PART I - ADMINISTRATIVE

Section 1. General administrative information

Title of project

Mitigation For Excessive Drawdowns At Libby Reservoir

BPA project number: 9401001
Contract renewal date (mm/yyyy): 11/1999 ☐ **Multiple actions?**

Business name of agency, institution or organization requesting funding
Montana Fish, Wildlife and Parks and the Confederated Salish and Kootenai Tribes

Business acronym (if appropriate) MFWP and CSKT

Proposal contact person or principal investigator:

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NPPC Program Measure Number(s) which this project addresses
903(a), 903(b) (NPPC 1987), 10.1B, 10.1C, 10.2A.2, 10.2B, 10.3A.1-4, 10.3A.6, 10.3A9, 10.3A11, 10.3A.18 (NPPC 1995)

FWS/NMFS Biological Opinion Number(s) which this project addresses
Kootenai River White Sturgeon Biological Opinion (59 FR 45989)
NMFS Hydrosystem Operations for Salmon Recovery (56 FR 58619; 57 FR 14653)
Bull Trout Listing (62 FR 31647)
Westslope Cutthroat Trout proposed listing (63 FR 31691)

Other planning document references
Fisheries Mitigation and Implementation Plan for Losses Attributable to the Construction and Operation of Libby Dam. 1998.

Kootenai Watershed Programmatic Habitat and Physical Parameter Review (Bibliography)Open File Report – MFWP-Libby, MT
Bull trout and westslope cutthroat trout recovery plans and actions (Montana Bull Trout Restoration Team 1997; Montana Bull Trout Scientific Group 1995; Montana Bull Trout Restoration Team 1998, MFWP and CSKT 1991, 1993; Montana Westslope Cutthroat Trout Recovery Team, in prep.)

Fisheries Losses Attributable to Reservoir Drawdown In Excess of Limits Stated in the Columbia Basin Fish and Wildlife Program: Hungry Horse and Libby Dams 1987-1991 (Marotz and DosSantos 1993); Fisheries Losses Attributable to Reservoir Drawdown In Excess of Limits in the Columbia Basin Fish and Wildlife Program: Hungry Horse and Libby Dams 1991-1993 (MFWP and CSKT 1997);

Short description
Mitigate for fish and fish habitat losses due to excessive drafting of Libby Reservoir for power production (Fish and Wildlife Program measures 903(a) and (b)).

Target species
Bull trout, Kootenai River White Sturgeon, Inland Redband Trout, Westslope Cutthroat Trout, Burbot, Mountain Whitefish

Section 2. Sorting and evaluation

Subbasin
Kootenai Subbasin, Upper Columbia

Evaluation Process Sort

CBFWA caucus	Special evaluation process	ISRP project type
Mark one or more caucus	If your project fits either of these processes, mark one or both	Mark one or more categories
☐ Anadromous fish ☒ Resident fish ☐ Wildlife	☐ Multi-year (milestone-based evaluation) ☒ Watershed project evaluation	☐ Watershed councils/model watersheds ☐ Information dissemination ☐ Operation & maintenance ☐ New construction ☒ Research & monitoring ☒ Implementation & management ☐ Wildlife habitat acquisitions

Section 3. Relationships to other Bonneville projects

Umbrella / sub-proposal relationships. List umbrella project first.

Project #	Project title/description
20517	Fisheries Mitigation for the Construction and Operation of Libby Dam
9401001	MFWP- Libby Reservoir Excessive Drawdown Mitigation
8346500	Libby and Hungry Horse Modeling Technical Analysis
8346700	Mitigation For The Construction And Operation Of Libby Dam

0	Purchase Conservation Easement from Plum Creek Timber Company along the Fis

Other dependent or critically-related projects

Project #	Project title/description	Nature of relationship
9608720	Focus Watershed Coordination-Kootenai River Watershed (FWC)	Excessive Drawdown Mitigation (EDDM, Project # 9401001), is the mechanism by which local watershed plans developed by the FWC are funded and implemented. EDDM also provides GIS support for developing and prioritizing watershed plans
8806500	IDFG-Kootenai River Fisheries Investigations	White Sturgeon Recovery
8806400	KTOI – White Sturgeon Experimental Aquaculture	White Sturgeon Recovery
9101903	Hungry Horse Reservoir Mitigation	Sister mitigation project on Flathead System- exchange information and techniques and occasionally share personnel.
9401002	Flathead River Native Species Project	Sister mitigation project on Flathead System- exchange information and techniques and occasionally share personnel.
3874700	Streamnet Geographic Information Services Unit	Providing data layer updating and development for managers and mitigation efforts and provides mapping services for local watershed planning and research

Section 4. Objectives, tasks and schedules

Past accomplishments

Year	Accomplishment	Met biological objectives?
98	Completed geomorphic surveys of major portions of Libby and Big Cherry Creeks (key recovery area for bull and westslope cutthroat trout) necessary to remap floodplain and design a large-scale habitat restoration effort	Drastically reduces opportunity to build in floodplain. When implemented, the channel redesign should provide several miles of critical bull and cutthroat trout spawning habitat in a sub-basin that currently has restricted

