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19 Pend Oreille Research, Monitoring and Evaluation Plan

In light of the various ongoing efforts to develop a regional monitoring plan, the Intermountain Province (IMP) has chosen to develop a monitoring plan based on existing monitoring methods described in the scientific literature. The IMP approach to the Research, Monitoring and Evaluation (RM&E) is as follows:

- Research is handled separately from the M&E design. A wish list of research needs is identified based on the biological objectives, strategies and critical uncertainties identified in the subbasin management plans and subbasin assessments. Many of the subbasin work teams developed preliminary research needs lists. Although there is an extensive "wish list" of research questions in the IMP, the limitations of available funding made it important to prioritize the research questions into two categories: "need to know" and "would like to know."

- For the M&E component, the IMP developed a framework to link specific objectives and strategies identified in the IMP subbasin management plans to a suite of M&E protocols and existing programs (an M&E "tool box"). To do this the subcommittee identified a broad list of existing M&E protocols and existing M&E program, which represent: peer reviewed, scientifically validated approaches to M&E; are appropriate to a range of geographic scales; and include the range of the Independent Science Review Panel's (ISRP) three tiers of RM&E. Specific M&E objectives and strategies from each of The Subbasin management plans, and from the province level, were then linked in Table 19.1 to:

    - The type of generic approach to addressing limiting factors that is addressed by the strategy or objective (same list used to categorize the inventory of projects)
    - The type of M&E protocol that would be most appropriate
    - Which ISRP M&E tier level of RM&E would be appropriate
    - Which of the "tool box" tools would be used.

The complete tool box bibliography is found in Appendix I. More detailed information on the process for developing the RM&E plan is found in Section 2.

Table 19.1. Pend Oreille Subbasin aquatic research, monitoring, and evaluation plan

AQUATIC					
Strategy & Objective	**Strategy Type[1]**	**Monitoring Type[2]**	**Tier[3]**	**Scale[4]**	**Tool Box Tool[5]**
Columbia River Basin Level Goal 1A: Complete assessments of resident fish losses throughout the basin resulting from the hydrosystem, expressed in terms of the various critical population characteristics of key resident fish species.	1,2,5,6,9,10			1, 2, 3	1, 3, 4, 6, 8, 11, 12, 14, 17, 22, 26, 28
Subbasin Objective 1A: Assess and mitigate fisheries effects due to construction and operation of federal and federally licensed hydropower projects, including a resident fish loss assessment.	1,2,5,6,9,10			1, 2, 3	1, 3, 4, 6, 8, 11, 12, 14, 17, 22, 26, 28
Subbasin Objective 1A1: By 2010, quantitatively evaluate the impacts of hydropower facility construction and operation on water level fluctuation in Lake Pend Oreille, and other waterbodies in the Subbasin, including effects on near-shore productivity.	1,2,6,9,10	survey, survey and mapping	1,3	1	3,13, 23,
Columbia River Basin Level Goal 1B: Maintain and restore healthy ecosystems and watersheds, which preserve functional links among ecosystem elements to ensure the continued persistence, health and diversity of all species including game fish species, non-game fish species, and other organisms. Protect and expand habitat and ecosystem functions as the means to significantly increase the abundance, productivity, and life history diversity of resident fish at least to the extent that they have been affected by the development and operation of the hydrosystem.	all	all	all	all	all
Province Level Objective 1B: Protect and restore instream and riparian habitat to maintain functional ecosystems for resident fish, including addressing the chemical, biological, and physical factors influencing aquatic productivity.	1,3,4, 5,6,10	all	1,2	1,2,3	1, 2,3, 4, 6, 9, 10, 11, 14, 15, 17, 19, 20, 21, 22,
Subbasin Objective 1B2: Improve water quality to meet or exceed applicable water quality standards in the Subbasin.					
Strategy c: Identify pollution sources, causes, and constituents on tributaries and mainstem Pend Oreille River; determine and implement actions necessary to eliminate or mitigate effects.	1,3,5,6,10	TMDL	1	1,2	17,20,

