FLATHEAD LAKE AND RIVER FISHERIES CO-MANAGEMENT PLAN 2001-2010

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November, 2000

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*Approved:*___________________
Patrick Graham, Director

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D. Fred Matt, Tribal Council Chairman

October 2000

EXECUTIVE SUMMARY

Flathead Lake and River Fisheries Co-Management Plan

Montana Fish, Wildlife & Parks and the Confederated Salish and Kootenai Tribes

Background

This co-management plan addresses the interconnected fisheries of Flathead Lake, the Flathead River upstream of the lake and its North and Middle Forks, the South Fork downstream from Hungry Horse Dam, and the Swan River downstream from Bigfork Dam. The plan does not cover fisheries in the Flathead River downstream from Kerr Dam. The plan sets management direction for the period 2001-2010.

Fish and aquatic communities have changed dramatically over the last decade. Since the last co-management plan was written in 1989, kokanee salmon have disappeared from Flathead Lake despite a 5-year effort to recover them. Mysis shrimp, first noted in Flathead Lake in 1981, strip zooplankton from the upper waters of the lake and serve as food for deep water fish such as lake trout and lake whitefish. Lake trout have increased in numbers and now make up most of the recreational fishery. Lake whitefish are very numerous. Native species such as bull trout and westslope cutthroat trout have declined. With the establishment of *Mysis* and growth of the lake trout population, managers increased angling limits on lake trout and decreased limits on native trout. These angling-limit changes illustrate the strategy followed by Montana Fish, Wildlife & Parks (FWP) and the Confederated Salish and Kootenai Tribes (CSKT) to address increasing numbers of nonnative fish and decreasing numbers of native fish.

The lake's food web has been unstable, calling for a new, flexible management plan based on "adaptive management". Adaptive management emphasizes the application of new knowledge and techniques as they become available. Through adaptive management, actions can be adjusted as new information comes to light.

Public Process

FWP and CSKT began the process to develop this plan in June 1999. Governor Marc Racicot and the late Tribal Chairman Mickey Pablo issued an open letter to people interested in Flathead fisheries, urging the public to "work together to develop and implement" a new co-management plan for Flathead Lake and the river system upstream of the lake. They also called on the Montana Consensus Council to assess the social and biological situation and to suggest a public involvement process. The Consensus Council produced an assessment that highlighted the changing nature of the aquatic system in Flathead Lake, called for timely action, and recommended an advisory group approach to sort out the complex biological and social issues regarding fisheries management in the system.

FWP and CSKT solicited 12 citizen advisors, peer selected from the public, to develop management options within those guidelines. The Flathead Lake and River Fisheries Co-management Advisory Committee met six times between February and June 2000.

Recognizing the changing nature of the fishery, CSKT and FWP developed fisheries management goals and guidelines that emphasized flexibility and research. Working within those guidelines, the Advisory Committee developed a draft management planning document for the Flathead Lake and River system.

The Advisory Committee was able to reach agreement on a number of actions or strategies to improve the lake and river fisheries. In addition, the committee developed four different options or approaches that addressed the complexity of fisheries management in Flathead Lake. The first two options proposed to reduce lake trout slowly, using recreational fishing as the main tool. The second two options proposed to reduce lake trout more rapidly, and each included some sort of commercial lake trout fishing.

The draft management planning document was released for general public and agency review in June 2000. Most of the public comment received on the planning document from approximately 280 individuals and groups focused on the four options for managing Flathead Lake fisheries. More than 90 percent of respondents favored a conservative approach. Less than 10 percent of respondents advised rapid reductions of lake trout using aggressive methods such as commercial fishing and netting. CSKT and FWP believe that a conservative approach is the most prudent given the complexity of the management situation. A final draft co-management plan was released for comment in September. Nine groups and nine individuals commented on the final draft. In October, the Flathead Reservation Fish and Wildlife Board held a final public meeting to finalize the plan and recommend it to CSKT and FWP for adoption. A summary of all comments and response to comments is included in the appendices of this final plan.

Fisheries Management Direction

This management plan reflects the work of the Citizen Advisory Committee and public comments received on the draft planning document, and forms these concepts into a management strategy to enhance native trout while maintaining a recreational fishery. The management approach applies to the lake and river system. The plan is consistent with the vision of CSKT, which is the restoration of the native fish community, and with FWP's vision, which is to protect and enhance native fish, while maintaining a viable recreational fishery.

Goals

Within the 10-year period of this management plan, we will accomplish the following goals:

- Increase and protect native trout populations (bull trout and westslope cutthroat trout).

- Balance tradeoffs between native species conservation and nonnative species reduction to maintain a viable recreational/subsistence fishery.
- Protect the high quality water and habitat characteristics of Flathead Lake and its watershed.

Objectives

Under the overall fisheries management goals, four major objectives will be achieved. These include:

- *Determine the population size and characteristics for westslope cutthroat trout and bull trout that are required for population security, using a science based approach, by December 2001*. This population level will be defined using a combination of information, including spawner counts, juvenile abundance, net and angler catch, and consultation with fisheries managers and researchers in other areas. A range of redd count numbers has been suggested as a goal for bull trout. Consecutive-year averages in index streams have ranged from an average of 383 (1980-1990; pre-decline) to 140 (1992-1999; post-decline) We expect that a scientifically derived level for a secure bull trout population will be within this range. The 1999 redd count (215 redds) and the 2000 red count (251 redds) are between the pre- and post-decline levels.
- *Increase and protect native trout populations to at least secure levels.* This objective will be measured using the set of parameters derived under the above objective. In the interim, we will implement a graduated series of fish population management strategies, and other strategies, aimed at increasing native fish numbers.
- *Maintain or if needed increase harvest on nonnative fish to benefit native fish species.* This objective will be measured by monitoring harvest rates of nonnative fish. The 1998 estimated harvest of lake trout was roughly 40,000 fish. This level of harvest may be controlling lake trout and benefiting native fish. If lake trout harvest is too high (as measured by a declining recreational fishery) fishing regulations will be adjusted to improve the fishery as long as the action does not conflict with native trout goals.
- *Provide a recreational fishery based on nonnative and native fish with harvest opportunities based primarily on nonnative fish.* Maintenance of current levels of angler use should be possible through a changed lake trout fishery, including increased opportunity to catch larger fish, and substitution of angling opportunities for other fish species to make up for losses in the fishery for small lake trout. This objective will be measured by monitoring angler pressure by direct counts and the statewide mail-in creel survey. The current recreational fishing use is roughly 50,000 angler days on Flathead Lake and 40,000 angler days in the river system. This level represents a viable level of fishery use in the system.

Strategies

The five major groups of strategies designed to achieve management goals are: fisheries assessment, monitoring, and research; water quality and aquatic habitat; conservation education and enforcement; lake and river access; and fish population management. These strategies must be implemented in combination for the management plan to be successful.

Fisheries Assessment, Monitoring, and Research: For research and monitoring, tasks will include refining fish population parameters for the lake and river. A major task will be to identify secure levels for native trout during the first year of the plan, using a number of indices. Monitoring of the lake trout fishery in Flathead Lake, through lake sampling and angler creel surveys, will show status of the lake trout population and angler opportunity. Ongoing research projects on northern pike and rainbow trout in the river system will help direct any needed changes in management for these species. Another task under research will include developing an environmental assessment listing alternatives about the release of white sturgeon into Flathead Lake. In addition, we will examine the *Mysis* population, its limiting factors, and the possibility of controlling *Mysis* numbers.

Water Quality and Aquatic Habitat: Habitat tasks are aimed at maintaining and improving water quality and streambed conditions. This will be achieved through administration of habitat protection laws, improvement of flows in the Flathead River below Hungry Horse Dam, and specific habitat protection actions. It will also include protecting or acquiring easements on critical habitats with hydropower mitigation dollars, taking part in Columbia Basin Fish and Wildlife Authority sub-basin planning, and following the effects of the selective withdrawal water temperature improvements below Hungry Horse Dam. In addition, we will seek public partnerships to promote improved water quality and habitat.

Conservation Education and enforcement is an essential strategy group for this management plan. We will focus on improving the ability of anglers to identify fish species, raise awareness of the need to reduce the numbers of small lake trout, and implement a strong campaign to inform the public about the fish consumption advisory. We will coordinate with groups interested in Flathead Lake to establish a lake honoring event. This event will promote conservation of lake and river aquatic values, and will be coordinated with the river-honoring event already established below Kerr Dam. CSKT and FWP wardens will increase patrols to protect native fish and inform anglers about management issues. We will produce fishing brochures to highlight methods to catch lake trout and lake whitefish. In addition, we will establish a website or hotline with up-to-date tips on where and when to catch these species.

Lake and River Access: Improving lake and river access was identified as a vital part of the management plan. Increased access for anglers is needed to reduce nonnative fish through recreational angling harvest, and to maintain current angler use levels. A comprehensive access plan, to be completed by 2001, will include numbers and locations of sites and improvement needs. We will establish fish cleaning stations at selected access sites. A strong effort will be made to keep the public informed of access improvements and opportunities.

Fish Population Management: Fish population management will be implemented in a progressive fashion as determined by our fisheries assessment and adaptive management. The strategy is divided into three major areas: recreational fishing to suppress nonnative fish, increased suppression of nonnative fish through commercial angling, and additional suppression through agency management actions.

Recreational angling harvest will be the major tool used initially to reduce nonnative fish populations, emphasizing lake trout. The strategy is to extend the present management approach of reducing nonnative fish through increased angling harvest. There are indications that this strategy may be reducing the lake trout population, and that bull trout numbers may be stabilizing. Changes will include raising the daily limits on small lake trout; the fishery for larger lake trout will be maintained. The limit on lake whitefish will be increased to reduce numbers of this nonnative species. A variety of fishing pamphlets will be produced which will aid anglers in catching nonnative fish, and anglers will be encouraged to bring lake trout to nonprofit community kitchens and food banks.

If this initial recreational angling strategy does not achieve our native trout goals, additional angling incentives will be established. These include providing direct incentives to bring lake trout to food banks and community kitchens, and encouraging or sponsoring fishing derbies to harvest large numbers of small lake trout.

The table below illustrates management actions taken under changing bull trout and lake trout populations in Flathead Lake based on the assumption that lake trout predation/competition is the main limiting factor for bull trout. This same general approach would apply to management of other native and nonnative fish in the lake and river system. This table provides a quick view of general management direction under simplified conditions. "Small lake trout" are defined as fish less than 28-30 inches in length, and comprise most of the angler catch. This is by far the most numerous size class and has the biggest competition and predation impact on native trout. Therefore, we focus on reducing this smaller size group of lake trout.

If the Bull Trout Population…	And the Lake Trout Population…	Then the Management Action Would be…
Increases	Increases	Increase reduction of small lake trout
Increases	Stabilizes	Continue current management
Increases	Decreases	If angler use declines below current levels and other species do not replace lake trout losses, stabilize harvest of lake trout
Stabilizes	Increases	Increase reduction of small lake trout
Stabilizes	Stabilizes	Reevaluate goals and objectives
Stabilizes	Decreases	If angler use declines below current levels and other species do not replace lake trout losses, stabilize harvest of lake trout
Decreases	Increases	More rapidly reduce the number of small lake trout
Decreases	Stabilizes	Increase reduction of small lake trout
Decreases	Decreases	Identify specific causes of bull trout decline and take appropriate action; if needed, further reduce small lake trout

If native trout populations do not reach secure levels using the complete set of recreational fishing strategies, more aggressive techniques may be used. These may include hook-and-line commercial fishing for lake trout, bounties for killed lake trout, and commercial netting of nonnative fish. Agency management actions could include live trapping nonnative fish, gillnetting lake trout on spawning grounds, removing rainbow trout from spawning tributaries, or installing migration barriers. In general, there is little public support for commercial fishing for or agency netting of lake trout. However these strategies may be reviewed and implemented if native trout populations drop to dangerously low levels or if they are needed to achieve native trout goals after all other techniques are exhausted.

Reporting

Annual reports regarding progress under this management plan, recommended management changes, and tasks for the coming year will be made to the Flathead Reservation Fish and Wildlife Board at a regularly scheduled public meeting. A detailed report and need for mid-course adjustments will be made at the end of the first 5 years of the plan.

FLATHEAD LAKE AND RIVER FISHERIES CO-MANAGEMENT PLAN

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INTRODUCTION

Background

This Co-management plan represents more than a year of work by the CSKT and FWP Co-Management Team. The Co-Management Team produced the plan based on cooperative work with the Citizen Advisory Committee for Flathead Lake and River Fisheries Management. The plan also reflects direction from extensive public comment received during the review process.

Montana Fish, Wildlife & Parks (FWP) and the Confederated Salish and Kootenai Tribes (CSKT) have recognized that the public wants an opportunity to help develop fisheries management strategies for important waters. In 1989, FWP and CSKT wrote a 5-year management plan for the Flathead Lake and River system after extensive public scoping. The plan was not rewritten in 1994 because of the continuing changes in the aquatic food web of Flathead Lake.

CSKT and FWP have a solid history of working together on fish and wildlife management. In 1990, the tribes and state signed a Cooperative Agreement governing bird hunting and fishing on the Flathead Indian Reservation. The agreement was renewed in 1994 and again in 1998.

In June 1999, FWP and CSKT began a process to develop a new co-management plan for the Flathead Lake and River system. Tribal Chairman Mickey Pablo and Governor Marc Racicot issued an open public letter to people interested in Flathead fisheries, urging the public to "work together to develop and implement this co-management plan." They also called on the Montana Consensus Council (a small state agency that specializes in consensus building) to assess the social and biological situation, and to suggest a process to meaningfully involve interested stakeholders.

Fish and aquatic life communities have changed dramatically over the past decade. Since the last plan was written, kokanee salmon have disappeared from the lake in spite of a 5-year effort to recover their populations. Lake trout have increased in numbers, and now make up the bulk of the recreational fishery. *Mysis* shrimp, first noted in Flathead Lake in 1981, strip zooplankton from the upper waters of the lake and served as food for deep-water fish such as lake trout and lake whitefish. Native species such as bull trout and westslope cutthroat have declined. Scientists note that it might take decades or more for the aquatic food web to reach some sort of equilibrium or steady state. These unstable conditions call for a new management plan that will be flexible and based on an "adaptive management" strategy.

