Upper Missouri River Reservoir Fisheries Management Plan 2010-2019

Montana Fish, Wildlife & Parks

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2010-2019

Montana Fish, Wildlife & Parks
Fisheries Bureau
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Executive Summary and Plan Implementation

Since the mid-1980s, Montana Fish, Wildlife & Parks (FWP) recognized that the fishing public desires an opportunity to participate in the development of management strategies for the state's fisheries resources. In 1989 the department completed a five-year management plan for Hauser Reservoir and in 1993 a similar management plan was prepared for Canyon Ferry Reservoir. Following expiration of these plans in the late 1990s, the Upper Missouri River Reservoir Fisheries Management Plan 2000-2009 was written to manage Canyon Ferry, Hauser, and Holter Reservoirs and the Missouri River from Toston to Canyon Ferry and below Hauser Dam as a system.

This fish management plan addresses the fisheries of the upper Missouri River Reservoir system including Canyon Ferry, Hauser, and Holter reservoirs, and the Missouri River from Toston to Townsend and between Hauser and Holter reservoirs (Figure 1). The plan sets management direction for a 10-year period (2010-2019) by providing specific goals and strategies for each of these waters. The plan also provides a framework for continued public involvement in monitoring and evaluating fisheries management activities.

Fish communities in these reservoirs have changed dramatically in the past 10 years (1999-2009) and existing management strategies warrant review. The establishment of a substantial walleye population in Canyon Ferry, the loss of the popular kokanee salmon fishery in Hauser Reservoir, and changes in the yellow perch fisheries in Canyon Ferry and Holter Reservoirs have significantly affected angler use of the fisheries in this reservoir system.

A variety of management tools are used in this plan to affect fish populations, including changes to fishing regulations (Table 1), habitat manipulations and fish stocking. In addition, management "triggers" (catch rates in gill nets, Table 2) have been established to maintain populations at levels appropriate for balanced predator/prey interactions and to maintain the multi-species diversity required in the plan. The plan will be allowed to function for three years before changes will be contemplated, because fish populations take time to respond to regulation changes and other management actions. However, within the first three years, if triggers are exceeded in ways that are judged to seriously threaten the ability to achieve management goals, then recommended management actions may be deferred or additional actions implemented to allow evaluation and consideration of alternative approaches in an "adaptive manner."

Management Plan Organization

This Executive Summary provides an overview of the Montana Environmental Policy Act (MEPA) process, structure of the plan, a description of the public involvement process used to develop the plan, and a summary of management goals for each body of water. Plan Implementation details the ongoing public involvement process that will be used to monitor, evaluate, and modify the plan over the 10-year period. The Management Plan Area provides a general description of the upper Missouri River reservoir system. Respective sections on individual waters provide more detailed information on history, physical and fisheries description, past/present management, and proposed management alternatives, goals, and strategies.

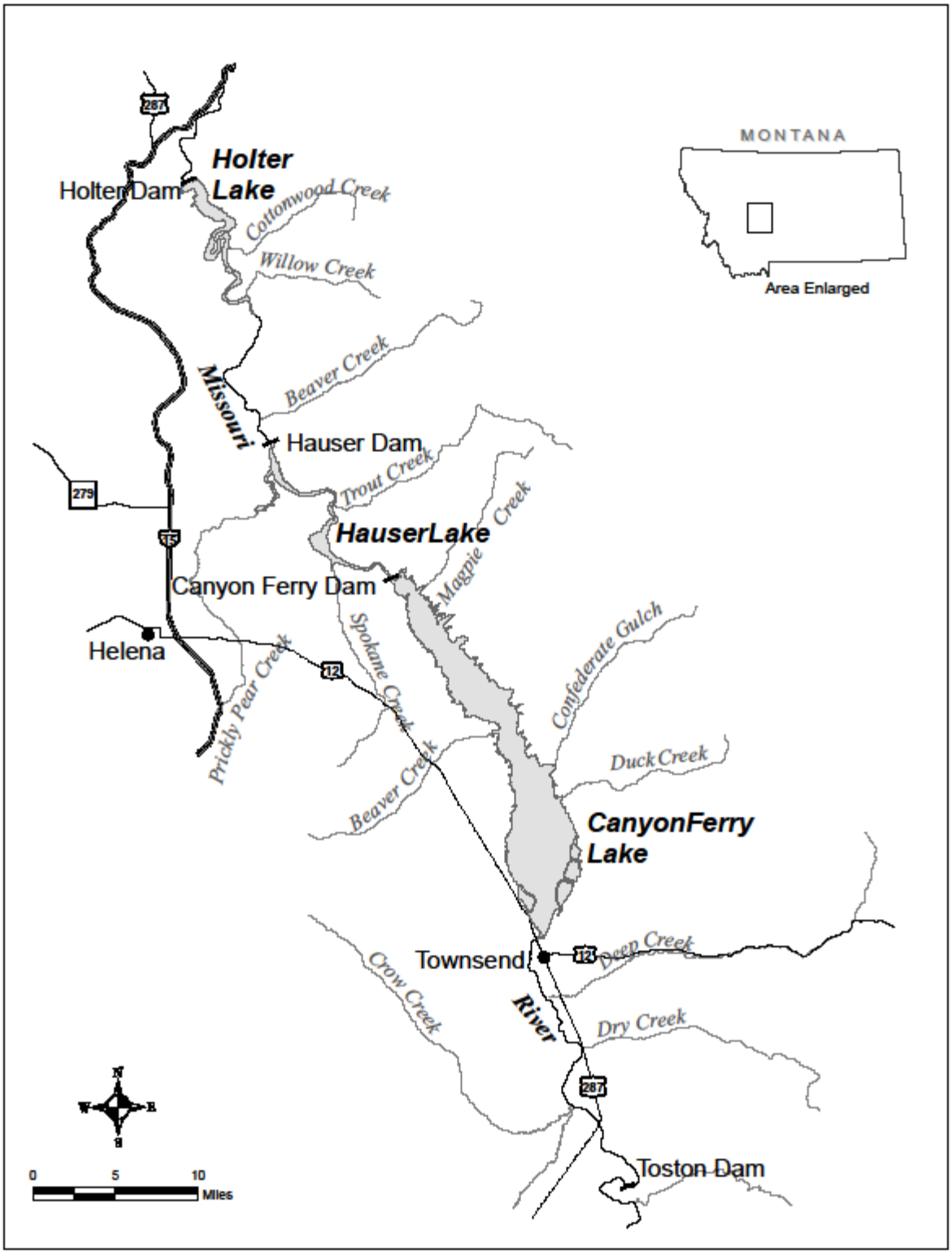


Figure 1. The upper Missouri River reservoir system.

Table 1. Fishing Regulations in Place Under the 2000-2009 Management Plan and Proposed Regulations for the 2010-2019 Management Plan

	Canyon Ferry		Hauser		Holter	
	2000-2009 Plan	**2010-2019 Plan**	**2000-2009 Plan**	**2010-2019 Plan**	**2000-2009 Plan**	**2010-2019 Plan**
Walleye	20 daily and 40 in possession, only 1 > 28”	Modified version of Alternative 2. Finalized during 2011 regulation setting process. See page 30 for criteria.	10 daily and 20 in possession, only 1 > 28”	20 daily and 40 in possession, only 1 > 28”	6 daily and 12 in possession, includes 5 fish < 20” and 1 fish > 28”	10 fish daily, with only one fish over 28”. No harvest of fish between 20 and 28”
Yellow perch	15 daily and in possession	15 daily and in possession	50 daily with no possession limit	25 daily with no possession limit	50 daily with no possession limit	25 daily with no possession limit
Rainbow trout	Combined trout 5 daily and 10 in possession	Rainbow trout 5 daily and 10 in possession	Combined trout and salmon 5 daily in any combination and 10 in possession	Combined trout and salmon 5 daily in any combination and 10 in possession	Combined trout and salmon 5 daily in any combination and 10 in possession	Combined trout and salmon 5 daily in any combination and 10 in possession
Kokanee	N/a	N/a	Combined trout and salmon 5 daily in any combination and 10 in possession	Combined trout and salmon 5 daily in any combination and 10 in possession	Combined trout and salmon 5 daily in any combination and 10 in possession	Combined trout and salmon 5 daily in any combination and 10 in possession
Brown trout	Combined trout 5 daily and 10 in possession	Catch and release only	Catch and release only	Catch and release only	Catch and release only	Catch and release only
Burbot	5 daily and in possession	5 daily and in possession	5 daily and in possession	5 daily and in possession	5 daily and in possession	5 daily and in possession
Northern pike	10 daily and in possession	No limit	10 daily and in possession	No limit	10 daily and in possession	No limit

Table 2. Management Goals and Triggers for the 2010-2019 Upper Missouri River Reservoir Fisheries Management Plan. Gillnet Trends are Based on Three-Year Running Average Catch Rates. WE = walleye, YP = yellow perch, RB = rainbow trout, SU = suckers, and LL = brown trout.

	Canyon Ferry			Hauser			Holter		
	Goal	**Upper Trigger**	**Lower Trigger**	**Goal**	**Upper Trigger**	**Lower Trigger**	**Goal**	**Upper Trigger**	**Lower Trigger**
Walleye	5 per net	> 7 per net or YP and/or RB < 3 per net	< 3 per net and YP > 10 per net and RB>5-6 per net	2-3 per net	> 6 per net or YP and/or RB < 1 per net	< 2 per net and YP and RB above goals	4 per net	> 6 per net or YP and/or RB < 2 per net	< 2 per net and YP and RB above goals
Yellow Perch	10 per net	> 15 per net recommend raising bag limit	< 3 per net	4 per net	> 7 per net recommend raising bag limit	< 1 per net	6 per net	> 10 per net recommend raising bag limit	< 2 per net
Rainbow trout	5-6 per net	None	< 5 per net evaluate stocking plan < 3 take active measures	3 per net	None	< 2 evaluate stocking plan < 1 take active measures	6 per net	None	< 4 evaluate stocking plan < 2 take active measures
Kokanee	N/a			None	None	None	None	Adjust stocking rate if LL < 100 per mile in Hauser tailrace	None
Brown trout	1 per net	> 1 consider allowing harvest	None	0.5 per net	None	None	None	None	None
Burbot	0.40 per net	None	None	0.5-1 per net	> 2 per net	< 0.5 per net evaluate reduction in harvest	0.25 per net	> 2 per net	None
Northern pike	None	None	None	None	None	None	None	None	None
Forage	15 SU per net 10 YP per net 20 zoop/L	WE > 7 per net	SU < 5 per net YP < 3 per net	None	None	None	None	None	None

Montana Environmental Policy Act

The MEPA requires state government to be accountable to the people of Montana when it makes decisions that affect the human environment. MEPA provides a process to help ensure that government actions are based on informed decisions. It does this by requiring that reasonable alternatives are evaluated, the consequences of a decision are understood, and the public's concerns are known.

MEPA requires all state agencies to recognize and consider to the fullest extent possible the consequences that their actions may have on the quality of the human environment (75-1-201, Montana Code Annotated (MCA)) and directs them to:

- Utilize a systematic, interdisciplinary approach which will ensure the integrated use of the natural sciences and the environmental design arts in planning and decision making which may have an impact on the environment; and

- Develop methods and procedures which will ensure that environmental values and amenities are identified and may be given appropriate consideration in decision making along with economic and technical considerations.

MEPA requires FWP to:

- Issue a draft Management Plan;

- Encourage and accept public comments on the draft; and

- Issue a final Management Plan.

The Final Management Plan may:

- Modify alternatives, including the preferred alternative;

- Develop and evaluate alternatives not previously considered;

- Supplement, improve, or modify the analysis contained in the draft;

- Make factual corrections; and

- Explain why comments do or do not warrant further response.

The purpose of preparing a draft plan prior to decision-making is to describe the proposed action, and evaluate potential impacts, including cumulative and secondary impacts, on the physical environment. This process helps to ensure that the department's decisions are based on all available information and that the analysis is accurate. The public comment period for the draft Management Plan was September 16 thru October 23, 2009. Please see Appendix A for more information on management alternatives and public comments.

This document assisted FWP in planning and decision making by presenting an integrated and interdisciplinary analysis of administrative alternatives for management of the upper Missouri River reservoir system. This document describes the proposed action and evaluates potential consequences on the physical environment. Analyses of impacts presented in this document were based on literature

research, public comments, and interviews with FWP personnel and wildlife agency personnel in other states.

Public Involvement and Citizen Workgroup

The Upper Missouri River Reservoir System Fisheries Management Plan Citizen Workgroup was appointed in January 2009 by Montana Fish, Wildlife & Parks (FWP) as an advisory body to help identify fisheries goals and management alternatives to be addressed in the 10-year management plan. This 18-member workgroup represented various interests with a stake in the fisheries of the reservoir system including warm and coldwater anglers, sportsman's groups, local communities, businesses, guides, kids fishing, and others. Through its Charter, the Workgroup was charged with providing management alternatives; although consensus was reached on some issues, it was not necessary for proposed alternatives to be considered by FWP. Through six meetings held throughout spring and summer of 2009, the workgroup identified the following goals/desired end results:

The Upper Missouri River Reservoir Management Plan should result in:

1. Management of all three reservoirs and connecting river sections as healthy multi-species fisheries.
2. Strategies that emphasize trout and walleye while recognizing perch as an important game and forage species.
3. Improved forage species and availability for game fish in the upper Missouri River reservoir system.
4. Realistic regulations and limits while providing a high level of angler satisfaction.
5. Social acceptance based on shared biological and social/economic interests.
6. An adaptive management plan and process to react to the changing dynamics of the system and adjust accordingly.

Fish, Wildlife & Parks endorsed and accepted these goals/end results for the 2010-2019 Fisheries Management Plan.

Please see Appendix A for more information on the Citizen Workgroup and management alternatives proposed for the draft and final Management Plan.

FWP considered alternatives proposed by the Citizen Workgroup and included many of them in the draft management plan, which was available for public comment from September 16 to October 23, 2009. During the public comment period, FWP held open houses in Billings, Bozeman, Butte, Great Falls, Townsend, and Helena. Open houses provided the opportunity for the public to view proposed fish management alternatives and provide substantive comments in writing. The draft document was also available for viewing on the FWP web site, as well as means for people to provide comment electronically. During the public comment period, 203 written public comments were received. A summary of responses to common public comments that are not directly addressed in the Management Plan can be found in Appendix B. After taking into account public comments, biological and social considerations, in some cases the alternatives adopted by FWP for the final Management Plan were not universally supported by the Workgroup or members of the public.

Role of Other Government Agencies

FWP is the lead agency for fisheries management in the upper Missouri River reservoir system. Maintaining a high quality, cost-effective, multi-species fishery with high levels of angler satisfaction is the department's overall management goal. To achieve this goal, this management plan has been prepared to direct future Department activities for the study area. Other agencies have responsibility for managing land and water important to the fishery resource.

The Montana Department of Environmental Quality (DEQ) is responsible for regulating activities that could affect the quality of state water. A permit from DEQ is required to construct or use any outlet for discharge of wastes or wastewater into state surface water or groundwater under the Montana Water Quality Act. Nonpoint source discharges from new or increased sources are regulated by DEQ under the nondegradation policy described in Title 75, Chapter 5, Part 3, MCA.

The Montana Department of Natural Resources and Conservation (DNRC) is responsible for regulating state surface and groundwater rights. Owners of all supply wells within the state are required to file a notice of completion of any new well within 60 days of completion. Water supply wells must be drilled by a contractor licensed by the Board of Water Well Contractors or by a person who has obtained a permit from the board to drill a well on agricultural property for private use. Any groundwater appropriation exceeding 35 gallons per minute or 10-acre feet of water per year for beneficial use, or is located inside an established controlled groundwater area, must be permitted by DNRC prior to well construction.

Three federal agencies are involved in management of resources in the upper Missouri River reservoir management area. The U.S. Bureau of Reclamation (BOR) manages federal lands around Canyon Ferry Reservoir, including numerous campgrounds and boat launches, and is responsible for operating Canyon Ferry Dam. The Bureau of Land Management administers campgrounds and boat launch facilities on Hauser and Holter Reservoirs. The U.S. Army Corps of Engineers is responsible for permitting placement of any dredged or fill material into waters of the U.S. or wetlands under Section 404 of the Clean Water Act. The U.S. Army Corps of Engineers also provides operational oversight of Canyon Ferry Reservoir when water levels are elevated into the flood control pool.

Managing the Fisheries

The species composition of the Upper Missouri River Reservoir system is typical of large river and reservoir fisheries in the intermountain region. The sport fishery is comprised primarily of rainbow trout, walleye, yellow perch, brown trout, kokanee salmon, mountain whitefish, and burbot (ling). Combined, the upper Missouri River reservoir system accounted for nearly 8% of the fishing pressure in Montana in 2007. These reservoirs traditionally are in the top five most heavily fished waters in Montana with Canyon Ferry averaging 92,527 angler days (1989-2007), Hauser averaging 58,487angler days (1989-2007) and Holter averaging 60,657 angler days (1989-2007). This level of pressure equates to an average of 15.4 angler days per acre and 12.6 days per acre on Hauser and Holter, respectively, and 2.6 angler days per acre on Canyon Ferry. Hauser Reservoir was the most heavily fished body of water in the state in 1991, which was attributable to a booming kokanee salmon population that resulted in a record 141,000 fish harvested in 1991. Since 1999 total angler pressure in the reservoir system has declined 31.5%, with Canyon Ferry pressure declining 30.5% and Holter declining 46% between 1999 and 2007. Angler use in Hauser declined through the early 2000s; however pressure there has increased 2.5% from 1999 to 2007.

Walleye have become a significant component of the Canyon Ferry fishery after this developing population expanded to reach fishable numbers in 1998. Prior to 1996, no walleye were observed in the standard roving creel census and reports of walleye caught by anglers were uncommon. Currently walleye serve as one of the most sought after species in the reservoir, with nearly 50% of summer anglers targeting exclusively walleye in 2007.

Angling pressure on Hauser Reservoir has varied considerably and has been closely linked to the abundance of kokanee salmon. Angler use trends decreased in response to the collapse of the kokanee fishery in the late 1990s. All efforts to revive the Hauser kokanee fishery following record high water flows in 1997 have failed. Currently, Hauser contains record high abundance of walleye due mostly to flushing of juvenile walleye from Canyon Ferry Reservoir upstream.

Holter Reservoir traditionally provided one of the most diverse and productive multi-species fisheries in the state. Historically, Holter provided good to excellent fishing for rainbow trout, kokanee salmon, walleye, and yellow perch simultaneously. Like in Hauser, flushing of walleye from Canyon Ferry Dam has heavily influenced the Holter fishery. Yellow perch harvest and abundance has fallen sharply since development of the Canyon Ferry walleye fishery in the late 1990s. Walleye abundance is at or near record high levels, with small fish dominating angler catch and population surveys. Modifications to the Holter rainbow trout stocking scheme has maintained a quality trout fishery. High angler catch rates for large rainbows are common, especially in the spring.

The presence of walleye at the head of the most heavily fished reservoir complex in Montana creates a challenge in maintaining these historically popular fishery resources. Walleye have tremendous reproductive potential in Canyon Ferry, in contrast to Hauser and Holter reservoirs, and will thrive there as long as there is an adequate forage fish supply. To sustain a multi-species fishery composed of trout, perch, walleye, native species, and other forage species will require active management of walleye to reduce predation on yellow perch, rainbow trout, and kokanee salmon. Failure to adequately manage walleye numbers will result in diminished perch and trout fisheries, which would be inconsistent with the six goals developed by the Citizen Workgroup. As documented in other western reservoir systems, poor walleye management may ultimately result in populations of stunted walleye as the prey base is depleted.

Missouri River (Toston Dam to Canyon Ferry Reservoir) Management Goals

The goal for managing the Missouri River between Toston Dam and Canyon Ferry Reservoir is to provide naturally reproducing brown and rainbow trout populations for recreational fishing opportunities in the Missouri River and associated tributaries and to provide important spawning and rearing conditions for the Missouri River/Canyon Ferry system. Management goals and strategies include:

- Rely on rainbow trout to provide both a resident fishery throughout the year and a migratory fishery linked to Canyon Ferry that enters the river during the fall and spring.

- Rely on brown trout to provide a resident fishery throughout the year and a migratory population of large fish that enter the river during the fall.

- Monitor and manage the northern pike population in the river and reservoir to minimize impacts to the existing trout and forage species. Expansion of a predator such as northern pike could have negative effects to the existing fish community in the Missouri River.

- Manage the walleye population to minimize impacts on existing trout and forage species and provide a low-level sport fishery.

Canyon Ferry Reservoir Management Goals

Walleye abundance in Canyon Ferry Reservoir has remained relatively steady over the past ten years. Following rapid population expansion in the late 1990s, walleye numbers peaked at 10.4 per net in 1998 and have since fluctuated between 2.0 to 7.4 per net. The current walleye population is composed of a large number of smaller-sized fish. Yellow perch abundance has increased slightly in recent years, following record low abundance in 2004 and 2005. Declines in perch abundance are largely attributable to increased predation by walleye. Canyon Ferry continues to maintain a quality rainbow trout fishery following changes to stocking strategies to reduce predation by walleye on rainbow trout plants.

Management of walleye in Canyon Ferry Reservoir in the previous ten years focused on high levels of angler harvest to manage walleye population growth to maintain a multi-species fishery. Although management alternatives for walleye in this new plan provide some strategies to improve size structure of the Canyon Ferry walleye population, active walleye management through high bag limits is still necessary to maintain the multi-species fishery by maintaining walleye population levels appropriate for available forage.

The primary goal for managing the Canyon Ferry-Missouri River fishery is to maintain a cost-effective multi-species fishery that maintains high levels of angler use during both the open water and ice fishing seasons. Management of the multi-species fishery will attempt to maintain desirable sport species (rainbow trout, walleye, yellow perch, brown trout, and burbot) as well as maintain populations of non-game species (e.g., suckers, dace, sculpins). To achieve this goal for the system, management strategies must be developed to enhance reproduction and survival of all potential species that will be influenced by predation. Management goals and strategies include:

- Continue to recognize the importance of yellow perch and apply management strategies to improve the current population to enhance the sport fishery and identify importance as a forage species. Yellow perch are the preferred prey of walleye and provide a significant component to the winter ice fishery. In order to preserve spawning sized perch, continuing conservative harvest regulations already in effect is recommended.

- Rely on hatchery rainbow trout to continue providing angling opportunity at approximately the current level of angler catch. Changes to the numbers and size of rainbows stocked in response to walleye population growth have so far maintained the quality of the rainbow fishery.

- Rely on walleye to maintain a self-sustaining sport fishery to enhance the summer fishery and provide an additional component to the winter fishery. Active walleye management will be necessary to maintain population levels consistent with availability of forage. Strategies for maintaining walleye abundance at levels appropriate for available forage are based on population “triggers” to adjust management actions as walleye populations fluctuate.

- Increase the number of brown trout residing in the reservoir as an additional component to the sport fishery. Maintain restrictive regulations in the reservoir as well as the Missouri River from Toston to Canyon Ferry.

- Rely on burbot (ling) to compliment the winter sport fishery by maintaining the current level of burbot in the reservoir. Burbot is the most popular native sport fish in Canyon Ferry Reservoir. Little is known about the population dynamics and limiting factors that regulate the burbot population.

- Manage and enhance the forage base to support a productive multi-species fishery that includes walleye, trout, and yellow perch. Continue yellow perch habitat enhancement project (i.e., Christmas tree structures) and identify other potential habitat enhancement projects for existing forage species. Introduction of new forage species is not proposed in this Management Plan.

- Monitor and manage the northern pike population in the river and reservoir, and evaluate impacts to other species. An already limited forage base in Canyon Ferry may be unable to support a voracious predator such as northern pike. The Plan proposes strategies to suppress additional population expansion.

- Manage fishing contests at Canyon Ferry Reservoir to balance general angling public concerns with competitive tournaments on a species-specific basis, and ensure that tournaments are consistent with species management objectives. Regulation of fishing tournaments on Canyon Ferry will reflect management strategies for individual fish species. Authorize up to three walleye tournaments in a calendar year but no more than one tournament per month to provide a balance with existing users of the lake that are not interested in competitive fishing events and who would be impacted by tournament activities. Applications for fishing tournaments will be accepted per FWP policy and considered on a first come, first served basis until all available slots are filled.

- Prevent introduction of new fish species into the upper Missouri River reservoir system by continued prohibition of the use of live fish as bait. An inadvertent introduction could significantly impact the existing fish communities in Canyon Ferry Reservoir as well as upstream and downstream waters.

- Prevent new diseases and exotic aquatic plant and wildlife species from entering the Canyon Ferry/Missouri River system and limit the expansion of current disease agents.

- Work with FWP's Wildlife Bureau and other government agencies to determine the impacts of pelicans and cormorants to Canyon Ferry fish populations. Consider bird population management measures only if impacts to sport fish populations are documented and deemed significant.

Hauser Reservoir Management Goals

The goal for managing the Hauser Reservoir fishery is to provide a cost-effective, balanced multi-species fishery with the opportunity to catch rainbow trout, walleye and yellow perch with kokanee, brown trout, and other species occasionally contributing to the sport fishery. Until factors limiting fisheries production in Hauser Reservoir are addressed, the fishery will not reach it's full potential. Management goals and strategies include:

- Rely primarily on stocked rainbow trout to provide the principal fishery and provide most fishing opportunity. Continue current stocking regime and adjust as angler use and population abundance change.

- Recognize kokanee salmon as a limited supplemental species to rainbow trout with poor opportunity as a viable sport species in Hauser Reservoir. Current kokanee abundance is too low to set or maintain a realistic management goal.

- Rely on walleye to provide a balanced, cost-effective fishing opportunity in Hauser. Utilize angler harvest as a tool to counteract the effects of walleye flushing from Canyon Ferry Dam. Rely on population "triggers" to adjust walleye management strategies as needed.

- Rely on brown trout to provide a limited trophy-fishing experience that is reliant entirely on natural reproduction.

- Rely on yellow perch to provide a self-sustaining fishery that is based entirely on natural reproduction. Maintain conservative angler harvest limits on yellow perch.

- Rely on burbot to provide a low-level, self-sustaining fishery that is supported entirely by wild reproduction.

- Continue work with the Bureau of Reclamation to improve seasonal water quality of water running into Hauser Reservoir from Canyon Ferry Dam.

- Evaluate annual and seasonal flushing rates of fish out of Hauser Reservoir. Determine feasibility of screening Hauser dam to reduce flushing losses.

- Determine walleye flushing rates from Canyon Ferry and evaluate measures to reduce or eliminate walleye flushing from Canyon Ferry Dam. Increased walleye densities in Hauser affect the balance of the multi-species fishery with increased predation on trout and perch.

- Enhance wild fish spawning opportunities in Hauser Reservoir and in tributary streams to Hauser Reservoir.

- Continue to monitor Hauser Reservoir and associated tributaries for whirling disease. Prevent introduction of exotic plant and wildlife species from entering the reservoir system.

- Manage fishing derbies/tournaments on Hauser Reservoir to minimize conflict with the general angling public and to ensure consistency with fishery management goals and objectives. Authorize up to three tournaments per year.

Missouri River - Hauser Tailwater (Hauser Dam to Holter Reservoir) Management Goals

The management goal for the Missouri River below Hauser Dam is to provide a multi-species fishery focused on wild rainbow trout and brown trout, with walleye and kokanee providing a low-level component to the fishery. Management of this water is greatly affected by the management direction of Canyon Ferry, Hauser, and Holter reservoirs. Management goals and strategies include:

- Rely on rainbow trout (particularly wild rainbow trout) to provide a cost-effective, sustainable fishery. Encourage the development of wild rainbow trout spawning and recruitment from the Hauser tailrace and Beaver Creek.

- Rely on brown trout to provide a self-sustaining trophy component to the Hauser tailwater fishery. Maintain the catch and release fishing regulation that was implemented in 1992 for this reach of the Missouri River and Holter Reservoir.

- Rely on remaining kokanee salmon flushed from Hauser Reservoir and any natural reproduction and supplemental stocking that may occur in Holter Reservoir to contribute in a limited way to the multi-species fishery.

- Rely on walleye flushed from Hauser Reservoir, resident walleye, and migratory adults from Holter to contribute to a multi-species fishery. Adjust walleye bag limits to maintain consistency with walleye management strategies in the reservoirs. Determine walleye flushing rates from Canyon Ferry Reservoir and downstream survival of flushed walleye if research funds become available.

- Enhance wild fish spawning opportunities in Holter Reservoir tributary streams.

- Monitor the Missouri River and principal tributaries for whirling disease. Prevent introduction of exotic plant and wildlife species from entering the reservoir system.

Holter Reservoir Management Goals

The management goal for Holter Reservoir is to provide a cost-effective, balanced multi-species fishery with the opportunity to catch rainbow trout, walleye, yellow perch and kokanee salmon. Management goals and strategies include:

- Rely on rainbow trout to provide one of the principal sportfish species in Holter Reservoir with continued emphasis on maximizing the contribution of wild to stocked rainbow trout in the fish community. To minimize flushing losses, stocking of fish will occur after high water.

- Rely on kokanee salmon flushed from Hauser Reservoir, stocking of surplus hatchery fish, and any natural reproduction that may occur in Holter Reservoir to provide limited kokanee harvest. Recognize kokanee as a supplemental fish to the sport fishery in Holter Lake.

- Rely on walleye to provide a cost-effective fishery that allows a moderate level of harvest while providing the opportunity to catch a trophy fish. This fishery will be reliant entirely on wild reproduction or flushing from upstream dams for recruitment. Adjust harvest regulations to maintain walleye densities appropriate for forage abundance. Determine walleye flushing rates and survival from Canyon Ferry Reservoir and impacts on Holter Reservoir.

- Rely on yellow perch to provide a cost-effective, self-sustaining fishery that is maintained entirely by wild reproduction. Preserve conservative perch limits on Holter Reservoir to prevent over harvest and provide forage for walleye.

- Rely on burbot to provide a self-sustaining fishery that is supported entirely by wild reproduction. Increase data collection efforts to learn more about the Holter burbot population.

- Determine annual and seasonal flushing rates of fish out of Holter Reservoir and the feasibility of screening Holter Dam to reduce flushing losses if funds become available.

- Enhance wild fish spawning opportunities in Holter Reservoir tributary streams. Identify and complete enhancement projects that will benefit spawning and recruitment of wild fish in Holter Reservoir.

- Monitor Holter Reservoir and principal tributaries for whirling disease. Prevent new diseases and exotic plant and wildlife species from entering Holter Reservoir and limit the expansion of current disease agents.

- Manage derbies/tournaments for consistency with fisheries management goals and objectives for Holter Reservoir and to minimize conflicts with the general angling public. Authorize up to two tournaments per year.

Plan Implementation and Public Involvement

This plan will be used to direct fisheries resource management activities for the next 10 years (2010-2019) on Canyon Ferry Reservoir, Hauser Reservoir, Holter Reservoir, and associated sections of the Missouri River. Fish population monitoring will be conducted annually to verify the effectiveness of management decisions. Data will be summarized and presented to interested citizens at annual public meetings (Table 3).

Table 3. Upper Missouri River Reservoir Management Plan Implementation Process

Schedule	
Action	**Dates**
Draft Management Plan Public Comment	September 16 through October 23, 2009
Final Management Plan (FWP Commission tentative and final approval)	Spring 2010
Adopt new fishing regulations	October 2010
Monitor Fisheries	On-going, annually
Prepare Annual Report	Fall, annually
Public Meetings	Late winter or early spring, annually
Review/Revise Management Plan	As needed
Propose Changes to Fishing Regulations	Regulation review cycle, or as needed

Section 1
Management Plan Area

The Upper Missouri River Reservoir Management Plan area is comprised of a portion of the Missouri River from Toston Dam, approximately 18 miles south of Townsend, to Holter Dam, approximately 30 miles north of Helena (Figure 1). Three reservoirs are included in the management area: Canyon Ferry, Hauser, and Holter. Two river sections are included in the area: from Toston to Canyon Ferry Reservoir and the Hauser Tailrace from Hauser Dam downstream 4.6 miles to Holter Reservoir. A variety of important fish species are present within the management area. Rainbow trout, kokanee salmon, yellow perch, brown trout, burbot (ling), and walleye are among the species of greatest interest to the public. Canyon Ferry Reservoir is the first major storage impoundment on the Missouri River. Hauser and Holter reservoirs lie about 3 and 30 miles downstream from Canyon Ferry, respectively. Downstream movement of hatchery rainbow trout from Canyon Ferry to Hauser and Holter reservoirs has been documented during periods of high surface water releases (Skaar and Humphrey 1996) and flushing of walleye out of Canyon Ferry has heavily influenced species composition in the downstream reservoirs.

Combined, the upper Missouri River reservoir system accounted for 7.7% of the fishing pressure in Montana in 2007. Fishing pressure on these reservoirs is high relative to other bodies of water in Montana. These reservoirs traditionally are in the top 5 most heavily fished waters in Montana with Canyon Ferry averaging 92,527 angler days (1989-2007), Hauser averaging 58,487 angler days (1989-2007) and Holter averaging 60,657 angler days (1989-2007). This level of pressure equates to an average 15.4 angler days per acre on Hauser, 12.6 days per acre on Holter, and 2.6 angler days per acre on Canyon Ferry. In 2007, Canyon Ferry was the third most heavily fished water in the state, and was the number one flatwater fishery in Montana (Figure 2). Hauser Reservoir was the most heavily fished body of water in the state in 1991 (Figure 2). This was attributable to a booming kokanee salmon population that resulted in a record 141,000 kokanee harvested in 1991. Since 1999 total angler pressure in the reservoir system has declined 31.5%, with Canyon Ferry pressure declining 30.5% and Holter declining 46% between 1999 and 2007 (Figure 2). Angler use in Hauser declined through the early 2000s, however pressure has increased 2.5% from 1999 to 2007 (Figure 2). Statewide angling pressure has also declined over that time, decreasing 25.4% from 1999 to 2007.

Canyon Ferry Reservoir and Missouri River (Toston Dam to Canyon Ferry Reservoir)

The Toston Dam to Canyon Ferry Reservoir reach of the Missouri River has been managed for wild trout since 1973, although hatchery stocking of Canyon Ferry Reservoir has resulted in significant seasonal movement of hatchery fish into this reach of the Missouri River. The sport fishery is primarily comprised of brown trout and rainbow trout. Although this reach of river is located downstream from Toston Dam, it does not have characteristics of tailwater fisheries similar to reaches of the Missouri River below Canyon Ferry, Hauser and Holter dams because the low head structure (26 feet) does not disrupt natural temperature extremes. Toston Dam is located 23 miles above Canyon Ferry Reservoir and is a barrier to upstream migrating fish. The 23-mile reach of the river upstream of Canyon Ferry Reservoir represents a transition area of the upper Missouri where cold-water species of fish and invertebrates thrive during average precipitation years or cool/wet years. During dry/warmer summers, this reach of the Missouri River becomes unsuitable for cold-water species of fish and invertebrates. Since the Canyon

Ferry/Missouri River fishery is linked by seasonal migrations, the reservoir and the river must be managed as a system.

Canyon Ferry Dam and Reservoir is operated by the BOR for power production, flood control, irrigation, recreation, and as a municipal water source. Canyon Ferry has been in full operation for the past 54 years. At full pool, Canyon Ferry has a surface area of 35,200 acres and a volume of nearly 2 million acre-feet. It is about 25 miles long and 1 to 4.5 miles wide. Canyon Ferry is a moderately deep reservoir, with an average depth of 58 feet and maximum depth near the dam of 160 feet (Table 4). The upper, southern half of the reservoir is characterized by low relief, relatively shallow depth (less than 50 feet), and gently sloping shorelines. It is frequently subject to strong winds, especially during the spring months. The lower, northern half is more protected and is characterized by cliffs and steeply sloping, rocky shorelines, particularly on the western shore. Depths tend to increase rapidly to greater than 60 feet a short distance from the shoreline. Submerged or emergent aquatic vegetation is almost totally absent in the reservoir (McMahon 1992).

The shoreline length of Canyon Ferry at full pool is 76 miles. The shoreline development factor, an index of the irregularity of the shore, is 2.9 (Rada 1974), reflecting a relatively uniform shoreline (1.0 is a circle) punctuated by a number of small coves and bays located near the mouths of tributary streams. Land immediately surrounding the reservoir is principally owned by the BOR with some private land. BOR manages recreational areas, including campgrounds, boat ramps, and day-use areas around the reservoir. Major tributaries to the reservoir include Duck Creek, Confederate Gulch, Hellgate Creek, Avalanche Creek, Magpie Creek, and Beaver Creek (Figure 3).

Reservoir Operation

Rapid filling of the reservoir begins in early May with peak storage occurring in late June to early July, followed by a steady decrease (about 2 feet per month) during the summer period of high irrigation use (July-September). Decreases in reservoir volume continue throughout the fall and winter in preparation for storage of spring run-off. The retention time of water in the reservoir averages 135 days, but ranges from 50-200 days depending on reservoir elevation and inflow-outflow regimes (Horn and Boehmke 1998). The storage ratio (reservoir water volume divided by average annual water release) averages 0.53. The annual water level fluctuation (drawdown) averages about 12 feet (McMahon 1992).

Canyon Ferry Reservoir is typically drawn down to its minimum level in March, and then is refilled during the March to June period. A reservoir operations steering committee comprised of Fish, Wildlife & Parks (FWP), PPL Montana, Bureau of Reclamation (BOR), irrigators and sportsmen have formulated operational guidelines for Canyon Ferry Reservoir to balance recreational values and minimize impacts to fish and wildlife. This committee meets annually to review operational guidelines.

Discharge from Canyon Ferry Dam occurs at various outlets: the radial gates near the top of the spillway (30 feet deep); power penstocks (94 feet); irrigation outlet (110 feet); and the river outlet (147 feet). The power penstocks are usually the main release point, except in spring and summer when additional releases are made from the spillway, irrigation, and river outlets (Rada 1974). Releases from the radial gates typically occur during June and July following peak river run-off. Radial gate spills occur in roughly two out of every three years, with an average duration of 30-45 days (McMahon 1992). Canyon Ferry has a generating capacity of 50-megawatts.