AQUATIC					
Strategy & Objective	**Strategy Type[1]**	**Monitoring Type[2]**	**Tier[3]**	**Scale[4]**	**Tool Box Tool[5]**
Proposed Strategy e: Continue monitoring the water quality of Lake Pend Oreille, Clark Fork River and Pend Oreille River to insure it meets State and Federal standards.	1,3,5,6,10	TMDL	1	1	17,20
Subbasin Objective 1B3: Conduct watershed assessments in drainages where sediment transport/bed load issues are negatively impacting resident fish habitat by 2008.	1,2,5,6,7	Holistic ecosystem monitoring (i.e., All)			1, 3, 4, 5, 6, 9, 10, 11, 12, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 36, 37
Strategy a: Conduct watershed assessment to determine sedimentation sources (i.e., natural or human caused) that are negatively impacting fish habitat.	1,2,5,6,7	Holistic ecosystem monitoring (i.e., All)			1, 3, 4, 5, 6, 9, 10, 11, 12, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 36, 37
Subbasin Objective 1B4: Develop, prioritize, and implement projects to remove or reduce sediment sources negatively influencing fish habitat, using a coordinated watershed approach with a broad coalition of partners.					1, 4, 5, 6, 9, 10, 14, 15, 16, 17, 18, 19, 20, 21, 23, 25, 26, 28
Strategy b: Research and identify methods of sediment reduction, removal and/or disposal of bedload and sediment from stream reaches; implement sediment reduction methodologies on prioritized streams.	1,2,5,6,7	Population, Habitat Surveys	1, 2, 3	1, 2, 3	1, 4, 5, 6, 9, 10 . . .
Strategy a: Map available spawning and rearing tributaries and pursue stream protection measures.	1,2,5	Mapping, Habitat Surveys	1, 2, 3	1, 2, 3	1, 4, 5, 6, 9, 10 . . .
Strategy c: Develop entire drainage restoration plans to improve fish habitat.	1,2,3,4,5,6,8	Mapping, Population/Habitat Surveys,	2	1, 2, 3, 4	4, 5, 6, 11, 12, 14, 15, 16, 17, 18, 19, 20, 21, 25, 26, 27, 28

AQUATIC					
Strategy & Objective	**Strategy Type[1]**	**Monitoring Type[2]**	**Tier[3]**	**Scale[4]**	**Tool Box Tool[5]**
Subbasin Objective 1B6: Maintain 1.7 million square feet of clean shoreline gravel areas for kokanee spawning in Lake Pend Oreille throughout the duration of this plan. Note: Any studies should include evaluation of effects of proposed actions on flood control capability relative to current hydropower facility operations.	1,2,6,10	survey, survey and mapping	1,2,3	1	3,13,21,
Strategy c: Monitor shoreline gravel areas for quality (as shoreline spawning areas). Vary lake levels between years, if necessary, to insure cleaning and re-sorting occurs.	1,2,6,10	survey, survey and mapping	1,2,3,	1	3,13,21,
Proposed strategy e: Evaluate the impact on near shore productivity from barge hydrojets to clean kokanee gravel spawning beds.	1,5,10				
Subbasin Objective 1B9: Control the spread (allow 0 acres) of Eurasian Watermilfoil in the Subbasin.	1,5,10	survey and mapping	1	1,2,	new tool
Strategy a: Inventory and map locations of milfoil occurrence.	1,5,10	survey and mapping	1	1,2,	45
Strategy b: Evaluate the impact of extended dewatering and exposure to freezing temperatures on milfoil shoots.	1,5,10	survey and mapping	1	1,2,	45
Columbia River Basin Level Goal 1C: Restore resident fish species (subspecies, stocks and populations) to near historic abundance throughout their historic ranges where suitable habitat conditions exist and/or where habitats can be restored.					
Province Level Objective 1C: Meet and exceed the recovery plan goals for federally listed threatened and endangered fish species.					
Proposed strategy b: Continue research into limiting factors of the kokanee and bull trout populations.	1,2,4,5,9,10	Presence absence and trend survey	1,2,3,	1,2,3	3,4,6,13,20,21,22,
Subbasin Objective 1C2: Research the effects of lake trout competition on bull trout and cutthroat trout in Priest Lake by 2015; implement corrective measures in accordance with recovery/restoration objectives.	2,9	Survey	1,2	1	new tool

