UPPER FLATHEAD SYSTEM FISHERIES MANAGEMENT PLAN

Developed by:

The Montana Department of Fish, Wildlife, and Parks
and
The Confederated Salish and Kootenai Tribes

1989 - 1994

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EXECUTIVE SUMMARY

This management plan was developed by the Montana Department of Fish, Wildlife, and Parks and the Confederated Salish and Kootenai Tribes to guide fisheries management for the next 5 years (1989 to 1994). The plan covers Flathead Lake and its major tributaries, the Flathead River and the North, Middle, and South Forks (below Hungry Horse Dam). The plan contains a description of the Flathead watershed, system-wide fisheries management goals, species specific fisheries information, species management objectives and strategies, and a description of fish habitat protection activities.

A fisheries management strategy is described. Under this strategy, Flathead Lake will be planted with three to five million kokanee, 260,000 bull trout, and one million westslope cutthroat trout per year. These plants would be experimental to determine if the Flathead Lake fishery can be improved through the use of hatchery fish. Funding for the expanded hatchery program will come partially through mitigation for damages done by hydroelectric dams. Changes in fishing regulations for westslope cutthroat, bass and lake trout are being proposed for public review during the regulation setting process. Current habitat protection efforts will be continued, but there will also be attempts to enhance or open up new spawning and rearing areas for wild spawning populations of cutthroat, bull trout, and kokanee.

The management objective for bull trout is to increase use and harvest by 20 - 25% in the lake and river and increase the numbers of spawning fish. The proposed strategies are to increase enforcement activities in spawning areas and at the river mouth fishery, to increase inter-agency coordination and habitat monitoring, to implement experimental hatchery plants, and to increase available spawning and rearing habitat by opening blocked areas. The existing regulations on bull trout will be maintained unless the other strategies mentioned above are ineffective in improving bull trout populations. In this case the angling season length will be shortened in the river and additional spawning streams will be closed in the Middle Fork drainage. If these strategies are effective in increasing the population, the daily bag limit may be increased.

The management objective for westslope cutthroat trout is to increase harvest and use by 20%. The strategy that will be used

to accomplish this is to stock Flathead Lake with 4 to 6 inch fingerlings at a rate of one million fish per year. Daily bag limits in the lake will be modified to provide a standardized lake-wide limit to prevent overharvest until the hatchery fish enter the fishery.

The management objective for kokanee is to restore the population to a level that may produce a harvest of about 60,000 fish at a catch rate of about 0.8 fish per hour, providing about 15,000 angler days a year. The strategy that will be employed to accomplish this goal is to stock the lake with 3 to 5 million hatchery reared kokanee fingerlings each year.

For lake trout, the preferred management objective is to increase use to 15,000 angler days and increase harvest to 8,000 fish per year while maintaining the trophy fishery. In order to accomplish this goal we will publicize, through the media or brochures, methods to catch smaller (3 to 8 pound) lake trout. Several tentative fishing regulations to restructure the size and numbers of fish harvested will be evaluated in the regulation setting process.

We will try to increase the harvest of yellow perch from the lake to 100,000 fish per year while maintaining the current catch rate and average length. The strategies that will be used to accomplish this goal are: provide better access for anglers on South Bay, increase public awareness of the fishing opportunities provided by yellow perch, develop a Flathead Lake fishing guide describing fishing techniques, seasons, and locations, and improve structural diversity within the low pool zone of East Bay.

Management of lake and mountain whitefish will be directed toward increasing angler use and harvest to 20,000 lake whitefish and 10,000 mountain whitefish per year. A fishing brochure will be developed to publicize fishing techniques,locations, and seasons.

The preferred management objective for rainbow trout is to increase harvest to 1,000 fish per year. The identification of rainbow trout will be publicized and anglers will be encouraged to harvest rainbow.

We will attempt to provide increased opportunities to harvest northern pike and largemouth bass by acquiring public access to river sloughs above Flathead Lake, transplanting bass to South Bay and constructing artificial habitat improvement structures. The largemouth bass regulations will be evaluated and fishing restrictions during the spawning season will be adopted if needed.

The fishery will be monitored and management strategies evaluated and modified as necessary. The entire management plan will be reviewed.

CONTENTS

INTRODUCTION

Flathead Lake is the largest natural body of fresh water in the western United States. Each year millions of people visit its waters and enjoy the surrounding natural beauty and the variety of fishing opportunities. The Montana Department of Fish, Wildlife and Parks (MDFWP) and the Confederated Salish and Kootenai Tribes (CS&KT) have developed this fisheries management plan for Flathead Lake and its major tributaries, the Flathead River and the North, Middle, and South Forks (below Hungry Horse Dam). This plan does not cover the Swan Drainage, the Whitefish River, the lower Flathead River below Kerr Dam or Hungry Horse Reservoir.

The recent dramatic decline of kokanee has dictated a re-evaluation of management direction within the Flathead Lake and River system. In addition, there was a need to develop mutual objectives and strategies to allow the CS&KT and the MDFWP to co-manage the fishery. There is also considerable public demand to either restore kokanee populations and/or create other fishing opportunities, and to manage for native species. This management plan is designed to review the current situation, address public and agency concerns, and suggest management strategies for the next five years to ensure that Flathead Lake and River remain a productive fishery.

This management plan also addresses native species management, the future possibilities of kokanee restoration, habitat protection and potential for future hatchery fish supplementation. Contained within this plan are a review of fish population status by species and an overview of present fish habitat within the basin. The results of past public meetings are reviewed. Finally we present species specific management goals, and the strategies needed to reach these goals.

THE FLATHEAD WATERSHED

PHYSICAL DESCRIPTION

The mainstem Flathead River above Flathead Lake represents the combined flow of hundreds of headwater creeks funneled from glacial cirques to the valley floors. The North, South and Middle Forks contribute over 90 % of the flow of the upper mainstem. The Stillwater and Whitefish Rivers are the most important tributaries downstream from where the three forks merge (Figure 1). The Swan River enters Flathead Lake at Bigfork.

Dams are found on two tributaries in the Flathead drainage, the South Fork of the Flathead River and Swan River. The Swan River diversion at Bigfork was built in 1902 for hydroelectric production. Hungry Horse Dam is located on the South Fork Flathead River 5.3 miles above its confluence with the main river. It was completed in September, 1953. Hungry Horse is operated primarily for flood control and hydroelectric energy production.

Flathead Lake covers 197 square miles in northwestern Montana. The lake's average depth is 107 feet, and its maximum depth is 371 feet. The upper ten feet of the lake is regulated by Kerr Dam. The lake forms discrete temperature layers during the summer, but its temperature is relatively uniform at other seasons, except when it occasionally freezes over. The lake basin was formed by glacial scouring of underlying soft sedimentary rock. Glacial deposits dating from the last ice advance define the lake's southern boundary. The northern shoreline of the lake has been modified by the deposition of sediments from the Flathead River. Otherwise the main lake basin, excluding Big Arm and South Bay, is steep sided. A broad mid-lake bar, from 70 to 180 feet deep, runs from Conrad Point south to Wildhorse Island approximately one mile off the western shore of the lake.

Flathead Lake is relatively cold and unproductive compared to other lakes. Agricultural and urban development in the basin contribute substantially to the natural nutrient load entering the lake. Water quality studies have raised concerns about the increasing phosphate load from sewage. However, both phosphates and nitrates working together may limit primary productivity in the lake during the spring and summer. Periodic blooms of blue-green algae may indicate declining water quality in Flathead Lake.

There are twelve gamefish species living in the Flathead system. Three of the major species are native: westslope cutthroat, bull trout and mountain whitefish. The nine introduced gamefish species are lake trout, rainbow trout, lake whitefish, yellowstone cutthroat trout, brook trout, northern pike, grayling, largemouth bass, and kokanee. With the exception of yellow perch, all the common non-game fish species are native.

Figure 1. Flathead River Basin above Flathead Lake

They include the northern squawfish, peamouth chub, longnose sucker, largescale sucker, redside shiner, and slimy sculpin (Table 1).

Much has been learned about the Flathead Lake/River system over the past decade. The Environmental Protection Agency, Bureau of Reclamation, and the Bonneville Power Administration provided funds to the MDFWP and the CS&KT for studies on spawning and rearing habitat for migratory cutthroat and bull trout as well as studies on the effects of hydroelectric operations on kokanee and yellow perch. The University of Montana Biological Station has investigated the relationship between primary and secondary productivity and water quality parameters of Flathead Lake. The MDFWP has been actively involved in species and harvest management, as well as habitat protection and angler surveys within the Flathead drainage since the early 1950's. The CS&KT have provided funds for lake wide water quality work, as well as investigating fish populations and angler use of South Bay using BPA funds.

Table 1 . Relative abundance of fish species in Flathead Lake and in the Flathead River upstream from Flathead Lake.

	Relative Abundance[a]		
	Upper Flathead River (North Fork) and Middle Fork	Lower Flathead River (below Middle Fork)	Flathead Lake
Cutthroat trout			
Westslope[b,c]	C	C	C
Yellowstone	R	R	R
Bull trout[b,c]	C	C	C
Rainbow trout	R	U	R
Brook trout	U	R[d]	R
Lake trout	N[d]	C[d]	C
Kokanee	C	U[d]	C
Lake whitefish	N	U	C
Pygmy whitefish[b]	N	C	C
Mountain whitefish[b]	C	R	C
Arctic grayling	R	C	N
Slimy sculpin[b]	C	C	C
Shorthead sculpin[b]	C	?	?
Mottled sculpin[b]	?	U	C
Longnose sucker[b]	U	C	C
Largescale sucker[b]	C	C	C
Peamouth[b]	N	C[e]	C
Northern squawfish[b]	U	R[e]	R
Northern pike	N	R[e]	C
Redside shiner[b]	N	R[e]	U
Largemouth bass	N	R[e]	C
Pumpkinseed	N	R[e]	C
Yellow perch	N	R[e]	R
Black Bullhead	N	R[e]	

[a] Symbols: C = common, U = uncommon, R = rare, N = not known to occur, ? = suspected but not confirmed.
[b] Native species
[c] Species of special concern to the State of Montana
[d] Refers to seasonal abundance
[e] Common in sloughs along the lower river

THE FISHERY

In 1982, an estimated 168,792 angler days were expended to catch an estimated 536,870 fish from Flathead Lake. The harvest consisted of 92% kokanee, 4% yellow perch, 2% lake trout and bull trout and 1% cutthroat trout. Boat anglers accounted for 92% of the harvest. The average length of the harvested fish was 12.3 inches for kokanee, 12.6 inches for cutthroat, 22.6 inches for bull trout, and 31.3 inches for lake trout. Anglers from Flathead, Lake, and Missoula Counties made up 73% of the total angler population, although this number increased to 92% in the October to February period. The May through September period accounted for 79% of the total number of angler days expended on the lake. November had the least total pressure of any month.

During the 1981 fishing season an estimated 35,940 angler days were expended on the mainstem Flathead River. Anglers (including snaggers) harvested 89,273 gamefish of which 86% were kokanee, 10% were cutthroat, 2% were bull trout, 2% were whitefish, and 0.5% were rainbow trout. Almost the entire kokanee harvest occurred during September and October. The peak cutthroat fishery occured during July and August. Most of the bull trout harvest occurred during May, June, and July. Flathead County residents comprised 88% of the anglers interviewed. Shore anglers were responsible for 76% of the hours fished by conventional anglers (non-snaggers) and the remainder were by boat fishermen.

