HUNGRY HORSE MITIGATION/HABITAT IMPROVEMENTS 9101903

SHORT DESCRIPTION:
Implement habitat restoration, fish passage improvement, off-site mitigation and monitoring pertaining to the Hungry Horse mitigation effort as directed by NPPC program amendments 1993.

SPONSOR/CONTRACTOR: MFWP
Montana Fish, Wildlife & Parks
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SUB-CONTRACTORS:
We occasionally subcontract with Dr. Ed Brothers EPS Consultants for otolith validation. There are no current plans to do this during FY97.Statistical consulting is subcontracted for specific tasks with Dr. Ed Boik, Montana State University

GOALS

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

RESIDENT FISH:
Habitat

NPPC PROGRAM MEASURE:
10.3A.13 and 10.3A.4

RELATION TO MEASURE:
NPPC program language is specific to the Hungry Horse Mitigation Plan (1991) and Implementation Plan approved 1993. Language clarifies direction for specific mitigation actions.This project also compiles data and conducts monitoring tasks to refine and validate the quantitative biological model HRMOD. The model was used to develop Integrated Rule Curves (IRCs) for Hungry Horse Reservoir. Operating criteria to balance reservoir and river requirements were called for by the NPPC Program.

OTHER PLANNING DOCUMENTS:
Flathead Basin Commission, Master Monitoring ProgramSouth Fork Conservation AgreementHungry Horse Mitigation Plan and Implementation PlanKerr Mitigation Plan / FERC Relicensing documents

TARGET STOCK	LIFE STAGE	MGMT CODE (see below)
Kokanee	All	A,NA,S
Rainbow trout	All	A,NA,S
Mountain whitefish	All	N
Westslope cutthroat trout	All	S,N,W
Bull trout	All	(P),N,W

AFFECTED STOCK	BENEFIT OR DETRIMENT
Northern squawfish, northern pike, yellow perch, pumpkinseed	Detrimental
Eastern brook trout	Detrimental

BACKGROUND

STREAM AREA AFFECTED
Stream name:
Flathead River
Stream miles affected:

LAND AREA INFORMATION
Subbasin:
Upper Columbia
Land ownership:

Approx. 170 miles

Hydro project mitigated:

Hungry Horse Dam

both

Acres affected:

entire Flathead drainage

Habitat types:

Reservoir, river, tributary, lake, pond

HISTORY:

Research began in 1982 to assess the effect of hydropower operation on the biota in Hungry Horse Reservoir(see BPA records for budget figures). Field data were used to develop the quantitative reservoir biological model HRMOD. Biological Rule Curves for dam operation were first published in 1989 (Fraley et al. 1989). These BRCs were later refined and renamed Integrated Rule Curves (IRCs)(Marotz et al. 1996). Research and initial mitigation work was funded as compensation for adverse impacts resulting from operational changes needed for power purposes (Intertie Development and Use). In 1990 MFWP and CSKT developed and submitted a mitigation plan to NPPC. This plan was approved and the state and tribe were told to develop an implementation plan (approved 1993). Hungry Horse Mitigation is a cooperative effort administered by MFWP and CSKT in cooperation with the USFWS. Pilot mitigation projects began in 1992, to help guide mitgation planning. Loss assessments were approved by NPPC, and mitigation direction was adopted into the NPPC program. Cost-share projects were established with U.S. Bureau of Reclamation (Technical Assistance Program, funding passage projects, zooplankton entrainment project), U.S. Forest Service (passage project funding, reservoir revegetation), Flathead Basin Commission (passage project budgets), National Fish and Wildlife Foundation (off-site lake rehabs, fish passage projects), Trout Unlimited (Bootjack spawning inlet). IRCs were adopted by NPPC in 1994 but not implemented because of conflicts with the NMFS Biological Opinion.