AQUATIC					
Strategy & Objective	**Strategy Type[1]**	**Monitoring Type[2]**	**Tier[3]**	**Scale[4]**	**Tool Box Tool[5]**
Proposed Strategy a: Significantly reduce lake trout predation on other species using such approaches as liberal harvest limits, large commercial trapnets, or changing the age structure of the population.	2,8,9	survey	3	1	
Subbasin Objective 1C3: In Lake Pend Oreille reduce competition and predation by lake trout on bull and cutthroat trout by reducing lake trout abundance to <4000 adults, if feasible, by year **2015**.					
Proposed Strategy a: Determine the number of lake trout in Lake Pend Oreille and their bioenergetic food demands.	2,9	Presence absence and trend survey	3	1	
Proposed strategy b: Evaluate the use of large commercial trap nets and hydroacoustics for making population estimates.	2,9	2	survey	2	46
Proposed strategy c: If lake trout abundance or population structure is resulting in unacceptable predation or other risks to native and desirable nonnative fish, research methods to reduce the energetic demand or competitive impact of the lake trout population.	9	survey	3	1	
Subbasin Objective 1C4: Remove 90% or more of the lake trout from Upper Priest Lake and prevent re-establishment through the Thorofare.		Population			
Proposed strategy c: Monitor the effectiveness of these actions and develop new approaches if needed.	2,9	Population, Habitat Surveys	1, 3	1, 2, 3	1, 3, 4, 5, 6, 8, 12, 17, 18, 22, 36, 37
Subbasin Objective 1C5: Restore bull trout to a harvestable surplus in the Subbasin by 2030. Targets: Lake Pend Oreille: capable of providing 1,000 fish annually based on historic harvest rates of the 1960s through 1980s. Pend Oreille River: to be determined. Priest Lake: to be determined.					
Proposed strategy c: Determine the harvestable surplus of bull trout stocks.	2				

AQUATIC					
Strategy & Objective	**Strategy Type[1]**	**Monitoring Type[2]**	**Tier[3]**	**Scale[4]**	**Tool Box Tool[5]**
Proposed strategy e: Research the habitat used by bull trout in Lake Pend Oreille and Priest Lake to determine overlap with lake trout.	1,2,5				
Proposed strategy g: Conduct research on bull trout population to determine factors limiting their population.	1,2,3,4,5,6,7,10				
Proposed strategy h: Evaluate fish passage for Priest Lake Dam, Boundary Dam, Albeni Falls Dam, Box Canyon Dam, Cabinet Gorge Dam, Noxon Dam and Thompson Falls Dam.	2,4,				
Proposed strategy i: Study to see if the bull trout are utilizing the larger than anticipated lake whitefish population in Lake Pend Oreille.	1	survey	2	1	0
Subbasin Objective 1C7: Investigate the feasibility, cost benefit, and biological effects of fish passage at Albeni, Box Canyon and Boundary dams.					
Subbasin Objective 1C8: Conduct a study to determine the economic impact of inundating 26 miles of the Pend Oreille River above Albeni Falls Dam and the lower 2 miles of the Clark Fork River.					
Proposed strategy a: Determine the positive and negative economic impacts that occurred as a result of inundating 26 miles of the Pend Oreille River above Albeni Falls Dam and the lower 2 miles of the Clark Fork River.	10	survey	2	1	
Province Level Objective 1D: Restore resident fish species (subspecies, stocks and populations) to near historic abundance throughout their historic ranges where suitable habitat conditions exist and/or where habitats can be restored					
Subbasin Objective 1D2: Manage nonnative fish to maximize use of available habitats to provide a subsistence and sport fishing resource, without adversely affecting native fish populations.					

AQUATIC					
Strategy & Objective	**Strategy Type[1]**	**Monitoring Type[2]**	**Tier[3]**	**Scale[4]**	**Tool Box Tool[5]**
Proposed Strategy b: Research the effectiveness of hatchery kokanee stocking and potential impacts between wild and hatchery fish.	2, 9	survey	2	1	13, 46
Proposed Strategy c: Develop methods and annually monitor predator and prey biomasses in Lake Pend Oreille.	2,9	survey	2	1	Maiolie et al. 2002
Subbasin Objective 1D3: By 2020 restore kokanee populations in Lake Pend Oreille to allow sustainable harvest of 750,000 fish/year, as long as this activity does not adversely impact native fish.	1,2,10	survey	1,2,3,	1	3,new
Proposed Strategy a: Continue to vary the winter lake level so as to increase the amount, and quality of, spawning gravel on the shores of Lake Pend Oreille.	1,2,6,9,10	survey and mapping	1,2,3	1	3, 46
Proposed Strategy b: Monitor shoreline spawning substrate to determine benefits.	1,6,10	survey	1,2,3,	1	3, 46
Proposed Strategy c: Monitor kokanee abundance in Lake Pend Oreille, through hydroacoustics and trawling, to determine response to lake level changes. Finally, adjust lake levels based on the annual monitoring.	1,2,6,10	survey	1,2,3,	1	3, 46
Proposed Strategy d: Research factors that may influence lake productivity, such as the effect of the altered hydrologic cycle of the lake (i.e., no slowly receding shoreline allowing annual growth of wetland vegetation down to typical low pool) and take corrective actions. Evaluate the impacts of controlling LPO level to more “natural” curves.	1,6	survey and mapping	2,3	1	
Proposed Strategy e: Determine the ecological role of lake whitefish in limiting Mysis shrimp abundance (their primary food) and potential benefits to zooplankton.	2,9	survey	2	1	