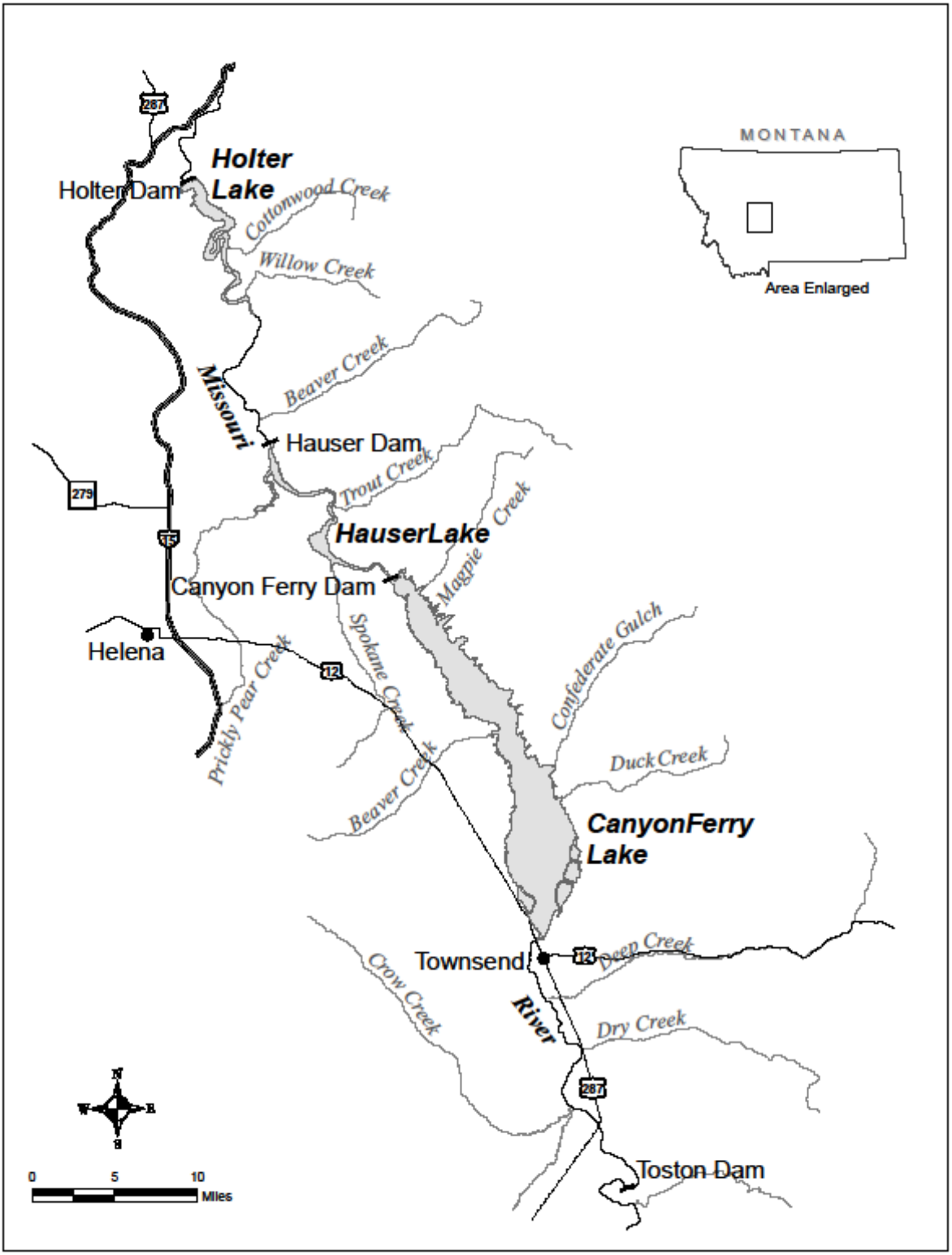
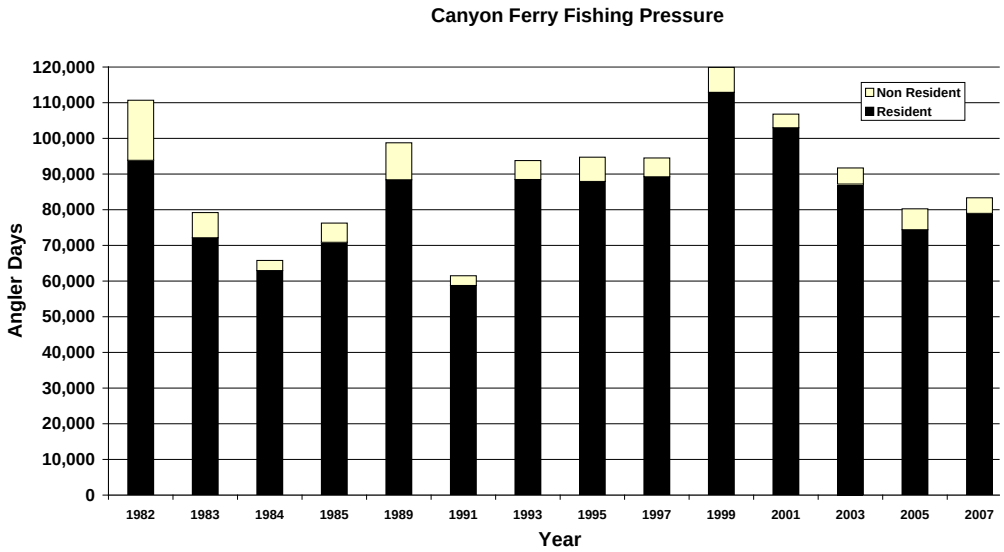
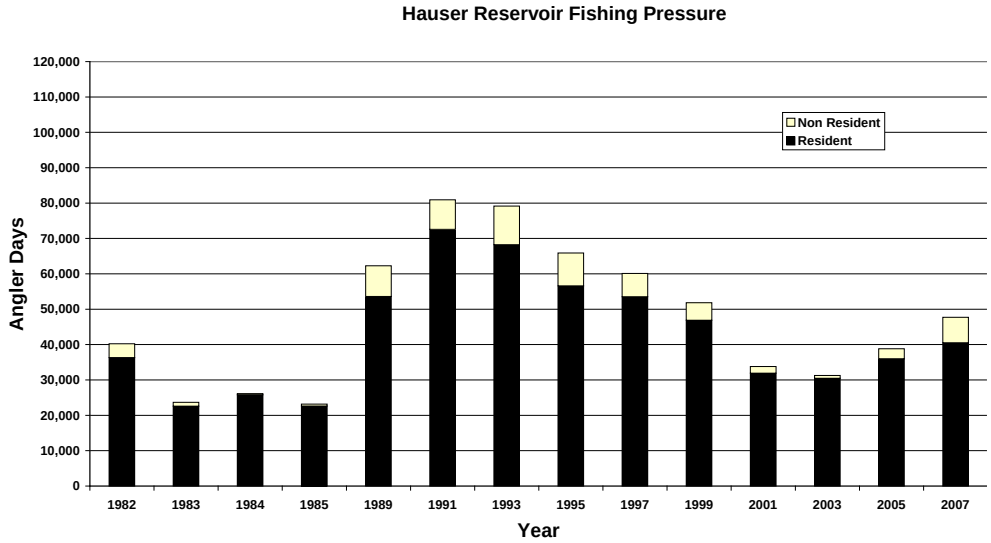


Figure 1. Upper Missouri River Reservoir Management Area.





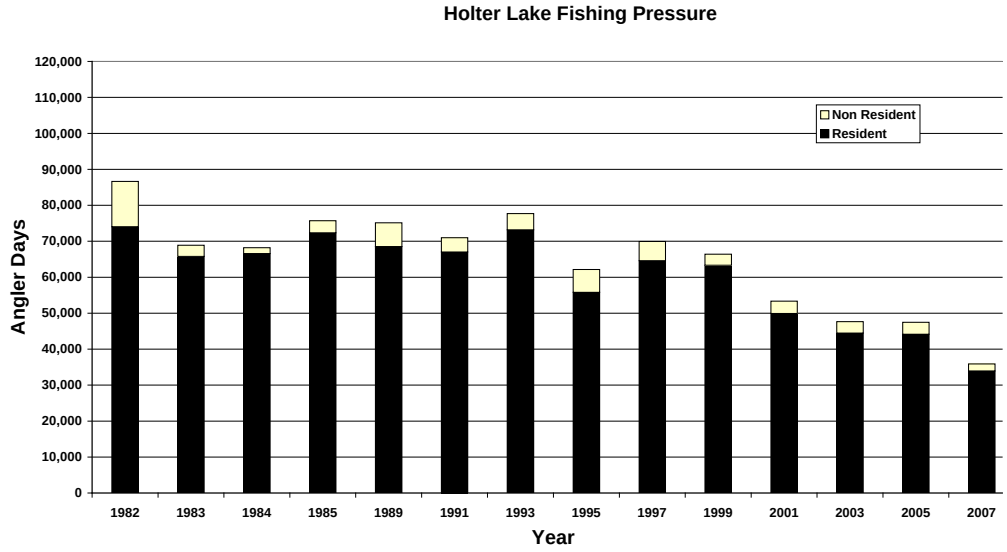


Figure 2. Resident and Non-Resident Angler Days on Canyon Ferry, Hauser, and Holter Reservoirs, 1982-2007.

Fisheries and Water Quality

Canyon Ferry Reservoir

The sport fishery of the Canyon Ferry Reservoir/Missouri River system is primarily comprised of rainbow trout, brown trout, yellow perch, burbot (ling), and walleye. Other game fish species in the system are not abundant enough to provide significant sport fishing opportunities, including smallmouth bass, largemouth bass, bluegill, and northern pike. Non-game species in this system are abundant, but not particularly diverse. The three primary nongame species include common carp, longnose sucker, and white sucker. Anglers at Canyon Ferry Reservoir have historically sought rainbow trout and yellow perch during ice free months of the year, and the development of a walleye population in the late-1990s has become a significant component of the summer fishery. Yellow perch were particularly popular during the winter ice-fishing season, however recent declines in perch abundance have been detrimental to the sport fishery. Burbot (ling) are also a popular sport fish during the winter and early spring season and remain an important component of the winter fishery. Walleye, yellow perch, and burbot sustain populations entirely through natural reproduction. Rainbow trout in Canyon Ferry Reservoir are primarily sustained through hatchery plants. Natural reproduction accounts for less than 10% of the total population of rainbow trout.

Brown trout populations are typically sustained by natural reproduction, and supplemental imprint stocking of brown trout that occurred in the Missouri River in the mid-1990s proved unsuccessful at increasing brown trout numbers in the river or the reservoir. Brown trout have provided an important trophy component to the fishery in the past, but low numbers of brown trout have resulted in low catch rates in Canyon Ferry Reservoir and the Missouri River upstream to Toston Dam since the mid-1990s.

Walleye have become a significant component of the Canyon Ferry fishery, especially during the summer fishing season. This population has expanded rapidly since the late 1990s and is now one of the most sought after species in the reservoir. Prior to 1996, no walleye were observed in the standard roving creel census and reports of walleye caught by anglers were uncommon. In summer 2008, 28.4% of anglers were fishing for walleye exclusively and 43.6% were targeting walleye in combination with some other species, such as trout.

Angling pressure at Canyon Ferry typically ranks near the top of the statewide angling pressure survey, averaging about 92,527 angler days from 1989-2007 (Figure 2). Angling pressure peaked at 119,886 angler days in 1999 and has averaged 96,083 angler days from 1997-2007. Approximately one third of the angling pressure at Canyon Ferry (35, 000 angler days) occurs during the relatively short ice-fishing season of January, February, and early March. Overall angler pressure on Canyon Ferry has decreased 30.5% from 1999 to 2007 (Figure 2).

Results from an angler satisfaction survey completed during the 2007 license year indicate a general lack of satisfaction with the current fishery in Canyon Ferry reservoir (FWP 2008). On a scale of 1 to 5 where 1 = poor and 5 = excellent, 33.2% rated 1 (poor), 26.7% rated 2, 27% rated 3, 8.2% rated 4, and 4.7% rated 5 (excellent).

Water transparency (Secchi disc depth) averages about 10 feet. Transparency varies by a factor of two to three from the upper to the lower reservoir, averaging 6, 10, and 15 feet in the upper (Silos), mid (White Earth), and lower (Cemetery) sections during the summer. A detailed limnological analysis of the reservoir in the early 1970s classified Canyon Ferry as mesotrophic or of intermediate fertility on the scale between shallow, nutrient-rich, often turbid eutrophic waters and clear, deep, nutrient-poor

oligotrophic waters (Rada 1974). More recent studies have found little change in nutrient levels and trophic status of the reservoir (Horn and Boehmke 1998). Dissolved oxygen (DO) levels recorded for Canyon Ferry surface waters are excellent, with minimum values typically exceeding 7 mg/l (Priscu 1986, Thomas 1992). However, Rada (1974) reported that DO levels fell below 5 mg/l during summer at depths below the thermocline (60 feet) near the dam. Low DO levels may affect some cold water fish species and can create a low DO plume in Hauser Reservoir. The pH levels in Canyon Ferry vary between 7 and 8.5 (Rada 1974).

Surface temperatures typically warm to 55°F by late May, peak near 70°F in early August, and cool to below 50°F by late October. The combination of wind action and a deep reservoir outlet (94 feet at power penstock) results in a deep, weakly developed thermocline in Canyon Ferry. Water in the upper reservoir tends to remain mixed throughout the ice-free season (April-December) because of shallow depths and frequent winds. In the middle and lower reservoir, a weak thermocline is present from June through August at a depth near 60 feet (McMahon 1992).

Missouri River (Toston Dam to Canyon Ferry Reservoir)

Drought conditions in the early 2000s have had detrimental effects to the Missouri River fishery between Toston Dam and Canyon Ferry. Catch per unit effort (CPUE) electrofishing surveys conducted annually in the fall indicate that mountain whitefish and rainbow trout abundance has declined drastically, while brown trout abundance remains at low levels. The rainbow fishery in this section is highly dependent upon stocking in Canyon Ferry, and rainbow CPUE in the river has increased slightly in recent years. This is likely due to improved water flows and modifications to the stocking regime in the reservoir.

Abundance of brown trout in the river has changed little over the past ten years. Brown trout have always comprised a small component of the Canyon Ferry fishery, and have been historically present in low to moderate numbers in the river. Spawning habitat and dewatering of spawning tributaries—factors that have been further enhanced due to the recent drought—have typically limited brown trout abundance in the river. It appears that two distinct populations have developed in this portion of the Missouri River/Canyon Ferry system. One population completes their entire life cycle within the Missouri River and its tributaries, while the other population depends on the Missouri River and its tributaries for reproduction, spending the remainder of their life cycle in Canyon Ferry Reservoir. Brown trout rearing in the reservoir become larger than those that reside in the Missouri River. Both populations appear to be limited by their ability to recruit and are declining.

CPUE electrofishing surveys in this reach of the Missouri River during 2008 indicate that mountain whitefish are the most abundant fish species in the river, followed by suckers, rainbow trout, carp, and brown trout. Use of the river by walleyes appears limited, as most walleye captured during electrofishing surveys are captured in the first two miles upstream of the reservoir. Recent increase in abundance of northern pike in the Toston Dam area are cause for concern in regards to fish management in the system, as northern pike would be an additional predator in an already prey-depleted system.

Table 4. Physical Characteristics of Canyon Ferry, Hauser, and Holter Reservoirs.

Characteristic	Reservoir		
	Canyon Ferry	**Hauser**	**Holter**
Impounded River	Missouri River	Missouri River	Missouri River
Surface Area (acres)	35,200	3,800	4,800
Mean Depth (feet)	58	26	50
Maximum Depth (feet)	164	70	121
Shoreline Length (miles)	76 miles	31 miles	50 miles
Age (years)	54 years	98	105
Drainage Area (square miles)	15,904	16,876	17,149
Avg. water retention time (days)	135	8	21
Discharge Type Spill gates a) Bottom b) Mid-depth c) Surface Turbines d) Bottom e) Mid-depth f) Surface	River Outlet Gates: 138 feet Surface to 31 feet Turbine outlet 91 feet	Spill gates – surface (0-14 feet) Turbines – 16-32 feet	Spill cap (0-6 feet) Spill gates (6-16 feet) “Exciter Unit” – 25-29 feet Turbines – 24-32feet
Surface elevation at full pool (feet above sea level)	3797 feet	3650 feet	3578 feet
Average annual pool height fluctuation (avg pool ht – avg drawdown height) (feet)	12 feet	2 feet	2 feet

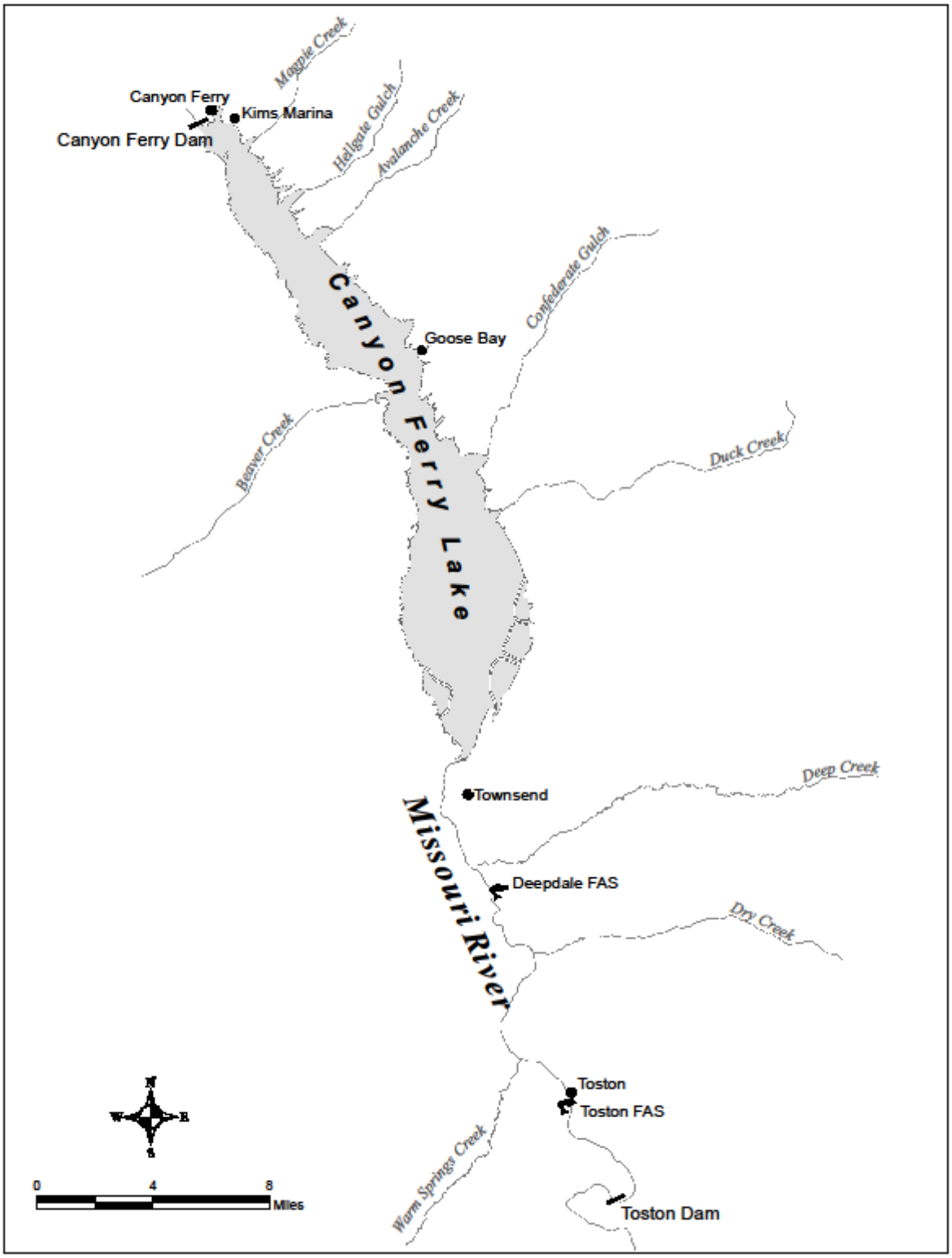


Figure 3. Canyon Ferry Reservoir and the Missouri River from Toston Dam to Canyon Ferry.

Hauser Reservoir, Holter Reservoir, and Missouri River (Hauser Tailwater)

Hauser and Holter are the second and third reservoirs below Canyon Ferry (Figure 4). These two upper Missouri River reservoirs differ significantly from Canyon Ferry Reservoir in that they are "run-of-the-river" facilities. This means that approximately the same volume of water flowing into the reservoirs is released. Hauser and Holter dams were constructed in 1911 and 1904 for the purpose of generating electric power and both reservoirs have limited storage capacity. The dams were historically owned and operated by the Montana Power Company; however the dams were purchased by Pennsylvania Power and Light Montana, now known as PPL Montana, in 1999. A 4.6-mile reach of the Missouri River is located between Hauser Dam and Holter Reservoir. This unique segment of river flows through a narrow, high-walled gorge for most of its length prior to entering upper Holter Reservoir.

Hauser Reservoir has a surface area of about 3,800 acres and stores approximately 98,000 acre-feet of water at full pool (Table 4). The Reservoir is about 15.5 miles in length and is relatively narrow, ranging from about 0.1 to 1.1 miles in width. The average depth of the reservoir is 26 feet, with a maximum depth of 70 feet. Important tributaries to Hauser Reservoir include Prickly Pear, Silver, Trout, Spokane and McGuire creeks (Figure 4).

A biologically important feature of Hauser is Lake Helena, which is a large, shallow water body connected to the Causeway Arm by a narrow channel. This impoundment was created when Hauser Dam inundated the lower reach of Prickly Pear Creek. Lake Helena connects to Hauser Reservoir through the Causeway Arm, which enters the reservoir about 1.5 miles upstream from Hauser Dam. The Causeway Arm is 3.9 miles in length from its Hauser Reservoir outlet to the Lake Helena Causeway bridge. The outlet works of the Lake Helena Causeway consist of a narrow rectangular concrete bridge through which water flows from Lake Helena into the Causeway Arm of Hauser Reservoir. Lake Helena has a surface area of 2,100 acres, average depth of five feet, and a maximum depth of 10 feet. Because of the shallow average depth, Lake Helena develops dense mats of aquatic vegetation and is an important waterfowl production area. FWP has a Wildlife Management Area (WMA) on the north shore. Most fish species probably move in from Hauser Reservoir seasonally, especially to take advantage of the early spring water temperatures and productivity.

The free flowing segment of the Missouri River, located between Hauser Dam and Holter Reservoir, is about 4.6 miles in length. This segment of river flows through a narrow, high-walled gorge for most of its length prior to entering into upper Holter Lake. Impounded water from Holter Dam greatly influences the lower 1.5 miles of river. Productivity in this river segment is affected by the two upstream reservoirs (Canyon Ferry and Hauser). Deep-water releases from Canyon Ferry Dam and associated releases from Hauser Dam create tailrace conditions where water temperatures are moderated and the water is enriched with nutrients.

Holter Reservoir has a surface area of about 4,800 acres, stores 243,000 acre-feet of water at full pool and is 25 miles long with widths ranging from 0.1 to 1.1 miles (Table 4). The average depth of the reservoir is 50 feet, with a maximum depth of approximately 121 feet. The 4.6 mile segment of free flowing river located upstream of Holter Reservoir provides very important spawning habitat to migrant salmonids. Beaver Creek, a tributary to this river segment, is the principal spawning stream for reservoir fish, especially in the spring. Cottonwood and Willow creeks are also important tributaries that empty directly into Holter Reservoir (Figure 4).

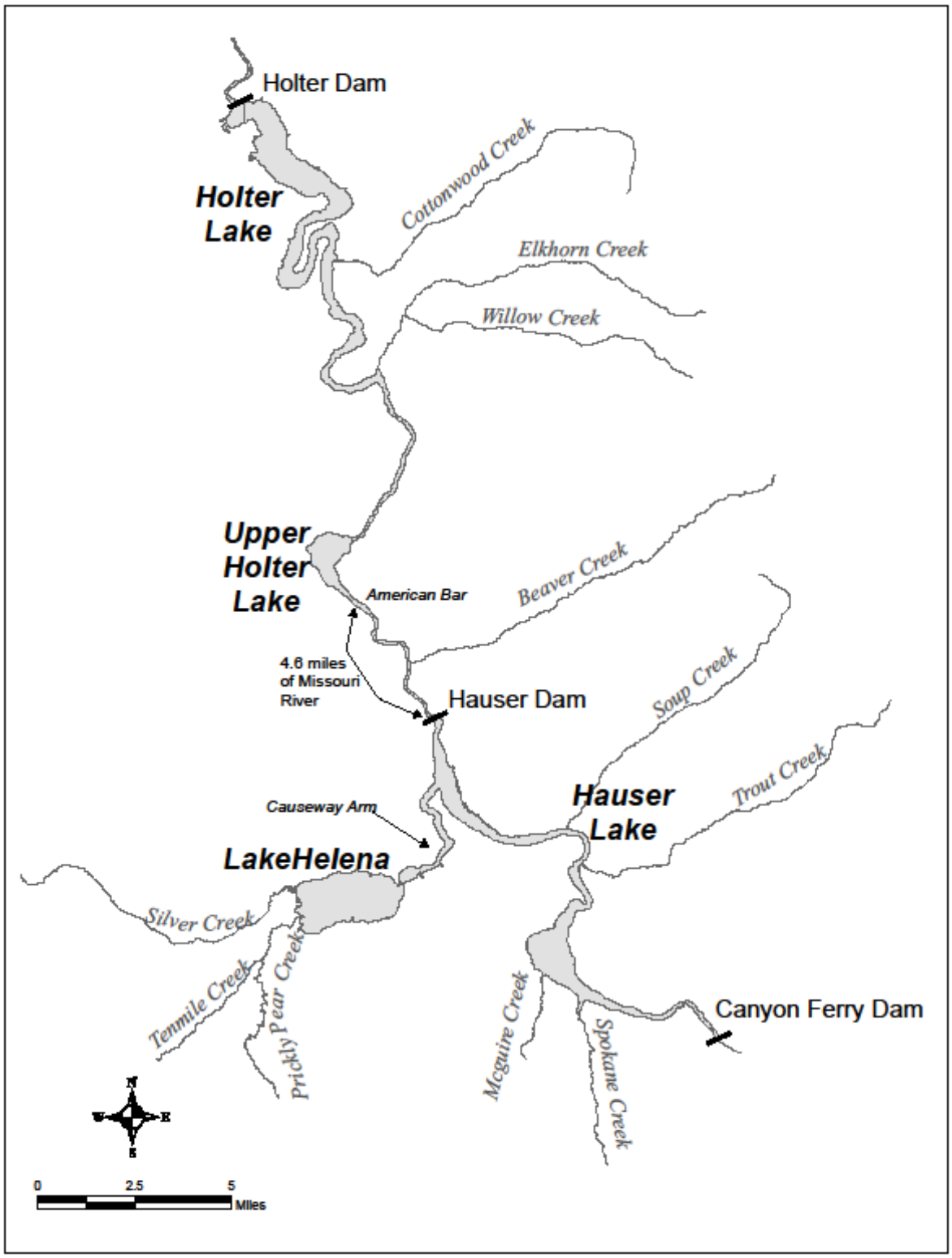


Figure 4. Hauser and Holter Reservoirs.

Reservoir Operation

Hauser Dam is a straight concrete gravity structure that is 700 feet long and 80 feet above the riverbed. The structure consists of an overflow spillway, a non-overflow section, a forebay intake section and two abutment sections. The spillway is 493 feet long with slide gates and removable flashboards for flow control. Hauser Dam has the lowest powerhouse capacity of the three dams (19-megawatts) and therefore spills the most water. Turbine water enters a 32-foot deep intake channel on the east side of the dam. The six-penstock intakes draw from this channel with the openings from 16 to 30 feet below full pool. Water is spilled from five hydraulic gates and 17 manually operated gates. Water that is spilled is drawn from 0-14 feet below full pool. Even on a dry water year such as 1986, water was spilled through much of January, February, and March and again in May. In a wet water year such as 1997, water is spilled every day of the year.

Holter Dam is a straight concrete gravity structure that is 1,364 feet long and 124 feet above the riverbed. The top of the dam is at elevation 3,568 feet. The structure consists of an overflow spillway section, a powerhouse/intake section, a left non-overflow section and a right non-overflow section. Holter has a generating capacity of 50-megawatts. It has a usable storage of approximately 81,920-acre feet between elevations 3,543 and 3,564 feet. Penstocks are between 24-32 feet below full pool. In addition, an "exciter" unit is always operating which has penstock opening from 25-29 feet below full pool. Water is spilled from a depth of 6-16 feet. In very high water conditions a "cap" can be removed from the spill gates allowing the top six feet of water to be spilled. In a dry year (1992) water was spilled only one day. Wet water years result in spilling throughout most of the year.

Operation of Holter Dam has a significant impact on the fishery, wildlife and recreational resources of the reservoir and downstream (as experienced in 1986 when flows were shut down). As part of the re-licensing process, a draft Environmental Impact Statement (EIS) released in 1997 outlined proposed operational modifications for Holter Reservoir. These guidelines direct PPL Montana to operate Holter as a run-of-the-river project with pool elevations maintained within one foot between 3,543 and 3,564 feet msl (Federal Energy and Regulatory Commission (FERC), 1997). Previously, a steering committee comprised of FWP, Montana Power Company, BOR, U.S. Forest Service (FS), irrigators, and sportsmen formulated operational guidelines for Holter Dam to optimize recreational values and to minimize impacts to fish and wildlife (FWP 1985). Steering committee recommendations for the operation of Holter Dam included: 1) provide a stable reservoir level, 2) no large spills (10,000 cfs, total turbine and spill) in August or September; and 3) facility maintenance drawdowns should be accomplished in March or during September (after Labor Day) through October 15.

Fisheries and Water Quality

Hauser Reservoir

Angling pressure on Hauser Reservoir has varied considerably and has been closely linked to the abundance of kokanee. In 1991, Hauser Reservoir was the most heavily fished water body in the state at 80,938 angler days (Figure 2). Angler use has fluctuated in recent years, averaging 37,897 angler days from 2001-2007 (Figure 2). Angler demographics historically shifted in response to the status of the kokanee fishery. The percentage of anglers from Lewis and Clark County decreased to 32% during the kokanee boom years (1988 through 1993) while the proportion of nonresidents and Montana anglers traveling more than 150 miles increased. Nonresident angling pressure peaked in 1988 at 19%. In 2008, 77.1% of anglers were from Lewis & Clark County and only 2.7% were from out of state. An average fishing trip on Hauser Reservoir in 2008 was 2.3 hours for shore anglers and 4.1 hours for boat anglers.

Kokanee salmon and rainbow trout dominated the angler creel through the early 1990's surpassing the 1989-1994 management goal of a combined harvest of 80,000 fish (1989 through 1993). Following high runoff in 1993, kokanee harvest declined 58.5% from 89,269 (1993) to 37,064 (1994). Angler harvest of kokanee declined drastically following the high water year of 1997 and kokanee currently contribute little to the Hauser sport fishery. In 2007, only 94 kokanee were harvested from the reservoir. Rainbow trout are currently the most sought after species in the reservoir, with 67.5% summer anglers and 96.7% winter anglers targeting rainbows in 2008. The majority of the rainbow trout caught in the reservoir continue to be of hatchery origin (average less than 10% wild fish caught).

Hauser Reservoir historically supported a small population of walleye, with the first walleye stocked by FWP in Lake Helena in 1951 and additional supplemental stocking in the early 1990s. Presently walleye abundance is highly influenced by flushing of walleye from Canyon Ferry. Walleye densities have remained at record levels for the past three years (2006-2008). Angler catch rates were high in 2008 (0.25 fish per hour), however only 26.3% of the catch was harvested due to poor growth rates. Walleye remain a popular component of the summer fishery, with 32.4% of anglers targeting specifically walleye or a combination of walleye and another species (trout). In 2007, 4,558 walleye were harvested from Hauser.

Yellow perch abundance has remained at low levels over the past 10 years, hitting record lows in 2008. Declines in perch abundance are largely attributable to flushing large numbers of walleye into the reservoir from Canyon Ferry. Angler perch harvest has averaged 3,720 since 2000, compared to an average harvest of 33,114 annually from 1989-1999. Few anglers target perch specifically, with 0.1% and 2.3% anglers targeting only perch in the 2008 summer and winter creel.

Brown trout numbers have remained low with long-term gillnet catches averaging 0.4 and 0.2 fish per net in spring and fall sinking gillnets from 2000-2008. Numbers are so low that long-term population trend evaluation is difficult. However, trophy sized brown trout are occasionally taken in the reservoir, especially during the fall when spawners concentrate around the mouths of the tributaries and the Canyon Ferry tailrace area. Largemouth and smallmouth bass are not commonly caught in Hauser Reservoir, with most bass fishing generally confined to the Causeway Arm and Lake Helena.

Results from an angler satisfaction survey conducted during the 2007 license year indicate a general lack of satisfaction with the current fishery in Hauser Reservoir (FWP 2008). On a scale of 1 to 5 where 1 = poor and 5 = excellent, 25.5% rated 1 (poor), 22.8% rated 2, 22.8% rated 3, 15.4% rated 4, and 13.5% rated 5 (excellent).

Water quality in Hauser is heavily influenced by Canyon Ferry Dam, especially in areas upstream of Spokane Creek. Short water retention times can lead to riverine-like conditions throughout Hauser, which can limit in-reservoir productivity. Weak layers of thermal stratification occur late in the summer in the lower reservoir. Deep-water releases from Canyon Ferry Dam can form a low DO plume during late summer, which is below the state water quality standard of 6.5 mg/L in flowing water. When stratification breaks up in Canyon Ferry in the fall, Hauser DO increases to saturation. This low DO plume may be a limiting factor in fish movement and habitat use in Hauser (Horn 2004). The BOR has installed an air injection unit on one power turbine with positive results, however more work is necessary to increase the efficiency and reliability of the system.

Missouri River - Hauser Tailwater (Hauser Dam to Holter Reservoir)

Angler use is very high on this short segment of the Missouri River, averaging about 21,000 angler days per year (1991-2007). This is reflective of the fact that this is the closest river fishery to the greater

Helena area. Fishing pressure peaked at nearly 30,000 angler days in 2001 and was at a record low of 6,000 angler days in 2007. Low pressure in 2007 was largely due to forest fires in the area that limited downstream access. No recent creel survey information has been collected; however, creel surveys in 1983 revealed that a majority of anglers fishing the river were from Lewis and Clark County (79%), while about 9% of the anglers were from out of state. A majority of anglers interviewed on the river during 1983 were bait fishermen. Rainbow trout and mountain whitefish were the most readily caught species in 1983, comprising 63 and 18% of the catch, respectively. Rainbow trout averaged 13.2 inches in the creel. An estimated 6,000 rainbow trout and 15,000 mountain whitefish were harvested from the river segment in 1983.

Recent fall electrofishing population estimates found rainbow trout numbers comparable to fall estimates in the 1980s. In 2007, the average rainbow captured during fall estimates was 17.6-inches long, and 35% were hatchery fish that migrated upstream from Holter Reservoir. Brown trout abundance is currently lower than in the 1980s, averaging 130 brown trout per mile 2003-2007, verses 391 in the 1980s. Trophy brown trout are a significant component of this river section, which is reflected in electrofishing estimates. In 2007 the average size brown trout was 21.0-inches. Walleye also provide a seasonal element to the fishery, with trophy walleye often caught early in the spring and fall.

Migrant kokanee from Holter Reservoir historically contributed to the river fishery during the fall. This fishery has fluctuated through the years and has reached record lows with the collapse of the Hauser Reservoir kokanee fishery. The remaining game fish species, including largemouth bass, cutthroat trout and brook trout, are not commonly caught in the river.

Holter Reservoir

Holter Reservoir has historically been one of the most diverse and productive multi-species fisheries in the state. In some years, Holter provides good to excellent fishing for rainbow trout, kokanee salmon, walleye, and yellow perch simultaneously. Angling pressure on Holter Reservoir has averaged 60,657 angler days annually from 1989-2007, however angling pressure has declined in recent years, averaging 46,079 between 2001-2007 (Figure 2). Because of Holter's proximity to Great Falls, most anglers fishing on the reservoir are from Cascade County (61.9% from Cascade County in 2008) while 14.7% of the reservoir users were from Lewis and Clark County and only 1.6% traveled from out of state. Most anglers fishing Holter Reservoir target rainbow trout (74%) while anglers fishing for walleye specifically comprise 18.5% of the fishing pressure. Effort and harvest rates for kokanee are far below historic averages, with only 0.2% anglers targeting kokanee in 2008 and only 296 harvested in 2007.

Yellow perch harvest has declined drastically in recent years, averaging 39,940 perch harvested annually from 2001-2007, well below the long-term average of 151,479 perch (1989-2007). Perch declines are largely attributable to flushing loss and increased predation due to the larger numbers of walleyes in the system.

Rainbow trout are generally the most sought after species with an average harvest of 34,173 fish since 1989. Rainbow harvest has fluctuated in recent years as the rainbow stocking regime has been modified. Average harvest from 2000-2007 has been 25,810 rainbow per year. Average size of creeled rainbow trout has remained high with an average rainbow in 2008 measuring 17.6-inches. Historically, wild trout comprised a significant component of the rainbow fishery (between 20-66%), but in recent years wild fish make up a much smaller component of the fishery, ranging between 4.7-12% of the catch in fall floating gillnets from 2004-2008.

Like in Hauser, kokanee harvest has declined drastically since 1998. From 1986-1998, Holter kokanee harvest averaged 13,897 fish. From 1999-2007, annual harvest has averaged only 577 fish and only 296 kokanee were harvested in 2007. There is a remnant kokanee fishery in Holter that is sustained by stocking of surplus hatchery fish. Recruitment of these fish to the sport fishery is highly variable and kokanee are expected to maintain a low-level population in Holter as long as surplus fish are available.

Brown trout are seldom caught in Holter Reservoir and contribute very little to the reservoir fishery. Very few anglers target brown trout due to low population densities. During summer creels since 1986, only 51 brown trout have been creeled, averaging 2.3 fish per year.

Walleye harvest in Holter has increased significantly following development of the Canyon Ferry walleye fishery. From 1986-1997 angler harvest averaged 744 walleye annually. From 1998-2007 angler harvest increased to an average of 9,300 walleye annually. Average size of walleye harvested has decreased in recent years due in part to the slot limit (no fish can be harvested between 20" and 28") but also from an increase in the number of young of the year fish thought to be flushed from Canyon Ferry when water is spilled from the surface spill gates. Walleye growth rates have declined as a function of increased walleye population densities.

Results from an angler satisfaction survey completed during the 2007 license year indicate a general lack of satisfaction with the current fishery in Holter reservoir (FWP 2008). On a scale of 1 to 5 where 1 = poor and 5 = excellent, 23.7% rated 1 (poor), 13.7% rated 2, 31.3% rated 3, 20.5% rated 4, and 10.8% rated 5 (excellent). Although satisfaction ratings of 3-5 (which indicate better fishing) are similar to Hauser Reservoir, they are greater than those reported for Canyon Ferry.

Canyon Ferry Dam normally controls flow patterns in Holter Reservoir. Annual discharge from Holter Dam averages about 3.7 million acre-feet (1929 through 1988). The intake capacity for water into the generators within the dam is approximately 7,000 cfs with all remaining water being spilled. Spilling surplus water over Holter Dam is a common occurrence, especially during the spring. Because of a relatively small storage capacity, Holter Reservoir has a short retention time with water in the lake being replaced about every 21 days. During spring runoff, retention time can be significantly less than 21 days. Holter Reservoir can be considered slightly productive when compared to other impoundments. Blooms of algae occasionally develop during the summer. Water temperatures tend to be similar to those in Hauser Reservoir and weak thermal layering has been found to occur during the mid-summer period.

Section 2
Missouri River (Toston Dam to Canyon Ferry Reservoir)

Management History

Management efforts since 1991 have focused on rehabilitating degraded spawning and rearing habitat in tributaries entering both the river and Canyon Ferry Reservoir. Project funding has come from Broadwater Power Plant fisheries mitigation (Toston Dam), FWP Future Fisheries Improvement Program, and the Broadwater Stream and Lake Committee. These efforts have targeted both rainbow and brown trout populations. Monitoring of these tributaries for spawning use includes redd counts, juvenile fish trapping, and the operation of an adult fish trap at Deep Creek since 1993. As a general indicator of the extent of spawning use in system tributaries, the adult fish trap captured an average of 1,311 spawning rainbow trout from 1993 through 2008 (range from 176 to 2,386 rainbow trout per year). Fish management trends in the mainstem Missouri River are monitored through spring and fall electrofishing annually.

Management Goals and Limiting Factors

The goal for managing the Missouri River between Toston Dam and Canyon Ferry Reservoir is to provide naturally reproducing brown and rainbow trout populations for recreational fishing opportunities in the Missouri River and associated tributaries and to provide important spawning and rearing conditions for the Missouri River/Canyon Ferry system.

Quality spawning and rearing habitat is limited for sustaining a high-density brown trout or rainbow trout fishery in this reach of the Missouri River. In addition, high water temperatures (approaching 80 degrees) and low stream flow occasionally impact trout fisheries and the food base during drought years. High sediment loading also impacts the quality of habitat for trout and invertebrates. Although improvements to habitat and stream flow have been made on a number of tributaries in the system since 1991, the overall quality of available spawning and rearing streams remains relatively poor. Extreme drought conditions from 2000 through 2007 have further deteriorated habitat conditions in the river and tributaries.

Whirling disease has been documented in the system, and although rates of infections appear to be relatively steady at the present time, increased mortality of young rainbow trout rearing in tributaries can be expected as this disease persists. Increasing observations of physical deformities due to whirling disease at the Deep Creek fish trap are cause for concern for adult fish that were infected by the disease as juveniles. Long-term impacts will likely result in decreased numbers of juvenile rainbow trout and reduced recruitment of adults that were infected as juveniles.

Quality habitat for rearing trout, particularly along shoreline areas, is limited in this reach of river resulting in poor juvenile rearing for brown trout, particularly during drought years. This lack of structural habitat, including good cover and holding areas for protection, results in increased predation by birds and fish.

The development of a northern pike population above Toston Dam and within Canyon Ferry Reservoir further confounds fisheries management in this stretch of river. Northern pike are a highly predatory species and depending on population abundance, could further limit fish production in the river as well as Canyon Ferry Reservoir. Angler observations of walleye in the river from approximately York's Islands to the river mouth have also increased in recent years. Increased use of river habitats by both northern pike and walleye may result in increased predation losses for trout and forage fish in future years.

Missouri River (Toston Dam to Canyon Ferry Reservoir) Management Goals by Species

Rainbow Trout

Goals and Objectives:

Rely on rainbow trout to provide both a resident fishery throughout the year and a migratory fishery linked to Canyon Ferry that enters the river during the fall and spring.

