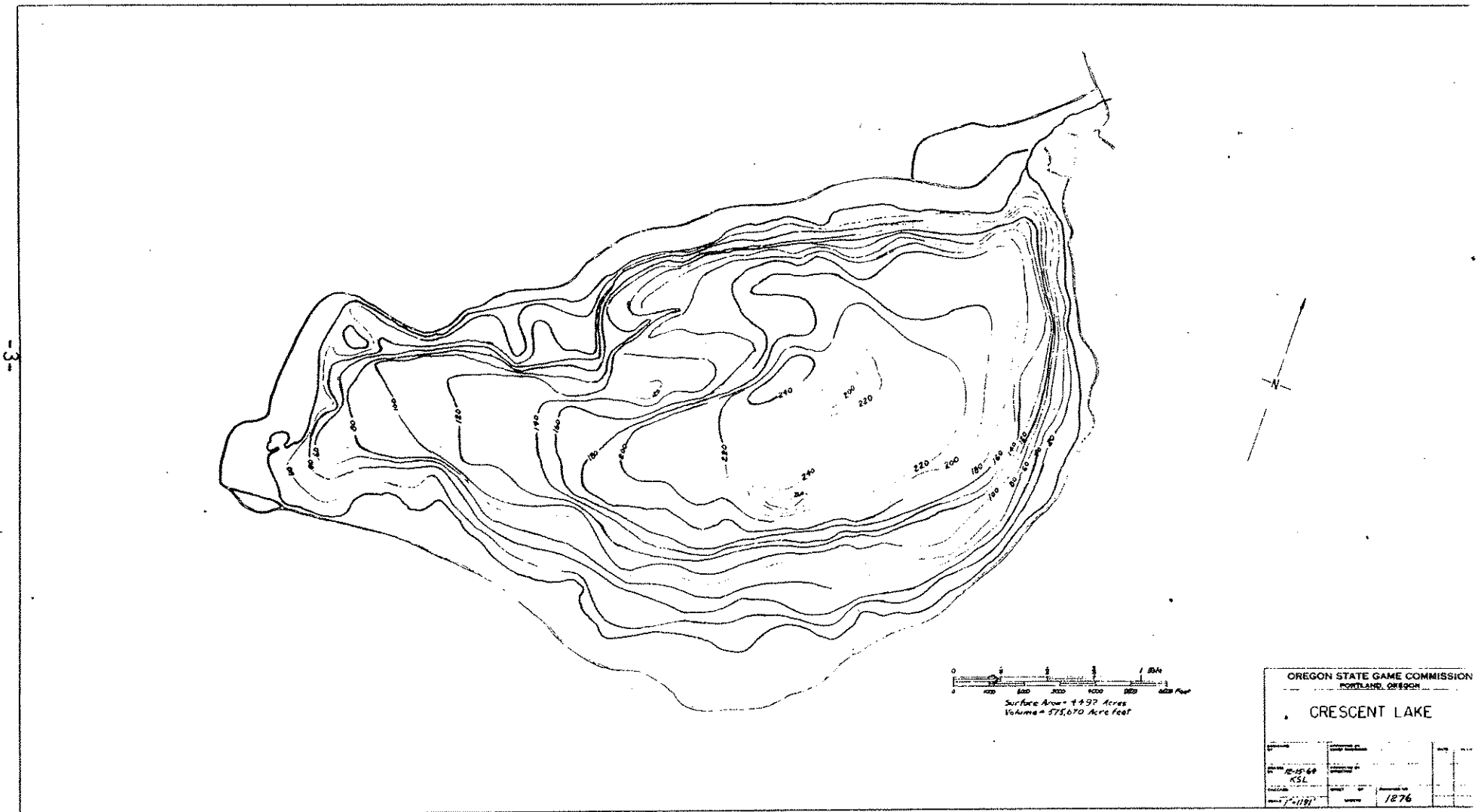


Fig. 2. Crescent Lake contour map.

FISH POPULATIONS

Crescent Lake has kokanee, lake trout, rainbow trout, brown trout, brook trout, mountain whitefish, tui chubs and sculpins.

Kokanee were first introduced in 1954 and have been stocked nearly every year at various rates since then. From 1978 through 1983, 100,000 fingerlings at 100/lb. were stocked each year, but natural reproduction still provides the majority of the fish we see in the catch. In the past twenty years, the length of maturing kokanee has averaged 12.9 inches within a range of 11.9 to 14.9 inches.

