

**Bonneville Power Administration Administration
Fish and Wildlife Program FY99 Proposal Form**

Section 1. General administrative information

**Hungry Horse Mitigation - Hatchery-Based
Implementation Of Native Fish Recovery**

Bonneville project number, if an ongoing project 9101904

Business name of agency, institution or organization requesting funding
U.S. Fish and Wildlife Service

Business acronym (if appropriate) USFWS

Proposal contact person or principal investigator:

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Subcontractors.

Organization	Mailing Address	City, ST Zip	Contact Name
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Confederated S&K Tribes	P.O. Box 278	Pablo, MT 59855	Joe DosSantos

NPPC Program Measure Number(s) which this project addresses.

10.3A.10, 10.3A.11, 10.3A.12

NMFS Biological Opinion Number(s) which this project addresses

Other planning document references.

Fisheries Mitigation Plan for Losses Attributable to the Construction and Operation of Hungry Horse Dam, by MFWP and CSKT; approved by NPPC November, 1991.

Hungry Horse Dam Fisheries Mitigation Implementation Plan, by MFWP and CSKT; approved by NPPC March, 1993.

Subbasin. List subbasin(s) where work is performed. Use commas to separate multiple subbasins. Coordination projects or those not affecting particular subbasins may omit this field.

Flathead

Short description.

Produce fish to mitigate losses to Flathead Lake as identified in the Hungry Horse Mitigation Plan; coordinate multiagency monitoring and reporting of the kokanee test; conduct planning and experimental activities to develop bull trout culture and westslope cutthroat trout natural rearing techniques.

Section 2. Key words

Mark	Programmatic Categories	Mark	Activities	Mark	Project Types
	Anadromous fish		Construction		Watershed
X	Resident fish		O & M		Biodiversity/genetics
	Wildlife	X	Production		Population dynamics
	Oceans/estuaries	+	Research		Ecosystems
	Climate	+	Monitoring/eval.		Flow/survival
	Other		Resource mgmt		Fish disease
			Planning/admin.	X	Supplementation
			Enforcement		Wildlife habitat en-
			Acquisitions		hancement/restoration

Other keywords

Artificial production, broodstock, spawning, fish culture, mitigation, monitoring, restoration, kokanee, bull trout, westslope cutthroat trout, lake trout, lake whitefish, Mysis, predation.

Section 3. Relationships to other Bonneville projects

Project #	Project title/description	Nature of relationship
9101901	CSKT Monitoring and Evaluation	Monitors stocking results.
9101903	MFWP Habitat	Develop habitat for imprint plants. Monitors stocking results.
9301600	Montana resident Fish Hatcheries	Develop additional production.

Section 4. Objectives, tasks and schedules

Objectives and tasks

Obj 1,2, 3	Objective	Task a,b,c	Task
1	Produce native westslope cutthroat trout for mitigation.	a	Acquire up to 500,000 westslope cutthroat eggs and rear for CSKT and MFWP-managed waters.
		b	Develop Sekokini Springs facility into a model for integrated hatchery natural rearing/habitat restoration for native species.
		c	Upgrade Creston Hatchery water supply system to provide highest quality water; use innovative disease management to control furunculosis bacterial infections and reduce other fish health risks.
2.	Develop experimental techniques for hatchery culture and rearing of bull trout.	a	Continue experimental evaluation of bull trout culture and broodstock development; provide bull trout fry for laboratory research experiments.
		b	Upgrade hatchery facilities to improve capability to deliver high quality stocks of native fish.
3.	Produce rainbow trout for offsite mitigation.	a	Acquire up to 100,000 rainbow trout eggs and rear for selected CSKT mitigation opportunities.
4.	Assist CSKT and MFWP with Flathead Lake monitoring and coordinate reporting of results from stocking efforts.	a	Complete monitoring and coordinate reporting of final evaluation of kokanee stocking test.
		b	Provide fish marking protocols and assistance in evaluation of timing, stocking strategies, and survival and performance of stocked fish.
		c	Develop proposals for hatchery-based research on spawning, supplementation, genetic reserves,

			imprinting, etc. to aid in restoration of native salmonids.
		d	Facilitate collection and analysis of wild and hatchery stocks for assessment of disease and genetic status.