BIOLOGICAL RESULTS ACHIEVED:

HRMOD was modified to assess the potential effectiveness of adding a thermal control device to Hungry Horse Dam to allow dam operators to control temperatures in the dam discharge. Results led to specific design modifications and congressional appropriation of funds to build the structure. Selective withdrawal was completed on Hungry Horse Dam August 1995. Natural water temperatures can now be released from the dam. The structure will function June-October annually. Returns natural river temperatures to 47 river miles of Flathead River mitigating thermal pollution from Hungry Horse Dam. This improves fish growth potentiontial and riverine insect production.

Phase I and II Hay Creek projects were completed, reconnecting »14.5 miles of bull trout spawning/rearing habitat to North Fork Flathead River. Phase II dealt with beaver activity and redefined the channel in a braided reach that was subject to dewatering.

The Taylor's Outflow project was completed reconnecting »2 miles of trout habitat to main stem Flathead River in 1996.

Eradication of eastern brook trout was »95 percent successful, and may need retreatment. A series of channel deflectors was added using dredge spoil and cobble, then revegetated. The riparian area is recovering. The outlet to the Flathead river was moved about 200 m. upstream and fitted with a fish ladder. The ladder is an original design made with steel plates, held vertical with rip-rap and topped with river cobble. The structure is nearly all natural materials so once the hydroseeding grows, it will develop a natural riparian margin. You have to see it.

Rogers Lake rehab 100 percent successful due to late treatment of rotenone just prior to ice formation. Reestablishes lake population of arctic grayling and westslope cutthroat, removes illegally introduced yellow perch.

Lion Lake rehab 100 percent successful also due to late fall treatment. Establish excellent trout fishery, removes four illegally introduced species. Unfortunately some idiot illegally introduced perch again so we are monitoring the problem. Fishing is still good to date.

Devon Lake 100 percent successful, removes eastern brook trout from bull trout range.

Fish passage projects in tributaries to Hungry Horse Reservoir, proposed since 1954, will be complete by September 1997. All but two were completed since 1994. The construction contract and cost share agreement for the final two were completed in 1996; work will begin after runoff. In total, these projects expand available adfluvial spawning and rearing habitat in Hungry Horse Reservoir by 16 percent.

PROJECT REPORTS AND PAPERS:

(1) Hungry Horse Fisheries Mitigation Plan. MFWP and CSKT, 1991. (2) Hungry Horse Implementation Plan. MFWP and CSKT, 1993. (3) the draft a basin-wide plan for habitat and passage was submitted to the COTR for review (4) Bi-annual Report for Hungry Horse mitigation. 1994, 1996 complted. (5) Flathead River Creel Report. 1995. (6) Model Development to Establish Integrated Operation Rule Curves for Hungry Horse and Libby Reservoirs, Montana. January 1996. (7) Aquatic Modeling: Hungry Horse Selective Withdrawal. 1995. (8) Kokanee Stocking and Monitoring - Flathead Lake 1993-1994. MFWP, CSKT and USFWS, 1995. (9-10) Kokanee Stocking and Monitoring - Flathead Lake. 1995 and 1996.

ADAPTIVE MANAGEMENT IMPLICATIONS:

Population assessments have determined that the upper South Fork Flathead River and Hungry Horse Reservoir harbor self-sustaining, stable populations of bull trout and westslope cutthroat, considered one of the strongest native species assemblages in the lower 48 states. The scientific and ecological value of this area should be recognized.

Habitat projects initiated to reclaim additional spawning and rearing habitat to enhance juvenile recruitment have utilized several new techniques that are applicable to other area. The Taylors Outflow fish ladder used cost saving, native materials that blend well with the natural environment. Revegetation techniques for bank stabilization are inexpensive compared to rip-rap or other "hard fix" methods used in the past, and riparian vegetation provides benefits to terrestrial species.

