HUNGRY HORSE MITIGATION - CRESTON HTCH KOKANEE 9101904

SHORT DESCRIPTION:
Produce fish to mitigate losses to Flathead Lake as identified in the Hungry Horse Mitigation Plan approved by the NPPC; coordinate kokanee reintroduction and multiagency monitoring, and research on supplementation techniques for affected native fish.

SPONSOR/CONTRACTOR: USFWS
U.S. Fish and Wildlife Service
Wade Fredenberg or Mark Maskill, Fish Production Coordinator / Hatchery Manager
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SUB-CONTRACTORS:
Montana Fish, Wildlife and Parks; Confederated Salish and Kootenai Tribes

GOALS

GENERAL:
Supports a healthy Columbia basin, Maintains biological diversity, Maintains genetic integrity, Increases run sizes or populations

RESIDENT FISH:
Production

NPPC PROGRAM MEASURE:
10.3A.10; 10.3A.11; 10.3A.12

TARGET STOCK	LIFE STAGE	MGMT CODE (see below)
Westslope Cutthroat Trout		S W
Bull Trout		(P) W
Kokanee		A

BACKGROUND

STREAM AREA AFFECTED
Stream name:
Flathead River/Lake
Stream miles affected:
Approx. 500
Hydro project mitigated:
Hungry Horse Dam

LAND AREA INFORMATION
Subbasin:
Upper Columbia
Land ownership:
Public/Tribal
Acres affected:
126,000

HISTORY:
Initiated in 1992 after NPPC adopted Hungry Horse Mitigation Plan (November 1991, see NPPC programma.10). Implementation as per NPPC direction upon adoption of Hungry Horse Implementation Plan (March 1993, see NPPC programma.11). Project 9101900 - Fish Production Coordinator - was merged with this program beginning in FY96. Significant cost-sharing to this mitigation program has been contributed by the U.S. Fish and Wildlife Service, including dedication of 70% of fish rearing capacity at Creston National fish hatchery and contribution of resources for project management and monitoring.

BIOLOGICAL RESULTS ACHIEVED:
Project stocked 210,000 yearling (5-7 inch) kokanee into Flathead Lake in June 1993; 802,000 in June 1994 (1st year of scheduled

5-year Test); 502,000 in June 1995; and 939,000 in April 1996. Additional tests of 409,000 3-inch fingerlings stocked in June 1995; 220,000 fingerlings in August 1996; and 603,000 fry in April 1996. Project currently holding about one million yearlings for stocking in 1997. Successful development of
captive kokanee broodstock was achieved, producing 2-3 million eggs per year to ensure future egg supplies.
Successful bull trout incubation and rearing experiments were conducted with eggs collected from wild bull trout. Collection of 1,000 wild juvenile bull trout from 26 streams was used in completing a basinwide genetic evaluation. Bull trout imprinting, rearing and brood development research is partially accomplished (in progress).
Monitoring indicates lake trout consumed large numbers of planted kokanee in 1993 and 1994 (see 93/94 Monitoring Report). Adaptive management strategy was employed to select a different stocking site in the south end of the lake in 1995 and 1996. Gillnet sets in 1995 indicated improved survival. Two trap nets set at stocking locations in the fall of 1995 captured over 300 adult kokanee (200-400 mm), all in excellent
condition, indicating that Flathead Lake has the necessary food base to produce kokanee. Returns to six trap nets set in fall 1996 were considerably lower (29 adult fish) and stocking sites and timing are being reevaluated. Reopening of the kokanee fishing season in 1996 produced little angler interest and no kokanee were recorded caught in a partial summer creel survey.

PROJECT REPORTS AND PAPERS:

Fisheries Mitigation Plan for Losses Attributable to the Construction and Operation of Hungry Horse Dam; Montana Department of Fish, Wildlife and Parks and Confederated Salish and Kootenai Tribes, Kalispell and Pablo; March 1991; 71 pp.