AQUATIC					
Strategy & Objective	**Strategy Type[1]**	**Monitoring Type[2]**	**Tier[3]**	**Scale[4]**	**Tool Box Tool[5]**
Proposed Strategy f: Develop methods to monitor predator abundance and balance predator and kokanee populations.	2,9	survey	1,2,3	1	46
Proposed Strategy g: Reduce the amount of dissolved gases that come down the Clark Fork River to within State water quality standards.	5,10	TMDL	1	1, 2	?
Proposed Strategy h: Research the effectiveness of hatchery kokanee stocking and potential impacts between wild and hatchery fish.	2,9	survey	2	1	46
Proposed strategy i: Fully utilize hydrojets on barges to clean gravel-spawning beds. Treat new gravel beds at lower lake elevations.	?				
Proposed strategy k: Determine the cause of shoreline sedimentation and erosion that is placing sediments on the kokanee gravels	?				
Subbasin Objective 1D4: By 2010 balance predator (lake trout, rainbow trout, bull trout)/prey (kokanee) populations in Lake Pend Oreille (1:10 biomass ratio).					
Proposed Strategy a: Develop methods and annually monitor predator and prey biomasses. Based on monitoring, recommend fishing regulation changes or active predator reduction methods to restore predator**:**prey balance if needed.	2	survey	1	1	46
Subbasin Objective 1D5: Improve the stocking program for kokanee in Lake Pend Oreille so that it contributes 375,000 kokanee to the harvest annually.					
Proposed Strategy a: Research why hatchery kokanee have not contributed more to the recovery of the fishery in Lake Pend Oreille. To determine this, monitor the survival of each age classes of hatchery kokanee and compare to wild survival rates. Then based on these findings, develop fish culture techniques that will improve kokanee survival.	2,9	survey	2	1	46

AQUATIC					
Strategy & Objective	**Strategy Type[1]**	**Monitoring Type[2]**	**Tier[3]**	**Scale[4]**	**Tool Box Tool[5]**
Subbasin Objective 1D6: As prey base improves in Lake Pend Oreille, restore the rainbow trout fishery to a sustainable harvest of >4,000 fish/year.					
Proposed Strategy a: Use appropriate management tools to restore Gerrard rainbow trout to numbers consistent with what can be supported by the prey base.	9	survey	1	1	46
Proposed strategy b: Model rainbow trout population and test regulation changes designed to improve the quality of the sport fishery.	2,9	survey	1	1	
Subbasin Objective 1D7: By 2010, gain a better understanding of the kokanee food habits, potential competition with Mysis shrimp, and the ecological role of lake whitefish in reducing shrimp abundance.					
Proposed Strategy a: Conduct study to better understand kokanee food habits, particularly with regard to Mysis shrimp and the ecological role of lake whitefish in reducing shrimp abundance. This should include estimating the abundance of lake whitefish by mark and recapture or hydroacoustic surveys. Then, quantify lake whitefish food habits and potential consumption of Mysis shrimp.	2	survey			
Proposed Strategy b: Determine if kokanee growth is impacted by shrimp. This could be examined by comparing the over-winter growth of kokanee in Lake Pend Oreille to grow rates and survival rates of kokanee in Priest Lake, Coeur d'Alene Lake and/or Spirit Lake, since these systems do not have Mysis shrimp.	2,9	survey	3	1	3,13,
Subbasin Objective 2A4: Enhance the native westslope cutthroat trout population so that it can sustain a sport fishery in the Pend Oreille River and its tributaries by 2020.					