Objective schedules and costs

Objective #	Start Date mm/yyyy	End Date mm/yyyy	Cost %
1	07/1997	Ongoing	50%
2	09/1993	09/1999	10%
3	10/1997	09/2005	10%
4	08/1992	Ongoing	30%

Schedule constraints

ESA listing of bull trout (currently proposed, final in 1998), or westslope cutthroat trout would affect scheduling and implementation of many tasks. Task 1b dependent on successful acquisition of Sekokini Springs site. All objectives subject to changes in management direction and implementation as per CSKT and MFWP strategies.

Completion date.

Mitigation for Hungry Horse Dam has no foreseeable endpoint.

Section 5. Budget

FY99 budget by line item

Item	Note	FY99
Personnel	Approx. 5.2 FTE	210,000
Fringe benefits		90,000
Supplies, materials, non-expendable property	Field supplies, production equipment	10,000
Operations & maintenance	Fish food, oxygen, chemicals, utilities	70,000
Capital acquisitions or improvements (e.g. land, buildings, major equip.)		0
Travel		12,000
Indirect costs	19%	92,000
Subcontracts		0
Other		0
TOTAL		484,000

Outyear costs

Outyear costs	FY2000	FY01	FY02	FY03
Total budget	484,000	484,000	484,000	484,000
O&M as % of total	15%	15%	15%	15%

Section 6. Abstract

This project implements NPPC Program Measures 10.3A.10, 10.3A.11, and 10.3A.12; employing hatchery-based mitigation strategies to produce, stock, and monitor fish and conducting experimental hatchery work to develop new techniques to mitigate for hydro-related impacts from Hungry Horse Dam. Due to ongoing habitat modifications and expanding populations of introduced fish species, NPPC-approved losses of 65,000 juvenile westslope cutthroat trout, 250,000 juvenile bull trout, and 100,000 adult kokanee cannot be fully mitigated with dam operational changes and ongoing habitat and passage projects. Selective stocking of offsite waters, imprint planting of native species in restored habitats, and experimental fish culture work are being scientifically applied and monitored to maximize successful implementation. Expected outcomes are increased populations of self-sustaining target species and additional angler opportunity within 2-5 years. Monitoring will occur by traditional fisheries management techniques (netting, redd counts, trapping, electrofishing, etc.) and will be evaluated annually to implement adaptive changes as required.

Section 7. Project description

a. Technical and/or scientific background

Hungry Horse Dam, completed in 1952, blocked access for fish from Flathead Lake to 363 miles of tributary reaches and 85 miles of the South Fork Flathead River, effectively eliminating 40 percent of the spawning and rearing habitat for bull trout and westslope cutthroat trout from Flathead Lake (Montana Department of Fish, Wildlife and Parks; Confederated Salish and Kootenai Tribes, 1991). Additionally, flow patterns and thermal regimes in the Flathead River downstream from Hungry Horse Dam were significantly altered, with particularly detrimental impacts to spawning kokanee salmon. To mitigate for net losses of fisheries, aquatic insects, and aquatic habitat attributable to Hungry Horse Dam, managers proposed a combination of operational and nonoperational mitigation. Non-operational actions (requiring no changes in dam operations) included: (1) aquatic habitat improvement; (2) fish passage improvements; (3) hatchery upgrades, fish production, and fish planting; and (4) off-site mitigation using these same techniques (Montana Department of Fish, Wildlife and Parks and Confederated Salish and Kootenai Tribes, 1991). Actions (3) and (4) are addressed in this project.

The planning phase of this program began in January of 1990, with formation of a consultation group, development of options, extensive public scoping, and issuance in

March 1991 of a Fisheries Mitigation Plan for Losses Attributable to the Construction and Operation of Hungry Horse Dam (Montana Department of Fish, Wildlife and Parks; Confederated Salish and Kootenai Tribes, 1991). The Mitigation Plan was developed consistent with Sections 903(a)(1-4) and 903(b)(1-4) of the 1987 Columbia River Basin Fish and Wildlife Plan (Northwest Power Planning Council, 1987) and the Upper Flathead System Fisheries Management Plan (Montana Department of Fish, Wildlife and Parks; Confederated Salish and Kootenai Tribes, 1989). The 1987 Fish and Wildlife Program called for Montana Fish, Wildlife and Parks and the Confederated Salish and Kootenai Tribes to present recommendations for further action regarding resident fish mitigation for Hungry Horse Dam.