		metapopulation opportunity
98	Completed channel protection/ stabilization/ habitat restoration and migration barrier removal that connects and revitalized over 15 miles of critical westslope and bull trout trout habitat in key core recovery tributaries to Libby Reservoir	Partially mitigates for losses of habitat and biotic function in drawdown zone of the reservoir and tributaries with improved biotic function in degraded habitat further upstream and reconnects inaccessible habitats for greater population resiliency
98	Continue trial of remote site incubators as a mechanism to improve the strength of native westslope cutthroat trout (WCT) populations in reservoir tributaries	Monitoring of this approach shows dramatic increases in both standing crops of 1,2,&3 year-old length class WCT in trial stream and the greatest number of the same migrating to the reservoir since 1984.
98	Complete a cooperative watershed inventory of the Young Creek Drainage with USFS	Gives the USFS and EDDM the information it will use to develop long-term Forest Plans and restoration planning at a watershed level for this critical WCT stream
96	Documented long-range, international migration of burbot from Libby Reservoir into Kootenai River in British Columbia	Provides managers new insight into metapopulation relationships between water bodies
96	Collected burbot genetic samples for a cooperative (IDFG) analysis to compare Libby Reservoir burbot to populations in the Kootenai River of Idaho	May provide the basis for determining that the two populations have been historically segmented (may affect ESA listing)
97	Documented severe declines in native westslope cutthroat trout populations in tributaries to Libby Reservoir	Gives managers and researchers to baseline data from which to measure success of recover efforts

Objectives and tasks

Obj 1,2,3	Objective	Task a,b,c	Task
1	Assess the metapopulation strength of transboundry (British Columbia and Montana) populations of native bull trout in the Kootenai River, above Libby Dam.	a	In cooperation with BC Environment, conduct aerial (helicopter) redd surveys of the major tributaries of the Kootenai River (Lussier, Skookumchuk, St. Mary, Findlay, Kikomun, Bull, Wild Horse and White Rivers, Gold and Bloom Creeks) of British Columbia.
		b	Ground truth major redd concentrations found by aerial

			surveys and identify possible index streams for long term population monitoring
		c	In cooperation with MFWP management personnel and Libby Mitigation, conduct redd surveys in the Grave and Weasel Creek drainages of Montana.
		d	In cooperation with BC Environment, capture and implant 40 adult bull trout in Kootenai River upstream of the Elk river, with 50-month radio transmitters
		e	Track movements of radio-tagged trout through the staging and spawning seasons to identify likely spawning areas.
2	Monitor permanent stream form and sediment monitoring stations in the WigwamRiver (BC) and Grave Creek (MT) to allow early detection of habitat degradation that could contribute to population declines for bull trout and westslope cutthroat trout	a	Conduct McNeil core sampling in both drainages using stratified random sampling techniques within these known spawning areas and establish permanent coring stations for long term monitoring.
		b	In known rearing areas in both drainages from population estimates and conduct Crouse substrate scoring transects in these areas.
		c	Correlate juvenile rearing densities with substrate scores and establish permanent substrate scoring stations in both drainages and juvenile population estimates.
		d	Correlate juvenile rearing densities with substrate scores and establish permanent substrate scoring stations in both drainages and juvenile population estimates.
3	Fill in the gaps in our knowledge of native westslope cutthroat populations and other trout species in Libby Reservoir and associated tributaries	a	Determine strength of adfluvial spawning runs in Young, Big, Five-mile, Ten-Mile, Pinkham, Sinclair, Therriault, Swamp, Lake and Fortine Creeks and the Tobacco River, using migrant traps and redd counts.
4	Continue to monitor the	a	Operate the Young Creek permanent

	effectiveness of using remote site incubators (RSI's) as a means of increasing recruitment of age-1 or greater westslope cutthroat trout into Libby Reservoir and expand the trial to include other tributaries.		weir to capture upstream migrating adult trout and downstream migrating juvenile trout to monitor number of spawning adults entering the creek to spawn and measure the number and size of WCT emigrating from the creek.
		b	Conduct electrofishing population estimates in historically sampled reaches to monitor the effects of RSI's and artificial redds. Begin comparative monitoring for future reference.
5	Evaluate thermal otolith marking methods for marking WCT fry delivered from RSI's to enable more effective evaluation of RSI program.	a	Treat all batches of eggs being deployed in RSI's with a unique series of temperature variations
		b	Collect emerged fry from each RSI, label and preserve in ethanol.
		c	Mount a random sample of emerged fry from each RSI collection, prepare otolith cross sections and create a digital images cross section catalogue of otolith growth patterns.
		d	Collect otoliths from out-migrating adult WCT captured in traps in Young Creek and from those WCT captured in Libby Reservoir gill nets. Prepare cross sections of otoliths.
		e	Determine if otolith patterns found in adult WCT have a similar early life pattern to that of a catalogued lots of eyed-eggs or emerged fry.
6	Develop a source of "in-drainage" westslope cutthroat trout eggs for use in RSI and artificial redd, WCT recovery program.	a	Determine with microsatelite genetic analysis if the BC Enviroment's Conners Lake WCT brood stock is sufficiently similar to "wild" in-drainage stocks to use in RSI based recovery efforts
		b	If a suitable "wild" strain is identified from BC, negotiate an egg exchange, obtain permits etc. to allow use of the eggs in the recovery program.

		c	If no source of BC WCT eggs is available develop a plan to trap and hold sufficient numbers of Wigwam River or Grave Creek WCT to provide genetic integrity and introduce sex products into existing Montana hatchery system for brood stock.
7	Develop and implement watershed-based habitat protection and enhancement projects in identified bull, westslope and inland redband trout core recovery areas.	a	Working cooperatively with the Focus Watershed Coordination program and local watershed councils, contact landowners to describe goals and encourage cooperation in renovation efforts.
		b	Conduct stream inventories and evaluate feasibility of returning specific stream reaches to quality native trout habitat.
		c	Select and prioritize project sites for habitat restoration, livestock fencing and watering stations, migrant passage improvement, point source sediment abatement, streambank stabilization and revegetation of riparian areas.
		d	Formalize landowner and agency agreements to protect investments. Develop cost-share programs with USFS, NRCS, Montana Department of Natural Resources and Conservation, Lincoln Conservation District, USACOE and other agencies and organizations
		e	Develop site plans, maps, material lists and contracts, obtain 124, 3A, 404 and chemical treatment permits for selected project sites.
		f	Initiate purchasing, contracts and implement plans at highest priority sites. Document remaining projects for inclusion in the Libby Mitigation Program.