Despite major efforts in research and management, the kokanee fishery, which provided approximately 95 % of the summer angler use, collapsed in 1987. Some of the major factors responsible for the decline were overharvest, hydroelectric operations, natural predation, and the appearance of opossum shrimp (Mysis relicta) in Flathead Lake. Mysis are now reaching densities where they may seriously complicate efforts to manage kokanee. Mysis will also affect populations of other fish in unknown ways. There is little doubt that due to Mysis it will cost more in the future to produce a fishery that will provide a lower harvest at a lower catch rate than was enjoyed in the past. The disappearance of kokanee will no doubt increase angler pressure on other game fish species. However, harvest of other fish species may make up for a portion of this loss.

Past management of Flathead Lake and the upper river system has centered around the maintenance of wild, self-sustaining fish populations. Much effort has also been expended in critical habitat protection for native cutthroat and bull trout populations, two species of special concern in Montana.

SOCIAL ISSUES

The economic/social structure of the Flathead basin is based on natural resource development and tourism. During the 1970's, the Flathead basin experienced a period of economic and population growth. Total employment increased by about 60%, accompanied by a 31% increase in population. Based on 1980 United States census figures, the Flathead basin supported approximately 73,000 residents. More than half of these live in the north end of the valley in the Kalispell, Whitefish, and Columbia Falls areas. In the south half of the valley much of the population is dispersed among small unincorporated communities, and within the boundaries of the Flathead Indian Reservation. As the regional population grows, so do the demands on the natural resource base. Recreational fishing is an important part of the quality of life and the economy of the basin, contributing more than 8 million dollars annually to the local economy.

The 1.2 million acre Flathead Indian Reservation is home to the Confederated Salish and Kootenai Tribes. The Salish and Kootenai people began their environmental awareness and relations with nature long before this country became a nation. Their custom, culture, heritage, and lives evolved around and depended upon the fish and wildlife resources that once populated a pristine environment. The southern half of Flathead Lake and the entire lower Flathead River are within the exterior boundaries of the Reservation.

During the 1970's, the CS&KT were involved in a lengthy court battle over jurisdictional authority over their lands. A private individual, the City of Polson, and the State of Montana joined in a suit against the Tribes for a declaratory judgment that the Flathead Reservation had been terminated by the 1904 Flathead Act. In January 1982, the Ninth Circuit Court of Appeals handed down final judgment on what is known today as the Namen case. In essence, the high court ruled that the bed and banks on the southern half of Flathead Lake are held by the United States in trust for the Salish and Kootenai Tribes. Because of this case and earlier cases decided by federal courts the CS&KT have authority to regulate the fishery in the southern half of the Lake to protect those fishing rights given to them by the Hellgate Treaty of 1855. Co-management of the Flathead Lake fishery represents a resource-based governmental recognition of the political distinctions between Tribal and State governments.

Conflicts over resource allocation may occur in the future. This plan will help to guide decision making when conflicts occur regarding the upper Flathead fisheries resource.

PUBLIC OWNED RIVER AND LAKE ACCESS FOR ANGLERS AND BOATERS

Acquisition and development of public access to the Upper Flathead River system and Flathead Lake for anglers and boaters has been an ongoing cooperative program for over 20 years. Cooperators in this program include: Flathead County, Flathead National Forest, CS&KT and MDFWP.

Flathead River System: Nineteen river sites provide angler and boating access along the 160 miles of the North Fork, Middle Fork, and Flathead River above Flathead Lake (Figure 2). The goal of the river plan is to acquire and develop public river access at approximately 10 mile intervals, which require from 4 to 6 hours to float.

The need for an additional access point has been identified along the 18 miles of the North Fork Flathead River, between Polebridge and Big Creek (shaded area, Figure 2). Efforts are in progress to acquire a site within this reach. No major expansion of existing river access points is anticipated during the next five years.

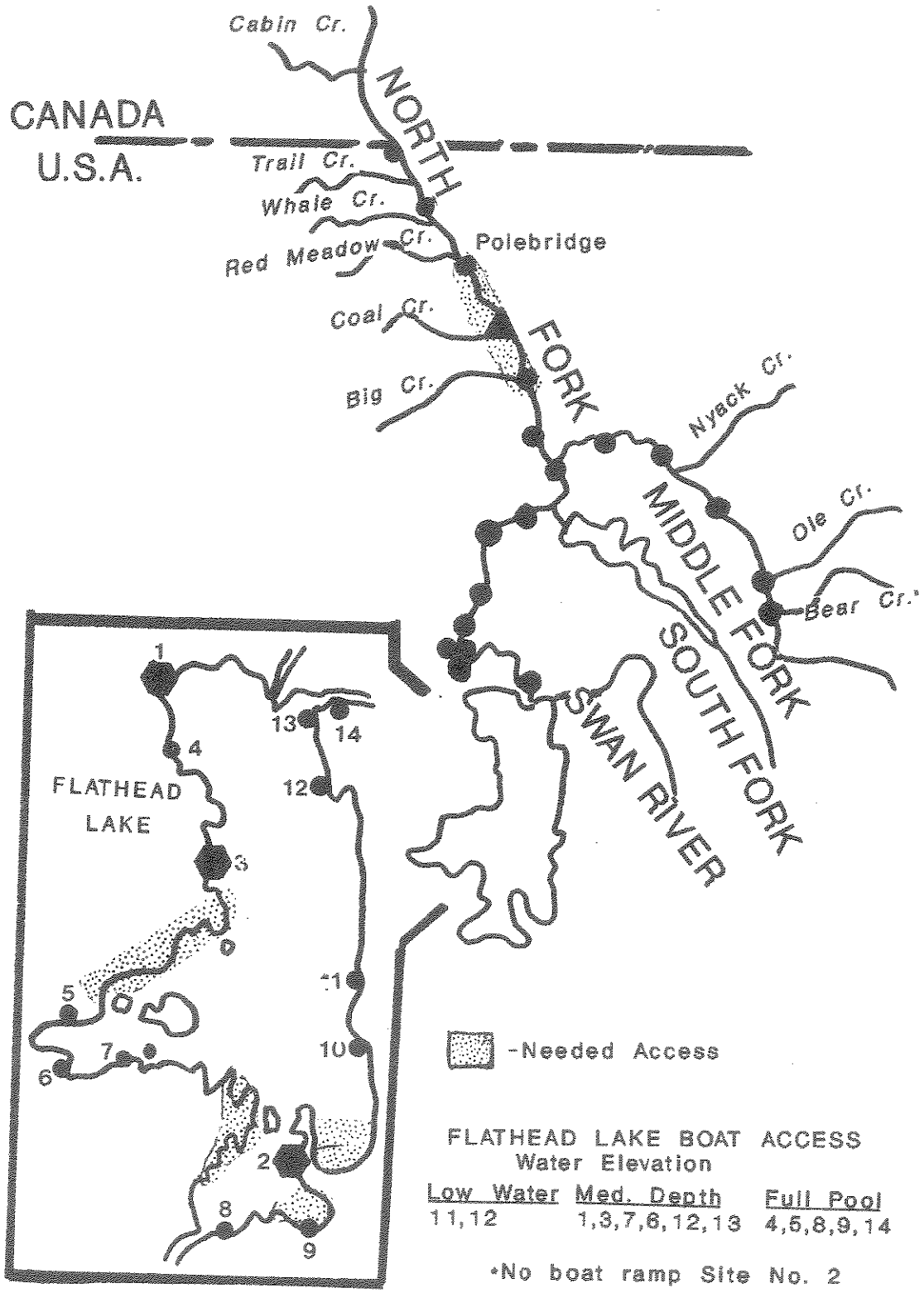
Flathead Lake: Fourteen lake sites provide angler and boating access along the 130 miles of shoreline around Flathead Lake. The main goal of the lake plan is to provide year round boat access to the major fishing areas. Recreational facilities at the public sites around Flathead Lake range from simple boat ramps and parking areas to full campgrounds with running water and showers.

Boat ramps are classified into three groups: low, medium, and full pool access (Figure 2). Low water ramps at Yellow and Blue Bays provide boat access even at minimum lake elevations. Ramps at Wayfarers, Somers, Woods Bay, West Shore, Walstad, and Big Arm sites provide access between full pool elevation to 8' below full pool. Additional access at full pool elevations are provided at Dayton, Big Arm, Polson, Lakeside, Bigfork, and Ducharme. No boat launching facilities are presently available at the Finley Point site.

Improved docks and boat launching facilities are planned at three present sites along the lake (hexagons in Figure 2). The first work is scheduled for the Somers fishing access site (#1 , Figure 2) during the 1989-1990 season to lengthen the ramp and improve docks, parking, and other facilities. The next work priority is at Finley Point (#2, Figure 2), tentatively scheduled during 1989-1991. Plans include development of a boat launching facility and modifications in the camping facility. Work at West Shore State Park (#3, Figure 2) includes a new boat dock and improvements to make this site accessible at low water. Work at this site is planned for the 1990-1992 period.

The need for additional boating access has been identified in Skidoo Bay, the western area of the Narrows, and between Elmo and West Shore State Park (shaded area, Figure 2). Both the CS&KT and the MDFWP are presently looking for suitable lands within these areas.

Figure 2



SCOPING MEETING RESULTS

During February 1988, a series of public meetings were held to solicit public comment on the future of fisheries management in the upper Flathead drainage. Meetings were held in Pablo, Bigfork, Polson, Kalispell, and Missoula. Questionnaires were passed out at each meeting and were completed by 101 people.

People were asked which species they preferred to fish for (in order of preference) in Flathead Lake. Kokanee, cutthroat trout, and bull trout were approximately tied as the most popular species with kokanee taking a slight edge as the most preferred species. Lake trout was ranked fourth, yellow perch fifth, and lake whitefish sixth. The same question was asked regarding the Flathead River. Cutthroat trout and bull trout were the most preferred species, and kokanee was the third most preferred.

In the lake, respondents favored fishing during the spring and summer. Winter was the next most popular season, and fall was least popular. However, a year long census showed that 80 % of fishing use on the lake occurs in the summer.

When given a choice between larger fish or an increased catch rate, most people wanted larger lake and bull trout and yellow perch, but more abundant kokanee. Cutthroat fishermen were about evenly divided on this issue. Many cutthroat fishermen said they wanted both larger fish and more of them.

The respondents expressed a desire for increased angling opportunities for cutthroat, bull trout, kokanee, and lake trout, but were satisfied with present fishing opportunities for yellow perch and lake whitefish.

Several questions were asked specific to bull and cutthroat trout. Most people stated that they preferred fishing for bull trout in the lake rather than the river. However, cutthroat fishermen had only a slight preference for the lake over the river. Spring was the preferred fishing season for both species. Summer, fall, and winter were tied for second place with bull trout fishermen. Cutthroat fishermen found summer and fall second to spring, with winter being least desirable.

Kokanee fishermen liked the summer lake fishery the best, followed by the winter lake, the river lure and then the river snag fishery. This ranking is compatible with past and present management of the kokanee fishery.

When asked about the direction of future management, respondents were equally divided between placing a strong emphasis on the native species (cutthroat and bull trout) or emphasizing kokanee. Respondents were also equally divided on the issue of introducing a new species into Flathead Lake. The people who desired a new

species most commonly suggested walleye. Coho salmon, smallmouth bass, and burbot were also frequently suggested.

People perceived Mysis to be the biggest problem in the Flathead system, with past management second and hydro-power development and lake levels (which are interrelated problems) to be third and fourth, respectively.

