Part 1 of 2. Administration and Budgeting

Section 1 of 10. General administrative information

Title of Project

Evaluation of the Biological Effects of the Northwest Power and Conservation Council's Mainstem Amendment on the Fisheries Upstream and Downstream of Hungry Horse and Libby Dams, Montana.

BPA project number: New Project requested by the NPCC's Mainstem Amendment.

Business name of agency, institution or organization requesting funding:
Montana Fish, Wildlife & Parks

Acronym: MFWP

Proposal contact person or principal investigator:

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Manager of program authorizing this project: Brian Marotz, Fisheries Program Manager.

Subbasin(s) in Mountain Columbia Province:
Kootenai and Flathead Subbasins

Target Species:
Kootenai white sturgeon, bull trout, westslope cutthroat trout, redband trout, mountain whitefish

Short Description:
The Northwest Power and Conservation Council (Council) directed the region to test, implement, and evaluate an interim summer operation, beginning in the summer 2004, that implements new drafting limits at Hungry Horse and Libby Dams. This proposal includes actions to monitor and evaluate the biological response in Montana to these dam operation changes. Monitoring and evaluation strategies are described sequentially based on the speed in which results can be made available to inform policy.

Information transfer
The expected outcomes of this project will be quantitative and qualitative. Data generated by this project will include model derivations supported by primary field data. Use of these data will be restricted to MFWP while the project is a work in progress and will be available with approval after the results are published. Data will be managed locally in printed and electronic form and backed up regularly. Public access will be available through printed reports, peer review journals and postings on the BPA web page.

Other methods for information transfer:
Information will be published in project reports and journal publications, and archived in computer files and hard copies.

Section 2 of 10. Past accomplishments

This is a new project. Some past accomplishments apply.

Year	Accomplishment
1993	Completed thermal modeling of selective withdrawl structures on Hungry Horse Dam to restore normative river temperatures (Marotz et al. 1994).
1995	Bureau of Reclamation completed installation of selective withdrawl structures on Hungry Horse Dam. Water temperatures were restored to normative historic river temperatures for one month in August, then operated annually from Late June to October.
1996	Completed cooperative culvert improvement projects on Murray Creek and Riverside Creek, direct tributaries to Hungry Horse Reservoir. Opened 7 km of high quality habitat and found adfluvial cutthroat trout redds and juvenile bull trout above culvert.
1996	Completed development of Integrated Rule Curves (IRCs) for Hungry Horse Reservoir (Marotz et al. 1996).
1998	Completed study quatifying zooplankton entrainment at Hungry Horse Dam under various operational scenarios using selective withdrawl (Cavigli et al. 1998).
1998	Completed development of a basin-wide radio-telemetry monitoring system for the upper Flathead River drainage.
1998	Completed seasonal movement studies on lake trout and northern pike and initiated habitat use and movement studies on bull trout and westslope cuttrhoat trout.
1999	Compared operations called for by the NMFS 1995 Biological Opinion with the Integrated Rule Curves (Marotz et al. 1999). Compared Kootenai white sturgeon operations to other operating scenarios in the Kootenai white sturgeon recovery plan (See Appendices B and C USFWS 1999).
1999	Monitored watershed level fish and habitat parameters in cooperation with fish management staff and other agencies. Efforts included population surveys, streambed coring, redd counts, and gillnetting (ongoing since 1991).
1999	Initiated Instream Flow Incremental Methodology study (IFIM) in cooperation with Miller Ecological Consultants, Inc. (Fort Collins, CO) on the Flathead River targeting size-classes of native bull trout and westslope cutthroat trout.
2000	Completed winter population electrofishing surveys, whirling disease sampling, spring migrant trapping, and radio-telemetry surveys in the Flathead River drainage.
2000	Completed winter growth analysis of westslope cutthroat trout in headwater populations.
2000	Completed a minimum instream flow study on the South Fork Flathead River (Marotz and Muhlfeld 2000).
2000	Completed the first year of data collection for the IFIM study in Reach 1 of the Flathead River; developed habitat suitability curves for juvenile and adult bull trout and westslope cutthroat trout (Muhlfeld et al. 2002)
2000	Miller Ecological Consultants, Inc. (CO) completed physical and hydrologic modeling of the Flathead River for the IFIM study.
2001	Completed the second year of data collection for the IFIM study in Reaches 1 and 2 of the Flathead River; developed habitat suitability curves for juvenile and adult bull trout and westslope cutthroat trout (Muhlfeld et al. 2002).
2001	Evaluated winter diel habitat use and movement of subadult bull trout in Reach 1 of the Flathead River (Muhlfeld et al. 2002).
2002	MFWP completed biologic and physical monitoring of the spill event at Libby Dam during June-July 2002, and developed quantitative models to describe the effects of total dissolved gas concentrations on resident salmonids (see Dunnigan et al. 2003).
2002	Evaluated winter diel habitat use and movement of subadult bull trout in Reach 1 and Reach 2 of the Flathead River (Muhlfeld et al. 2003a).
2002	Completed habitat suitability curves for IFIM model (Muhlfeld et al. 2002b).
2003	MFWP commented on NPCC's Mainstem Amendment (See comments posted at NWCouncil.org)
2003	Published results of the diel habitat use study in a peer-reviewed journal (Muhlfeld et al. 2003b).