Project designed to eradicate undesirable or illegally introduced species have met with mixed success. Late fall applications of Rotenone have been extremely effective when treatment occurs just prior to ice formation. Toxicity remains high for a long period under the ice, then oxygen depletion caused by organic decomposition creates a higher probability of achieving a total kill. We have had complete success in three lakes. Detoxification occurs rapidly for repopulating the site in early spring (this is important where loons, osprey, or other fish eating birds rely on the site for forage). Rotenone has been only partially successful in running water and in ponds with extensive spring activity. As expected, some fish will enter groundwater areas and escape the toxin. Since eradication projects are a useful tool to reduce the threat of non-native species (hybridization, predation or competition) to weakening native species assemblages, the region should collaborate on research and development of an alternative ichthyotoxin for use in streams or groundwater recharge areas. Antimycin is one alternative, but is not registered for use in most states and is rarely available for purchase. As with all chemical treatments, it is extremely important to complete a full inventory of aquatic life in the treatment area to avoid impacts to rare species (eg. Invertebrates, amphibians etc.) or inadvertent reductions in species diversity. It may be necessary to collect and hold non-fish gill breathing animals for restocking after the treatment. Other areas may be deemed too important for non-fish biota to warrant treatment.

PURPOSE AND METHODS

SPECIFIC MEASUREABLE OBJECTIVES:

Create spawning habitat by installing upwelling zones in suitable substrate (redd count to check). Reduce concentration of fine materials in spawning gravels through bank revegetation and stabilization (sediment coring/scoring). Restore riparian vegetation through fencing and bank stabilization (establish photo points for comparison pre- and post-test). Reestablish migration routes in blocked areas through culvert upgrades, installation of fish ladders, gabions, etc. (compare spawning runs, electrofishing results and redd counts). Enhance juvenile rearing habitat through pool and cover installation (stream habitat inventory survey pre- and post-test, survey populations by snorkeling, electrofishing, or netting). Monitor survival of stocked fish, as in the kokanee restoration test (establish success criteria, evaluate success using creel survey, netting series, hydroacoustics, sampling). (see implementation plan, basin-wide habitat plan and project reports for site specific details)

CRITICAL UNCERTAINTIES:

The reservoir fishery may not reach full potential because of high numbers of northern squawfish which experienced a population explosion after the reservoir filled. Fish populations in the Flathead system below Hungry Horse Dam are in a state of flux due to interactions with non-native species. It remains uncertain whether mitigation efforts can overcome past damages. Rapid growth of human population and associated development in the Flathead valley will exert greater pressure on local resources. Operations defined by the IRCs conflict with those operations dictated by the NMFS 1995 Biological Opinion. The IRCs differ during August when NMFS would draft Hungry Horse reservoir 20 to meet flow targets in the lower Columbia for salmon recovery. This draft impacts biological production in the reservoir and creates an unnatural second flow peak in the river downstream. The IRCs were modified for compromise to allow a 10 foot draft, with the discharge shaped to create a gradual ramp down from the natural spring freshet. Comparatively, the flow changes in the Flathead (200-500 percent) resulting from the NMFS plan are far greater than the flow benefits in the lower Columbia (flows from Hungry Horse and Libby Dams combined change the flow by less than 16 percent). The risk of causing irreversible damages to resident fisheries by implementing the NMFS summer draft is greater than warranted by available evidence supporting the summer flow augmentation. The compromise offered by Montana should be implemented to avoid impacting our mitigation activities.

BIOLOGICAL NEED:

This project is needed to address NPPC program measures regarding Hungry Horse mitigation, adopted in 1993; the losses attributed to Hungry Horse were adopted by NPPC and incorporated in Amendment 903(h)(2)(C): (1) "replace lost annual production (minimum of 65,000 westslope cutthroat annually) from the South Fork Flathead River using a mix of habitat enhancement, fish passage improvement, 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 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"; (4) replace stream habitat lost when the reservoir inundated 43 miles of tributaries and 35 miles of South Fork Flathead River; (5) balance Hungry Horse Dam operation with the reservoir and river fishery, ESA actions to recover the endangered Snake River salmon and protect critical unlisted stocks (e.g. bull trout westslope cutthroat trout, mountain whitefish, arctic grayling, etc.). Bull trout and cutthroat populations downstream of Hungry Horse are experiencing an alarming decline due to habitat loss and interactions with non-native species. ESA actions for salmon recovery as directed by NMFS must be balanced with resident fish requirements.