"Adaptive management" is a flexible management approach that emphasizes the application of new knowledge and techniques as they become available. Through adaptive management, actions can be adjusted as new information comes to light. The approach emphasizes research, actions, and monitoring to provide feedback. Actions that work effectively are continued; those that do not are dropped. In this way, a management direction can be fine-tuned as managers learn and as new technology and new approaches become available. This approach was popularized by a Canadian scientist and adopted for the Northwest Power Planning Council's mitigation program during the 1980s and 1990s.

This co-management plan addresses the fisheries of Flathead Lake, the Flathead River and its tributaries upstream to its forks, the Swan River downstream from Bigfork Dam, the South Fork downstream from Hungry Horse Dam, the Middle Fork and tributaries, and the North Fork and tributaries upstream to the Canadian border. The plan will set co-management direction for the period 2001-2010. It will include monitoring, annual reporting to the public, and a 5-year mid-term check and evaluation.

Montana Environmental Policy Act

The Montana Environmental Policy Act (MEPA) requires state government to be accountable to the people of Montana when it makes decisions that affect the human environment (75-1-201, MCA). MEPA provides a process to ensure that government actions are based on informed decisions. It does this by requiring that reasonable options/alternatives are evaluated, the consequences of a decision are understood, and the public's concerns are known. MEPA requires the following:

- issue a draft management plan document;
- encourage and accept public comments on the draft;
- issue a final management plan.

The final plan may modify alternatives, add alternatives, supplement analyses, make factual corrections, and explain why comments do not warrant further response. The purpose of preparing a draft is to describe the proposed action and evaluate potential impacts on the physical environment. Analysis of impacts is based on literature research, public comments, and interviews with FWP and CSKT staff and other technical experts.

MEPA is not required for CSKT to adopt the plan; the Tribal Council has the authority to adopt the plan through their administrative process.

Agency Roles

FWP and CSKT are the lead entities for fisheries co-management in the Flathead Lake and River System. FWP manages fisheries resources of the state of Montana. FWP is authorized to negotiate co-management agreements with CSKT for fish and wildlife management. The Montana Fish, Wildlife & Parks Commission sets policies for management of fish species, including setting fishing regulations and seasons.

The southern half of Flathead Lake lies within the Flathead Indian Reservation, which is home to the Confederated Salish and Kootenai Tribes, a sovereign nation. The Reservation was established under the Hellgate treaty of 1855, which guaranteed the tribes the exclusive right of taking fish in all streams "running through or bordering" the Reservation. The Tribal Natural Resources Department is responsible for fisheries management. The CSKT Tribal Council sets policies for management of fisheries and approves fishing regulations and seasons on the Reservation. The CSKT Fisheries Management Plan for the Flathead Indian Reservation, adopted in 1987 and renewed in 1993, guides management of fisheries resources. The Flathead Reservation Fish and Wildlife Board advises the Tribal Council and the FWP Commission on regulation of non-member hunting and fishing within the Reservation pursuant to the state/tribal agreement.

Other agencies have management interests in the Flathead System. The U.S. Fish and Wildlife Service administers the federal Endangered Species Act. Bull trout are a threatened species under the Act, and the Service would become involved legally if any actions in this plan would result in a "taking" of bull trout. The U. S. Forest Service manages much of the forested land in the upper Flathead drainage where most bull trout and westslope cutthroat spawn; Plum Creek Timber, Inc. manages land in the basin as well. The National Park Service manages lands and wildlife within the boundary of Glacier National Park. The Federal Energy Regulatory Commission is responsible for decisions related to the licensing of Kerr and Bigfork Dam, including harm to the fisheries. PP & L Montana operates Kerr Dam; the U. S. Bureau of Reclamation operates Hungry Horse Dam. The Bonneville Power Administration and Northwest Power Planning Council are involved in funding mitigation for impacts caused by dam construction and operation.

Public Involvement

The Montana Consensus Council interviewed 100 "stakeholders," or persons interested in Flathead fisheries during the summer of 1999. Their Situation Assessment summarizes information from these interviews and represents initial public scoping for the planning document.

In their report, the Consensus Council recommended FWP and CSKT immediately begin a process to involve the public in developing a fisheries management plan for the Flathead System. They recommended an advisory committee process to develop management options.

From September-November 1999, FWP and CSKT met three times to agree on joint goals and to develop a process for choosing advisors. In late November, a call for advisor nominees was included in direct mailings to interested persons, the FWP website, newspaper ads, news stories, radio shows, and television interviews. A total of 83 people requested applications for the advisory committee. FWP and CSKT received 53 completed applications. These applications were then typed, copied, and returned to all 53 nominees so that the nominees themselves could help choose the committee based on peer rankings.

FWP and CSKT chose 12 advisors based on the peer rankings and other criteria deemed important for the committee: geographic location, tribal and nontribal interests, lakeshore owners, and other factors. Of the 12 advisors chosen, 5 are tribal members, 1 is a tribal descendant, and 6 are not tribal members (see acknowledgements). These advisors represent several hundred years of experience in the Flathead Lake and River System.

These advisors met six times from February-June 2000, in cooperation with six FWP and CSKT resource staff members, to develop four management options. Professional facilitator, Virginia Tribe of Missoula, conducted meetings. These options were included in a draft-planning document and released for general public and agency review from June 27-August 4.

The planning document attracted comment from about 280 individuals and groups. During the public comment period, FWP and CSKT held three open houses to gather public comment on the planning document; these meetings, held in Missoula, Pablo, and Kalispell, attracted 90 people. Comments on the document were extensive. The summary of these public comments and the CSKT and FWP response to the comments are found in Appendix A. CSKT and FWP, in cooperation with the Flathead Reservation Fish and Wildlife Board formulated a final draft management plan to reflect these public comments, as well as the Citizen Advisory Committee recommendations. The final draft was released for general public and agency review from September 25- October 13. The final draft was mailed directly to everyone who commented on the initial planning document.

On October 18, the Board held a final public meeting to consider the comments, finalize the plan, and recommend it to the CSKT Tribal Council and the FWP Director for final approval. CSKT and FWP approved and adopted this final co-management plan, which will take effect on January 1, 2001. See Table 1 for a detailed description of the management plan process.

Table 1. FLATHEAD LAKE AND RIVER FISHERIES CO-MANAGEMENT PLAN: TIMELINE

DATE	ACTIVITY
June 1999	Governor Marc Racicot and Tribal Chairman Mickey Pablo release an open letter on Flathead fisheries and hire the Consensus Council to assess the situation
July-August 1999	Consensus Council conducts interviews with 100 people interested in Flathead Fisheries
September-November 1999	FWP and CSKT form a Co-management team and have three meetings to design the co-management process
November 1999	Consensus Council's Situation Assessment released; FWP and CSKT issue a joint news release announcing the process and calling for citizen advisor nominees
December 1999	FWP and CSKT work with the media to publicize the process; collect nominations for citizen advisors; FWP and CSKT brief Lake County and Flathead County Commissioners, Flathead Basin Commission, Federal Agencies on the process
January 2000	FWP and CSKT choose a facilitator; work with peer rankings, other criteria to choose the citizen advisors
February 2000	Initial advisory committee meeting held in mid-February, focuses on introductions, goals, process
March 2000	Two meetings address: biology of the system; comments discussed on draft chapter of the planning document dealing with goals, background and process; fisheries management options; comments discussed on draft chapter on biology
April 2000	Monthly meeting continues to focus on options; previous draft material discussed
May 2000	Monthly meeting focuses on options; draft material discussed
June 2000	Monthly meeting addresses final discussion of fisheries management options; final comments discussed; draft planning document submitted to Flathead Reservation Board; revisions made
June/July 2000	Draft planning document released for public review; open houses held
August 2000	Public review completed; revisions made based on public review
September 2000	Final draft plan completed; CSKT/FWP/Board releases plan for final review
October 2000	Board holds public meeting and recommends plan to FWP Director / Commission, and CSKT Council. CSKT Council and FWP Director/Commission adopt final Fisheries Co-Management Plan for Flathead Lake and River; plan put in place by the year's end.

CO-MANAGEMENT PLAN AREA

The Flathead Lake and River System: Description and Values

Flathead Lake is the largest freshwater lake in the western United States. The Flathead Lake and River System in Northwest Montana represents one of the cleanest large lake and river systems in the United States. The lake and its tributaries have unique ecological, recreational, spiritual, and economic values.

The upper Flathead River drains millions of acres of forestland including the Bob Marshall and Great Bear wildernesses and Glacier National Park. The south half of Flathead Lake is within the Flathead Indian Reservation. In total, the Flathead drainage upstream of Flathead Lake comprises an area of roughly 7,104 square miles (18,400 square kilometers)(see Figure 1). Of that area, 65 percent is managed by the U.S. Forest Service and the remainder is in private ownership, within Glacier National Park, Montana Department of Natural Resources and Conservation land, and other ownerships.

The area covered by this management planning document includes: Flathead Lake and shoreline tributaries; the Swan River below Bigfork Dam; the Flathead River and tributaries upstream of the lake to its forks; the South Fork of the Flathead downstream of Hungry Horse Dam; and the North and Middle forks and their tributaries. The planning document does not cover the Swan River upstream from Bigfork Dam, Hungry Horse Reservoir, or the upper South Fork of the Flathead River.

Flathead Lake is unproductive in comparison with many other lakes in the United States. Its waters are termed "oligotrophic" because they are relatively low in nutrients and have low densities of plankton. The lake has a maximum length of 27 miles, surface area of about 125, 250 acres (510 square kilometers), and a maximum depth of 386 feet (113 meters).

The Flathead System is integral to the area's economy and quality of life in many ways. Dollar values are assigned to each angler day based on work conducted in the 1980s, and brought forward to 1997 figures using the Consumer Price Index from the Department of Labor. Two types of values are calculated: the expenditure value of an angler day (actual dollars to the local economy), and a net economic value of an angler day (value assigned to the experience by anglers). These values are calculated for each segment of the Flathead Lake and River System (see Table 2). Based on the 1997 angling pressure estimates, dollar values for the recreational fishery can be calculated. The recreational fishery alone is worth $4,654,928 in expenditures each year to the local economy. In addition to this, the net economic value totals $11,450,030. This yields a total economic value of $16,104,958.

Figure 1: Flathead Lake and River System
Area covered by the Fisheries Co-Management Plan

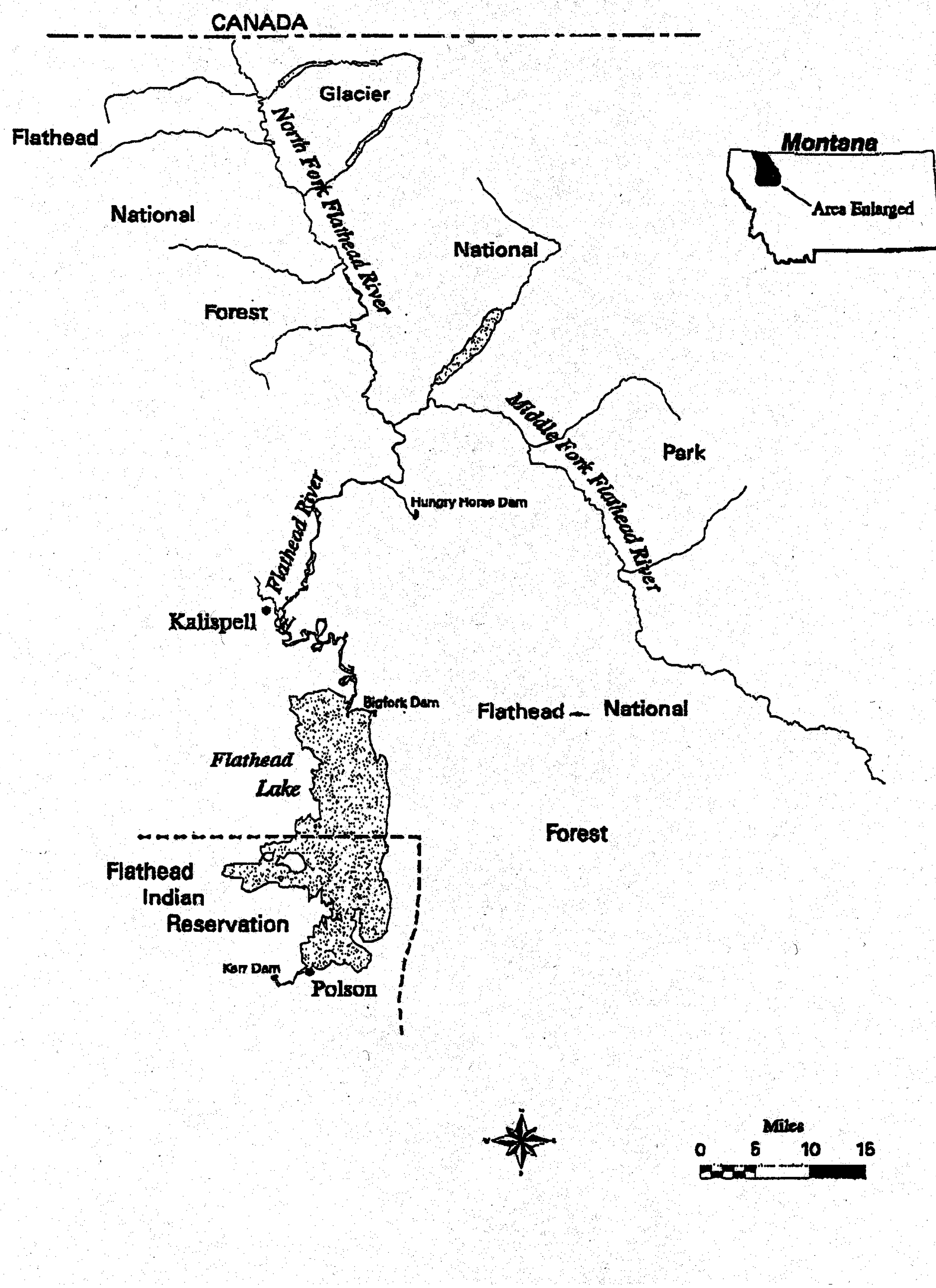

Table 2. Actual expenditure values (direct input to the local economy) and **additional net economic values** (dollar value placed on the fishing experience by anglers) for the Flathead Lake and River System. Figures are based on the 1997 angling pressure estimates and values per angler day brought forward to 1997 based on the Consumer Price Index. **The total economic value for the system adds to $16,104,958.**

Water Body	Angler Days	Total Expenditures ($)	Additional Net Economic Value
Flathead Lake	52,286	$2,666,434	$6,954,038
Flathead River (main stem)	26,039	$1,321,525	$2,161,237
Middle Fork Flathead River	5,564	$285,084	$1,190,696
North Fork Flathead River	7,287	$381,885	$1,144,059
Total—Flathead System	***91,176***	***$4,654, 928***	***$11,450,030***

These dollar values do not take into account the intrinsic value of water quality, native aquatic species such as bull trout and westslope cutthroat, and sense of place and spiritual renewal the system provides, both to tribal and nontribal peoples. Also, there is an economic impact of reduced bull trout numbers in waters draining national forest lands because timber harvest could be affected. This would be difficult to separate from the economic impact resulting from restrictions for grizzly bears, lynx, and other species.