Section 3 of 10. Relationships to other projects

Project #	Project title / description	Nature of relationship

199502510	Instream Flow Incremental Methodology (IFIM) study on the Flathead River	Completed the Physical and hydraulic component of the IFIM model (Miller et al. 2003)
199101903	Hungry Horse Mitigation	Provided data for model development and verification
199500400	Libby Mitigation	Provided data for model development and verification

Section 4 of 10. Estimated budget for Planning and Design phase

Objective	Task	Task duration	Estimated FY 04 Cost	Subcon-tractor
1. Evaluate the potential response of listed bull trout and resident fish resulting from the Council's reservoir drafting strategy.	1. Use HRMOD and LRMOD to calculate the amount of physical habitat available for aquatic productivity resulting from reservoir drafts in the Mainstem Amendments at Hungry Horse and Libby Reservoirs.	FY 2004	5,591	Yes, in part
1.	2. Use HRMOD and LRMOD to calculate the biological responses resulting from reservoir drafts in the Mainstem Amendments at Hungry Horse and Libby Reservoirs.		7,790	Yes, in part
1.	3. Compile age-growth and condition factor data from annual gill net series to compare actual growth at age under varying reservoir operating strategies to long-term composite growth increments. Relate variation in growth increments to environmental conditions.		4,288	
1.	4. Update the Libby Reservoir model using data from recent years to improve the predictive capability of the hydrologic model to better estimate the unregulated component of the flow via a regression on reservoir inflow.		5,002	Yes, in part
2. Evaluate alterations in native fish habitat associated with dam operations in the Flathead and Kootenai Rivers.	1. Use IFIM models to calculate the biological responses resulting from river flow in the Mainstem Amendments in the Flathead and Kootenai Rivers.		3,811	
2.	2. Estimate annual salmonid cohort survival, and relate that survival to environmental variables including weekly and daily summer flow variation (tributary and river phase).		1,236	Yes
2.	3. Use radio telemetry to assess		1,592	

	fish locations and movement associated with river flows. Verify IFIM model simulations by using radio telemetry to assess fish locations and movement associated with river flows.			
2.	4. Use migrant trapping (i.e., screw and box traps) and Passive Integrated Transponder (PIT) tagging to estimate survival and growth of bull trout and cutthroat trout populations.		1,592	Yes, in part
2.	5. Compare length at age and growth increments of rainbow, westslope cutthroat and bull trout captured below Libby and Hungry Horse Dams via electrofishing to compare alternative system operation strategies.		357	
		Total	**31,260**	

Out year objective-based estimated 2004 – 2007 budget

Objective	**Starting FY**	**Ending FY**	**Estimated cost**
1. Evaluate the potential response of listed bull trout and resident fish resulting from the Council's reservoir drafting strategy.	Task 1,2&4 FY 2004 Task 3 FY 2004	Task 1,2&4 FY 2005 Task 3 FY 2007	18,383 4,288
2. Evaluate alterations in native fish habitat associated with dam operations in the Flathead and Kootenai Rivers.	Task 1&3 FY 2004 Task 2, 4 &5 FY 2004	Task 1&3 FY 2006 Task 2 , 4 &5 FY 2007	5,403 3,186

Out year estimated budgets

	FY 2004	**FY 2005**	**FY 2006**	**FY 2007**
Total budget	31,260	24,249	20,384	15,000

Section 5 of 10. Estimated budget for Construction/Implementation phase

Objective	**Task**	**Task duration**	**Estimated FY 04 Cost**	**Subcon -tractor**
1. Evaluate the potential response of listed bull trout and resident fish resulting from the Council's reservoir drafting strategy.	1. Use HRMOD and LRMOD to calculate the amount of physical habitat available for aquatic productivity resulting from reservoir drafts in the Mainstem Amendments at Hungry Horse and Libby Reservoirs.	FY 2004 and 2005	2,978	Yes
1.	2. Use HRMOD and LRMOD to calculate the biological responses resulting from reservoir drafts in the Mainstem Amendments at Hungry Horse and Libby Reservoirs.		2,978	Yes
1.	3. Compile age-growth and			Yes