SYSTEM-WIDE FISHERIES MANAGEMENT GOALS

The CS&KT and MDFWP will manage the lake, river, and tributaries as an interconnected system to achieve the following goals:

1) To preserve, protect and enhance populations of native fish species living in the drainage. Species of special concern such as bull trout and westslope cutthroat trout shall receive top priority for protection activities.

2) To maintain a diverse recreational fishery in the Flathead system. The fishery will provide a variety of opportunities for fishing during all seasons of the year, for a variety of species and sizes with trophy, sport, and harvest-oriented fishing available to the angler.

3) To maintain or enhance existing water quality and aquatic habitat.

FISH HABITAT

Both residents and visitors are attracted to the Flathead drainage by an abundance of cold, clean water and spectacular vistas. Just as water quality and aquatic habitat formed the original fishery, manmade changes in the drainage are now reshaping the fish community. Development in the watershed has reduced water quality and speeded up the eutrophication or aging process in Flathead Lake. Changes in habitat have decreased or eliminated the ability of some streams to produce fish. Environmental changes favor introduced species over native fish and nongame fish over gamefish. Fortunately, there is widespread support for maintaining or enhancing water quality and aquatic habitat, and a wide variety of planning, management, and regulatory processes have been developed.

Environmental problems can generally be categorized as changes in physical habitat, water quantity, and water quality. The goal of CS&KT and MDFWP is to maintain or enhance fish habitat in the Flathead Basin. Following is a summary of major strategies developed to meet this goal.

PHYSICAL HABITAT

Physical Alterations

A major portion of the Flathead drainage lies within pristine areas such as Glacier and Waterton National Parks and the Bob Marshall and Great Bear Wilderness areas. The remainder of the drainage is subject to a wide range of development.

A number of agencies at the Tribal, local, county, state, and federal government level each year review 250 to 300 proposals to alter stream or lake habitats. Projects are reviewed in an effort to eliminate or mitigate damage to aquatic habitat. Enforcement is initiated against approximately 10 to 12 projects each year for failure to obtain proper authorization or for noncompliance with permit requirements. Enforcement actions usually emphasize repair or mitigation of habitat damage rather than fines or penalties.

Strategies:

A. Agencies will continue to enforce habitat protection statutes within the limits of their jurisdiction.

Timber Management

Timber management is one of the major resource development activities in the watershed, with major landholdings by the Forest Service, Montana Department of State Lands, and Plum Creek Timberlands. In most drainages modern forest practices have prevented timber harvest from damaging streams, although the cumulative effects of timber removal have increased water yields beyond desired levels in some drainages. This is particularly true of areas with mixed ownership and little coordination of activities.

The major impact to fisheries from timber management is from the development of road systems. Roads physically alter streams at crossing points and can cause erosion and fish migration barriers if culverts are improperly installed. Roads are also a major sediment source that can disrupt fish habitat and smother aquatic insects and fish eggs. Timber management is of particular concern because it occurs in many streams in the upper drainage that provide critical spawning and rearing habitat for cutthroat and bull trout. Studies have shown a direct negative impact from logging and road building on bull trout egg survival, with egg survival decreased by 10-20% or more in most critical spawning areas.

Several efforts are underway to mitigate the effects of timber management on fisheries. The Flathead National Forest (FNF) has adopted a forest plan that sets objectives for maintaining fish populations, water quality, and physical habitat. A cooperative study between FNF and MDFWP is examining the relationship between

timber development and bull trout. A forest model is used to predict the impacts of specific timber sale alternatives. Timber sales in critical areas are reviewed by MDFWP or CS&KT.

The 1987 Montana Legislature adopted House Joint Resolution 49 which established several subcommittees to examine the need for a Forest Practices Act in Montana. The effort is directed by the Montana Environmental Quality Council and is evaluating the impacts of logging on water quality and the need for best management practices (BMP's) or regulations to mitigate those impacts. A companion effort proposed by the Flathead Basin Commission, Department of State Lands, and Plum Creek Timberlands, would further study the impacts of logging on water and fish and would evaluate the effectiveness of BMP's.

Strategies:

A. Continue to review timber sales in critical spawning and rearing areas.

B. Encourage coordination and cooperation between land managers to hold cumulative effects of timber management to desired levels.

C. Promote the passage of BMP's and or regulations that will eliminate or mitigate the impacts of logging on fisheries.

Dams

The development and operation of three hydroelectric dams has had a profound effect on the Flathead fishery. Hungry Horse Dam eliminated access to 42% of the traditional spawning grounds in the South Fork of the Flathead for cutthroat and bull trout. Bigfork Dam eliminated or restricted access to an additional 18% of the spawning areas in the Swan drainage. Erratic flow releases from Hungry Horse Dam nearly eliminated kokanee spawning in the main Flathead River. Kerr Dam, which fluctuates the upper 10 feet of Flathead Lake, limits food production and fish spawning around the lakeshore, with kokanee shoreline spawning now essentially eliminated. Water level fluctuations have caused increased erosion of the lakeshore and the streambanks of 22 miles of the Flathead River above the lake.

In 1980 Congress passed the Northwest Power Planning Act (NWPPA) directing the Bonneville Power Administration (BPA) and electric utilities to document and mitigate impacts to fish and wildlife from the construction and operation of hydroelectric projects in the Columbia River drainage. Studies in the Flathead system have focused on impacts to cutthroat and bull trout, kokanee, and yellow perch. A comprehensive mitigation plan for fish and wildlife will be presented to the Northwest Power Planning Council in October, 1990. A mitigation plan for Kerr Dam is being developed by the Montana Power Company under a relicensing provision by the Federal Energy Regulatory Commission. The plan

should be released for review in 1989. The two plans will recommend operational changes, including minimum releases for Kerr and Hungry Horse Dams. Other fishery losses will be mitigated by improving fish access to spawning grounds and through hatchery plants. Implementation of this fish management plan is partially contingent on mitigation funding. In addition, Pacific Power and Light is expected to award a contract in spring, 1989, for study of the feasibility of changing the design and operation of a fish ladder on Bigfork Dam to facilitate fish migration to the Swan River.

Twenty-two small hydroelectric dams were proposed for the Swan drainage in the early 1980's along with several other proposed dams in the Flathead drainage. Most of the proposals have now been dropped because of changes in hydroelectric rates and policies. A number of other small dams constructed for irrigation have localized but cumulative effects on fisheries. The Northwest Power Planning Council recently adopted a Protected Areas program which effectively bans new hydroelectric development on critical spawning and rearing stream reaches. This program should significantly reduce the threat of new hydropower development to western Montana fisheries.

Strategies:

A. Prepare a comprehensive fisheries mitigation plan for the Northwest Power Planning Council by October, 1990. Enlist public and agency support to implement the recommended mitigation and compensation measures.

B. Develop a mitigation plan for the operation of Kerr Dam.

C. Work with Pacific Power and Light to promote the redesign and operation of Bigfork Dam to facilitate fish passage to the Swan drainage.

Cabin Creek Coal Mine

In 1985, the Governments of Canada and the United States asked the International Joint Commission (IJC) to examine the effects of the proposed Cabin Creek open-pit coal mine on the aquatic resources of the Flathead system. Of special concern was the amount of bull trout spawning which occurred within North Fork tribuaries. The IJC convened a study board, which along with various technical committees, analyzed the potential effects of the mine. The IJC's final decision, reached in March 1989, was to reject the existing mine proposal, put restrictions on any future proposal, and recommend considering integrative management of the upper North Fork area as a conservation reserve.

Strategies:

A. Monitor future mine proposals as they arise.

Water Quantity

Maintenance of Flathead drainage fisheries depends on keeping adequate amounts of water in the streams and reservoirs to allow for spawning, rearing, and feeding. In 1969, the Montana legislature required the MDFWP to file for instream flows in some of the best trout streams in the State, including the main Flathead River and its forks. In addition, the Bureau of Reclamation and BPA have agreed to provide flow releases from Hungry Horse Dam to maintain flows in the main Flathead River for fish spawning, rearing and aquatic insect production. The river is maintained at a minimum of 3,500 cfs year around with a maximum of 4,500 cfs (if needed) during the kokanee spawning period of October 15 to December 15.

In 1978 MDFWP also purchased a portion of the water rights owned by the Ashley Creek Irrigation District. The purchased rights totaled 11,900 acre-feet of water stored in Ashley Lake. The water is released through the year to maintain a 13 cfs flow for fish and wildlife habitat and 3 cfs to dilute the sewage effluent from the Kalispell municipal sewage treatment plant.

CS&KT has been actively involved in protecting instream flows for fisheries both on and off the Flathead Reservation. These efforts, if successful, could have a significant beneficial impact on the fisheries of the Flathead drainage.

Strategies:

A. Maintain instream flows in the drainage by reviewing water right applications and other water development projects.

B. Secure guaranteed flow releases from Hungry Horse Dam through the Northwest Power Planning Council.

C. Manage Ashley Lake flow releases to maintain a 16 cfs flow in Ashley Creek at Kalispell for fish and wildlife habitat and sewage dilution for water quality.

D. Pursue the maintenance of instream flows through the state water adjudication process and negotiations between the CS&KT and the state compact commission.

Water Quality

Most of the water quality monitoring and regulation in the Flathead drainage is handled by the Montana Water Quality Bureau (WQB), Flathead and Lake County Sanitation Departments, the University of Montana Biological Station, the Whitefish Sewer and Water District and several other municipal or district sewer and water departments. To protect water quality in Flathead Lake, the WQB imposed a limit of one part per million of phosphate for effluent from municipal sewage treatment plants. To assist in meeting this standard, Flathead and Lake counties banned

detergents containing phosphates. The City of Kalispell also cooperated with MDFWP in the purchase of water from Ashley Lake to dilute the sewage discharge into Ashley Creek.

The CS&KT and MDFWP cooperate to maintain water quality through enforcement of habitat protection laws, and review of discharge permits, subdivisions, and other development proposals.

Strategies:

A: Continue to coordinate with other agencies to review development proposals and enforce existing water quality laws.

FISH POPULATION STATUS AND SPECIES SPECIFIC MANAGEMENT OPTIONS

This section gives detailed information on the ten major sport fish species found in the lake and river system. The life history, past management, abundance, angler use and management concerns are described for each species. The management objective for each species is stated along with the strategies for achieving that objective. The costs and benefits for achieving each objective are presented. The projected cost increases are primarily due to increased hatchery plants. There are several options for increasing hatchery production including renovation of existing state hatcheries, utilization of space at the USFWS Creston hatchery, pen rearing, or construction of a new hatchery. The success of experimental plants and selection of long term management goals will eventually determine the hatchery option chosen. Projected benefits are calculated on increased fishing use and the estimated value of an angler day based on the recent MDFWP bioeconomic survey.

BULL TROUT

Life History

The bull trout is the largest fish native to the Flathead drainage, attaining a length of up to three feet and a weight of up to 20 pounds. The bull trout of inland waters is a separate species from the smaller, coastal Dolly Varden. Most bull trout in the Flathead system are migratory, growing to maturity in Flathead Lake and migrating up to 150 miles through the river system and into tributaries to spawn. Juvenile fish remain in tributaries from one to three years before migrating back to the lake. Most bull trout in the North and Middle Forks of the Flathead River mature in Flathead Lake. The bull trout is designated a species of special concern in Montana because of the restricted distribution of the large migratory form, threats to spawning habitat, and danger of interbreeding with brook trout. Migratory bull trout from Flathead Lake once spawned in tributaries of all forks of the Flathead River and the Swan River, but Hungry Horse and Bigfork dams now block about 50 % of the original spawning habitat.