Genetic Sampling Plan for Bull Trout in the Flathead River Drainage; Wade Fredenberg, U.S. Fish and Wildlife Service, Creston National Fish Hatchery; December 1992; 19 pp.

Planning Considerations for Development of a Low-Cost Bull Trout Isolation and Rearing Facility; Wade Fredenberg, U.S. Fish and Wildlife Service, Creston National Fish Hatchery; February 1993; 20 pp.

Hungry Horse Dam Fisheries Mitigation Implementation Plan; Montana Department of Fish, Wildlife and Parks and Confederated Salish and Kootenai Tribes, Kalispell and Pablo; March 1993; 43 pp.

Gas Supersaturation Monitoring Report, Creston National Fish Hatchery; Wade Fredenberg and Don Edsall, U.S. Fish and Wildlife Service, CNFH; November 1993; 17 pp.

Collection of Juvenile Bull Trout in the Flathead River Drainage, Montana; Wade Fredenberg, U.S. Fish and Wildlife Service, Creston National Fish Hatchery; December 1993; 26 pp.

Flathead Lake Angler Survey; Les Evarts, Barry Hansen, and Joe DosSantos, Confederated Salish and Kootenai Tribes, Pablo; February 1994; 38 pp.

Hungry Horse Dam Fisheries Mitigation, Biennial Report, 1992-1993; Hungry Horse Implementation Group; June 1994; DOE/BP-60559-2, Bonneville Power Administration, Portland, Oregon; 15 pp.

Evaluation of Thyroxine Content as an Indicator of Imprint Timing in Juvenile Bull Trout (Salvelinus confluentus); H. Galloway, A. Scholz, J. Hendrickson, R. White, M.B. Tilson, and W. Fredenberg; July 1994; Upper Columbia United Tribes Fisheries Center Fisheries Technical Report No. 50; Cheney, Washington; 35 pp.

Experimental Bull Trout Hatchery Progress Report, 1993-1994; W. Fredenberg, P. Dwyer, and R. Barrows; June 1995; U.S. Fish and Wildlife Service, Kalispell, Montana; 29 pp.

Hungry Horse Dam Fisheries Mitigation: Kokanee Stocking and Monitoring In Flathead Lake, Annual Report 1995; B. Hansen, J. Cavigli, M. Deleray, W. Fredenberg, and D. Carty; September 1996; DOE/BP-65903-7, Bonneville Power Administration, Portland, Oregon; 25 pp.

Kokanee Stocking and Monitoring, Flathead Lake - 1993 and 1994; M. Deleray, W. Fredenberg, and B. Hansen; July 1995; DOE/BP-65903-6, Bonneville Power Administration, Portland, Oregon; 47 pp.

ADAPTIVE MANAGEMENT IMPLICATIONS:

Monitoring of the kokanee program has provided conclusive evidence that lake trout predation is THE limiting factor to successful reestablishment of a kokanee fishery in Flathead Lake. Adaptive changes to stocking program have aimed to improve survival of stocked fish by timing and selection of stocking sites where predation is minimized. Initial results also indicate adaptive changes in fish size at stocking, ie. using larger numbers of smaller fish, should be reexamined. Initial constraints on the program due to insufficient egg supplies were remedied by establishment of a captive kokanee broodstock. Initial efforts to develop a bull trout culture program were successful. However, a proposal to list bull trout under the ESA, and concurrent establishment of a Montana Bull Trout Restoration Team have considerably raised the profile of the species (legal, social, political) and heightened concerns over proposed supplementation actions. These developments have precluded opportunities to conduct field supplementation experiments on bull trout, but we have learned enough about culture techniques from experiments to increase our confidence in our capability to successfully culture the species if adaptive strategies involving hatcheries are called for in the future.