The Flathead Lake and River System is uniquely important to people of the Confederated Salish and Kootenai Tribes. It is important to remember that the Flathead Nation is composed of more than one tribe. The CSKT include Salish, Pend O'reille, Kalispell, and Kootenai Indians. The values held for the system are not exactly the same, but all hold a reverence for the system. Members of the cultural committees stress that humans are just managers of the system and must respect the animals living in these waters.

Native fish are very significant to the survival of the native people who compose the Flathead Nation, and are an important part of their culture, spirituality, and survival. The Salish, Kootenai, and Pend O'reille tribes emphasize that fish and wildlife are the true owners of the resource and are managed for seven future generations. They also state that native people are merely the stewards of the land, while depending upon the fish, wildlife, water, plants, and air to remain in balance, which is significant to their cultural integrity. The complexity of the spiritual connection of the tribes composing the Flathead nation goes beyond the above-mentioned statements.

Major Dams

Kerr Dam, built in 1938, is located on the southern end of Flathead Lake four miles (7 kilometers) downstream from the natural lake outlet at Polson. The dam, operated by PP&L Montana under a lease to CSKT, controls the upper 10 feet (3 meters) of the lake's water. Flood control and recreation require the lake level to be at low pool elevation (2883 feet) by April 15, refill to 2890 feet by May 30, raise to full pool (2893 feet) by June 15, and maintained at full pool through Labor Day.

Bigfork Dam, built in 1902 for power generation, is located on the Swan River just over a mile (2 kilometers) upstream from Flathead Lake. This is a low-head dam but has generally blocked fish movement upstream from Flathead Lake. An inoperable fish ladder is located on the north side of the dam.

Hungry Horse Dam, completed in 1954 for power and flood control, is located on the South Fork of the Flathead River about 5 miles (9 kilometers) upstream of the South Fork's confluence with the main stem of the Flathead River. Hungry Horse Dam is operated for flood control, power production, and recreation. The dam, 540-feet high, is a complete block to upstream fish passage. Above the dam, Hungry Horse Reservoir extends 35 miles (56 kilometers). The Upper South Fork enters the upper end of the reservoir after flowing 57 miles (95 kilometers) through the Bob Marshall Wilderness.

Fish Species

FWP and CSKT manage the Flathead Lake and River System as one entity because of the migratory nature of fish in the system. Native Species of Special Concern (a state designation) in the system include bull trout and westslope cutthroat trout. These species use Flathead Lake, River, forks, and tributaries for various portions of their life history. For example, most bull trout grow to adulthood in Flathead Lake, migrate upstream through the main stem and one of the forks, enter a tributary to spawn, then return to the lake. Offspring from this spawning rear in the tributary for several years then return downstream to the lake. There, they grow to adulthood and return upstream to complete the cycle. Thus, all parts of the aquatic system are crucial to life stages of these native fish. Bull trout are also listed as threatened under the Endangered Species Act.

Other native fish found in the Flathead Lake and River system include the mountain whitefish, northern pikeminnow (previously known as squawfish), longnose and largescale suckers, and peamouth chub.

Introduced species also inhabit the river and lake system. These include the major sportfish: lake trout, lake whitefish, and yellow perch. Most nonnative fish were introduced early in the last century (see Table 3.) In addition to the species listed in Table 3, a small number of mountain lakes support populations of yellowstone cutthroat trout or arctic grayling; these species move downstream through the lake outlets in some cases. The introduction of *Mysis* shrimp and its establishment in Flathead Lake in the early 1980s resulted in major changes in the aquatic food web of the lake and river.

Table 3. Native and nonnative fish (dates of introduction in parentheses) residing in Flathead Lake, the Flathead River and tributaries, and Flathead River Sloughs.

Native	Nonnative
Bull Trout	Lake Trout (1905)
Westslope Cutthroat Trout	Lake Whitefish (1890)
Mountain Whitefish	Kokanee (1916)
Pygmy Whitefish	Yellow Perch (1910)
Longnose Sucker	Northern Pike (1960s, illegal introduction)
Largescale Sucker	Rainbow Trout (1914)
Northern Pikeminnow	Brook Trout (1913)
Peamouth Chub	Largemouth Bass (1898)
Redshide Shiner	Pumpkinseed Sunfish (1910)
Sculpin	Black Bullhead (1910)

PAST AND CURRENT FISHERIES MANAGEMENT

Fisheries management in the Flathead Lake and River System has focused on increased protection for native species and increased harvest of nonnative species. This pattern began in the 1950s with the beginning of the modern fisheries management program in Northwest Montana.

Management of Native Fish Species

The Flathead bull trout population has been regarded as one of the premier bull trout populations in the Pacific Northwest because of the numbers and size of fish and the long (up to 140 miles) spawning migrations of adult fish. Bull trout are considered a vital part of the natural lake and river ecosystem. Native Americans have always revered bull trout as part of their culture, but Euro-Americans at one time viewed them differently. Bull trout were harvested in a commercial fishery on Flathead Lake beginning in about 1913. In a 1926 article in *Montana Wildlife,* bull trout were referred to as "the cannibal of Montana's streams." About the same time M. J. Elrod, at the University of Montana Biological Station, called the bull trout an "enemy" of other fish in the lake.

In the 1950s, George Weisel of the University of Montana warned that bull trout were declining across their range. Since then, bull trout and westslope cutthroat trout have been given special protection. In 1953, four tributaries in the North Fork Flathead drainage (Big, Coal, Whale, and Trail) were closed to angling to protect spawning bull trout and westslope cutthroat trout. This was followed in 1962 by four more tributary closures in the National Forest portion of the Middle Fork drainage (Granite, Morrison, Lodgepole and Long creeks). In 1972, FWP and Glacier Park closed additional Middle Fork tributaries in the Glacier Park portion of the drainage (Ole, Park, Nyack, Muir). In 1983, Montana worked with the British Columbia Ministry of the Environment to establish angling closures on major spawning tributaries in the Canadian portion of the North Fork drainage.

Angling limits on bull trout and westslope cutthroat have become more restrictive over time. In 1959, limits on all trout were 10 fish, or 10 pounds and 1 fish. Beginning in 1982, limits decreased or maintained at low levels for bull trout and cutthroat (see Table 4). Angling is now closed for bull trout in the system. Angling for cutthroat trout is catch-and-release, except for the Middle Fork Flathead in the Great Bear Wilderness.

Limits on lake trout were initially decreased to address increasing fishing pressure. But with the establishment of Mysis and growth of the lake trout population, angling limits on lake trout were increased. These angling limit changes illustrate the strategy followed by FWP and CSKT managers to address increasing numbers of lake trout and decreasing numbers of native fish. This strategy reflects the classification of westslope cutthroat trout and bull trout as Species of Special Concern by FWP and the Montana Legislature.

Table 4. Angling creel limits for native bull trout and westslope cutthroat trout, and nonnative lake trout in Flathead Lake and River.

Year	Lake Trout	Bull Trout	Westslope Cutthroat Trout
1959	10, or 10 pounds and 1 fish	10, or 10 pounds and 1 fish	10, or 10 pounds and 1 fish
1982	1	1	5 (only 1 over 14 inches)
1984	2	1	5 "
1986	5	1	5 "
1990	7 (river remains 5)	1	2 "
1992	10 (with slot limit)	1 (river closed)	2 "
1994	10 (with smaller slot limit)	System Closed (lake closed in 1993)	2 "
1996	16 (with slot limit)	Closed	2 "
1998	16 (with slot limit)	Closed	Catch and Release

Additional management protection has been afforded to cutthroat trout and bull trout. In the early 1970s, managers developed a policy of not planting nonnative fish species where they would compete with native fish. One exception to this may be kokanee salmon, planted in the system up until the mid-1990s. Kokanee may compete with westslope cutthroat trout. Since 1982, a policy has restricted the use of nonnative fish in private ponds connected to the Flathead Lake and River System. In 1988, FWP began a voluntary, statewide catch-and-release program for cutthroat trout.

In cooperation with the U. S. Forest Service, FWP and CSKT have monitored effects of timber harvest on spawning and rearing areas and conducted extensive monitoring of populations through redd (spawning nest) counts and fish abundance. Habitat protection has been directed towards protection of this spawning and rearing habitat and water quality. These efforts account for about half of FWP's regional fisheries program, and at least that much of the CSKT fisheries program.

Mountain Whitefish are a native species abundant in the river system. This species is the only native gamefish for which harvest is encouraged. The recreational angling limit is 100 fish daily; a commercial fishery is allowed but it attracts little interest. An extended season for whitefish allows angling from December 1 through the third Saturday in May.

Management of Nonnative Fish Species

Since their introduction, lake trout have been managed as a self-sustaining species. Prior to the establishment of *Mysis*, lake trout abundance was low, but it provided a popular trophy fishery. After the establishment of *Mysis*, the lake trout population increased dramatically in size and put Flathead Lake on the map as a world class lake trout fishery. Managers recognized that this nonnative fish competed with native fish in the lake and river system. To address this, FWP and CSKT increased harvest limits on lake trout to the point where limits on Flathead Lake are probably the most liberal in the nation (Table 5). The focus has been on heavy harvest of smaller, younger fish and maintaining a trophy fishery for the large fish over 36 inches. Lake trout are a long-lived, slow-growing fish. To maintain a trophy fishery, it is necessary to place slot limits or restrictions on harvest of large fish.

Harvest estimates and length of the lake trout in the catch (Table 5) reflect both the effects of the regulations and shifting population (size and age structure). Current lake trout population analysis suggests that this level of angler harvest mortality may not be sustainable over a long period of time.

Table 5. Harvest estimates, length, and lake trout limits on Flathead Lake.

Year	Harvest	Mean Length	Limit
1982	3,600	31 inches	1 fish
1992	22,700	21 inches	10 (with slot)
1998	42,400	21 inches	16 (with slot)

Kokanee once supported the majority of the recreational fishery, but began to decline in the 1960s due to a combination of dam operations and angling harvest. The establishment of *Mysis* and increases in lake trout accelerated the decline. Managers decreased limits as kokanee declined. However, because of food web conditions in the lake the species disappeared by the late 1980s. A vigorous recovery effort in the mid-1990s failed to reestablish kokanee.

Northern pike were introduced illegally in the 1960s and have since established populations in a number of waters, including 20 miles of the upper Flathead River influenced by Kerr and Hungry Horse dams, and associated river sloughs. Pike support a large portion of the recreational angling in these sections. Angling limits on pike in the mainstem are high (15 fish daily) to encourage harvest on this nonnative, predaceous fish. Studies are ongoing to better define the effects of predation in the river and sloughs by northern pike, lake trout, and northern pikeminnow. Managers have increased efforts to document illegal introductions of pike and other nonnative fish, and to increase penalties for those cited for illegal introductions.

Yellow perch and lake whitefish, along with lake trout, comprise the bulk of the recreational fish harvest in the system. These nonnative species are managed with extremely liberal limits. Yellow Perch inhabit the shallow areas around Flathead Lake and the river sloughs. The angling limit on perch in Flathead Lake is 50 fish daily. The majority of angling for yellow perch is located on the shallow, south end of the lake.

Lake whitefish are an abundant deep-water species that increased after the establishment of *Mysis*. The angling limit in the lake and river system is 50 fish daily. The recreational fishery for lake whitefish is encouraged, but this species can often be difficult to catch in the lake. A thriving fall fishery for this species has developed in the Flathead River. To encourage lake and river harvest, FWP has issued flyers with tips on how to catch and cook lake whitefish. A commercial fishery harvests about 20,000 pounds of lake whitefish annually from the lake and river system.

Rainbow trout is a nonnative species residing in the Flathead River System. A harvest of two fish daily is allowed in the river and forks. Rainbow trout spawn in tributaries to the river and threaten native cutthroat through hybridization and competition. Rainbow trout, cutthroat trout, and hybrids are difficult to distinguish causing a management challenge for these species.

Status of the Previous Fisheries Management Plan

As described under a previous section, CSKT and FWP adopted a five-year fisheries co-management plan for the Flathead Lake and River System in August 1989. The fishery has changed dramatically since adoption of the plan, but the general direction of conserving native species, encouraging harvest of nonnative fish, and habitat protection has been followed. In the plan, FWP and CSKT included system-wide goals consistent with this approach. The plan expired in 1994, but a new plan has not been completed because of major changes in the Flathead Lake food web. More information is now available on which to base this current management plan.

FISHERIES MANAGEMENT GOALS, OBJECTIVES, AND STRATEGIES

Background

This management plan draws from ideas and information developed and discussed by the Citizens Advisory Committee during the 5-month process of developing fisheries management options. The plan also reflects comments received from about 300 individuals and groups during two public comment periods. The management plan forms these concepts into a management direction with strategies that progress towards the stated goals. It discusses assumptions, techniques, monitoring, adaptive management, and associated research. This format provides managers clear direction, acceptable tools, and flexibility to accomplish biological goals while recognizing social and economic realities.

The plan is consistent with the vision of CSKT, which is the restoration of the native fish community; and with FWP's vision, which is to protect and enhance native fish, while maintaining a viable recreational fishery. FWP and CSKT recognize that the native trout populations in the system may not be at secure levels. This is due to numerous factors in addition to competition with nonnative fish. We recognize that native trout species have been reduced by nonnative fish and in many cases popular fisheries have developed and are supported by nonnative fish. This conflict is most evident with the relationship between bull trout and lake trout.

CSKT and FWP consider it unwise to initiate strategies that would result in dramatic shifts in the lake's ecology. The system has not stabilized from the establishment of *Mysis*, which ultimately resulted in substantial reduction in native trout. Any deliberate shift in the system should be slow and measurable to avoid further unintended consequences. This approach is prudent given the current status of the bull trout population and the biological and social setting of the system. The management direction and strategies laid out here build on and extend efforts used over the past decade. In this plan, we give the rationale for our management approach and possible tradeoffs that may be necessary to achieve the stated goals.