The diet of bull trout in Flathead Lake consists almost exclusively of fish. Lake whitefish and pygmy whitefish are the most important food item, followed by yellow perch, kokanee and many non-game species. Small bull trout now feed incidentally on Mysis. Bull trout in the lake grow from two to five inches per year, and most mature at six years of age. Biologists believe that about one-third (1/3) to one-half (1/2) of the mature bull trout present in the lake each year embark on a spawning run.

Mature bull trout (ages 5 to 9, ranging in length from 20 to 36 inches) begin their migration into the river system during April, move slowly upstream, and arrive in the North and Middle Forks in June and July. Most bull trout enter tributaries during July and

August, hold in the streams for one month or more, and spawn in September and October, when water temperatures drop below about 50°F. The fish select relatively flat areas in the stream channel with clean, uncompacted gravels, and with groundwater influence or upwelling. These specific requirements for spawning sites result in restricted distribution of spawning within the drainage. Bull trout spawning has been identified in 28 tributaries of the North and Middle Forks with ten tributaries supporting most of the spawning.

Bull trout eggs hatch in January and the resulting fry emerge in April. Incubating eggs and sac fry are very sensitive to siltation and other streambed changes.

Most emigration of juveniles from the tributaries takes place from June through August; juveniles then move rapidly downstream into the main Flathead River below the South Fork.

Past-Management

MDFWP has managed the bull trout as a unique trophy species since the early 1950's. In the 1950's, a daily creel limit of two fish was put in place, and major tributaries used by spawning bull trout in the North Fork drainage (Whale, Trail, Big and Coal Creeks) were closed to angling. In the 1960's, MDFWP closed major tributaries used by spawning bull trout in the Middle Fork drainage (Long, Granite, Morrison and Lodgepole Creeks).

In 1982, MDFWP reduced the creel limit on bull trout to one fish, daily and in possession. An 18-inch minimum size limit was dropped in 1983 since the one fish daily limit was considered to provide adequate protection. In 1983, Montana worked cooperatively with the British Columbia Ministry of the Environment to establish angling closures on major tributaries used by spawning bull trout in the North Fork drainage in British Columbia, and to reduce the creel limit on bull trout in British Columbia to one fish daily.

Considerable management and research activities have been directed toward this species. In cooperation with the U.S. Forest Service, MDFWP has monitored effects of timber harvest on spawning and rearing habitat in the upper drainage, and worked to protect sensitive spawning areas from disturbance. In addition, MDFWP has monitored the population through redd counts and juvenile estimates in conjunction with the Flathead Basin Commission's water quality monitoring plan.

Abundance

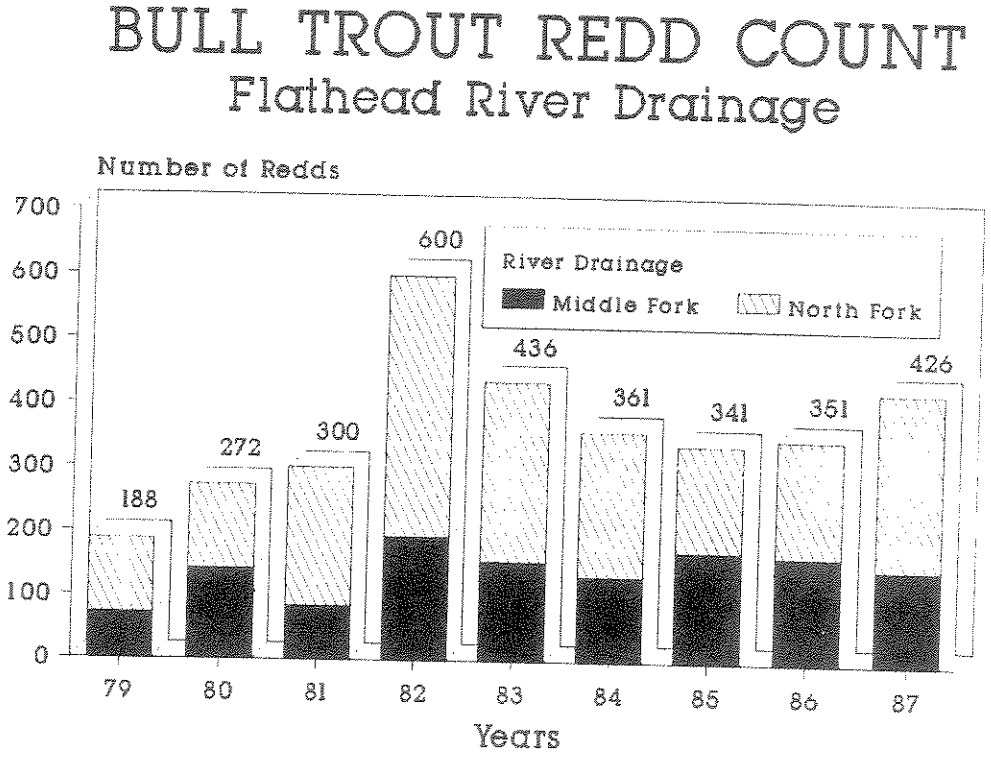
Drainage-wide counts of bull trout redds in 1980 (568), 1981 (714), 1982 (1,138), and 1986 (814) were used to index the number of migratory bull trout which successfully spawned in the river-tributary system. Based on several assumptions, these counts

indicate that an average of 3,450 bull trout successfully spawned annually in the Flathead drainage during this period.

Annual monitoring of bull trout spawning in the drainage at selected major sites indicates that more bull trout spawned in 1982 than in any other year, but spawning has been variable revealing no definite trend (Figure 3).

Estimates for the number of bull trout in Flathead Lake are not available, but sampling indicates that the population has been relatively stable for the last 20 years. Average catches of bull trout in sinking nets were 1.2 to 2.1 fish per net in 1967-1970, and 2.2 to 2.9 fish per net in 1980-81. The percentage of trophy fish (greater than 25 ") was similar in both sampling periods.

Figure 3



Angler Use and Harvest

Bull trout support an important trophy fishery in Flathead Lake and the Flathead River. Based on a 1981 survey, anglers fished about 20 hours for each trophy fish landed. Most anglers troll for bull trout in Flathead Lake, while most river anglers fish with plugs during the spawning migration.

A creel survey conducted on Flathead Lake from May 1981 through May 1982 estimated that anglers harvested 5,452 bull trout during that one year period. Most bull trout (65 %) were harvested from May through October. The harvest of bull trout represented 1% of the total harvest of all fish from Flathead Lake. In 1985, a creel survey on Flathead Lake was conducted from June 16 through September 7. Anglers caught an estimated 1,265 bull trout during this period.

A creel survey conducted during 1981 to 1982, (during a time when there was a two-fish limit) estimated that 1,827 and 404 bull trout were harvested on the main stem Flathead River and North Fork Flathead River, respectively. Nearly all of the bull trout harvest in the river system occurred from May through July. Anglers released about half of the bull trout they landed. Approximately 246 bull trout were harvested on the North Fork Flathead River from May to September, 1987, under a one-fish limit.

Hatchery Culture

Bull trout could be cultured in hatcheries and released into Flathead Lake to increase bull trout populations in the Flathead system. Hatchery fish could compensate for part of the loss of bull trout spawning and rearing areas caused by the construction of Hungry Horse, Kerr, and Bigfork Dams. Two major methods are available to culture bull trout: (1) taking eggs from wild fish and transferring eggs to the hatchery, or (2) developing a captive brood stock of mature fish that would remain in the hatchery. Large scale bull trout culture has not been attempted in Montana. Consequently, the effects on population genetics and contribution to the fishery is unknown. It is estimated it will take 260,000 juvenile bull trout to replace the loss that occurred with the construction of Hungry Horse and Bigfork Dams.

Management Concerns

1. Bull trout management is an international issue. Some fish from Flathead Lake spawn in North Fork tributaries in British Columbia, Canada.

2. The species is very sensitive to streambed habitat degradation and angling pressure.

3. There are trade-offs in balancing the lake and river harvest.

4. Bull trout are predators and may compete with lake trout and may also eat cutthroat trout.

5. A coal mine in the Cabin Creek drainage, if built, has the potential to severely impact bull trout spawning habitat in the Canadian portion of the Flathead. (See the Fish Habitat section for more information on the status of this mine.)

6. Hatchery production of bull trout is experimental and the return rate to the creel is unknown.

Selected Management Direction

Increase use and harvest by 20 - 25%, increase harvest to 6,000 fish from Flathead Lake and 2,500 fish in the Flathead River system. Increase levels of spawning fish to exceed average counts in North and Middle Fork tributaries.

Strategies:

A. Increase enforcement activities in spawning areas and at the river mouth fishery.

B. Increase agency coordination and habitat monitoring; increase available spawning and rearing habitat by opening blocked areas.

C. Plant 260,000 - 8" bull trout directly into Flathead Lake through an experimental hatchery program.

D. Initially maintain existing regulations. If hatchery program is successful in increasing the population then the daily bag limit may be increased. If these strategies are ineffective in increasing the population, shorten the angling season length in the river, or close additional spawning streams in the Middle Fork drainage.

E. Encourage voluntary catch and release through a public education campaign.

Benefits and Costs of Management Direction:

Benefits: Approximately 7,500 angler days per year, valued at $547,500. per year.

Costs: Brood stock development: $500,000 one time cost, annual hatchery operation and maintenance $150,000. Funding may come from mitigation for damages done by hydroelectric dams.

Other Management Alternatives

Another management alternative which was considered in developing this plan was to maintain the current population. Because loss of spawning habitat has reduced fish production, this alternative

would have required more restrictive regulations as fishing pressure increased. This alternative was not chosen because of the need to replace fishing opportunity lost when kokanee decreased and because of demand for more native trout.

WESTSLOPE CUTTHROAT TROUT

Life History

Cutthroat trout are native to the Flathead drainage. They are widely distributed throughout the system, and are the only fish present in many of the headwater streams.

There are three populations of cutthroat trout in the Flathead system: resident, fluvial, and adfluvial. Resident trout spend their entire life in the tributary streams. Fluvial and adfluvial fish spawn in tributary streams where their young live for up to three years before the fluvial fish migrate to the Flathead River and the adfluvial fish migrate to Flathead Lake. The migratory cutthroat grow to maturity in the river or lake before returning to the streams they were born in to spawn. The three stocks can primarily be differentiated by the size of the mature adults, with the adfluvial fish being the largest and the resident fish the smallest.

In the Flathead drainage both resident and migratory cutthroat spawn in May and June in small and intermediate-sized tributaries. Fry emerge from July through August, depending on time of spawning and water temperature. Most migratory cutthroat leave the tributaries as juveniles at two or three years of age. Fry migrate downstream primarily during June and July.

Juvenile adfluvial cutthroat trout enter the lower Flathead River from August through September where they may remain during the winter months prior to entering Flathead Lake. The fish remain in Flathead Lake for two to three years prior to returning to the Flathead River and tributaries to spawn. Some adult cutthroat enter and remain in the lower river from January through April, presumably for feeding purposes, prior to migrating upstream to spawn.

The North Fork of the Flathead downstream from Polebridge and the Middle Fork of the Flathead downstream from the wilderness boundary contain mostly adfluvial cutthroat. The Middle Fork upstream of the wilderness boundary and, possibly, the North Fork from Polebridge to the Canadian border contain primarily fluvial cutthroat.