Objective schedules and costs

Obj #	Start date mm/yyyy	End date mm/yyyy	Measureable biological objective(s)	Milestone	FY2000 Cost %
1	10/1997	11/2002	Maintain stable to increasing native species populations. Understand the population dynamics of and monitor for signs of collapse, one of North Americas strongest bull trout meta populations		3.00%
2	1/1994	11/2002	Forecast potential downturns in bull trout populations and allow managers to react prior to population collaspe		5.00%
3	1/1994	11/2002			10.00%
4	4/1994	11/2002	Reverse the downward trend in westslope cutthroat trout (WCT) populations in tributaries to Libby Reservoir and increase number of WCT returning to tribs. as adults from the Reservoir to spawn		15.00%
5	6/1994	11/2002			10.00%
6	1/1999	4/2001			5.00%
7	8/1996	11/2002	Increased numbers of spawning and rearing native species in core recovery areas and increases in connection between populations		52.00%
				Total	100.00%

Schedule constraints

Project schedule changes are the norm rather than the exception due to many variables beyond our control (e.g.weather, CBFWA priorities) making prioritization of tasks an adaptive process. It is anticipated that project will proceed as scheduled

Completion date

2002. Some projects initiated by excessive drawdown mitigation will continue under the Libby Mitigation Program (project 8346700)

Section 5. Budget

FY99 project budget (BPA obligated): $377,971

FY2000 budget by line item

Item	Note	% of total	FY2000
Personnel	0.2 FTE Focus Watershed Coordinator, 1 FTE Senior Technician, 1FTE Junior Technician., 0.5 FTE Junio	%17	63,520
Fringe benefits		%3	12,704
Supplies, materials, non-expendable property	Minor tools and instruments, software habitat restoration material	%7	24850
Operations & maintenance	office furniture ($700), light fixture, office painting	%0	1200
Capital acquisitions or improvements (e.g. land, buildings, major equip.)	Purchase of conservation easements to protect stream project investments (20,000	%5	20,000
NEPA costs	Meeting rooms and printing costs for documents. NEPA documentation performed in-kind by project	%0	1200
Construction-related support		%0	
PIT tags	# of tags:	%0	
Travel	52 nights per diem @$12, 170 days @$23, 10 nights out-of state lodging@50, 12 nights in-state lodge	%4	16,927
Indirect costs	17.2%	%15	55470
Subcontractor	Stream design 120 hrs@ $50/hr, 40hrs@$75/hr, Contract topographic surveys 80 hrs @ $45/hr,	%3	12600
Subcontractor	5000 feet channel reconstruction ($45/foot, Young Creek) 75/25 cost-share with USACOE	%15	56250
Subcontractor	3400 feet channel reconstruction ($45/foot, Libby Creek) 50/50 cost share with Libby Conservancy Dis	%20	76,500
Other	Fixed wing flight time for radio telemetry tracking of bull trout 50-	%10	36750

	3.5 hr flights @ $210/hr		
TOTAL BPA FY2000 BUDGET REQUEST			$377,971

Cost sharing

Organization	Item or service provided	% total project cost (incl. BPA)	Amount ($)
US Army Corps of Engineers	75/25 cost share for channel stabilization Young Creek	%26	168750
US Army Corps of Engineers (25%) and Libby Area Conservancy District (25%)	50/50 cost-share for channel stabilzation of Libby Creek	%12	76500
BC Environment	40- coded,high frequency, 50 month transmitters	%2	11,000
BC Environment	Operating migrant trap on Wigwam River. BPA funds contract labor and BC Environment coodinates equipment, support and logistics	%1	6000
Total project cost (including BPA portion)			$640,221

Outyear costs

	FY2001	FY02	FY03	FY04
Total budget	$300,000	$250,000	$0	

Section 6. References

Watershed?	Reference
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☒	Montana Bull Trout Scientific Group. 1995a. Flathead River drainage bull trout status report. Prepared for the Montana Bull Trout Restoration Team. 46 pp.
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☒	Montana Bull Trout Scientific Group. 1996a. Lower Kootenai River Drainage bull trout status report (Below Kootenai Falls.) Prepared for the Montana Bull Trout Restoration Team. 32pp.

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PART II - NARRATIVE

Section 7. Abstract

Extreme reservoir drawdown impacts all biological trophic levels as the pool volume shrinks, and reduces the probability that the reservoir will refill during spring runoff. Refill failures are especially harmful to the fishery resource during the productive warm months. Resulting discharges influence biological productivity in the Kootenai River downstream. Dam operation and other anthropogenic factors have resulted in population declines in native fish species. Kootenai River white sturgeon are listed as endangered species and bull trout are proposed for listing under the Endangered Species Act. Westslope cutthroat trout are likely to be petitioned for listing, and burbot in the middle and lower Kootenai are likely candidates for petition before the turn of the century. This project executes research and mitigative actions designed to improve the survival and growth of these native fish species and protect, as genetic reserves, stable to increasing bull trout and burbot populations in the upper Kootenai. Habitat improvements in tributary streams focus on natural reproduction, rearing and integrated, multi-agency watershed planning. Results complement and extend the Libby Mitigation Program (project 8346700) and Kootenai Focus Watershed Program (project 9608720). Cooperative projects are designed to improve the likelyhood of long-term persistence, survival and growth of native trout populations by protecting, recovering and modifying environmental conditions in the Kootenai Watershed. (Replace this text with your response in paragraph form)