On November 12, 1991, the Council voted unanimously to approve loss statements and mitigation actions for resident fish affected by Hungry Horse Dam. The Council approved recommended actions associated with the Mitigation Plan submitted by the State and Tribes, thereby amending their 1987 Fish and Wildlife Program (amendment 903(h), which stated, in part:

- Resident fish losses identified in the Mitigation Plan are incorporated into the Council Program: (1) 65,000 juvenile westslope cutthroat trout, (2) 250,000 juvenile bull trout, and (3) 100,000 adult kokanee.
- The State and Tribes were instructed to develop an Implementation Plan, limited to nonoperational mitigation measures, to include measurable mitigation objectives and address baseline data collection, fish passage, initiation of kokanee supplementation, offsite mitigation, and habitat improvements.
- Hatchery supplementation activities called for in the Implementation Plan were to address kokanee only, initially, utilizing low-cost and temporary strategies. Hatchery supplementation of other species was to be limited to research activities aimed at development and refinement of techniques for westslope cutthroat trout and bull trout.

In presenting the Hungry Horse Dam Fisheries Mitigation Implementation Plan (Montana Department of Fish, Wildlife and Parks; Confederated Salish and Kootenai Tribes, 1993) to the Council, the managers noted that habitat and fish passage improvements for native species (bull trout and westslope cutthroat trout) can only meet a portion of the losses, due to the magnitude of habitat already lost and the ongoing habitat modifications and expanding non-native fish populations. They stated: “It is likely that some level of future hatchery supplementation will be necessary for native species, if full mitigation is desired. Over the long-term, hatchery production will be required for imprint plants and offsite fish plants as well as possibly some level of salmonid supplementation.” (MDFWP and CSKT, 1993).

On March 10, 1993 the Council conditionally approved the Implementation Plan, to be

implemented with a proposed five-year kokanee test and experimental work in the propagation and/or supplementation of native species. These directives were incorporated into the 1994 Fish and Wildlife Program under Sections 10.3A.10, 10.3A.11, and 10.3A.12.

The kokanee test began in earnest in 1994, with stocking of 802,000 6.5-inch yearling kokanee into Flathead Lake. Program objectives were to produce a kokanee fishery as a result of stocking that would result in: (1) 30% first-year survival of planted fish, (2) 10% survival of one million stocked fish to adulthood (100,000 adult salmon), and (3) a kokanee fishery that resulted in a harvest of 50,000 fish at a catch rate of 0.5 fish per hour, average length of 11 inches or longer, and fishing pressure to exceed 100,000 angler-hours. By the end of 1997, over 5.0 million kokanee of various sizes had been outplanted from Creston Hatchery into numerous locations throughout the lake and lower Flathead River. Annual technical monitoring reports (see section 7e, this proposal) provided the basis for adaptive management decisions regarding stocking locations and monitoring strategies.

Based on monitoring results, biologists concluded that by 1997 a kokanee sport fishery had not developed (Carty et. al. 1997). Further, bioenergetics modeling predicted that nearly all yearling kokanee stocked into Flathead Lake would be preyed upon by lake trout within 1 year after stocking. Monitoring data supported the model predictions. The Hungry Horse Implementation Group concluded that the kokanee objectives could not be met under the current stocking regimen. Based on this evidence, in July, 1997, managers elected to terminate the kokanee test, completing stocking and spawning of all kokanee on hand during 1997, and continuing kokanee monitoring through the expected life of the fish (1999).

Termination of the kokanee program led to a return to the adaptive management strategies proposed in the decision trees presented in the Implementation Plan, which the Council had endorsed in adopting the Implementation Plan in 1993. Recognizing that kokanee restoration will not work with the present levels of hatchery production and fisheries dynamics in the lake (predation by lake trout), the Implementation Plan (page 21) directs: "Evaluate potential for supplementation of native species, incorporating results of habitat restoration, fish passage, and genetic investigations". Based on that evaluation, we are directed to either proceed into native species supplementation, or into offsite stocking programs. We are currently evaluating both options, and intend to pursue a mixture of both on-site in-kind and offsite mitigation opportunities, described in more detail in the following section of this proposal.

We remain committed to mitigating for fish losses resulting from Hungry Horse Dam and meeting the goals that the Council has incorporated into the Program. As was stated previously, mitigation for these losses cannot be met by the habitat program alone, and must incorporate a substantial contribution from fish hatchery production.

