

## **SECTION 51 – Table of Contents**

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## 51 Lake Rufus Woods Research, Monitoring and Evaluation Plan

In light of the various ongoing efforts to develop a regional monitoring plan, subbasin planners the Intermountain Province (IMP) have 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, planners in 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 a subcommittee of the OC identified a broad list of existing M&E protocols and existing M&E programs, which represent: peer reviewed, scientifically validated approaches to M&E; are appropriate to 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 51.1 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 51.1. Rufus Woods Subbasin research, monitoring, and evaluation plan

AQUATIC					
Strategy & Objective	Strategy Type <sup>1</sup>	Monitoring Type <sup>2</sup>	Tier <sup>3</sup>	Scale <sup>4</sup>	Tool Box Tool <sup>5</sup>
<b>Subbasin Objective 1A2:</b> Determine baseline data on relative abundance, condition, size structure, growth, distribution, and species composition for all fish that inhabit the Lake Rufus Woods Subbasin.	2,8,9,10		1,2 and 3	1,2,3,4	1,2,3,4,8,12,13,17,24,28
<b>Subbasin Objective 1B2:</b> Inventory and prioritize all passage barriers within the Lake Rufus Woods Subbasin	1,2,3,4,5,6,9,10		2?	1,2,3,4	1,4,5,6,9,10....
<b>Subbasin Objective 1B6: strategy d:</b> Develop Minimum-flows for all fish-bearing streams within the Rufus Woods Subbasin that meet the needs of focal species were present.	1,2,3,4,5,9,10			1,2,3	1,4,5,6,9,10,14,15,16,18,19,20,21,23,25,26,28
<b>Subbasin Objective 2A1: strategy a:</b> Determine and map the genetic and geographic distribution of all focal species.	1,2,3,4,5,6,8,9,10			1,2,3,4	4,5,6,7,8,12,14,15,16,17,18,19,20,21,23,24,25,26,27,28
<b>Subbasin Objective 1B1:</b> Identify limiting factors and management strategies specifically designed to enhance physical habitats for salmonids.	All	All		1,2,3,4	All
<b>Subbasin Objective 2B1:</b> Determine the appropriateness, economic, and ecological impacts of Walleye on salmonid populations in Lake Rufus Woods.	2,8,9			1,2,3,4	1,4,5,6,9,10....
<b>Subbasin Objective 2C1:</b> Study potential methods of adult reintroductions for anadromous Chinook and steelhead above Chief Joseph Dam and providing downstream passage for smolts.	All	All habitat		1,2,3,4	Basic Research
<b>Subbasin Objective 1B1:</b> Develop EMAP sites for water quality, focal species production, habitat quality, and habitat quantity data needed to determine progress toward objectives in the San Poil Watershed. (65 sites)	All			1,2,3,4	6,10,14,16,26,28
<b>Subbasin Objective 1B7:</b> Continuously monitor water quality (flow, temperature, etc.) at all selected EMAP sites (5 sites annually, 15 sites every fourth year).	All			1,2,3,4	6,10,14,16,26,28

AQUATIC					
Strategy & Objective	Strategy Type <sup>1</sup>	Monitoring Type <sup>2</sup>	Tier <sup>3</sup>	Scale <sup>4</sup>	Tool Box Tool <sup>5</sup>
<b>Subbasin Objective 1B5:</b> Develop baseline width-to-depth ratios for at all selected EMAP sites (5 sites annually, 15 sites every fourth year).	1,5			1,2,3,4	6,10,14,16,26,28
<b>Subbasin Objective 1B3:</b> Develop GIS layer of historic riparian habitats	1,6			1,2,3,4	1,2,4,5,6,7,9,10,11,12,14,15,16,17,18,21,25,26,28
<b>Subbasin Objective 1B3:</b> Survey and monitor existing riparian habitats to determine the percent of remaining functional riparian areas compared to historic at all selected EMAP sites (5 sites annually, 15 sites every fourth year).	1,6			1,2,3,4	1,2,4,5,6,7,9,10,11,12,14,15,16,17,18,21,25,26,28
<b>Subbasin Objective 1B4:</b> Determine stream embeddedness at all selected EMAP sites (5 sites annually, 15 sites every fourth year).	1,5			1,2,3,4	1,2,4,5,6,7,9,10,11,12,14,15,16,17,18,21,25,26,28
<b>Subbasin Objective 2A2:</b> Conduct annual creel surveys at Lake Rufus Woods and along the Nespelem River to estimate harvest rates of focal species.	2,9			1,2,3,4	3,4,5,6,8,12,17,24
<b>Subbasin Objective 2A4:</b> Estimate annual adult returns of kokanee salmon to the Nespelem River	2,4,8,9,10			1,2,3,4	3,4,5,6,8,12,17,24
<b>Subbasin Objective 2B2:</b> Report species, stocks, size, return-to-creel and locations of all artificial production planted into waters contained within the Lake Rufus Woods subbasin.	9			1,2,3,4	3,4,5,6,8,12,17,24
<b>Subbasin Objective 1C2:</b> Develop a database to store all monitoring, evaluation, and research data throughout the intermountain province and make data available by the internet for all managers.	All			1,2,3,4	12
<b>Subbasin Objective 1A1:</b> Monitor all entrainment into and out of Lake Rufus woods for all focal species.	1,7,10			1,2,3,4	3,5,8,13,17,22,23,28
<b>Subbasin Objective 2C2:</b> Identify adult and juvenile annual habitat utilization for all focal species.	All			1,2,3,4	1,2,4,5,6,7,9,10,11,12,14,15,16,17,18,21,25,26,28