Section 8. Project description

a. Technical and/or scientific background

Drawdown and discharge limits were placed on Hungry Horse and Libby dams by measures 903(a) and (b) of the Northwest Power Planning Council's Fish and Wildlife Program (NPPC 1987). The NPPC Program directs Bonneville Power Administration to fund the mitigation of fisheries losses caused by reservoir drawdowns for power operations in excess of limits set at Libby Dam(90-110 feet). These drawdown limits remain in effect until an updated operating plan called Integrated Rule Curves (NPPC 1994) are implemented.

Montana Fish, Wildlife & Parks (FWP) and the Confederated Salish and Kootenai Tribes (CSKT) initiated a program to mitigate fisheries losses caused by excessive drawdowns that occurred between 1987 through 1991 (Marotz and DosSantos 1993). Draft limits were again exceeded in 1993. Losses were estimated by comparing paired simulations using the quantitative biological models HRMOD and LRMOD (Marotz et al. 1996) duplicating techniques described by Marotz and DosSantos (1993).

Growth of the target species in the model, kokanee, was reduced by 1.1 to 1.6 percent in length and 3.3 to 4.6 percent in weight as the drawdown limit was exceeded. Angling pressure varies with fish abundance and size (Chisholm and Hamlin 1987; FWP unpublished files).

Estimation of the economic value attributable to the biological effects listed above is difficult. We can only guess at the value of dwindling fish populations (eg. bull trout, westslope cutthroat, burbot etc.) to future generations, so must focus on the potential fisheries benefits in terms of angler days. Estimated annual fisheries losses during the period 1989 through 1991 ranged from $748,374 to $1,759,969 (Marotz and DosSantos 1993). In 1993, reservoir drawdown and estimated biological effects were similar to 1989, or an approximate loss of $1.7 million. Mitigation measures are listed in the attached objectives and tasks. Mitigation measures are designed to partially offset fisheries losses..

In 1993, Libby Reservoir was drafted to 136 feet below full pool, exceeding the 90 to 110 foot drawdown limit. Inflow volume was low enough to maintain discharges within flood stage limitations without drafting below the 90 foot draft limit. When the limit was exceeded, aquatic resources were confined within a reduced reservoir volume as the surface area diminished. This resulted in an overall loss in aquatic production and increased the potential for high predation rates on juvenile kokanee, trout and whitefish as fish were concentrated in a smaller pool. Primary production, the base of the aquatic food web, declined by 4.8 percent during 1993.

Deep drawdowns also reduce the probability that the reservoir will refill during the following summer. Since primary production is maximized when the reservoir remains near full pool during the warm months (June through September), impacts due to excessive drafts are exacerbated when the reservoir fails to refill.

Reservoir drawdown reduces the surface area and volume of the pool, thus reducing zooplankton production. This important food for kokanee, young trout and adult trout during the winter, was reduced 4.7 percent due to excessive drawdown in 1993. Reduced reservoir volume and thus, more rapid water replacement in the pool, results in greater downstream loss of zooplankton.

Benthic insect production, an important springtime food supply for insect eating fish species, was reduced by 25.8 percent when drawdown exceeded 90 feet in 1993. Insect larvae dry or freeze when water recedes during reservoir drawdown. One excessive draft can impact benthic insect production for over two years.

Terrestrial insect deposition is reduced as the reservoir surface area shrinks and water recedes from shoreline vegetation. In 1993, excessive drawdown reduced the accumulation of this important summer / fall food supply by 11.8 percent (Coleoptera), 2.0 percent (Hemiptera), and 0.6 percent (Homoptera). There as little effect on Hymenoptera, presumably because of their better flying ability (wider dispersal from shoreline vegetation) and later seasonal activity period.

Trophic responses reveal that aquatic and terrestrial insects are effected to a greater extent than plankton. Stomach contents have shown that trout and whitefish eat mainly insects during spring, summer and fall, so are more severely impacted by reduced food availability than are planktivorous species (eg. kokanee, Columbia River chub etc.). Long-term monitoring has shown that rainbow and cutthroat trout populations have stabilized at low levels in the reservoir. Mountain whitefish are seldom captured anymore in seasonal population monitoring (Dalbey et al. 1997, in final draft). Spawning runs of trout in reservoir tributaries have shown a continuous decline since impoundment (Snelson et al. 1997, in final draft; Marotz et al. 1988; Marotz and Fraley 1986). The above impacts have been linked to decreased survival, reproductive success, fecundity and shifts in species relative abundance. Columbia River chubs are now the most abundant species in Libby Reservoir.