HYPOTHESIS TO BE TESTED:

Specific habitat improvement techniques vary in effectiveness (as compared by pre- and post-treatment criteria) dependent on measurable pre-existing conditions at the site. These conditions can be used to prescribe specific treatments at a given site. Cost-effectiveness of prescribed treatments can be used to direct future habitat projects through adaptive management. Adfluvial spawning runs can be initiated through natural pioneering when suitable tributary habitat is reconnected. Alternative: runs must be initiated through restoration stocking.Increased juvenile recruitment from tributaries will result in larger adult returns during the spawning run. Increased natural recruitment resulting from habitat improvements can overcome intense predation because a greater number of recruits will avoid being eaten. Reduced fines in spawning gravels will increase egg to fry survival. Juvenile fish imprint on their natal water source before emigration. The timing of imprinting can be approximated using measures of thyroxine hormone. Fry placed in a new stream before the time of imprinting will imprint on the new stream. Imprinted juveniles will return to their natal stream to spawn as adults. It is possible to initiate a spawning run in a newly reopened or restored stream by planting fry of a desirable genetic strain before they imprint.

ALTERNATIVE APPROACHES:

Operations called for by the NMFS Biological Opinion were assessed and determined to reduce reservoir refill probability (as compared to the IRC) and August releases cause an unnatural duel peak in Flathead River discharges. (see Wright et al. 1996; Marotz et al. 1996).

JUSTIFICATION FOR PLANNING:

N/A

METHODS:

Pre- and post-treatment surveys are used to compare various habitat restoration, passage improvement and off-site mitigation efforts. Photo points measure the success of revegetation and bank stabilization projects (camera). Habitat surveys quantify shifts in cover, pool-riffle run ratio and substrate (boots, notepad). Population assessment compare species relative abundance, population structure, survival recruitment (mark-recapture, two-pass electrofishing, snorkeling, netting). Redd surveys estimate adult spawning population and describe habitat requirements (annual monitoring of index streams, periodic basin-wide efforts). Migration counts compare strength of spawner population (weirs, box traps). (see basin-wide habitat plan for site-specific descriptions and a more detailed description of monitoring strategies).
Computer modeling/data analysis involves linear and non-linear regression, multi-variate and step-wise analysis. ANOVA, multiple range tests, etc. All statistics reviewed by University statistical consultants. (see Marotz et al. 1996 for modeling methodology). Power analyses are conducted by BPA modelers using SAM and HYDRSIM at Dittmar Center, and NPPC modelors in Portland. Flood control aspects are modeled by ACOE Hydrolics Branch.
Many aspects of this project germane to this field have already been described previously in this document.

PLANNED ACTIVITIES

SCHEDULE:

Planning Phase **Start** 1992 **End** 2022 **Subcontractor** Various

Task Develop site plans for future projects. Complete permits and let contracts.

Implementation Phase **Start** 1992 **End** 2022 **Subcontractor** Various

Task (1) Test groundwater dams in stream reach that runs subsurface during low flow periods; reconnect habitat. (2) Use woody debris collector to deflect erosive flow from mass waste on streambank; level toe, revegetate to stabilize. (3) Stabilize/monitor fish passage structure at Taylor's Outflow. (4) Continue cost-share partnership with U.S. Forest Service to repair slumps and road erosion above critical spawning areas. (5) Monitor effectiveness of various revegetation and habitat improvement techniques. (6) Monitor kokanee survival and spawning migrations as part of the five-year recovery test. (7) Initiate high priority projects identified in the basin-wide plan. (8) Complete off-site lake rehabilitation projects as scheduled.