AQUATIC					
Strategy & Objective	**Strategy Type[1]**	**Monitoring Type[2]**	**Tier[3]**	**Scale[4]**	**Tool Box Tool[5]**
Proposed strategy a: Determine the status of cutthroat trout in Pend Oreille River.		Population, Habitat Surveys	1, 2, 3	1, 2, 3	1, 4, 5, 6, 9, 10 . . .
Proposed strategy b: Define westslope cutthroat genetic purity and prospects for recovery.		Mapping, Population/Habitat Surveys, Genetics	2, 3	1, 2, 3, 4	1, 4, 5, 6, 7, 8, 12, 14, 15, 16, 17, 18, 19, 20, 21, 23, 24, 25, 26, 27, 28
Proposed strategy c: Determine westslope cutthroat limiting factors in the environment.		Mapping, Population/Habitat Surveys, Genetics	2, 3	1, 2, 3, 4	1, 4, 5, 6, 7, 8, 12, 14, 15, 16, 17, 18, 19, 20, 21, 23, 24, 25, 26, 27, 28
Proposed strategy d: Identify key westslope cutthroat trout tributary habitat and develop a plan for protection and restoration.		Mapping, Population/Habitat Surveys,	1, 2, 3	1, 2, 3	1, 4, 5, 6, 9, 10, 14, 15, 16, 17, 18, 19, 20, 21, 23, 25, 26, 28

[1] ***Strategy types:***

1) Habitat Assessments
2) Population Assessments
3) Instream Diversion
4) Instream Passage
5) Instream Habitat
6) Riparian Habitat
7) Upland Habitat
8) Education/Coordination
9) Population Management
10) Reservoir Operations

[2] ***Monitoring Protocol (e.g., type of monitoring protocol [note: the specific reference to detailed monitoring protocol is identified in the "tool box"]):***

- TMDL
- Survey
- Survey and mapping

- HEP
- P/A and trend surveys
- All habitat

[3]***ISRP Tier Level:***

1) Tier 1: trend or routine monitoring
2) Tier 2: statistical (status) monitoring
3) Tier 3: experimental research (effectiveness) monitoring

[4]***Scale of Monitoring and Evaluation:***

1) Project
2) Subbasin
3) Province
4) Columbia Basin

[5]***Tool Box Tool***

The Tool Box is found in Appendix I.

Table 19.2. Pend Oreille Subbasin terrestrial research, monitoring, and evaluation plan

TERRESTRIAL					
Strategy & Objective	**Strategy Type[1]**	**Monitoring Type[2]**	**Tier[3]**	**Scale[4]**	**Tool Box-tool[5]**
Pend Oreille Subbasin Objective 1A (Highest Priority): Fully mitigate wildlife habitat losses associated with the construction and inundation of the Albeni Falls Project per the requirements of the NWPPC 2000 Fish and Wildlife Program and Northwest Power Act. Complete the compensation mitigation consistent with the HEP loss assessment (Appendix C, Table 11-4 of the Columbia River Basin 2000 Fish and Wildlife Program) and the Albeni Falls Dam Wildlife Mitigation Project Operating Guidelines by year 2015. (These requirements will be met in coordination with the Coeur d'Alene and Kootenai Subbasins.)					
Objective 1A.1: Protect, enhance, or restore bald eagle breeding Habitat Units to address coniferous and deciduous forest and forested wetland habitat losses resulting from construction of Albeni Falls Project.					
Objective 1A.2: Protect, enhance, or restore bald eagle wintering Habitat Units to address coniferous and deciduous forest habitat losses resulting from construction of Albeni Falls Project.					
Objective 1A.3: Protect, enhance, or restore black-capped chickadee Habitat Units to address deciduous forest habitat losses resulting from construction of Albeni Falls Project.					