The lake trout population has been self-sustaining since the first and only release of large fingerlings was made in 1957.

Brown trout were stocked in 1925. Natural production has maintained modest numbers of these fish. In 1982, another 10,000 fingerlings were released to bolster the population.

Rainbow trout were stocked periodically from 1928 through 1976. Stocking has been discontinued since 1976 because of poor returns caused by Ceratomyxa shasta. There has been evidence of some natural reproduction in angler catches and in trapnet samples in recent years. These fish are apparently resistant to C. shasta.

Brook trout were stocked from 1928-1939 but none since that time. A few brooks still appear in the lake; they are probably strays that have come down from the tributaries.

Whitefish are indigenous to the lake, have had fairly stable numbers, and make up a substantial portion of the total fish population. Tui chubs are the only rough fish present and are quite numerous at times in shoal areas. Whitefish and chubs are the primary forage fish for lake and brown trout.

FISHERY

General angling regulations for the Central Zone are in effect on Crescent Lake. The season opens in late April and closes at the end of October. The daily bag limit for trout is 10 per day, not more than 5 over 12 inches, nor more than 2 over 20 inches. Kokanee are considered trout. There is no limit on whitefish.

Kokanee provide the main fishery at Crescent Lake. Angler success is generally good early in the season when the fish are near the surface but the fishery has a history of "dying" after early July when the kokanee seek cooler waters below the thermocline. Since 1964, catch rates have varied from a low of 0.1 fish/angler hour in 1977 to 0.7 fish/hr in 1975.

In 1980-82, statistical creel surveys were conducted to evaluate the contribution by marked hatchery reared kokanee. The following estimates were made:

<u>Year</u>	<u>Anglers</u>	<u>Kokanee Caught</u>	<u>% hatchery origin</u>
1980	11,300	16,500	44
1981	9,500	8,730	31
1982	9,300	8,360	37

Returns to the angler ranged from 2.7% for kokanee stocked in 1980 to 5.4% for those released in 1978. The overall return to the angler from the 300,000 marked fish was 4.1%.

Lake trout draw the second most angler interest at Crescent Lake. In 1981, angler effort for lake trout increased to 1,500 angler days from 700 angler days the previous year. Effort rose further in 1982 to 2,100 angler days. Catch rose from 110 lake trout in 1980 to 800 in 1981 but fell to 690 in 1982. Part of the total catch was taken incidental to other fisheries. Catch rates for anglers seeking lake trout were 0.02, 0.1 and 0.1 fish/hr for 1980, 1981 and 1982, respectively. Lengths of lake trout caught have been between 15 and 38 inches. Average sizes of lake trout in the angler catch were 25.4 inches in 1981 and 29.3 inches in 1982.

The catch of rainbow and brown trout is largely incidental to other fisheries. However, in 1983 and 1984 there appeared to be more anglers targeting on these species by angling from bank areas and trolling the shorelines. Rainbow from 13 to 15 inches are typical of those caught. A few large brown trout are taken each year and create interest in a trophy fish. The browns stocked in 1982 were entering the catch in 1984.

The few brook trout in the lake make virtually no contribution to the angler. Nearly all of the whitefish taken from the lake are caught incidentally to other fisheries. Most are taken by anglers jigging for kokanee; and the majority of those fish are thrown back.

DISCUSSION

Kokanee

At Crescent Lake, there is an inverse correlation between the length of maturing kokanee and the total amount of inflow in the three years prior to maturity (Fig. 3). More water flowing into the lake carries more nutrients and raises the lake elevation which provides more food and rearing area for juvenile kokanee. The greater flow of water may also increase spawning and hatching success. Better survival of juvenile fish causes greater competition for the available food in successive years. That situation produces more but smaller fish, usually resulting in better catch rates for the angler.