- Maintain a stable trend of rainbow trout exceeding 1.0 rainbow trout per minute based on fall CPUE electrofishing sampling near Toston.

Rationale:

Through the late 1990s, the rainbow trout population increased to approximately 300 trout per mile because of seasonal migration of wild strains of rainbow stocked in Canyon Ferry Reservoir. In addition, the wild strains successfully reproduced, enhancing the wild, resident component of the rainbow fishery. Following drought conditions from 2000-2007, not enough rainbows were collected during fall sampling to calculate a viable population estimate; therefore current management goals are set on CPUE of 1.0 rainbow per minute of electrofishing. Sustaining this rainbow fishery will be a challenge and may be unrealistic if the walleye and northern pike populations in the Canyon Ferry and Missouri River expand. Water temperatures and flows may further limit trout abundance if low stream flow levels observed from 2000 to 2007 become more common. Fishing closures on primary spawning tributaries until June 15 helps protect fish during spawning runs.

Strategies:

- Continue stocking wild strains of rainbow trout in Canyon Ferry Reservoir to support the existing spawning runs in the system. Monitor movement and use of the river by domesticated strains of rainbow trout.

- Experiment with new strains of rainbow trout that may develop life history strategies conducive to the limiting conditions.

- Continue tributary enhancement (e.g., Deep Creek where Clean Water Act funds are used to enhance watershed health). Work with local water districts and irrigators to improve stream flows during critical periods.

- Maintain harvest regulations designed to protect spawning fish in tributaries and other important spawning areas.

- Identify additional limiting factors and consider management changes as needed.

Brown Trout

Goals and Objectives:

Rely on brown trout to provide a resident fishery throughout the year and a migratory population of large fish that enter the river during the fall.

- Attempt to increase the population to historic levels observed prior to drought conditions from 2000-2007. (Approximately 0.40 brown trout per minute based on CPUE sampling near Toston).

Rationale:

The main reason for the brown trout population decline is not known, although factors such as drought conditions during the early 1990s and early 2000s have been a major factor throughout southwest Montana. In addition, other factors may have contributed to the decline, including: the elevated rainbow trout population resulting in increased competition for limited spawning habitat; the 1989 Toston Dam hydropower retrofit; whirling disease; angler over-harvest during fall spawning periods; and others. One component of the Broadwater Power Project mitigation was to collect brown trout eggs in the wild, rear these fish in the hatchery, and imprint brown trout to the Missouri River and Deep Creek after habitat projects were completed. Approximately 400,000 brown trout were imprinted during 1992 to 1998, but return on these fish was very poor. In fact, the population continued to decline during the imprint process. It is possible that egg collection efforts impacted the natural spawning runs and the imprinting of juvenile brown trout was insignificant in offsetting the egg collection impacts.

There is potential for improved brown trout numbers as record drought conditions from 2000-2007 has broken, decreasing concerns over dewatering, lethal temperature thresholds, and competition for limited habitats.

Strategies:

- Continue to enhance spawning and rearing areas, particularly where groundwater and spring areas exist.

- Protect spawning-sized brown trout through modified bag limits.

  - Implement catch and release only regulations for brown trout. Children age 14 and under can possess one brown trout.

  - Recommend allowing harvest if brown trout abundance increases above management goals in the river and in the reservoir.

- Discontinue egg collection and imprint stocking. Based on results of past egg collection and imprint stocking, this strategy does not appear to provide enhanced recruitment in areas that lack quality spawning habitat.

- Identify additional limiting factors and consider management changes as needed.

Northern Pike

Goals and Objectives:

Monitor and manage the northern pike population in the river and reservoir to minimize impacts to the existing trout and forage species.

Rationale:

Canyon Ferry and the Missouri River between Toston and Canyon Ferry have long held a low-level northern pike population. In recent years, an abundance of northern pike have been discovered in the impoundment upstream of Toston Dam and reports of smaller-sized pike caught by anglers in Canyon Ferry became more numerous. In 2008, reproduction of northern pike in the reservoir was documented through the capture of young of the year pike during summer beach seining. Northern pike are highly piscivorous fish and the current forage base in the Missouri River and Canyon Ferry is likely incapable of supporting another voracious predator.

Strategies:

- Eliminate all angler bag limits for northern pike in the upper Missouri River reservoir system and in the Missouri River from Headwaters State Park to Toston Dam.
- Allow spear fishing for northern pike in the impoundment above Toston Dam.
- Identify critical spawning habitats in the river and reservoir and determine if habitat manipulations can suppress pike numbers and emigration through the system.
- Explore other opportunities or techniques to suppress pike numbers.
- Determine impacts of northern pike to existing forage.

Walleye

Goals and Objectives:

Manage the walleye population to minimize impacts on existing trout and forage species and provide a low-level sport fishery.

Rationale:

Although trout are the primary sport fish sought by anglers in this river section, angler reports for walleye have increased in recent years. Continued expansion of walleye from the reservoir to the river could adversely affect rainbow and brown trout populations due to increased predation. Increased predation by walleye coupled with drought conditions could further limit the sport fishery from Toston to Canyon Ferry. Currently walleye in the river are migratory fish that move upstream from the reservoir seasonally. Resident populations in the river have remained relatively constant over the past ten years.

Strategies:

- Manage the river walleye population consistent with Canyon Ferry management goals and objectives.
    - Reduce bag limit to 10 fish daily, only one fish greater than 28-inches, and 20 in possession.
- Monitor migratory and resident walleye populations and determine impacts to wild trout populations in the river. Recommend additional management action as needed.

Section 3
Canyon Ferry Reservoir

The species composition of the Canyon Ferry Reservoir/Missouri River system is typical of large river and reservoir fisheries in the intermountain region (Table 5). Fisheries of the Missouri River downstream from Toston Dam, Canyon Ferry Reservoir, and associated tributaries are managed as an ecological system. Many fish species in the system do not complete their entire life cycle within any single component of the system. Management considerations for any portion of the system (river, reservoir, or tributaries) must be considered in the context of the entire system.

Fisheries management of the upper Missouri River reservoir system has changed following expansion of the walleye population in Canyon Ferry. Walleye have effected recruitment of wild reproducing and stocked species not only in Canyon Ferry, but also in the river above Canyon Ferry as well as the reservoir and river sections downstream. Active walleye management is necessary to manipulate walleye abundance in Canyon Ferry, as well as maintain multi-species fisheries throughout the entire upper Missouri River reservoir system.

Management History

The rainbow trout population in Canyon Ferry Reservoir is maintained through annual stocking of hatchery fish. Annual stocking is required because natural recruitment is not sufficient to meet current demand by the fishing public. The most probable reason for inadequate natural reproduction for rainbow trout in Canyon Ferry Reservoir is limited spawning and rearing habitat. Tributaries to the reservoir, as well as tributaries to the Missouri River, have been degraded as a result of land use practices both public and private. The discovery of whirling disease in the Missouri River and some associated tributaries in the 1990s has created an additional factor that can limit successful natural reproduction of rainbow trout.

Since the filling of the reservoir in 1955, the rainbow trout fishery in Canyon Ferry has been maintained by stocking between 250,000 and 1.2 million fish, mostly fingerlings each year. Exceptions to this range in stocking rates occurred twice. In 1980, 2.0 million fingerlings were planted into the reservoir, with 1.0 million of these fish coming from a private hatchery donation. In 1992, a portion of Creston National Fish Hatchery was available for a one-year increase in stocking density at Canyon Ferry resulting in nearly 1.5 million fingerlings stocked. For the period between 1981 and 1998, the stocking allocation at Canyon Ferry Reservoir averaged about 1.0 pounds of rainbow trout per acre, which was typically represented by stocking about 400,000 yearling fish per year. Following expansion of the walleye population, predation on stocked rainbow reduced survival of fingerling rainbow plants. Rainbow stocking problems were further complicated by the discovery of polychlorinated biphenyls (PCBs) at Big Spring State Trout Hatchery in 2004, resulting in the shutdown of that facility during raceway treatment. The current hatchery allocation calls for 300,000 8-inch rainbow trout planted in spring and fall, which represents about 1.7 pounds of rainbow trout per acre. Stocking of 8-inch fish increased hatchery costs 7-fold due to increased hatchery space necessary to grow larger fish, increased food, and transportation costs to haul additional loads of fish.

In past years, FWP has adjusted the stocking of Canyon Ferry Reservoir several times in an attempt to enhance the rainbow population. These adjustments have included changing the number and size of fish stocked, as well as adjusting the season of the year that the fish were distributed. Beginning in the early 1980s, FWP began experimenting with different strains of rainbow trout and with different methods of

dispersing them into the reservoir in an attempt to improve the fishery. Evaluation of stocking techniques indicated that stocking yearling rainbow trout (5-7 inches in length) during spring plankton bloom (May) yielded the most consistent survival of hatchery fish. Following walleye population expansion, it was found that stocking larger sized fish in the spring and fall is necessary to avoid predation. Stocking in the fall also takes advantage of lower energy demands of walleye during cooler water temperatures, reduces the potential for avian predation, and maximizes use of hatchery space for production.

Table 5. Fish Species in Canyon Ferry Reservoir/Missouri River System Including Native Status, First Stocking Date (In Drainage), Population Trend and Relative Abundance as of 2008.

Species	Native	First Stocking Date	Population Trend	Relative Abundance (Based on historic field monitoring.)
Game Fish Species				
Rainbow trout	No	1928	Stable	Abundant
Mountain whitefish	Yes	N/A	Decreasing	Common
Walleye	No	N/A	Stable	Abundant
Brown trout	No	1931	Decreasing	Common
Burbot	Yes	N/A	Stable	Common
Brook trout	No	1934	Unknown	Rare
Black crappie	No	N/A	Unknown	Rare
Cutthroat trout	Yes	N/A	Unknown	Rare
Northern pike	No	N/A	Increasing	Rare
Smallmouth bass	No	N/A	Unknown	Rare
Largemouth bass	No	N/A	Unknown	Rare
Yellow perch	No	1938	Decreasing	Abundant
Nongame Fish Species				
Common carp	No	Unknown	Stable	Abundant
Longnose dace	Yes	N/A	Unknown	Abundant
Longnose sucker	Yes	N/A	Decreasing	Abundant
White sucker	Yes	N/A	Decreasing	Abundant
Mottled sculpin	Yes	N/A	Unknown	Abundant
Fathead minnow	Yes	N/A	Unknown	Common
Stonecat	Yes	N/A	Unknown	Common
Utah chub	No	N/A	Decreasing	Common
Bluegill	No	N/A	Unknown	Rare
Flathead chub	Yes	N/A	Unknown	Rare
Mountain sucker	Yes	N/A	Unknown	Rare

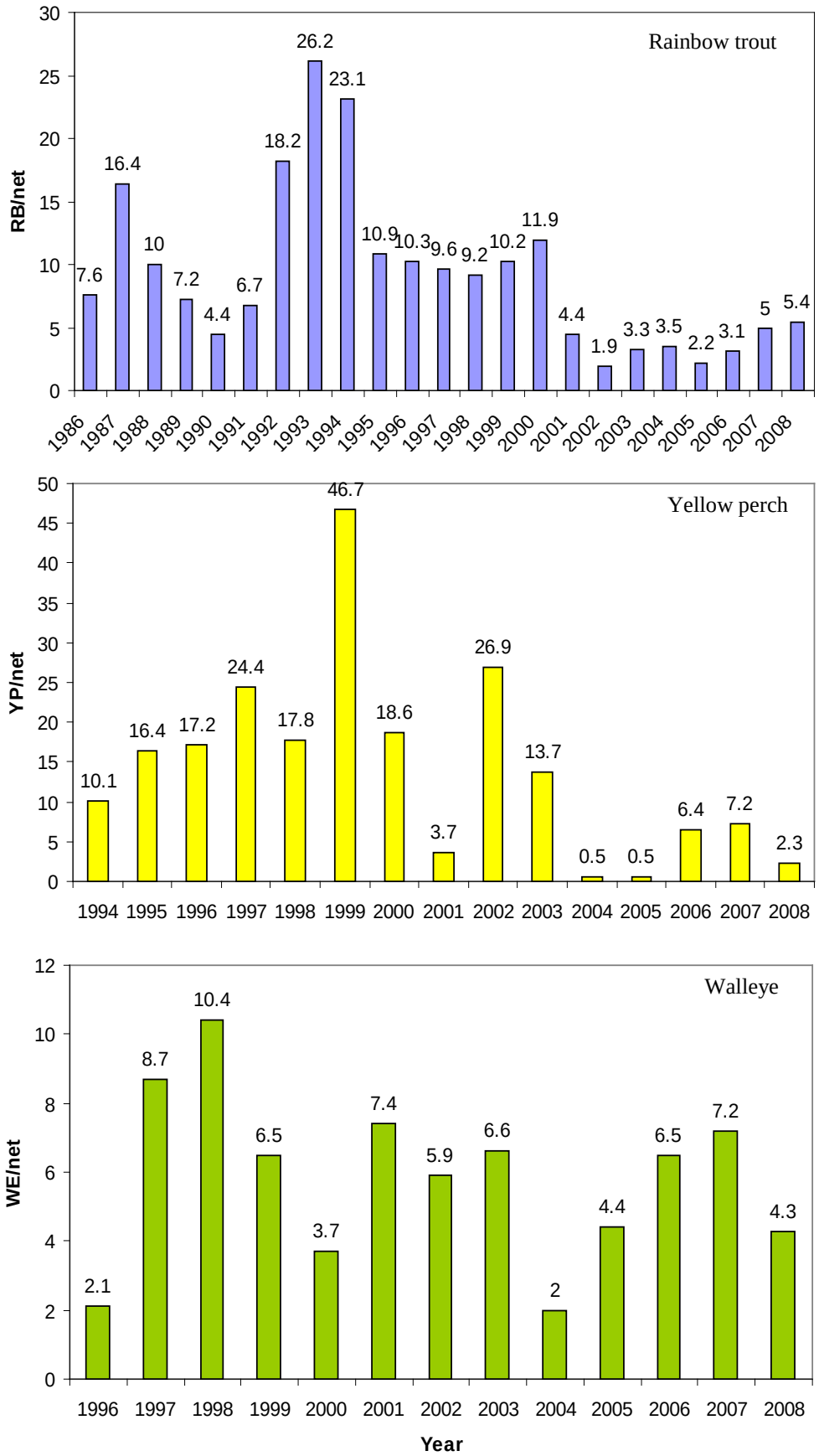


Figure 5. Canyon Ferry Reservoir Fish Population Trends for Rainbow Trout, Yellow Perch, and Walleye from Standardized Gillnetting Series.

Over the last 40 years, there have been significant fluctuations in the number of rainbow trout in Canyon Ferry Reservoir. These fluctuations in numbers have affected fishing success over the years. The Department measured poor fishing success (catch rates) in the mid 1960s (0.08 rainbow/hour), and again in the 1980s (0.08 – 0.14 rainbow/hour). These fluctuations appear to be closely associated with the varying success of the Department's stocking program for the reservoir. After a significant increase in rainbow trout abundance during the mid 1990s from increased stocking rates of yearling fish, the rainbow trout population trend remained relatively stable at approximately 10 rainbow trout per net throughout the late-1990s (Figure 5). By 2000, large year classes of walleye produced in 1996 and 1997 were large enough to effectively prey upon stocked rainbow fingerlings, and rainbow numbers declined in subsequent years. Stocking larger sized, 8-inch fish in the spring and fall has increased rainbow recruitment, resulting in an upward trend in recent years. The current population level maintains annual angler catch rates of 0.15 to 0.50 fish per hour (Figure 6).

Past management efforts have focused on rehabilitating degraded tributaries entering the Canyon Ferry/Missouri River system to enhance spawning habitat and increase recruitment of juvenile trout into the fishery. Sizeable spawning runs of wild strain rainbow trout have developed in various tributaries in the system, but contributions of juvenile trout from this increased spawning activity produces less than 10 percent of the Canyon Ferry rainbow trout fishery. Efforts to benefit the wild fishery will continue.

The brown trout population in Canyon Ferry Reservoir has remained at a relatively low level since the reservoir first filled in 1955. Results from sinking gill nets set periodically since 1955 indicate that brown trout numbers were highest immediately after the reservoir first filled, then remained relatively stable from 1958 through 1988. The brown trout population declined significantly between 1988 and the mid-1990s as a result of drought and spawning competition with stocked wild strain rainbow trout. Spawning habitat enhancements resulted in little improvement, and brown trout abundance is currently at an all time low level.

Yellow perch have been one of the most abundant species of fish in Canyon Ferry Reservoir for the past fifty years. However, the perch population has fluctuated extensively over time. These fluctuations are probably related to poor spawning and rearing habitat and variable spring weather conditions, which are believed to influence yellow perch spawning and rearing success on an annual basis. Yellow perch are a vulnerable prey species that is selected by walleye over other prey species, further influencing the variable nature of perch populations. Trends in yellow perch abundance in Canyon Ferry Reservoir have been periodically monitored since 1955 using a sinking gill net series set in June and August. Catch of perch per net pre-walleye declined from a high of 79 per net in 1964 to a low of 10 per net in 1994. Following walleye expansion in the late 1990s, catch of yellow perch per net has varied from a high of 47 per net in 1999 to a low of 0.5 per net in 2004 and 2005 (Figure 5).

Yellow perch population trends are also being monitored with summer beach seining data and a roving creel census that began in 1985. The beach seining series was initiated in 1991 to provide an index of annual perch production. Reliability of this tool for assessing annual production of perch is variable but it indicates that perch production can vary significantly from year to year and highlights years when yellow perch contribute to higher levels of forage availability. However, the relationship between annual production of yellow perch (measured by beach seine catches) and size of the adult population (measured by gillnet sets) shows little correlation.

Based on the roving creel census the number of anglers fishing on Canyon Ferry Reservoir during the summer specifically seeking to catch yellow perch has been steadily declining, with an average of 0.1%

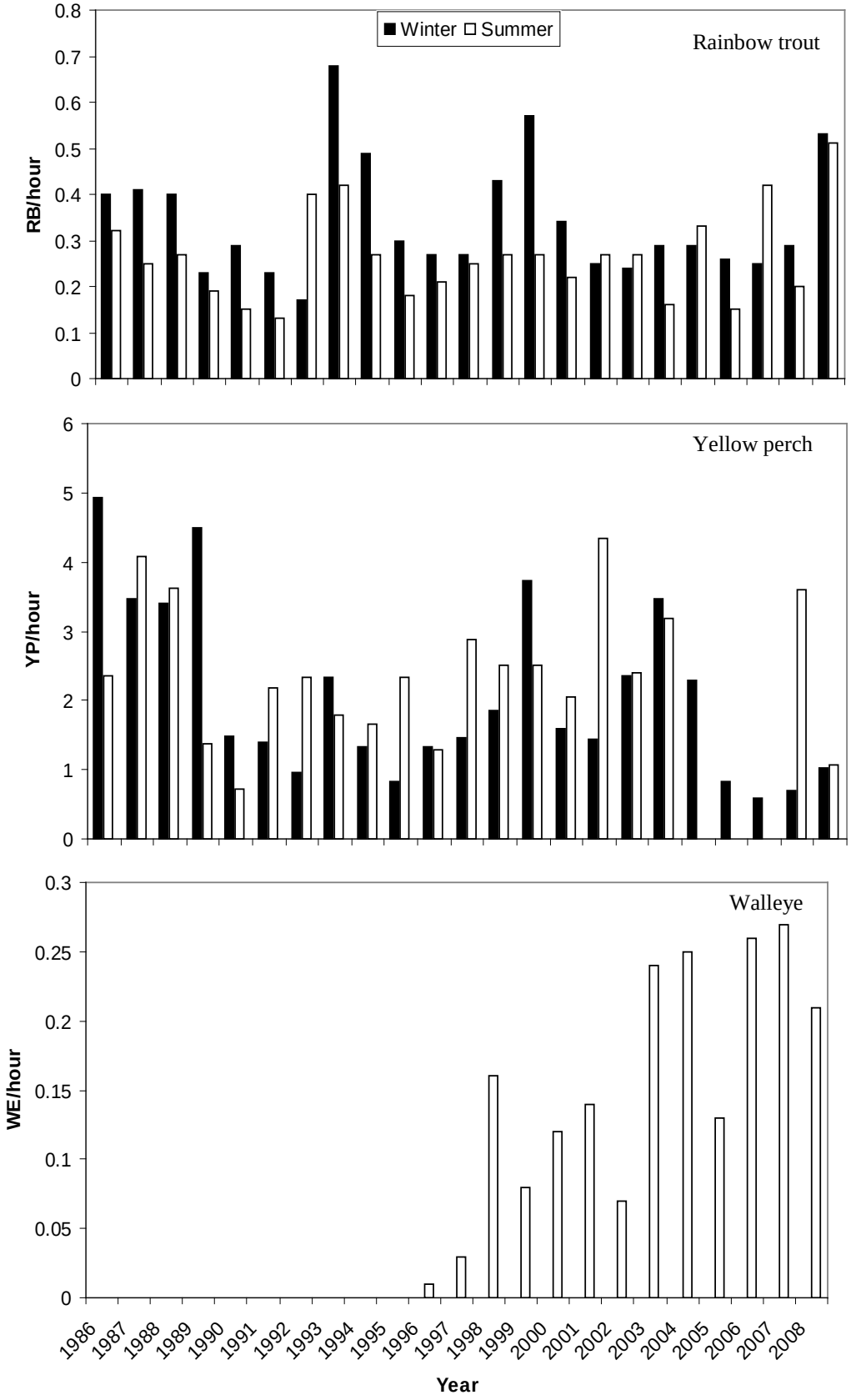


Figure 6. Canyon Ferry Reservoir Angler Catch Rates for Rainbow Trout, Yellow Perch, and Walleye.

of all anglers targeting only perch from 2004-2008. However, fishing for yellow perch is more popular during the winter. During the winter of 2008, 37% of all anglers were specifically seeking to catch yellow perch. Winter angler catch rates for yellow perch can be high, with an average of 2 fish per hour from 1986-1996 (Figure 6). Winter catch rates have been lower in recent years, averaging 1.6 fish per hour (2000-2008). Winter angler catch rates for yellow perch have remained comparatively low since 2005, and were at record low of 0.6 fish per hour in 2006 (Figure 6).

Yellow perch is now classified as a game fish in Montana and they are being managed as such in many waters. In 2005, the yellow perch daily and possession bag limits were reduced from 50 to 15 in order to counteract record low abundance in the reservoir. Additional ongoing management efforts included methods to reduce the impacts of reservoir operations on fishery resources and enhancing spawning and rearing success by providing additional lake bottom structure. For the past decade, thousands of recycled Christmas tree structures have been placed in the reservoir with the aid of several community and sportsman's groups. Yellow perch have been documented using the structures as spawning habitat, however it is difficult to determine if the structures positively influence perch abundance.

Walleye were not observed in Canyon Ferry biological sampling from 1955 through 1988. The first walleye was captured in 1989 during fall netting efforts to monitor rainbow trout. From 1989 to present, walleye have been captured in various monitoring net series annually. Walleye population trends in Canyon Ferry are based on four monitoring systems developed to assess fish populations: 1) sinking gill net series conducted periodically since 1955 (June and August sampling); 2) floating gill net series set annually since 1986 (May and October); 3) fall walleye gill netting series initiated in 1996 (September); and 4) roving creel census conducted since 1986.

The walleye population initially entered a phase of extremely rapid population growth that is characteristic of newly developing populations (McMahon 1992). In 1998 fall gill net catch of walleye reached record high 10.4 walleye per net, however continued exponential growth characteristic of new populations were not realized. Relative abundance of walleye declined after the 1998 peak and since has fluctuated between 2.0 (2004) and 7.4 (2001) walleye per fall gillnet (Figure 5). Since 2000, fall relative abundance has averaged 5.3 walleye per fall sinking gillnet. The current composition of the walleye population consists of smaller-sized, young walleye with 84% of walleye captured in fall gillnets in 2008 between 10-14.9-inches total length.

Forage diversity and supply is critical for sustaining quality walleye populations. Consequently, intensive walleye diet analyses has been conducted since 1994. Yellow perch and suckers comprised most of the walleye diet when the population first developed in Canyon Ferry. Yellow perch are still a significant component of the walleye diet, with perch comprising 49% of the diet since 1994. Suckers currently contribute little to the walleye diet, comprising only 0.3% of the diet in 2008. Low frequency of suckers in the walleye diet is largely a function of lower sucker densities. Salmonids (trout) can also comprise a large percentage of the walleye diet, with trout comprising over 70% of the diet in some years. Since 1994 salmonids average nearly 20% of the walleye diet. Food habits vary seasonally and other prey items are of significance through different periods of the year.

A risk assessment entitled "Potential Impacts of the Introduction of Walleye to the Fishery of Canyon Ferry Reservoir and Adjacent Waters" concluded that the possibility of increasing fishing opportunities with the introduction of a species such as walleye is offset by the potential impacts on other fish species (McMahon 1992). This assessment, along with numerous other sources of expertise, experience, and input, provided the basis for management efforts centered on walleye management. The primary

concerns at Canyon Ferry are that walleye reproductive potential is very high, and there is tremendous potential for creating a high-density walleye population that could deplete prey species, including sport fish such as yellow perch and trout. Walleye densities did not grow to proportions anticipated when the population first expanded in the late-1990s, but the reproductive potential in Canyon Ferry is still very high. Also, determination of walleye densities that can be maintained without permanently depressing the prey populations is still being studied. Due to the variable nature of walleye spawning, it is only a matter of time before another extraordinary year class, such as that produced in 1996, occurs.

Results of intensive walleye sampling conducted since 1994 confirm concerns expressed in the 1992 risk assessment. A small spawning population in 1996 produced a very strong year class of fish that resulted in a well-established walleye fishery at Canyon Ferry. In 1997, the reservoir was drawn down to near record low levels that reduced the quality of walleye spawning habitat at the only documented spawning site. Concurrently, FWP conducted an effort to remove mature walleye from spawning areas. Approximately 40 million walleye eggs were intercepted from 175 females prior to spawning. Despite this effort, walleye produced 4.0 yearlings per net in the fall 1998 netting series, compared with 6.27 yearlings per net in the 1997 fall netting series. Following failed walleye removal efforts in 1997, FWP recognized that walleye were going to be a significant component of the fishery and developed strategies to incorporate walleye into the multi-species fishery.

In addition to monitoring traditional game fish species, FWP gillnetting and beach seining efforts also track populations of other species present in the system. Monitoring will be an increasingly important component of data collection as the fish community continues to adjust to the changing walleye population. Monitoring abundance of white suckers, for example, will assist efforts to evaluate the forage fish availability for walleye. White suckers have decreased significantly since the mid-1950s when the reservoir was filled, remained relatively stable through the early 1990s, and have declined significantly since 1996. Examining sucker abundance in conjunction with other species (both predators and prey) will provide important information for future management of the Canyon Ferry-Missouri River system.

Continued monitoring of relative abundance of selected fish species as well as angler use is critical in identifying and maintaining management goals. Improvements in angler technology coupled with changes in angler pressure can influence the amount of fish harvest in the system. For primary species actively managed in Canyon Ferry, management “triggers” have been implemented to adjust management strategies with changing fish populations and resulting changes in angler trends.

Canyon Ferry Reservoir Management Goals and Limiting Factors

The goal for managing the upper Missouri River reservoir system fishery is to maintain a cost effective multi-species fishery that maintains the current level of angler use during both the open water and ice fishing seasons. Management of the multi-species fishery will attempt to maintain desirable sport species (i.e., rainbow trout, yellow perch, brown trout, walleye, and burbot) as well as maintain populations of non-game species (e.g., suckers, dace, sculpins).

To achieve this goal for the system, management strategies must be developed to enhance reproduction and survival of all potential species that will be influenced by walleye predation.

Determining all of the limiting factors that regulate fisheries in complex systems like the Canyon Ferry-Missouri River system is difficult to accurately assess. However, there are some basic limitations that are

known to exist for each of the major sport fish species in Canyon Ferry Reservoir. Perch populations tend to be limited by reproductive and rearing success, while trout populations are limited by number and size of fish stocked and recruitment of stocked fish. In contrast, walleye reproductive potential is extremely high in Canyon Ferry and may ultimately be limited by available forage, other predators (e.g. Northern pike), and other environmental variables (i.e., spring spawning conditions). A depleted forage base will ultimately result in reduced growth and productivity of not only walleye, but also other fish in the system as well. Other factors currently or potentially limiting sport fish species in Canyon Ferry Reservoir include but are not limited to:

- Available spawning and rearing tributaries are insufficient to adequately supply juvenile brown and rainbow trout for the reservoir, and hatchery allocation constraints and costs limit the number of fish available for stocking. The limited spawning habitat of rainbow trout and brown trout further impacts their poor reproductive success, and predation by walleye further reduces recruitment of successfully reared fish.

- Walleye diet studies indicate a high preference for yellow perch, suckers, and trout. At current yellow perch and sucker population levels and reproductive capability, it is unknown if these species can adequately provide a sustainable forage base for the walleye population. Predation of stocked trout could impede the cost-effectiveness of fish stocking and hinder recruitment to the sport fishery.

- Yellow perch spawning and rearing success is variable and density of the adult population appears to be limited by recruitment. A relatively small spawning stock of perch are capable of producing large age classes of perch, however lack of suitable nursery and cover habitats leave juvenile perch vulnerable to predation and limiting recruitment of entire age classes. Heavy predation has the potential to permanently suppress the yellow perch population and may jeopardize the ability to manage the yellow perch sport fishery.

- Development of a low dissolved oxygen plume in the deep water at the base of Canyon Ferry Dam occurs in the summer months. Deep areas, greater than 60-80 feet, at the north end of the lake may not be suitable for some fish species because of low dissolved oxygen levels during the summer months.

- Whirling disease has been found in the Missouri River between Toston Dam and Canyon Ferry Reservoir and in some of the associated tributaries. This disease is caused by a parasite that affects the cartilage of young trout and leads to physical deformities that reduce their ability to feed and avoid predators. As this disease progresses in the system it could potentially reduce reproductive success of rainbow trout and wild fish recruitment.

- Reservoir operations that result in average annual fluctuations of 12 feet limits establishment of shoreline vegetation to serve as spawning and rearing habitat for yellow perch or other species with similar spawning requirements.

- Extended surface spills during spring run-off may result in fish loss/transport out of Canyon Ferry. Losses of walleye and rainbow trout have been documented and may be significant.

- Localized depletions of fish may occur during intensive fishing periods (e.g. concentrated areas of yellow perch anglers during high-use periods in the winter) limiting recruitment and survival in distinct subpopulations in the reservoir.

- Expansion of the northern pike population could increase predation on an already limited forage base.

Canyon Ferry Reservoir Management Goals by Species

In order to manage a fish community that includes multiple sport fish species, it is important to recognize that the goal for each species is affected by the success of management strategies for other species in the system and not all fish species can be maximized simultaneously. This plan emphasizes management for trout and walleye while recognizing the importance of yellow perch as a sport fish and a forage species.

Yellow Perch

Goals and Objectives:

Continue to recognize the importance of yellow perch and apply management strategies to improve the current population to enhance the sport fishery and identify importance as a forage species.

- Achieve and maintain a three-year running average gillnet catch of 10 yellow perch per net in the summer sinking gillnet series.

- Maintain a three-year running average winter angler catch rate of 2.0 yellow perch per hour.

Rationale:

Yellow perch are the preferred prey item for most predator species in Canyon Ferry Reservoir; predation losses have increased significantly with walleye population expansion. Increasing the abundance of yellow perch is difficult and achieving a level of 10 per net will require successful implementation of a variety of management actions including spawning/rearing habitat enhancement, conservative angler harvest regulations, and active management of walleye through angler harvest. Cost-effective spawning/rearing habitat enhancement projects such as building juniper or Christmas tree reefs have been implemented since the early 90s, with larger scale efforts beginning in 1998 and continuing to present.

Strategies:

- Continue conservative harvest regulations to prevent over-harvest by anglers. Evaluate and implement further regulation changes if needed. In 2005, yellow perch daily and possession bag limits were dropped to 15 fish.

- Continue adequate data collection to determine if strategies are effective and the goal is being met.

  - If three-year average catch for perch in summer sinking gillnets falls below 3 perch per net, implement more conservative perch management strategies, such as further reductions in angler harvest, increased predator suppression, and/or additional habitat manipulations and improvements.

  - If three-year average catch for perch in summer sinking gillnets increases above 15 perch per net, recommend increasing angler harvest limits.

  - If these triggers are exceeded within three years following plan implementation, consider deferring management action to better determine effectiveness of strategies outlined in this plan.

- Continue to construct spawning/rearing habitat in Canyon Ferry as long as the project remains cost-effective.

- Within the two years of implementing the plan, determine the feasibility of proposed enhancement opportunities (e.g., waterfowl ponds as rearing areas, net pens, use of other artificial habitat).

- Continue the Christmas tree habitat enhancement project. Evaluate success of structures in other locations. Maintain relationship with City of Helena to continue supply of Christmas trees.

- Work with reservoir managers and water users to identify opportunities to modify reservoir levels and improve shoreline spawning habitat.

- Implement research to identify critical spawning habitats and nursery areas using telemetry within the first two years of the plan.

- Determine other funding sources and options for habitat enhancement projects (e.g., Walleyes Unlimited, Non Government Organization).

- Consider the feasibility and effectiveness of stocking perch to supplement perch population.

- Report measurable progress annually through public meetings and annual reports.

Rainbow Trout

Goals and Objectives:

Rely on rainbow trout to continue providing angling opportunity at approximately the current level of angler catch.

- Maintain a three-year running average gill net catch of 5-6 rainbow trout per net in the fall floating gillnet series.

- Maintain a three-year running average summer angler catch rate of 0.25 rainbow trout per hour.

Rationale:

The 2001-2009 Upper Missouri River Reservoir Fisheries Management Plan established higher objectives for rainbow trout abundance in Canyon Ferry (10 rainbow per gill net), but it was not feasible to sustain the fishery at that level, as the hatcheries could not supply the request for fish necessary to maintain 10 rainbow trout per gillnet. These objectives were only met in 2000. At present stocking levels and with current minimal levels of natural recruitment to the reservoir, it is reasonable to expect that a relatively stable fishery with good angler catch rates can be maintained at approximately 5-6 rainbow trout per gill net set. Since 2006, spring and fall stocking of 8-inch Eagle Lake and Arlee strain rainbow trout have seen increases in overall rainbow abundance and angler harvest. Stocking of larger sized rainbow trout is necessary to avoid predation by walleye. Stocking in the spring and fall also allows for efficient use of hatchery raceways, plus fall stocking takes advantage of lower energy demands by walleye due to lower water temperatures.

Strategies:

- Continue annual planting of approximately 150,000 age one, 8-inch Eagle Lake rainbow trout in the spring and approximately 50,000 age 0, 8-inch Eagle Lake and approximately 100,000 age 0, 8-inch Arlee rainbow trout in the fall.

- Continue annual monitoring and data collection to evaluate if management goals are being met.
  - If three-year average catch for rainbow in fall floating gillnets falls below 5 rainbow trout per net and/or angler catch rates decline substantially, recommend changes to the stocking plan (e.g., timing and location of fish plants, different rainbow strains, size at stocking) and implement if deemed cost-effective. Determine what limiting factor is reducing rainbow trout recruitment (e.g., hatchery or strain issues, increased predation by walleye).
  - If three-year average catch for rainbow trout in fall floating gillnets falls below 3 rainbow trout per net, consider more active management actions such as lowering angler harvest limits and/or implement predator suppression measures based on biological justification if predation is identified as the primary factor limiting recruitment.
- Continue to improve trout spawning tributaries in the system to increase wild trout abundance.
- Maintain restricted harvest regulations and closures associated with spawning areas.
- Consider stocking additional rainbow trout when additional hatchery fish are available. Do not stock if surplus fish will interfere with rainbow trout strain or season of stocking evaluations.
- Work with Wildlife Bureau of FWP and U.S. Fish and Wildlife Service (USFWS) to better quantify effects of pelicans and cormorants on stocked rainbow trout recruitment.

Walleye

Goals and Objectives:

Rely on walleye to maintain a self-sustaining sport fishery to enhance the summer fishery and provide an additional component to the winter fishery.

- Maintain a three-year running average of 5 walleye per net in the fall walleye gillnetting series.
- Evaluate criteria for determining appropriate walleye density consistent with the availability of forage.

Rationale:

Based on extensive studies since 1990, including a risk assessment for a walleye introduction in Canyon Ferry (McMahon 1992), maintaining the long-term quality of the walleye fishery is difficult because of high walleye reproductive success relative to available forage supply. Management of other desirable fish species in the reservoir will be difficult without active walleye management. Maintaining walleye at a level that sustains a balanced fish community is necessary to reaching multi-species goals. Failure to adequately control walleye population growth will result in further depletion of the food supply including sport fish species such as yellow perch, trout, and burbot. Substantial reductions in the population levels of yellow perch and rainbow trout are inconsistent with the goal of managing for a multi-species fishery in Canyon Ferry Reservoir. Angler harvest is the most cost-effective tool for walleye management; however other strategies may need to be explored if the walleye population reaches full reproductive potential. Data suggests that liberal fishing regulations likely play a role in size distribution of the walleye population, with high rates of exploitation limiting the number of larger fish in the population. However, due to known forage limitations in the reservoir, adjustments to limits may be necessary to maintain walleye population numbers compatible with forage abundance. Strategies for managing the

walleye population to sustain the desired trout and yellow perch fisheries by using more aggressive tools are based on "triggers" to initiate progressive management actions.

Strategies:

- Adjust angler harvest regulations to manage walleye population abundance and reduce predation on other desirable species. This is the most cost-effective and selective management tool available at Canyon Ferry to manage the walleye population. Regulations from the 2000-2009 Management Plan were designed to require few fish to be released, even by the most successful anglers, and the daily limit not likely to be exceeded. Limits below those set in the 2000-2009 Management Plan may increase numbers of desirable sized walleye, however limits above standard regulations for the Central Fishing District for walleye (5 daily and 10 in possession) are necessary to maintain a suitable forage base and preserve populations of other species. Modified angler bag and size limits may be used as management tools to improve desirable size groups (i.e., slot limits, bag limits, closures, among other tools).

  - Initially reduce the walleye daily bag limit to a number within a range of 10-16 fish per day with a range of no more than 3-5 fish of those may be of a size greater than a minimum length not less than 14 inches or greater than 18 inches, only one of those which may be greater than 28-inches.

  - If management triggers are exceeded, other regulations outside of the ranges listed above may be proposed.

- If needed, implement more aggressive management to control walleye population growth or manage population size structure. Triggers for modifying management actions will be based on annual fall monitoring of walleye (15 sinking gillnets set in September), summer netting for yellow perch (33 sinking gillnets set in June and August), and fall monitoring for rainbow trout (18 floating gillnets set in October). Additional aggressive management techniques may be implemented if, based on a three-year running average, any of the following criteria are reached:

  1. Walleye density increases above 7 fish per net.
  2. Yellow perch density decreases below 3 per net.
  3. Rainbow trout density decreases below 3 per net and walleye predation determined the primary factor limiting rainbow trout recruitment.

  - If these triggers are exceeded within three years following plan implementation, consider deferring management action to better determine effectiveness of strategies outlined in this plan.

  Upon reaching the targets listed above and within the adaptive management framework more aggressive actions may be implemented following public discussion. The following actions may be considered through a Montana Environmental Protection Act (MEPA) analysis and/or public review process:

  - Increase angler bag limits for walleye. This would likely be the first action implemented to reduce walleye densities.

  - Consider use of gill nets or trap nets to remove walleye during periods when fish are concentrated in specific areas (e.g., spawning period, fall).

- Allow spear fishing by submerged swimmers or through the ice to increase harvest. Consider imposing a maximum size restriction to prevent targeting the biggest fish and to retain a trophy component in the fishery.

- Evaluate walleye derbies/tournaments as a tool for aggressively harvesting fish.

- Authorize commercial harvest of walleye. In anticipation of the necessity to establish a commercial walleye operation on Canyon Ferry Reservoir, FWP must request authorization from the Montana Legislature to allow the taking and sale of walleye (87-4-601, Montana Code Annotated (MCA)) and subsequently revise the Administrative Rules of Montana governing commercial fishing (12.7.101, Administrative Rules of Montana (ARM)).

- Use electrofishing to remove walleye from the Missouri River during spring spawning.

■ If it is determined that the walleye population is over-harvested and more conservative limits are necessary to support a viable walleye population, walleye daily and possession limits will be modified and derbies/tournaments will be evaluated to protect walleye. Decisions will be based on fall monitoring showing a decline in walleye to below 3 per fall gillnet net based on a three year running average.