This direction falls in line under the conceptual framework of the Multi-Year

Implementation Plan (MYIP). Section 6, the Resident Fish portion of the MYIP, incorporates the previously-mentioned mitigation objectives for the Flathead Subbasin (6.6.4.8) of replacing losses of 250,000 juvenile bull trout, 100,000 adult kokanee, and 65,000 juvenile cutthroat trout. Strategies identified include the hatchery propagation techniques endorsed in this proposal.

b. Proposal objectives.

c.

Since this project is currently transitioning, from the previous 5-year kokanee test into a new mixture of native species and offsite stocking proposals, the objectives are not yet firmly set. Initial objectives will be modified as stocking plans are solidified by the managers and again as results are achieved and successful portions of the program are expanded. Initially, objectives are based on managers anticipated demands as follows:

1. **Westslope cutthroat trout - Up to 500,000** eggs will be acquired annually from MFWP broodstock at Washoe Park Hatchery. A portion (undetermined at this time) will be used for imprint planting experiments, including proposed remote-site incubation. It is anticipated that the bulk of these fish will be reared for 1-3 years at the Sekokini Springs Natural Rearing Facility (in the planning and acquisition stage). The emphasis will be on rearing high quality wild stocks of fish in naturalized surroundings. A smaller portion may be reared using more traditional hatchery methods at Creston National Fish Hatchery and used to supplement recreational fisheries offsite in smaller waters within the Flathead Basin, partially offsetting angling pressure on weak but recoverable native stocks in the mainstem Flathead system. In FY98 approximately eight waters are slated for stocking, with an expansion in FY99.

2. **Bull trout** - Experimental efforts will continue, with evaluation of broodstock development and fish culture techniques. Excess fish eggs will be provided for laboratory research. Investigation is beginning into planning of bull trout genetic reserve strategies for the Flathead Lake bull trout stocks. Approval and development of this proposal will take several years, with fish not available for stocking until 2003 or later.

3. **Rainbow trout - Up to 100,000** rainbow trout will be acquired annually from Ennis National Fish Hatchery, a Service broodstock facility, or from other appropriate sources. These fish will be reared to supplement recreational fishing in offsite waters where previously existing State and Tribal management programs have not been able to provide these opportunities. Three Tribally-managed reservoirs, none of which provide opportunity for natural reproduction or hold other native salmonids, are slated for stocking in FY98. Again, the objective of this program is to provide recreational opportunity to partially offset pressure on weak but recoverable native stocks. This portion of the program will be our lowest priority and, following the adaptive management approach, may be phased out as opportunities under 1 and 2 (above) expand.

4. **Monitoring and evaluation** - The Fish Production Coordinator, funded under this project, is responsible for coordinating stocking and monitoring activities. This includes development of marking schemes and assuring that all waters that are stocked have management plans in place and monitoring and evaluation programs. By utilizing the information from these monitoring programs we can improve upon future stocking strategies, site selection, etc. Based on monitoring results, the kokanee program was terminated in 1997. Monitoring of the kokanee test will continue through at least 1999, or as long as these fish remain in the system. Critical information from this program may be utilized in the Kerr Mitigation program that is currently in the planning phases, and provides insight on other future options.

c. Rationale and significance to Regional Programs.

The Fish and Wildlife Program goals of replacing Flathead system fisheries losses due to Hungry Horse Dam impacts (250,000 juvenile bull trout, 65,000 juvenile cutthroat trout, 100,000 adult kokanee) under amendment 903(h) are directly relevant to this project. Restoration of habitat alone cannot replace losses of this magnitude and we have outlined in detail the interrelationships between this project and the ongoing watershed-based State and Tribal habitat projects.

The Flathead Lake bull trout and westslope cutthroat trout stocks are of regional significance because of the high quality of habitat in the large interconnected watershed and the presence of adfluvial stocks that remain weak but recoverable. Research under this project related to improving fish culture and supplementation techniques for these species has been, and will continue to be useful in other projects of a similar nature throughout the basin.

d. Project

This project (9101904) was initiated in 1992, after the NPPC adopted the Mitigation Plan (November, 1991). In adopting the Mitigation Plan, the Council voted unanimously (Amendment 903(h) to the 1987 Fish and wildlife Program) to approve the loss statements and mitigation actions which called for the replacement of annual losses of 65,000 juvenile westslope cutthroat trout, 250,000 juvenile bull trout, and 100,000 adult kokanee.