This plan uses a group of strategies to achieve the stated management goals within the 10-year period and sets the desired direction for the fishery. There will be annual evaluations of the fishery along with a five-year reevaluation of the overall goals and accomplishments. These assessments will direct managers to make appropriate changes in management. Implicit in this approach is a gradual movement toward fisheries management goals supported by high quality monitoring and adaptive management.

Overall Fisheries Management Goals

Within the 10-year period of this management plan, accomplish the following goals:

- Increase and protect native trout populations (bull trout and westslope cutthroat trout).

- Balance tradeoffs between native species conservation and nonnative species reduction to maintain a viable recreational/subsistence fishery.
- Protect the high quality water and habitat characteristics of Flathead Lake and its watershed.

Overall Objectives

- *Determine the population size and characteristics for westslope cutthroat trout and bull trout that are required for population security, using a science based approach, by December 2001*. This population level will be defined using a combination of information, including spawner counts, juvenile abundance, net and angler catch, and consultation with fisheries managers and researchers in other areas. A range of redd count numbers have been suggested as a goal for bull trout. Consecutive-year averages in index streams have ranged from an average of 383 (1980-1990; pre-decline) to 140 (1992-1999; post-decline). We expect that a scientifically derived level for a secure bull trout population will be within this range. We will employ strategies to increase bull trout abundance in the interim while a secure level for bull trout is identified through redd counts and other indices.
- *Increase and protect native trout populations to at least secure levels.* This objective will be measured using the set of parameters derived under the above objective. In the interim, we will implement a graduated series of fish population management strategies, and other strategies to include: conservation, education and enforcement, targeted research, and habitat protection, all aimed at increasing native fish numbers. This objective is consistent with Montana's Bull Trout Recovery Plan formulated by an interagency team.
- *Maintain or if needed increase harvest on nonnative fish to benefit native fish species.* This objective will be measured by monitoring harvest rates of nonnative fish. Because predation and competition by lake trout is thought to be the primary factor limiting native fish abundance, the size of the overall lake trout population will be reduced. This could reduce overall catch rates for lake trout. The 1998 estimated harvest of lake trout was roughly 40,000 fish. This level of harvest may be controlling lake trout and benefiting native fish. This harvest level will be adjusted biennially based on observed changes in the bull trout and lake trout populations.
- *Provide a recreational fishery based on nonnative and native fish with harvest opportunities based primarily on nonnative fish.* Maintenance of current levels of angler use should be possible through a changed lake trout fishery, including increased opportunity to catch larger fish, and substitution of angling opportunities for other fish species to make up for losses in the fishery for small lake trout. If the recreational fishery begins to decline, lake trout fishing regulations will be adjusted to improve the fishery as long as the action does not conflict with native trout goals. This objective will be measured by monitoring angler pressure by direct counts and the statewide mail-in creel survey. The current recreational fishing use is roughly 50,000 angler days on Flathead Lake and 40,000 angler days in the river system. This level represents a viable level of fishery use in the system; measurable declines based on a three-year average will trigger a reevaluation of our management strategies.

Overall Assumptions

- Reduction of lake trout will cause an increase in westslope cutthroat trout and bull trout through reduced predation and competition. The size of lake trout targeted for reduction includes fish under 28-30 inches. This is by far the most numerous size class, and has the largest predation and competition impact.

- Reduction of rainbow trout will increase westslope cutthroat trout by minimizing competition and hybridization.
- To achieve native fish goals there will be a reduction in numbers of small lake trout and lake trout catch rates. Angler opportunity will remain stable if use shifts to large lake trout and other fish species such as native trout, lake whitefish, and yellow perch.
- A lake trout population structure made up of fewer but larger lake trout will achieve native trout goals.
- Implementation of multiple strategies, rather than any single strategy, is necessary to achieve the goals.

Fisheries Management Strategies

There are five major groups of strategies aimed at achieving fisheries management goals in the lake and river system. These include:

(1) Fisheries Assessment, Monitoring, and Research;
(2) Water Quality and Aquatic Habitat;
(3) Conservation Education and Enforcement;
(4) Lake and River Access; and
(5) Fish Population Management.

Each strategy includes assumptions, discussion, tasks, and a timeline.

Some of these strategies are currently being implemented in part and will be continued; some strategies will be stepped up. Strategies for reducing lake trout are tiered using a graduated series of techniques to gradually decrease the number of lake trout. Prior to implementation of each technique, the existing baseline conditions and the need for additional actions will be determined. This information would be used in an adaptive management approach within the time frame of this 10-year plan.

STRATEGY 1: Fisheries Assessment, Monitoring, and Research

Build on successful monitoring and research efforts to assess fisheries status and develop additional monitoring indices.

Assumptions:

- Sound management decisions require extensive scientific information.
- Ongoing monitoring and research efforts will build a body of biological information to assess fishery status and direct management.

Discussion:
This strategy establishes current status and trends of fisheries and identifies parameters and criteria that will be used in subsequent evaluations. Research and monitoring activities are a necessary precursor to changes in management. Current fisheries status will be compared to

management goals to determine the need for changes. A developing body of information will allow managers to assess new findings and if required change course adaptively and identify measurable criteria (biological and social) that will be used to measure the impact of strategies and progress toward the goals.

Tasks:
Develop, refine, or continue measuring fish population parameters including:

- Bull trout and westslope cutthroat trout abundance trends, redd counts and juvenile abundance estimates; these indices will be used to identify secure levels for native trout.
- Lake trout abundance trends, population size, structure, and mortality rates.
- Trends in relative abundance of all fish species.
- Quantification of predation and competition between species.
- Rainbow trout distribution and hybridization.
- Angler harvest, catch rates, and effort.
- Mysis abundance and controlling factors.
- Identify limiting factors of bull trout spawning and rearing habitat.
- Assess status of white sturgeon as a native fish species to Flathead Lake.
- Consult with U. S. Fish and Wildlife Service about possible release of white sturgeon in Flathead Lake.
- Develop an Environmental Assessment listing alternatives about release of white sturgeon into Flathead Lake, if appropriate after consultation with U. S. Fish and Wildlife Service.
- Investigate and research more aggressive lake trout suppression techniques, in case they are needed to maintain at least secure levels of native trout

Timeline:
The biological evaluation will be completed and updated annually. We will develop indexes of bull trout and westslope cutthroat trout security levels by December 2001. Monitoring of important indices is ongoing.

STRATEGY 2. Water Quality and Aquatic Habitat

Protect water quality and watershed habitat condition to maintain fish populations and high water quality.

Assumptions:
- Habitat quality is a limiting factor in fish abundance. Clean, cold, complex, and connected habitats are vital for native trout species and protection.
- The quality of water and aquatic habitat are important to all lake users.

Discussion:
Maintaining and improving water quality is of critical importance to healthy fisheries and users of Flathead waters. Flathead Lake is characterized as having high water quality and low inflow of nutrients, and efforts to maintain that condition are consistent with maintaining conditions for native fish species. Fisheries management agencies administer laws to protect stream habitat and water quality. It is recognized that FWP and CSKT have limited jurisdiction to control water

quality. Fisheries management agencies interact with other governmental agencies to be proactive where they have no direct authority to improve water quality.

Tasks:

- Administer the Montana Stream Protection Act, Aquatic Lands Conservation Ordinance, and Montana Natural Streambed and Land Preservation Act.
- Monitor effects of selective water withdrawal from Hungry Horse Dam on the temperature regime and biological production of Flathead River and Flathead Lake.
- Monitor effects of Kerr Dam on fish populations and habitat quality in the Flathead River and Flathead Lake.
- Work toward stabilizing and naturalizing Flathead River flows by encouraging adoption of operations for Hungry Horse and Kerr dams, which are similar to natural conditions, including Incremental Rule Curves and Variable Discharge Strategy. These efforts will result in a more natural flow regime in the system that will benefit native fish.
- Develop stable flow recommendations for the mainstem Flathead River with instream flow incremental methodology. Participate in the Columbia Basin Fish and Wildlife Authority Sub-Basin planning process to minimize demands from downstream water users.
- Review land management activities to minimize stream and lake habitat degradation
- Continue monitoring conditions of bull trout spawning and rearing habitat.
- Initiate a strong educational effort to highlight the importance of water quality; alert the public to the pollution problems of Flathead Lake, what can be done to reduce pollution, and the consequences of not acting.
- Acquire and/or protect through purchase and/or easements, critical habitats with hydropower mitigation dollars.
- Encourage partnerships with public groups to help implement water quality tasks

Timeline:

Continue the current efforts and immediately initiate additional tasks.

STRATEGY 3. Conservation Education and Enforcement

Increase conservation education and enforcement efforts to increase support for and effectiveness of the fisheries management plan.

Assumption:

- Increasing education and enforcement will result in increased protection and appreciation of native fish species, and maintenance of high water quality.

Discussion:

A successful fisheries management plan is built around public acceptance and cooperation. Education and enforcement efforts are required to communicate management direction, goals, and progress and ensure compliance with fishing regulations and related laws.

Tasks:

- Improve ability of anglers to identify fish species; focus specifically on distinguishing bull trout and westslope cutthroat trout from other fish species.

- Increase enforcement patrols on Flathead Lake and River and penalties for violations involving native fish species.
- Increase awareness of proper catch and release techniques.
- Initiate a strong campaign to inform and educate the public throughout the lake and river system about the fish consumption advisory and associated health risks of regularly eating large fish. Add consumption advisories to fishing regulation pamphlets.
- Publicize a Flathead fishing brochure and computer hotline on methods to increase catch of nonnative fish. Inform public of lake whitefish summer opportunities with current information on locations and techniques.
- Use education and awareness to maintain and enhance cultural sites and values associated with the lake and river system; take no steps to impact cultural sites.
- Establish a lake-honoring event to raise the awareness about important fisheries and water quality issues. The event would be lake-wide and co-sponsored by CSKT and FWP and other interested groups or agencies.
- Foster public support of and participation in the management strategy of recreational harvest of lake trout to benefit native species.
- Encourage partnerships with public groups to address illegal fish introductions.

Timeline:
Continue current efforts and immediately initiate additional tasks.

STRATEGY 4: Lake and River Access

Improve and increase boating and shore access to Flathead Lake and River to maintain current levels of angler use and provide increased seasonal opportunity.

Assumption:

- Increasing number of access locations and conditions at accesses will lead to increased use by anglers.

Discussion:
Anglers have expressed the need for increased and improved access to the lake and river in order to increase or maintain current angler use levels. Angler use is critical to meet management goals of reducing nonnative fish through recreational fishing. In particular, access is limited during periods of low water level and winter ice cover.

Tasks:

- Develop an access management plan for the lake and river system. This will include numbers and locations of sites, sites targeted for improvement, and needs for additional sites. Ensure handicap access at all sites.
- Create and distribute a map showing access sites that are functional at full and low pool lake levels. This map should also highlight recent improvements, such as those at Blue Bay, Big Arm, and Elmo access sites.
- Maintain opportunities at all currently used access sites.
- Establish usable dock facilities on Flathead Lake for all seasons; extend ramps and use portable docks to follow declining water levels during winter drawdown.
- Increase number of winter (low lake pool elevations) access sites.

- Identify locations for public fishing piers.
- Provide fish cleaning stations at lake access sites.

Timeline:
Develop an access management plan by December 2001. This plan will be detailed, and will guide access development and acquisition over the 10-year planning period.

STRATEGY 5: Fish Population Management

Manage fish populations to increase abundance of native species; maintain a recreational/ subsistence fishery. This strategy will be implemented in a progressive or stepwise fashion as determined by our fisheries assessment and adaptive management.

A. Suppress Nonnative Fish Through Recreational Angling

Assumptions:
- Reduction of lake trout or other nonnative fish populations will lead to increases in native fish populations.
- Deliberate, gradual, or incremental shifts in species abundance can be measured and are not irreversible in the short-term.
- Increases in bull trout populations will require disproportionate decreases in lake trout populations.
- We cannot predict all the consequences of manipulation of one species abundance on the abundance of others.
- Recreational angling can generate and maintain sufficient harvest of nonnative fish to benefit native fish.

Discussion:
This is a continuation of our current management efforts as expressed by current regulations in the lake and river system. Manipulation of the abundance of species is the most influential element available to fisheries managers. Manipulations should be done gradually with constant monitoring and evaluation to assure that the intended objectives are being met. Manipulations are intended to increase native species populations by reducing nonnative species that directly compete with and/or prey upon them, while maintaining a viable fishery. Table 6 outlines this general approach to management.

Table 6. This table illustrates management actions taken under changing bull trout and lake trout populations in Flathead Lake **based on the assumption that lake trout predation/competition is the principal limiting factor for bull trout**. This same general approach would apply to management of other native and nonnative fish in the lake and river system. This table provides a quick view of general management direction under simplified conditions. "Small lake trout" are defined as fish less than 28-30 inches in length and comprise most of the angler catch.

If the Bull Trout Population…	**And the Lake Trout Population…**	**Then the Management Action Would be…**
Increases	Increases	Increase reduction of small lake trout
Increases	Stabilizes	Continue current management
Increases	Decreases	If angler use declines below current levels and other species do not replace lake trout losses, stabilize harvest of lake trout
Stabilizes	Increases	Increase reduction of small lake trout
Stabilizes	Stabilizes	Reevaluate goals and objectives
Stabilizes	Decreases	If angler use declines below current levels and other species do not replace lake trout losses, stabilize harvest of lake trout
Decreases	Increases	More rapidly reduce the number of small lake trout
Decreases	Stabilizes	Increase reduction of small lake trout
Decreases	Decreases	Identify specific causes of bull trout decline and take appropriate action; if needed, further reduce small lake trout

Strategy 5A (continued)

Lake trout and lake whitefish have benefited from the shifting lake ecology and have increased in abundance. During the early 1990s, abundance of native trout decreased due to competition and/or predation by lake trout and other species. Among other functions we believe that the most effective action that would result in meaningful benefits to native trout would be to reduce the size of the lake trout population. The current lake trout fishery is very popular with anglers and currently provides most of the angling opportunity in Flathead Lake. The intent of this strategy is to preserve a viable fishery by shifting fish populations in both size and structure. Specifically for Flathead Lake we will reduce the overall size of the lake trout population by increasing harvest on smaller fish while minimizing harvest of larger fish. The intent is to provide a fishery based on fewer but larger lake trout and other native and nonnative fish.