PURPOSE AND METHODS

SPECIFIC MEASUREABLE OBJECTIVES:

As listed in the 1993 Implementation Plan: "Criteria for determining success of kokanee reintroduction: We would propose that the kokanee supplementation program be considered initially successful if it establishes a fishery by 1998 that produces statistical values roughly equivalent to about 25 percent of 1981-1982 levels. These standards would include: 1) Post-stocking survival of 30 percent of planted kokanee one year after stocking. 2) Yearling to adult kokanee survival of 10 percent (100,000 adult salmon from a plant of 1 million). 3) Annual kokanee harvest of 50,000 or more fish; including a catch rate of 0.5 fish per hour for kokanee-specific anglers, average length at harvest of 11 inches or longer, and 100,000 or more hours of angler effort."

Success will be measured in part by a programmed creel census, currently proposed for 1998 or after. An Independent Scientific Group (ISG) review of the mitigation program, conducted in 1995, suggested that program objectives were optimistic and should be revised downward.

CRITICAL UNCERTAINTIES:

Uncertainties: Are kokanee goals achievable based on current stocking levels, especially in light of heavy lake trout predation? Will establishment of a kokanee population result in the desired fishery? Will introduced kokanee successfully reproduce in the wild? Can biological, social, and political obstacles to supplementation of native species (bull trout, cutthroat trout) be resolved in order to make supplementation a viable mitigation approach?
Risk: Increased kokanee population could result in increased abundance of lake trout, further aggravating predation problems.

BIOLOGICAL NEED:

The losses attributed to Hungry Horse Dam were adopted by NPPC and incorporated in Fish and Wildlife Program Amendment 903(h)(2)(C):
1) Replace lost annual production (minimum of 65,000 westslope cutthroat trout annually) from the inundated 43 miles of tributaries and 35 miles of South Fork Flathead River using a mix of habitat improvement, improvement in fish passage, and hatchery production.
2) Replace lost annual production of 250,000 young bull trout in the lost stream sections using a mix of the above fisheries techniques.
3) Replace lost annual production of 100,000 kokanee adults, initially through hatchery production and pen rearing in Flathead Lake, partially replace lost forage for lake trout in Flathead Lake.

HYPOTHESIS TO BE TESTED:

1) Stocked yearling kokanee can survive to maturity in Flathead Lake.
2) A kokanee fishery can be developed by stocking yearling fish into Flathead Lake.
3) Bull trout and/or westslope cutthroat trout populations and fisheries can be enhanced by supplementation.

ALTERNATIVE APPROACHES:

See Hungry Horse Mitigation Plan, 1991 and Hungry Horse Implementation Plan, 1993 cited previously.

METHODS:

Annual stocking goal of +/- 1.0 million yearling kokanee into Flathead Lake from Creston National Fish Hatchery. Monitoring developed through adaptive management, with most successful methods to date employing gill net and trap net sampling and analysis of lake trout stomach samples to evaluate growth and survival of oxytetracycline-marked hatchery fish. Hydroacoustic estimates, trawling, and angler creel methods expected to be employed more extensively in the future. Quantitative results will be achieved, in part, through programmed creel census.

PLANNED ACTIVITIES

SCHEDULE:

planning Phase **Start** 3/91 **End** 3/93 **Subcontractor**

Task Develop implementation plan to replace approved losses.

implementation Phase **Start** 3/93 **End** ongoing **Subcontractor**

Task Develop successful kokanee rearing protocols and refine stocking methods and locations through adaptive management. As kokanee program success is refined, increasing emphasis will be placed on imprinting and stocking techniques to increase likelihood of reestablishing self-sustaining populations. Bull trout and cutthroat trout supplementation efforts have been scaled back pending development of suitable introduction opportunities through habitat projects and/or accepted protocols for use of hatchery fish in native species recovery.

o&M Phase **Start** 3/93 **End** ongoing **Subcontractor**

Task Low-cost and temporary upgrades to Creston National Fish Hatchery facility to maximize opportunity to produce healthy, high quality fish for purpose of meeting mitigation program objectives. Decision on construction of permanent facilities under project 9301600 following initial test period.