The loss replacement was to occur through a combination of fish passage, habitat improvements, and hatchery supplementation techniques. In Amendment 903(h) the Council directed MFWP and CSKT to develop an Implementation Plan to lay out specific nonoperational mitigation strategies and time frames. The Implementation Plan was the result, conditionally approved on March 10, 1993, with further conditions attached that directed initial fish culture activities to focus on low-cost and temporary supplementation of kokanee with an experimental and research phase for supplementation of native species.

In 1993, the U.S. Fish and Wildlife Service became fully involved as a partner, allocating the use of 70% of the production space at Creston National Fish Hatchery for fish production under Hungry Horse Mitigation. The Fish Production Coordinator project, initiated as Project 9101900 and funded beginning in 1992, was merged with Project 9101904 at the beginning of FY96.

Major Results: Under direction of the NPPC, fish production during FY92 through FY97 focused first on an introduced species, kokanee salmon. As the program progressed, we produced and stocked over 5 million kokanee of varying sizes into Flathead Lake during 1992-1997. In addition, we developed a very successful kokanee broodstock program, producing up to 3.0 million eggs annually in 1995-1997. However, the kokanee restoration program was hindered from 1995 on with chronic losses of fish at the hatchery due to furunculosis (a bacterial disease). Success criteria for the kokanee experiment, detailed in the Implementation Plan, were to achieve 30 percent survival of stocked kokanee after one year, 10 percent survival to maturity, and to produce an annual angler harvest of 50,000 or more fish. The kokanee fishery did not measure up to these criteria, primarily due to extremely high predation losses of kokanee to lake trout. During this period we were also successful in developing fish culture techniques for bull trout. We successfully reared bull trout in the hatchery through maturity and established an experimental broodstock that produced over 100,000 eggs. These eggs are being used in several other programs nationwide for experimental purposes. We also conducted research on imprinting, growth, and survival of juvenile bull trout.

Adaptive Management: In the spring of 1997, a decision was made to terminate the kokanee effort due to extreme losses caused by lake trout predation. This project proposal represents a “turn” in direction for the hatchery program as a result of adaptive management. We will continue to strive to replace mitigation losses adopted by the NPPC by employing a diverse hatchery strategy which will include: (1) offsite (satellite facility) rearing of native westslope cutthroat trout in a more natural environment (Sekokini Springs); (2) offsite stocking of both westslope cutthroat and (in a limited number of sites) rainbow trout as an experiment to replace on-site mitigation that presently cannot be accomplished in Flathead Lake due to lake trout predation; (3) continued experimental work and development of supplementation experiments using westslope cutthroat trout and possibly bull trout; and (4) continued monitoring and assessment of Flathead Lake fishery conditions to identify future opportunities to mitigate for losses on-site with innovative hatchery-based approaches.

Project Reports:

Fredenberg, W. 1992. Genetic sampling plan for bull trout in the Flathead River drainage. U.S. Fish and Wildlife Service, Kalispell, Montana.

Fredenberg, W. 1993. Planning considerations for development of a low-cost bull trout isolation and rearing facility. U.S. Fish and Wildlife Service, Kalispell,

Montana.

Fredenberg, W. and D. Edsall. 1993. Gas supersaturation monitoring report, Creston National Fish Hatchery. U.S. Fish and Wildlife Service, Kalispell, Montana.

Fredenberg, W. 1993. Collection of juvenile bull trout in the Flathead River drainage, Montana. U.S. Fish and Wildlife Service, Kalispell, Montana.

Evarts, L., B. Hansen, and J. DosSantos. 1994. Flathead Lake Angler Survey. Confederated Salish and Kootenai Tribes, Pablo, Montana. DOE/BP-60479-1, Bonneville Power Administration, Portland, Oregon.

Hungry Horse Implementation Group. 1994. Hungry Horse Dam fisheries mitigation, biennial report, 1992-1993. DOE/BP-60559-2, Bonneville Power Administration, Portland, Oregon.

Galloway, H., A. Scholz, J. Hendrickson, R. White, M.B. Tilson, and W. Fredenberg. 1994. Evaluation of thyroxine content as an indicator of imprint timing in juvenile bull trout (*Salvelinus confluentus*). Upper Columbia United Tribes Fisheries Center, Technical Report #50, Cheney, Washington.

Deleray, M., W. Fredenberg, and B. Hansen. 1995. Kokanee stocking and monitoring, Flathead Lake - 1993 and 1994. DOE/BP- 65903-6, Bonneville Power Administration, Portland, Oregon.,

Fredenberg, W., P. Dwyer, and R. Barrows. 1995. Experimental Bull Trout Hatchery progress report, 1993-1994. U.S. Fish and Wildlife Service, Kalispell, Montana.