Mitgation actions in 2000 will be directed toward core recover areas identified as part of the Montana Bull Trout Restoration Team (MBTRT) Draft Restoration Plan for Bull Trout in the Clark Fork River Basin and Kootenai River Basin Montana (1998) and in areas that provide good recovery potenial for westslope cutthroat and inland redband trout. Priority will given to the Upper Kootenai where the strongest metapopualtion of bull trout exists. Plans and recovery actions are being directed toward protecting and improving natural hydrolic, riparian and biological function to streams.

b. Rationale and significance to Regional Programs

This project addresses mitigation for excessive reservoir drawdowns for power operations at Libby Dam, in excess of drawdown limits stated in the FWP (measures 903a and 903b, NPPC 1987). The Integrated Rule Curve (measures 10.3B.6 and 10.3B.7, NPPC 1995) have not been implemented, so the original drawdown limits are in effect. Impacts from several excessive drawdowns have yet to be mitigated. Native species aspects of this project are consistent with measure 10.1B which accords the highest priority to weak but recoverable, native populations injured by the hydropower system. Measure 10.2B requires comprehensive management which is carried out by the related Kootenai Focus Watershed project(9648701). Funding for on-the-ground watershed projects is included in this proposal and the related Libby Mitigation Program (8346700). Mitigation projects are directed by measure 10.3B, (specifically measure 10.3B.8) which instructs BPA to fund the design, construction and maintenance of mitigation projects. Research aspects are directed by measure 10.3B.5 which instructs BPA to continue to fund studies to evaluate the effects of Libby Dam. (Replace this text with your response in paragraph form.)

c. Relationships to other projects

This project complements the larger Libby Reservoir Mitigation Program addressing operational mitigation (Integrated Rule Curve refinement and assessment: measure 10.3B of the FWP) and non-operational mitigation (habitat and passage improvements).

Changes in dam operation for recovery actions in the lower Columbia have been shown to impact resident fish in the headwaters (ISAB 1997) and must be balanced to benefit all native fish species. Actions taken, must also be affordable or the public will likely stop the effort. To do this, decision makers must have tools to assess tradeoffs and make wise choices.

This project collaborates with the Libby Reservoir Mitigation Project by creating new trout habitat and by restoring degraded habitat to functional condition through stream rehabilitation and fish passage repairs. The two projects compliment each other in that they are concentrating on restoring and maintaining native trout populations in the Kootenai River System.

Compliments US Forest Service Forest Plan to enhance native species through habitat restoration projects and the NRCS and Conservation Districts in promiting stream bank stability.

The radio-telemetry work of this project will identify migration habits, habitat preferences and spacial distribution of species in the Kootenai System aiding state and provincial fish manageres in setting harvest regulations and in interceeding in land management decisions.

As stated above the project objectives are to identify, enhance and maintain native trout species in the Kootenai River system. These objectives compliment the concerns and efforts of the US Fish and Wildlife Service, and the Montana Bull Trout Recovery Team. These agencies are all advocating for the recovery of native species in the Kootenai, particularly white sturgeon, bull trout and westslope cutthroat.

Human resources and funding for most of the on-the-ground actions for Focus Watershed Coordination -Kootenai drainage (FWC-KR, Project # 9608720) are provided by the Excessive Drawdown Mitigation Program and Libby Mitigation Program. FWC-KR project provides coordination for both. FWC-KR is most closely connected with Libby Reservoir Excessive Drawdown Mitigation (EDDM, Project #9401000). The FWC-KR biologist serves as the primary supervisor for this program. This arrangements allows the EDDM to be successfully staffed with one senior fish technician and 1.5 junior technicians. The project biologist duties necessary for a successful, scientifically rigorous EDDM program, requires specialized data analysis and scientific and geomorphic design. These duties are cost-effectively provided by the FWC-KR biologist without the need for a separate EDDM project biologist. Conversely, EDDM technicians provide the essential biological, geomorphic and technical information needed for identifying limiting factors in watershed analysis and in monitoring implemented projects, as well as carrying out the day-to-day implementing of watershed based habitat projects.

d. Project history (for ongoing projects)

Montana Fish, Wildlife & Parks (FWP) and the Confederated Salish and Kootenai Tribes (CSKT) initiated a program to mitigate fisheries losses caused by excessive drawdowns that occurred between 1987 through 1991 (Marotz and DosSantos 1993). Draft limits were again exceeded in 1993. The Mitigation for Excessive Drawdown of Libby Reservoir was staffed in November of 1993.

Since that time, EDDM has implemented successful stream protection and rehabilitation projects at sites on Grave, Young, Spring, Sinclair, and Therriault, of the upper Kootenai Drainage. These actions have reconnected and rehabilitating over 15 miles of important spawing and rearing habitat for native species. EDDM have worked cooperatively with private landowners, USFS, NRCS, the Lincoln County Conservation District, Montana DNRC (State Lands) and the Montana Department of Transportation and the British Columbia Ministry of Environment to identify and designed mitigation actions and habitat protection projects on Libby, Parmenter, Flower, and Bobtail Creeks.

EDDM was the Montana coordinator for the first transboundry redd counts with BC Environment in the Wigwam drainage of the Kootenai and performed helicopter redd counts with BC Environment biologist Bill Westover. The joint project, which included

a downstream migration trapping operation by BC Environment, indicated that the Kootenai drainage (Wigwam River) may have one of the most important runs of bull trout in the world. EDDM initiated and designed a radio telemetry study of the transboundry bull trout population. The results of the telemetry work have already provided essential information to managers about migration patterns, straying rates, and locations of other important spawning tributaries in the system.

EDDM designed and was responsible for all aspects of implementing a study to determine where, when and under what conditions Libby Reservoir burbot were spawning and how deep drafting of the reservoir will effect burbot populations.EDDM captured burbot and surgically implanted spawning-size burbot with both sonic and radio transmitters. Tracking transmittered burbot has revealed previously undescribed migrations of burbot greater than 60 air miles into tributaries of the Kootenai River above Libby Reservoir in British Columbia, a pattern that will likely have important management implications. EDDM tracked sonic tagged fish and noted season movements, and macrohabitat parameters from location sights (depth, substrate characteristics, bottom temperature and water column temperature profiles). EDDM conducted creel surveys to determine winter food habits, sexual maturation characteristics, age structure, and population trends.