- Should three-year average walleye catch decline below 3 per gillnet while perch and rainbow abundance are below management goals (10 perch per summer gillnet and 5-6 rainbow per fall gillnet), changes to walleye limits will be recommended only after impacts to perch and rainbow populations are determined.

- Should three-year average walleye catch decline below 3 per gillnet while yellow perch and/or rainbow trout abundance are below management triggers (3 per summer gillnet for yellow perch and 3 per fall gillnet for rainbow trout) adjustments to walleye limit will not be made.

■ Continue adequate data collection to determine if strategies are effective and goals are being met.

- Report measurable progress annually through public meetings and annual reports.

- Conduct additional monitoring and research as needed (e.g., supplemental netting, tagging studies, 3-inch mesh gillnets). Explore sampling methods that reduce mortalities.

■ Recognize the importance for anglers to have multiple size classes of walleyes represented in the population. If more than 30% of fish are not above 16-inches, than changes to regulations will be recommended to maintain more, larger sized fish. Regulation changes will be dependent upon walleye abundance relative to management goals and triggers for walleye, other fish, and forage availability.

Brown Trout

Goals and Objectives:

Increase the number of brown trout residing in the reservoir as an additional component to the sport fishery.

- Increase the current catch of 0.2 brown trout per net to a three-year running average of 1.0 brown trout per net in the summer sinking gillnet series.

Rationale:

The decreased abundance of brown trout observed in the past 10 years is largely attributable to drought conditions in the river and primary spawning tributaries throughout the early 2000s. Other factors such as drought impact from 1985 through the late 1990s, whirling disease, turbine installation at Toston Dam in 1989, and increased competition with the wild strains of rainbow trout introduced in the late 1980s are also potentially responsible for the decline observed in recent years.

Strategies and Management Alternatives:

- Maintain restrictive regulations to protect the spawning brown trout population.
  - Implement catch and release only regulations for Canyon Ferry. Children age 14 and under can possess one brown trout.
  - Recommend allowing harvest if brown trout abundance increases above management goals.
- Continue ongoing efforts to enhance spawning and rearing habitat for brown trout.
  - Continue work with landowners and irrigators to reduce dewatering of critical streams during brown trout spawning (fall).
- Continue work with Department of Natural Resource and Conservation (DNRC) to mitigate impacts of hydropower on Toston Dam.
- Continue to evaluate brown trout limiting factors and develop new solutions.

Burbot (Ling)

Goals and Objectives:

Rely on burbot to compliment the winter sport fishery by maintaining the current level of burbot in the reservoir.

- Increase efforts to monitor the burbot population in Canyon Ferry Reservoir.
- Maintain a three-year running average gill net catch of 0.40 burbot per net in the summer sinking gillnet series.
- Provide brood and/or foundation stock for re-introductions to other waters for conservation and sport fishing considerations.

Rationale:

Burbot is the most popular native sport fish in Canyon Ferry Reservoir. Burbot are sought by anglers primarily in the ice-fishing season and provide little to the summer fishery. Unlike other upper Missouri River reservoirs, burbot abundance and angler catch rates in Canyon Ferry have declined in recent years. Little is known about the population dynamics and limiting factors that regulate the burbot population.

Strategies:

- Improve data collection to better understand burbot population dynamics.

- Maintain current angler harvest regulations unless monitoring justifies adjustments to bag limits.

Forage Fish

Goals and Objectives:

Manage and enhance the forage base to support a productive multi-species fishery that includes walleye, trout, and yellow perch.

- Increase white sucker gill net catch to 15 per net or higher.

- Increase yellow perch gill net catch to 10 per net or higher.

- Maintain mid-summer zooplankton density of 20 per liter and maintain current zooplankton species composition.

Rationale:

Additional fish species (forage fish species and sport fish species) introduced into Canyon Ferry Reservoir will compound an already rapidly changing system and may result in irreversible effects on the fish communities of Canyon Ferry, Hauser, and Holter reservoirs, and the Missouri River below Holter Dam. Sucker species and yellow perch are expected to continue providing the bulk of the walleye diet. Yellow perch are particularly important to the fish community because of their significant value as both a sport fish and a forage fish for walleye. One of the primary concerns of introducing new forage species would be the impact on the plankton community, which currently provides the bulk of the rainbow trout and yellow perch diet and are vital for survival of naturally produced walleye fry. Changes to the zooplankton community composition following introduction of a forage species could potentially limit recruitment of juvenile fish, especially yellow perch and walleye. There is also potential that walleye would not utilize a new species stocked as forage. Maintenance of at least 20 organisms per liter of cladocerans and copepods during mid-summer plankton sampling (average June, July, and August) will ensure that the yellow perch, rainbow trout and juvenile walleye food supply is maintained at current levels. Zooplankton species composition is also a vital component to a functional food web; in Canyon Ferry *Daphnia sp*. are essential to growth and survival of all juvenile fishes in the reservoir.

Strategies:

- Prevent depletion of the available forage by managing the walleye population at a sustainable level of no more than 7 fish per gillnet on a three-year running average. Consider active management measures if walleye abundance increases above 7 fish per gillnet and/or sucker abundance decreases below 5 per net or yellow perch abundance decreases below 3 per net on a three-year running average.

  - Active management measures may include increasing walleye bag limits, species specific netting, or commercial fishing. See Walleye discussion for adaptive management strategies.

- Explore opportunities to improve the forage base in Canyon Ferry.

  - Give priority to increase current forage species to support a multi-species fishery. Informal evaluation of forage introductions has shown that risks associated with a new species introduction

outweigh any potential benefits. Consequently, no new species will be evaluated or considered for introduction into the management plan area. Introducing a new forage species would also be contrary to the FWP Illegal and Unauthorized Introduction of Aquatic Wildlife Policy. See Appendix C for additional discussion on forage introductions and Appendix D for the Unauthorized Aquatic Wildlife Policy.

- During the course of this 10-year management plan, FWP will work to prevent the unauthorized introduction of new fish species to protect the resident fish community. Implementation measures would include development of a public education program, surveillance, and strict enforcement of State laws and policies prohibiting introduction of unauthorized species.

Northern Pike

Goals and Objectives:

Monitor and suppress the northern pike population in the river and reservoir, and evaluate impacts to other species.

Rationale:

Canyon Ferry and the Missouri River between Toston and Canyon Ferry have long held a low-level northern pike population. In recent years, an abundance of northern pike have been discovered in the impoundment upstream of Toston Dam and reports of smaller-sized pike caught by anglers in Canyon Ferry Reservoir became more numerous. In 2008, reproduction of northern pike in the reservoir was documented through the capture of young of the year pike during summer beach seining. Northern pike are highly piscivorous fish and the current forage base in Canyon Ferry is likely not adequate to support an additional voracious predator.

Strategies:

- Eliminate all angler bag limits for northern pike in the upper Missouri River reservoir system.
- Identify critical spawning habitats in the river and reservoir and determine if habitat manipulations can suppress pike numbers and emigration through the system.
- Explore and implement other opportunities or techniques to suppress northern pike numbers.
- Determine impacts of northern pike to existing forage.
- Additional management methods may be necessary to reduce pike populations (e.g., spearing, commercial fishing, required harvest during tournaments) following public review and MEPA process.

Other Canyon Ferry Reservoir Fisheries Management Issues

Reservoir Operations

Goals and Objectives:

Work cooperatively with BOR to incorporate fisheries management and angler access concerns into the management of Canyon Ferry Reservoir.

Rationale:

Reservoir operations have a significant impact on fish populations residing in Canyon Ferry Reservoir by influencing the quality of shoreline habitat, flushing losses over and through the dam, and recreational access to the lake.

Strategies:

- Continue participation with the reservoir operations steering committee to focus efforts on optimizing reservoir operations for the fisheries resources. The reservoir operations steering committee, comprised of FWP, PPL Montana, BOR, irrigators, marina operators, guides and outfitters, and sportsmen, meet annually to review water supply forecasts, proposed dam operations and operational guidelines in an effort to minimize impacts of dam operations on fish, wildlife and recreational resources.

- Work with reservoir steering committee and BOR to manipulate reservoir operations to provide better fish habitat.

  - Manage reservoir levels to better promote shoreline vegetation development.

Derbies/Tournaments

Any regional, district-wide or statewide policies, restrictions or regulations governing tournaments which may be developed during the plan period and which geographically include Canyon Ferry will supersede restrictions listed here unless less restrictive.

Rationale:

Fishing tournaments can impact fish populations and conflict with non-tournament angling and recreational opportunity.

Strategies:

- Regulation of fishing tournaments on Canyon Ferry Reservoir will be based on management strategies for individual fish species. Generally, this will require a conservative approach to harvesting native fishes (burbot or ling) and sport fish species (trout and perch) that are subject to predation by walleye. Management strategies direct a liberal approach to harvesting walleye unless monitoring shows a significant decline in walleye. If walleye decline below the goal of 3 per gillnet for a three-year average, tournaments may be restricted or denied to minimize handling mortality. Conversely, if walleye monitoring shows a three-year average exceeding 7 per gillnet, it may be necessary to encourage or require selective harvest of fish taken to support management objectives.

- Harvest-oriented and/or catch and release tournament sponsors may be required to accommodate data collection or fish tagging by the department. Important data can be generated from the tagging or sampling of fish caught in tournaments that would be beneficial to management of the fishery in Canyon Ferry.

- Regulation of tournaments will account for the need to distribute tournaments evenly throughout the year and provide for angling opportunities on the reservoir free from tournaments. A maximum of 12 tournaments per year of any type (open water angling, ice fishing, bowfishing, etc.) will be permitted. More than one tournament will not be permitted for the same day and tournaments will not be approved for consecutive weekends in order to minimize the potential for conflicts. Applications will be considered on a first come basis until all available slots are filled. Applications must be received

by July 1 for ice derbies and November 1 for open water of the year preceding the proposed tournament. Applications received earlier than May 1 for ice fishing and September 1 for open water will be returned to the applicant for resubmittal.

Rainbow Trout

Harvest from competitive fishing events is not consistent with the management strategy to maintain conservative regulations relating to rainbow trout harvest and support year around angler harvest.

- Maintain the past and current management strategy of not allowing competitive fishing derbies for rainbow trout in Canyon Ferry.

Yellow Perch

Perch are highly sought after by anglers as a sport fish in both the ice and open water, but also are the primary forage fish for all piscivorous (fish-eating) fish species in the reservoir.

- Maintain the past and current management strategy of allowing one competitive fishing event during January.

- Based on the conservative perch harvest limits adopted by the FWP Commission, it may be necessary to modify the structure of events (such as team fishing events) to ensure compliance with the daily harvest limit of 15 fish.

Walleye

Tournaments would potentially attract new or additional anglers to the reservoir to assist efforts to promote angler harvest of walleye, which is consistent with strategies to manage walleye numbers.

- Authorize up to three tournaments in a calendar year but no more than one tournament per month to provide a balance with existing users of the lake that are not interested in competitive fishing events and who would be negatively impacted by tournament activities.

- All applications (catch and release or harvest oriented) will receive the same consideration. Preference will be given to tournaments held previously (first come basis).

- Fish mortality for catch and release tournaments is a concern during the summer months when water temperatures exceed 65 degrees. Logistics for handling and transporting fish will be addressed as necessary to minimize mortality.

Burbot (Ling)

Burbot population trends are not well understood and additional harvest caused by a competitive fishing derby may cause unforeseen impacts to the fishery. Burbot are a long-lived and slow growing native species.

- Allow up to two derbies (restricted to angling only) per year. Structure these events to allow for competitive fishing for large and/or the largest fish and not to include competitive fishing for the most fish or most total weight of fish.

Carp

Carp are a non-native fish, which probably contribute very little to the community of native and/or preferred sport fish in the reservoir. No biological concerns are raised by these events and there is currently no need to restrict the number of carp derbies.

- No restriction on number of events other than the total number of events allowed on Canyon Ferry Reservoir, but derbies must be compatible with management objectives.

- Derbies for young anglers should avoid competitive events by structuring the derbies to reward participation rather than for catching the largest or most fish.

- Adult competitive carp events can and should emphasize biggest fish, most fish and/or most weight. Harvest is recommended but not required.

Use of Live Fish as Bait

Goals and Objectives:

Prevent introduction of new fish species into the Upper Missouri River Reservoir system from the use of live fish as bait.

Rationale:

The use of live fish as bait poses significant risks for introducing new fish species to the system. An inadvertent introduction could significantly impact the existing fish communities in Canyon Ferry Reservoir and downstream waters. There is increased interest in fishing with live fish as bait as the walleye fishery continues to develop, particularly during seasons when catch rates are low (i.e., ice-fishing).

Strategies:

- Continue to prohibit the possession or use of live fish as bait unless investigations demonstrate the potential for allowing native bait fish species to be used safely.

- Initiate education efforts regarding the risks associated with use of live baitfish and the importance of preventing inadvertent introductions of new species.

- Educate anglers regarding effective bait alternatives that are commercially available that pose no threat of inadvertent species introductions.

Habitat

Goals and Objectives:

Aggressively protect and enhance fish habitat as a management tool.

Rationale:

Habitat quality for sport fish species and forage species is an important factor in determining the quality and sustainability of the fish community in the Canyon Ferry/Missouri River system. Habitat complexity is critical for providing balance in predator/prey relationships, particularly in western reservoirs where habitat diversity is minimized by fluctuating lake water levels and associated poor development of submergent and emergent vegetation. Continued enhancement of spawning habitat for salmonids provides diversity of recruitment sources to the system.

Strategies:

- Efforts to expand yellow perch spawning and rearing habitat may enhance habitat diversity for this important sport fish and forage species. Implementation will focus on using natural materials, limiting costs, and monitoring effectiveness.

- Enhancement projects for salmonids will focus on providing fishing opportunities and spawning areas in the Missouri River and associated tributaries to enhance trout fishing opportunities in locations where walleye are less abundant.

- Enhancement of tributary habitat and improved water quality will be used to mitigate effects of whirling disease and drought on trout populations in the system.

- Other habitat concerns will be addressed by working with BOR on lake level issues, working with DNRC on Toston Dam operation and Broadwater Power Project mitigation, reviewing 310 and 124 permitting, private pond licensing, and implementation and monitoring of instream flow reservations on the Missouri River and associated tributaries.

Disease and Aquatic Nuisance Species

Goals and Objectives:

Prevent new diseases and exotic aquatic plant and wildlife species from entering the Canyon Ferry/Missouri River system and limit the expansion of current disease agents.

Rationale:

The outbreak of disease has potential to impact all fish species and hatchery egg sources in the Canyon Ferry/Missouri River system. Introductions of invasive aquatic species (e.g., Zebra mussels, Eurasian watermilfoil, New Zealand mudsnail, asian carp) have the potential to out-compete desirable flora and fauna in the reservoir system and can negatively impact recreation and water use as well as fish populations. Illegally moving live fish to or from the reservoir for introduction into other systems is a threat to the Missouri River system as well as water bodies throughout Montana.

Strategies:

- Reduce the risk of introducing disease agents to the system by disease testing hatchery fish and egg sources.

- Initiate education efforts to reduce spread of disease and invasive species.

- Continue regulating private ponds near Canyon Ferry.

- Continue monitoring of existing diseases such as whirling disease.

- Continue work with Aquatic Nuisance Species Coordinator to conduct boat-check and boat washing stations during periods of exceptionally high angler use.

- Continue work with Enforcement personnel to insure live fish are not transported into or out of the reservoir system.

Piscivorous Birds

Goals and Objectives

Work with FWP Wildlife Bureau and the U.S. Fish and Wildlife Service to determine the impacts of pelicans and cormorants to Canyon Ferry fish populations. Consider active bird management strategies if research shows significant impacts to fish populations.

Rationale:

Numbers of American pelicans on Canyon Ferry have grown exponentially from record-low population levels of the early 1990s. Double crested cormorant numbers steadily increased through the late-1990s and have currently stabilized near 500 nesting pairs on the Canyon Ferry Wildlife Management Area. Both pelicans and cormorants are piscivorous (fish eating) birds. FWP observations of pelican and

cormorant diet while fledgling birds were still on the nest (typically mid-June) found pelican diet comprised primarily carp and crayfish, while cormorants showed a preference for trout. These observations only provide a snapshot of what comprises the bird's diet—additional study is necessary to determine seasonal variation in bird diets and to better assess total fish consumption by pelicans and cormorants.

Strategies:

- Determine the cost and feasibility of a Graduate study to assess seasonal diet and composition for pelicans and cormorants.
  - Evaluate the economic impact of consumption of stocked rainbow trout by cormorants.
  - Evaluate the impact of pelicans and cormorants to sport and native fish populations.
  - Evaluate the potential need for population control measures of pelicans and/or cormorants.
- Any proposal to implement population management measures will require an Environmental Assessment and provide opportunity for public comment. No management action will be taken without thorough research and evaluation of bird and fish interactions.

Access

Goals and Objectives

Identify areas and strategies to improve fishing, boating, and camping opportunities on Canyon Ferry Reservoir. Maintain or improve access for shore anglers and kid's fishing.

Rationale:

Maintaining quality access to the reservoir is essential to maintaining Canyon Ferry as one of the most heavily fished waters in the state. Shoreline development in some areas of the reservoir may lead to additional conflict between homeowners and anglers. Other areas of the reservoir have limited boat-launching facilities, which can lead to increased bank erosion from boats launching from beaches.

Strategies:

- Inquire with BOR about installing an additional boat ramp on the east shore (i.e., Duck Creek, Confederate Bay) to reduce bank erosion due to boats launching from the beach and for safety of boats during wind and storm events.
- Educate anglers and landowners about what areas are legally accessible by anglers and recreators.

Flushing Losses at Canyon Ferry Dam

Goals and Objectives:

Evaluate annual and seasonal flushing rates of fish out of Canyon Ferry Reservoir. Determine feasibility of screening Canyon Ferry Dam to reduce flushing losses.

Rationale:

Flushing loss of fish out of Canyon Ferry Reservoir can be significant, especially during high water years. Skaar and Humphrey (1996) documented that flushing losses of hatchery rainbow trout was correlated with high runoff. Flushing loss can effect recruitment of stocked fish, but appears to have little overall effect to perch and walleye abundance in Canyon Ferry. Flushing loss from Canyon Ferry have

significant impacts to fish populations downstream of Canyon Ferry. Flushing flows typically occur in the spring, when pelagic walleye fry are readily flushed over Canyon Ferry Dam. Adult walleye are also susceptible to flushing, with walleye tagged in Canyon Ferry captured in Hauser Reservoir and below Hauser Dam. Record high levels of walleye abundance in Hauser and Holter Reservoirs are largely attributable to flushing from Canyon Ferry Dam. In the Missouri River below Holter Dam, walleye abundance increases following years with flushing flows. Achieving balance between predator and prey species in downstream waters will be difficult unless walleye flushing issues can be addressed.

Strategies:

- Evaluate entrainment and flushing rates of fish out of Canyon Ferry Dam. Determine timing and magnitude of flushing losses.

- Determine feasibility of reducing fish flushing losses out of Canyon Ferry Reservoir.

  - Evaluate screening devices on Canyon Ferry Dam that would reduce flushing losses.

  - Investigate other technologies that may be effectively employed on Canyon Ferry Dam to reduce fish flushing losses and entrainment to downstream waters.

Section 4
Hauser Reservoir

Management History

Hauser Reservoir supports 12 game and 10 nongame fish species (Table 6). Of these 21 species, 11 are native and 10 are nonnative. Yellow perch, rainbow trout, and kokanee salmon have historically been the most abundant game fish found in the reservoir. In recent years, walleye numbers have increased to comprise a major component of the Hauser fishery. Suckers (white and longnose) are the most abundant nongame species. Native game species including burbot (ling), westslope cutthroat trout and mountain whitefish that all occur at low densities.

Since construction of Hauser Dam in 1911, a variety of fish species have been introduced into the reservoir without consideration of habitat requirements. Earliest records from the 1930s document the haphazard introduction of sunfish, bass, bullheads, bluegills, coho salmon, rainbow trout, brown trout, and yellow perch. Most of these early introductions failed to produce a fishery. Rainbow trout, brown trout, and yellow perch proved relatively successful (Figures 7 and 8). Walleye were first planted by FWP into Lake Helena in 1951. Survivors from this plant maintained a sparse population in Hauser Reservoir with numerous documented angler creel reports and gill net catches throughout the 1960s and 1970s. Walleye were again stocked in 1989 by FWP as part of the 1989-1994 Hauser Reservoir Management Plan. Approximately 5,000 advanced fingerlings (3-5” total length) were stocked annually 1989 through 1998. Walleye stocking ceased following expansion of the Canyon Ferry walleye population.

In the early 1950s, kokanee salmon were introduced into Hauser Reservoir. Kokanee plants were unsuccessful in producing a fishery in the reservoir despite stocking almost one million kokanee over a six- year period. The kokanee population that thrived through the 1980s and 1990s apparently originated from plants that were made into Canyon Ferry Reservoir in the late 1960s or from plants made into the Helena Valley Regulating Reservoir in the 1970s. Some of the kokanee stocked in Canyon Ferry Reservoir were siphoned into the Regulating Reservoir where they survived and produced a good fishery, which prompted annual stocking beginning in 1971. The kokanee population in Hauser Reservoir began to develop when the Regulating Reservoir was drained for repairs in 1978. Apparently, kokanee from the Regulating Reservoir were spilled into the Hauser system when the repair work was conducted. Since the late 1970s, the kokanee population in Hauser Reservoir expanded dramatically and has undergone large annual fluctuations. Record high runoff and associated fish flushing during 1995, 1996 and 1997 resulted in a severe decline in the Hauser kokanee population to a fraction of early 1990s levels (Figure 7). Hatchery plants throughout the late 1990s and early 2000s were unsuccessful at reestablishing the kokanee population.

The rainbow trout fishery in Hauser Reservoir has been maintained by annual stocking. Wild rainbow comprise less than 10% of the fishery due primarily to poor quality spawning habitat in tributary streams. Approximately 200,000 3-5 inch Arlee rainbow trout were planted annually through 1990 when stocking numbers were reduced to nearly half in response to the dramatic increase of the kokanee salmon population. Catch rates for rainbow trout declined steadily following reductions in the number of hatchery rainbow stocked. Through the early and mid 1990s, Arlee rainbow were planted after spring runoff in an attempt to minimize losses of fish over the dam when water was spilled. Following the

Table 6. Fish Species in Hauser Reservoir Including Statewide Native Status, First Stocking Date, Population Trend and Relative Abundance.

Species	Native	First Stocking Date	Population Trend (1986-2008)	Relative Abundance (Based on historic field monitoring.)
Game Fish Species				
Kokanee salmon	No	1950	Decreasing	Common
Rainbow trout	No	1934	Stable	Abundant
Brown trout	No	1931	Stable	Common
Burbot	Yes	Native	Increasing	Common
Mountain whitefish	Yes	Native	Decreasing	Common
Yellow perch	No	1938	Decreasing	Abundant
Walleye	No	1951	Increasing	Abundant
Northern pike	No	Unknown	Unknown	Rare
Largemouth bass	No	1926	Unknown	Uncommon
Smallmouth bass	No	Unknown	Unknown	Uncommon
Brook trout	No	Unknown	Unknown	Rare
Cutthroat trout	Yes	Native	Unknown	Rare
Nongame Fish Species				
Common carp	No	Unknown	Stable	Abundant
Longnose sucker	Yes	Native	Decreasing	Abundant
Mottled sculpin	Yes	Native	Unknown	Abundant
White sucker	Yes	Native	Decreasing	Abundant
Fathead minnow	Yes	Native	Unknown	Common
Longnose Dace	Yes	Native	Unknown	Uncommon
Utah chub	No	Unknown	Decreasing	Uncommon
Flathead chub	Yes	Native	Unknown	Rare
Smallmouth Buffalo	Yes	Unknown	Unknown	Rare
Stonecat	Yes	Native	Unknown	Rare

kokanee population crash, numbers of stocked rainbows were increased to the current level of 50,000 Eagle Lake strain rainbow trout planted after spring runoff and 100,000 Arlee rainbow trout stocked in the fall. Plants of catchable sized rainbow trout were initiated in 2002 to reduce predation by the growing walleye population.

Prior to 1988, daily and possession limits for trout were 10 pounds and 1 fish, not to exceed 10 fish. For kokanee and walleye, the daily and possession limits were 10 fish and 5 fish, respectively. Beginning in 1988, more conservative regulations were implemented to prevent over harvest of kokanee and protect the walleye population. The trout and kokanee limits were combined making the daily and possession limits 10 trout and kokanee in combination. In 1996, the combined trout/kokanee limit was reduced to 5 fish with a possession limit of 10 trout and salmon in any combination, and the limit for walleye was changed to 5 fish, only one of which could exceed 20 inches. Current regulations (2009) allow the harvest of 5 trout and salmon in any combination. Walleye regulations have been liberalized to 10 fish daily, only one over 28-inches.

Hauser Reservoir Management Goals and Limiting Factors

The goal for managing the Hauser Reservoir fishery is to provide a cost-effective, balanced multi-species fishery with the opportunity to catch rainbow trout, walleye, and yellow perch with kokanee, brown trout, and other species occasionally contributing to the sport fishery.

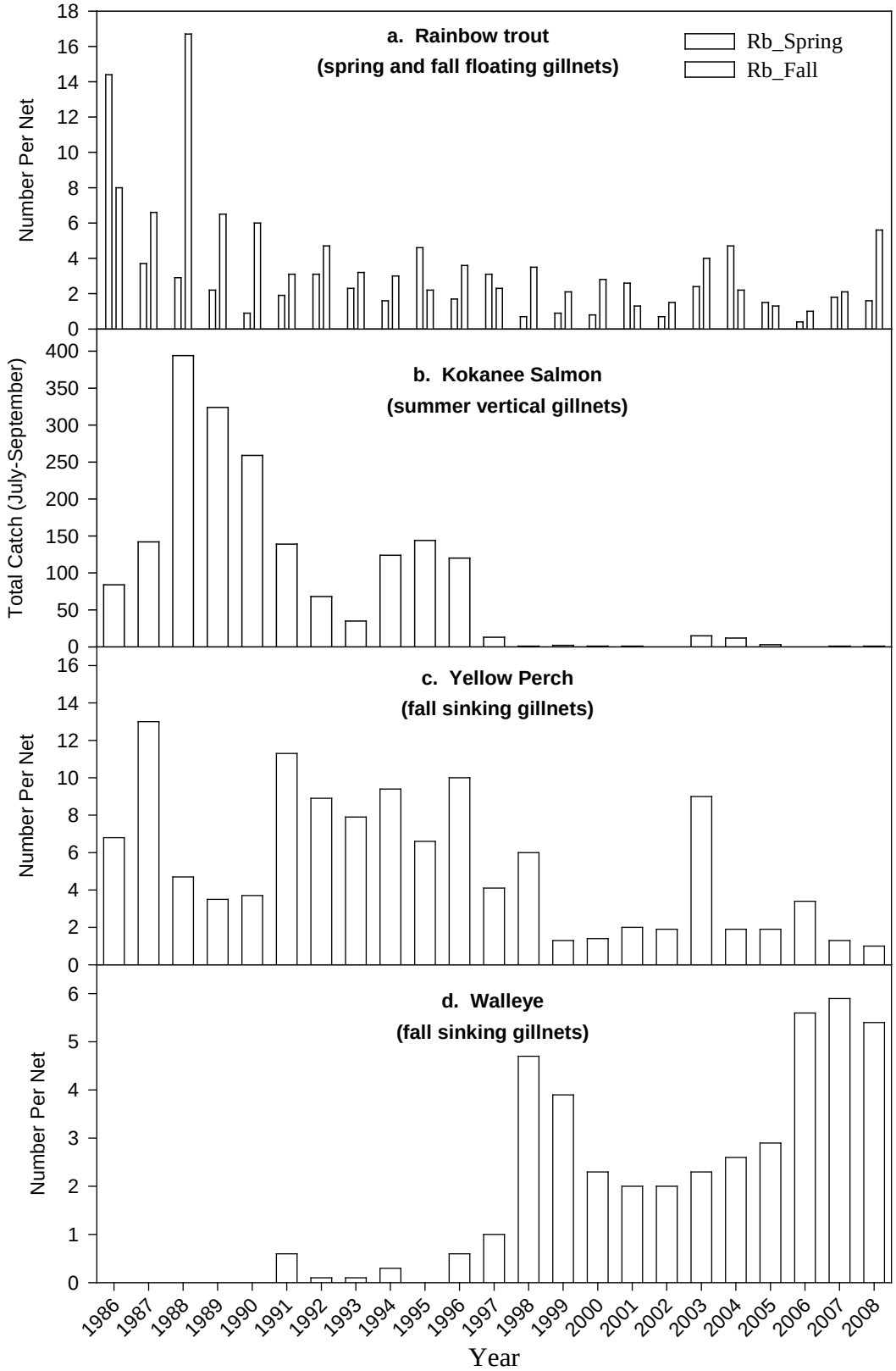


Figure 7. Hauser Reservoir Fisheries Gillnetting Trends for the Four Principal Game Fish: Rainbow Trout (A), Kokanee (B), Yellow Perch (C), and Walleye (D). Species Trends are for the Period 1986 through 2008.

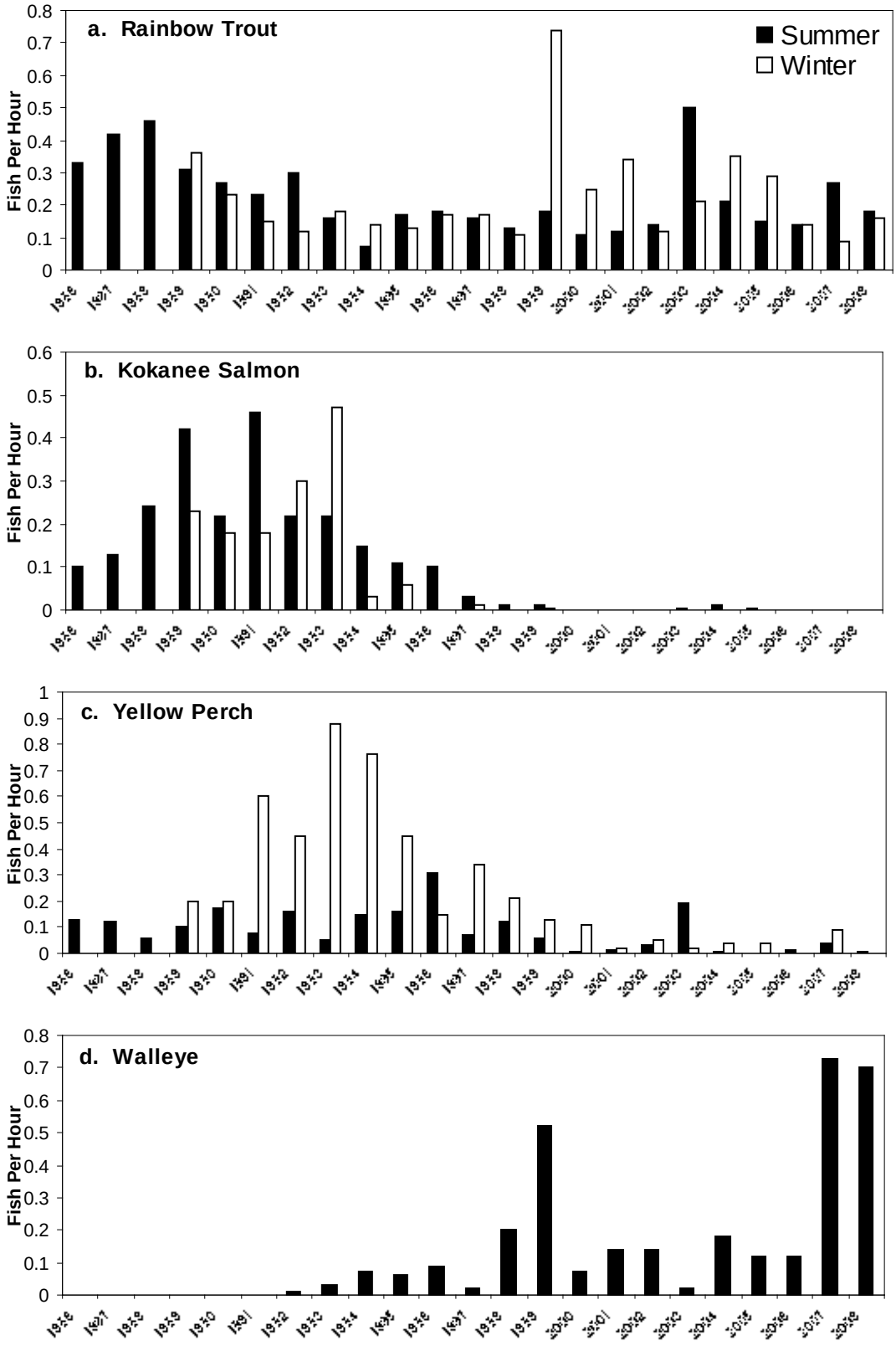


Figure 8. Angler Catch Rates (Fish/Hour) for the Principal Game Species in Hauser Reservoir for the Period 1986 through 2008. Summer (dark bars) and winter (light bars) are represented. Catch rates for rainbow and walleye represent anglers targeting only those species, while kokanee and perch represent all anglers.

Until factors limiting fisheries production in Hauser Reservoir are addressed, the fishery will not reach it's full potential. Most of the problems are large in scale, and involve numerous government agencies and private landowners. Resolution of these problems will require cooperation of highly focused individuals representing the various agencies. As with many large-scale resource management problems, money and manpower will limit the completion of any goals targeted at benefiting the fishery. PPL Montana took over operational control of Hauser and Holter dams in 2000, and received a new federal operating license in 2001. FERC requires PPL Montana to provide funds for monitoring, protection, maintenance, and enhancement of fisheries resources in Hauser and Holter Reservoirs.

Five factors have been identified as limiting fisheries production in Hauser Reservoir:

- Oxygen deficient water continues to be an issue and could be a key limiting factor. Oxygen deficient water (less than 6.5mg/l) is being released annually during fall months (August, September, and October) from Canyon Ferry Dam. Low levels of dissolved oxygen (DO) were first discovered in 1996 below Canyon Ferry dam in Hauser Reservoir, although evidence suggests that it may not be a recent phenomenon. Data collected through the summer and fall of 1998 revealed that the problem is severe at times with low DO values falling below 3mg/l and extending through as much as 75-80% of the surface area of Hauser Reservoir. Based on scientific literature, low DO related impacts to fish range from simple avoidance to increased susceptibility to disease or death if fish are exposed to chronically low DO. Each species is affected differently; although salmonids are more sensitive than most cool and warm water species, especially to DO levels less than 5 mg/l (Environmental Protection Agency (EPA) 1976). Levels below 5 mg/l are especially critical to aquatic life and are estimated to occur an average 45 days/year in Hauser Reservoir. FWP studies conducted in 2002 found that Hauser fish are forced down-reservoir to avoid deoxygenated water, forcing fish to reside either in the Causeway arm or in front of Hauser Dam, where DO typically is at saturation. Downstream movement to avoid low DO waters may cause increased entrainment over Hauser Dam during the fall months. Kokanee salmon likely sustained the most severe impact from low DO, as they would spawn in the fall immediately below Canyon Ferry Dam, where DO values are lowest. Air injection units placed on one turbine at Canyon Ferry Dam has been in place since 2007 and appears effective at bringing DO at least to statewide standards for running water during the fall. Further monitoring in upper Hauser is needed to determine the overall effectiveness of the modified turbine unit and its effects on the fishery.

- Fish loss out of Hauser Reservoir from flushing over the spillway and entrainment (passage through the turbines in the dam) continues to be one of the principal factors affecting species assemblages on an annual basis. While all fish species are susceptible to flushing, kokanee salmon may flush at higher rates because of behavioral tendencies. Skaar and Humphrey (1996) documented flushing of stocked rainbow trout correlated with high runoff. Walleye flushing has been documented through the recovery of tagged fish. Walleye tagged in Hauser Reservoir have been recaptured in Holter Reservoir and the Missouri River below Holter Dam by anglers and FWP survey crews.

- Walleye flushed from Canyon Ferry Reservoir into Hauser Reservoir is an issue that affects the balance of the multi-species fishery. Depending on annual year class strength and water year, the number of walleye flushed into Hauser Reservoir has the potential to be significant. Since the expansion of the Canyon Ferry walleye fishery, walleye relative abundance in Hauser has increased 1,700%, from an average abundance of 0.2 walleye per net (1986-1997) to an average of 3.6 walleye per net (1998-2008). Although Hauser has historically supported a low-level walleye population, there is not enough forage to support the current abundance of walleye in Hauser. Growth rates and

condition factors for Hauser walleye are very poor. Currently, invertebrates and zooplankton comprise the majority of walleye diet samples rather than fish, which is an expected and preferred prey item.

No screening devices are in place on Canyon Ferry Dam to limit the number of walleye flushed into Hauser and Holter Reservoir. However, there may be technology available that may limit the effects of fish flushing from Canyon Ferry. Electric weirs have been successful at reducing entrainment at some dam and diversion facilities. There may also be potential to add pressurization devices that kill any fish that are entrained. Such systems will be expensive and further research is needed to evaluate the cost-effectiveness of such a system. These types of measures may be necessary to maintain a balanced multi-species fishery in Hauser Reservoir.

- Poor quality spawning tributaries to Hauser Reservoir will continue to limit the production of wild fish and the contribution of wild fish to the Hauser fishery. Kokanee salmon have been the only sport fish that has at times had excellent success spawning in Hauser. Spawning has occurred in the Hauser tailrace and Spokane Creek. Other available streams (Trout, McGuire, Soup, Prickly Pear and Silver Creeks) have water quality and quantity problems. Poor land management practices (both historic and present) in these watersheds will continue to limit fish production. Until these issues are addressed, there is little potential for establishing wild runs of fish that could contribute significantly to the Hauser Reservoir fishery.

  Yellow Perch spawning habitat in Hauser Reservoir is limited by the lack of structure in the Reservoir. This is a common problem in many reservoirs as submerged wood that is initially inundated following dam construction breaks down over time. Based on the age of Hauser Reservoir, nearly all of the trees that were initially flooded have decayed.

- Whirling disease is a prominent player in fish management in Montana. Because Hauser Reservoir is reliant on hatchery rainbow trout, this disease has not had as great an impact as it has had on fisheries dependant on wild salmonid reproduction. Rainbow trout are planted into Hauser when they are 8 inches, which lowers the susceptibility to contracting whirling disease compared to smaller fish. However, wild fish produced from tributary or tailrace spawning have a high chance of exposure to the disease. Silver Creek (tributary to Lake Helena/Hauser) was the first tributary in the Hauser/Holter system to test positive for whirling disease in 1998. Since then Prickly Pear, Trout and Spokane creeks have tested positive for whirling disease. Other Hauser tributaries have been tested but results are not yet available. Whirling disease testing will continue at some level on all principal tributaries of the reservoirs.

Hauser Reservoir Management Goals by Species

In order to manage a fish community that includes multiple sport fish species, it is important to recognize that the goal for each species is affected by the success of management strategies for other species in the system and that all fish species may not be maximized simultaneously.

Rainbow Trout

Goals and Objectives:

Rely on rainbow trout to provide a principal component of the sport fishery.

- Recruit a three-year running average of 3 rainbow trout per net to fall floating horizontal gill nets.

- Provide a three-year running average angler catch rate of 0.15 to 0.20 fish/hour.

Rationale:

Throughout the late 1980s, rainbow trout provided a significant percentage of the Hauser Reservoir fishery. Catch rates during this period were considered good, averaging 0.24 rainbow/hour. Concurrently, FWP was annually stocking roughly 220,000 rainbow fingerlings per year. In 1990, the number of rainbows planted was reduced by nearly half to an eight-year average of only 118,000 fingerlings based on recommendations made in the previous management plan to maximize harvest of the self-sustaining kokanee population (FWP 1989). From 1995-1996, an average 100,000 fingerlings were stocked annually with catch rates during this period averaging 0.06 rainbow/hour. Following the crash of the kokanee fishery in the late 1990s, rainbow stocking rates and size of fish at stocking were increased to 150,000 8-inch rainbows stocked in the summer and fall. These stocking rates have yielded an average summer angler catch rate of 0.14 rainbow per hour (2006-2008).

Strategies:

- Continue annual rainbow plants of approximately 100,000 Arlee rainbow (average 8-inches in length) and 50,000 Eagle Lake rainbow (8-inches). These fish will be stocked following peak runoff to reduce flushing impacts. Adaptive management changes in the rainbow stocking plan could occur in response to walleye predation.