Hansen, B., J. Cavigli, M. Deleray, W. Fredenberg, and D. Carty. 1996. Hungry Horse Dam fisheries mitigation: kokanee stocking and monitoring in Flathead Lake, annual report 1995. DOE/BP-65903-7, Bonneville Power Administration, Portland, Oregon.

Carty, D., W. Fredenberg, L. Knotek, M. Deleray, and B. Hansen. 1997. Hungry Horse Dam fisheries mitigation: kokanee stocking and monitoring in Flathead Lake, annual report 1996. DOE/BP-60559-3, Bonneville Power Administration, Portland, Oregon.

e. Methods

This project is integrally linked with the MFWP and CSKT monitoring and habitat projects (9101901 & 9101903). Fish provided from this project are raised to meet

9101904 Hungry Horse Mitigation - Hatchery-Based Implementation Of Native Fish Recovery

specific objectives of those programs, including supplementation experiments, imprint planting into newly-created or reopened habitat, and to a small extent enhancement of offsite recreational fishing opportunities to reduce pressure on native Flathead weak but recoverable stocks. Detailed accounting of the methods that have been used to develop stocking strategies, conduct poststocking assessments, and make adaptive changes are provided in the reports referenced in section 7d of this report (see also Knotek et. al. 1997, in press, for future strategies related to habitat projects: Hungry Horse Dam fisheries mitigation program, fish passage and habitat improvement in the Upper Flathead River basin. BPA, Portland).

Within the direct scope of this hatchery-based project is our ability to produce fish that meet those program objectives (Objectives 1,2, and 3) and mark and stock fish in a manner that maximizes accountability and survival (Objective 4b.). We attempt to do this by using the most modern technology available; kept current by staff training and attendance at regional and national fish culture conferences, consultation with Service, State and BPA engineers, and review of fisheries literature. In addition, the Fish Production Coordinator is responsible for providing a link between the production (hatchery) and management (partners) entities to assure that all parties are communicating in this joint effort.

Critical to this effort, is the assumption that the hatchery-raised fish are fit. Fitness of hatchery fish is optimized by beginning with genetically-appropriate stocks; rearing them under low-density conditions with as many natural and high-quality attributes of food, cover, and space as possible; assuring that water quantity and quality (temperature, oxygen, dissolved gas) are optimal; utilizing the best available therapeutic and disease diagnostic and treatment protocols; and minimizing stress from outside factors. At Creston National Fish Hatchery we have added degassing and oxygen injection capabilities to most of the raceways; installed shelters to provide visual isolation, reduce light penetration, and provide protection from predators; instituted stricter disease protection policies; utilized vaccine baths and injectable vaccines prophylactically; and provided overhead cover and modified feeding methods where necessary. We consult regularly with the staff at the Service's Bozeman Fish Technology Center, Bozeman Fish Health Lab, and the Montana Fish Wildlife and Parks fish health biologist to ensure that we are employing the best fish culture techniques available. All lots of fish released are subjected to a complete assessment prior to stocking to evaluate overall health and condition and inspections of fish health on the station are conducted every six months.

It is also critical to ensure that placement of hatchery-raised fish occurs in an environment that is suitable, if not optimal, for their ultimate survival. Excessive lake trout predation in Flathead Lake led to failure of the experimental kokanee effort, and there was limited ability on the part of the hatchery program to modify the size, timing, or location of plants to change the end result. It is imperative that future management-driven efforts to stock fish place a strong focus on biological evaluation of the receiving waters. By spreading future plants into many different waters and diversifying the stocking program into different species and life stages we will enhance our capability to adapt the program to

capitalize on portions that are working and eliminate or modify portions that are not.

Experimental work to develop fish cultural techniques for the rearing of bull trout has progressed from incubation of eggs and rearing of fry and juveniles to development of an experimental broodstock. By conducting these efforts we have expanded the knowledge base for culturing this species, verified the suitability of the Creston water supply for bull trout culture, and provided bull trout for other laboratory-based experimental efforts (dioxin-susceptibility, thermal tolerance, electrofishing injury, etc.). If, in the future, ESA-related or other needs arise we can confidently move into bull trout culture on an as-needed basis.