Past Management

The management goal for cutthroat trout has been to maintain naturally reproducing populations in Flathead Lake, River, and tributaries. Fisheries managers have tried to reach this goal through the use of fishing regulations, policy restrictions, and habitat protection.

In 1984, the limit on cutthroat trout in the Flathead River was reduced to five trout, with only one greater than 14", in order to protect adult fish. The limit in the north half of Flathead Lake is five fish. The limit in Tribal waters is 5 fish, only one greater than 14". In 1988 MDFWP initiated a voluntary, state-wide, catch-and-release program for cutthroat trout. Anglers are now being asked to release all fish which exhibit red slash marks in the throat area.

In the early 1970's MDFWP developed a policy of not planting non-native fish species in places where they would compete with native species. The Department also has a policy restricting the use of non-native species in private fish ponds in order to reduce the impacts on native species. The state has designated the westslope cutthroat trout a species of special concern due to the decline in numbers and range. Habitat protection activities have been directed toward the protection of trout spawning and rearing habitat and water quality. These efforts account for approximately 40% of the state's regional fisheries program, and at least that much of the Tribal Fisheries Program.

Most management in the past has concentrated on the river and tributaries because cutthroat trout are one of the most abundant game fish species available in these areas. The importance of maintaining the integrity of the entire Flathead system is recognized.

Abundance

An assessment of the population status of cutthroat trout in the Flathead drainage is complicated by the existence of three life history patterns and by their habit of spawning during spring runoff.

Cutthroat populations have remained at fairly stable but low levels since the early 1980's when surveys began. Population estimates of cutthroat are highest in the smaller tributary streams (an average of 7.7 fish per 1000 sq. ft.). Tributaries in the upper portion of the Middle Fork Flathead River contain an average of 3.9 fish per 1000 sq. ft. Tributaries of the Lower Middle Fork and the South Fork Flathead River contain an average of 3.5 fish per 1000 sq. ft. A 1985 population estimate conducted on the North Fork of the Flathead River near the Ford Ranger Station found 456 cutthroat over 4 inches in length per mile. Estimates made in 1988 on sections of the Middle Fork Flathead River upstream of the wilderness boundary ranged from 50-140 cutthroat per mile of stream. Little information is available on cutthroat densities in the mainstream Flathead River or Flathead Lake.

Angler Use and Harvest

Based on surveys conducted in 1981 and 1987, anglers harvest approximately 30,000 to 50,000 cutthroat trout each year in the

Flathead drainage. About 80% of the harvest occurs in the river and tributaries. The lake cutthroat fishery is primarily a spring and fall fishery. Much of the catch in the lake is incidental - anglers usually catch cutthroat while fishing for other species.

Catch rates for cutthroat in Flathead Lake are highest in April and May (about .03 fish/hour) and lowest in January and February (about .001 fish/hour). The average catch in the lake is .01 cutthroat/hour.

Catch rates in the Flathead River system vary widely by month and area but overall are considerably higher than in the lake. Catch rates in the mainstream Flathead River are highest in July, August, and November (average .43 fish/hour) and lowest in May and June (average .03 fish/hour), however winter time creel surveys on the river have not been conducted. The overall average catch rate on the river is .18 fish/hour. Cutthroat account for 10% of the total harvest of game fish from the Flathead River. However, cutthroat account for 91% of the total harvest from the North Fork of the Flathead. Catch rates in the North Fork average .68 fish/hour while catch rates on the Middle Fork are considerably lower at .20 fish/hour.

Hatchery Culture

Since hydroelectric dams have blocked access to about 50% of the traditional spawning areas, hatchery planting is the only way to significantly increase cutthroat populations. Concerns have been raised about the impacts of hatchery fish on the genetics of wild trout populations. The current MDFWP cutthroat brood stock was developed under the guidance of the University of Montana Zoology Department Genetics Laboratory. The majority of the brood fish came from Flathead populations in Hungry Horse Reservoir. These fish differ little genetically from the existing Flathead Lake cutthroat. Geneticists with the University of Montana feel that stocking Flathead Lake with hatchery fish raised from the present brood stock will have little impact on the genetics of Flathead Lake cutthroat trout.

The plants will be experimental since the return rate to the creel has varied in other large lakes. Implementation will require several years as it will require the development of mitigation plans and funding.

Management Concerns

1) Maintenence of genetic purity and diversity of westslope cutthroat stocks.

2) Spawning and rearing habitat is threatened by human activities.

3) Maintain suitable catch restrictions on a fish which is very vulnerable to anglers in the river system.

4) It is difficult to monitor populations in both the lake and the river.

5) Loss of the kokanee fishery may cause a substantial increase in fishing pressure on cutthroat.

Selected Management Direction

Objective: Increase harvest and use of cutthroat by 20%. Fisheries biologists do not know if Flathead cutthroat populations can withstand increased harvest. To be conservative we assume that populations will have to increase in order for harvest to increase.

Strategies:

A. Improve fish passage in blocked areas and restore damaged areas. Increase agency coordination, habitat protection and monitoring.

B. Increase enforcement activities to insure compliance with fishing regulations.

C: Stock Flathead Lake with one million 4 to 6 inch fish annually.

D: Initially set a lake-wide daily limit of 2 cutthroat. This will standardize limits and prevent overharvest until the hatchery fish enter the fishery. Limits may be increased at a later date if hatchery plants are successful in increasing the population. In the North Fork of the Flathead, upstream from Polebridge, a more restrictive limit may be proposed to increase the number of larger, fluvial, cutthroat.

E: Encourage voluntary catch and release of cutthroat through a public education campaign.

Benefits and Costs of Selected Management Alternative

Benfits: Approximately 6000 angler days/year at a value of $438,000/year.

Costs: Approximately $262,000/year for hatchery operation, planting, and all other costs plus $500,000 for an upgrade of the existing Creston National Fish Hatchery. Funding may come from mitigation for damages done by hydroelectric dams.

Other Management Alternatives

The other objectives considered in the planning process were maintaining the current management direction or very large

hatchery plants. Given increasing fishing pressure, current management direction would have required more restrictive limits to avoid overharvest of cutthroat. The large scale hatchery planting option (2.5 million cutthroat/year) exceeded current hatchery capacity and increased costs may not produce the desired benefits. Therefore these options were not chosen.

KOKANEE

Life History

Kokanee are a landlocked form of sockeye salmon. Kokanee retain the migratory life history of their sea-run relatives. In the Flathead, most of the spawning occurs in the tributary streams. Some shoreline spawning also occurs in areas of groundwater seeps or stream inflows. Spawning occurs in November and egg incubation requires about 65 days.

Soon after hatching, kokanee move into the lake to rear and mature. They normally spend four growing seasons in the lake before returning to their birthplace to spawn and then die. Kokanee can be found throughout most of the lake but prefer to occupy the cooler open water areas at depths from 30 to 60 feet. They feed mostly on the larger sized zooplankton (Daphnia spp.) found near the surface in the open mid-lake zone.

As kokanee approach maturity feeding stops and visible changes start to occur in body color and shape. This body deterioration continues past spawning and eventually causes death.

Past Management

Kokanee were first introduced into the Flathead system in 1916. By the late 1930's the kokanee population had expanded and was providing a popular sport fishery. A naturally sustained kokanee population flourished during the late 1950's and 1960's. This natural supply of fish seemed to be unlimited and angling limits and seasons allowed a liberal harvest. Fishing was open year around, with a daily and possession limit of 35 and 70 fish, respectively. In addition, anglers were also allowed to snag kokanee as spawning fish concentrated in the river and along the lakeshore.

Fisheries work during the late-1960's documented reduced numbers of kokanee on specific spawning areas around the lake and in the river. These declines were, in part, caused by the operation of Kerr and Hungry Horse dams. These dams cause mortality by fluctuating water levels on spawning grounds where eggs are killed through dewatering and freezing. Kerr Dam affected lakeshore spawning kokanee by increasing shoreline erosion and decreasing spawning gravel quality. Kokanee numbers continued to decline during the late 1980's due to other sources of mortality, such as overharvest and predation. In 1981, Mysis,a large zooplankton, was discovered in Flathead Lake. Mysis compete with

kokanee for the same food supply and have reduced the numbers of some species of Daphnia in the lake, possibly reducing kokanee survival.

To compensate for decreased numbers of naturally reproducing kokanee a program was adopted of conservative fishing regulations and spawning habitat protection or improvement. The snag fishery was eliminated in 1983, the river lure fishery was closed in 1984, the winter ice fishery was limited for a time and then closed completely in 1986. Presently, the only kokanee angling season is the summer troll fishery. Daily catch limits have been reduced from 35 to 10 fish. To aid the recovery of the river spawning kokanee stock, instream flow restraints for the spawning and incubation season were implemented in the Flathead River at Columbia Falls in 1981 by the U. S. Bureau of Reclamation, and adopted as an interim measure in the Northwest Power Planning Council's Fish and Wildlife Program in 1982.

With the exception of the initial introductions in 1914, kokanee recruitment has depended upon natural reproduction. However, periodically 100,000 to 2,000,000 kokanee fry have been planted in the lake or river. These plants were intended to establish spawning runs or to replace fish in an area where eggs had been collected.

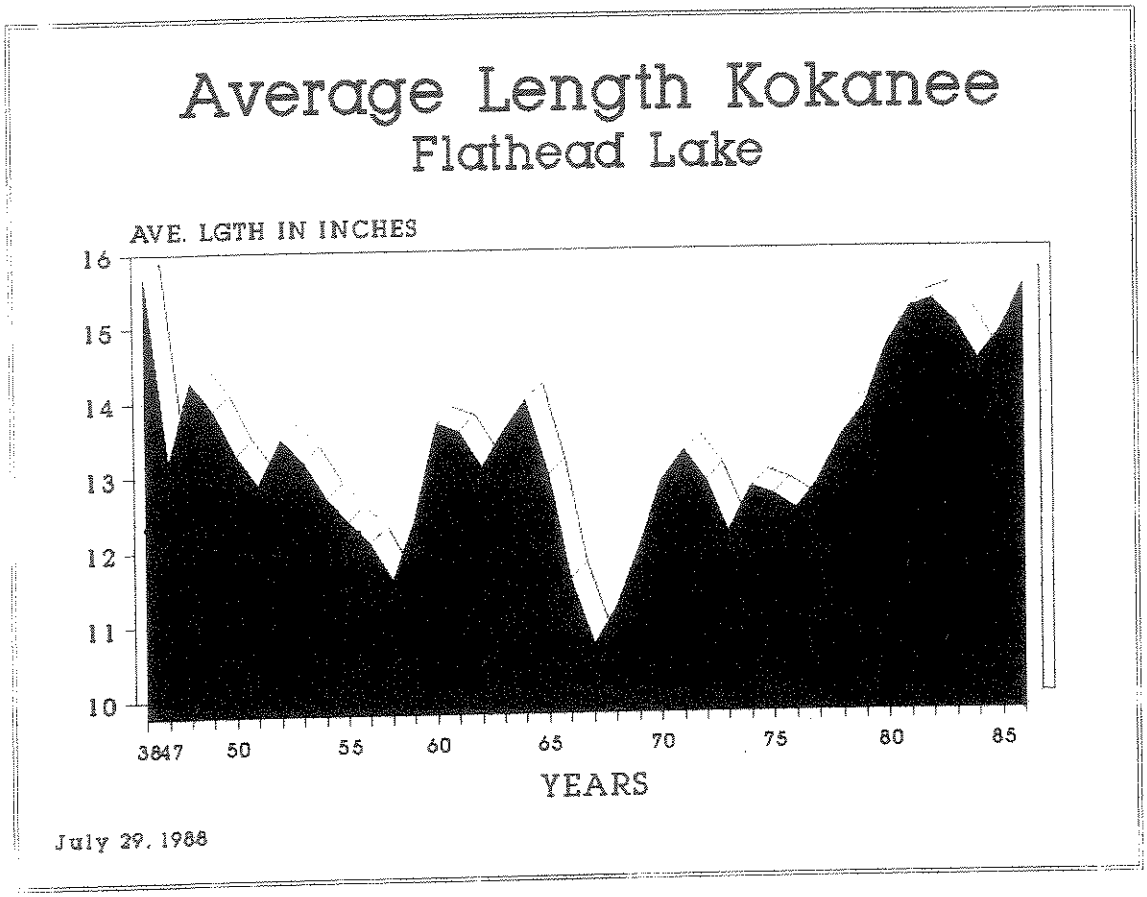
Abundance

Growth of kokanee is density dependent, meaning their length decreases as fish numbers and food competition increases. Neither kokanee size nor numbers over the last 50 years have been stable (Figure 4). Length changes have occurred within a 5-inch range (11 to 16 inches), suggesting the instability in the status of kokanee. As kokanee became established in the system, 1938 to 1956, their numbers increased while their length decreased.