PROJECT COMPLETION DATE:

ongoing

CONSTRAINTS OR FACTORS THAT MAY CAUSE SCHEDULE OR BUDGET CHANGES:

The ecological perturbation of the Flathead Lake food chain resulting from the introduction of Mysis shrimp has resulted in an unpredictable outcome for kokanee reestablishment. The 1995 ISG Review of the Hungry Horse Mitigation Implementation Program highlighted that uncertainty and predicted failure for the kokanee effort. However, the Hungry Horse Implementation Group (Montana Fish, Wildlife and Parks; Confederated Salish and Kootenai Tribes; U.S. Fish and Wildlife Service) feels that criticism is not supported by the facts and through employment of adaptive management, and based on monitoring results, they are making progress on kokanee restoration. The ISG also suggested that kokanee restoration goals may be optimistic; adjustments to the goals are being evaluated. Lake trout predation appears to be the key threat to kokanee restoration. Risks of bull trout and westslope cutthroat trout supplementation are more closely linked to genetic, social, and legal concerns. While a comprehensive basinwide genetic survey of bull trout was initiated under this project, little progress has been made in the rest of those arenas. A primary constraint on achieving stocking goals (1 million yearling kokanee/year) has been the limited production capacity (and other factors) at Creston NFH. Hatchery constraints to achieving project goals include fish health obstacles (furunculosis) and inability to achieve needed upgrades to expand production due to low cost and temporary directives of the NPPC.

OUTCOMES, MONITORING AND EVALUATION

SUMMARY OF EXPECTED OUTCOMES

Expected performance of target population or quality change in land area affected:

Replacement of losses identified above; 65,000 juvenile westslope cutthroat trout, 250,000 juvenile bull trout, 100,000 adult kokanee annually.

Present utilization and convservation potential of target population or area:

Current utilization based on lakewide angler creel survey conducted over a one-year period in 1992-1993. Estimated angler use: 4

7,883 angler days; kokanee harvest: 0 fish; bull trout harvest: 196 fish; cutthroat trout harvest: 118 fish. Bull trout fishing closed by regulation in 1993. Lakewide creel currently scheduled for repeat in 1998.

Assumed historic status of utilization and conservation potential:
Historic utilization established by lakewide angler creel survey conducted over a one-year period in 1981-1982. Estimated angler use: 168,792 angler days; kokanee harvest: 495,910 fish; bull trout harvest: 5,452 fish; cutthroat trout harvest: 6,910 fish.

Long term expected utilization and conservation potential for target population or habitat:
Kokanee: Restore to 1981-1982 level of harvest and angler use. Bull trout/cutthroat trout: Restore populations to levels of fishable surplus.

Contribution toward long-term goal:
Kokanee: Initial objective to restore to 25% of desired level by 1998 (this goal may need to be revised downward based on ISG review). Bull trout/cutthroat trout: Not currently being supplemented.

Indirect biological or environmental changes:
Current kokanee stocking program has unknown implications in supporting lake trout population; may cause lake trout to persist at artificially high levels; may provide alternate forage resulting in reduced lake trout predation on native bull trout and cutthroat trout.

Physical products:
Average 750,000 yearling kokanee stocked into Flathead Lake annually (3 years); production of 2 million kokanee eggs annually.

Environmental attributes affected by the project:
Hungry Horse Dam flow releases to the Flathead River during kokanee spawning and incubation period (fall) are directly affected by release of kokanee into Flathead Lake. "Kokanee flows" are required when spawning kokanee are present.

Changes assumed or expected for affected environmental attributes:
NA

Measure of attribute changes:
NA

Assessment of effects on project outcomes of critical uncertainty:
Monitoring population levels of affected species. For kokanee includes spawner surveys, hydroacoustic estimates, and angler catch and harvest surveys.

Information products:
Annual monitoring report, supplemental research reports.