This is and has been the current management strategy, but there is some uncertainty that it is reducing numbers of small lake trout. Exploitation rates on lake trout (pounds of fish harvested per acre and numbers of fish harvested annually) are very high as compared to other lakes, but this does not confirm that lake trout are declining. Even if current recreational angling is holding in check and slowly reducing numbers of lake trout in the system, more measurable reductions would be desirable if needed to meet native fish management goals. Aggressive reductions in lake trout may be made if information shows that bull trout are not reaching at least secure levels.

Tasks:
(1) Suppress abundance of nonnative fish through recreational/subsistence fishing and liberal bag limits while protecting native fish through restrictive fishing regulations. In Flathead Lake, suppression will focus on reducing numbers of small lake trout while maintaining and enhancing a trophy fishery for large lake trout.

- Biennially review fishing regulations for nonnative species. Liberal bag limits on lake trout, lake whitefish, northern pike, yellow perch, and rainbow trout aim to increase mortality rates, reduce abundance, and increase harvest of specific size groups. Manage harvest of nonnative fish species in the lake and river system through adjustments of fishing bag and size limits for lake trout, lake whitefish, northern pike, rainbow trout, and yellow perch as needed to meet goals for native trout as established under strategy 1. Daily and possession limits for lake whitefish will be increased. For lake trout, adjust the size limit to maintain large fish. At the same time, reduce numbers of small fish (sizes responsible for most of the predation) by increasing the bag limit.
- Complete the assessment of rainbow trout hybridization and competition with westslope cutthroat trout; identify and implement strategies to minimize impacts.
- Complete ongoing northern pike distribution, movement, and food habits studies, and implement increased harvest if warranted.
- Continue ban on bull trout fishing. Determine if more angling closures are needed on the lake and lower river to minimize angling mortality.

- Determine westslope cutthroat status and the potential for harvest in the river and lake.

(2) Actively use angling in an increased effort to suppress small lake trout and lake whitefish, increase angler effectiveness at catching and harvesting fish, communicate the need for increasing harvest, and provide socially acceptable ways to deal with harvested fish. Anglers should harvest more lake trout if they recognize that bringing fish to collection sites contributes to a good community cause of feeding people at community kitchens. Potential actions associated with this technique include the following:

- Train CSKT and FWP angler interviewers (creel clerks) to provide information on the management objectives for the lake and assess public attitudes concerning management activities.
- Post information at access sites, including productive fishing locations and angling techniques.
- Identify nonprofit depositories for harvested fish that would benefit the community, such as food banks and community kitchens. Assist these depositories by providing or helping to secure freezers for fish storage.
- Inform the public of the management objectives associated with this strategy. Strive to get widespread acceptance of management objectives and increase awareness of the status of bull trout and westslope cutthroat trout. Emphasis should be given to the possible consequences of moving to more extreme management actions if recreational angling is not effective.
- Publish a fishing brochure that emphasizes the rationale, techniques, and locations for harvesting small lake trout and conserving native fish.
- Establish a web site or hotline that would give current updates on lake trout and lake whitefish angling, and major management findings and actions.

(3) Establish additional angling incentives

- Provide fishing lures free at food banks and community kitchens in exchange for harvested fish to encourage participation.
- Increase harvest of nonnative fish species by encouraging, sponsoring, or subsidizing fishing derbies.

Task 3 is intended to recruit enough anglers to effectively increase mortality on lake trout and other nonnative fish and is assumed to generate the largest harvest based on recreational angling. This may be implemented if recreational harvest is not high enough to achieve native trout goals.

B. Increase Suppression of Nonnative Fish if Necessary Through Commercial Harvest Techniques

Assumptions:

- Necessary legislation and public scoping processes would not prohibit implementation.
- Large-scale fish community manipulations would lead to increased native fish populations.
- Tasks would require subsidies and would have to continue indefinitely.

Discussion:

In general, the Citizen Advisory Committee and the general public were opposed to commercial fishing to suppress lake trout. We are optimistic that fish population management through recreational angling will provide for measurable improvements to the native trout populations. However, these strategies may be reviewed and proposed for implementation if native trout populations drop to dangerously low levels or as a means to achieved native trout goals after all other efforts are exhausted. The lowest recorded bull trout redd count was 83 redds in index tributaries; this is considered an unacceptably low level. One option suggested by the Citizen Advisory Committee included using 100 redds in index streams as a trigger point to begin more aggressive lake trout suppression efforts. As stated in the objectives of this plan, within the first year we will develop a scientifically based level for a secure bull trout population. Through this effort, we will refine numbers to identify secure and insecure bull trout population levels. Commercializing the fishery is a tool of last resort and would require additional public review before implementation.

Tasks (these tasks would require legislation to implement lake-wide):

- Establish hook-and-line commercial angling for lake trout.
- Pay bounties for killed lake trout.
- Commercially net nonnative fish.

C. Implement Agency Management Actions if Necessary to Reduce Nonnative Fish

Assumptions:

- Necessary legislation and public scoping processes would not prohibit implementation.
- Large-scale fish community manipulations would lead to increased native fish populations.
- Tasks would have to continue indefinitely and would be costly.

Discussion:

Currently there are examples of this type of management strategy being employed to reduce lake trout abundance in adjacent states. At this time, we can assess the success and learn from these projects.

In regards to rainbow trout and yellowstone cutthroat trout, complete genetic and distribution surveys and identify opportunities to reduce the threat of hybridization. Once identified, assess potential to curtail rainbow trout spawning. This effort would reduce the opportunity for westslope cutthroat trout to hybridize with rainbow trout and yellowstone cutthroat trout. There is public support for suppression of rainbow trout and maintenance of pure westslope cutthroat trout populations.

Tasks:

- Live trap lake trout and lake whitefish.
- Gillnet lake trout spawning grounds to remove spawning lake trout.
- Live trap and remove rainbow trout spawners in tributaries.
- Install rainbow trout migration barriers in certain spawning tributaries.

Timeline:
Determine native trout security index levels by December 2001. Continue current efforts outlined in task A1, phase in task A2 over the next three years, and determine success for biannual reporting period 2003.

Reporting

Annual Reports including any recommended management changes will be presented to the Flathead Reservation Fish and Wildlife Board at a regularly scheduled public meeting. The presentation will include a list of tasks planned for the coming year.

A detailed report of progress and need for mid-course management adjustments would be made at the end of the first 5 years of the plan (by the middle of 2006).

This reporting schedule allows for frequent adjustments and is consistent with the flexible, adaptive management approach in this management plan.

BIOLOGICAL INFORMATION SUPPORTING THE CO-MANAGEMENT PLAN

Water Quality and the Aquatic Food Web

People living in the Flathead Basin have long recognized the value and importance of high water quality. Flathead Lake is one of the cleanest lakes today; however, in recent years the water quality has declined. The Flathead Lake Biological Station, University of Montana, has been monitoring water quality in Flathead Lake since the late 1970s and continues to date. Over this time period primary productivity has increased in Flathead Lake. Primary productivity is an indicator of water quality, as algal production increases, water quality decreases. Algae levels in the lake are controlled by nutrient availability, specifically nitrogen and phosphorus supply. Nutrients enter the system through river tributaries and precipitation. Human activities in the drainage have elevated nutrient inputs. In addition, food web changes, such as fluctuations in *Mysis* abundance, may also affect how nutrients are used in the system and the level of algal production. Experiments have shown that if nutrient levels increase, organisms such as *Mysis* will become more important in regulating primary production, but at current nutrient levels, nitrogen and phosphorus concentrations appear to be more important in controlling the algal community in Flathead Lake.

In 1968 and in the mid-1970s, FWP planted *Mysis relicta*, the opossum shrimp, into Ashley, Whitefish, and Swan lakes. *Mysis* moved downstream and colonized Flathead Lake in the early 1980s. *Mysis* abundance then increased exponentially, peaked in 1986, and then dropped to lower levels in subsequent years. *Mysis* created unforeseen and far-reaching changes to the Flathead System. *Mysis* avoid light, so during the day they rest in the dark depths on the lake bottom. After dark they move up into the water column and feed, again descending by first light. *Mysis* eat larger zooplankton, tiny animals that live suspended in the open water column, the same forage used by many fish species. *Mysis* severely depleted zooplankton populations and became a competitor with fish foraging on zooplankton rather than forage for those fish, as managers had intended. *Mysis* provide an abundant food source for fishes using the deep lake bottom, such as lake trout and lake whitefish, and substantially increased the abundance of these species.

The establishment of *Mysis* has considerably altered the zooplankton community in Flathead Lake. Principally, there has been a dramatic decrease in the abundance of larger zooplankton. The larger zooplanktors were the principle food for kokanee and are seasonally important to other fish species including westslope cutthroat trout. When *Mysis* densities peaked, zooplankton densities severely declined. Two of four principle zooplanktors disappeared from lake samples, while two persisted, but at greatly reduced densities. In years following the decline from peak *Mysis* densities, the two principle zooplanktors have reappeared in samples but at very low levels. Presently, the zooplankton community has stabilized with a shift from dominance by large zooplanktors before *Mysis* to small zooplanktors after *Mysis*. Not only has the abundance of larger zooplanktors declined, but also the summer blooms or peaks in abundance are reduced and delayed by roughly one month.

Mysis abundance appears to be controlled by predation by fish, because there is substantial evidence that forage for *Mysis* is not limiting. *Mysis* in Flathead Lake mature early, complete a life cycle in one year, and produce a large number of young per female. These characteristics are indicative of a population that is not limited by forage. In addition, throughout the year *Mysis* are eating their preferred forage, large zooplankton, specifically *Daphnia spp*. They are not switching prey species and not resorting to less preferred zooplankton. Shifts of these types would occur if forage were limiting.

The Changing Fish Community of Flathead Lake

Over time, Flathead Lake has supported three very different fish communities. Historically, the fish community was solely comprised of the native species (Table 3), which colonized the Flathead's waters following the last glacial period, roughly 10,000 years ago. Bull trout, westslope cutthroat trout, and mountain and pygmy whitefish were the only salmonids. Bull trout and northern pikeminnow were the dominant predaceous fishes. Most likely, the minnows (northern pikeminnow and peamouth chub) dominated in fish abundance and biomass. Tribal oral history through song and stories indicates presence of sturgeon in the Flathead Lake and River system. Accurate depiction of relative species abundance is difficult due to lack of recorded and quantified surveys or fishery encounters.

Federal and state government agencies aggressively introduced gamefish, both native and nonnative species, into Montana waters beginning in the 1880s (see Table 3). They constructed fish hatcheries and developed fish transport systems incorporating railroads. By the 1920s, a new fish community had developed in Flathead Lake that included kokanee, lake trout, lake whitefish, and yellow perch. Kokanee and yellow perch dominated the recreational fishery. By the early 1930s, an estimated 100 tons of kokanee were annually harvested from Flathead Lake. Angler creel surveys into 1980s showed kokanee provided the majority of the sport fishery, from 77 to 97 percent of harvested fish numbers. This new fishery composition was relatively stable until the mid-1980s.

Mysis establishment in the 1980s drove the shift in species abundance to what exists in Flathead Lake today. Kokanee disappeared from the system in the late 1980s. Bull trout and westslope cutthroat trout declined in abundance and lake trout and lake whitefish increased in abundance. The CSKT and FWP monitor changes in the status of fish populations using a number of field surveys. Surveys are directed at specific fish species or groups, age classes, and habitats. Many of these surveys were established in the late 1970s and have been conducted over a long time period producing a database to assess fisheries changes over time.

Trends in Species Abundance

Annual spring gillnetting in Flathead Lake is an important monitoring tool. This lake-wide survey consists of sinking and floating gill nets set at specific locations and depths. In 1981 and 1983, the spring survey was conducted and provided a baseline of fisheries information prior to the establishment of *Mysis*. The program was discontinued until the early 1990s, and has since been conducted annually. Recent surveys depict current fisheries status and changes associated with *Mysis* establishment. Netting provides catch-per-unit-effort (CPUE), species and size composition, age, diet, and other types of fisheries information.

The species composition of fish captured in the spring gillnet survey varies between floating and sinking net types and changed since *Mysis* became established. For example, in sinking nets prior to the establishment of *Mysis*, peamouth chub dominated catch, followed by bull trout, northern pikeminnow, and lake whitefish (Figure 2). After *Mysis* established, lake whitefish dominate catch, followed by lake trout and northern pikeminnow. In the floating net catch before *Mysis*, peamouth chub dominated catch, followed by westslope cutthroat trout and northern pikeminnow. After *Mysis*, peamouth chub and northern pikeminnow dominate catch in floating nets. The CPUE information depicts the same trends. Following *Mysis* establishment, lake trout catch increased from an average of 0.1 per net to 1.6 per net and lake whitefish catch increased from 2.7 per net to 12.0 per net. Conversely, bull trout catch decreased from 2.1 per net to 0.2 per net and westslope cutthroat trout catch decreased from 2.7 per net to 0.5 per net. The presence of *Mysis* in the system has benefited lake trout and lake whitefish; both are fish species that evolved with *Mysis* in other areas. As these introduced species increased in abundance, the native bull trout and westslope cutthroat trout declined in abundance. The native minnows, northern pikeminnow, and peamouth chub, remain abundant, however, peamouth chub comprise a smaller proportion of the sinking net catch. These trends in gillnet catch are supported by similar trends in other monitoring indices.

Creel Surveys

Angler creel surveys provide valuable information, including estimates of angler use, catch, harvest, and availability of fish species. A number of creel surveys and survey techniques have been employed on Flathead Lake in the last 40 years. For example, since 1969, FWP has conducted a mail-in creel survey to estimate angler pressure on state waters. Presently, this survey is conducted every other year; the most recent survey was completed in 1997. In addition to the mail-in survey, roving creel surveys were conducted. CSKT completed the most recent lake-wide roving creel survey in 1999 and will continue surveying indefinitely.