EDDM initiated a pilot westslope cutthroat (WCT) recovery program in tributaries of Lake Koocanusa. This recovery effort included tests of new techniques to imprint WCT to target streams using remote site incubators. This project is designed to test if fry, having hatched and remaining until emergence, in the target tributaries, would remain in the streams until they grew to a size where they would be less vulnerable to predation in the reservoir. Population estimates and migrant trapping in 1998 show that this technique is likely responsible for the first upward trend in westslope cutthroat numbers in the test tributary for both resident 1,2 and 3 year-old length class and out-migrating 1-3 year-old length class WCT since 1984. EDDM showed that the current practice of releasing fingerling WCT into tributaries as a mechanism for target stream imprinting has failed to reduce WCT declines. EDDM is pioneering the use of cold marking of otoliths as a mechanism for identifying the origin of fingerling and adult WCT.

EDDM operated migrant traps of reservoir tributaries and showed a drastic decline in the number of adfluvial spawners migrating to Reservoir tributaries.

EDDM surveyed all reservoir tributaries for potential migration barriers that might be exposed when Libby Reservoir experiences deep drawdowns. EDDM was responsible for conducting public scoping meetings for a proposed chemical rehabilitation program of Kilbrennan Lake which included restocking with native inland redband trout to form a genetic reserve for the rare fish. EDDM conducted zooplankton assays, fish density surveys, and lake bathymetry surveys in preparation for the rehabilitation.

EDDM conducted the necessary geomorphic surveys for a floodplain remapping of Libby and Big Cherry Creeks and development a large scale channel stabilization design for the

extremely unstable Libby Creek (key recovery core area for bull trout and westslope cutthroat trout).

e. Proposal objectives

OBJECTIVE 1. Assess the metapopulation strength of transboundry (British Columbia and Montana) populations of native bull trout in the Kootenai River, above Libby Dam.

The Kootenai River and Lake Koocanusa contain important populations of native bull trout which pass freely over the international boundary between British Columbia (BC) and Montana (MT). Recent MFWP telemetry studies on bull trout show that individual fish range widely throughout the reservoir in MT and the river in BC, during different seasons of the year. Last year a cooperative program between BC Environment and MFWP identified the Wigwam River (BC) as one of the most important spawning tributaries for bull trout in the Kootenai Drainage (concentrated in a 17 mile area). Bull trout are a species of special concern in Montana. It is known that bull trout spawn in other tributaries of the Kootenai Drainage (above Libby Dam) but the strength of runs in these tributaries in BC has not been determined, except in the Grave Creek drainage of MT. New logging operations are planned in the roadless Wigwam drainage over the next decade. Because the potential exists for a local catastrophic events to cause declines in the spawning run in the Wigwam River, it is important to know if there are any additional strong spawning runs in the drainage that would provide adequate recolonization potential for recovery of populations if such events should occur. This baseline information is essential for mid and long range watershed planning for this species. Identifying migration patterns will also give managers essential information for manipulating harvest regulation to best protect the bull trout populations.

OUTCOME OF OBJECTIVE 1: A GIS database and maps will be developed. A database of helicopter and ground redd counts will be attached for index streams. Telemetry locations will also be added. A report of findings regarding bull trout migrations and spawning trends will be updated yearly and be available at the MFWP-Libby internet site (MFWP-Libby internet homepage will be developed spring of 1999).

OBJECTIVE 2: Monitor permanent stream form and sediment monitoring stations in the WigwamRiver (BC) and Grave Creek (MT) to allow early detection of habitat degradation that could contribute to population declines for bull trout and westslope cutthroat trout in these two known spawning tributaries.

OUTCOME OF OBJECTIVE 2:
A GIS layer of this information will be developed and available on the website and reported in quarterly reports to BPA. Correlations will be determined between adult and juvenile densities and core ratings and substrate scores and yearly stream condition reports will be forwarded to both Canadian and US fish managers.

OBJECTIVE 3. Fill in the gaps in our knowledge of native westslope cutthroat populations and other trout species in Libby Reservoir and associated tributaries.

Evaluations of trout populations (1970-present) have shown an alarming decreasing trend in adfluvial spawners. As efforts are made to improve reservoir and tributary populations of westslope cutthroat trout, it will be important to document current adfluvial use of the major tributaries by spawning fish to evaluate progress.

OUTCOMES OF OBJECTIVE 3:
A GIS layer of this information will be developed and reported in quarterly and annual reports to BPA. This information will provide a basis for evaluating the success of mitigation actions directed at recovering the reservoir's native species fishery.

OBJECTIVE 4. Continue to monitor the effectiveness of using remote site incubators (RSI's) as a means of increasing recruitment of age-1 or greater westslope cutthroat trout into Libby Reservoir and expand the trial to include other tributaries.

Upstream migrant trapping in tributaries to Libby Reservoir, indicate a severe decline in numbers of adfluvial westslope cutthroat trout adults ascending reservoir tributaries during the spring spawning period. Electrofishing population estimates for juvenile size classes in the tributaries also show a significant decline. This decline is occurring in Young Creek despite long-term planting of fingerling westslope cutthroat trout (WCT) into the tributary. In the fourth year of RSI trial and monitoring on Young Creek significant increases in 1+ and 2+ WCT in trial streams have been observed. Both resident > 1 year-old and outmigrating > 1 year-old WCT numbers are the highest observed since 1984.