  - If three-year average catch in fall floating gillnets falls below 2 rainbow per net, consider changes to the stocking plan (e.g., timing and location of fish plants, strains, size at stocking) and implement if deemed cost-effective.

  - If three-year average catch in fall floating gillnets falls below 1 rainbow per net, consider more liberal management actions, such as reducing harvest limits and/or predator suppression measures.

- Continue evaluation of fall released rainbow trout:

  - Stock rainbow trout at a larger size in the fall to reduce susceptibility to walleye predation and reduce flushing losses.

  - Avoid low DO by waiting until Canyon Ferry Reservoir turns over (generally the first two weeks in October) before stocking fish. Stocking would occur when DO values in Hauser Reservoir are within a more optimum range for rainbow trout (greater than 6.5mg/l).

- Maintain the current fishing regulation of 5 trout or salmon daily in combination, 10 trout or salmon in combination in possession.

Kokanee Salmon

Goals and Objectives:

Recognize kokanee salmon as a limited supplemental species to rainbow trout with poor opportunity as a viable sport species in Hauser Reservoir. Current kokanee abundance is too low to set or maintain a realistic management goal.

Rationale:

Although popular with some anglers, the kokanee fishery in Hauser has historically proven to be erratic and heavily influenced by runoff and to a lesser degree, harvest. Following record water years in 1997 and increased flushing of walleye from Canyon Ferry, current abundance of Hauser kokanee is a fraction of historic levels. Attempts at reestablishing the kokanee population through stocking have failed. Given the current species composition and abundance in the reservoir, it is no longer cost effective to maintain the Hauser kokanee fishery.

Strategies:

- Eliminate stocking kokanee in Hauser Reservoir. Water quality issues, walleye predation, and flushing rates of kokanee make the cost-effectiveness of continued kokanee stocking unjustifiable. Stocking may continue if these limiting factors can be mitigated.

- Evaluate other strategies that may provide cost-effective solutions to maintaining the Hauser kokanee fishery (i.e., artificial spawning channels).

Walleye

Goals and Objectives:

Maintain walleye as a species that provides a balanced, cost-effective fishing opportunity in Hauser.

- Maintain a three-year running average of 2-3 walleye per fall sinking gill net.

Rationale:

The current prey base in Hauser is not capable of supporting walleye abundance at current walleye population levels. Walleye population numbers should be decreased to meet prey availability. The stated objective of 2-3 walleye per sinking fall gillnet is based on recent gillnetting trends as well as the successful multi-species fishery that historically existed in Holter Reservoir prior to expansion of walleye in Canyon Ferry. Holter has provided a sustainable multi-species fishery containing rainbow trout, kokanee salmon, walleye and yellow perch. Hauser Reservoir differs from Holter Reservoir in several key physical parameters. Most prominent is water retention time: Holter exchanges water on average every 21 days while Hauser is only 8 days (Table 1). This has the potential to strongly influence walleye populations and prey availability because of flushing losses. The substantially lower growth rates of Hauser walleye indicate prey availability is much lower than in adjacent reservoirs. Flushing of walleye from Canyon Ferry will continue to be a problem unless a way to reduce entrainment at Canyon Ferry Dam is found.

Strategies:

- Adjust angler bag limits to increase harvest and lower walleye abundance to levels sustainable with forage abundance.

  - Increase daily bag limit to 20 fish only one over 28-inches, 40 in possession to maximize walleye harvest and decrease abundance to levels more consistent with available forage.

  - Monitor harvest from the new Lake Helena Fishing Access Site (FAS) to determine if size or seasonal restrictions are necessary to protect larger-sized fish during the spring. Until recently, boat access to Lake Helena has been limited, and the new FAS may increase fishing pressure during the spring.

- Evaluate restrictions in walleye bag limits if walleye abundance falls below the three-year average of 2 walleye per gillnet and angler harvest is determined to be the cause of abundance declines.

  - Regulation changes will be considered if rainbow trout abundance exceeds management goals (three-year running average of 3 rainbow trout per fall floating gillnet) and yellow perch abundance is near management goals (three-year running average of 4 yellow perch per fall sinking gillnet).

  - Restrictions may include reducing bag limits, size restrictions, and/or seasonal closures.

- Evaluate use of other tools to reduce walleye numbers if three-year average walleye catch in fall sinking gillnets increases above 6 walleye per net or if rainbow trout and/or yellow perch abundance falls below 1 fish per fall gillnet on a three-year average. Other tools may include unlimited harvest, gillnetting or trap netting during periods when fish are highly concentrated, spearing through the ice or underwater, among others. Any of these management actions will require public input prior to implementation.

  - If these triggers are exceeded within three years following plan implementation, consider deferring management action to better determine effectiveness of strategies outlined in this plan.

- Solicit funding to determine walleye flushing and entrainment at Canyon Ferry Dam.

  - Determine the feasibility of screening or other methods to reduce walleye entrainment and evaluate the effects on Canyon Ferry Reservoir.

Brown Trout

Goals and Objectives:

Rely on brown trout to provide a limited trophy-fishing experience that is reliant entirely on wild reproduction.

- Maintain at least 0.5 brown trout per sinking gillnet.

Rationale:

Evidence suggests that kokanee salmon had a detrimental impact on brown trout populations in Hauser Reservoir. Competition for spawning areas may have reduced brown trout populations. With kokanee populations depressed, brown trout populations have demonstrated minor increases. Brown trout are a long-lived species that have maintained low densities in Hauser because of limited reproduction and/or recruitment. Relatively few anglers target brown trout however, records indicate that prior to the kokanee population explosion in the early 1990s, brown trout numbers were higher and represented an important trophy fishery.

Strategies:

- Identify critical brown trout spawning areas (e.g., Spokane Creek) and implement habitat improvement projects to increase spawning and recruitment.

- Continue catch and release angling regulations on brown trout from below Canyon Ferry dam to Hauser Dam.

- Eliminating angler harvest allows the brown trout population to rebuild. Continuing this regulation maintains consistency with brown trout regulations proposed throughout the reservoir system.

Yellow Perch

Goals and Objectives:

Rely on yellow perch to provide a self-sustaining fishery that is based entirely on wild reproduction.

- Maintain a running average of at least 4.0 yellow perch per fall sinking gill net.

Rationale:

Yellow perch were planted in Hauser Reservoir from 1939 to 1955. Subsequently they have maintained moderate population levels in the reservoir entirely through natural reproduction. Although present for approximately the same period of time, perch densities have not achieved levels comparable to Holter Reservoir. Yellow perch populations have been limited by flushing, habitat conditions, predation, and possible competition with abundant planktivores (kokanee salmon). Populations appear to be driven by environmental conditions rather than by the number of spawning aged adults. A relatively small spawning stock of adult yellow perch can still produce large year-classes of fish. Perch flushed from Canyon Ferry also heavily influence population abundance.

Yellow perch were commonly the most sought after species by Hauser ice-fisherman and can be an important component of the Hauser winter fishery. Catch rates have always been variable but have declined as walleye abundance has increased. Winter angler catch rates averaged 0.45 fish per hour (1989 through 1997) and has declined to an average of 0.06 fish per hour (1998-2008). In winter 2008 no anglers were surveyed who were targeting exclusively perch.

Strategies:

- Identify and implement cost-effective yellow perch habitat enhancement projects.

  - Construct and deploy tree structures for spawning and rearing habitat if an easily accessible source of trees is available. Recycled Christmas trees from the Helena and Bozeman areas are used to construct perch spawning structure in Canyon Ferry. Hauling of Christmas trees or cutting junipers from nearby areas are options for more trees, however these options are often limited by the cost of cutting and hauling trees on site.

  - Identify and experiment with other artificial habitat structures that may enhance perch spawning.

- Lower daily angler bag limit to 25 yellow perch daily with no possession limit.

  - Limiting factors listed above (see Rationale) likely have more significant impacts to yellow perch abundance than angler harvest. Dropping the daily bag limit from 50 to 25 will allow evaluation of angler harvest and determine if harvest is a significant limiting factor.

  - Recommend raising the bag limit if yellow perch abundance increases above 7 perch per fall sinking gillnet on a three-year running average.

- Consider additional management actions if yellow perch abundance falls below 1 perch per fall sinking gillnet on a three-year running average.

- Additional actions may include further reductions in angler harvest of perch and/or implementation of active walleye management strategies.

- If these triggers are exceeded within three years following plan implementation, consider deferring management action to better determine effectiveness of strategies outlined in this plan.

Burbot (Ling)

Goals and Objectives:

Rely on burbot to provide a low-level, self-sustaining fishery that is supported entirely by wild reproduction.

- Attempt to recruit a three-year running average of 0.5 to 1.0 burbot per fall sinking gill net.

Rationale:

Burbot (ling) is one of three native game fish in Hauser Reservoir. Limited information is known on burbot population dynamics and basic life history in the upper Missouri River reservoir complex, however burbot abundance in Hauser appears to have increased over the past four years.

Strategies:

- Increase knowledge of burbot population dynamics in Hauser Reservoir. Specifically, efforts will be made to collect data (age, growth, food habits, general abundance) from burbot during normal field sampling (gill netting and electrofishing).

- Evaluate reduction in angler harvest if three-year running average falls below 0.5 burbot per fall sinking gillnet.

- Evaluate increasing angler harvest if three-year running average catch of burbot increases above 2.0 burbot per fall sinking gillnet.

- Consider establishing a sampling regime specifically targeting burbot. This would likely involve use of specialized sampling gears deployed in the late winter months.

- Redirect effort during winter creel to determine burbot harvest.

Northern Pike

Goals and Objectives:

Monitor and suppress the northern pike population in the reservoir, and evaluate impacts to other species.

Rationale:

Increased abundance of northern pike in upstream waters significantly increases the likelihood of flushing of northern pike into Hauser. FWP documented the first northern pike in Hauser during standardized sampling in fall, 2009. Northern pike are highly piscivorous fish and the current forage base in Hauser is likely not adequate to support an additional voracious predator.

Strategies:

- Eliminate all angler bag limits for northern pike in the upper Missouri River reservoir system.

- Identify critical spawning habitats in the reservoir and determine if habitat manipulations can suppress pike numbers and emigration through the system.

- Explore and implement other opportunities or techniques to suppress northern pike numbers.

- Determine impacts of northern pike to existing forage.

- Additional management methods may be necessary to reduce pike populations (e.g., spearing, commercial fishing, required harvest during tournaments) following public review and MEPA process.

Other Hauser Reservoir Fisheries Management Issues

Low Dissolved Oxygen (DO)

Goals and Objectives:

- Monitor DO values in Hauser Reservoir to ensure that water released from Canyon Ferry contains at least 5mg/l DO throughout the entire year.

Rationale:

Low levels of DO (less than 6.5 mg/l) were first discovered in 1996 below Canyon Ferry Dam in Hauser Reservoir. Based on scientific literature, DO values of at least 5 mg/l are required to maintain "well-rounded" fish populations while 6 mg/l is required to support healthier and more diverse populations (EPA 1976). Impacts of broad environmental stresses such as low DO are manifested through an increased incidence of parasites and disease. Species are affected differently by low DO, but in general, salmonids are more sensitive than most cool and warm water species to DO levels less than 5 mg/l. Monitoring on Hauser has found that fish are avoiding the upper reservoir; especially during periods when oxygen levels from water releases from Canyon Ferry Dam are lowest (late-summer and early-fall). Presence of a low DO plume may also increase fish entrainment at Hauser Dam as fish move into the lower reservoir to avoid the low DO plume.

Strategies:

- Continue to monitor fish movement in Hauser Reservoir and monitor the effectiveness of oxygenation units on Canyon Ferry dam.

- Evaluate the results of recent flushing study at Hauser Dam to determine effects of water quality on fish entrainment at Hauser Dam and determine if low DO increases fish flushing out of Hauser Reservoir.

- Work with BOR to identify and rectify any problems with the oxygenation unit on the turbine at Canyon Ferry Dam. Cavitation and excessive wear on the turbine unit has been observed, occasionally making the unit inoperable.

- Enhance water quality monitoring by collecting DO measurements in the upper reservoir during low DO periods (July-September).

Flushing Losses at Hauser Dam

Goals and Objectives:

Evaluate annual and seasonal flushing rates of fish out of Hauser Reservoir. Determine feasibility of screening Hauser dam to reduce flushing losses.

Rationale:

Flushing loss of fish out of Hauser Reservoir is a key limiting factor affecting fish populations. All fish species are susceptible to flushing, however, kokanee may flush at higher rates because of behavioral tendencies. Kokanee population fluctuations can be largely attributed to age class strength and magnitude of water runoff. Rainbow trout and walleye flushing have also been documented. Skaar and Humphrey (1996) documented that flushing losses of hatchery rainbow trout was correlated with high runoff. Fish flush both through turbines and over the spillway. Walleye flushing has been documented through the recovery of tagged fish. Walleye tagged in Hauser Reservoir have been recaptured in Holter Reservoir and in the Missouri River below Holter Dam by anglers and FWP sampling.

Strategies:

- Evaluate entrainment and flushing rates of fish out of Hauser Dam as determined by recent graduate study. Determine timing and magnitude of flushing losses.

- Determine feasibility of reducing fish flushing losses out of Hauser Reservoir.

  - Evaluate screening devices on Hauser Dam that would reduce flushing losses.

  - Investigate other technologies that may be effectively employed on Hauser Dam to reduce fish flushing losses.

Walleye Flushing from Canyon Ferry Reservoir

Goals and Objectives:

Determine walleye flushing rates from Canyon Ferry Reservoir and evaluate measures to reduce or eliminate walleye flushing from Canyon Ferry Dam.

Rationale:

Walleye flushing out of Canyon Ferry into Hauser Reservoir has increased as the walleye population in Canyon Ferry increased. Increased walleye densities in Hauser Reservoir affect the balance of the multi-species fishery with increased predation on trout and yellow perch. Since the expansion of the Canyon Ferry walleye fishery, walleye relative abundance in Hauser has increased 1,700%, from an average abundance of 0.2 walleye per net (1986-1997) to an average of 3.6 walleye per net (1998-2008). Although Hauser has historically supported a low-level walleye population, there is not enough forage to support the current abundance of walleye in Hauser.

Strategies:

- Request funding from BOR to determine how most walleye pass through Canyon Ferry Dam, study walleye flushing rates, and identify strategies to reduce or eliminate entrainment.

- Determine feasibility of reducing fish flushing losses out of Canyon Ferry Reservoir.

  - Evaluate screening devices on Canyon Ferry Dam that would reduce flushing losses.

- Investigate other technologies that may be effectively employed on Canyon Ferry Dam to reduce fish flushing losses and entrainment to downstream waters.

Habitat

Goals and Objectives:

Enhance wild fish spawning opportunities in Hauser Reservoir and in tributary streams to Hauser Reservoir.

Rationale:

In the past, lack of funding limited the number of projects completed to enhance wild reproduction of Hauser fish. Over the past 10 years, habitat projects such as yellow perch spawning structure placement, habitat enhancement on Prickly Pear Creek, and Merritt Spring Creek channel reconstruction have been constructed or implemented. Other identified projects that are currently limited by funding or other resources include Spokane Creek channel reconstruction, water allocation in Prickly Pear Creek, removal of potential barriers on Trout Creek, among others. The Future Fisheries program provides funding for projects targeting enhancement of wild fish and will continue to provide financial assistance for projects in the future. An important component to accomplishment of habitat enhancement projects on Hauser Reservoir will be the participation by various watershed and local sportsman's groups.

Strategies:

- Develop a list of habitat projects that would be funded by FERC relicensing. Develop this list in conjunction with sportsmen's groups and local watershed groups. Prioritize projects based on cost-effectiveness and highest benefit.

- Implement enhancement projects that will benefit spawning and recruitment of wild fish in Hauser Reservoir.

- Submit future fisheries grant proposals for habitat enhancement projects benefiting Hauser Reservoir.

Disease and Aquatic Nuisance Species

Goals and Objectives:

Monitor Hauser Reservoir tributaries for whirling disease. Prevent introduction of exotic plant and wildlife species from entering the reservoir system.

Rationale:

Whirling disease is a prominent factor in fish management in Montana. Because of Hauser Reservoir's reliance on hatchery rainbow trout, this disease has not had as great an impact as on wild salmonid fisheries. Rainbow trout are planted into Hauser when they are 8 inches. Fish of this size are not as susceptible to contract whirling disease as smaller fish. However, wild fish produced from tributary or tailrace spawning have a high chance of exposure to the disease. Introductions of invasive aquatic species have the potential to out-compete desirable flora and fauna in the reservoir system and can negatively impact recreation and water use as well as fish populations.

Strategies:

- Sample Hauser Reservoir tributaries for whirling disease as part of a state-wide monitoring program. Include whirling disease testing results in annual report.

- Periodically conduct on-site exposure testing in Silver, Prickly Pear, and Trout creeks. Collections will also be made in the Hauser tailrace. McGuire, Spokane, and Ten Mile creeks will be tested as funding allows.

  - Utilize statewide whirling disease taskforce funding and manpower to conduct *in situ* exposure of fish to determine infection rates and severity.

Derbies/Tournaments

Goals and Objectives:

Manage derbies/tournaments on Hauser Reservoir to minimize conflict with the general angling public, encourage safety, and ensure consistency with fishery management goals and objectives.

Rationale:

Currently one angling tournament is held on Hauser Reservoir in the summer, and no tournaments are held in the winter. Increased interest in fishing tournaments may result in additional requests in the future.

Strategies:

- Do not allow ice fishing tournaments on Hauser Reservoir for public safety reasons. Ice on Hauser often does not develop to a thickness that would allow for safe ice-fishing tournaments.

- Monitor harvest associated with angling tournaments. If harvest of sport fish is deemed excessive and detrimental to the population, angling tournaments of this nature will be discontinued.

- No more than three derbies/tournaments will be allowed each year. Tournaments would be required to coordinate with Bureau of Land Management (BLM) and/or FWP for access (where appropriate). FWP will encourage use of private access facilities (where possible) to alleviate crowding problems.

Section 5
Missouri River - Hauser Tailwater (Hauser Dam to Holter Reservoir)

The free flowing segment of the Missouri River located between Hauser Dam and Holter Reservoir is about 4.6 miles long and flows through a narrow, high-walled gorge for most of its length prior to entering into upper Holter Reservoir. Impounded water from Holter Dam greatly influences the lower 1.5 miles of river. Productivity in this river segment is affected by the two upstream reservoirs (Canyon Ferry and Hauser). Deep-water releases from Canyon Ferry Dam and associated releases from Hauser Dam create tailrace conditions where water temperatures are moderated and the water is enriched with nutrients.

One of the unique aspects of this area is that access is limited to foot or boat travel because of the ruggedness of the canyon. Boating restrictions imposed during the 1999 legislature established a no-wake zone in this section of river from Hauser Dam to Beaver Creek. Areas accessible by car include Hauser Dam, Beaver Creek, and Gates of the Mountains Marina (private ownership).

This segment of the Missouri River has been designated as a Class I, Blue Ribbon sport fishery. The river provides important spawning habitat to brown trout, rainbow trout, kokanee, and mountain whitefish. Species of fish present in the river are similar to those found in Hauser and Holter Reservoir (Tables 6 and 7). Mountain whitefish and rainbow trout are the most abundant game fish species and suckers are the most abundant nongame species.

Management History

Trout populations in this segment of the Missouri River were monitored nearly annually until 1987, when electrofishing surveys were discontinued because of concerns about potential adverse effects to spawning rainbow and brown trout. Due to increased fishing pressure and concerns over angler impacts to the fishery, electrofishing surveys were resumed during odd-numbered years in 2003. Historic estimates of the number of rainbow trout (longer than 9.0 inches) ranged from a low of 1,600 fish per mile (1983) to a high of 5,300 fish per mile (1986) while estimates conducted in the 2000s range from 1,900 fish per mile (2005) to 4,600 fish per mile (2003). Studies in 1995 and 1996 indicated that flushing of fish from Hauser Reservoir heavily influences the abundance and species of fish in this reach (Skaar and Humphrey 1996). Rainbow trout (Skaar and Humphrey 1996) and walleye flushing (Teuscher and Humphrey 1996) have been documented along with kokanee salmon. Apparently, fish are flushed both through turbines and over the Hauser Dam spillway. An increasing number of walleye have been caught in recent years, which corresponds with an increasing Canyon Ferry walleye population and years with high runoff. Walleye tagged in Canyon Ferry and Hauser Reservoirs have been recaptured in Hauser tailrace by anglers and FWP survey crews.

Historically, this section of the Missouri River has been managed as a wild trout fishery and, with the exception of McConaughy strain rainbow trout plants (1984 through 1986), has not been supplemented with hatchery fish. However, rainbow trout planted into Hauser and Holter reservoirs undoubtedly influence the resident population. Electrofishing data from 2007 indicated that approximately 35% of the rainbow population in the river was comprised of hatchery fish. Hatchery fish appear more susceptible to

angling, with 13% of hatchery fish exhibiting hook scars, verses only 8% of wild rainbows with hook scars during 2007 estimates.

Historical brown trout population estimates obtained during 1982 and 1983 indicated that 250 to 425 fish were residing in the river throughout the year and that approximately 1,000 migrant spawners entered the river segment every fall. The average total length of brown trout was exceptional, with fish longer than 18.0 inches comprising up to 48% of the population. Since these early estimates, brown trout populations have declined. Throughout the mid-1980s, the kokanee salmon population in Hauser and Holter Reservoirs increased dramatically resulting in concerns about the potential adverse effects that kokanee may have on this brown trout population. Current brown trout abundance is well below historic levels, averaging 130 brown trout per mile (2003-2007). Average size of brown trout is still exceptional, with an average length of 21-inches in 2007.

Fishing regulations on this segment of river allow for year around angling and differ from Holter Reservoir in that only one rod is allowed compared to two on the reservoir.

Prior to 1983, daily and possession limits for trout were 10 pounds and 1 fish, not to exceed 10 fish. Beginning in 1983, the Department implemented a more restrictive limit of 5 fish. In 1992, catch and release regulations were implemented to protect the remaining brown trout population. Currently (2009) brown trout remain catch and release only and rainbow limit is 5 fish daily and in possession, only 1 over 18-inches. Walleye limits are 6 daily and in possession, includes 5 under 20-inches and 1 over 28-inches.

Missouri River – Hauser Tailwater Management Goals and Limiting Factors

The management goal for the Missouri River below Hauser Dam is to provide a multi-species fishery focused on wild rainbow and brown trout, with walleye and kokanee providing a low level component to the fishery.

The following factors have been identified as limiting the fisheries production in the Missouri River below Hauser Dam. Until they are addressed, the fishery will not reach its full potential. These problems are directly affected by the management direction of Canyon Ferry, Hauser, and Holter Reservoirs.

- Walleye flushed from Canyon Ferry and Hauser Reservoirs into the Missouri River below Hauser Dam is an issue that influences the dynamics of the multi-species fishery. Detailed information on the magnitude of flushing rates from Canyon Ferry is needed to determine timing, magnitude, and influence of walleye flushing. Currently, no screening devices are in place on Canyon Ferry or Hauser Dams to limit the number of walleye flushed.

- Poor spawning conditions in Beaver Creek will continue to limit wild fish production in the Missouri River. Beaver Creek is the principal spawning stream that supports substantial runs of rainbow trout. FS data demonstrates that large beaver dams on the lower reaches (the first 1-2 miles upstream of the confluence with the Missouri River) can substantially impact fish passage to important upstream spawning gravels. Problems have surfaced in the past when angler groups and FWP have removed dams from Beaver Creek without consensus from FS. High sediment values and imbeddedness of substrates further compound spawning success. FS initiated designs for habitat improvements in lower Beaver Creek, however administrative and financial hurdles have suspended implementation.

- Whirling disease is a prominent player in fish management in Montana. This reach of the Missouri River provides exceptional fishing for wild rainbow trout as well as producing a substantial portion of the wild rainbow trout in Holter reservoir. Wild fish produced in the tailrace and Beaver Creek have a high chance of exposure to the disease. These runs could be adversely impacted if whirling disease is discovered. Whirling disease has not been found in these areas yet and testing will continue.

- Angling pressure is increasing because of the close proximity to the greater Helena area. The growing population in the Helena valley suggests that pressure will increase as the quality of this river section becomes widely known. Detailed creel surveys quantifying angler catch rates and satisfaction will be important in the management of this unique fishery.

Missouri River – Hauser Tailwater Management Goals by Species

Because of the proximity and association with Holter Reservoir and to a lesser degree Hauser Reservoir, many of the species specific goals for the river below Hauser are the same or similar as those stated for the reservoirs. FWP monitors fish populations via electrofishing on odd numbered years, however current angler harvest estimates are not available.

Rainbow Trout

Goals and Objectives:

Rely on rainbow trout (particularly wild rainbow trout) to provide a cost-effective, sustainable fishery.

- Maintain fall rainbow trout abundance at or above 3,500 rainbows per mile during fall electrofishing surveys.

- Manage angling pressure to sustain population and manage angler conflict.

Rationale:

This section of the Missouri River has always been managed as a wild trout fishery and, with the exception of McConaughy strain plants (1984 through 1986), has not been directly supplemented with hatchery fish. Rainbow trout planted into Hauser and Holter reservoirs have a significant influence on the resident population. Electrofishing data from 1986 and 1987 indicated that approximately 15% of the rainbow population in the river were comprised of hatchery fish. In 2007, 35% of rainbows captured during population monitoring were of hatchery origin. Increased use of this river section in recent years has led to increased conflicts between various recreational users in the tailrace (e.g., fly fisherman, bait anglers, boaters, guides). A no wake zone currently in place from Hauser Dam to Beaver Creek reduces some conflict between shore anglers and boaters, however poor accessibility in the canyon can make enforcement difficult.

Strategies:

- Continue fall electrofishing on odd-numbered years to monitor rainbow trout numbers. If rainbow trout abundance falls below 1,000 rainbow trout per mile, consider regulation changes to protect the wild trout fishery. Changes may include but are not limited to:

  - Seasonal closures and/or time of day closures.

  - Additional motorized restrictions (also see other Management Issues).

- Evaluation of guided fishing pressure and strategies to address the issue.
- Additional size restrictions to protect spawning-sized fish.
- Evaluation of predator (walleye) impacts to the wild trout fishery.

- Educate anglers about current regulations and rationale for management actions.
- Monitor reservoir-operating plans to ensure adequate stream flows in this river segment to support fish populations.
- Monitor whirling disease presence and identify management strategies to minimize the impacts of whirling disease.
- Encourage the development and maintenance of wild rainbow trout spawning and recruitment from the Hauser tailrace and Beaver Creek.
  - Continue work with FS for habitat and fish passage improvements in lower Beaver Creek.
  - Maintain the closure on Beaver Creek from November 30th to June 15th to protect spawning rainbow trout.
- Develop a multi-year angler creel census using FERC relicencing funds to evaluate angler catch rates, annual harvest of rainbow trout, percent of rainbows caught and released, among several other statistics.

Brown Trout

Goals and Objectives:

Rely on brown trout to provide a self-sustaining trophy component to the Hauser tailwater fishery.

- Maintain brown trout abundance at or above 150 brown trout per mile during fall electrofishing surveys.

Rationale:

Currently brown trout numbers appear to be limited by existing habitat and historically by competition with kokanee salmon for spawning areas. Tools to enhance brown trout numbers are limited to restrictive fishing regulations because habitat and flow conditions are considered good. Potential competition with kokanee salmon has been reduced due to failed kokanee reintroduction efforts in Hauser Reservoir. Brown trout could be adversely affected if kokanee abundance ever reach historic levels. In the interim, brown trout populations have a good chance to experience growth with catch and release regulations in place on this section of river and throughout Holter Reservoir.

Historically, during the fall spawning season, brown trout in the 5-10 pound size range would migrate into the river from Holter Reservoir. Fall population estimates documented that fish greater than 18 inches comprised up to 48% of the population. Anglers occasionally landed these large fish, however, historic catch rates were relatively low, averaging only 0.04 fish per hour. Historic harvest was also low with an estimated 700 brown trout harvested in 1983. Population estimates in 2007 were below historic

levels at 120 brown trout per mile. Large brown trout are still prevalent in this river section, with an average size of 21-inches in 2007 estimates.

Strategies:

- Maintain the catch and release fishing regulation for brown trout that was implemented in 1992 for this reach of the Missouri River and Holter Reservoir.

- Consider additional restrictions if brown trout numbers fall below 100 brown trout per mile during fall estimates.

  - Consider use of seasonal fishing closure during critical spawning periods.

  - Identify critical spawning areas and seasonally restrict fishing these areas if deemed feasible.

- Continue work with FS to improve potential spawning habitat in Beaver Creek.

- Develop a multi-year angler creel census using FERC relicencing funds to evaluate angler catch rates among several other statistics.

- Continue to monitor the Holter kokanee population and evaluate impacts to the brown trout population in the Hauser tailrace. Discontinue stocking or reduce stocking rates of surplus kokanee in Holter Reservoir if there are observable effects to brown trout abundance.

Kokanee Salmon

Goals and Objectives:

Rely on remaining kokanee salmon flushed from Hauser Reservoir and any natural reproduction and supplemental stocking that may occur in Holter Reservoir to contribute in a limited way to the multi-species fishery.

Rationale:

This fishery has been heavily supplemented through annual flushing of kokanee out of Hauser reservoir. Historically, kokanee spawned heavily in this river section but it now appears that survival of eggs to hatching is low. Due to unsuccessful attempts to reestablish the kokanee fishery in Hauser, kokanee abundance is low in the Hauser tailrace. Unless the Hauser fishery rebounds, this river section will rely upon natural reproduction or supplemental stocking of kokanee from Holter Reservoir.

Strategies:

- Depend on supplemental kokanee stocking and natural reproduction from Holter Reservoir to provide a low-level kokanee fishery to the Hauser tailrace.

- Reduce or discontinue stocking kokanee in Holter Reservoir if kokanee impact spawning of brown trout in the Hauser tailrace.

Walleye

Goals and Objectives:

Rely on walleye flushed from Hauser Reservoir, resident walleye, and migratory adults from Holter to contribute to a multi-species fishery.

Rationale:

Walleye trends in this river section largely mimic walleye trends from Hauser and Holter Reservoirs. Historic surveys and angler tag return data show many flushed walleye appear to remain immediately below the dams from which they are flushed. Investigations specific to the Holter reservoir walleye population determined that this river section plays a minor role for the Holter Reservoir walleye population (Binkley 1996). There is a trophy component to the walleye fishery in this reach, with large walleye (greater than 25-inches) caught by anglers, especially in the spring and fall months. Typically, not enough walleye are captured during fall electrofishing to produce a viable population estimate; therefore an abundance management goal for walleye is not set.

Strategies:

- Adjust river regulations to reflect regulations on Holter Reservoir to maintain consistent walleye management strategies between the river and the reservoir.

  - Increase daily bag limit to 10 fish daily, with only one fish over 28-inches. No harvest of fish between 20-28-inches. Possession limit of 20 fish.

- Develop a multi-year angler creel census using FERC relicencing funds to evaluate angler catch rates, annual harvest of walleye, percent of walleye caught and released, among several other statistics.

Other Missouri River – Hauser Tailwater Fisheries Management Issues

Walleye Flushing from Canyon Ferry Reservoir

Goals and Objectives:

Determine walleye flushing rates from Canyon Ferry Reservoir and evaluate measures to reduce or eliminate walleye flushing from Canyon Ferry Dam.

Rationale:

Walleye flushing out of Canyon Ferry into Hauser and Holter Reservoirs likely increases during high water runoff years. Increased walleye densities in Holter Reservoir and in the Missouri River will affect the balance of the multi-species fishery due to increased predation on trout, perch, and kokanee. It is unknown if walleye densities in the Missouri River will increase substantially over the long term with increased flushing from upstream. Walleye have historically been caught in low numbers in this reach. Recent walleye increases in upstream waters have brought about increased angler catch rates in this portion of the Missouri River. No screening devices are in place on Canyon Ferry dam to limit the number of walleye flushed.

Strategies:

- Request funding from Bureau of Reclamation to study walleye flushing rates and identify strategies to reduce or eliminate entrainment at Canyon Ferry Dam.

Habitat

Goals and Objectives:

Enhance wild fish spawning opportunities in Holter Reservoir and Missouri River tributary streams.

Rationale:

Spawning conditions in Beaver Creek will continue to limit wild fish production in the Missouri River. Beaver Creek is the principal spawning stream that supports substantial runs of rainbow trout. Habitat conditions in Beaver Creek have been degraded through a variety of land use activities. Agricultural development, roads on the floodplain, channelization, and pipeline construction have all contributed to the decline in quality habitat. Channel alteration has allowed beaver dams to block fish passage. Specific limiting factors include elevated fine sediment values, imbeddedness of substrates, channel straightening (loss of stream length), and loss of large woody debris recruitment. Recent fires and beaver colonization are other factors influencing fisheries production.

Strategies:

- Identify and complete enhancement projects that will benefit spawning and recruitment of wild fish in Holter Reservoir and the Missouri River below Hauser Dam. Work cooperatively with the FS to develop a fisheries management strategy for the Beaver Creek watershed. Specifically, find agreeable solutions to beaver management in Beaver Creek to facilitate use by wild fish.

Disease and Aquatic Nuisance Species

Goals and Objectives:

Monitor the Missouri River below Hauser Dam and principal tributaries for whirling disease. Prevent introduction of exotic plant and wildlife species from entering the reservoir system.

Rationale:

Wild fish produced in this portion of the Missouri River and from Beaver Creek have a high chance of exposure to whirling disease. Due to the high amount of angler pressure, this river reach may be more susceptible to inadvertent introductions of nuisance species from anglers (i.e., improperly cleaned boats, waders, boots).

Strategies:

- Conduct in situ exposure testing for whirling disease in the Missouri River and/or Beaver Creek. Utilize statewide whirling disease monitoring program to conduct *in situ* exposure of fish to determine infection rates and severity.

- Educate anglers about aquatic nuisance species and how their spread can be prevented. Conduct angler and boat check stations during high use periods.

Creel Survey

Goals and Objectives:

Determine angler catch rates and satisfaction on this reach of the Missouri River and Beaver Creek and make adaptations to strategies and regulations accordingly.

Rationale:

Creel surveys in this reach need to be updated to better direct adaptive management strategies. Increased use by boat and shore anglers, as well as increased use by guides could affect the wild trout fishery.

Strategies:

- Conduct an angler creel survey on the Missouri River and Beaver Creek to monitor angler catch rates, annual harvest, percent of fish caught and released, angler origin, species targeted, among several other statistics.

- Use collected creel data to implement adaptive management strategies for the Hauser tailrace.

Motorized Access

Goals and Objectives:

Manage social conflict and maximize safety on this stretch of the Missouri River.

Rationale:

Substantial enforcement staff time has been expended patrolling the Hauser tailrace area during the spring due to the heavy boat and angler use. Currently a no-wake speed restriction is in effect from Hauser Dam downstream to Beaver Creek. Complaints are frequent regarding the heavy boat use in an area with substantial navigation hazards. Closing the area to all motorized boat use limits accessibility by many anglers due to the remote nature of the area.

Strategies:

- Maintain the no wake zone from Beaver Creek to the base of Hauser Dam.

  - Continue enforcement efforts to reduce conflicts between boaters and shore anglers, especially during high use periods.

- Monitor spawning activities and evaluate the effects of motorized boat use on spawning behavior.

Section 6
Holter Reservoir

Management History

Species of fish present in Holter Reservoir (Table 7) are similar to those found in Hauser Reservoir. Rainbow trout, yellow perch, and walleye historically have been the most abundant game species in the reservoir. Suckers are the most abundant nongame species.

Rainbow trout were first introduced into Holter Reservoir during the early 1940s. From the 1970s through 1995 the reservoir fishery was supplemented by annually stocking approximately 325,000 Arlee rainbow trout. Since 1990, wild rainbow trout have comprised less than 14% of the fish harvested by anglers. Annual stocking is required because natural recruitment cannot meet current angler demand. From 1984 through 1986 an attempt to develop a migratory population that would spawn in the river and then grow to a large size in the reservoir with McConaughy strain rainbow trout was undertaken. This approach was unsuccessful. In 1996, in an effort to increase the proportion of wild rainbow trout in Holter, FWP shifted from Arlee rainbow trout to Eagle Lake rainbow trout. On alternating years, age one and age zero rainbows were planted to evaluate the most cost effective approach. This adaptive approach involved planting approximately 100,000 age one fish (average length 7.8 inches) in 1996 and 1998 and 371,000 age zero fish (average length 4.2 inches) in 1997. Evaluation of this program was difficult because of flushing losses in 1996 and 1997. Throughout the 2000s Holter has been stocked with 125,000 age 1 Eagle Lake rainbow trout in the summer and 125,000 Arlee rainbow trout in the fall. This stocking rate currently yields a summer angler catch rate of 0.29 fish per hour (2006-2008, Figure 10).

Kokanee salmon were first introduced in the early 1950s with the stocking of about 800,000 fish over a six-year period. These initial plants were unsuccessful in producing a viable kokanee fishery. The kokanee population that eventually established in Holter Reservoir apparently originated from fish that were flushed out of Hauser Reservoir. Kokanee spawn unsuccessfully or with limited success in Holter Reservoir. This fishery has undergone significant population fluctuations with anglers first catching substantial numbers of kokanee beginning in the mid 1980s (Figure 10). Kokanee harvest peaked in the early 1990s with harvest averaging over 22,000 fish for the years 1990 through 1992. Harvest fell by nearly half in 1993 to 12,000 kokanee but rebounded to record highs in 1996 as the age zero kokanee that were flushed out of Hauser during high water of 1993 recruited to the creel. The kokanee population continued to decline following severe flushing losses associated with high water in 1995, 1996, and 1997. In 2007, only 296 kokanee were harvested in Holter. The current kokanee fishery is supported by supplemental stocking when extra fish are available from state hatcheries. The last time kokanee were stocked into Holter was in 2007 when approximately 180,000 fish were stocked in the spring and summer.

Prior to 1988, daily and possession limits for trout were 10 pounds and 1 fish, not to exceed 10 fish. For kokanee, the daily and possession limit was 10 fish. Beginning in 1988, more conservative regulations were implemented to protect kokanee populations. The trout and kokanee limits were combined, making the daily and possession limits 10 pounds and 1 fish, not to exceed 10 trout and kokanee in combination. Beginning in 1996, limits were made still more restrictive with a combined trout and salmon limit of 5 and a possession limit of 10. That limit is still in place today.

Table 7. Fish Species of Holter Reservoir Including Native Status, First Stocking Date Population Trend and Relative Abundance.

Species	Native	First Stocking Date	Population Trend	Relative Abundance (Based on historic field monitoring.)
Game Fish Species				
Kokanee	No	1950	Decreasing	Common
Rainbow Trout	No	1941	Stable	Abundant
Yellow Perch	No	N/A	Decreasing	Abundant
Walleye	No	N/A	Increasing	Abundant
Mountain Whitefish	Yes	N/A	Decreasing	Common
Brown Trout	No	1931	Stable	Uncommon
Burbot	Yes	N/A	Increasing	Uncommon
Brook Trout	No	N/A	Unknown	Rare
Cutthroat Trout	Yes	N/A	Unknown	Rare
Largemouth Bass	No	N/A	Unknown	Rare
Smallmouth Bass	No	N/A	Unknown	Rare
Nongame Fish Species				
Carp	No	N/A	Stable	Abundant
Longnose Sucker	Yes	N/A	Decreasing	Abundant
Mottled Sculpin	Yes	N/A	Unknown	Abundant
White Sucker	Yes	N/A	Decreasing	Abundant
Fathead Minnow	Yes	N/A	Unknown	Uncommon
Longnose Dace	Yes	N/A	Unknown	Uncommon
Flathead Chub	Yes	N/A	Unknown	Rare
Smallmouth Buffalo	Yes	N/A	Unknown	Rare
Stonecat	Yes	N/A	Unknown	Rare
Utah Chub	No	N/A	Unknown	Rare

The walleye population in Holter Reservoir likely resulted from the single plant made into Lake Helena in 1951. This population of fast growing walleye historically maintained a relatively stable level with natural reproduction. The fishery has become increasingly popular, requiring more restrictive regulations to limit harvest and enhance the trophy component. Walleye in Holter Reservoir eat up to 45% trout and salmon depending on the season. This level of consumption by an expanding walleye population impacts the number of rainbow trout and kokanee that are available for anglers. Prior to 1988, daily and possession limits were 5 fish but beginning in 1988, to protect spawning fish, 5 fish could be harvested with only one exceeding 20 inches. Regulations were made even more restrictive in 1990 when the daily limit was reduced to 3 fish with one fish exceeding 20 inches. Beginning in 1996, a slot limit was imposed to protect walleye between 18 and 28 inches, the limits allowed harvest of 3 walleye under 18 inches and one over 28 inches. In 2000, the slot limit was modified to allow harvest of 6 walleye, 5 under 20-inches and 1 greater then 28-inches and a possession limit twice the daily limit. That regulation is still in 2008.