	condition factor data from annual gill net series to compare actual growth at age under varying reservoir operating strategies to long-term composite growth increments. Relate variation in growth increments to environmental conditions.			
1.	4. Update the Libby Reservoir model using data from recent years to improve the predictive capability of the hydrologic model to better estimate the unregulated component of the flow via a regression on reservoir inflow.		7,742	Yes
2. Evaluate alterations in native fish habitat associated with dam operations in the Flathead and Kootenai Rivers.	1. Use IFIM models to calculate the biological responses resulting from river flow in the Mainstem Amendments in the Flathead and Kootenai Rivers.			
2.	2. Estimate annual salmonid cohort survival, and relate that survival to environmental variables including weekly and daily summer flow variation (tributary and river phase).			
2.	3. Use radio telemetry to assess fish locations and movement associated with river flows. Verify IFIM model simulations by using radio telemetry to assess fish locations and movement associated with river flows.			
2.	4. Use migrant trapping (i.e., screw and box traps) and Passive Integrated Transponder (PIT) tagging to estimate survival and growth of bull trout and cutthroat trout populations.			
2.	5. Compare length at age and growth increments of rainbow, westslope cutthroat and bull trout captured below Libby and Hungry Horse Dams via electrofishing to compare alternative system operation strategies.			
		Total	**13,697**	

Out year objective-based estimated 2004 – 2007 budget

Objective	**Starting FY**	**Ending FY**	**Estimated cost**
1. Evaluate the potential response of listed bull trout and resident fish resulting from the Council's reservoir drafting	Task 1,2&4 FY 2004 Task 3	Task 1,2&4 FY 2005 Task 3	13,697 0

strategy.	FY 2004	FY 2007	
2. Evaluate alterations in native fish habitat associated with dam operations in the Flathead and Kootenai Rivers.	Task 1&3 FY 2004 Task 2 , 4 &5 FY 2004	Task 1&3 FY 2006 Task 2 , 4 &5 FY 2007	0 0

Out year estimated budgets

	FY 2004	FY 2005	FY 2006	FY 2007
Total budget	13,697	0	2,800	0

Section 6 of 10. Estimated budget for Operations & Maintenance phase

Objective	Task	Task duration	Estimated FY 04 Cost	Subcon-tractor
1. Evaluate the potential response of listed bull trout and resident fish resulting from the Council's reservoir drafting strategy.	1. Use HRMOD and LRMOD to calculate the amount of physical habitat available for aquatic productivity resulting from reservoir drafts in the Mainstem Amendments at Hungry Horse and Libby Reservoirs.	FY 2004 &05	2,948	Yes, in part
1.	2. Use HRMOD and LRMOD to calculate the biological responses resulting from reservoir drafts in the Mainstem Amendments at Hungry Horse and Libby Reservoirs.		1,280	Yes, in part
1.	3. Compile age-growth and condition factor data from annual gill net series to compare actual growth at age under varying reservoir operating strategies to long-term composite growth increments. Relate variation in growth increments to environmental conditions.		14,352	Yes, in part
1.	4. Update the Libby Reservoir model using data from recent years to improve the predictive capability of the hydrologic model to better estimate the unregulated component of the flow via a regression on reservoir inflow.		1,072	Yes
2. Evaluate alterations in native fish habitat associated with dam operations in the Flathead and Kootenai Rivers.	1. Use IFIM models to calculate the biological responses resulting from river flow in the Mainstem Amendments in the Flathead and Kootenai Rivers.		14,947	
2.	2. Estimate annual salmonid cohort survival, and relate that survival to environmental variables including weekly and daily summer flow variation (tributary and river phase).		13,053	Yes

2.	3. Use radio telemetry to assess fish locations and movement associated with river flows. Verify IFIM model simulations by using radio telemetry to assess fish locations and movement associated with river flows.		23,522	
2.	4. Use migrant trapping (i.e., screw and box traps) and Passive Integrated Transponder (PIT) tagging to estimate survival and growth of bull trout and cutthroat trout populations.		33,626	Yes, in part
2.	5. Compare length at age and growth increments of rainbow, westslope cutthroat and bull trout captured below Libby and Hungry Horse Dams via electrofishing to compare alternative system operation strategies.		5,479	
		Total	**110,279**	

Out year objective-based estimated 2004 – 2007 budget

Objective	**Starting FY**	**Ending FY**	**Estimated cost**
1. Evaluate the potential response of listed bull trout and resident fish resulting from the Council's reservoir drafting strategy.	Task 1,2&4 FY 2004 Task 3 FY 2004	Task 1,2&4 FY 2005 Task 3 FY 2007	5,300 14,352
2. Evaluate alterations in native fish habitat associated with dam operations in the Flathead and Kootenai Rivers.	Task 1&3 FY 2004 Task 2 , 4 &5 FY 2004	Task 1&3 FY 2006 Task 2 , 4 &5 FY 2007	38,469 52,158