After 1957 kokanee length increased or remained the same for the next seven years, until 1964. After 1967, length generally increased. Flathead kokanee are now the same length as they were in 1938.

From 1979 to 1985, an average of 80,000 kokanee spawned annually in the lake and river system. The 1985 spawner count of 141,000 was the maximum number of fish during the period of record. Inferences on the present status of the kokanee can be made by comparing counts for the last three years as numbers dropped from a record high of 141,000 in 1985 to 24,000 in 1986, 600 fish in 1987, and 500 in 1988.

Figure 4


Average Length Kokanee
Flathead Lake
AVE. LGTH IN INCHES
16
15
14
13
12
11
10
3847
50
55
60
65
70
75
80
85
YEARS
July 29, 1988

Angler use and harvest

Creel surveys conducted in 1962 - 63, 1981 - 82 and 1985, indicated kokanee accounted for about 95% of the fish harvested from Flathead Lake. Until 1985, Flathead Lake ranked as one of the top three fishing waters in the state and provided 90,000 to 128,000 recreational angler-days and a harvest of nearly 300,000 kokanee annually. The summer troll fishery (June to September) was the most popular angling season representing about 75% of the total angling effort. Catch rates during the summer averaged about 1 fish/hour.

Winter concentrations (December to April) of kokanee found in Skidoo and Blue Bays attracted anglers in the early 1980's, thus creating a new fishing opportunity which had not previously been exploited. Peak angler counts exceeded 400 persons in an area less than 5 acres during ice cover. Winter angling success averaged nearly three times the summer catch rate and rose to over 10 fish/hour when ice cover persisted. Since 1982, the winter fishery has been regulated by a season closure when the harvest approaches 50,000 kokanee. Such a closure has been imposed twice, in the winters of 1983 - 84 and 1985 - 86.

Numbers of adult kokanee in the lake during the last two summers, 1986 and 1987, were so low that anglers were discouraged and abandoned their fishing efforts for kokanee. The winter kokanee angling season during these two years was closed completely, from December 1st through April 30th. Present fishing regulations will continue this winter closure at least through May 1, 1990.

Hatchery Culture

Kokanee are currently being planted in an experimental four year program. The planting strategy for kokanee is to hold the fish in the hatchery until late June. The fish should be approximately 2" in length at the time of planting. This planting strategy should increase kokanee survival because warmer water increases plankton blooms and decreases competition by with Mysis.

If the plants do not produce a viable fishery they will be discontinued after 4 years. Low level plants may be considered to provide forage for lake trout.

Current egg sources and hatchery facilities can only produce 3 - 5 million kokanee statewide. A long term hatchery program may require mitigation funding.

Management Concerns

1. The change in the lake food chain created by the introduction of Mysis which affects kokanee survival.

2. Spawning in most of the traditional areas has been greatly reduced due to hydroelectric operations.

3. Present state hatchery facilities and egg supplies are inadequate to produce the number of kokanee needed for full recovery. Egg supplies must be developed, a costly and time consuming process.

4. Plants of fingerling kokanee are experimental and may not be successful in increasing the fishery.

5. Lake trout predation may limit kokanee recovery.

Selected Management Direction:

Objective: Restore kokanee population to a level that might sustain a harvest of 60,000 fish and provide, potentially, 15,000 anglers days of use.

Strategies:

A. Continue annual experimental stocking of 3 - 5 million kokanee which may produce a harvest of 60,000 adults.

B. Continue current management efforts to protect kokanee in the lake and river system.

Benefits and Costs of Management Direction

Benefits: Will potentially produce 15,000 angler days/year valued at $1,095,000/year

Costs: If hatchery plants are implemented on a long term basis it will be necessary to build a new hatchery. Hatchery construction costs are estimated at $3.0 million or reconstruct an existing hatchery, plus $200,000/year for operation and maintainence. Funding may come from mitigation for damages done by hydroelectric dams.

Other Management Alternatives

Other objectives considered in the planning process were no hatchery planting or planting of 8-10 million kokanee. We would expect no recovery of the kokanee fishery without hatchery plants. The high level kokanee stocking option is not feasible with current hatchery facilities.

LAKE TROUT

Life History

Lake trout, commonly called mackinaw, were introduced into Flathead Lake in 1905 and are now self-sustaining. Lake trout were common in angler catches by 1930 and by the 1950's provided

the best lake trout fishery and one of the top trophy fisheries in Montana.

Lake trout are distributed throughout the lake but are more selective about area and depth than most other species. Lake trout are solitary fish that prefer to stay just above the bottom in 50°F waters, typically over 100 feet in depth. Lake trout mature at 6 to 7 years of age and spawn in 10 to 40 feet of water broadcasting their eggs over rock and rubble bottoms during October and November. Spawning sites are located in suitable habitat all around the lake.

Smaller lake trout eat zooplankton, larger invertebrates (insects and Mysis), and small fish. Larger trout (over 16 inches) prefer a fish diet consisting of kokanee, lake whitefish, pygmy whitefish, sculpin, and yellow perch in that order. Lake trout are typically slow growing, requiring up to 10 years to reach 10 pounds and 15 to 20 years to reach trophy size (greater than 20 pounds). The state record lake trout weighing 42 pounds was caught in Flathead Lake in 1979.

Past Management

Since their introduction lake trout have been managed as a self-sustaining species. Prior to 1982 lake trout were included in the general trout limit of 10 pounds and 1 fish, not to exceed 10 fish. Under this limit it was legal to harvest at least two and possibly up to 10 lake trout. In 1982, concerns about over harvesting of trophy trout prompted a restriction in the trout limit to allow only 1 lake trout. Due to an apparent increase in the number of small (under 7 pounds) lake trout, the limit was liberalized in 1984 to allow up to 2 lake trout. However, under this limit anglers started harvesting 2 large lake trout again, renewing concerns about overharvest. Therefore, in 1986 the limit was changed to its present form of up to 5 lake trout daily, with only 1 trout over 28 inches. This limit encourages harvest of smaller, more abundant lake trout while protecting trophy-sized fish. Fishermen were also concerned about the effects of lake trout predation on kokanee and therefore wanted to limit increases in lake trout abundance.

Abundance

Lake trout are difficult to sample because of their solitary nature and the depths they inhabit. Although lake trout formed a major fishery by 1950, little was known about their life history until gill net surveys began in 1966. At that time, lake trout comprised less than 2% of all the fish sampled at 85 sites around the lake. A similar survey in 1981 found that lake trout still comprised only 1% of all fish. Survival may be increasing due to improved foraging conditions with the introduction of Mysis.

Angler Use and Harvest

Lake trout fishing requires specialized gear and techniques. The meat of large lake trout is very oily and is considered unpalatable by many anglers. These factors have limited use in the past but recently there is increasing interest in the trophy fishery. Some smaller lake trout (under 7 pounds) now have orange tasty meat, probably from eating Mysis, and are attracting increasing attention from anglers.

Most lake trout are hooked at depths over 100 feet. Steel line trolling outfits have been the preferred method in the past although fishing with downriggers or vertical jigging are becoming more popular as anglers look to take trout on lighter tackle. Other requirements are a boat capable of handling inclement conditions on a large lake, a fish finder, and a knowledge of favored fishing spots. Lake trout catches from anglers casting from shore or trolling in shallow water have increased in recent years.

Despite the specialization of the fishery, lake trout have attracted an avid group of anglers that comprise about 20% of all fishermen and that harvest 3,000 to 7,000 lake trout each year. Studies also show that one fish is harvested for every two released. Catch rates average about 0.2 fish per hour with the highest harvests occurring in February, June, August, and December. Most fish are caught in the northeast and southwest quadrants of the lake.

Creel data from 1963 to the present shows that the overall size frequency has changed only slightly with the average size and weight increasing slightly to 30.6 inches and 12.5 pounds although most anglers perceived sizes to be decreasing (Table 1). Small lake trout (less than 28 inches) also comprise a smaller percentage of the catch than they did 25 years ago despite limits that encourage harvest of small trout.

Currently about 30% of the lake trout caught are less than 28 inches, 20% are from 28-30 inches, 30% are from 30-32 inches and 30% are longer than 32 inches.

Management Concerns

1. Maintain the trophy segment of the lake trout population in spite of the loss of the kokanee food base.

2. Overharvest of fish that take 15 or more years to reach trophy size.

3. Increased predation on kokanee if the lake trout population increases.

4. Competition with other large predators (bull trout) for food if the favored prey (kokanee) decreases.

Table 2. Angler creel data for Flathead Lake lake trout, 1960-1987.

Year	No. Fish	Average Length (inches)	Average Weight (pounds)	Percent Less Than 28 inches
1960's	65	27.7	10.2	49.2
1970's	9	29.4	9.3	44.4
1981	51	31.4	13.7	23.5
1985	58	27.4	10.4	63.8
1986	155	31.3	13.8	27.7
1987	235	30.6	12.5	30.6

Selected Management Direction

Objective: Maintain trophy fishery. Reduce overall lake trout biomass by increasing the harvest of small fish. Increase use to 15,000 angler days/year and harvest to 8000 fish/year.

Strategies:

A. Publicize, through the media or brochures, methods to catch smaller (3-8 lb.) lake trout.

B: Modify regulations after public imput through the regulation setting process. Options include increasing the size limit, a slot limit, increasing the daily bag limit, or some combination.

Other Management Alternatives

Other alternatives which were considered but not chosen included maintaining the current use and harvest with the same or slightly more restrictive regulations. This could result in a decline of the trophy fishery as lake trout populations exceed their food supply. The other option considered was more liberal bag limits which has the potential to overharvest the trophy fishery.

YELLOW PERCH

Life History

Yellow perch were randomly introduced into the Flathead drainage during the early 1900's. Today they are found throughout the lake and the river sloughs.

Yellow perch become sexually mature in their second or third year of life. Usually, spawning migrations of yellow perch are short ranged. In South Bay of Flathead Lake this involves movement from deep water, where the fish have overwintered, to shallow water spawning areas primarily along the east shore of South Bay. Males arrive on the spawning grounds earlier than females, who stay in deeper water until they join the males and spawning takes place. Yellow perch spawn during April and May when water temperatures reach 45 to 50° F. Large numbers of yellow perch can spawn in relatively small areas. The eggs are extruded in long, flat, ribbon-like masses which become twisted around and attached to the spawning substrate. Yellow perch will spawn over a wide variety of substrates including boulders and gravel, aquatic plants, roots of trees, and other material- normally in water depths in excess of 1.5 feet.