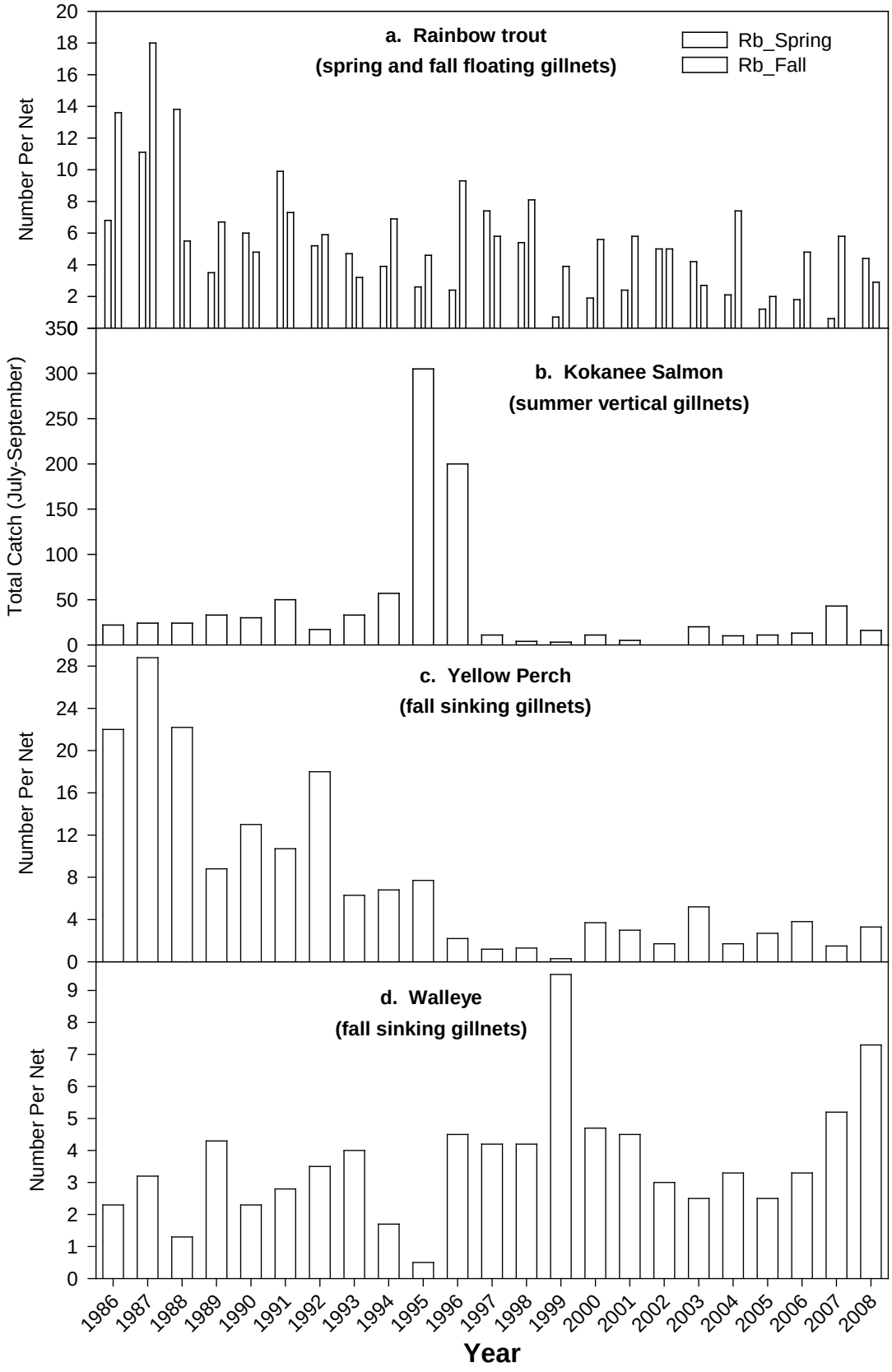


Figure 9. Holter Reservoir Fisheries Trends for the Four Principal Game Species: rainbow trout (a), kokanee salmon (b), walleye (c), and yellow perch (d). Species trends are for the period 1986 through 2008.

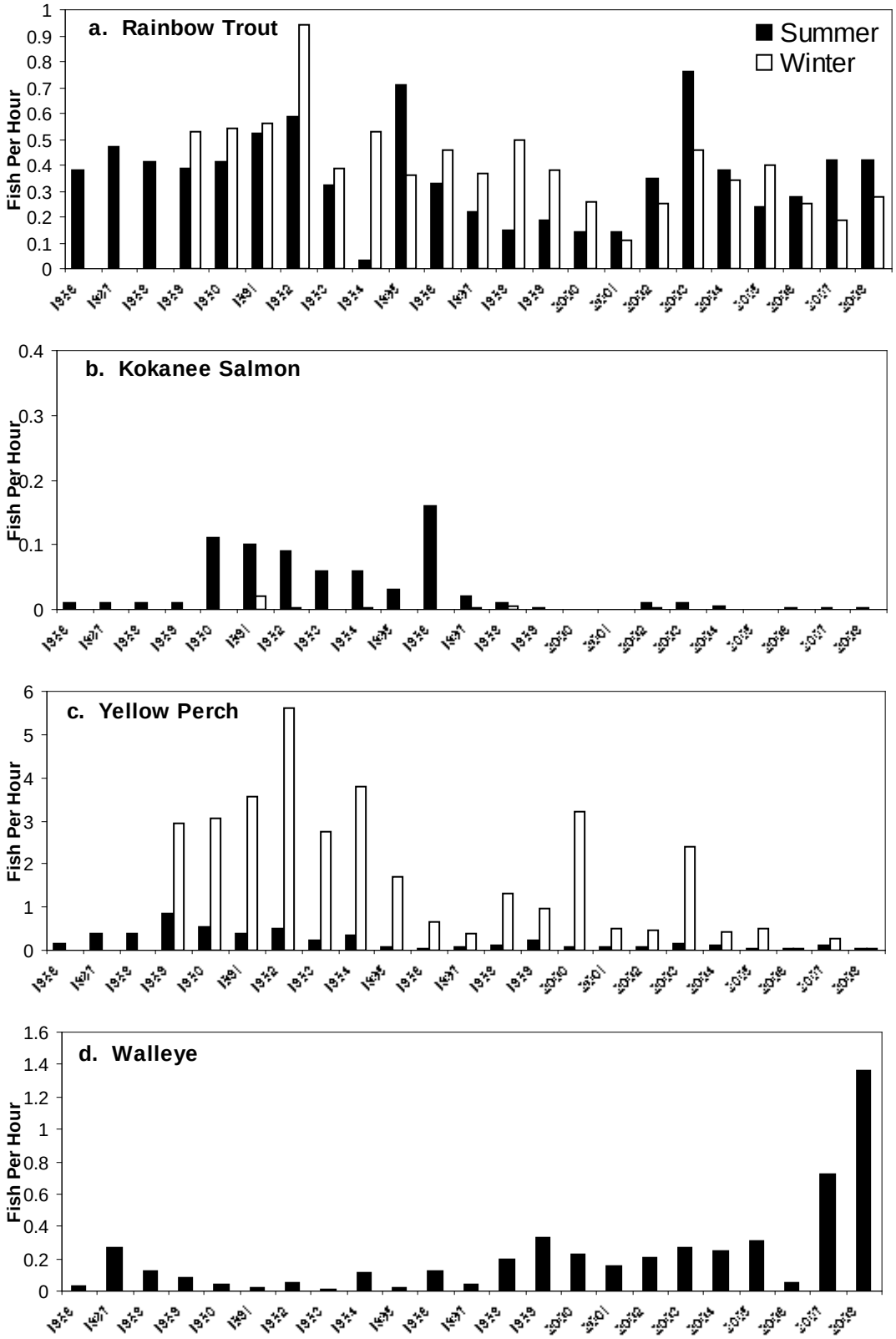


Figure 10. Angler Catch Rates (Fish/Hour) for the Four Principal Game Species in Holter Reservoir for the Period 1986 Through 2008. Summer (dark bars) and winter (light bars) are represented. Catch rates for rainbow and walleye represent anglers targeting only those species, while kokanee and perch represent all anglers.

From the early 1930s to 1950, approximately 1.5 million brown trout were stocked into Holter Reservoir. Brown trout in the reservoir today are likely the progeny of these early plants that have maintained a low-level population through natural reproduction. Few anglers target this species because of consistently low population densities. Average numbers of brown trout caught in spring and fall gill nets since 1986 is 0.23 and 0.07 fish per net respectively. No brown trout were collected from 1997 to 2001 in spring sinking gillnets and from 1997 to 2006 in fall sinking gillnets. As fall spawners, kokanee were thought to have a negative impact on the brown trout population through superimposition of redds after brown trout spawned in the limited spawning habitat in the Hauser tailrace and potential transmission of disease from spawned out kokanee. Disease testing was completed and no conclusive evidence ever validated this theory. Prior to 1988, daily possession limits for brown trout were part of the combined trout limit (10 pounds and 1 fish, not to exceed 10 fish). Beginning in 1992, catch and release regulations were implemented to protect the remaining brown trout population. Brown trout regulations remain catch and release only today.

Yellow perch were established in Holter Reservoir from plants into Hauser Reservoir during the period 1939-1955. They have maintained a significant population entirely through natural reproduction. Historically, perch have comprised an important component of the Holter fishery--principally the winter ice fishery. Catch rates in spring and fall gill nets peaked in the late 1980s after which they demonstrated normal population variation through 1993 (Figure 9). High water years of 1997 and the development of the Canyon Ferry walleye fishery have had detrimental effects to the yellow perch population. Average perch abundance from 1986-1996 averaged 13.3 perch per fall gillnet, compared to 2.45 per net from 1997-2008. Concurrently, angler harvest has fallen from peak angler harvest of 493,000 perch in 1992 to 16,000 perch in 2007. Historically, no limits were in place on the number of perch anglers can harvest. Due to declining perch numbers, a 50 fish limit on perch was implemented in 2000 with the hope that reduced harvest would assist in recovery of the population.

In 1971, anglers were allowed to fish at all hours (both day and night) during the regular fishing season. FWP received numerous complaints about night anglers exceeding limits in Holter Reservoir and concerns that daytime fishing was being adversely affected. Despite the fact that increased surveillance did not reveal unusual numbers of anglers taking over-limits of fish, in the late 1970s the reservoir was closed to fishing between midnight and 5 A.M. to resolve these perceived conflicts. In 1992, the night closure was lifted but was reinstated in 1996 from midnight to 3 A.M. Limited biological data exists to maintain the night fishing closure and night fishing was once again allowed beginning in 2007.

Holter Reservoir Management Goals and Limiting Factors

The management goal for Holter Reservoir is to provide a cost-effective, balanced multi-species fishery with the opportunity to catch rainbow trout, walleye, yellow perch, and kokanee salmon.

The following factors have been identified as limiting the fisheries production in Holter reservoir. Until they are addressed, the fishery will not reach its full potential. The problems are large in scale, involve numerous government agencies and private landowners, and will be difficult or perhaps impossible to solve. Resolution of these problems will require cooperation of highly focused individuals representing the various agencies. As with many large-scale resource management problems, money and manpower will limit the completion of any goals targeted at benefiting the fishery. PPL Montana took over operational control of Hauser and Holter dams in 2000, and received a new federal operating license in 2001. FERC requires PPL Montana to provide funds for monitoring, protection, maintenance, and enhancement of fisheries resources in Hauser and Holter Reservoirs.

- Fish losses out of Holter Reservoir from flushing and entrainment are one of the principal factors affecting fish populations. Feasibility studies to reduce fish losses from Holter need to be conducted.

- Walleye flushed from Canyon Ferry and Hauser Reservoirs have impacted the balance of the multi-species fishery.

- Spawning tributaries to Holter Reservoir provide substantial wild fish production. Beaver Creek is the principal spawning stream that supports substantial runs of rainbow trout. Other streams that provide potential spawning areas include Willow, Elkhorn, and Cottonwood creeks, which are located on the FWP-owned Beartooth Wildlife Management Area.

- Whirling disease may impact the wild trout in the reservoir and tributaries.

- There is an expanding burbot population and it should be studied with possible targets set depending on the numbers identified.

Holter Reservoir Management Goals by Species

Rainbow Trout

Goals and Objectives:

Rely on rainbow trout to provide one of the principal fish species in Holter Reservoir with continued emphasis on maximizing the proportion of wild rainbow trout.

- Attempt to recruit a three-year running average of 6 rainbow trout per net to spring and fall floating horizontal gill nets.

- Provide a three-year running average summer angler catch rate of at least 0.25 fish per hour.

Rationale:

Rainbow trout have been stocked in Holter Reservoir since the early 1940s and have provided the principal fishery. Wild rainbow trout have comprised less than 15% of the fish harvested by anglers since 1990. Stocking is required to supplement natural recruitment and meet angling demand. Attempts have been made to enhance wild rainbow trout runs without success. Annual monitoring in the late 1990s showed improved survival of age 1 over age 0 Eagle Lake rainbows. Currently Holter is stocked with 125,000 age 1 8-inch Eagle Lake rainbows in the summer and 125,000 8-inch Arlee rainbows in the fall. Stocking of larger sized fish with average length of 8-inches has improved recruitment of stocked rainbows by reducing predation by walleyes. This stocking rate currently yields a summer angler catch rate of 0.29 fish per hour (2006-2008). This population of Eagle Lake rainbows also serves as an egg source for hatchery propagation of rainbow trout. Rainbow trout eggs are collected in conjunction with walleye spawn sampling in the spring and efforts to maintain genetic diversity are necessary to reduce inbreeding within the population.

Strategies:

- Continue to stock at least 125,000 age zero 8-inch Arlee rainbow and 125,000 age one Eagle Lake rainbow trout. To minimize flushing losses, stocking of fish will occur after high water.

- Continue to monitor and investigate that this stocking approach provides substantial angler return. Specific parameters used to evaluate the stocking approach will include: growth rates, survival rates, flushing rates (quantified through a flushing study at the dam and/or fish population monitoring in the Missouri River below Holter Dam), reproductive potential, and angler harvest rates.

- If three-year average catch in fall floating gillnets falls below 4 rainbow trout per net, consider changes to the stocking plan (e.g., timing and location of fish plants, strains, size at stocking) and implement if deemed cost effective.

- If three-year average catch in fall floating gillnets falls below 2 rainbow trout per net, consider more liberal management actions, such as reducing harvest limits and/or predator suppression measures.

- Consider stocking additional rainbow trout when additional hatchery fish are available. Do not stock if surplus fish will interfere with rainbow trout strain evaluation or identification for spring rainbow trout egg take.

- Continue work with hatchery personnel to maintain genetic diversity of Holter Eagle Lake rainbow for use as an egg source for hatchery propagation.

■ Continue monitoring whirling disease presence and impacts and identify management strategies to minimize impacts to the Holter rainbow trout fishery.

■ Encourage the development of wild rainbow trout spawning and recruitment from the Hauser tailrace and principal spawning tributaries (Beaver, Cottonwood, Willow and Elkhorn creeks).

- Continue closure on Beaver Creek from November 30th to June 15th to protect spawning rainbow trout.

- Continue development of fish passage management plans with FWP Wildlife Bureau and FS that incorporates beaver management programs on Beaver, Elkhorn, Willow, and Cottonwood creeks.

Kokanee Salmon

Goals and Objectives:

Rely on kokanee salmon flushed from Hauser Reservoir, stocking of surplus hatchery fish, and any natural reproduction that may occur in Holter Reservoir to provide limited kokanee harvest. Recognize kokanee as a supplemental fish to the sport fishery in Holter Lake.

■ Determine appropriate kokanee densities to maintain kokanee fishery with minimal impacts to brown trout spawning.

Rationale:

Kokanee spawn unsuccessfully or with limited success in Holter Reservoir. Kokanee populations in Holter historically mirrored kokanee population trends observed in Hauser Reservoir. Flushing losses associated with high water in 1995, 1996, and 1997 reduced the number of kokanee captured in 1998 summer vertical gill nets (July through September) to only four. Of these four fish, three were hatchery kokanee planted into Hauser. Supplemental stocking into Holter with surplus fish since 2002 appears

moderately successful (Figure 9). After catching zero kokanee in summer gillnets in 2002, an average of 19 kokanee were caught in summer vertical gillnets from 2003-2007. Angler harvest remains at relatively low levels, averaging nearly 300 fished harvested annually (2003-2007, Figure 10).

Strategies:

- Supplement the Holter sport fishery by stocking surplus kokanee when available.

- Monitor river and reservoir brown trout population densities to determine if kokanee spawning negatively effects brown trout recruitment.

  - Adjust or eliminate stocking of surplus kokanee if brown trout densities in the Missouri River below Hauser Dam decline below 100 fish per mile.

Walleye

Goals and Objectives:

Rely on walleye to provide a cost-effective fishery that allows a moderate level of harvest while providing the opportunity to catch a trophy fish. This fishery will be reliant entirely on wild reproduction and flushing from upstream dams.

- Maintain a running three-year running average of least 4 walleye per fall sinking gill net.

- Maintain a running average summer angler catch rate of 0.10 walleye per hour for anglers specifically targeting walleye.

Rationale:

Holter historically supported a healthy population of walleye that likely originated from fish flushed out of Hauser. This wild reproducing population has remained relatively stable, providing a moderate level of harvest while furnishing the opportunity to catch a trophy walleye greater than 28 inches. With increasing popularity, harvest has become more restrictive to protect spawning fish while enhancing the trophy component. The Holter walleye population appears to be strongly influenced by flushing, both from Canyon Ferry and Hauser but is also influenced by losses out of Holter into the Missouri River. Evidence shows that flushing of walleye from Canyon Ferry has impacted the Holter walleye population. Walleye abundance in Holter has increased significantly since expansion of the Canyon Ferry population, increasing from an average of 2.6 walleye per gillnet (1986-1996) to 4.6 per gillnet (1997-2008). Walleye abundance reached a record high at 7.3 per net in 2008. As walleye abundance has increased, average length and growth rates have decreased which are likely functions of a limited forage supply in the reservoir.

Strategies:

- Use angler harvest as a management tool to maintain walleye population levels that are appropriate for forage availability.

  - Increase harvest by implementing a bag limit of 10 fish daily, with only one fish over 28-inches. No harvest of fish between 20 and 28-inches. Possession limit is twice the daily limit.

- Evaluate reductions in angler daily limits and/or adjusting slot limit if three-year running average falls below 2 walleye per fall sinking gillnet. Reductions will be considered only if rainbow trout and yellow perch abundance are near or above management goals.

- Additional restrictions may include reducing bag limits, adjusting size restrictions, and/or seasonal closures.

- Consider increasing walleye limit if three-year running average increases above 6 walleye per fall sinking gillnet or if on a three-year average rainbow trout abundance declines below 2 rainbow per net and yellow perch abundance declines below 2 per net.

  - Evaluate use of other tools to reduce walleye numbers. Other tools may include unlimited harvest, gillnetting or trap netting during periods when fish are highly concentrated, spearing through the ice or underwater, among others. Any of these management actions will require public input prior to implementation.

  - Determine if adjustments to the slot limit are necessary to maintain population levels appropriate for forage abundance.

  - If these triggers are exceeded within three years following plan implementation, consider deferring management action to better determine effectiveness of strategies outlined in this plan.

- Determine how flushing of walleye from Canyon Ferry influences the Holter Reservoir walleye fishery. Continue tagging walleye in Canyon Ferry and Holter in the spring using live release trap nets. Evaluate year class strength of spawning aged females. Maintain a database of walleye tag returns (angler returns and field survey returns) to determine annual flushing statistics.

- Continue enforcement efforts to reduce the proportion of slot limit walleyes that are illegally harvested.

  - Utilize creel data to determine periods of high walleye catch rates and use this information to focus enforcement activities on the reservoir.

  - Programmatically develop a schedule for routine patrolling with special emphasis on peak fishing periods. As needed, operate periodic check stations to evaluate regulation compliance.

- Recognize the importance for anglers to have multiple size classes of walleyes represented in the population. Maintain a three-year running average of at least 10 - 25% of the population at 20 inches or more in fall sinking gill nets. Recommend regulation changes as needed to maintain more, larger sized fish, depending upon walleye population abundance relative to goals and triggers for other fish and forage availability.

Yellow Perch

Goals and Objectives:

Rely on yellow perch to provide a cost effective, self-sustaining fishery that is supported entirely with wild reproduction.

- Maintain a three-year running average of at least 6 yellow perch per fall sinking gill net.

- Provide an average angler catch rate of 0.2 to 0.4 yellow perch per hour in the summer creel and 1.0 to 2.0 perch per hour in the winter creel.

Rationale:

Yellow perch have maintained significant population levels in the reservoir entirely through natural reproduction. Historically, perch have comprised a substantial portion of the Holter fishery; principally the winter ice fishery. High water years in the late 1990s and expansion of the Canyon Ferry walleye fishery have had detrimental effects to the Holter yellow perch population. Average perch abundance in fall gillnets from 1986-1996 averaged 13.3 perch per net, compared to 2.45 per net from 1997-2008. Since 2000, a 50 fish limit has been in place to achieve two objectives: 1) reduce the total number of perch harvested by anglers thereby increasing the number of spawning age fish in the population, and 2) recognize that increased walleye populations in the three reservoirs have had an impact on perch populations. Recognizing that yellow perch are an important component of the walleye diet, a conservative limit may increase the number of perch available as forage. Given continued declines in perch abundance, more restrictive bag limits may be necessary to further protect the perch population.

Strategies:

- Reduce daily limits of perch to 25 fish daily with no possession limit.
    - Recommend implementing higher bag limits if yellow perch abundance increases above 10 perch per fall sinking gillnet on a three-year running average.
- Consider additional management actions if yellow perch abundance falls below a three-year average catch of 2 perch per fall sinking gillnet.
    - Additional actions may include further reductions in angler harvest of perch and/or implementation of active walleye management strategies (see Walleye section).
    - If these triggers are exceeded within three years following plan implementation, consider deferring management action to better determine effectiveness of strategies outlined in this plan.
- Continue monitoring of perch populations to determine seasonal flushing losses.
- Continue to evaluate predation impacts by walleye on Holter Reservoir yellow perch populations.
    - Collect walleye stomachs during normal field surveys.
    - Maintain a database on seasonal walleye perch consumption.
    - Conduct bioenergetic modeling to assess overall impacts of walleye to the perch population and implement changes as needed.
- Explore opportunities to improve perch spawning habitat.

Burbot (Ling)

Goals and Objectives:

Rely on burbot to provide a self-sustaining fishery that is supported entirely by wild reproduction.

- Maintain a three-year running average of 0.25 burbot per fall sinking gillnet.

Rationale:

Burbot are native to the upper Missouri River system and have always had a very low level of abundance in Holter. Population monitoring has shown increases in burbot numbers in recent years (0.01 burbot per fall gillnet 1986-1999, 0.3 per gillnet 2000-2008) however; abundance of burbot is low relative to other predators in the reservoir. Burbot are piscivorous (fish-eating) species, and it is presently unclear what effect increases in the burbot population will have on other species.

Strategies:

- Increase knowledge of burbot population dynamics in Holter Reservoir. Specifically, efforts will be made to collect data (age, growth, diet, general abundance) from burbot during normal field sampling (gillnetting and electrofishing).

- Evaluate increasing angler harvest if three-year running average catch of burbot increases above 2.0 burbot per fall sinking gillnet.

- Consider establishing a sampling regime specifically targeting burbot. This would likely involve deployment of additional sampling gears in the late winter spawning period.

- Increase effort during winter creel to determine burbot harvest.

Northern Pike

Goals and Objectives:

Monitor and suppress the northern pike population in the reservoir, and evaluate impacts to other species.

Rationale:

Increased abundance of northern pike in upstream waters significantly increases the likelihood of flushing of northern pike into Holter. Northern pike are highly piscivorous fish and the current forage base in Hauser is likely not adequate to support an additional voracious predator.

Strategies:

- Eliminate all angler bag limits for northern pike in the upper Missouri River reservoir system.

- Monitor Holter reservoir to determine presence and abundance of northern pike in the reservoir. Take active management action as needed. Explore and implement other opportunities or techniques to suppress northern pike numbers.

Other Holter Reservoir Fisheries Management Issues

Flushing Losses at Holter Dam

Goals and Objectives:

Determine annual and seasonal flushing rates of fish out of Holter Reservoir and the feasibility of screening Holter Dam to reduce flushing losses.

Rationale:

Flushing losses of fish out of Holter Dam is a principal factor affecting fish populations on an annual basis. All fish species are susceptible to flushing, however, kokanee may flush at higher rates because of

behavioral tendencies. Rainbow trout and walleye flushing have also been documented via tag returns and other fish marks.

Strategies:

- Determine feasibility of reducing fish flushing losses out of Holter Reservoir.
  - Evaluate screening devices on Holter Dam that would reduce flushing losses.
  - Investigate other technologies that may be effectively employed on Holter Dam to reduce fish flushing losses.

Walleye Flushing from Canyon Ferry Reservoir

Goals and Objectives:

Determine walleye flushing rates and survival from Canyon Ferry Reservoir.

Rationale:

Walleye flushing out of Canyon Ferry into Hauser and Holter reservoirs has increased as the population in Canyon Ferry increased. Increased walleye densities in Holter Reservoir affect the balance of the multi-species fishery with increased predation on trout and yellow perch and potential negative effects on walleye growth rates. Walleye abundance remains at record high levels, adding to an already limited forage base in the reservoir. Walleye diet in Holter comprises up to 45% trout and salmon and up to 50% yellow perch depending on the season. This level of consumption by an expanding walleye population will impact the number of yellow perch and hatchery rainbow trout that are available for anglers.

Strategies:

- Request funding from the BOR to determine walleye flushing rates from Canyon Ferry Dam.
- Continue walleye tagging on Canyon Ferry and Holter Reservoirs to evaluate rates of walleye flushing into and out of Holter Reservoir.

Habitat

Goals and Objectives:

Enhance wild fish spawning opportunities within Holter Reservoir and Holter tributary streams.

Rationale:

Spawning and rearing habitat in the principal tributaries to Holter Reservoir has been degraded through a variety of land use activities. Logging, agricultural development, and road related impacts have all contributed to a reduction of productive stream habitat throughout the watershed. Specific limiting factors include increased amounts of fine sediments, channel straightening (loss of stream length), and loss of large woody debris recruitment. Recent fires and beaver colonization are also influencing fisheries production. Successional changes with reservoir aging have also led to degraded spawning habitats within the reservoir.

Strategies:

- Identify and complete enhancement projects that will benefit spawning and recruitment of wild fish in Holter Reservoir and in Holter Reservoir tributaries.

Disease and Aquatic Nuisance Species

Goals and Objectives:

Monitor Holter Reservoir and principal tributaries for whirling disease. Prevent new diseases and exotic plant and wildlife species from entering Holter Reservoir and limit the expansion of current disease agents.

Rationale:

Whirling disease is a prominent player in fish management in Montana. Rainbow trout are planted in Holter when they are 8 inches and are not as susceptible to contract whirling disease. However, wild fish produced from Beaver Creek, the river section above Holter Reservoir, or other tributaries have a high chance of exposure to the disease. To date, only a low-level infection rate has been detected in Beaver Creek with no evidence of infection in the tailrace section. Introductions of invasive aquatic species (e.g., Zebra mussels, Eurasian watermilfoil, New Zealand mudsnail, asian carp) have the potential to out-compete desirable flora and fauna in the reservoir system and can negatively impact recreation and water use as well as fish populations.

Strategies:

- Conduct *in situ* exposure testing in Holter Reservoir tributaries the Missouri River. Utilize statewide whirling disease funding and manpower to conduct in situ exposure of fish to determine infection rates and severity.

- Initiate and continue education efforts to reduce spread of disease and invasive species.

- Continue work with the Aquatic Nuisance Species Coordinator to conduct boat-check and boat washing stations during periods of exceptionally high angler use.

Derbies/Tournaments

Goals and Objectives:

Manage derbies/tournaments for consistency with fisheries management goals and objectives for Holter Reservoir, to minimize conflicts with the general angling public, and to address safety issues.

Rationale:

No angling tournaments are currently scheduled on Holter Reservoir. Increased interest in fishing tournaments may result in additional requests to hold tournaments in the future.

Strategies:

- Do not allow ice-fishing tournaments on Holter Reservoir. Ice on Holter rarely develops to a level that would allow for safe ice-fishing tournaments.

- Monitor harvest associated with tournaments. If harvest of sport fish is determined to be excessive and detrimental to the population, angling tournaments of this nature will be evaluated with the possibility of discontinuance.

- No walleye tournaments will be authorized on Holter Reservoir as long as slot limits are in place.

- No more than two derbies/tournaments will be allowed each year. Proposed tournaments will be required to coordinate access use with BLM. Use of private access will be encouraged and mitigation for potential crowding problems will be required.

Access

Goals and Objectives:

Pursue any opportunities to improve angler access to Holter Reservoir with a focus on youth and handicap fishing access.

Rationale:

Shoreline development and limited road access can be a limiting factor for youth and handicapped anglers. Currently, access sites administered by the BLM do offer handicapped fishing access. Most of the reservoir is accessible only by boat.

Strategies:

- Work with BLM, PPL Montana, private landowners, and other interests to improve fishing access to Holter, with an emphasis on areas that provide more opportunity for youth and handicapped anglers.

Section 7
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Appendix A
Citizen Workgroup and Management Alternatives

In fall 2008, FWP called for nominations to serve on a Citizen Workgroup to develop fisheries management alternatives to be considered for the 2010-2019 Management Plan. A total of 36 nominations were submitted and examined by a panel consisting of FWP personnel from multiple Bureaus and the Management Plan Facilitator. Nominations were considered to represent the following groups or interests: unaffiliated warmwater angler, unaffiliated coldwater angler, organized warmwater angler group, organized coldwater angler group, ice fishing angler, conservation group, fishing tournament organizer, landowner, outfitter, local government, local business, kids fishing, upstream/downstream interests, and other. Nominees were selected based on their experience and willingness to work in a collaborative process, knowledge and affiliation with the interest or group they were chosen to represent, and their experience and knowledge of the reservoir system. Initially, 18 citizens were chosen to sit on the workgroup plus one member of FWP; however one member declined nomination following scheduling conflicts and another member left the group prior to the final two meetings.

The Citizen Workgroup convened 8 times throughout 2009 to consider data presented by FWP and discuss and develop management alternatives for the new plan. Although consensus was not a desired end result, agreement was reached on many issues. The Citizen Workgroup worked within a collaborative framework developed by the Workgroup and FWP to develop alternatives for consideration. As defined by its Charter, the Workgroup functioned in an advisory capacity only and did not have final decision making authority. Some alternatives chosen by FWP for the final plan were not universally endorsed by the Citizen Workgroup.

The Workgroup received 77 written public comments throughout the planning and collaboration process. A formal public comment period from September 16 – October 23, 2009 allowed public opportunity to comment on specific management alternatives or any other aspects of the draft Management Plan. During the public comment period 203 written comments were received.

Summaries of Citizen Workgroup structure are contained here via the Workgroup Charter, goals and guidelines provided by FWP, and management alternatives submitted for public comment. Information provided here only presents a brief outline of issues considered by the Citizen Workgroup. For more information about the Citizen Workgroup and the collaborative process used to develop alternatives, please contact FWP Fisheries Bureau, PO Box 200701, Helena MT 59620, or by calling (406) 444-2449.

Charter for the Upper Missouri River Reservoir System Fisheries Citizen Workgroup

January 2, 2009

The Upper Missouri River Reservoirs and associated river fisheries are some of the most heavily fished waters in Montana accounting for roughly 15 percent of the total annual statewide angling pressure. Because of the system's proximity to Bozeman, Great Falls, Butte, Missoula and Helena, recreational use of the reservoirs will continue to grow as the fisheries become even more integral to the quality of life for those who live and recreate in Lewis and Clark and Broadwater counties.

The current fisheries management plan (Upper Missouri River Reservoir Fisheries Management Plan 2000-2009) established a common goal that the "three-reservoir system should be managed as a high quality, cost effective, multi species fishery with high levels of angler satisfaction."
The current plan will expire December 31, 2009.
It is the goal of this management planning process to have the new fisheries management plan in place by December 2009.

Interests to be Represented on the Citizen Workgroup

- Unaffiliated warmwater anglers
- Unaffiliated coldwater anglers
- Organized warmwater-angler groups
- Organized coldwater-angler groups
- Ice-fishing anglers
- Conservation groups
- Kids' fishing
- Fishing-tournament organizer
- Landowner
- Outfitter
- Local government
- Local business
- Other interests

Role of the Workgroup

The Workgroup will:

- develop Upper Missouri River Reservoir system fisheries management alternatives for consideration by FWP. Alternatives must conform to the joint Goals and Guidelines developed by FWP.
- provide information and input needed for FWP to make informed selections among the alternatives.
- forward alternatives to FWP for incorporation into the management plan and attend public open-house meetings to help explain alternatives.

Responsibilities of the Workgroup Members

The Workgroup:

- is a cooperative effort, with all members participating in formulating each alternative.
- is not charged with developing consensus on one preferred alternative.
- members acknowledge the value of each advisors comments and viewpoint— individuals will be allowed to speak without interruption.

- members agree to bring information into the process and likewise, to communicate to constituents about the process as it goes forward.
- functions in an advisory capacity aligned with state law and policies, and does not have decision-making authority.
- members will be required to attend every meeting; substitutes or proxies will not be allowed.

Responsibilities of Resource Specialist Group

- The Resource Specialist Group will provide biological, social and hydrological information on all aspects of the upper Missouri River reservoir system fisheries; biologists will bring in other technical representatives to add information to the process when needed.
- FWP fisheries biologists and managers will provide fisheries management expertise, background on past management and management constraints.
- FWP plan coordinators will ensure that the process is timely and effective. FWP plan coordinators will:
- If three-year average catch for perch in summer sinking gillnets increases above 15 perch per net, recommend increasing angler harvest limits
  - serve as general information source;
  - serve as workgroup members regarding any special needs or requests;
  - organize meetings and provide written meeting summaries in cooperation with facilitator;
  - organize guest speakers or topic specific experts to present information to the workgroup;
  - write drafts of plan chapters and alternatives;
  - conduct optional working and subcommittee meetings;
  - manage review of plan chapters;
  - compile the final draft plan;
  - coordinate the public involvement process after the draft is released to the general public.

Meetings

- Timing of Meetings
- Meetings will be held monthly from January through June or July. If more or fewer meetings are required, adjustments will be made via general agreement among members. Meetings will be all-day, held on weekdays and/or weekends. Optional working subcommittee meetings may be required to complete the plan. FWP will schedule the first meeting; the workgroup will set subsequent meetings. FWP will provide mileage and per diem at state rates for workgroup members.
- Location of Meetings
- Meetings will typically be held in Helena at the Montana Association of Counties Building (MACO).
- Role of the Facilitator
- The facilitator will:
  - conduct the monthly meetings in a positive and inclusive manner.
  - help develop agreement among workgroup members on ground rules for member conduct and meeting operation.
  - help the workgroup address items on each meeting agenda in a timely fashion.
  - ensure participation by advisors is equitable and courteous.
  - assist in producing a written summary of the major points for each meeting.
  - help the workgroup identify issues and develop effective fisheries management alternatives.

Timeline

The process will result in recommendations/alternatives presented to FWP in June 2009. FWP will prepare a draft plan that will be released for 30-60 days of public review. After another revision, the

FWP Director will consider the plan and select an alternative. FWP will adopt and release the final plan upon the December 2009 decision.

Upper Missouri River Reservoir System Fisheries Management Plan Citizen Workgroup Goals and Guidelines January 7, 2009

The goals and guidelines for the upper Missouri River reservoir system management plan are established by FWP to provide direction for the Citizen Workgroup (CWG) to consider while developing fisheries management alternatives. Alternatives must conform to these Goals and Guidelines and fit within the Guiding Principles of the CWG.

FWP's Guiding Principles

- The upper Missouri River angling and recreation community includes warm- and coldwater anglers, ice-fishing anglers, fisheries managers, outfitters, public-land managers, private landowners, local business, local governments, and other interests.
- Montana's fisheries are held in trust by the State of Montana for the enjoyment of all.
- The upper Missouri River's three-reservoir system is to be managed as a high-quality, cost-effective, multi-species fishery with high levels of angler satisfaction.

Goals

- Develop alternatives for FWP to consider when writing the new upper Missouri River reservoir system fisheries management plan.
  - FWP will provide necessary information to CWG to make informed recommendations.
  - CWG and FWP will work in collaborative process to consider management alternatives.

Department Assumptions

FWP assumes that:

- alternatives will be realistic in that they seek attainable outcomes based upon scientific data.
- alternatives that could adversely affect aquatic resources in the upper Missouri River system and beyond will not be considered.
- alternatives that are not economically feasible will not be considered.
- the Resource Specialist Group will be available to the CWG for additional information when needed.
- according to it's Charter, the CWG functions in an advisory capacity only and does not have decision-making authority.

Draft Management Plan Alternatives

The following management alternatives were developed collaboratively with the Citizen Workgroup and FWP. Although FWP and the Citizen Workgroup specifically identified these issues and alternatives as important, substantive public comments were accepted regarding any aspect of the draft Management Plan. FWP responses to specific comments can be found in Appendix B of the 2010-2019 Fisheries Management Plan.

Canyon Ferry Walleye

Management Goal: Rely on walleye to maintain a self-sustaining sport fishery to enhance the summer fishery and provide an additional component to the winter fishery.

Alternatives

- **Alternative 1**: (FWP Preferred) Reduce bag limit to 10 fish daily, 20 in possession with only one fish greater than 28-inches. Maintain 10 fish limit for three years in order to evaluate any changes to the walleye population structure.
  - **Notes**: This Alternative was initially chosen by FWP for the final Management Plan. Following public discussion and input to the FWP Commission, the Commission adopted the final plan with a variation of Alternative 2 while maintaining the desired effects of Alternative 1.
- **Alternative 2**: Reduce bag limit to 10 fish daily, 20 in possession with only 4 fish greater than 16-inches and one fish greater than 28-inches.
  - **Notes**: This Alternative was preferred by some members of the Citizen Workgroup as well as many of the public comments. FWP chose Alternative 1 because biological data suggests that allowing harvest of only 4 fish greater than 16-inches would have little effect on walleye population size structure and reducing the daily limit from 20 to 10 will have the same desired effects.
- **Alternative 3**: Maintain current bag limit of 20 fish daily, 40 in possession.

Hauser Walleye

Management Goal: Maintain walleye as a species that provides a balanced, cost-effective fishing opportunity in Hauser.

Alternatives

- **Alternative 1**: (FWP Preferred) Increase daily bag limit to 20 fish only one over 28-inches, 40 in possession.
  - **Notes:** This Alternative was chosen by FWP for the final Management Plan.
- **Alternative 2**: Increase daily bag limit to 20 fish, 19 fish under 20-inches and only one over 28-inches, 40 in possession. No harvest of fish between 20 and 28-inches.
- **Alternative 3**: Keep current daily limit of 10 fish, only one over 28-inches, 20 in possession.
- **Alternative 4**: No daily limit for walleye.

Holter Walleye

Management Goal: Rely on walleye to provide a cost-effective fishery that allows a moderate level of harvest while providing the opportunity to catch a trophy fish. This fishery will be reliant entirely on wild reproduction and flushing from upstream dams.

Alternatives

- **Alternative 1**: Maintain current regulation of six fish daily, with 5 less than 20-inches and only one over 28-inches. No harvest of fish between 20 and 28-inches.

- **Alternative 2**: (FWP Preferred) Increase harvest by increasing bag limit to 8 fish daily, with 7 less than 20-inches and only 1 over 28-inches. No harvest of fish between 20 and 28-inches.
- **Alternative 3**: Increase harvest by increasing bag limit to 10 fish daily, with 9 less than 20-inches and only 1 over 28-inches. No harvest of fish between 20 and 28-inches.
  - **Notes:** FWP adopted a modified version of this Alternative, which increases the daily bag limit to 10 fish daily, with only one fish over 28-inches. No harvest of fish between 20 and 28-inches.
  -

Hauser Yellow Perch

Management Goal: Rely on yellow perch to provide a self-sustaining fishery that is based entirely on wild reproduction.