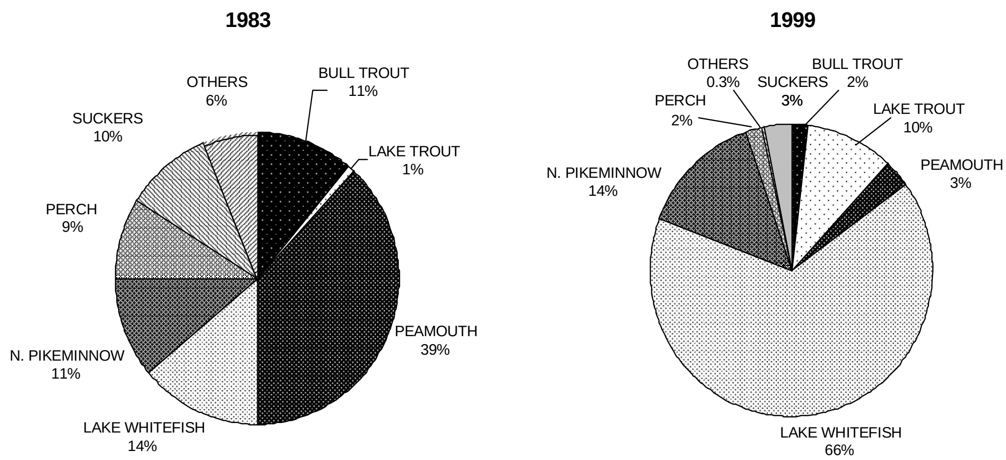

Figure 2. Percent composition of fish species captured in sinking gill nets, Flathead Lake, spring monitoring series.

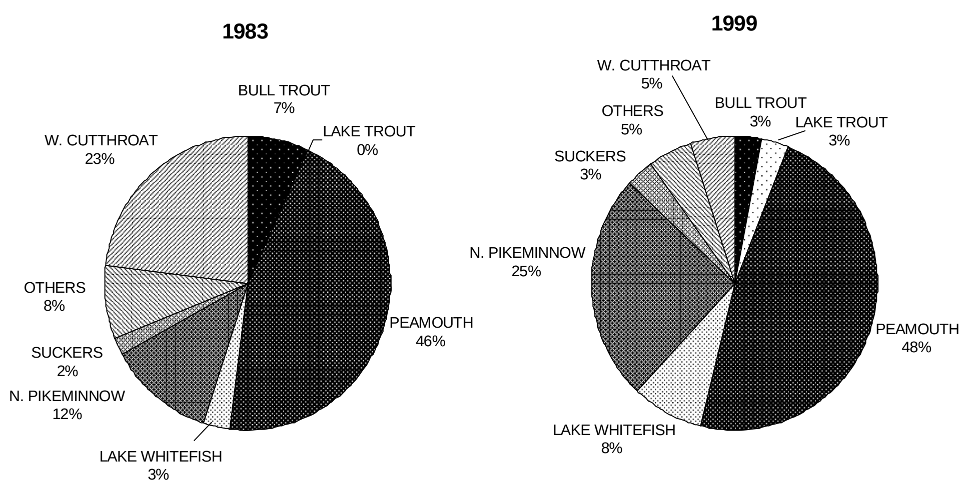

Figure 3. Percent composition of fish species captured in floating gill nets, Flathead Lake, spring monitoring series.

Similar to other indices, creel surveys highlight dramatic changes in the Flathead Lake fishery. For example, angling pressure in the 1990s decreased on Flathead Lake to roughly 60 percent of angler pressure in the 1980s. This drop in pressure is believed to be a response by anglers to changes in fish species composition, specifically the collapse of the kokanee fishery.

Prior to the late 1980s, kokanee provided most of the fish harvest on Flathead Lake. In the early 1980s, kokanee represented over 90 percent of harvest, while lake trout made up a very small percentage (less than 2 percent) of harvest. In the 1990s, lake trout provided most of the harvest in Flathead Lake. In 1992, no kokanee were harvested, lake trout represented 55 percent of harvest and lake whitefish and perch comprised over 44 percent of the remaining 45 percent. In all years, native bull trout and westslope cutthroat trout comprised a relatively small proportion of total fish harvest. In the 1960s, 1980s, and 1990s, the two species combined provided less than five percent of harvest.

Over the last four decades, there was a progressive increase in lake trout harvest. In 1962, lake trout harvest was estimated at 1,248 fish, while in 1981 it rose to 3,600 lake trout with only an estimated 17 percent increase in angler pressure. In 1992, it increased to 21,656 lake trout, a 500 percent increase in harvest with a 50 percent drop in total angler pressure. This increasing trend in the lake trout harvest is due to increased lake trout abundance (reflected in gillnet monitoring surveys), and redirected angler pressure (resulting from the loss of the kokanee fishery). For example, in 1992 approximately 80 percent of angler pressure was directed at lake trout while prior to the kokanee population crash, they received less than 15 percent of the total angler pressure. In the 1998 survey, investigators estimated that anglers harvested 42,469 lake trout, roughly a 100 percent increase from 1992. The average size of lake trout caught in 1998 was 20 inches.

Biologists evaluated lake trout exploitation by comparing lake trout harvest in Flathead Lake with lake trout harvest in other lakes. By multiplying the weight of the average lake trout harvested (over 2.3 pounds) in 1998 by the estimated number of lake trout harvested (42,469), they produced a rough estimate of the number of pounds of harvested lake trout (98,000 pounds). By dividing this estimate by the size of Flathead Lake, biologists calculate 0.8 pounds of lake trout harvested per surface acre of Flathead Lake. Scientists reviewing other lake trout lakes found 0.2 to 0.7 pounds per acre to be long-term sustainable lake trout yields. They concluded that sustainable yields from lake trout are unlikely to exceed 0.5 pounds per acre and predicted that if harvest was above this value then the lake trout population was likely over-fished. These data indicate that anglers are heavily harvesting lake trout in Flathead Lake.

In response to the increasing lake whitefish population in Flathead Lake, anglers became interested in commercial harvest. The lake whitefish is a desirable food fish, commercially harvested in the central United States and Canada. In 1989, a hook-and-line commercial fishing began in the Flathead System. However, it was not until 1992 that anglers commercially harvested large numbers of fish. The fishery occurs in the lake and during a fall spawning migration in the river. During the 1992 to 1999 period, anglers have commercially harvested from 14,057 to 20,561 pounds of lake whitefish per year. The majority of this harvest occurs in the fall river fishery. Harvest varies with river flow conditions and number of anglers participating in the commercial harvest. Over the ten-year period, harvest has remained relatively stable and lake whitefish averaged 1.8 pounds per fish.

A Changing Lake Trout Population

Lake trout populations respond to exploitation in predictable ways. In general, high mortality rates or exploitation results in specific changes in population characteristics including reductions in average age, length, weight, and number of age-classes, and increases in growth rate, fecundity, and biomass of younger age-classes. As mortality rates increase, the number of older fish decreases leading to a population dominated by smaller fish. At present, this appears to be the condition of the lake trout population in Flathead Lake, although a fishery for larger fish still exists. As creel and gillnetting results indicate, smaller lake trout dominate the population with relatively fewer large lake trout (Figure 4). The 1998 creel data show a five-fold decrease in trophy lake trout harvested in 1998 relative to 1992.

In 1997, FWP and CSKT began an extensive lake trout tagging program on Flathead Lake. The goal of this project was to estimate characteristics of the lake trout population using volunteer anglers to tag, release, and recapture as many lake trout as possible. Anglers tagged thousands of lake trout on both the north and south halves of the lake using a variety of angling techniques.

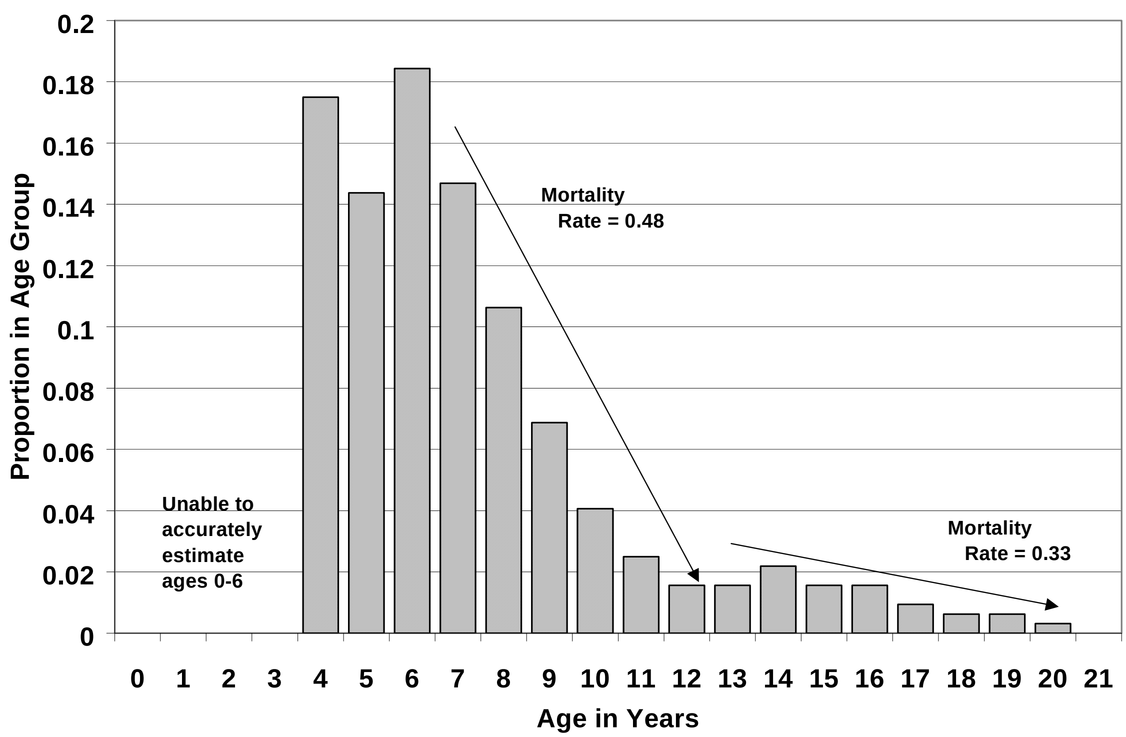

Figure 4. The age structure of the lake trout population in Flathead Lake, 1998.

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The average length of lake trout was just over 21 inches, with fish from 9 to over 45 inches being caught. The average length of lake trout caught by anglers has decreased over the last two decades. In the mid-1980s, lake trout averaged 31 inches in the catch, while in the late 1980s they averaged 26 inches. There have been a number of changes to Flathead Lake in this time period. Improvements to juvenile lake trout forage as *Mysis* became established probably resulted in increased survival and abundance of small lake trout. A decrease in the abundance of older, larger lake trout may have resulted from increased exploitation by anglers.

Lake Trout Mortality Rates

Its is important for managers to know the mortality or death rate for age groups in the lake trout population. From catch data collected from gillnet surveys and volunteer angler records, biologists constructed the length distribution of the lake trout population. Estimated annual mortality rates are being refined, but preliminary results range from 36 to 58 percent. Beginning in 1998, we began conducting a gillnet survey designed to determine the mortality rates and size distribution of the lake trout population. This survey estimated mortality rates of 0.48 (ages 7-12), and 0.33 (ages 13-20); see Figure 4. These are considered high rates when compared to lake trout populations in other lakes. In other lakes, some populations were able to withstand mortality rates of 50 percent annually, but all populations suffering mortality rates in excess of 50 percent were declining.

Lake Trout Growth and Maturation

Lake trout are slow growing and long-lived fish (Figure 5). Growth rings on fish bones allow researchers to determine their age. Of 143 samples examined from Flathead Lake, the oldest lake trout was 38 years old. Males and females had similar growth rates, reached lengths over 36 inches and lived to be greater than 30 years old. Fish grew more rapidly in their first 10 years of life, growth slowed after fish reached sexual maturity. On average, fish entered the lower boundary of the slot limit (30 inches) at 12 years old, but this ranged from 9 to 20 years old. Fish exited the upper boundary of the slot limit (36 inches) 5 to 6 years later. It also appeared that some individuals might not grow larger than the upper boundary of the slot limit. For Flathead Lake, lake trout growth across all ages was near the maximums observed for lake trout across their distributional range.

The age at which lake trout become mature is controlled by both environmental and physiological factors. As populations shift in size structure and abundance, parameters such as age at maturity shift and provide the population a means of compensation for those changes. In 1997 and 1998 female lake trout matured on average at about five years and at about 20 inches in length. It was determined in 1998 that about 53 percent of lake trout harvested by anglers were less than 20 inches in length and were not mature.

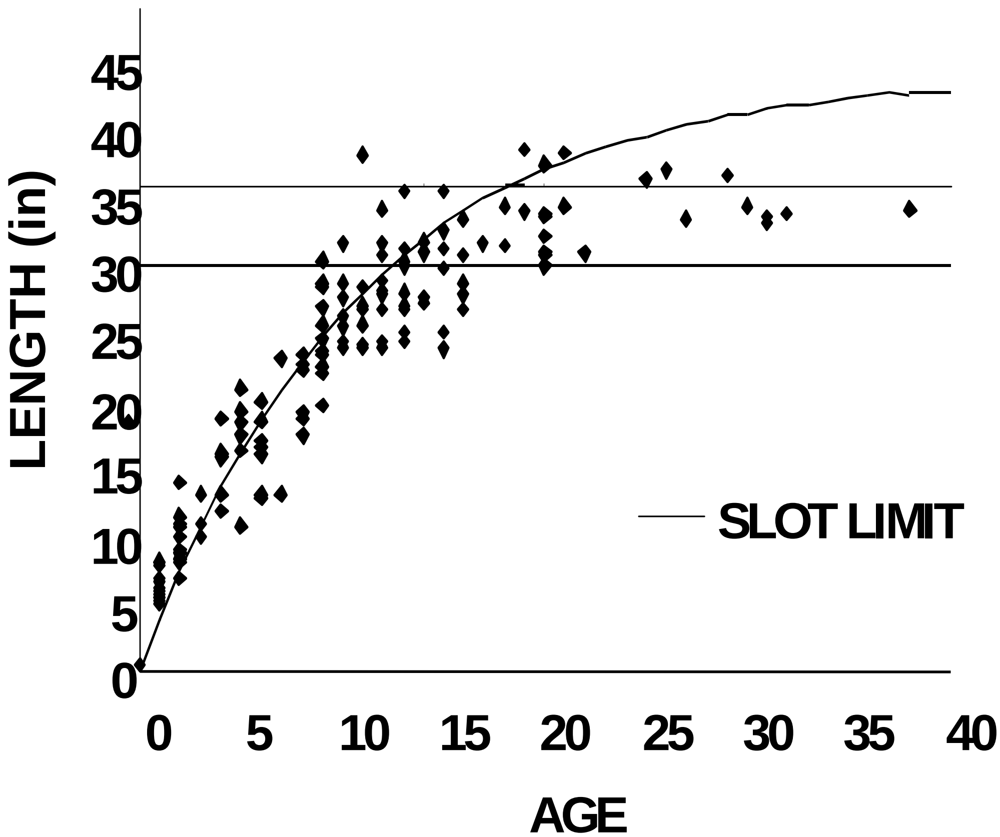


Figure 5. Age and growth of lake trout in Flathead Lake

Mercury and PCBs Levels in Fishes

Chemical contaminants in the environment accumulate in fish tissues. To assess the health risk to fish consumers in Montana, FWP tested fish from selected waters across the state. Flathead Lake was included in this test. The survey looked at levels of polychlorinated biphenyls (PCBs) and methylmercury (Hg) in lake trout and lake whitefish.