Past Management

Yellow perch are not classified as game fish and there are no harvest restrictions. Yellow perch have received little management attention in Flathead Lake.

Abundance

Yellow perch primarily occupy the shallower, littoral areas around virtually the entire lake. They prefer areas of submerged aquatic vegetation, but will also occupy generally open areas. Yellow perch are commonly observed in and around man-made structures during the summer months. Because of their distribution, yellow perch are easily accessible to the average recreational angler. South Bay, that portion of Flathead Lake south of the Narrows, sustains the largest concentration of yellow perch within Flathead Lake. Yellow perch populations appear to be expanding with increased numbers of fish being harvested by fishermen in Big Arm and Somers Bay.

Angler Use

Yellow perch provide a popular sport fishery because of their good eating qualities and seasonally high catch rates. A creel census conducted in 1962 estimated that yellow perch was second only to kokanee in catch and comprised 17% of all fish harvested lakewide. Since 1986, yellow perch have been the most commonly creeled fish taken from Flathead Lake, representing a yearly estimated harvest of 50,000 to 75,000 fish. The winter ice fishery accounts for approximately half of the yearly harvest, depending on ice conditions. Yellow perch also provide an

excellent early spring boat fishery during the time when they are congregating for spawning. Within East Bay harvest rates are high (greater than 2 fish/hour) and fish creeled by fishermen usually average 9 inches or longer.

Selected Management Direction

Objective: Increase harvest of yellow perch from Flathead Lake to 100,000 fish annually. Maintain catch rate and average length.

Strategies:

A. Provide better public access for anglers on the South Bay.

B. Increase public awareness of fishing opportunities for yellow perch.

C. Develop a Flathead Lake fishing guide describing fishing techniques, seasons, and locations.

D. Structural diversity is essentially non-existent within the low pool zone of East Bay. To increase recruitment to the fishery, it is theorized that some type of artificial structure enhancement would be needed to reduce over-wintering predation.

Other Management Alternatives

Another alternative which was considered was to maintain current use levels, which underutilizes the current potential of the fishery and does not help to replace fishing opportunity lost due to reduced kokanee populations.

LAKE WHITEFISH

Life History

Lake whitefish were first introduced into Flathead Lake in 1909 in an attempt to establish a commercial fishery. Plants continued through 1914 but were abandoned when commercial netting captured only bull trout and mountain whitefish. By 1920 a few lake whitefish were being caught but were scarce and not readily taken by fishing.

Fisheries surveys from 1950-1970 found that lake whitefish were becoming more abundant and were distributed lakewide, with adults commonly found near the bottom in bay areas in 20-100 feet of water. Juvenile whitefish were more likely to be found suspended at midwater depths in the middle of the lake. Although the Flathead River system is accessible, lake whitefish have rarely been found in the river. In the fall of 1987 large schools were reported as far up as Blankenship Bridge, 55 miles above Flathead

Lake. Some lake whitefish have been observed up the Middle Fork of the Flathead River as far as West Glacier. It is not known if these migrations are for spawning, feeding or some other purpose.

Most male lake whitefish are mature by four years with females requiring an additional year to mature. Spawning usually occurs during January and early February along gravel shoreline areas at depths from 10 to 50 feet. The largest spawning concentrations of lake whitefish have been found near Lakeside, Bigfork, and Yellow Bay. The other two whitefish species (mountain and pygmy) found in the lake spawn in the river.

Lake whitefish feed primarily on zooplankton as juveniles and bottom organisms as adults. Zooplankton and midge larvae are the two main food items with fingernail clams and small fish (particularly yellow perch) also eaten occasionally. In recent years, Mysis have increasingly been found in stomachs of whitefish longer than 8 inches.

Lake whitefish grow moderately fast with four year old fish averaging 12 to 14 inches in length. Until recently, the State record lake whitefish was a 6 pound, 1 ounce fish caught in 1951 near Yellow Bay. During 1986, a number of fish over 6 pounds were measured, with increased sizes probably due to feeding on Mysis. The largest fish set a new State record of 6 pounds, 10 ounces before it was surpassed by a 10 pound fish from St. Mary's Lake (Glacier National Park).

Past Management

Past attempts at developing the techniques for a commercial fishery have failed. Daily angling limits have been liberalized in recent years to 100 whitefish per day to encourage sport fishing use and harvest. Flathead Lake and River are also open to commercial hook-and-line fishing although there has been little interest in the program.

Abundance

Lake whitefish appear to be one of the more abundant fish species in Flathead Lake. Densities have increased in recent years, possibly in response to improved feeding conditions with the appearance of Mysis.

Angler Use and Harvest

Although lake whitefish have delicious, flaky white meat, a good average size (12 to 17 inches), and are good fighters, they have attracted little attention from fishermen. Creel surveys have estimated that only 1,000 to 4,000 fish are harvested from the lake each year. Most harvest occurs during the winter in Woods, Yellow, Table, and Somers bays. Fish have also been caught in Woods Bay during the summer.

Management Concerns

1. Lake whitefish may compete for food with other species that eat zooplankton such as kokanee and westslope cutthroat.

2. Lake whitefish are under utilized by anglers.

Selected Management Direction

Objective: Increase use to 10,000 angler days of fishing and harvest to 20,000 fish per year.

Strategies:

A. Publicize fishing quality, fishing techniques, locations, and seasons in the lake through brochures and the media.

Other Management Alternatives

Other alternatives which were considered included maintaining use and harvest at present levels, which would not help to provide fishing opportunities lost when kokanee populations declined. The other option considered was to increase use and harvest with a commercial fishery. This was not selected due to the danger to non-target species and the apparent lack of interest by commercial anglers.

MOUNTAIN WHITEFISH

Life History

Mountain whitefish are native to the Flathead drainage and are the most abundant fish in river habitats and the lower reaches of major tributaries. Whitefish exhibit seasonal movements in the drainage associated with feeding, spawning, and overwintering habitat. Some mountain whitefish are found along the shoreline in Flathead Lake.

Whitefish overwinter in deep pools in the river system. In the spring, whitefish gradually move up river and into some tributaries to feed. Mountain whitefish spawn from October through December, broadcasting their eggs over gravel and small rocks in shallow, fast, midstream areas. Whitefish are very prolific with one female producing from 3,000 to 8,000 eggs. After spawning, whitefish move rapidly downstream to deep pools to overwinter.

After hatching in the spring, young whitefish rear in shallow riffles and backwaters, moving to deeper water as they grow. Whitefish mature at 3 to 5 years of age and can grow to a maximum 16 to 18 inches in length and 12 to 14 years of age. Mountain whitefish feed almost exclusively on aquatic and terrestrial insects.

Past Management

Past management has focused on increasing angler use of this highly abundant and under-utilized fish. Daily limits are 100 whitefish per day and an extended whitefish season is open in the Flathead River and the North and Middle Forks from December 1 through April to encourage harvest. The same areas are open to commercial hook-and-line fishing although there is little interest in the program.

Abundance

Mountain whitefish are the most abundant fish in the river system with densities measured as high as ten times that of all other gamefish. Overwintering concentrations of whitefish have exceeded 12,000 fish per pool.

Angler Use and Harvest

Although many anglers show little interest in mountain whitefish, many are caught because of their sheer abundance. A 1981 creel census estimated there were 2,683 mountain whitefish harvested in the North Fork Flathead and mainstem Flathead Rivers. Many times this number are probably caught and released by anglers each year.

Management Concerns

1. Mountain whitefish may compete for food and space with other gamefish that are more popular with anglers.

2. Mountain whitefish are greatly under utilized relative to their abundance. Their small average size discourages more harvest.

Selected Management Direction

Objective: Increase use and harvest to 10,000 fish

Strategies:

A: Publicize fishing techniques, seasons, and locations and cooking tips through brochures and the media.

Other Management Alternatives

Maintain use and harvest at present levels. Mountain whitefish would continue to be underutilized.

RAINBOW TROUT

Life History

The first recorded introduction of rainbow trout into the Flathead drainage occurred in 1914. Over six million rainbows were subsequently planted in or above Flathead Lake through 1954. Stocking was finally discontinued in 1966 because of poor returns from catchable plants and more importantly because of concern over the potential for competition and hybridization with native westslope cutthroat trout.

Rainbow trout grow at about the same rate as cutthroat trout for the first two years of life and slightly faster than cutthroat after that. Rainbow trout eat primarily aquatic insects and zooplankton with larger trout occasionally eating small fish.

Rainbow trout spawn in the spring, depositing their eggs in gravel at the tail end of pools in streams or rivers. Actual spawning sites have not been identified in the Flathead, but rainbow trout in spawning condition have been found in the Flathead River between Columbia Falls and Blankenship Bridge.

Past Management

The general planting of rainbow trout in the Flathead drainage was discontinued more than 20 years ago and is now restricted to closed basin lakes where there is no potential for competition with native species. Use of rainbow trout in private fish ponds is restricted to those areas where there is little or no chance for escape into public waters.

Rainbow trout are managed under the general river trout limits of 5 trout with only one trout over 14 inches.

Abundance

Rainbow trout still maintain low population levels in parts of the drainage through natural reproduction. Rainbow trout are most abundant in the mainstem Flathead River immediately above the mouth of the South Fork of the Flathead River. Abundance decreases both upstream and downstream with rainbows reported as far upstream as the Camas Creek Bridge in the North Fork of the Flathead and in McDonald Creek, a tributary to the Middle Fork. Rainbow trout are common in some portions of the South Fork Flathead below Hungry Horse Dam, the Swan River, the Whitefish River and McDonald Creek. Rainbow trout are very rare in Flathead Lake.

Angler Use and Harvest

Because of their low abundance, rainbow trout are not common in the harvest. A creel census in 1981 estimated that 477 rainbow trout were harvested in the main Flathead River and only 73

rainbows from the North Fork of the Flathead. This accounted for less than 1% of a catch that was predominated by cutthroat trout, mountain whitefish, and kokanee.

Management Concerns

1. Rainbow trout may compete for food and space with native westslope cutthroat trout.

2. Rainbow trout may hybridize with westslope cutthroat trout, reducing the genetic integrity of native cutthroat populations.

3. Returns from past plants have been poor.

Selected Management Direction

Objective: Increase use and harvest to 1,000 rainbow trout per year.

Strategies:

A. Publicize identification of rainbow and cutthroat trout. Encourage angler harvest of rainbow trout and voluntary catch and release of cutthroat trout.

Other Management Alternatives

Another alternative was to maintain use and harvest at present levels. This alternative was not selected because rainbow can withstand slightly increased harvest.

NORTHERN PIKE

Life History

Northern pike spawn from April through June in many lakes and rivers when water temperatures begin to exceed 40°F. Eggs are broadcast into shallow vegetation and hatch in 15 to 30 days, depending on water temperature. Sexual maturity is reached from 3 to 5 years of age with spawning females typically being a year older than males. When northern pike attain a suitable length, usually one year old, they become almost exclusively fish eaters, and their growth becomes dependent on food availability.

Past Management

Northern pike were illegally introduced into the Flathead system sometime prior to the mid 1960's which is when the first documented catch occurred in Polson Bay of Flathead Lake. There has been much concern that northern pike can have an adverse impact upon more desirable trout species. Therefore, in response to this concern, a liberal 15 fish daily limit has remained in effect for northern pike within Flathead Lake and the upper river system.