Alternatives

- **Alternative 1**: Lower daily angler bag and possession limit to 15 yellow perch.
- **Alternative 2**: Maintain current angler bag limit of 50 perch daily with no possession limit.
- **Alternative 3**: (FWP Preferred) Lower daily angler bag limit to 25 perch daily with no possession limit.
  - **Notes:** This Alternative was chosen by FWP for the final Management Plan.

Holter Yellow Perch

Management Goal: Rely on yellow perch to provide a cost-effective, self-sustaining fishery that is supported entirely with wild reproduction.

Alternatives

- **Alternative 1**: (FWP Preferred) Reduce daily limits of perch to 25 fish daily with no possession limit.
  - **Notes:** This Alternative was chosen by FWP for the final Management Plan.
- **Alternative 2**: Maintain current bag limit of 50 fish daily with no possession limit.
  - **Notes:** This Alternative was preferred by some members of the Citizen Workgroup and by some public comments on the basis that angler harvest might not be a significant limiting factor to Holter perch abundance. FWP chose Alternative 1 to maintain a conservative approach to perch management and to evaluate whether angler harvest limits perch abundance.

Hauser Kokanee

Management Goal: Recognize kokanee salmon as a supplemental species to rainbow trout with poor opportunity as a viable sport species in Hauser Reservoir.

Alternatives

- **Alternative 1**: Continue work with hatcheries to find a cost-effective solution for stocking kokanee in Hauser.
- **Alternative 2**: Explore opportunities to construct artificial spawning facilities for kokanee.
- **Alternative 3**: (FWP Preferred) Eliminate stocking of kokanee in Hauser Reservoir.
  - **Notes:** This Alternative was chosen by FWP for the final Management Plan.

Holter Kokanee

Management Goal: Rely on kokanee salmon flushed from Hauser Reservoir, stocking of surplus hatchery fish, and any natural reproduction that may occur in Holter Reservoir to provide limited kokanee harvest. Recognize kokanee as a supplemental fish to the sport fishery in Holter Lake.

Alternatives

- **Alternative 1**: (FWP Preferred) Continue stocking surplus hatchery kokanee when available.
  - **Notes:** This Alternative was chosen by FWP for the final Management Plan.

- **Alternative 2**: Modify stocking requests to stock kokanee in Holter annually.
- **Alternative 3**: Discontinue kokanee stocking in Holter Reservoir.
  - **Notes:** This Alternative was preferred by a few public comments based on concerns with kokanee interfering with brown trout reproduction in the Missouri River below Hauser Dam.
  -

Missouri River (Toston to CFR) Brown Trout

Management Goal: Rely on brown trout to provide a resident fishery throughout the year and a migratory population of large fish that enter the river during the fall.

Alternatives

- **Alternative 1**: Maintain current combined trout regulation, with catch and release only for brown trout between 18 and 24 inches.
- **Alternative 2**: Consider catch and release only for brown trout. Children age 14 and under can possess one brown trout.
  - **Notes:** This Alternative was chosen by FWP for the final Management Plan.

Canyon Ferry Brown Trout

Management Goal: Increase the number of brown trout in the reservoir as an additional component to the sport fishery.

Alternatives

- **Alternative 1**: (FWP Preferred) Consider catch and release only regulations for Canyon Ferry. Children age 14 and under can possess one brown trout.
  - **Notes:** This Alternative was chosen by FPW for the final Management Plan.
- **Alternative 2**: Maintain current bag limit of 5 combined trout daily.

Canyon Ferry Forage Fish

Management Goal: Manage and enhance the forage base to support a productive multi-species fishery that includes walleye, trout, and yellow perch.

Alternatives

- **Alternative 1**: (FWP Preferred) Give priority to increase current forage species to support a multi-species fishery. Informally identify potential new species that may be appropriate for the system.
  - **Notes:** This Alternative was chosen by FWP for the final Management Plan. An informal review was completed and can be found in Appendix C of the 2010-2019 Management Plan.
- **Alternative 2**: Begin a formal process to evaluate introduction of alternative species that would be part of the forage base identified in initial forage evaluations.
  - **Notes:** This Alternative was preferred by some members of the Citizen Workgroup as well as several public comments. Other Workgroup members and public comments were adamantly opposed to any forage introductions. Informal review of potential forage species show that the risks associated with introducing new forage species outweigh the benefits. A thorough Environmental Analysis will not be completed at this time.

Hauser Tailrace Motorized Access

Management Goal: Manage social conflict and maximize safety on this stretch of the Missouri River.

Alternatives

- **Alternative 1**: Maintain the no wake zone from Beaver Creek to Hauser Dam.
  - **Notes:** This Alternative was chosen by FWP for the final Management Plan.
- **Alternative 2**: (FWP Preferred) Restrict boat use from Hauser Dam to Beaver Creek to non-motorized boats only.

- **Notes:** This Alternative was supported by shore and wade anglers and generally opposed by boaters. FWP did not have enough data available to fully support this Alternative; therefore the choice was made to maintain the existing condition.

- **Alternative 3**: Restrict boat use from Hauser Dam to Cochrane Gulch to non-motorized boats only.

Appendix B
Response to Public Comments

Over 200 written comments on the draft Management Plan were accepted during the open comment period. Most comments were in response to specific alternatives proposed in the draft plan. Many other comments pertained to other aspects of the Management Plan and did not address specific alternatives. This Appendix addresses comments to specific alternatives proposed in the draft Management Plan as well as comments on other aspects of the Plan. Please see Appendix A for more information on proposed alternatives and the Citizen Workgroup that helped develop the alternatives.

Missouri River (Toston – Canyon Ferry Reservoir) Brown Trout

Alternatives

Alternative 1: Maintain current combined trout regulation, with catch-and-release only for brown trout between 18 and 24 inches.
Alternative 2: Consider catch-and-release only for brown trout. Children age 14 and under can possess one brown trout.

Comments

a) **Comment:** Enact catch and release only for brown trout in all of the reservoirs and river sections.

Response: Brown trout are catch and release only from Canyon Ferry Dam downstream through the rest of the reservoir system. Strategies in the management plan propose catch and release only to be adopted for Canyon Ferry Reservoir and the river from Toston to Canyon Ferry. There is a desire among some anglers to maintain the opportunity to keep a trophy fish in these waters if caught and some degree of harvest will be recommended should brown trout reach management goals.

Canyon Ferry Walleye

Alternatives

Alternative 1: (FWP Preferred) Reduce bag limit to 10 fish daily, 20 in possession with only one fish greater than 28-inches. Maintain 10 fish limit for three years in order to evaluate any changes to walleye population structure.
Alternative 2: Reduce bag limit to 10 fish daily, 20 in possession with only 4 fish greater than 16-inches and one fish greater than 28-inches.
Alternative 3: Maintain current bag limit of 20 fish daily, 40 in possession.

Comments

a) **Comment:** A 10-fish limit is still too high for Canyon Ferry walleye. The limit should be lowered to 6 fish daily with a protective slot, like regulations currently in place on Holter.

Response: Reducing daily limits to 6 fish daily with a protective slot could jeopardize the goal of maintaining a multi-species fishery. FWP data suggests that lowering the walleye limit to 6 fish with a protective slot could increase consumption by the walleye population by over 40%. Canyon Ferry is forage limited and such increases in consumption by walleye could collapse the forage base, which in turn would have negative effects to all sport fish in the reservoir. Data also suggests that a protective slot would not be an effective tool for improving size distribution of walleye in the reservoir.

b) **Comment:** High limits are not necessary at Canyon Ferry. No one catches that many fish, anyway.

Response: For much of the year few people are able to catch a limit of walleye. High limits are in place on Canyon Ferry to maximize harvest when the walleye "bite" is on. Higher limits are designed to maintain a balance between the predator population and the forage base.

c) **Comment:** There is a lack of enforcement at Canyon Ferry in regard to over-harvesting walleye.

Response: Two Helena area FWP Game Wardens and one Townsend area Game Warden provide year-round patrols at Canyon Ferry. Game Wardens often patrol "under cover" and often attempt to blend in among anglers without their knowledge. A review of FWP's 1-800-TIP-MONT database, which allows the public to report game violations, revealed few, if any, reports of angler over-harvests at all of Southwestern Montana's lakes or reservoirs. This suggests reports of over harvest may not be substantive problems.

d) **Comment:** Why are there different walleye management strategies for Canyon Ferry and Holter? I think limits should be the same on all the reservoirs.

Response: Angling pressure trends and potential walleye carrying capacity are quite different between Canyon Ferry and Holter Reservoirs. Canyon Ferry essentially has unlimited spawning potential for walleye, while Holter is habitat limited for walleye spawning. Angler pressure on Canyon Ferry averages 2.6 angler days per acre while Holter averages 12.6 angler days per acre. In the past, due to poor spawning habitat and relatively high concentrations of angler pressure, more conservative limits maintained the viability of the Holter walleye population. This Plan proposes lower daily limits on Canyon Ferry in an effort to improve the size structure of the walleye population. Higher daily limits are proposed on Holter to increase harvest of walleye to prevent deterioration of desirable size structure of the Holter Lake walleye population.

e) **Comment:** Take off all limits on walleyes and try to catch as many as possible. Walleye numbers should be greatly suppressed and reservoir management should return to a trout and perch fishery.

Response: Walleye are a primary sport fish species and an important component of the multi-species fishery, as are yellow perch and trout. Strategies in the management plan strive to maintain walleye population levels appropriate for the available forage base and maintain a viable perch and trout fishery. Although managed as multi-species fisheries, historic levels of abundance for perch and rainbow are likely unattainable in a system with walleye. Depending on reproductive success of walleye in Canyon Ferry and flushing rates into Hauser and Holter, liberal limits may be implemented as part of the adaptive nature of this management plan.

Canyon Ferry Yellow Perch

No new management alternatives for perch were presented by the Citizen Workgroup or FWP.

Comments

a) **Comment:** Emergency regulations should be implemented—either reduce harvest on perch or create incentives to harvest more walleye—should perch populations plummet below 8 per gill net in any given year.

Response: Due to large annual fluctuations of fish populations, especially perch, management triggers set over a three-year average are more sensitive to detecting long-term population trends than evaluating annual trends only. New management triggers for perch are considerably lower than in the old plan, however data suggests that these trigger points are the minimum abundance possible to maintain perch as a forage fish and not necessarily to maintain the perch sport fishery.

b) **Comment:** Perch fishing should not be allowed south of the Silos boat ramp from March 31 to June 1 to allow perch to spawn.

Response: There is no evidence to suggest that angler harvest during this period is a limiting factor for perch spawning success. Yellow perch spawn throughout the reservoir and a fishing closure in this nature would do little to increase spawning success of perch. Spawning habitat and environmental variables (weather) during spring spawning are likely the biggest limiting factors for spawning success.

Canyon Ferry Brown Trout

Alternatives

Alternative 1: (FWP Adopted) Consider catch-and-release only regulations for Canyon Ferry. Children age 14 and under can possess one brown trout.
Alternative 2: Maintain current bag limit of 5 combined trout daily

Comments

a) **Comment:** Enact catch and release only for brown trout in all of the reservoirs and river sections.

Response: Brown trout are catch and release only from Canyon Ferry Dam downstream through the rest of the reservoir system. Strategies in the management plan propose catch and release only to be adopted for Canyon Ferry Reservoir and the river from Toston to Canyon Ferry. There is a desire among some anglers to maintain the opportunity to keep a trophy fish in these waters if caught and some degree of harvest will be recommended should brown trout reach management goals.

Canyon Ferry Forage Fish

Alternatives

Alternative 1: (FWP Adopted) Give priority to increase current forage species to support a multi-species fishery. Informally identify potential new species that may be appropriate for the system.

Alternative 2: Begin a formal process to evaluate introduction of alternative species that would be part of the forage base identified in initial forage evaluations.

Comments

a) **Comment:** Additional forage needs to be stocked to feed the walleye. Shad, smelt, shiners, or cisco have been used successfully in other places.

Response: Often times the unintended consequences of forage introductions outweigh the benefits. Introducing new fish species could have negative effects on the trophic dynamics not only in the reservoirs, but also within the entire Missouri River system. Initial review of potential species that may be appropriate for introduction show that many species would be of little to no benefit to walleye. Depending upon the species, there is great potential that forage fish would have negative effects to the species it was stocked to benefit. Changes to the food web and trophic dynamics within the system could jeopardize natural reproductive success of walleye and perch and make the put-take rainbow fishery unsustainable.

b) **Comment:** Do not stock an additional forage species into Canyon Ferry.

Response: The management plan does not propose a forage introduction at this time. Any introduction of a new species will require a through Environmental Assessment and a public review independent of this management planning process. The management plan proposes strategies to increase abundance of forage species already present in the system (see pages 33).

c) **Comment:** The management plan seems to oppose introduction of new forage species, but it also seems to be open to the idea.

Response: FWP opposes any forage introduction that may cause any negative effects to the trophic (food and energy) dynamics of the system. A portion of the angling users of the system feel a forage introduction may benefit the fisheries of the system. Alternatives presented in the draft plan were to gauge public input regarding forage introduction prior to committing to an in-depth Environmental Assessment of a forage introduction. Furthermore, the Illegal and Unauthorized Introduction of Aquatic Wildlife Policy adopted by the Fisheries Division on May 22, 2002 states that if the department determines that successful removal of unauthorized species is not likely or if removal fails, the department will take into consideration the illegal nature of the introduction in future management decisions. One of the management options identified is: do not stock any forage fish species to benefit the unauthorized or illegally introduced species, or if the department was previously stocking fish that are used as forage by the illegally introduced species, stop stocking that species or alter stocking strategy to reduce predation. Honoring this policy precludes FWP from considering the introduction of new forage species in Canyon Ferry Reservoir (see Appendix D for the Illegal and Unauthorized Introduction of Aquatic Wildlife Policy).

d) **Comment:** FWP should use the waterfowl ponds on the South end of Canyon Ferry for rearing a supplemental forage fish base.

Response: The management plan contains strategies to look into using the waterfowl ponds as a rearing area for yellow perch. The cost-effectiveness, impacts to wildlife, and the physical capability of retrofitting such a use will need to be evaluated prior to implementing any such project. Given the shallow, turbid waters of the waterfowl ponds, it may not be possible to maintain habitats suitable for perch rearing.

e) **Comment:** Stocking another forage fish will take pressure off of other species in the lake, such as perch.

Response: CANYON FERRY: It is unknown if stocking another species will actually alleviate predation on existing species, such as yellow perch. Yellow perch are a preferred food item for walleye across their native range, and walleye often select yellow perch when other food is more abundant and readily available. An additional forage fish may negatively affect the reproductive success or growth of yellow perch as well as other species used as forage.

Hauser Walleye

Alternatives

Alternative 1: (FWP Adopted) Increase daily bag limit to 20 fish only one over 28-inches, 40 in possession.
Alternative 2: Increase daily bag limit to 20 fish, 19 fish under 20-inches and only one over 28-inches, 40 in possession. No harvest of fish between 20 and 28-inches.
Alternative 3: Keep current daily limit of 10 fish, only one over 28-inches, 20 in possession.
Alternative 4: No daily bag limit for walleye.

Comments

a) **Comment:** Walleye limits should be eliminated in Hauser and Holter to create lower densities of fish and create a bottleneck, which would reduce the number of walleye flushed into the Missouri River.

Response: FWP has no evidence to suggest that unlimited walleye harvest in Hauser and Holter would reduce walleye densities to levels resulting in fewer walleye flushed into the river. Data suggests walleye fry and juvenile walleye flush through the entire system, including the Missouri River below Holter, when Canyon Ferry Dam spills water in the spring. During years that Canyon Ferry spills water, any amount of walleye harvest in Hauser and Holter would likely have little or no effect on numbers of walleye flushed into the river.

One proposed alternative in the new plan was to allow unlimited harvest of walleye in Hauser Reservoir. The adopted alternative would implement a limit of 20 fish daily, 40 in possession in order to evaluate the impacts of high harvest to the population. Higher limits are proposed in an effort to reduce walleye densities to levels appropriate for the available forage and may or may not influence the number of walleye flushed downstream. Identification of mechanisms that can eliminate high survival of walleye flushed from Canyon Ferry may provide the greatest potential for management of downstream waters.

Hauser Yellow Perch

Alternatives

Alternative 1: Lower daily angler bag and possession limit to 15 yellow perch
Alternative 2: Maintain current angler bag limit of 50 perch daily with no possession limit.
Alternative 3: (FWP Adopted) Lower daily angler bag limit to 25 perch daily with no possession limit.

Comments

a) **Comment:** You should reduce the limit to 15 (daily) and 30 (in possession) like Canyon Ferry.

Response: Perch limits on Canyon Ferry are 15 daily and in possession. Reducing angler bag limits (25 daily and no possession) for perch on Hauser and Holter were proposed as an alternative in the draft plan and adopted as the final strategy in the final management plan. Establishing even greater restrictions may be warranted if declines in perch abundance continue and future population goals are not met. Predation by walleye is likely more of a controlling factor to perch abundance than angler harvest.

Hauser Kokanee

Alternatives

Alternative 1: Continue work with hatcheries to find a cost-effective solution for stocking kokanee in Hauser.
Alternative 2: Explore opportunities to construct artificial spawning facilities for kokanee.
Alternative 3: (FWP Adopted) Eliminate stocking of kokanee in Hauser Reservoir.

Comments

a) **Comment:** Kokanee salmon should not be stocked in any of the reservoirs because even a modest spawning run will damage the brown trout fishery.

Response: There is a desire by anglers to maintain some degree of a kokanee fishery in the system. Stocking of surplus fish in Holter appears to maintain a low level kokanee population at much lower densities than in the 1990s. Declines in brown trout numbers in the tailrace below Hauser Dam through the 1980s and 1990s may be attributable to competition for spawning areas, superimposition of spawning kokanee over brown trout redds and opportunistic infections of fungus. In recent years (2003-2007), brown trout numbers have remained near 130 fish per mile in the Hauser tailrace reach and the current low densities of kokanee are not expected to impact brown trout numbers. Stocking kokanee in Holter would be suspended if kokanee impact spawning of brown trout in the tailrace.

Hauser Tailrace Motorized Access

Alternatives

Alternative 1: (FWP Adopted) Maintain the no wake zone from Beaver Creek to Hauser Dam.
Alternative 2: (FWP Preferred) Restrict boat use from Hauser Dam to Beaver Creek to non-motorized boats only.
Alternative 3: Restrict boat use from Hauser Dam to Cochrane Gulch to non-motorized boats only.

Comments

a) **Comment:** Due to poor signage, many boaters are not aware of the no-wake zone upstream from Beaver Creek.

Response: The burden of law falls upon the user; therefore boaters are responsible for knowing laws and regulations prior to entering a lake or river. However, FWP may explore the potential to erect signs to better inform the boating public.

b) **Comment:** FWP needs to better enforce the no-wake zone upstream from Beaver Creek.

Response: FWP Enforcement personnel regularly patrol the Hauser tailrace area, especially during high-use periods. Enforcement staff also regularly follows up on reported violators to the no-wake rule. Violators are typically turned in by other boaters or anglers who record the boat number of the violator and report them to 1-800-TIP-MONT.

c) **Comment:** There should be seasonal closures to boating to protect spawning rainbow and brown trout.

Response: Population surveys conducted bi-annually show that trout population abundance and recruitment are relatively stable, indicating that fishing from boats or from shore have little effect to the spawning success of trout in the Hauser tailrace. If fishing pressure continues to increase and trout abundance declines, seasonal closures may need to be considered. Seasonal closures to protect brown trout redds would need to extend from October to April and for rainbow trout, until early June, resulting closing the tailrace a significant portion of the year. The posting of spawning area closures for rainbow and brown trout in this reach, which are relatively discrete areas, would also draw attention to those areas and could be counterproductive.

d) **Comment:** Fishing in and near Beaver Creek should be closed during fish spawning periods.

Response: Current regulations for Beaver Creek open the stream on June 15th to provide protection for spawning rainbow trout and close it on November 30. No closures are in effect for the Missouri River near the mouth of Beaver Creek and to date, FWP has not identified any biological issues that currently justify a spawning closure. Social issues may be examined in the future.

e) **Comment:** I would like to see the guides and outfitters removed from Hauser Dam to American Bar.

Response: Regular patrols by Enforcement personnel indicate that guides and outfitters constitute a small percentage of users on this stretch of river. FWP plans on conducting a comprehensive creel survey of this section of river, which will include collecting data that will quantify use by guides and outfitters in this reach**.**

f) **Comment:** All riverine sections within the system should be designated non-motorized boating only. Let the motorboat users have Canyon Ferry, Hauser, and Holter to enjoy their motors.

Response: Limiting motorized access on all river sections would severely limit angling opportunity on the river. The management plan proposes limits to motorized access to the Missouri River from Hauser Dam to Beaver Creek only. A further review of boating regulations jurisdiction within FWP revealed any strategy adopted in the management plan would only be a recommendation to agency personnel responsible for boating safety, regulations, and restrictions. In the other river sections within the system there are few boater-shore angler conflicts.

g) **Comment:** Install surveillance cameras or web cams at strategic locations above the river monitoring all boat traffic 24-hours a day.

Response: Due to the isolated location of the Hauser tailrace, setup and maintenance of surveillance cameras would likely be cost-prohibitive. Time used for operation and maintenance of surveillance cameras would be better used for Enforcement and on the ground data collection.

Holter Walleye

Alternatives

Alternative 1: Maintain current regulation of six fish daily, with 5 less than 20-inches and only one over 28-inches. No harvest of fish between 20 and 28-inches.
Alternative 2: (FWP Preferred) Increase harvest by increasing bag limit to eight fish daily, with 7 less than 20-inches and only one over 28-inches. No harvest of fish between 20 and 28-inches.
Alternative 3: (Modified and adopted by FWP) Increase harvest by increasing bag limit to ten fish daily, with 9 less than 20-inches and only one over 28-inches. No harvest of fish between 20 and 28-inches.

Comments

a) **Comment:** Why are there different walleye management strategies for Canyon Ferry and Holter? I think limits should be the same on all the reservoirs.

Response: Angling pressure trends and potential walleye carrying capacity are quite different between Canyon Ferry and Holter Reservoirs. Canyon Ferry essentially has unlimited spawning potential for walleye, while Holter is habitat limited for walleye spawning. Angler pressure on Canyon Ferry averages 2.6 angler days per acre while Holter averages 12.6 angler days per acre. In the past, due to poor spawning habitat and relatively high concentrations of angler pressure, more conservative limits maintained the viability of the Holter walleye population. This Plan proposed lower daily limits on Canyon Ferry in an effort to improve the size structure of the walleye population. Higher daily limits are proposed on Holter to increase harvest of walleye to prevent deterioration of desirable size structure of the Holter Lake walleye population.

b) **Comment:** I would like the present walleye limit on Holter to remain at 20 fish daily, 40 in possession.

Response: The current (2009) walleye limit on Holter is 6 fish daily with 5 less than 20 inches and 1 greater than 28 inches. Possession limit is twice the daily limit. The original preferred alternative identified in the draft management plan was modified to raise the walleye limit to 10 fish with 1 greater than 28-inches with no harvest of fish between 20 and 28-inches. This is intended to increase harvest on smaller-sized fish and preserve the trophy component of the fishery (see pages 72-73 in the management plan).

c) **Comment:** Walleye limits should be eliminated in Hauser and Holter to create lower densities of fish and create a bottleneck, which would reduce the number of walleye flushed into the Missouri River.

Response: FWP has no evidence to suggest that unlimited walleye harvest in Hauser and Holter would reduce walleye densities to levels resulting in fewer walleye flushed into the river. Data suggests walleye fry and juvenile walleye flush through the entire system, including the Missouri River below Holter, when Canyon Ferry Dam spills water in the spring. During years that Canyon Ferry spills water, any amount of walleye harvest in Hauser and Holter would likely have little or no effect on numbers of walleye flushed into the river.

Holter historically held a low-level walleye population with many trophy-sized fish. Given higher angler concentrations (12.6 angler days per acre) and higher concentrations of fish, unlimited walleye harvest could negatively affect the Holter walleye population, which is an important component of the multi-species fishery. Higher walleye limits are proposed to reduce walleye densities to levels appropriate for the available forage.

Holter Yellow Perch

Alternatives

Alternative 1: (FWP Adopted) Reduce daily limits of perch to 25 fish daily with no possession limit.
Alternative 2: Maintain current bag limit of 50 fish daily with no possession limit.

Comments

a) **Comment:** You should reduce the limit to 15 (daily) and 30 (in possession) like Canyon Ferry.

Response: Perch limits on Canyon Ferry are 15 daily and in possession. Reducing angler bag limits (25 daily and no possession) for perch on Hauser and Holter were proposed as an alternative in the draft plan and adopted as the final strategy in the final management plan. Establishing even greater restrictions on Holter may be warranted if declines in perch abundance continue and future population goals are not met. Predation by walleye is likely more of a controlling factor to perch abundance than angler harvest.

Holter Kokanee

Alternatives

Alternative 1: (FWP Adopted) Continue stocking surplus hatchery kokanee when available.
Alternative 2: Modify stocking requests to stock kokanee in Holter annually.
Alternative 3: Discontinue kokanee stocking in Holter Reservoir.

Comments

a) **Comment:** Kokanee salmon should not be stocked in any of the reservoirs because even a modest spawning run will damage the brown trout fishery.

Response: There is a desire by anglers to maintain some degree of a kokanee fishery in the system. Stocking of surplus fish in Holter appears to maintain a low level kokanee population at much lower densities than in the 1990s. Declines in brown trout numbers in the tailrace below Hauser Dam through the 1980s and 1990s may be attributable to competition for spawning areas, superimposition of spawning kokanee over brown trout redds and opportunistic infections of fungus. In recent years (2003-2007), brown trout numbers have remained near 130 fish per mile in the Hauser tailrace reach and the current low densities of kokanee are not expected to impact brown trout numbers. Stocking kokanee in Holter would be suspended if kokanee impact spawning of brown trout in the tailrace.

Rainbow Trout

No new formal management alternatives for rainbow trout were presented by the Citizen Workgroup or FWP.

Comments

a) **Comment:** Consider catch and release for all rainbow trout in the riverine sections to promote population growth and spawning success.

Response: Standard river and stream daily and possession limits for rainbow trout apply in the river sections within the system. These standard limits allow an angler only 1 rainbow trout greater than 18 inches, which provides protection for a substantial portion of the spawning population. Additionally, rainbow trout populations in the river sections are heavily influenced by migratory rainbow from the reservoirs. Most of these migratory fish are of hatchery origin. Catch and release regulations in these sections would likely have little effect on overall population abundance given the strong influence of hatchery fish, which are stocked annually.

b) **Comment:** We question whether current levels of angler catch are possible given lower rainbow management targets than in the previous plan.

Response: FWP data from recent years suggests that if relative abundance goals set in the new plan are met, angler catch rates for rainbow should meet or exceed 0.25 fish per hour, which is widely considered as good fishing.

c) **Comment:** Any changes that are implemented to help the walleye fishery should not jeopardize the existing trout fishing opportunities**.**

Response: Triggers in the management plan are in place to try to achieve a balance in the multi-species fisheries. If walleye numbers increase and are found to be detrimental to the trout population, then management strategies will be implemented to increase trout numbers.

d) **Comment:** The Eagle Lake trout plant at the Gates of the Mountains (Holter Lake) could be halved with the other portion stocked below Hauser Dam.

Response: Current FWP policy limits stocking of trout into rivers and streams. FWP surveys show that migratory reservoir fish, mostly of hatchery origin, comprise 35% of rainbows captured during fall surveys. Stocking additional fish in this river section would further decrease the number of wild fish in the river.

e) **Comment:** More Eagle Lake rainbows should be planted in Hauser. Rainbow strain evaluation needs to be done in Hauser in conjunction with a true creel census.

Response: Eagle Lake strain rainbow trout were first stocked in Hauser when approximately 100,000 Eagle Lakes were stocked in 2003. Angler return was very high, with Eagle Lakes from the initial plant comprising 36.8% of the angler creel by 2006. After that year angler harvest declined due to natural morality and harvest of the initial plant. Starting in 2008, approximately 50,000 Eagle Lake and 100,000 Arlee strain rainbows were planted in Hauser. Stocking plans over at least the next six years include continued annual stocking of 50,000 Eagle Lake and 100,000 Arlee strain rainbows. Hatchery space is not available to increase the plants of Eagle Lake in Hauser Reservoir without decreasing the number stocked in other reservoirs. Monitoring and strain evaluation will continue through standardized sampling and creel surveys.

General Comments

Walleye

a) **Comment:** Your numbers showing fisherman targeting walleye are way off. There are way more fisherman that target walleye.

Response: CANYON FERRY: Canyon Ferry partial creel census has been conducted annually during the winter and summer ice fishing seasons since 1986. The creel census uses a scientifically based approach to sample the angler creel. For the 2007 license year (including the summer and winter fishing seasons), 26,469 anglers targeted only rainbow and 24,630 targeted only walleye. Angler pressure estimates for 2008 are not available at this time, but 2008 creel surveys for the winter and summer seasons show 41.5% anglers targeted only trout while 14.5% targeted only walleye.

b) **Comment:** We need to bring the walleye fisheries in these lakes back to what they were in the 1990s and early 2000s.

Response: CANYON FERRY: Following expansion of the Canyon Ferry walleye population in 1997, walleye grew at an extraordinary rate, as there was essentially an unlimited forage base. As the population grew the forage base was depleted and walleye growth slowed to a rate similar to that of other walleye populations in the region. This "boom" cycle is common in new or developing fisheries and was observed in Canyon Ferry. Now that walleye are firmly established in the reservoir and given the available food base, population growth and fish growth similar to that observed in the late 1990s is not possible.

HAUSER AND HOLTER: Hauser and Holter historically maintained low-level walleye populations. Flushing of walleye from Canyon Ferry Dam has upset the balance between these walleye populations and available forage. Walleye populations in Hauser and Holter cannot achieve the appropriate balance between walleye and forage unless something can be done to eliminate the effects of walleye flushed from Canyon Ferry.

c) **Comment:** Why are we not saving the spawning class walleye in Canyon Ferry? Walleye fishing should be closed from March 31 to June 1 south of the Silos.

Response: Angler harvest during the walleye spawn does not appear to be a limiting factor to spawning success. Angler harvest of spawning fish is relatively low during the spring spawning period due to the nearly unlimited amount of spawning habitat available in the reservoir. Although walleye congregate on the south end of the reservoir during the spawn, concentrations of fish are low compared to reservoirs where there is a limited amount of spawning habitat and large numbers of fish are forced into a small area. Environmental factors (weather, temperatures) are believed to be the primary limiting factors for walleye spawning success.

d) **Comment:** Stock walleye every three years to see if the walleye increase in size.

Response: Walleye populations in the entire system are currently maintained through natural reproduction. Walleye growth is already limited due to low forage abundance. Stocking more walleye would add more pressure to the already limited forage base and provide negative impacts to all sport fisheries in the system.

e) **Comment:** Triggers for aggressive walleye management should be based on a three-year running average, when any two of the following criteria are met: walleye density exceeds 4 per

gill net, yellow perch density decreases below 8 per gill net, or rainbow trout density decreases below 9 per gill net.

Response: CANYON FERRY: Data collection over the past 10 years, under guidance of the 2000-2009 management plan, shows that maintaining a relative abundance at 8 perch per gill net and rainbow trout at 9 per gill net is unlikely with the presence of walleye in the reservoir. However, angler catch rates for rainbow trout are deemed satisfactory at current population levels and may be a better indicator of successful rainbow trout management than gill netting data. Walleye sampling show that densities would exceed 4 per gill net over most three-year periods. In the final plan the upper walleye density trigger was reduced to a three-year average of 7 fish per net in an attempt to ensure that walleye densities remain at levels appropriate for available forage. In order to maintain levels above the proposed trigger points for yellow perch and rainbow, walleye numbers would need to be drastically reduced through means other than angler harvest, which would be highly controversial and possibly require legislative action. The goals and triggers for Canyon Ferry attempts to honor one of the underlying goals of the Citizen Workgroup, which is a plan that results in "strategies that emphasize trout and walleye while recognizing perch as an important game and forage species."

Yellow Perch

a) **Comment:** Perch fishing and size of fish has declined over the years. Something should be done to improve perch fishing.

Response: The management plan outlines several strategies to improve perch fishing. Strategies include habitat improvements, identification of critical perch habitat, adjustment of bag limits, and active predator management. Predator management is the factor that has the largest potential to influence perch fishing. See the yellow perch sections for each reservoir for all perch management strategies.

Northern Pike

a) **Comment:** Has FWP made any plans to account for possible expansion of the northern pike population?

Response: The management plan takes an aggressive stance regarding northern pike management. The plan proposes elimination of bag limits in the entire reservoir system. Further management actions to suppress northern pike may be implemented if deemed appropriate. For more information on northern pike strategies see pages 17, 34, 51 and 75 in the management plan.

b) **Comment:** Has the perch habitat enhancement project using Christmas trees had the unintended consequences of providing pike spawning habitat?

Response: Although it is possible that northern pike are using Christmas tree structures for spawning, FWP has seen no evidence that this is actually occurring. Most northern pike captured during FWP population surveys are observed near the river mouth or in areas of the reservoir where weed beds are present. Reports of angler catch reflect the same. Evidence shows that pike are either flushing in from the river or any spawning is occurring near established weed beds.

Carp

a) **Comment:** We have not seen any provisions to promote the commercial fishing for carp.

Response: FWP has granted an experimental commercial fishing license for carp annually since 2004. The license holder has not commercially fished Canyon Ferry since the original year the permit was issued. A commercial fishing license has also been issued for Lake Helena but it has not been commercially fished since the late-1980s.

Reservoir Operations

a) **Comment:** Reservoir management meant to benefit reservoir fishes should occur only when it does not pose a risk to the river's fisheries.

Response: Flood control, irrigation, and power generation are the primary water uses for Canyon Ferry. As a result, water management to benefit the reservoir fisheries is limited and most fisheries benefits from water manipulations are realized in the river downstream of Canyon Ferry. When operational flexibility is possible, FWP will evaluate and provide advice to the Bureau of Reclamation regarding the risks and benefits of reservoir manipulations to enhance river and reservoir fisheries on a case-by-case basis. FWP would advocate for reservoir management that benefits reservoir fisheries when risks to the river fisheries are minimal.

Fishing Tournaments

a) **Comment:** Each tournament or derby should be required to have an invasive species prevention plan that includes boat inspections by FWP personnel and mandatory boat washing stations. The tournament participants should shoulder the cost for this.

Response: FWP rules for fishing contests stipulate, "contest sponsors are responsible for notifying participants that boats and trailers must be cleaned before and after the contest to prevent transport and introduction of aquatic nuisance species" (ARM 12.7.802(6)). In addition, FWP currently maintains boat check stations at most popular Montana reservoirs and river sections during high use periods (such as tournaments). Check stations require that all boats are checked for invasive species and often include boat-cleaning stations for boats suspected of carrying invasive species.

b) **Comment:** All tournaments and derbies should be eliminated or limited to only one event per year.

Response: <u>CANYON FERRY:</u> The management plan includes strategies to minimize conflicts between tournament anglers and other recreational anglers and users. There is no biological evidence that tournaments currently held on Canyon Ferry adversely impact fish populations. One existing fishing contest provides a substantial harvest of carp and could be considered to have some minimal beneficial effects. Also, fishing contest ARM rules allow an application to be denied if in the opinion of the FWP the proposed contest would be held during a period of heavy recreational use on the host body of water, increasing the likelihood of conflicts with other users or if there is significant public opposition to the proposed contest based on biological or recreational conflict concerns. This provides adaptive management if social conflicts involving fishing contests increased in the future. See pages 35-36 for rationale and strategies for tournaments and derbies.

<u>HAUSER AND HOLTER:</u> Only one fishing tournament is currently held between Hauser and Holter Reservoirs. Ice fishing derbies are discouraged due to unsafe ice conditions common in the winter.

Use of live Fish as Bait

a) **Comment:** What does it mean in the draft plan, which states live bait may be allowed if investigations demonstrate the potential for native fish to be used safely?

Response: Interest has been shown in the past to provide live fish from a local source with a species composition consisting of fish already present and common in the system. Investigations would include whether such a source is available, if fish are disease free, and certifiably free of any species not already present in the system. Such a bait source has not been proposed or observed by FWP.

Habitat

a) **Comment:** Focus effort and money on habitat and water quality improvement on all tributaries in the study area to promote a viable wild fishery.

Response: The management plan outlines strategies to continue habitat improvement projects on the tributaries in the system and continue to explore opportunities to enhance wild fisheries.

b) **Comment:** Mitigation money from Toston Dam needs to be properly used. Several years ago $60,000 of mitigation money was returned to the general fund because it was not utilized.

Response: Approximately $300,000 was made available for Toston Mitigation in the early 1990's. Three projects intended to improve brown trout abundance were implemented during this time (Confederate Creek Spawning Enhancement, Deep Creek Siphon, and four years of brown trout egg collection and imprinting). In addition, DNRC provided approximately $16,000 per year to fund fisheries technician time to monitor results from 1998 to 2008 (10-year monitoring contract). Results of this monitoring clearly show that brown trout have not responded to past mitigation projects.

It is correct that $54,000 remained in the mitigation fund in 2007 and FWP initiated a feasibility study to conduct an additional mitigation project at Big Springs (just downstream of Toston Dam). The study was completed, but project implementation is on hold due to funding constraints and ongoing negotiations with water users. DNRC returned the $54,000 to the general fund, but made a commitment to ask the legislature for spending authority to recover this funding during the next legislative session.

Missouri River

a) **Comment:** FWP needs to do more about pollution in our rivers. Economic gains from increased use by boaters also increase pollution.

Response: The Department of Environmental Quality enforces water quality regulations in Montana, however FWP will continue to monitor water quality and fish health within the reservoir system as well as the Missouri River and cooperate in identifying point and non-point sources of pollution and work towards finding solutions to the problems.

b) **Comment:** I would like to see the Missouri River below Holter Dam managed as a trout fishery only, and not as a multi-species fishery.

Response: Since this management plan covers the Missouri River reservoir system from Toston Dam downstream only to Holter Dam, management strategies for this stretch of river were not

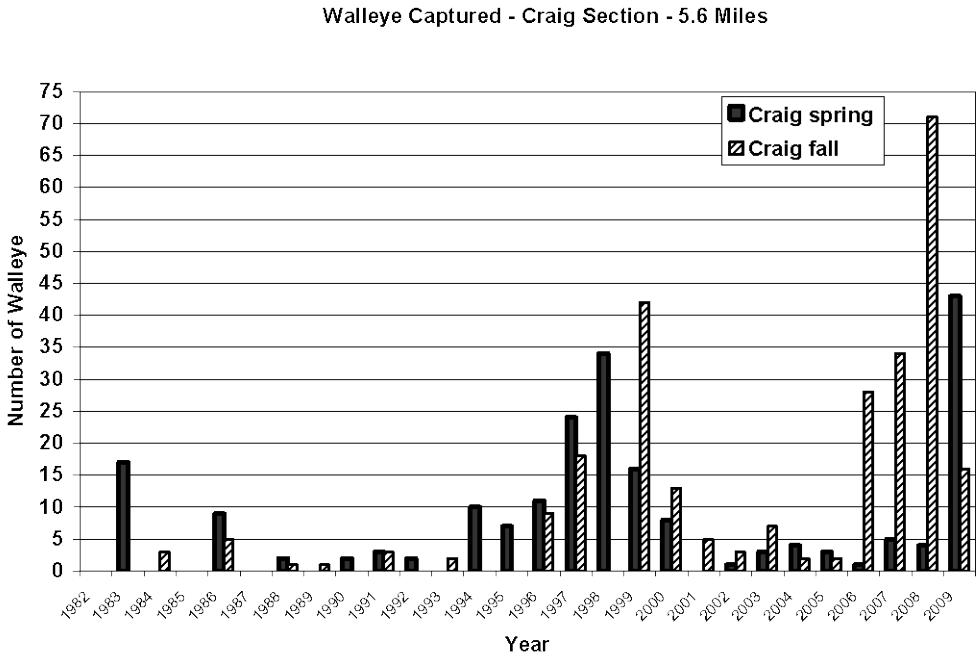
included in this plan. The Missouri River below Holter Dam is currently managed as a cold-water fishery and no substantive changes to the fisheries management are currently proposed or planned for this stretch of river.

c) **Comment:** Anglers should be allowed to take as many walleye as possible from the Missouri River below Holter Dam.