O&M Phase **Start** 1992 **End** 2022 **Subcontractor**

Task Motorpool vehicles, maintenance of field equipment, vehicles and boats

PROJECT COMPLETION DATE:

When damages have been mitigated

CONSTRAINTS OR FACTORS THAT MAY CAUSE SCHEDULE OR BUDGET CHANGES:

Habitat projects are subject to hang-ups in permitting and contracting. We must move ahead simultaneously on multiple projects to assure a constant string of completed projects. Continued environment damage from other activities (eg. mining, logging, road construction, illegal fish introductions and increased human use, etc.) can counter or reverse progress toward mitigation. Reinvasion or range expansion of non-native fish species could cause genetic introgression, competition or extirpation of desirable native species. Failure to achieve a total kill on rotenone rehabilitation projects could require retreatment (sometimes on a regular basis). Natural disasters such as flood or forest fire may destroy completed projects. Legal and illegal fish introductions could reverse progress toward recovering weakened stocks.

OUTCOMES, MONITORING AND EVALUATION

SUMMARY OF EXPECTED OUTCOMES

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

IRCs will be implemented, improving reservoir and river productivity. Temperature control through the newly installed selective withdrawal device will improve trout growth potential two to three times in the affected reach of the Flathead River. Improved temperatures may influence the presence of lake trout in the Flathead River and thus reduce predation on juvenile bull trout and westslope cutthroat. Increased recruitment of juvenile bull trout and cutthroat trout from newly improved habitat, plus improved growth due to selective withdrawal, will result in greater adult returns to the spawning areas. Improved conditions in spawning areas will increase egg to fry survival.

Present utilization and convservation potential of target population or area:

Multi use. Hungry Horse Reservoir and upper South Fork Flathead River in the Bob Marshall Wilderness contains one of the last remaining native species assembleges in the lower 48 states. The drainage remains relatively pristine, inhabited by self sustaining populations of westslope cutthroat and bull trout. Headwaters are functioning ecosystems that can be used as a source for repairing past damages in other areas. Today, man's activities have effected nearly all areas that are not too high, steep, wet or dry, cold or hot to develop. Pristine (wild) ecosystems have become fractionated and isolated, and as such become unstable and vulnerable to cataclysmic events (e.g. fire, flood, pollution etc.). In many areas, there is no longer a nearby reserve of a like ecotype that can protect or restock an area after a cataclysm. This makes the remaining pristine areas more valuable than ever before as living laboratories and reserves of species diversity. The Flathead drainage is inhabited by grizzly bear, mountain goats, bighorn sheep, bald eagles and many endangered plants. This area must be recognized for its scientific and biological value. Potential is high.

Assumed historic status of utilization and conservation potential:

Unlimited supply, frontier ethic.

Long term expected utilization and conservation potential for target population or habitat:

Protect what remains, restore what we can.

Contribution toward long-term goal:
All resident fish species in Hungry Horse Reservoir and the Flathead River below the dam have been impacted by man's activities including hydropower development. Modifications to dam operation will help balance hydropower and fish requirements. We recognize that hydropower is more efficient and cleaner than comparable power sources available today (with similar capacity). Our "operational " mitigation recommendations, therefore seek to protect fisheries concerns while minimizing impacts to the power system. We also consider our actions in the scope of the Columbia River system as a whole watershed. The IRCs are an example of this concept.

Non-operational " mitigation strategies (measures that do not require changes to dam operation) and recommendations were designed with multiple species in mind, terrestrial and aquatic. We have developed new techniques with applicability elsewhere in the basin, and will strive to do so in the future.

Indirect biological or environmental changes:
Restoration of normalized river flows and flood plain function will improve riparian vegetation and benefit terrestrial species as well as aquatic, and water quality.

Physical products:
See project reports for details.

Environmental attributes affected by the project:
Reservoir operation, river flows, discharge temperature, reconnection of blocked habitat, rehabilitation of lake and stream habitat.