AQUATIC					
Strategy & Objective	Strategy Type <sup>1</sup>	Monitoring Type <sup>2</sup>	Tier <sup>3</sup>	Scale <sup>4</sup>	Tool Box Tool <sup>5</sup>
<b>Subbasin Objective 2B2:</b> Monitor all upland lakes that receive hatchery production for return to creel, age and growth, species composition, natural reproduction, and habitat suitability once every 10-years and adjust management or stocking rates accordingly.	1,2,8,9			1,2,3,4	4,8,12,22,24
<b>Subbasin Objective 2A3:</b> Determine natural production and recruitment for all focal species at Lake Rufus Woods.	2,8,9,10			1,2,3,4	3,5,8,12,13,17,24,28
<b>Subbasin Objective 2A2:</b> Compare cost and return rates for net pen and hatchery-reared trout stocked into Lake Rufus woods at several different sizes.	9			1,2,3,4	Basic Research
<b>Subbasin Objective 1B1:</b> Collect data necessary to conduct an EDT analysis for all tributary streams for all focal species.	1,3,4,5,8			1,2,3,4	See Mobrاند Biometrics
<b>Subbasin Objective 2C2:</b> Research and develop food-web models and energy flow diagrams for Lake Rufus Woods.	2,8,9,10			1,2,3,4	Basic Research
<b>Subbasin Objective 1B8:</b> Research and monitor the impacts of TDG on focal species and suckers during years of high flows and during use of discharge tubes at Grand Coulee Dam.	8,10			1,2,3,4	Basic Research
<b>Subbasin Objective 1B8:</b> Research and monitor the impacts of TDG on focal species and suckers during years of high flows downstream of Chief Joseph Dam.	8,10			1,2,3,4	Basic Research
<b>Subbasin Objective 1B1: Strategy I:</b> Determine possible lake elevation changes to enhance salmonid production.	1,2,5,9,10			1,2,3,4	Basic Research
<b>Subbasin Objective 2C3:</b> Implement the Chief Joseph Dam Hatchery Master Plan RM&E component.	2,8,9			1,2,3,4	5,6,10,14,16,17,28

AQUATIC					
Strategy & Objective	Strategy Type <sup>1</sup>	Monitoring Type <sup>2</sup>	Tier <sup>3</sup>	Scale <sup>4</sup>	Tool Box Tool <sup>5</sup>
<b>ADDITIONAL RESEARCH, MONITORING, AND EVALUATION NEEDS</b>					
<b>Research:</b> Determine the economic costs and benefits to the Lake Rufus Woods Subbasin from implementing the measures called for in the Subbasin plan.	8			1,2,3,4	Standard environmental economic accounting protocols
<b>Research:</b> Determine the keystone species that can be used to indicate the quality of environments for focal salmonid fish species.	All			1,2,3,4	Basic Research
<b>Research:</b> Determine contaminant levels in fish and provide information to the public	8,10			1,2,3,4	Use standardized fish contaminant protocols
<b>Research:</b> Establish population estimates for all focal species in all established stream reaches and determine viability thresholds to meet recovery/restoration/management goals.	2,9			1,2,3,4	Basic Research
<b>Research:</b> Determine limiting factors and abundance of white sturgeon and burbot.	1,2,4,5,9,10			1,2,3,4	Basic Research

**<sup>1</sup>Strategy types:**

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

**<sup>2</sup>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

**<sup>3</sup>ISRP Tier Level:**

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

**<sup>4</sup>Scale of Monitoring and Evaluation:**

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

**<sup>5</sup>Tool Box Tool**

The Tool Box is found in Appendix I.