Abundance

Northern pike have been documented in Polson and Somers Bays, but exist in very low densities and are considered rare in Flathead Lake. In the Flathead River above Flathead Lake, northern pike are common, particularly in the slough areas. Northern pike are not known to exist above the mouth of the Stillwater River, where multiple river channels converge to form a single channel. Individuals exceeding 20 pounds are not uncommon from these river sloughs.

Angler Use and Harvest

Intensive creel census information has not been collected for northern pike in the Flathead River above Flathead Lake. The extent of this river fishery is unknown, but most likely consists of a small select group of anglers. Northern pike have also been recently creeled from the north shore of Flathead Lake, however the last documented northern pike taken from the southern half of the Lake (Polson Bay) was in the mid 1970's.

Management Concerns

1. Northern pike may prey upon other desirable species when their territories overlap.

Selected Management Direction

Objective: Provide an increased opportunity to catch northern pike.

Strategies:

A. Attempt to acquire access sites that would provide better access to river sloughs above Flathead Lake.

Other Management Options

Another alternative which was considered was to maintain harvest and use at current levels. This was not selected because there is a need for additional opportunity and northern pike are in demand.

LARGEMOUTH BASS

Life History

Largemouth bass typically spawn from late spring to early summer soon after water temperatures reach 60°. Spawning takes place in substrates varying from sand to soft mud with aquatic vegetation. Males excavate a nest approximately 2 to 3 feet in diameter in water from 1 to 4 feet deep. Following fertilization, the adhesive eggs hatch in 3 to 5 days depending on temperature. Year class strength is dependent on spawning success, growth, and

ultimate survival during the first year. Sexual maturity is reached from 3 to 5 years of age with spawning females typically being a year older than males. Growth in Montana is relatively slow due to lower water temperatures and lake productivities. Food habits of largemouth bass change with size with adults primarily eating fish. Adult largemouth bass select warmer surface temperatures (up to 80°F) and are typically associated with aquatic vegetation and underwater structures within the upper 12 feet of the water column.

Past Management

Management for coolwater species in Flathead Lake and River involved the early planting of largemouth bass in 1898 and smallmouth in 1910. Introductions were conducted by the U.S. Bureau of Fisheries.

In the Flathead River above Flathead Lake, specific regulations were adopted in Fennon and Church sloughs that allowed the harvest of 5 bass daily and in possession, only one which may exceed 12 inches. In the north half of the lake and river, the standard 5 fish limit applies. In Tribal waters, the limit is 5 fish, none between 12 and 15 inches.

Abundance

Largemouth bass have been documented in Polson and Somers Bays, but exist in very low densities and can be considered rare in Flathead Lake. In the Flathead River above Flathead Lake, largemouth bass are common, particularly in the slack water slough areas. Largemouth bass are not known to exist above the mouth of the Stillwater River. Spawning occurs in the sloughs of the river, and fish exceeding 5 pounds have been collected. Special regulations in Church and Fennon Sloughs are designed to protect large, adult fish and maintain spawning recruitment.

Smallmouth bass do not appear to be present in the Flathead system above Kerr Dam based on past fish collections and angler reports.

Angler Use and Harvest

Intensive creel census information has not been collected for largemouth bass or northern pike in the Flathead River above Flathead Lake. A tagging program was conducted in Church and Fennon Sloughs to determine angler exploitation rates. It was determined that mature adults were very vulnerable to angling during spawning which resulted in the special regulation of 5 fish, only one which may exceed 12 inches.

Management Concerns

1. Largemouth bass may prey upon other desirable species when territories overlap.

2. Overharvest of largemouth bass in the future may require more regulations.

3. Largemouth bass population structure in the river sloughs above Flathead Lake is not well understood.

4. Current regulations are inconsistent between Tribal and State waters.

Selected Management Direction

Objective: Provide an increased opportunity to catch largemouth bass.

Strategies:

A. Conduct a creel census on Fennon Slough to determine pressure and harvest.

B. Monitor effectiveness of current special regulations and consider the potential for spawning season closures if necessary.

C. Construct artificial habitat improvement structures to improve feeding and rearing habitat in South Bay or the upper river sloughs.

D. Attempt to acquire access sites that would provide better access to river sloughs above Flathead Lake.

E. Stock South Bay with either hatchery reared fish or transplants from other lakes.

Other Management Options

Maintain harvest and use at current levels.

INTRODUCTION OF NEW SPECIES

Since the decline of the kokanee fishery there has been a considerable increase in interest in the introduction of new species into Flathead Lake. At scoping meetings held in February 1988 approximately 50% of the people responding said they would like to see a new species introduced into Flathead Lake. If new species were to be added to the lake it would be either to replace the summer sport fishery previously provided by kokanee, or be a forage base for the predacious fish species, primarily lake trout and bull trout. The emphasis over the next few years will be on re-establishing kokanee and on improving and maintaining the fish populations already existing in the lake. We estimate it will be five years before we can reliably know the level of the kokanee population that will be maintained in the lake, either through natural reproduction or hatchery plants.

There are a number of problems posed by introducing new species. It is not possible to predict with absolute certainty what effect the new species will have on the existing fishery. Mysis are a good example of an introduction which was intended to benefit the fishery but ended up having the opposite effect. Possible problems caused by new species introductions include:

1. The new species may compete with the existing species for food and space.

2. Some species have the danger of hybridizing with the native species.

3. The new species may prey upon other desirable species.

4. Introduced species may introduce new disease organisms which may harm the existing species.

5. Introduced species may be transplanted illegally or may spread naturally to other areas where they are not desired.

There is a lengthy process which must be followed before any new introduction can occur. This process is designed to minimize any potential problems. Since Flathead Lake is co-managed by the Tribes and the State of Montana, both the Tribal and the State review procedures would be followed prior to making any introductions. The Tribal fisheries management plan requires a six step procedure be followed before any introduction can occur. Included in the process is a through review of all known information concerning the new species, an opportunity for public comment and experimental research in confined waters. The introduction will take place only if this evaluation process shows the species is likely to succeed. The State of Montana has a similar review process which includes opportunity for public comment resulting in the writing of an environmental assessment or an environmental impact statement.

The following is a discussion of specific species which were mentioned at the scoping meetings:

Walleye: An environmental assessment on the introduction of walleyes west of the continental divide was completed in 1989. The available data indicate that walleyes may adversely affect salmonids. The MDFWP's position is that walleye introductions will not be made in any waters west of the Continental divide. **Advantages:** Walleye are a popular sport fish, are excellent eating, would feed on rough fish to some extent and would provide some summer fishing opportunities. **Disadvantages:** Walleye would primarily be a spring and fall fishery and there is a poor short term hatchery supply. In addition, they may deplete the forage base, they can be difficult to catch and they will compete with or prey on yellow perch and trout. Once introduced into one water body west of the divide there is a strong chance they would spread naturally into other waters. As illustrated by the

history of northern pike in western Montana, there is also a potential for illegal introductions into other waters.

Coho salmon, king salmon, and kamloops trout: Advantages: These species do well in deep, cold lakes and can reach trophy size. They would probably establish some natural reproduction, are good eating, and are good fighters. Kamloops live longer than coho and king salmon and do not die after spawning. **Disadvantages:** They would provide primarily a spring and fall fishery requiring specialized fishing gear to reach the deep water that they prefer. They would compete with bull trout and lake trout, have a questionable hatchery supply and difficult disease problems. Coho and king have a finite life span and therefore a finite maximum size. They were planted in the past and did not stay in the system. All these species prefer to eat kokanee and there probably would not be a sufficient food base if kokanee are not re-established.

Smallmouth bass: MDFWP is currently working on an environmental assessment of the impacts of smallmouth bass introductions into western Montana. **Advantages:** Smallmouth bass would provide a summer fishery and would naturally reproduce. They are good fighting, good eating, a popular sport fish and they like clean cool water. They would utilize some rough fish as forage and would be limited to shoreline areas. **Disadvantages:** There is limited suitable habitat for them as they prefer rocky shorelines. They would compete to some extent with the existing species. Short growing seasons limit growth, and there is limited hatchery stock available.

Burbot (ling): Advantages: They are good eating and may eat Mysis. Burbot would be a trophy fishery (fish up to 10 lbs.), and would be self-sustaining. **Disadvantages:** They will eat both desirable and non-desirable species and will compete with existing predacious species. They would have limited distribution around the lake and the night time winter fishery is best. Some anglers dislike them because of their snake-like appearance.

Rainbow trout: Advantage: They are a good fighting, tasty popular sport fish. There is a good hatchery source and they may eat some Mysis. They grow larger and faster than cutthroat and may provide a good troll fishery. **Disadvantage:** They have been planted in the past in good numbers but never became established, so they would probably need hatchery support. They like deep water in the summer and are most easily caught in the spring and fall. They have relatively slow growth rates. Fertile rainbow trout could hybridize with westslope cutthroat trout. Rainbow trout can be made sterile prior to planting. However, the procedure is expensive, results in high fish mortality, and is not 100 % reliable.

Brown trout: Advantage: They can grow quite large, they eat Mysis, they are fair eating and are tolerant of warm temperatures

such as found in South Bay. They may be more successful than spring spawners due to the more stable fall conditions and are relatively long lived. **Disadvantages:** They would compete with bull trout and may prey on desirable species. They are not readily caught in lakes.

White sturgeon: Advantages: They are good eating and they eat Mysis. Their eggs are used for caviar and sturgeon would not compete to a great extent with the existing fishery. They could provide a trophy fishery for fish weighing 100 lbs. or more. **Disadvantages:** They are a very slow growing fish, it would take a long time to see results from planting. Hatchery stocks are questionable and it is not clear if they would be self sustaining. They would produce only a limited fishery.

Other suggested sport fish species such as paddlefish, striped bass, and shad are not realistic because of unsuitable habitat.

Forage species:

Cisco: Advantages: They eat Mysis, would be utilized by lake and bull trout, and would be self-sustaining. **Disadvantages:** They grow too large to be utilized as prey items throughout their life. They would compete with other plankton eaters and would compete directly with lake whitefish. They would not provide any sport fishing.

Rainbow smelt: Advantages: They will eat Mysis and lake trout will eat them. They will also provide a limited sport fishery, are good eating, and would stay small. They would probably be self-sustaining. **Disadvantages:** They are predacious on eggs and fry and are not eaten by some large predators. They tend to have boom and bust cycles and are host to a number of parasites. They tend to be very migratory.

Alewife: Advantages: They can handle cold water, are self-sustaining in deep cold lakes, are a highly sought after prey item, and they remain small. **Disadvantages:** They tend to have spring die-offs which litter beaches with numerous dead fish. They tend to give the fish that feed on them an oily taste, and they would compete with other plankton eaters.

Deepwater sculpin: Advantages: They eat Mysis, and are food for lake trout. **Disadvantages:** Their habits are poorly known.

In conclusion, nothing is likely to replace kokanee as a summer fishery. We believe that smallmouth bass, sterile rainbow trout, white sturgeon, and burbot have the most potential to produce additional sport fishing opportunities in Flathead Lake. If the kokanee do not recover to any substantial degree, we would consider reviewing these species in more detail. We will not introduce a new forage fish into the lake until the kokanee recovery has been evaluated. There are several abundant forage species already in the lake. Only the lake trout are likely to suffer due to the loss of the kokanee.