Changes assumed or expected for affected environmental attributes:
Improved reservoir operation will improve survival and growth of fish by enhancing biological productivity. Reconnecting blocked habitat will provide more spawning and rearing habitat for fluvial and adfluvial fish species. Restoration of flood plain function will improve system health. Also see above.

Measure of attribute changes:
Restoration of flushing flows in regulated river reaches will depend on allowable river stages and the physical capacity of the dam. Given this, substrate armoring can only be partially offset by higher flows during the spring freshet. Specific tributary projects described in the Mitigation Plan and Basin-wide Habitat Plan use revegetation techniques to stabilize eroding banks. Our goal is to reduce fines to 30 percent or less (Weaver and Fraley 1992). More detail can be found in project reports.

Assessment of effects on project outcomes of critical uncertainty:
Population monitoring, sampling of primary production using C14 scintillation, chlor a, zooplankton density and vertical distribution, benthic insect grabs, fish food habits, growth rate evaluation (scale and otolith), migrant trapping, riparian revegetation evaluation, hydrographic monitoring.

Information products:
Monthly or quarterly reports, completion reports, mitigation plan, site plans, permit applications, decision notices, media reports, Mepa documents, fact sheets, slide presentations etc.

Coordination outcomes:
1. Initiated Big Creek improvement project, acted as catalyst to initiate the project and turned it over to the Forest Service for continued funding and completion; 2. Hay Creek project was coordinated with the private landowner who provided some equipment and labor; 3. Bull Trout redd surveys expanded to South Fork Flathead, backcountry work utilized Forest Service horse packers and one FS employee; 4. Elliott and Taylor Creek projects involved assistance from land owners; 5. Offsite lake rehabilitation at Lion Lake was partially funded by state, Forest Service and National Fish and Wildlife Foundation; 6. Bootjack Lake inlet reconstruction was completed using labor from Trout Unlimited; 7. Reservoir revegetation experiment partially funded by Forest Service, seeding plot experiment used FS equipment; 8. Fish passage projects around Hungry Horse were completed

through cooperation with state, Bureau of Reclamation, National Fish and Wildlife Foundation, FS, Flathead Basin Commission and BPA; 9. Artwork and production of Montana Species of Special Concern poster will be cost-shared with BPA, state, American Fishery Society, USFWS, FS and others (work in progress)

MONITORING APPROACH

The region should implement a monitoring program to assess the effectiveness of mitigation actions to determine which techniques work and which should be modified or discarded. Coordination among projects is crucial so that the best techniques can be applied basin-wide.

Once implemented, the IRCs should be evaluated using the same techniques used to develop the models: empirical measurements of carbon fixation using C14 liquid scintillation, chlor a; sampling of zooplankton density and vertical distribution by genera, benthic insect larval density (dredging) and adult emergence (emergence traps), terrestrial insect deposition (surface tows) and fish growth (vertical and horizontal gill nets, scale and otolith analysis) and fish abundance (netting, hydroacoustics), substrate/cover mapping, pit tags and various marks and subcontracted insect work. Linear and non-linear regression, multi-variate and stepwise analysis, multiple range tests, numeric transformation, ANOVA, graphical analysis can be used to compare pre- and post-treatment effects. All statistics can be reviewed by University statistical consultants.

Bull trout, rainbow, westslope cutthroat etc. should be monitored using state of the art fisheries methodologies.

Pre- and post-treatment surveys should be used to compare various habitat restoration, passage improvement and off-site mitigation efforts. Photo points can be used to measure the success of revegetation and bank stabilization projects. Habitat surveys can be used to quantify shifts in cover, pool-riffle run ratio and substrate. Population assessments can compare species relative abundance, population structure, survival recruitment (mark-recapture, two-pass electrofishing, snorkeling, netting). Redd surveys can be employed to estimate adult spawning population and describe habitat requirements (annual monitoring of index streams, periodic basin-wide efforts). Migration counts compare strength of spawner population (weirs, box traps).