The Sekokini Springs Natural rearing Facility offers an opportunity to integrate habitat and hatcheries into a model project. The facility will be used to rear westslope cutthroat trout fry that can be released into a series of ponds and spring-fed streams that will be rehabbed under the guidance of Project 9101903. The released fish may imprint and then emigrate into the Flathead River, eventually returning to the Sekokini Springs facility. The returning spawners may serve as a source of eggs for expansion of the project objectives to other sites.

With these protocols in place, it is our expectation that we can provide high quality fish for managers to use in developing the restoration program for native salmonids. In areas where monitoring indicates successful establishment of spawning runs we will terminate stocking and seek to duplicate those successes at other sites in the project area. In areas where the monitoring information clearly indicates failure (e.g. the kokanee test), we will seek to understand the reasons those projects failed. Where we can, we will correct the contributing factors that led to these failures and continue our efforts to establish self-sustaining populations with hatchery support. Where the contributing factors cannot be modified, we will terminate stocking and avoid repeating these types of projects elsewhere. Over the course of time, we will be able to use the hatchery program to support an aggressive management strategy that seeks to reclaim habitat and restore stocks of native salmonids in the Flathead Basin.

f. Facilities and equipment.

Project staff are headquartered at Creston National Fish Hatchery in Kalispell, Montana. As employees of the U.S. Fish and Wildlife Service, project staff have access to the full training and support staff of the Service through the Region 6 headquarters (Denver), as well as nationally. This includes technical support involving fisheries science as well as administrative aspects, including computer, e-mail, etc. The Service maintains a full fleet of vehicles and boats that are used for project activities. Lab space and equipment are available, although an improved wet lab facility needs to be developed for processing field samples so they can be kept isolated from the hatchery.

Creston National Fish Hatchery was completed in 1940 and underwent several upgrades in

subsequent years. It is a fairly modern coldwater fish rearing facility, with a hatchery building, 42 usable outside raceways (a portion under shelters), a full shop, and storage facilities. There are two office buildings apart from the hatchery. The hatchery building is fed by an artesian well supplying 300 gpm (up to 1,000 gpm if pumped). The 1,600 cf outdoor raceways are fed by gravity flow from spring sources that are collected in a pond and piped to the hatchery. The springs supply 10,000-15,000 gpm of high quality rearing water with an annual temperature profile that ranges from about 38°-52°F. Rainbow trout, Yellowstone and westslope cutthroat trout, lake trout, brown trout, bull trout, brook trout, and kokanee have all been successfully reared at the facility. A pending dam safety upgrade is expected to provide treatment system options to secure water quality into the future from pathogens. There remains a need to develop a better system for treating wastewater.

The use of the facility is being provided as an in-kind partnership contribution of the U.S. Fish and Wildlife Service, for achieving mitigation purposes. Up to 70% of the facility has been made available for this purpose since 1992. While the facility is not completely modern, it has a high quality and high volume water supply and offers tremendous potential to meet a portion of long-term fish mitigation needs in the Flathead Basin with adequate investments in future upgrades.

Sekokini Springs is a private hatchery operating on leased Forest Service land. It is presently being acquired for use in the Hungry Horse Mitigation Program and a cooperative agreement for its operation is being developed with the Forest Service. It is located near West Glacier, Montana along the middle reaches of the Flathead River. The lease includes 11.4 acres of land on a terraced, partially-forested bench, with several spring water sources and a series of channels and earthen ponds constructed in the 1950's. The water supply flows from four springs located near the upper property boundary. The Forest Service water rights are for 2.5 cfs (1,122 gpm). Water temperature varies seasonally (approximately 40°F - 65°F) and is different from each spring source, providing flexibility for fish culture use. There is a 42' x 60' steel building, constructed in 1979, that houses the hatchery and living quarters.

Service personnel began rearing westslope cutthroat at Sekokini Springs in July, 1997 through a cooperative arrangement with the owner. These fish have performed well and the water supply appears to be suited for this purpose, although there are some concerns about warm summer temperatures. It is our intent to rehabilitate the existing earthen pond and channel system into a natural interconnected series that will be reattached to the river.

Currently, fish from the Flathead River are denied access. We plan to utilize Sekokini Springs as a satellite facility of the Creston National Fish Hatchery, where we will emphasize natural rearing of westslope cutthroat trout.

g. References.

Montana Department of Fish, Wildlife and Parks; Confederated Salish and

Kootenai Tribes. 1991. Fisheries mitigation plan for losses attributable to the construction and operation of Hungry Horse Dam. Montana DFWP and CSKT, Kalispell.