Out year estimated budgets

	FY 2004	**FY 2005**	**FY 2006**	**FY 2007**
Total budget	110,279	112,529	101,279	100,000

Section 7 of 10. Estimated budget for Monitoring & Evaluation phase

Objective	**Task**	**Task duration**	**Estimated FY 04 Cost**	**Subcon-tractor**
1. Evaluate the potential response of listed bull trout and resident fish resulting from the Council's reservoir drafting strategy.	1. Use HRMOD and LRMOD to calculate the amount of physical habitat available for aquatic productivity resulting from reservoir drafts in the Mainstem Amendments at Hungry Horse and Libby Reservoirs.	2004	4,288	Yes, in part
1.	2. Use HRMOD and LRMOD to calculate the biological responses resulting from reservoir drafts in the Mainstem Amendments at Hungry Horse and Libby Reservoirs.		4,288	Yes, in Part
1.	3. Compile age-growth and condition factor data from annual		17,079	Yes, in part

	gill net series to compare actual growth at age under varying reservoir operating strategies to long-term composite growth increments. Relate variation in growth increments to environmental conditions.			
1.	4. Update the Libby Reservoir model using data from recent years to improve the predictive capability of the hydrologic model to better estimate the unregulated component of the flow via a regression on reservoir inflow.		4,288	Yes
2. Evaluate alterations in native fish habitat associated with dam operations in the Flathead and Kootenai Rivers.	1. Use IFIM models to calculate the biological responses resulting from river flow in the Mainstem Amendments in the Flathead and Kootenai Rivers.		19,380	
2.	2. Estimate annual salmonid cohort survival, and relate that survival to environmental variables including weekly and daily summer flow variation (tributary and river phase).		38,904	Yes, in part
2.	3. Use radio telemetry to assess fish locations and movement associated with river flows. Verify IFIM model simulations by using radio telemetry to assess fish locations and movement associated with river flows.		23,167	
2.	4. Use migrant trapping (i.e., screw and box traps) and Passive Integrated Transponder (PIT) tagging to estimate survival and growth of bull trout and cutthroat trout populations.		48,842	
2.	5. Compare length at age and growth increments of rainbow, westslope cutthroat and bull trout captured below Libby and Hungry Horse Dams via electrofishing to compare alternative system operation strategies.		44,866	Yes, in part
		Total	**205,101**	

Out year objective-based estimated 2004 – 2007 budget

Objective	**Starting FY**	**Ending FY**	**Estimated cost**
1. Evaluate the potential response of listed bull trout and resident fish resulting from the Council's reservoir drafting strategy.	Task 1,2&4 FY 2004 Task 3 FY 2004	Task 1,2&4 FY 2005 Task 3 FY 2007	12,863 17,079

2. Evaluate alterations in native fish habitat associated with dam operations in the Flathead and Kootenai Rivers.	Task 1&3 FY 2004 Task 2 , 4 &5 FY 2004	Task 1&3 FY 2006 Task 2 , 4 &5 FY 2007	42,547 132,612

Out year estimated budgets

	FY 2004	FY 2005	FY 2006	FY 2007
Total budget	205,101	172,397	175,997	175,000

Section 8 of 10. Estimated budget summary

Itemized estimated budget

Item	Note	FY 2004
Personnel	3.35 FTE	154, 995
Fringe benefits	(included in line above)	
Supplies, materials, non-expendable property		7,895
Travel		12,805
Major equipment over $10,000		60,293
NEPA Costs		
Subcontractor	C. Althen - Computer modeling	16,000
	MSU PhD Student	17,380
	Scale/Otolith Analysis	30,000
Repair & Maintenance		7,450
Aerial survey flights		4,000
Communications		1,400
MFWP Overhead (19.1 %)	On non-equipment items only	48,118
	Total	$360,336

Total estimated budget
$

Cost Sharing

Organization	Item or service provided	Amount ($)	Cash or in-kind?
This project depends on resources supplied by the Hungry Horse and Libby Mitigation Programs.	This project shares equipment, personnel and data.	150,000	In-Kind
	Total cost-share	150,000	

Out year budget totals

	FY 2004	FY 2005	FY 2006	FY 2007
Planning and design phase	31,260	24,249	20,384	15,000
Construction / implementation phase	13,697	0	2,800	0
O&M phase	110,279	112,529	101,479	100,000
M&E phase	205,101	172,397	175,997	175,000
Total Budget	360,337	309,175	300,660	290,000

End Part 1 of 2.