Coordination outcomes:
Project supervised by Implementation Group comprised of representatives from three agencies: MFWP, CSKT, USFWS. Monitoring efforts conducted cooperatively with support of BPA.

MONITORING APPROACH
Kokanee program measured by degree of success in establishing fishable population; long-term goal of reestablishing self-sustaining population, with environmental outcomes measured by population response of other species. Bull trout and cutthroat trout outcomes weighed by degree to which project enhances, assists, or encourages restoration of those species in the Flathead River Basin.

Provisions to monitor population status or habitat quality:
Programmed creel survey - 1998 or later; spawner surveys.

Data analysis and evaluation:
Summarized by Technical Team in annual reports published by BPA.

Information feed back to management decisions:
Decision trees presented in implementation plan.

Critical uncertainties affecting project's outcomes:
More refined and quantifiable population data for lake trout are badly needed. Broader research on lake trout impacts on native species (bull trout, westslope cutthroat trout) and interactions with kokanee are needed. Additional fish production capacity at Creston NFH or other sites is needed to meet the target of stocking 1 million yearling kokanee per year.

EVALUATION
Successful reestablishment of a kokanee fishery. Recovery of native bull trout and cutthroat trout to pre-Mysis (pre-1980's) population levels.

Incorporating new information regarding uncertainties:
Adaptive management through adjustments in stocking/production strategies.

Increasing public awareness of F&W activities:
Project receives frequent local and regional press coverage.

RELATIONSHIPS

RELATED BPA PROJECT	RELATIONSHIP
9502600 MFWP/CSKT MODEL WATERSHED	Improve coordination between entities affecting watershed health in Flathead Basin.
9301600 MONTANA RESIDENT FISH HATCHERIES	Will construct additional fish production facilities to meet goals of this program.
9101903 MFWP HABITAT	Habitat enhancement in Flathead Lake tributaries to improve spawning/juvenile recruitment of bull trout and westslope cutthroat trout.
9101901 CSKT M&E	Conducts monitoring of fish stocked under this project.

RELATED NON-BPA PROJECT	RELATIONSHIP
Kerr Dam Mitigation / Montana Power Co.	FERC Relicensing - Order Pending - Expected to overlap directly with existing mitigation of kokanee and other salmonids in Flathead Lake/River.

COSTS AND FTE

1997 Planned: $465,000

FUTURE FUNDING NEEDS:

FY	$ NEED	% PLAN	% IMPLEMENT	% O AND M
1998	$484,000		100%	0%
1999	$484,000		100%	0%
2000	$484,000		100%	0%

PAST OBLIGATIONS (incl. 1997 if done):

FY	OBLIGATED
1992	$64,457
1993	$200,699
1994	$326,362

2001	$484,000	100%	0%	1995	$327,919
2002	$484,000	100%	0%	1996	$544,245
				TOTAL:	$1,463,682

Note: Data are past obligations, or amounts committed by year, not amounts billed. Does not include data for related projects.

FY	OTHER FUNDING SOURCE	AMOUNT	IN-KIND VALUE
1998	U.S. Fish and Wildlife Service / Montana Power Co.	up to $4.3MM	$100M
1999	U.S. Fish and Wildlife Service / Montana Power Co.	5MM / $300M	$100M
2000	U.S. Fish and Wildlife Service / Montana Power Co.	5MM / $300M	$100M
2001	U.S. Fish and Wildlife Service / Montana Power Co.	-- / $300M	$100M
2002	U.S. Fish and Wildlife Service / Montana Power Co.	-- / $300M	$100M

OTHER NON-FINANCIAL SUPPORTERS:
Montana Fish, Wildlife and Parks; Confederated Salish and Kootenai Tribes

LONGER TERM COSTS: Annual implementation at FY 97 level.

1997 OVERHEAD PERCENT: 15%

HOW DOES PERCENTAGE APPLY TO DIRECT COSTS:
total

CONTRACTOR FTE: 6

SUBCONTRACTOR FTE: NA