A fish's age and position in the food chain influence contaminant accumulation. A species at or near the top of the food chain accumulates contaminants by consuming other animals with contaminants. The longer a fish lives, the more contaminants it accumulates. Therefore, large and old fish-eating species have the highest concentrations of contaminants. Lake trout fit these criteria. Lake trout from Flathead Lake have moderate to high levels of Hg and PCBs, levels high enough to warrant public advisory warnings on consumption of larger fish (Table 6). Lake whitefish from Flathead Lake had low to moderate levels of Hg and PCBs were not detected. Table 6 summarizes meal guidelines for consumption of fish with these contaminant levels. Generally, anglers should continue to eat fish, but need to be cautious with regular consumption of lake whitefish and lake trout, particularly the large fish. A Montana Fish Consumption advisory is available from the Montana Department of Public Health and Human Services or FWP. Persons following the consumption advisories should experience no health problem.

Table 6. Concentrations of mercury and PCBs (ug/g) in fish length groups (inches) and recommended consumption for people eating fish from Flathead Lake over the entire year. Meal guidelines are less restrictive if fish are only eaten on a seasonal basis or for short periods.

Fish Species	Length (inches)	Mercury (ug/g)	PCB (ng/g)	Meal (0.5 lbs) Guidelines for Annual Use
Lake Trout	18 to 27	0.3 to 0.4	Less than 0.1	Adults – 1 meal/week Women (child bearing years) – 1 meal/month Children – 1 meal/month
	28 to 39	0.6 to 0.9	0.1 to 0.4	Adults – 1 meal/month Women (child bearing years) – don't eat Children – don't eat
Lake Whitefish	11 to 14	0.1	ND	Adults – unlimited Women (child bearing years) – 1 meal/week Children – 1 meal/week
	14 to 19	0.2	ND	Adults – 1 meal/week Women (child bearing years) – 1 meal/month Children – 1 meal/month

Kokanee Reintroduction Test

Following the collapse of the kokanee salmon population in Flathead Lake, there were a series of experimental reintroduction efforts to restore kokanee. Biologists monitored and reported the outcomes of these efforts. From 1993 through 1997, under Hungry Horse Dam Fisheries

Mitigation funded by the Bonneville Power Administration, about 3.2 million kokanee yearlings and 2.6 million young-of-year kokanee were stocked into the Flathead Lake and River System.

Survival of stocked kokanee was monitored to develop and adjust management strategies designed to maximize survival of stocked fish. Monitoring results were used to determine the ability of reintroduction efforts to meet established success criteria. The three success criteria were: (1) 30 percent survival of kokanee one year after stocking; (2) yearling survival to adulthood of 10 percent; and (3) annual angler harvest of 50,000 kokanee (≥11 inches) and fishing effort ≥100,000 angler hours. Kokanee stocking was discontinued following the 1997 plants. Monitoring continued through 1998. The Hungry Horse Fisheries Technical Team summarized important findings for each year of the program and, based on that summary, agreed on the following general conclusions about kokanee reintroduction in Flathead Lake. First, the three success criteria were not met with current stocking levels in the present lake environment, based on data from monitoring and predictions of bioenergetic models. Second, when using yearling kokanee, lake trout predation was the primary obstacle to possibly achieving the three success criteria. Third, monitoring efforts were sufficient to evaluate whether the kokanee test met the three success criteria. The reintroduction test indicated that kokanee are not viable under current lake conditions.

Bull Trout Redd Counts

A reliable census of annual spawner numbers is a valuable element of any fisheries monitoring program. These data are frequently used as measures of anticipated production in succeeding generations and current population status. They also provide an index of success in regulating the fishery.

Every fall, field crews count the number of bull trout spawning sites (redds) in specific stream sections. These counts provide information on the number of adult bull trout successfully spawning in upper basin tributaries. Over the past 20 years, biologists have monitored high density spawning areas in four tributaries in each of the North and Middle fork drainages. Fish spawning in these eight index streams have migrated upstream from Flathead Lake. In addition to our annual work in these index sections, biologists have periodically surveyed all known bull trout spawning areas presently available to Flathead Lake bull trout. Over the 19 years on record biologists have completed these basin-wide counts during seven years. Biologists believe that only a small percentage (<10 percent) of all bull trout spawning is unaccounted for during years when field crews complete basin-wide counts.

Historically, the Flathead Lake bull trout population had access to all three forks of the Flathead River as well as the other interconnected streams and rivers both above and below Flathead Lake. Construction of Hungry Horse Dam on the South Fork of the Flathead River in 1953 blocked off an estimated 38 percent of the historic bull trout spawning and rearing areas available to Flathead Lake fish. Bull trout presently occupying the reservoir as adults utilize tributaries to the reservoir and the South Fork upstream as spawning and rearing areas. No exchange is possible with the Flathead Lake population. Separate bull trout populations occupying the Swan and South Fork Flathead drainages are presently stable or increasing. There are also 27 disjunct bull trout populations in the Flathead Basin. Little is known about some of these populations.

There are limited data on the bull trout spawning run out of Flathead Lake prior to the current monitoring scheme. The earliest and only comparable data on the number of spawning bull trout are from a study in the North Fork during the early 1950s. Researchers operated a two-way weir in Trail Creek during 1954 and conducted a complete redd count survey. Results from this work yielded an estimate of 160 adult bull trout spawning in Trail Creek during 1954.

Redd numbers reported from 1980 and beyond are directly comparable (Figure 6). During the 11-year period from 1980 through 1990 (pre-decline) the Flathead Lake index count averaged 383 redds with a range from 272 in 1980 to 600 in 1982. A large decline in bull trout redd numbers occurred between 1991 and 1992. Since 1992 (post-decline) the Flathead Lake index count has averaged 140 redds ranging from a low of 83 in 1996 to a high of 215 in 1999. This average represents a reduction by approximately 63 percent from the 1980s period. The 2000 redd count of 251 redds is encouraging, showing a continued improvement in native trout numbers. The North Fork index counts appear to have declined to a greater degree than Middle Fork streams. From 1980 to 1991, North Fork index streams averaged 231 redds or 62 percent of the total Flathead Lake index count. From 1992 to 1999, counts show closer to a 50:50 split between North and Middle fork index tributaries.

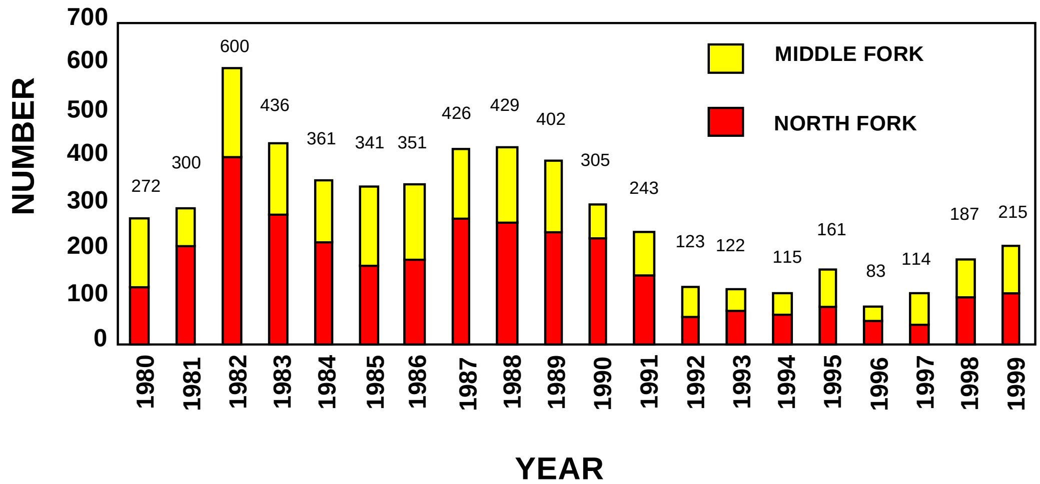


Figure 6. Bull trout redd counts from the Flathead River Drainage, 1980 to 1999.

Based on the number of redds observed, the 1999 spawning run out of Flathead Lake again was below the numbers observed in the 1980s. This was the eighth consecutive year field crews reported low but relatively stable redd numbers. Despite the apparent stability during the past eight years, the low number of redds created concern over persistence of the Flathead Lake bull trout population. The 1999 redd count was the highest since 1991. Although the increased count appeared encouraging for bull trout persistence in Flathead Lake; the 1999 count is 58 percent of the 1980-1991 average. The 2000 redd count of 251 redds is about 66 percent of the pre-deline average.

When comparing our annual index counts with the basin-wide counts during the seven years on record, biologists see that annual index has ranged from 39 to 52 percent of the basin-wide number. These data show an average of 45 percent of all Flathead Lake bull trout spawn in the eight stream sections in which biologists conducted annual redd count surveys. It appears that the annual index counts accurately reflect basin-wide trends.

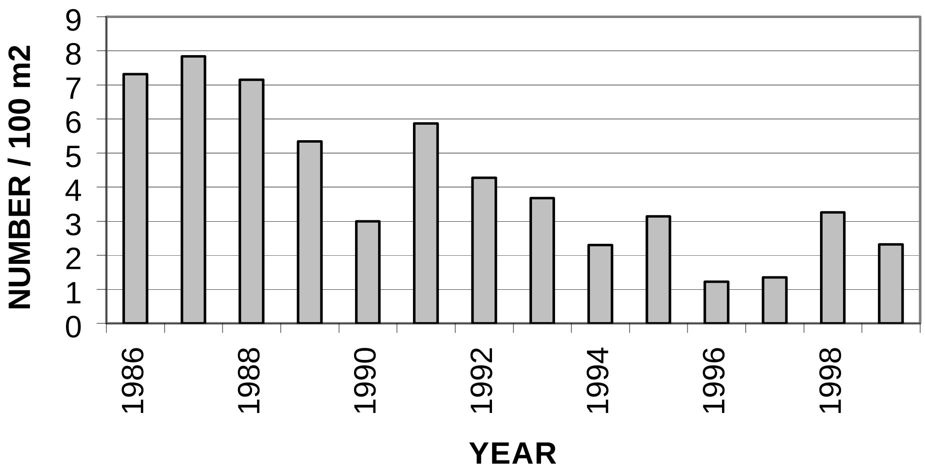
The actual proportion of the adult bull trout population in Flathead Lake that spawns in any given year is unknown. This number is likely variable over time. The question is further complicated by the fact that biologists know some mature fish spawn every year while others spawn every other year. There is also evidence of fish that may only spawn one out of every three years. Redd count surveys provide a relative abundance index for spawner escapement and over an extended timeframe allows management agencies to assess trends and changes in the status of populations.

Juvenile Bull Trout Abundance Estimates

Estimating fish population abundance is necessary for understanding basic changes in numbers, species composition, and year class strength. Fish populations are dynamic and may fluctuate considerably, even over relatively short periods of time, regardless of human influence. FWP developed a protocol to assess fish abundance in the Flathead Basin using electrofishing techniques. Monitoring focuses on quantifying yearly variation of fish abundance in stream sections sampled consistently year after year.

To assess overall juvenile bull trout abundance in tributaries to Flathead Lake, biologists developed annual composite densities (Figure 7). This composite is simply the annual average of abundance estimates of Age I and older bull trout in the sections of five streams (Big, Coal, Whale, Red Meadow, and Morrison creeks), which are electrofished each year. Juvenile bull trout densities are strongly correlated with rearing habitat quality and fine sediment levels in the spawning/incubation grounds. Composite density began to decline during the late 1980s. This trend coincides with the extended drought period when both spawning/incubation and juvenile rearing habitat quality indices showed declining trends. Our indices suggest that habitat responded positively to flushing flows in the early 1990s, however, composite juvenile bull trout density continued to decline through 1996. It is likely that changes in the trophic dynamics of Flathead Lake began to influence bull trout abundance during the early to mid-1990s. Bull trout redd counts declined between 1991 and 1992 and remained low for seven years. During the past two years, composite density has increased even though spawner escapement was low. This suggests better survival of recent year classes due to improving habitat conditions.

Figure 7. Composite juvenile (Age 1 and older) bull trout densities in tributaries of the Flathead River.



Streambed Quality

Successful egg incubation and fry emergence are dependent on gravel composition, streambed permeability, water temperature, and surface flow conditions. The female bull trout begins redd construction by digging an initial pit or depression in the streambed gravel with her tail. After the spawning pair deposits eggs and sperm into this area, the female moves upstream a short distance and continues the excavation, this covers the deposited eggs. Excavation of the redd causes fine sediments and organic particles to be washed downstream, leaving the redd environment with less fine material than the surrounding substrate. Weather, stream flow, and transport of fine sediment and organic material in the stream can change conditions in redds during the incubation period by increasing the levels of fine material.

Redds become less suitable for incubating embryos if fine sediments and organic materials are deposited in interstitial spaces of the gravel during the incubation period. Fine particles impede movement of water through the gravel, thereby reducing delivery of dissolved oxygen to, and flushing of metabolic wastes away from incubating embryos. This results in lower survival. For successful emergence to occur, fry need to be able to move within the redd, but high levels of fine sediment can restrict their movements. In some instances, embryos that incubate and develop successfully can become entombed (trapped by fine sediments).

Measurements of the size range of materials in the streambed reflect spawning and incubation habitat quality. In general, research has shown negative relationships between fine sediment levels and incubation success. A significant inverse relationship existed between the percentage of fine sediment in substrates and survival to emergence of westslope cutthroat trout and bull trout embryos in incubation tests. Mean adjusted emergence success ranged from about 80 percent when no fine material was present, to less than 5 percent when half of the incubation gravel was smaller than 0.25 inch; about 30 percent survival occurs at 35 percent fines. Entombment was the major mortality factor. Biologists monitor bull trout spawning and incubation habitat quality by determining the percent fines in a given spawning area through hollow core sampling.