Hatchery reared kokanee have provided an important segment of the catch and are needed to augment natural production to produce an adequate fishery. The survival of stocked kokanee is probably keyed to the availability of enough food at the time of stocking. The food supply, mainly zooplankton, is dependent on the primary productivity of the lake for a given year and the time of year. Good numbers of zooplankton are not present until July, at the earliest. In recent years, we have been stocking kokanee about the first of July with fish weighing about 100/lb. Review of past plankton sampling shows a substantial increase in zooplankton in August, particularly for Daphnia. It

is likely that survival of hatchery reared kokanee could be improved by stocking in August when conditions are best. If such a plan did lead to much better survival, it may be possible to reduce the number stocked and still produce a good fishery. Later stocking of hatchery fish may also improve survival of wild kokanee because hatchery fish would not be competing with the wild fry when they begin foraging in the lake. Populations of both wild and hatchery kokanee will continue to vary in response to the productivity of the lake. Stocking at higher rates cannot fully overcome poor conditions in the lake.

Recruitment of wild kokanee is apparently limited by shortage of spawning areas. They have been known to spawn in Whitefish Creek and in the upwelling spring areas in the lake. But kokanee have made little use of Whitefish Creek since they were denied access to that stream in 1979-81 by a punice delta during those low water years. Efforts were begun in 1984 to get kokanee to return to Whitefish Creek by stocking fingerlings in the steam channel. Production in that stream may be enhanced by improving the spawning habitat if kokanee begin using it again.

Lake trout

Natural production of lake trout has sustained the fishery since the one and only stocking in 1957. In recent years there has been an increase in anglers seeking lake trout and the catch has increased similarly. With the advent of hydro-acoustic gear, "fishfinders", it is easier to locate and catch these fish and there is potential for overfishing the stock. The numbers of lake trout caught, their size distribution and rate of catch should be monitored. Evidence of a diminishing stock may necessitate a management change to reduce the bag limit or require stocking. There are no lake trout being reared in the state at this time.

Rainbow trout

There has been enough natural reproduction of rainbow trout to provide a small fishery for this species and some catches incidental to the other fisheries. These resident trout are apparently resistant to *C. shasta* but their numbers are probably limited by a lack of good spawning habitat. It is likely that numbers of rainbow could be increased substantially by stocking fish of the Deschutes strain. If so, more rainbow would be available to the angler later in the summer when it is more difficult to catch kokanee and lake trout.

Brown trout

Although the number of brown trout caught is small, each one is a trophy and creates excitement among the anglers. Natural production of this species is probably limited by the lack of good spawning habitat. A supplementary stocking was made in 1982 to augment natural production. Further stocking at modest rates could provide more of these fish to the anglers who prize them. They are also a species that should be available to the angler throughout the summer and fall. Brown trout may compete for food with lake and rainbow trout to some degree but they are most likely to forage on chubs.

Whitefish

There is a substantial population of whitefish which could sustain a much higher level of harvest. There is little interest in a fishery for this species. Whitefish are important as forage for lake trout.

Tui chubs

Although there are often many chubs taken in net sets, their numbers are probably out of proportion to the other species because they are more susceptible to netting in the shallow water they inhabit. They no doubt compete for food with other species but they, in turn, are forage for lake, brown and rainbow trout. Attempts to control the number of chubs are probably not feasible or necessary.

RECOMMENDATION

Manage Option: Manage Crescent Lake for wild and hatchery trout. Natural reproduction of kokanee, rainbow and brown trout is inadequate to provide an attractive fishery. This alternative allows us to supplement natural stocks with hatchery reared fish in order to produce an adequate fishery. Increased angling pressure and greater catches of lake trout may exceed the natural capacity of this species to maintain adequate numbers of fish, even with possible further restrictive regulations. This alternative reserves the option of future stocking of lake trout if necessary.

Objectives

Kokanee

Stock hatchery reared fingerlings in early to mid-August at a size of 100/lb. or larger to supplement natural production to provide an attractive fishery.

Attempt to get kokanee to use Whitefish Creek for spawning and pursue improvements to the spawning habitat with a goal of increasing natural reproduction.

Lake trout

Maintain a viable population of wild lake trout. Monitor the size and catch rate for lake trout; diminishing returns may necessitate more restrictive regulations.

Brown trout

Supplement wild brown trout production with hatchery reared fingerlings to provide another trophy fish and add variety to the fishery. Stocking rates should be about 5,000/year or 10,000/biennium.

Rainbow trout

Supplement wild rainbow trout production with hatchery reared fingerlings (Deschutes stock) at a rate of 20,000/year with a goal of providing a target fishery through the summer and fall.