TERRESTRIAL					
Strategy & Objective	**Strategy Type[1]**	**Monitoring Type[2]**	**Tier[3]**	**Scale[4]**	**Tool Box-tool[5]**
Objective 1A.4: Protect, enhance, or restore Canada goose Habitat Units to address floodplain meadow, shoreline, open water and herbaceous wetland habitat losses resulting from construction of Albeni Falls Project.					
Objective 1A.5: Protect, enhance, or restore mallard Habitat Units to address floodplain meadow, scrub-shrub, open water, and herbaceous wetland habitat losses resulting from construction of Albeni Falls Project.					
Objective 1A.6: Protect, enhance, or restore muskrat Habitat Units to address herbaceous wetland and open water habitat losses resulting from construction of Albeni Falls Project.					
Objective 1A.7: Protect, enhance, or restore white-tailed deer Habitat Units to address scrub-shrub wetland habitat losses resulting from construction of Albeni Falls Project.					
Objective 1A.8: Protect, enhance, or restore redhead Habitat Units to address open water and near-shore floating aquatic weed bed habitat losses resulting from construction of Albeni Falls project.					
Strategy a (**for Objectives 1A.1-1A.8) (Priority 1):** Identify and Protect habitat through fee title acquisition, conservation easements, lease, or management agreements. NPPC defines protection as any action that protects habitat in perpetuity.	1,2,6,7,9	Population/Habitat Surveys,	1,2	1,2	32,33,34,52
Strategy b (for Objectives 1A.1-1A.8)* (Priority 3): Develop management plans consistent with Columbia Basin Fish and Wildlife Authority (CBFWA) Guidelines for Enhancement, Operation, and Maitenance Activities for Wildlife Mitigation Projects (CBFWA Wildlife Managers 1998). Management plans will address roaded and non-roaded access, livestock, habitat connectivity (to other lands managed for wildlife), soil, vegetation enhancement and management of unwanted species, fire and fuels, non-native wildlife, and monitoring.	1,2,6,7,9	Population/Habitat Surveys,	1,2	1,2	32,33,34,52

TERRESTRIAL					
Strategy & Objective	**Strategy Type[1]**	**Monitoring Type[2]**	**Tier[3]**	**Scale[4]**	**Tool Box-tool[5]**
Strategy c (**for Objectives 1A.1-1A.8)* (Priority 4):** Identify and evaluate sites for potential use in mitigation, including a) opportunities for enhancement and restoration on federal, state, and tribal lands, and b) opportunities for cooperative restoration and enhancement efforts with private landowners, when habitat protections can be demonstrated to be permanent.	1,2,6,7,9	Population/Habitat Surveys,	1,2	1,2	32,33,34,52
Objective 1A.9: Maintain wildlife habitat values (Habitat Units) for the life of the project on existing and newly acquired mitigation lands through adequate long-term Operations and Maintenance (O&M) funding.			1,2	1,2	
Strategy a (Priority 2): Ensure long-term protection, enhancement, and monitoring of habitat units through secured funding for Operations and Maintenance.	1,2,6,7,9	Population/Habitat Surveys,	1,2	1,2	32,33,34,52
Province Level Objective 1B*: Quantitatively assess and mitigate **operational impacts** of the Chief Joseph, Grand Coulee Dam, and Albeni Falls projects per the requirements of the Northwest Power Act and the current Wildlife Mitigation Program. Complete assessment of operational impacts by **2008**; develop mitigation plan by **2010**; implement initial mitigation by **2015**; incorporate formal methods for review and update of effects assessment and mitigation plan on a three-year cycle, to respond to changes in operation and to effectiveness of mitigation actions.					
Pend Oreille Subbasin Objective 1B *: Quantitatively assess and mitigate operational impacts of Albeni Falls Project on terrestrial resources in the Pend Oreille Subbasin by year 2015.					
Objective 1B.1(Second Priority) *: Complete the assessment of operational effects on terrestrial resources by year 2008.					
Strategy a (Priority 1)*: Conduct the assessment and consider the fluctuation zone, hydrologic alterations (based on current hydropower facility operations), loss of nutrients in watershed from loss of salmon, identify recreational effects to terrestrial resources, BPA transmission lines, habitat connectivity, and erosion.	1,10	Mapping, Population/Habitat Surveys,	2,3	1,2	32,33,34,35