OUTCOMES OF OBJECTIVE 4: A report of findings will be made to BPA in quarterly and annual reports and pier review publications when applicable.

OBJECTIVE 5. Evaluate thermal otolith marking methods for marking WCT fry delivered from RSI's to enable more effective evaluation of RSI program.

It will be important to identify the origin of WCT fry and adults that are captured in gill net, population trend monitoring, in Libby Reservoir, and migrant trapping operations in the tributaries to the reservoir, to more precisely evaluate the effectiveness of RSI techniques for native trout recovery. No permanent marking technique has been developed for retention from fry to adult stage for WCT. Fry marking is inherently difficult through physical means. One promising method of mass marking WCT fry is to mark the otoliths of pre-emergent fry by treating the eggs with variations in water temperature for regulated periods of time. This should provide a detectable mark on otoliths which can be detected when these fish are captured as adults (Schroder et al. 1996).

OUTCOMES OF OBJECTIVE 5:
A catalogue of cold marking otolith patterns will be maintained at the MFWP-Libby office for future evaluation of RSI-based tributary recovery efforts. Results of the

evaluation of cold marking techniques for use with WCT will be reported in quarterly and annual reports to BPA and pier review journal if applicable.

OBJECTIVE 6. Develop a source of "in-drainage" westslope cutthroat trout eggs for use in RSI and artificial redd, WCT recovery program.

MFWP has used Hungry-Horse derived WCT brood stock as the source of eggs for all tributary and reservoir planting since the mid-eighties. MFWP has collected little evidence to indicate that planting of this strain of WCT has been effective in slowing the decline of WCT in Lake Koocanusa and its tributaries. While strain characteristics may not be a primary cause of the ineffectiveness of this program, using "in-drainage" gametes for recovery efforts should provide a greater chance of success.

OUTCOME OF OBJECTIVE 6:
A source of in-drainage WCT eggs will be identified or developed for use in WCT recovery effort of in Kootenai system.

OBJECTIVE 7. Develop and implement watershed-based habitat protection and enhancement projects in identified bull, westslope and inland redband trout core recovery areas.

A very successful program of landowner contacts and specific fish habitat protection and enhancement projects, on private lands, has been implemented over the first three years of the Excessive Drawdown Project. Over 15 important habitat projects have either been implemented or agreements have been reached to complete project work on tributaries necessary for recovery of native species. Over the past two years, the program has gained a good reputation in communities where we have been active. Successful negotiation of additional projects is therefore accelerating. Priority will be given to tributaries of the Tobacco River and Libby Creek Continued efforts to negotiate and implement specific habitat projects on private land has the highest potential as a cost-effective, non-operational way to promote native species recovery for the reservoir.

OUTCOME OF OBJECTIVE 7:
Stream inventory data and population inventories will be summarized and reported in regular BPA reports. Prioritzation of identified project and the justification for this ranking will be reported. All stream manipulation and revegetation projects will include pre- and post-monitoring which, at a minimum, will include 1) Rosgen (1996) level III stream geomorphic evaluation and 2) fish population estimates. These will be reported in regular BPA reports.

f. Methods

For brievity imposed by length limits I only include detail for methods not relatively clear

in the narrative and objective and tasks chart above.

OBJECTIVE 1: Assess the metapopulation strength of transboundry (British Columbia and Montana) populations of native bull trout in the Kootenai River, above Libby Dam.

Radio transmitter implants and telemetry work with follow proceedures described by Winter 1983, Williams and Roaf 1973, Hart and Summerfelt 1975, Schramm 1984, Heezen and Tester 1967, Henderson et al 1966, Stasko 1971a, Stasko 1971b, Stasko 1971c, Summerfelt and Hart 1972

OBJECTIVE 2: Monitor permanent stream form and sediment monitoring stations in the WigwamRiver (BC) and Grave Creek (MT) to allow early detection of habitat degradation that could contribute to population declines for bull trout and westslope cutthroat trout in these two known spawning tributaries.

Conduct McNeil (Weaver and Fraley 1991, McNeil and Ahnell 1964) core sampling in spawning areas and Crouse substrate scoring (1981) in juvenile rearing area in both drainages using stratified random sampling techniques within these known spawning areas and established permanent coring stations for long term monitoring. Rosgen (1996) level III and IV geomorphic evaluation will be conducted at randomly selected permanent cross sections.

OBJECTIVE 4. Continue to monitor the effectiveness of using remote site incubators (RSI's) as a means of increasing recruitment of age-1 or greater westslope cutthroat trout into Libby Reservoir and expand the trial to include other tributaries.

We are using the 5 gallon size incubator for our trials. Water supplies for the incubators is from an instream source and incubator buckets are place directly on streambanks. Fry are able to enter the creek directly from incubator buckets.

OBJECTIVE 5. Evaluate thermal otolith marking methods for marking WCT fry delivered from RSI's to enable more effective evaluation of RSI program.