Response: As stated above, this management plan area does not cover the Missouri River below Holter Dam; however, FWP feels it is imperative to address anglers concerns regarding walleye limits and densities in this reach. Currently, FWP feels it is not warranted to remove angling limits for walleye in this stretch of river. The current limit for walleye is 5 daily and 10 in possession. FWP personnel have observed high harvest levels below Holter Dam that suggest increased walleye densities will be temporary in nature. Any proposals of this nature should be submitted to FWP and would be considered during the statewide public scoping process for regulation changes slated to begin in 2011.

d) **Comment: FWP should actively remove all walleye captured downstream of Holter Dam.**

Response: While this management plan does not include the Missouri River below Holter Dam, fisheries management biologists believe that current densities of walleye do not pose a threat to the trout fishery below Holter Dam and have not proposed any plans to actively remove walleye from the Missouri River. FWP data shows that increases in walleye abundance below Holter Dam is strongly correlated to high flows and flushing from Canyon Ferry Reservoir. The frequency of small walleye and low abundance of young of the year fish indicate a low level resident population of walleye. While data collected in the 5.6 mile long Craig section since 1982 shows substantial walleye increases in the late 1990's and from 2007-2009 (see graph below), these increases never represented more than a maximum of 3.4% and 2.7% of the brown and rainbow trout, respectively, handled during estimate work. While the average number of brown trout handled in the spring has been 1,587 fish, the maximum walleye ever handled was 43; for fall work, an average of 3,841 rainbow trout have been handled and the maximum number of walleye sampled is 71, which occurred in 2008. The highest percentage of walleye handled compared to brown trout was obtained in 1983. Additionally, seasonal movements of larger walleye show use of the entire 90-mile reach of river from Holter Dam to Great Falls and movements likely follow a forage base that is not trout. Should monitoring show changes that pose a risk to trout populations, active management strategies for walleye would be considered.



e) **Comment:** FWP needs to work with the power company and other government entities to reduce downstream escapement of walleye.

Response: FWP maintains excellent working relationships with PPL Montana representatives, as well as Bureau of Reclamation water managers and land management agencies. Strategies in the management plan include working with PPL Montana and the Bureau of Reclamation to identify potential approaches to reduce flushing of fish through Canyon Ferry, Hauser, and Holter Dams and will continue work already completed to assess and determine what steps may be taken to reduce flushing of walleye.

f) **Comment:** FWP needs to develop a monitoring plan in river sections adjacent to the reservoirs.

Response: FWP has conducted electrofishing surveys below Hauser Dam on odd-numbered years since 2003 and below Holter Dam on even-numbered years since 2006. Similar surveys were conducted in the early-80s in the spring and fall below Hauser Dam. FWP also has a long term monitoring section 5.6 miles long from the Wolf Creek Bridge to Craig (downstream of the management plan area), which has been sampled from 1982 to present. FWP, with assistance from PPL Montana, plans the continuation of these surveys to monitor fish populations directly below the dams and collect catch per unit effort for cold and warm water species and calculate population estimates when possible.

Piscivorous (fish eating) Birds

a) **Comment:** Killing of white pelicans and double-crested cormorants is not necessary. Science does not support killing of birds to protect the sport fishery.

Response: FWP's intent with the management plan was not implementation of a program that would result in the killing of piscivorous (fish-eating) birds without evidence demonstrating negative effects to the sport fishery. The management plan recommends additional research to quantify the year-round effects of pelicans and cormorants to the sport fishery. Any management

action to control bird numbers would require a separate public process, environmental assessment, and consultation with Federal regulators. Any actions would minimize significant, long-term impacts to the bird populations.

b) **Comment:** If the birds are having an impact to the fish, then stock more fish.

Response: Montana State fish hatcheries are currently running at full capacity, so stocking more fish is not a viable option. Rainbow trout and kokanee salmon are currently the only species stocked in the system. Walleye and yellow perch populations are naturally reproducing, self-sustaining populations, and stocking of those species would not be cost-effective alternatives.

c) **Comment:** Number of pelicans and cormorants need to be reduced.

Response: FWP pelican and cormorant diet studies have only been conducted during the early summer. During that time, the pelican diet is comprised of primarily carp and crayfish, while data suggests that cormorants may impact stocked rainbow trout, which comprise nearly 25% of the samples some years. Past diet collection efforts have provided only a snapshot of bird diet composition while fledglings are still on the nest. Further research is necessary to determine the composition of bird diet throughout the entire summer and to calculate the fish biomass consumed by pelicans and cormorants on a seasonal basis to determine the significance of predation by birds to fish populations.

Management Plan and Goals

a) **Comment:** FWP should do a 5-year plan instead of a 10-year plan. Ten years is too long of a planning period.

Response: This is an adaptive management plan that includes annual reviews of trend information and allows public input on an annual basis. FWP feels there is adequate opportunity to adjust management strategies based on "triggers" outlined in the management plan. The 10-year duration is necessary to allow adequate time to implement management strategies and judge their effectiveness. Additionally, the substantial amount of resources involved in such a planning effort limits the fiscal ability to shorten the duration of the planning period.

b) **Comment:** We are concerned that provisions of the management plan will be circumvented if lands currently managed by the BOR are turned over to the Forest Service or other agency.

Response: By law (MCA, 87-1-201) the State of Montana is responsible for enforcing the restrictions and regulations for fish and wildlife management in the state. Any changes to administration to public lands surrounding the reservoirs will not affect fisheries management strategies outlined in the management plan.

c) **Comment:** We are concerned that analysis must include promotion of mining opportunities in the Missouri headwaters. There is continued growth in the interest of recreational mining and we need to provide for that opportunity in the planning process.

Response: The management plan addresses strategies that guide fisheries management in the reservoir system for the next ten years. Promoting mining or any other activity that does not directly enhance the fisheries of the upper Missouri River reservoir system would not be appropriate in this planning process.

d) **Comment:** We are concerned that all diversions on the waterway may not have received the proper amount of discretion to insure water rights are protected.

Response: Although the management plan does not include any specific strategies to acquire water rights, habitat work on tributary streams will continue as will cooperation with private landowners and water users to preserve water rights while improving fish habitat and instream flow in streams. As part of day-to-day management activities, water use issues will be monitored, opportunities to benefit instream flows will be explored, and complaints may be filed with DNRC if inappropriate diversions are identified.

e) **Comment:** If you propose regulation changes during the management plan, will the public be allowed to comment?

Response: All regulation changes, including emergency changes, will be considered by the FWP Commission and the process will allow opportunity for public comment.

f) **Comment:** It's sad that there were no open houses on the west side of the divide.

Response: Open houses were held in five locations east of the divide (Helena, Townsend, Great Falls, Bozeman, and Billings) and one location west of the divide (Butte). Many of the primary users of the reservoir system come from these 6 cities. While it would be desirable to hold open houses in all major Montana cities, fiscal considerations limited outreach to other areas through local media outlets and FWP's website. These methods were judged to provide ample opportunity for public participation in review and comment of the draft management plan.

g) **Comment:** Could FWP keep the work group together to work on adaptive changes to the plan, maybe they only meet once a year to assess how well it's working?

Response: The Citizen Workgroup was appointed only to help identify management alternatives for the new management plan. Workgroup members will be welcome to participate in all public processes under the new 10-year plan, which provides for public outreach and allows public input on an annual basis.

h) **Comment:** Who and when will FWP make the decisions on which options will be adopted into the final approved plan?

Response: Following the public comment period, FWP field staff from Regions 3 and 4 as well as Helena staff contributed to the decision making process to identify alternatives adopted for the final plan. The Citizen Workgroup reconvened in December 2009 to review public comments and discuss the final alternatives selected for the plan. The final plan was submitted to the FWP Director and considered by the FWP Commission for approval in spring, 2010.

i) **Comment:** I am concerned that the trout fishing community didn't have the same representation on the Citizen Workgroup as the walleye fisherman.

Response: FWP attempted to balance the representation on the workgroup based on the wide variety of angler constituencies and related interests that are using the reservoir system, rather than a base representation on which species of fish they prefer. The 18 member workgroup was chosen to represent the following constituencies: Organized warm water, unaffiliated warm water, organized cold water, unaffiliated cold water, general anglers, guides and outfitters, ice fishing anglers, fishing-tournament organizer, local business, conservation group, local

government, kid's fishing, upstream/downstream interests, landowner, and other. One representative from FWP was also on the workgroup. Two members, one representing organized cold water and one representing conservation group withdrew from the Citizen Workgroup following scheduling conflicts. Regardless of the balance of representation, the process of developing alternatives by the Citizen Workgroup was based on members acknowledging the value of each member's comments and viewpoints. On many issues, consensus was reached.

Appendix C
A Review of Forage Fish
Montana Department of Fish, Wildlife & Parks
August 2009

1.0 Introduction

It has long been known that as the walleye population in Canyon Ferry Reservoir developed, the potential for depletion of the forage base throughout the reservoir system would be high. McMahon (1992) predicted that the rapidly expanding walleye population would quickly outstrip the forage available in the system. He also predicted that as walleye growth and relative weights (condition) declined, there would be a push by the public to supplement the forage base with another species. Currently, forage abundance in Canyon Ferry remains at low levels; however forage abundance appears adequate for current walleye population levels based upon walleye growth and relative weight data.

This review was completed in response to discussions which occurred during meetings of the *Upper Missouri River Reservoir System Fisheries Management Plan Citizen Workgroup*, where desires were expressed to identify potential species that may be appropriate to introduce to the system should it be deemed necessary. This Appendix provides only a cursory review of fish species used for walleye forage in similar systems and is intended for informational purposes only.

1.1 Reservoir Description

The U.S. Bureau of Reclamation (BOR) constructed Canyon Ferry Dam between 1949-1954 as part of the Pick-Sloan Missouri Basin Program. At full pool, Canyon Ferry Reservoir (CFR) is a 35,200 surface acre reservoir on the Missouri River with the inlet located 2-miles downstream of Townsend, Montana and the dam located 27-miles downstream from Townsend. The total capacity is 2,051,000 acre-feet at a pool elevation 3,800.00 msl. CFR is 25-miles long with a maximum width of 4.5-miles, 75-miles of shoreline, and a maximum depth of 165 feet. Reservoir characteristics are significantly different between the north and south ends. The north end is narrow and deep with numerous bays, steep slopes and rocky shorelines, while the south end is shallow (averaging 49 feet) with gently sloping shorelines. An average annual drawdown of 12-feet occurs in most years and reservoir fluctuations have considerable effects on CFR fisheries (Yerk 2000). Water temperatures fluctuate between 55ºF in May, rise to the upper 60's in early August and drop to below 50ºF by late October. A weak summer thermocline develops at a depth of approximately 60-feet between June and August on the north end, while the south end never stratifies (McMahon 1992).

1.2 Fisheries Management History

Montana Fish, Wildlife and Parks (FWP) has actively managed the CFR fishery since the dam was completed. Today rainbow trout, yellow perch, walleye, brown trout, northern pike and burbot comprise the sport fishery in the reservoir. Walleye are currently the primary top-level predators in the CFR system, while a developing northern pike population could have additional detrimental impacts to forage species in the system. CFR is currently managed as a multi-species fishery, with rainbow trout, yellow perch and walleye persisting as the primary target species for anglers. Walleye were first captured in 1989 while conducting historical fall gill net sampling and have since established a self-sustaining population. As the new walleye population showed an extremely rapid population growth rate, forage fish numbers declined. This has

resulted in requests for forage fish introductions to supplement existing species. To date, no new forage fish have been authorized for introduction into Canyon Ferry Reservoir.

2.0 Issue Analysis

A number of issues need to be addressed when considering what the benefits and negative impacts would be from the introduction of additional forage specie(s). They include:

- Determine the need for forage enhancement;
- Determine if the introduced forage will be utilized by the predator as a food resource;
- Determine if the introduced forage will be available to the predator based on habitat utilization or if forage fish growth rates are so rapid that they quickly become unavailable due to size;
- Determine the potential impacts of the introduced species to the zooplankton food base for existing species including walleye, yellow perch, and rainbow trout;
- Determine the cost-effectiveness of introducing and maintaining an introduced species;
- Review impacts of forage species introductions in other reservoirs;
- Determine potential negative effects of the introduced species to the fish communities in Hauser, Holter and the Missouri River upstream and downstream from CFR.

3.0 Forage Species Considered

Several non-native species to the upper Missouri River, upstream of Moroney Dam, are described below as potential forage for walleye. Species chosen for this analysis were based upon species range, use of forage in other western reservoirs, use as walleye forage, likelihood of becoming established in CFR, as well as other factors. The following species have been included in this analysis: Alewife, bluegill, cisco, gizzard shad, goldeye, green sunfish, kokanee salmon, rainbow smelt, emerald shiner, golden shiner, redside shiner and spottail shiner. The golden shiner, redside shiner, goldeye, cisco, rainbow smelt, and gizzard shad are all species that have been successfully used as forage in the Western United States or southern Canada (Hadley 1982, Bennett and Bennett 1993). Bonneville Cisco have also been suggested as an option for introduction, although stocking success for this species in western reservoirs is as yet unproven (Hadley 1982, Page and Barr 1991) and the species was not included in this review.

Alewife (Alosa pseudoharengus)
Native to the Atlantic Coast, Alewives were historically an anadromous marine species, but can complete their life cycle in freshwater environments (AIS Indiana 2009). In a freshwater system, alewifves are pelagic, obligate planktivores that are a schooling fish and can be prolific spawners when environmental factors are optimal. In addition, they can become adfluvial (move into rivers), which could have negative effects on the salmonid population in the Missouri River upstream of CFR and below Holter Dam if introduced. Adding a prolific spawning, obligate planktivore would be detrimental to rainbow trout, a principle sportfish in CFR. In reservoir environments alewives are shallow, shoreline spawners, that have shown drastic population swings in fluctuating reservoirs much like that of CFR. Also, alewives prefer deep (150-300 ft.) water from August through March (Scott and Crossman 1973), which is on the maximum depth threshold in CFR and may not be available to predators. Since alewives are prone to great population

swings with large reservoir water level fluctuations, it could be concluded that annual stocking events would be necessary. Repeated stocking could increase the potential for parasite or disease introductions, as well as the risk of introducing additional unwanted exotics due to the use of fish sources outside of Montana. Repeated stocking would also limit the cost-effectiveness of alewife as a forage fish. Alewives are also prone to massive die-offs, which can become health hazards to the fish community and for recreational uses to the lake (Scott and Crossman 1973). Literature suggests that trout that feed extensively on alewives can acquire a thiamine deficiency, which is responsible for suppressing feeding habits and may reduce rainbow trout growth potential (AIS Indiana 2009). Introductions of alewives in Montana would represent a major extension of their current range.

Bluegill (Lepomis macrochirus)
Common to waters in eastern and central North America, bluegills are a non-native pan fish that are found in various ponds and lakes throughout Montana. Bluegill are opportunistic feeders and are a highly sought after game fish in the Midwest, where typically, they are stocked in conjunction with largemouth or smallmouth bass and northern pike as a forage fish and to supplement sport fisheries. However, contemporary fisheries managers have moved away from this practice in the West as water temperatures and lack of predation have proved ineffective in growing fish large enough to interest anglers. Bluegill spawning is triggered at >68ºF and they need quality shoreline vegetation and cover (i.e. woody debris) for successful reproduction (Scott and Crossman 1973), which limits bluegill production in most western reservoirs. Based on the literature review for bluegill, it appears that CFR is not suitable habitat, considering the lack of shoreline vegetation and cover and a thermal regime that may never meet bluegill spawning triggers.

Cisco (Coregonus artedii)
Cisco (Lake Herring) have been introduced into Tiber and Fort Peck reservoirs to augment forage for walleye populations. According to Bennett and Bennett's (1993) environmental assessment for the introduction of cisco into Tiber, cisco populations can be unstable when exploited or subject to competition, and prefer cool waters. In addition, cisco may spatially segregate themselves from walleye by remaining in the deepest portions of the reservoir. However, cisco are heavily utilized and preferred by walleye in Fort Peck, a deep reservoir (Mullins 1991).

Cisco spawn in fall, when water levels in CFR have dropped, but are not at their lowest levels, which may affect the incubating eggs. Cisco can grow very rapidly since they are very efficient planktivores, and could grow too large to provide forage for all but the largest walleye given CFR's plankton densities (Colby et al. 1987). Based on the experience of cisco in Fort Peck Reservoir, it would be safe to assume that the initial plant of cisco would grow too fast to provide much forage the first year. Although initially unavailable for food, this cohort would become the nucleus of the brood stock for 2 to 3 years.

It is likely that cisco would provide forage only to the larger predators in the reservoir and that some of reservoir productivity will be tied up in cisco biomass without a significant return. It is likely that cisco would have profound effects on rainbow trout and yellow perch population densities due to changes to zooplankton community size and composition. Recruitment of juvenile walleye may also be limited due to lower zooplankton densities following fry emergence.

Cisco are native to Lake Superior: a deep, clear, cold lake system. Bennett and Bennett (1993) summarized their temperature tolerances as a preference for waters of 20°C (68°F) or less, but capable of tolerating temperatures up to 23°C (74 °F). Colby and Brooke (1969) reported an upper lethal limit of 24 to 26°C (75

to 79 °F) for both young and adult cisco. Cisco's adaptation and preference for cooler waters might benefit them in an introduction into CFR.

Cisco have the ability to migrate, as observed after introduction into Fort Peck Reservoir. Just a few years after initial stocking, they were captured near the mouth of the Judith River, approximately 70 miles upstream. The riverine habitat did not provide suitable habitat or temperatures to establish a resident population, but cisco were successful in colonizing the dredge cut area, a series of pools immediately downstream of Fort Peck Dam. Cisco moving upstream into the Missouri River from CFR are not likely to establish a resident population. Downstream flushing would provide mixed results, with Hauser and Holter reservoirs seemingly suitable for resident populations to become established, while in the Missouri River, they would likely reside seasonally or temporarily.

In summary, if Cisco were to be considered for introduction, their success in CFR could result in growth rates high enough that they would not initially, or potentially over the long term, be available for walleye forage and have significant negative impacts to the food supply for other species, including rainbow trout, yellow perch, and juvenile walleye. Additionally, flushing into downstream waters could result in significant impacts to Hauser and Holter Reservoirs and the Missouri River. The biological impacts to the resident fishery in the Missouri River by introducing an aggressive planktivore upstream are presently unknown, but could result in reduced growth and recruitment rates of rainbow and brown trout, poor recruitment of other sport and forage fish, and changes to the plankton community due to changing community composition in the reservoirs.

Emerald Shiner (Notropus antherinoides)
Native to the Missouri River basin, Emerald shiners are thought to be native in the eastern drainages of Montana (Brown, 1971; Holton and Johnson, 2003). Emerald shiners are a small, schooling fish that do not live past 3 years of age and individuals may grow up to four inches in length. Spatial overlap may be limited during some seasons, as emerald shiners remain offshore in the summer and move to shoreline habitat as water temperatures cool in the late summer; they move to deep water throughout the winter months. Emerald shiners are planktivores that can sustain high populations when water conditions are optimal. Similar to other planktivores discussed in this analysis, dense populations could lead to competition with rainbow trout, yellow perch, and juvenile walleye. Emerald shiners are highly susceptible to bird populations (Scott and Crossman 1973), and although they are the most abundant minnow species in the Missouri and Mississippi rivers, piscivores (e.g., walleye, northern pike) have not allowed them to become firmly established in many reservoirs (Pflieger 1997). If heavy predation persists, annual stocking would be required. Repeated stocking increases the potential for parasite or disease introductions as well as the risk of introducing additional unwanted exotics due to the use of out of state sources for fish. Repeated stocking also reduces the cost-effectiveness of emerald shiners as a forage fish.

Gizzard Shad (Dorosoma cepedianum)
Gizzard shad are not a native species in the upper Missouri River system and their introduction into CFR would represent a major range extension (Bennett and Bennett 1993). Gizzard shad avoid rivers and streams that lack large permanent pools or stagnant backwaters (Pflieger 1975). Migration upstream into the Missouri River below Toston Dam may be likely during drought years, when optimal summer temperatures could allow a seasonal population in this reach of the river. Although the establishment of a resident population downstream in the Missouri River may be unlikely, gizzard shad would be transported downstream to Hauser and Holter reservoirs and the Missouri River below Holter Dam. Overall conditions for summer survival and growth in the reservoir system seem excellent. Previous introductions in various

bodies of water in North America indicate that this species has significant pioneering capabilities. If temperature limitations do not suppress or extirpate initial stocks of gizzard shad, impacts to the entire system may be irrevocable with unknown biological consequences.

Gizzard shad have been successfully introduced into Wyoming lakes and have proven beneficial to the walleye fishery (Baughman 1983). Introductions into walleye reservoirs in Utah (Schaugaard and Sorenson 2000) and South Dakota (Meester 2000) have demonstrated similar success. Gizzard shad are tolerant of turbid waters; it is unknown if this would be a benefit or detriment for CFR.

Although the Wyoming introductions of gizzard shad have provided excellent forage for trout and walleye, their poor over-winter survival suggests that repeated stocking would be necessary in Montana (Baughman 1983). Fuller (1997) states that cold weather limits this species' northern range. The partial or total loss of adult gizzard shad each year due to temperature limitations would probably necessitate annual stocking of adult gizzard shad from out-of-state sources. Transporting pre-spawn adult shad over long distances from South Dakota or Nebraska would likely cause high or total mortality to the transplanted fish as they do not handle or transport well and such a project would incur substantial costs. The potential for introducing aquatic nuisance species, exotics, and diseases from outside the state would be a serious concern each year fish were transported. In fact, it is highly likely that no adult fish would be granted import status into the state.

In the unlikely event that gizzard shad successfully establish a population in CFR, the end result may not be entirely positive, as they are known to be extremely effective plankton feeders and may negatively impact growth and recruitment of other fish species (Jenkins and Burkhead 1994).

Goldeye (Hiodon alosoides)
Native to Montana in the Missouri River below Morony Dam, goldeye are a large-river fish, but also inhabit large lakes. Lake dwelling populations are primarily adfluvial (lake resident which spawn in rivers) species, which make a considerable spring spawning migration each year. Goldeye are considered opportunistic feeders (Brown 1971) and there is some concern about competition with the CFR principle sportfishes. It is unknown as to the possible detrimental effects on the salmonid fishery upstream of CFR if an adfluvial species were introduced. Goldeye have been removed from other reservoirs in the past because of their low angler appeal and potential for competition with preferred game species (Bennett and Bennett 1993). Although Goldeye are not a desirable target species by anglers, they have been commercially harvested in Fort Peck Reservoir. Goldeye can achieve lengths of up to 16 inches, which may be unavailable as forage to many walleye. Goldeye were analyzed as a possible forage fish for Fort Peck Reservoir and apparently afford little forage benefit to walleye based on diet analyses by Fort Peck Reservoir fisheries managers (Wiedenheft 1987, 1988, and 1991; Mullins 1991).

Golden Shiner (Notemigonus crysoleucas)
An exotic species in Montana, primarily found in Eastern Montana prairie ponds, golden shiners are a minnow species that thrive in well-vegetated, shallow shoreline habitat. Golden shiners are planktivores as juveniles and become opportunistic feeders as adults. They are extremely efficient at reproduction and become sexually mature at 7 to 8 months post-hatch and Golden shiners can typically reach lengths of up to 5.5 inches. Literature suggests that the thermal requirements for reproduction are between 60°F and 80°F. Golden shiners are dependent upon vegetation for reproduction, much like yellow perch, and have relatively high thermal requirements (Scott and Crossman 1973); thus they may be limited by fluctuations in CFR's water level (pool elevation) and cool seasonal water temperatures. Stocking success of golden shiners

would depend largely on maintaining water levels conducive to their reproduction. If golden shiners were to be introduced, a multi-year stocking commitment would be necessary to supplement potential losses from a poor water year. Repeated stocking increases the potential for parasite or disease introductions as well as the risk of introducing additional unwanted exotics due to the use of out of state sources for fish. Repeated stocking also reduces the cost-effectiveness of golden shiners as a forage fish.

Green Sunfish (Lepomis cyanellus)
Common to waters in eastern, central and southwest North America, green sunfish are non-native pan fish that are found in some prairie ponds and lakes throughout Montana. Green sunfish are opportunistic feeders and are a highly sought after game fish in the Midwest. Typically, green sunfish are stocked in conjunction with largemouth and smallmouth bass and northern pike as a forage fish. However, contemporary fisheries managers have moved away from this practice as water temperatures in the west are not conducive to growing fish large enough to interest anglers. Green sunfish spawning is triggered at >68°F and they need quality shoreline vegetation and cover (i.e. woody debris and large substrate) for successful reproduction (Scott and Crossman 1973). Based on the literature review for green sunfish, it appears that CFR is habitat limited, considering the lack of shoreline vegetation, woody debris and a thermal regime that may never meet green sunfish spawning temperatures.

Kokanee (Oncorhynchus nerka)
Not native to Montana, kokanee salmon are a landlocked form of sockeye salmon that have been successfully stocked throughout western reservoirs, including Montana, as a game fish. Kokanee are planktivores that live to 4 years of age, then spawn and die. Kokanee are adfluvial and will make substantial spawning migrations into primary reservoir tributaries to spawn (Wadoski and Bennett 1981). Kokanee are fall spawners and have been known to compete with brown trout (*Salmo trutta)* for spawning habitat, sometimes superimposing their redds on brown trout redds. This factor is of concern to the principle sportfish in the Missouri River upstream of CFR to Toston Dam. Kokanee were successfully stocked as forage for rainbow trout in both British Columbia and Idaho lakes and were deemed responsible for producing the world record rainbow and bull trout in Lake Pend Oreille, Idaho. According to Wadoski and Bennett (1981), wherever kokanee are planted, piscivore growth has improved and successful fisheries have resulted.

In CFR from 1966 to 1970, over 400 million kokanee fry were planted and a self-sustaining population never established. Hauser Lake, immediately downstream of CFR, developed a world-class Kokanee fishery in 1997, before flushing flows and expansion of the Canyon Ferry walleye population suppressed kokanee production in the reservoir. With a well-established, top-level predator such as walleye, kokanee are preyed upon shortly after stocking. Following high flows that flushed fish in 1997, all attempts at reestablishing a self-sustaining kokanee population in Hauser have failed, largely due to high rate of predation by walleye. It is no longer cost-effective to maintain a kokanee fishery in Hauser Reservoir. The likelihood of stocking enough kokanee in Canyon Ferry Reservoir to establish and maintain a viable, self-sustaining population that would not require annual stocking is very low.

Rainbow smelt (Osmerus mordax)
Rainbow smelt are a pervasive species in lakes and coastal areas of the eastern United States and have moved into a variety of cool water systems (Hadley 1982). Rainbow smelt exist in freshwater and anadromous forms, and although they prefer streams for spawning, have been known to use lakeshore habitat as well (Hadley 1982). Their distribution is concentrated in the Great Lakes region and eastward, but rainbow smelt have been introduced to the Missouri River drainage and are now found in North Dakota, South Dakota, Montana (downstream of Fort Peck), and have extended their range as far south as Louisiana

via the Mississippi drainage (Lee et al. 1981, Hadley 1982). Their rapid expansion demonstrates their natural mobility and may be of concern since they have not extended their range in Montana above intake diversion on the Yellowstone, and above Fort Peck Dam on the Missouri (Hadley 1982). There is also a history with viral diseases (viral erythrocytic necrosis) and parasites (*Glugea hertwigi*) associated with smelt introductions that are of concern (Hadley 1982).

Rainbow smelt prefer cool, clear waters near 60 °F, and tend to school in pelagic areas when temperatures are cool, but may seek refuge in deeper waters when temperatures climb (Hadley 1982). Young-of-the-year smelt are planktivorous and as they mature, they feed on macroinvertebrates and fish (potentially young walleye). Juvenile and adult smelt are opportunistic piscivores and exceptional competitors for food, including zooplankton. They have consistently out-competed other planktivores, except for alewives, in many lake environments (Hadley 1982). Case histories show that rainbow smelt, could pose a threat to juvenile walleye, yellow perch, and trout by reducing the total food available, rather than provide a supplemental forage resource for adult walleye (Johnson and Goettl 1999).

Redside shiner (Richardsonius balteatus)
Native to Montana west of the Continental Divide, redside shiners are planktivores as juveniles and become opportunistic feeders as adults, feeding on invertebrates, fish eggs and fish. Redside shiners are dependent upon vegetation for reproduction, much like yellow perch (Scott and Crossman 1973), and may be limited by CFR's water level fluctuations. Redside shiners have demonstrated intolerance for large water level fluctuations, and were extirpated from an Idaho reservoir after repeated drawdown's (Bennett and Bennett 1993). Redside shiners have been collected in the Missouri River above Toston Dam, however they have never been documented in CFR. Expansion of redside shiner into the reservoir may be limited by habitat availability and reservoir water level fluctuations. The largest redside shiners are about 7 inches long.

Spottail shiner (Notropus hudsonius)
Spottail shiners are not native to Montana but were introduced into Fort Peck Reservoir in 1981 and 1982. Outside of Montana, they are found in the Missouri River system only in the James River drainage, the Big Sioux drainage of South Dakota and Minnesota, and in lakes and streams of northwestern Iowa. They also occur in the Minnesota River drainage (Bailey and Allum 1962). Eddy (1957) lists spottail in North Dakota and adjacent Manitoba, to the Hudson River and south to Virginia, Illinois and Iowa. Carlander (1969) further defines the ranges to include Alberta, Hudson Bay, Quebec south along the coast to northern Georgia and in the Mississippi Valley to Missouri and Kansas.

Spottail shiners are most abundant in lakes and prefer this type of habitat, however, they are found in large rivers with low turbidities, avoiding strong currents (Liebelt 1981). Dense schools are common in shallow water. Maximum growth is about five inches. Spottail are mature at age 1 or 2, generally at a length of about 2.5 inches. Spottail shiners are not dependent on vegetation for spawning. They spawn over gravel, sand or aquatic vegetation from May to July throughout their range at temperatures in the upper 60's (°F). Females carry 100—2600 eggs (average 1800). This shiner spawns in closely packed groups with no evidence of nesting. Food selection varies, generally consisting of whatever is most abundant. Small fish feed on algae and rotifers, while medium sized fish feed mainly on zooplankton. Larger fish feed on insects, zooplankton, water mites, algae, fingernail clams, and eggs and larvae of their own species (IDFG 1985). While spottail shiners are considered a preferred food item in many walleye waters throughout their range, other waters in Montana show limited utilization of them by walleye. Diet analysis in 1996 in Fresno Reservoir showed that 14% of the non-empty walleye stomachs contained yellow perch while 4% contained spottail shiner (MFWP 2001). In Tiber Reservoir, spottail shiners compose nearly 80% of the available forage, however they make up less than 25% of the walleye diet (Dave Yerk pers. comm.).

Predation by spottail shiners on eggs or small game fish would need to be assessed. Literature reviews indicate spottail will prey on their own eggs; only one reference implied that spottail fed on walleyes eggs (Wolfert, et al. l975). Environmental concerns associated with the introduction of spottail shiners include: the possibility of introducing diseased fish, predation on eggs of game fish, competition with existing species, changes to the zooplankton community and overall food web due to increased predation by spottails, and invasion of drainages and tributary streams above and below CFR.

Upstream movement in the Missouri River above CFR may not occur due to avoidance of strong currents. Stocking spottail shiners would be a major range extension in the upper Missouri River system. Flushing of spottail shiners downstream in the reservoir system and the Missouri River below Holter Dam would be unavoidable.

4.0 Zooplankton Population

The primary concern for introducing additional forage fish is ensuring that the existing food base is adequate for all life stages and species and that existing species will not be harmed. All species of fish present in CFR utilize the zooplankton population to varying degrees, some just during their early life stages and some throughout their entire life. If the current fish community is unable to thrive on the existing food base, introducing an additional species may stress populations and undermine production. Walleye fry are also planktivores and would be in direct competition for food with most potential forage species. Bennett and Bennett (1993) surveyed current literature on zooplankton densities that could support walleye fry and found that densities of 40 zooplankton/ liter (L) were more than adequate, and that several lakes that supported walleye and other forage fish that might compete with walleye fry had much lower zooplankton densities.

Adding another planktivore to CFR might have negative effects on overall plankton densities, which could cascade trophically to affect walleye. Walleye fry depend on plankton for their food, especially in their first 3-5 days when their yolk sac is depleted (Bennett 1991). However, since walleye shift to piscivory fairly early in their life, they do not have the finely spaced gill rakers characteristic of pure planktivores. An efficient planktivore, like cisco or gizzard shad, can out-compete walleye fry for food, and deplete the larger, more calorie rich plankton. Smaller plankton provide less energy and require more energy to collect, but are still accessible to fish with fine gill rakers. When the plankton food base is stripped to the smallest species, planktivores with wider spaced gill rakers like walleye fry cannot compete (Bennett 1991). Newly emerged walleye cannot get the nutrition they need, and increased walleye numbers may not occur due to this increased pressure on the zooplankton base, resulting in a decrease in overall walleye recruitment (Bennett 1991). Competition between young walleye and any new forage species needs to be considered. Forage introductions usually imply that the intent is for the new species to be used as food by the target species, and not undermine their reproductive or maturation processes (MFWP 2001). The goal is to create better conditions for the target species, walleye. If the forage fish competes significantly with any life stage of the target prey species, then the forage species may in fact hinder or cripple their (walleye's) success. Reductions in growth and/or recruitment may occur. Artificial maintenance of the walleye population through stocking is not a preferred alternative. The *Mysis* introduction in Flathead Lake provides an all too clear illustration of how the best of fisheries management intentions can go awry (Spencer et al 1991).

CFR could support another forage species, but the question remains, would such an addition make a positive difference in the walleye population and not have a negative impact on other species such as yellow perch or rainbow trout (Montana Fish, Wildlife and Parks 2001)? It is important to remember that walleye are a top-level predator and require a much larger food base to maintain their populations than do planktivorous or omnivorous fish. At each trophic level from producers to grazers, to first level predators and on up, there is

only about a 10% energy transfer. In other words, it takes 10 oz. of algae to make 1 oz of snail, and 10 oz. of snail to make 1 oz of pumpkinseed, and 10 oz of pumpkinseed to make 1 oz. of walleye. Fish like trout that consume at a lower trophic level, can get much bigger and more numerous in a similar system than walleye (Shepard 1991). Creating a stable and quality walleye fishery requires a very productive system with lots of biomass at all forage levels, not just at the level where walleye directly consume.

5.0 Potential Negative Effects on Local Fish Communities

Introducing a new species into an existing ecosystem always has the potential for unforeseen negative effects. Sometimes these effects are short-lived, and reflect adjustments in the community as the new species are incorporated. Some introductions have resulted in minimal negative impacts, but also provided none of the intended benefits. However, other effects could be dramatic and irreversible. Montana has seen its share of catastrophic effects from well intentioned, well-researched species introductions such as the *Mysis* introduction to the Flathead River system (Spencer et al. 1991).

Problems associated with introducing nonnative species into the reservoir include an unwanted species inadvertently included and contaminating the fish being planted. As an example, a portion of the minnows transported to Fort Peck Reservoir in 1983 was the common shiner (*Notropis cornutos*) instead of the intended species, spottail shiner. This problem can only be eliminated for a live fish transfer by physically sorting every fish at time of planting and destroying all species other than that proposed for introduction.

New species added to CFR could migrate upstream as far as Toston Dam and downstream throughout the length of the Missouri River system. Impacts to these systems must be considered as well. If possible, any species selected for additional study should be either native to Montana rivers or already established in the Missouri River Drainage. In order to reduce the risk of disease or parasite introductions, all out-of-state stock would need to be certified disease free, meet strict health inspections and extreme caution would be required to prevent contamination from transport containers and water. It cannot be stated strongly enough that annual stocking efforts for a species likely would not be possible unless eggs or the fish were from a hatchery source with a strong health record, since the potential risk of disease or parasite introductions is compounded with each stocking effort.

The migration of exotic species introduced into CFR and colonizing in other waters is of great concern. An exotic fish species prescribed to help increase diversity of CFR's forage may not necessarily provide a similar benefit for adjacent waters. Since there is the potential for irrevocable change to the biological system by introducing an exotic species, careful and prudent consideration must be given to what is at risk.

The potential for disease introduction cannot be overlooked. There is a concern for introducing bacterial diseases including furunculosis (*Aeromonas salmonicida*), redmouth (*Yersinia ruckeri*) and in particular, VHS. Many spottail shiners stocked in Fort Peck Reservoir in 1983 were infected with a metacercjal trematode (*Centrovarjum lobates*), which develops into an adult in predator fish species such as walleye, perch, and, northern pike. Adequate information to assess the potential for introducing new parasites and diseases from in-state spottail sources needs to be obtained prior to any forage supplementation. Assessment of diseases issues associated with new introductions is difficult since incomplete information exists regarding disease and parasite occurrence in Montana fishes and waters.

6.0 Summary Comments

No strong candidate has emerged as a preferred option. Based on the information gathered for this review, it is also apparent that there is no new forage fish perfectly suited to meet all the needs in CFR. The potential for negative consequences outweigh any potential positive results that might be gained from an exotic fish introduction. Any decision to introduce a new species must also take into consideration the potential to harm the fishery and interconnected aquatic resources. Displacing other prey fish species with an aggressive planktivore could result in reduced species diversity and less public fishing opportunity. Any species introduction would require a rigorous formal evaluation of its impact to the CFR aquatic community and the upper Missouri River reservoir system to prevent a mistake that could have devastating consequences to all existing fisheries both upstream and downstream. Due to these concerns, no new species will be evaluated or considered for introduction into the management plan area. Enhancing the current forage species should be given priority.

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Appendix D
Illegal and Unauthorized Introduction of Aquatic Wildlife Policy

POLICY
MONTANA FISH, WILDLIFE & PARKS
FISHERIES DIVISION

ISSUED 5/22/02	REVISED
APPROVED BY: M. Jeff Hagener, Director	

TITLE: ILLEGAL AND UNAUTHORIZED INTRODUCTION OF AQUATIC WILDLIFE POLICY

SUBJECT: FISH MANAGEMENT

PURPOSE:
The purpose of this policy is to clearly state the approach for dealing with illegal and unauthorized introductions of aquatic species. For purposes of this policy aquatic species include any fish, insects, crustaceans, mollusks or other species requiring aquatic habitat to complete its life cycle.

RELATED STATE STATUTES/ADMINISTRATIVE RULES:
MCA 87-5-701-721, ARM 12.7.601 (4)

GENERAL:
Illegal and unauthorized introduction of aquatic wildlife can adversely affect native, wild and stocked fish population, spread disease, impact water quality and aquatic habitat, increase fishery management costs and cause a loss in fishing quality and opportunity for anglers. Montana Fish, Wildlife and Parks is the sole legal entity that may stock or permit stocking of fish or aquatic wildlife in the waters of the State of Montana.

POLICY:

It is the policy of the Montana Fish, Wildlife and Parks that:

1. When the Department becomes aware of an illegal or unauthorized introduction it will:
   A. Immediately begin an investigation of the introduction utilizing all available resources.
   B. Prosecute to the fullest extent of the law any individual believed responsible for the introduction.
   C. Violations will be pursued through civil court and will seek restitution for removal of the introduced species and re-establishment of the original fishery.

2. The department will determine of there is a realistic likelihood that removal of the introduced species will be successful.
   A. At the earliest possible opportunity sample the body of water to determine age structure, size and distribution of the illegally introduced population;
   B. Review and evaluate possible removal options;
   C. Make a determination about feasibility of removal.

3. If the department determines that removal may be feasible it shall attempt removal at the earliest

possible date and will:

A. Complete all necessary environmental compliance and permitting;
B. Seek reimbursement for cost of removal via the courts from the individual(s) responsible for the introduction.

4. If the department determines that successful removal is not likely or if removal fails, the department will take into consideration the illegal nature of the introduction in future management decisions. Each body of water will be treated on a case-by-case basis. Management options include, but are not limited to:
   A. Cease stocking the water body if the presence of illegally introduced species are reducing the effectiveness of the stocking effort.
   B. Deny applications for fishing contests that target the unauthorized or illegally introduced species, or require (as a condition) that the tournament have a catch-and-kill format.
   C. Do not stock any forage fish species to benefit the unauthorized or illegally introduced species, or if the department was previously stocking fish that are used as forage by the illegally introduced species, stop stocking that species or alter stocking strategy to reduce predation.
   D. Implement control measures to reduce the population of illegally introduced or unauthorized species. Measures may include increasing or removing harvest limits, authorizing additional means of take, installation of fish barriers, removal using chemical or mechanical methods, netting spawning fish, habitat manipulation (e.g. reservoir drawdowns) or disturbing spawning areas to reduce survival.
   E. Authorize commercial harvest of illegally introduced or unauthorized species if a statutory authority is provided.
   F. Close a water body to all fishing.