TERRESTRIAL					
Strategy & Objective	**Strategy Type[1]**	**Monitoring Type[2]**	**Tier[3]**	**Scale[4]**	**Tool Box-tool[5]**
Objective 1B.2 (Third Priority): Complete development of mitigation plan by year 2010 and complete the implementation of initial mitigation by year 2015.					
Objective 1B.3 (Fourth Priority)*: Perform review and update of effects assessment and mitigation plan on a three-year cycle, to respond to changes in operation and to effectiveness of mitigation actions.					
Province Level Objective 2A: Mitigate for wildlife losses that have occurred through **secondary effects** of hydrosystem development by protecting, enhancing, restoring, and sustaining **populations of wildlife** for aesthetic, cultural, ecological, and recreational values. Objective includes assessment of secondary impacts, development of mitigation plan in coordination with other resources and resource managers, implementation, maintenance, and monitoring.					
Province Level Objective 2B*: Mitigate for wildlife losses that have occurred through **secondary effects** of hydrosystem development by protecting, enhancing, restoring, and sustaining **native wildlife habitat** function to maintain or enhance ecological diversity and security for native and desirable non-native wildlife species. Objective includes assessment of secondary impacts, development of mitigation plan in coordination with other resources and resource managers, implementation, maintenance, and monitoring.					
Objective 2B.2*: Identify, maintain, restore, and enhance priority habitats (wetlands, riparian areas, upland forests, steppe and shrub-steppe, cliffs and rock outcrops) within the Pend Oreille Subbasin, including their structural attributes, ecological functions, and distribution and connectivity across the landscape.					
Objective 2B.1: Fully mitigate for all FERC hydropower terrestrial resources effects within the Pend Oreille Subbasin in-kind and in-place when possible. Complete all mitigation requirements consistent with approved and active guidelines, agreements, and applicable federal (FERC) licenses					
Strategy a: Acquire land management rights to identified native wildlife habitats of concern through fee title acquisition, lease, conservation easement, or management plan.	1,2,6,7,9	Population/Habitat Surveys,	1,2	1,2	32,33,34,35, 52

TERRESTRIAL					
Strategy & Objective	**Strategy Type[1]**	**Monitoring Type[2]**	**Tier[3]**	**Scale[4]**	**Tool Box-tool[5]**
Strategy b: Develop management plans to enhance and/or restore native habitats. Management plans should address roaded and non-roaded access, livestock, non-native plant and animal species; soils, and vegetation management activities to improve habitat quality.	1,2,6,7,9	Population/Habitat Surveys,	1,2	1,2	32,33,34,35, 52
Strategy c: Implement management plans and conduct implementation and effectiveness monitoring to ensure that objectives are being met.	1,2,6,7,9	Population/Habitat Surveys,	1,2	1,2	32,33,34,35, 52
Strategy d: Improve enforcement of existing state and tribal hunting regulations and modify regulations where needed to improve success of achieving wildlife management objectives.	1,2,6,7,9	Population/Habitat Surveys,	1,2	1,2	32,33,34,35, 52
Objective 2A.2: Maintain bald eagle populations at or above present levels (2004) within the Pend Oreille Subbasin.					
Strategy a: Identify, map, and provide long-term protection to current and/or potential winter perching, nesting, and foraging habitat.	1,2,6,7,9	Population/Habitat Surveys,	2,3	1,2	32,33,34,35, 52
Objective 2A.3: Restore a self-sustaining population of grizzly bears in the Selkirk Recovery Zone that meets the *Grizzly Bear Recovery Plan* goals (USFWS objective)					
Objective 2A.6: Protect, restore, enhance, and sustain populations of big game species such as black bear, elk, mountain goat, moose mountain lion, mule deer, and white-tailed deer.					
Objective 2B.3: Reverse long-term mule deer population decline by providing for a 25-year increasing trend in the quantity and quality of mule deer habitats, particularly winter and spring habitats.					
Strategy a: Secure and enhance winter and spring ranges; protect from human development.	6,7,9	Population/Habitat Surveys,	1,2	1,2,3	32,33,34,35
Strategy e: Manage motorized traffic in critical mule deer spring and winter ranges.	6,7,9	Population/Habitat Surveys,	1	1,2,3	32,33,34,35