Provisions to monitor population status or habitat quality:

Mitigation and Implementation Plans, Flathead Basin Commission Master Monitoring Plan

Data analysis and evaluation:

See above

Information feed back to management decisions:

Adaptive management will guide future direction. Things that produce measurable results will continue, things that do not work will be modified or discontinued.

Critical uncertainties affecting project's outcomes:

The main issue here is when the IRCs will be implemented. Scientific review has taken place and concurred with this approach. Yet, policy direction has not allowed any deviation from the NMFS Biological Opinion. We are constantly assured that the BiOp is "a living document" with flexibility to change as new information becomes available, but no change in implementation has occurred. ESA actions must be based on the best available science. Policy makers should assure this occurs.I believe "any corollary" has been addressed previously in this document.

EVALUATION

Redundant see above

Incorporating new information regarding uncertainties:

Our track record has shown that we readily accept and adapt to new information. Scientific principal leads us to search for the truth. If we are wrong we admit it and gratefully accept the correction, this makes our product better.

Increasing public awareness of F&W activities:

Public scoping provides two-way communication with the public. Media also.

RELATIONSHIPS

RELATED BPA PROJECT	RELATIONSHIP
9501200 Will assess the effectiveness of the IRCs for Hungry Horse after implementation	Project is high priority for funding, but can not begin until the IRCs are implemented.
9101903 Flathead River IFIM	Project is high priority for funding, planned to balance river needs with the existing reservoir model (HRMOD).

RELATED NON-BPA PROJECT	RELATIONSHIP
Project 9101904 is another aspect of the mitigation project conducted by the USFWS	USFWS provides hatchery support for the kokanee restoration test, experimental culture of bull trout to determine imprint timing and assists with monitoring of hatchery plants
Project 9101901 is another aspect of the Hungry Horse mitigation program conducted by the Confederated Salish and Kootenai Tribes and USFWS	CSKT is a full cooperator in Hungry Horse Mitigation. Tribal personnel repair habitat and perform monitoring on the southern portion of Flathead Lake and River

OPPORTUNITIES FOR COOPERATION:

The mitigation program is a cooperative effort with the Confederated Salish and Kootenai Tribes, U.S. Fish and Wildlife Service, Bureau of Reclamation, Flathead Basin Commission, National Fish and Wildlife Foundation, U.S. Forest Service, Flathead Fishing Association, Yellow Bay Biological Station U of M, Trout Unlimited and others. Cost-share agreements have and will be developed for cooperative projects. The Volunteer Lake Monitoring Program is a cooperative arrangement with FBC.IRCs are best applied using the Corp's VARQ flood control strategy embodied in the IRC concept. The Corps has not yet agreed to implement VARQ, but has determined that the strategy will work.The NMFS Biological Opinion on Snake River salmon recovery and the IRCs can be merged to recognize the needs of resident and anadromous fish.

COSTS AND FTE

1997 Planned: $382,400

FUTURE FUNDING NEEDS:

FY	$ NEED	% PLAN	% IMPLEMENT	% O AND M
1998	$470,000	10%	50%	40%
1999	$480,000	10%	50%	40%
2000	$490,000	10%	50%	40%
2001	$500,000	10%	50%	40%
2002	$515,000	10%	50%	40%

PAST OBLIGATIONS (incl. 1997 if done):

FY	OBLIGATED
1992	$81,500
1993	$274,300
1994	$896,579
1996	$377,925
TOTAL:	$1,630,304

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

OTHER NON-FINANCIAL SUPPORTERS:

General public, sporting groups, land owners

LONGER TERM COSTS:

The Libby Mitigation Program is expected to extend until losses have been mitigated. We will pursue a trust fund agreement to place a budget cap.

Please remove redundancies before next year, this form appears too detailed for general use. Also, this had better be used for something meaningful and not just a bureaucratic exercise.

1997 OVERHEAD PERCENT: 17%

HOW DOES PERCENTAGE APPLY TO DIRECT COSTS:

[Overhead % not provided so BPA appended older data.] Total minus equipment

SUBCONTRACTOR FTE: 0