Montana Department of Fish, Wildlife and Parks; Confederated Salish and Kootenai Tribes. 1993. Hungry Horse Dam fisheries mitigation implementation plan. Montana DFWP and CSKT, Kalispell.

Section 8. Relationships to other projects

This project represents the U.S. Fish and Wildlife Service contribution to an unprecedented cooperative effort between State, Federal, and Tribal governments working collectively to replace lost fishery resources in the Flathead Basin. A complementary effort is being planned as a condition of FERC relicensing of Kerr Dam, whose objective is to replace annual losses of 131,000 pounds of salmonids to Flathead Lake. The combined fish stocking efforts of these two mitigation programs will greatly enhance the likelihood of success in restoring the fishery losses. ESA listing of bull trout (proposed) will further increase the need for a collective partnership to accomplish our common goal of fishery mitigation.

Section 9. Key personnel

Wade Fredenberg - Project Co-manager; Fish Production Coordinator.

Wade is responsible for coordinating Service fish rearing and stocking efforts, fish marking, monitoring, and evaluation with our partners (MFWP & CSKT). He has been the primary investigator in development of bull trout culture experimental efforts and supervised the collection of 1,000 juvenile bull trout from the Flathead Basin for genetic analysis. He also serves on the Montana Bull Trout Scientific Group as the Service expert on bull trout issues in the region of western Montana. Approximately 70% of his FTE is funded by BPA projects, the remainder by the Service.

Fredenberg received B.S. (1978) and M.S. (1980) degrees in Fish and Wildlife Management from Montana State University and spent nearly 13 years (1980 - 1992) as a fisheries management biologist employed by Montana Fish, Wildlife and Parks. His primary emphasis, in a series of progressively responsible positions in Kalispell, Great Falls, Billings, and Bozeman, was on reservoir monitoring and wild trout management, culminating in a research project on the effects of electrofishing injury on fish.

He has held the Service Fish Production Coordinator position since August, 1992. His expertise is primarily in management and research and the application of management

concerns to fish culture. He has coauthored several project reports directly related to this project's activities (see section 7d, this proposal).

Mark Maskill - Project Co-manager; Fish Hatchery Manager.

Mark is the manager of the U.S. Fish and Wildlife Service's Creston National Fish Hatchery. He oversees the day-to-day operations of the hatchery, budget, and staff of six full-time and several part-time employees. All fish rearing and stocking requests, fish health and fish cultural decisions, as well as maintenance and upgrades of the facility are his responsibility. As approximately 70% of the facility is dedicated to mitigation responsibilities, so is 70% of his and the staff's FTE's. The remainder is Service funded for Tribal stocking programs, etc.

Maskill received a B.S. degree in Conservation/Biology from Northern Michigan University. Mark has worked for the U.S. Fish and Wildlife Service since 1978 in a variety of programs. He has held positions with the following Service projects: Great Lakes Sea Lamprey Control, Marquette, Michigan; Pittsford National Fish Hatchery, Pittsford, Vermont; Tunison Laboratory of Fish Nutrition, Hagerman, Idaho; Dworshak National Fish Hatchery, Orofino, Idaho; Leadville National Fish Hatchery, Leadville, Colorado; Saratoga National Fish Hatchery, Saratoga, Wyoming; and Creston National Fish Hatchery, Kalispell, Montana.

He has been the manager of the Creston National Fish Hatchery since January, 1996. His expertise is primarily in hatchery management, hatchery operations, fish culture techniques, and public relations.

Section 10. Information/technology transfer

As has been the case previously (1994-1997), annual progress reports on implementation of this portion of the Hungry Horse Mitigation program will be prepared. In the past five years the project had a primary focus on kokanee restoration in Flathead Lake and a detailed stocking and monitoring report (green cover BPA) was prepared and circulated. In cases where relevant information on bull trout experimental work or other program aspects was developed, it has been presented in the form of a Service publication and circulated to all known interested parties (see Section 4d, this report). We have presented information at the annual International Kokanee Workshop, at the Montana Chapter AFS meetings, at the Northwest Fish Culture Conference, and at the BPA Project Review. We plan to develop at least one scientific publication for an AFS journal on the bull trout project. As the program evolves we will seek every appropriate opportunity to disseminate the information and subject our program to critical peer review, incorporating all valid suggestions to improve the program.