Cold treatment of eyed WCT eggs that are place in remote site incubators in order to lay down unique otolith marks for RSI evaluation.(Neilson and Geen 1985, 1981, Campana and Neilson 1985.) WCT Eyed-eggs are shipped from our hatchery at Washoe Park to Libby, on ice. Eggs are then brought to approximately 54 degrees using non-chlorinated water and returned to ice in unique time patterns at our Murray Springs hatchery.

g. Facilities and equipment

The Libby Field Station of MFWP has two office buildings containing office space, wet lab, otolith grinding equipment, microscope and imaging equipment, and computer equipment sufficient for project staff. Remnants of the old fish hatchery provide facilities

for meeting experimental aquiculture objectives. A workshop and boatshed are situated near the office buildings on the state property. State vehicles and workboats are available for project use. Electrofishing equipment (boat-mounted, bank and backpack units), surveying and GPS equipment, SCUBA gear, lake and river sampling devices for sampling/monitoring all trophic levels are available at the site. A bobcat with apparatus designed for habitat enhancement work is time-shared with the Hungry Horse Mitigation Program. Minor tools and equipment are included in the project budget.

h. Budget

(Replace this text with your response in paragraph form)

Section 9. Key personnel

Scott Snelson
Focus Watershed Coordination Biologist (0.2 FTE)
Montana Fish, Wildlife & Parks
475 Fish Hatchery Road
Libby, MT 59923
Phone (406) 293-4713
Fax (406) 293-6338
E-mail ssnelson@libby.org

Education Master of Science - Biology
1992 - 1996 Montana State University Bozeman, Montana
3.8 GPA

Bachelor of Science - Fish and Wildlife Management
Montana State University Bozeman, Montana

Wildland Hydrology (Rosgen) -Short Courses Pagosa Springs, Colorado
Applied Fluvial Geomorphology July 1996
River Morphology and Application August 1997
River Monitoring and Evaluation August 1998

Performance Evaluation Training - Montana Dept. of Administration
Geographic Information Systems Training - MT Chapter Amer. Fish. Soc.
Clean Water Act Training - US Forest Service, MT Dept. of Env. Qual.
PADI certified Advanced SCUBA diver

Profession Experience

1997 – current: Focus Watershed Coordination Biologist
Montana Fish, Wildlife & Parks Libby, Montana

Duties: Coordinate formation of local watershed working groups for development of "grass-roots" watershed plans and facilitate implementation of plans integrating state, federal, tribal, and private resources.

1995-1997 Project Leader - Libby Reservoir Excessive Drawdown Mitigation
Montana Fish, Wildlife & Parks Libby, Montana

Duties: Identify key limiting factors for native fish stocks in Libby Reservoir, develop and implement mitigation actions for the excessive drafting of Libby Reservoir and provide implementable mitigating measures for the construction of Libby Dam to be included in the Libby Dam mitigation plan.

1992-1994 Graduate Research Assistant
Montana State University Bozeman, Montana

Duties: Conducted research on the initial use of a newly accessible spawning stream by adult rainbow and brown trout and examined the use patterns of the stream by their progeny.

1993 Creel Survey Clerk
Montana Fish, Wildlife & Parks Townsend, Montana

Duties: Conducted creel surveys on anglers on Canyon Ferry Reservoir. Surveys included examination of catch for hatchery impregnated pigments, scale, and vertebrae collection for strain evaluation research.

1989-1992 Conservation Director
Montana Wildlife Federation Bozeman, Montana

Duties: I administered the legislative lobby efforts of Montana's largest conservation organization which included bill drafting, legal research, coalition development, opinion poll design grass-roots network development, and coordinating and preparing hearing testimony. Other duties included grant development, education, fundraising, and local chapter establishment.

Awards Received

Wildlife Professional of the Year - Montana Wildlife Federation 1991.

Thomas E. Ostrowski
Senior Fisheries Technician (1 FTE)
Montana Department of Fish, Wildlife and Parks
475 Fish Hatchery Road
Libby, MT 59923

Degrees Earned

Michigan State University - East Lansing, MI
Bachelor of Science in Forest Resource Management, May 1985

CURRENT RESPONSIBILITIES

Project Leader- Montana Department of Fish Wildlife & Parks Libby Reservoir Excessive Drawdown Project:
6/97 - present
Plan and implement projects to restore and enhance habitat for native fish species in the Kootenai River Drainage.
Montana Department of Fish Wildlife & Parks Libby Fisheries Mitigation Project; 11/91 - 6/97

OTHER EMPLOYMENT

Fisheries Technician for U.S. Forest Service
@ Alsea District, Siuslaw National Forest; Philomath, OR; 5/91 - 9/91
@ Cordova District, Chugach National Forest; Anchorage, AK; 4/90 - 11/90
@ Elk City District, Nez Perce National Forest; Grangeville, ID 6/85 - 4/90

EXPERTISE

- Proficient back ground in the principles, methods of fish population and habitat surveys.
- Global Positioning Systems (GPS) and application computer programs used for mapping.
- Lead Projects SCUBA diver with advanced certification and experienced in adverse diving conditions.
- Experienced surveyor at the 3rd level of error.

1989: Region 1 Stream Inventory Methodology Workshop - Elk City, Idaho
1990: Copper River Delta Symposium - Cordova, Alaska
1996: Advanced SCUBA Certification - Kalispell, Montana
1997: Fish Mark and Recapture Symposium - Bozeman, Montana

PUBLICATIONS (RELEVANT)

Ostrowski, T., C. Muhlfeld, S. Snelson, W. Young. In Press. Progress Report, Mitigation for Excess Drawdowns at Hungry Horse and Libby Reservoirs. Presented to the Bonneville Power Administration, Portland, Oregon Project 94-10

Dalbey, S., J.DeShazer, L.Garrow, G.Hoffman, T.Ostrowski. In Press. Quantification of Libby Reservoir levels needed to maintain or enhance reservoir fisheries. Presented to the Bonneville Power Administration, Portland, Oregon

Section 10. Information/technology transfer

Project results will be published in BPA reports and, where applicable, peer reviewed journal articles. Monthly or quarterly reports to all agency and citizen groups will be available via Kootenai Watershed web page (to be designed and available for access by spring 1999).

Congratulations!