TERRESTRIAL					
Strategy & Objective	**Strategy Type[1]**	**Monitoring Type[2]**	**Tier[3]**	**Scale[4]**	**Tool Box-tool[5]**
Strategy b: Manage forests for a variety of successional stages to meet mule deer habitat needs on a site-specific basis; use fire and forest management to increase quality and quantity of shrubs and mature forest cover.	6,7,9	Population/Habitat Surveys,	1,2	1,2,3	32,33,34,35
Strategy d: Increase the area of aspen stands	6,7,9	Population/Habitat Surveys,	1,2	1,2,3	32,33,34,35
Strategy i: Modify state and tribal hunting regulations to help increase mule deer populations.	9	Population/Habitat Surveys,	1	1,2,3	32,33,34,35
Strategy c: Restore grasses and forbs where noxious weeds have impacted mule deer habitat.	6,7,9	Population/Habitat Surveys,	1,2	1,2,3	32,33,34,35
Strategy g: Develop, prioritize, and implement projects and/or research to address identified limiting factors for mule deer.	6,7,9	Population/Habitat Surveys,	1,2	1,2,3	32,33,34,35
Strategy h: Improve enforcement of state and tribal hunting regulations.	6,7,9	Population/Habitat Surveys,	1	1,2,3	32,33,34,35
Strategy f*: Continue funding to complete WDFW cooperative Mule Deer Project	6,7,9	Population/Habitat Surveys,	2,3	1,2,3	32,33,34,35
Objective 2A.7: Protect, restore, enhance, and sustain populations of waterfowl, upland game, and furbearers under traditional levels of recreational and subsistence use.					
Objective 2A.10: Maintain or enhance amphibian and reptile populations relative to current levels within present use areas and identify limiting factors within the subbasin.					
Objective 2A.8: Maintain or enhance neo-tropical migrant bird populations relative to current levels within present use areas and identify limiting factors for these populations within the Pend Oreille subbasin.					
Objective 2A.11: Maintain or enhance invertebrate populations relative to current levels within present use areas and identify limiting factors for these populations within the subbasin.					

TERRESTRIAL					
Strategy & Objective	**Strategy Type[1]**	**Monitoring Type[2]**	**Tier[3]**	**Scale[4]**	**Tool Box-tool[5]**
Objective 2A.1: Increase the Selkirk woodland caribou herd to 75 animals or more by 2010, with the intent to meet ESA de-listing criteria by 2020.					
Objective 2A.4*: Identify, prioritize, and implement habitat improvements that address limiting factors in order to restore or maintain viable lynx populations in the Pend Oreille Subbasin.					
Objective 2A.5: Restore and sustain state threatened and endangered species, tribal and state species of special concern, federal candidate species, BLM and USFS sensitive species, and USFS indicator species					
Objective 2A.9: Maintain or enhance populations of cavity nesting species relative to current levels within present use areas and identify limiting factors within the subbasin.					
Strategy b (for Objectives 2A.1-11)*: Identify limiting factors for species/guilds, and identify relationships to indicator species/habitats analyzed in HEP loss assessments.	1,2	Population/Habitat Surveys,	1,2	1,2	32,33,34,35, 52
Strategy a (for Objectives 2A.1-11)*: Use current Subbasin Plan Assessment to determine current distribution and population status of species/guild and define target species/guilds; supplement with additional inventory as needed.	1,2	Population/Habitat Surveys,	1,2	1,2	32,33,34,35, 52
Strategy c (for Objectives 2A.1-11): Develop and implement mitigation to address limiting factors for species/guilds, with consideration of benefits that can be acquired through acquisition of HUs for indicator species/habitats used in HEP loss assessments.	1,2	Population/Habitat Surveys,	1,2	1,2	32,33,34,35, 52
Objective 2B.4*: Identify and implement strategies and opportunities for restoring the diversity, block size, and spatial arrangement of habitat types needed to sustain target wildlife species at ecologically sound levels.					

TERRESTRIAL					
Strategy & Objective	**Strategy Type[1]**	**Monitoring Type[2]**	**Tier[3]**	**Scale[4]**	**Tool Box-tool[5]**
Objective 2B.5: Restore the connectivity of habitat types needed to sustain wildlife populations at the landscape level. Encourage and support the implementation of all forest practices, including road building and maintenance, as specified in the WDNR and IDL Forest Practices Rules and Subbasin Forest Plans for all National Forests within the Subbasin.					

[1] ***Strategy types:***

1) Habitat Assessments
2) Population Assessments
3) Instream Diversion
4) Instream Passage
5) Instream Habitat
6) Riparian Habitat
7) Upland Habitat
8) Education/Coordination
9) Population Management
10) Reservoir Operations

[2]***Monitoring Protocol e.g. type of monitoring protocol [note: the specific reference to detailed monitoring protocal is identified in the "tool box"]):***

a. TMDL
b. Survey
c. Survey and mapping
d. HEP
e. P/A and trend surveys
f. All habitat

[3]***ISRP Tier Level:***

1) Tier 1: trend or routine monitoring
2) Tier 2: statistical (status) monitoring
3) Tier 3: experimental research (effectiveness) monitoring

[4]***Scale of Monitoring and Evaluation:***

1) Project
2) Subbasin
3) Province
4) Columbia Basin

[5] **Tool Box Tool**

The Tool Box is found in Appendix I.