Field crews began core sampling spawning areas utilized by Flathead Lake's migratory fish stocks in 1981. Initially, biologists sampled the main bull trout spawning areas in four North Fork tributaries. Biologists subsequently expanded the program to include an important bull trout spawning stream in the Middle Fork drainage and two additional spawning areas in the North Fork Drainage. Seven spawning areas comprise the long-term data set for monitoring bull trout spawning habitat quality relative to Flathead Lake.

Biologists combined sediment measurements from surveyed streams to produce a composite to describe the overall quality of bull trout spawning habitat in Flathead tributaries. An increasing trend in composite fine sediment level began in 1987. Fine sediment levels peaked from 1988 through 1990, at values greater than 35 percent and reaching over 40 percent fines. This increase corresponds to the extended period of drought, which spanned the late 1980s. Spring runoff in 1991 was the first normal flushing flow. Our sampling results show a corresponding reduction in the level of fine sediment present in the main bull trout spawning areas; however, levels remained at or close to 35 percent through 1992. There have been good flushing flows during most spring runoffs since 1991. The improving trend in spawning habitat quality, although not continuous, is evident up through the 1998 sampling. Current conditions, as indicated by composite percent fines, are approaching the best observed during the 18-year period of record.

Environmental factors, such as temperature, cover, and water quality, influence distribution and abundance of juvenile bull trout. Depth, velocity, substrate, cover, predators, and competitors affect juvenile trouts' use of habitat. Although spawning occurs in limited portions of a drainage, juvenile salmonids disperse to occupy most of the areas that are suitable and accessible.

Juvenile bull trout rear for up to four years in tributaries. Observations during past studies indicate juvenile bull trout are extremely substrate-oriented and territorial. This combination of traits results in partitioning of suitable rearing habitat. Biologists assess juvenile bull trout habitat by scoring the condition of the substrate.

Substrate composition influences rearing capacities of nursery streams. Sediment accumulations reduce pool depth, cause channel braiding or dewatering, and reduce interstitial spaces among larger streambed particles. Juvenile bull trout are almost always found in close association with the substrate. A positive relationship exists between substrate score and juvenile bull trout densities. A substrate score is an overall assessment of streambed particle size and embeddedness. Large particles, which are not embedded in finer materials, provide more interstitial space that juvenile bull trout favor. This situation generates a high substrate score. Low substrate scores (10 or less) occur when smaller streambed particles reduce the space between streambed materials, creating poor rearing conditions. Field crews began collecting substrate scores in Flathead Lake rearing streams in 1984. By 1986 biologists were annually sampling at least six rearing streams, tributaries to the North and Middle forks of the Flathead River. From 1986 on, the data set provides an index of juvenile bull trout rearing habitat quality throughout the basin.

To best describe basin-wide rearing habitat quality, biologists averaged all substrate scores available during each year and plotted these composite scores. From 1986 through 1990, composite substrate score decline sharply from over 12.5 in 1986 to less than 11.5 in 1990. This corresponds to an extended period of drought, which spanned the late 1980s. A rain-on-snow event in the fall of 1989 was the first flushing flow in several years. Spring runoff in 1991 provided flushing as have several more recent spring runoffs. An improving trend in composite substrate score began in 1991 and although not continuous, this trend is evident through most recent sampling. Current conditions as indexed by composite substrate score are approaching the highest observed to date. Juvenile bull trout rearing habitat in Flathead Lake nursery streams is presently in good condition.

Westslope Cutthroat Trout Abundance Estimates in the Flathead River System

Managers assess westslope cutthroat trout abundance through population estimates in the upper Flathead River drainage and gillnet surveys in Flathead Lake (see previous section). Investigators had limited success assessing population status by counting redds, as is done for bull trout, since westslope cutthroat trout spawn in the spring and high stream flows make it difficult to get accurate counts.

Three distinct life history forms of westslope cutthroat trout commonly occur within the forks of the Flathead River. Adfluvial cutthroat trout spend one to three years in tributaries before emigrating as juveniles to the lake. They generally reside in a lake for one to three years, mature, and return to their natal stream for spawning. Cutthroat trout exhibiting this life history form generally occur in the Middle and North forks. Fluvial westslope cutthroat trout are relatively low in abundance in the North Fork and in the lower portions of the Middle Fork, yet they are abundant in the upper Middle Fork. These fish have a similar life cycle to adfluvial except they grow and mature in a river rather than a lake. The resident form of westslope cutthroat trout completes its entire life cycle in tributaries to both the North and Middle forks. Resident cutthroat trout seldom reach lengths greater than 8 inches, whereas fluvial and adfluvial fish may attain lengths up to and exceeding 18 inches.

Fish population estimates allow managers to assess the status and health of fisheries. These surveys over a long timeframe display changes or trends in abundance or size structure. Results from four years of population estimates for the Ford section (near Polebridge, Montana) are shown in Figure 8. From 1990 to 1996, overall cutthroat trout estimates dropped dramatically from near 700 per mile to just over 200 per mile. In all years, small (<10 inches) cutthroat trout comprised 94 percent of total cutthroat trout abundance with mid-size representing five percent and large cutthroat trout only one percent. The majority of the decline occurred in the small cutthroat trout with mid and large size fish maintaining low numbers in all three years. In 1999, the population estimate returned to roughly 700 per mile.

During the 1996 estimate, incidence of hook scars was recorded for all captured fish. Biologists observed scars on two percent of the small cutthroat trout, 18 percent of the mid-size fish, and 25 percent of the large cutthroat trout. This was the highest incidence of hook scars in any of the surveyed sections in the Flathead River drainage.

In 1998, FWP placed catch-and-release regulations on cutthroat trout in the North Fork, as well as the Middle Fork, main stem Flathead River and Flathead Lake. The 1999 survey did not show a large increase in the proportion of larger fish; however, it may be too early to realize changes associated with the changed fishing regulation. It may also be true that the new regulation will not affect the size distribution of the population, since it appears that westslope cutthroat trout population in the North Fork is primarily adfluvial fish dominated by small juvenile migrants.

Surveys of westslope cutthroat abundance occurred in four locations in the Middle Fork of the Flathead River. Three are within the wilderness boundaries and one is downstream outside the boundaries. Two of the locations, near Gooseberry and Shafer Creeks, describe primarily resident populations with relatively few migratory fish. Small (< 10 inch) fish dominated both headwater stream reaches. Surveys in mid-1990s indicated increased abundance from the late 1980s. Two lower reaches, one near Spruce Park and the other near Paola Creek, showed higher incidence of larger fish. In these sections, fish over 10 inches comprised 21 to 58 percent of the population estimates. These populations appear to be predominately fluvial in nature. Surveys began in these sections in the mid to late 1990s so trend information is not available until completion of future surveys.

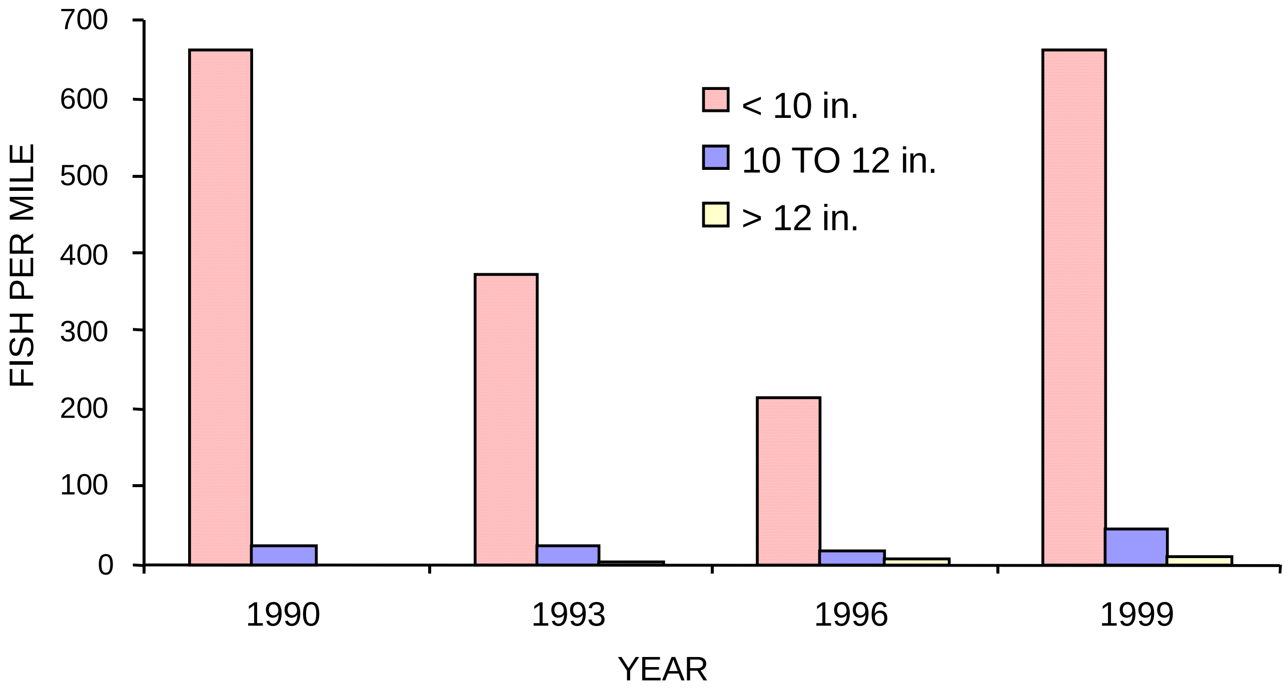


Figure 8. Population estimates and length frequency for westslope cutthroat trout in the North Fork of the Flathead River, Ford section.

Conflicts with Nonnative Fish Species in the River

Nonnative fish species negatively affect native species in the Flathead River System. One of the major threats to westslope cutthroat trout is hybridization with rainbow trout and/or Yellowstone cutthroat trout. Another is predation by northern pike.

Westslope cutthroat trout are indigenous to the upper Columbia and Missouri River drainages in Montana. However, they now occupy only 27 percent of their historic range in Montana, and genetically pure populations occupy only 3 percent of their historic range. Declines in westslope cutthroat trout are attributed to overexploitation, genetic introgression and competition from nonnative fish species, and habitat degradation. Northwestern Montana, specifically the Flathead River Drainage, is presently the stronghold for westslope cutthroat trout. Currently, the greatest threat to westslope cutthroat trout persistence in the Flathead Drainage is hybridization with nonnative rainbow trout and Yellowstone cutthroat trout. In the last two decades, FWP and the University of Montana genetically tested the main stem Flathead River and numerous lakes and streams in the North Fork, Middle Fork, and South Fork drainages. Results showed a high incidence of westslope cutthroat trout hybridization with rainbow trout and Yellowstone cutthroat trout.

In the mainstem river, two samples of 25 fish, one from the river near Columbia Falls and the other from a reach near Kalispell, showed high incidence of hybridization between westslope cutthroat trout and rainbow trout. They also showed evidence that both genetically pure westslope cutthroat trout and rainbow trout exist. It appears that these two samples contained fish from a number of populations. FWP is surveying tributaries to locate spawning streams where hybridization is occurring and rainbow trout are reproducing. Once this information is compiled, managers will determine actions to reduce abundance and spread of nonnative fish and thus, minimize risk of hybridization.

There is a large database of genetic information from mountain lakes. For example, surveys in the North Fork and Middle Fork drainages showed that seven of 22 lakes had hybrid trout populations. In addition, surveyors found hybrid or nonnative trout in many streams below lakes containing hybrid or nonnative trout. Rainbow trout and Yellowstone cutthroat trout presence resulted from hatchery stockings into these lakes in the 1920s through the mid-1950s. Emigration of individuals from these hybrid or nonnative populations threaten the persistence of westslope cutthroat trout throughout the Flathead River Drainage.

Beginning in the early 1980s, FWP experimented with a restoration technique to reduce nonnative trout by stocking high numbers of genetically pure westslope cutthroat trout on top of hybrid or nonnative populations. This technique has met with some success in reducing the proportion of nonnative trout genes in successive genetic surveys of introgressed or nonnative populations. However, the technique has not completely removed the nonnative component from any of the populations and thus has not removed the threat of introgression to westslope cutthroat trout in the Flathead River Drainage.

Westslope cutthroat trout was petitioned for listing under the Endangered Species Act. The U.S. Fish and Wildlife Service recently issued a ruling finding the species not warranted for listing because of the number of populations that exist and current management efforts in place. Government agencies have increased effort toward protecting and expanding the present range of westslope cutthroat trout. An example of the heightened commitment to westslope cutthroat trout conservation is the Memorandum of Understanding and Conservation Agreement for Westslope Cutthroat Trout in Montana (May 1999) recently signed by FWP, USDI Fish and Wildlife Service, USDI Bureau of Land Management, and USDA Forest Service. At an interagency meeting (December 1999), participants prioritized river drainages in Montana for westslope cutthroat trout conservation and restoration. At this meeting, the North, Middle, and South forks of the Flathead River were categorized as priority one statewide. In upcoming years, FWP will further assess genetic status of mountain lake populations and determine actions to remove nonnative genes from these lakes. Actions will include treating lakes with chemical toxicants and then reestablishing westslope cutthroat trout populations.

Another nonnative fish species that has raised concern in the Flathead System is the northern pike. The pike inhabits the lower main stem Flathead River, associated backwater sloughs, and portions of Flathead Lake. Pike are fish eating predators. Their impact on native fish is being questioned. Currently, there is a project determining movement patterns, habitat use, and diet of pike in the Flathead System.

Pike appear to move between the lake, river, and sloughs. Seasonal movements include migrations into sloughs to spawn. Seasonal diet sampling from pike is incomplete at this time. Summer, fall, and winter samples (20 to 30 per season) have not shown bull trout predation by pike. Native minnow species by far dominated the diets of pike in these seasons. Trapping results showed that spring was potentially the season where most predation on bull trout could occur, since during this time there is the greatest overlap in habitat use between pike and bull trout and westslope cutthroat trout. Future results from current sampling will address these concerns.

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The Flathead Reservation Fish and Wildlife Board reviewed the plan and worked with CSKT and FWP on the public involvement process and finalizing the plan. Board members included: Ralph Goode, Chairman; Fred Matt, and Terry Tanner (Tribes); Rod Johnson, Ray Aylesworth, and Bob Lucas (State); and Dave Wiseman (U. S. Fish and Wildlife Service).

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