TERRESTRIAL					
Strategy & Objective	Strategy Type <sup>1</sup>	Monitoring Type <sup>2</sup>	Tier <sup>3</sup>	Scale <sup>4</sup>	Tool Box Tool <sup>5</sup>
<b>Columbia Basin Level Goal 1B:</b> Quantify the <b>operational effects</b> of federal hydrosystem projects on terrestrial resources, develop mitigation plan in coordination with other resource mitigation and resource planning efforts, and implement projects to mitigate the impacts, including maintenance and monitoring.	1,6,7			1,2,3,4	29,30,31,32,33,34,35
<b>Province Level Objective 1B:</b> Quantitatively assess and mitigate <b>operational impacts</b> of the Chief Joseph Dam, 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 <b>2008</b> ; develop mitigation plan by <b>2010</b> ; implement initial mitigation by <b>2015</b> ; 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.	1,6,7			1,2,3,4	29,30,31,32,33,34,35
<b>Subbasin Objective 1B:</b> Quantitatively assess operational impacts of the Grand Coulee Project on terrestrial resources by year 2008.	1,6,7			1,2,3,4	29,30,31,32,33,34,35
<b>Subbasin Objective 1B1:</b> Quantitatively assess operational impacts of the Grand Coulee Project on terrestrial resources by year 2008.	1,6,7			1,2,3,4	29,30,31,32,33,34,35
<b>Subbasin Objective 1B1: Strategy a:</b> Conduct the assessment and include, but not limit to, fluctuation zone effects on vegetation and wildlife, loss of nutrients in watershed from loss of salmon, recreational effects to terrestrial resources, BPA transmission lines, etc.	1,2,6,7			1,2,3,4	29,30,31,32,33,34,35
<b>Subbasin Objective 1B1: Strategy b:</b> Assess project-related recreational activities effects on habitat.	1,2			1,2,3,4	30
<b>Subbasin Objective 2A1: Strategy a:</b> Continue or increase monitoring of nesting and wintering bald eagles.	1,2,9			1,2,3,4	30



TERRESTRIAL					
Strategy & Objective	Strategy Type <sup>1</sup>	Monitoring Type <sup>2</sup>	Tier <sup>3</sup>	Scale <sup>4</sup>	Tool Box Tool <sup>5</sup>
<b>Subbasin Objective 2A2: Strategy a:</b> Determine limiting factors on sharp-tailed grouse populations within the Intermountain Province and associated subbasins by 2006.	1,2,6,7,9			1,2,3,4	29,30,31,32,33,34,35
<b>Strategy d:</b> Continue and increase monitoring.	1,2,6,7,9			1,2,3,4	29,30,31,32,33,34,35
<b>Subbasin Objective 2B3: Strategy a:</b> Inventory existing and historic habitat.	1,6,7			1,2,3,4	29,30,31,32,33,34,35
<b>Subbasin Objective 2A2: Strategy d:</b> Assess and, if deemed needed, limit/restrict nonnative invasive species interaction/competition and habitat degradation.	1,6,7			1,2,3,4	29,30,31,32,33,34,35
<b>Subbasin Objective 2A3: Strategy a:</b> Identify specific factors limiting/affecting sage grouse populations in the San Poil Subbasin.	1,2,6,7,8,9			1,2,3,4	29,30,31,32,33,34,35
<b>Strategy d:</b> Continue and increase monitoring.	1,2,6,7,8,9			1,2,3,4	29,30,31,32,33,34,35
<b>Subbasin Objective 2A4: Strategy a:</b> Increase and maintain high level of monitoring on selected state, federal and Tribal species of concern.	1,2,6,7,8,9			1,2,3,4	29,30,31,32,33,34,35
<b>Subbasin Objective 2A6: Strategy a:</b> Determine limiting factors for golden eagles by 2006.	1,2,6,7,9			1,2,3,4	29,30,31,32,33,34,35
<b>Subbasin Objective 2A6: Strategy c:</b> Continue and increase monitoring of golden eagles.	1,2,6,7,9			1,2,3,4	29,30,31,32,33,34,35
<b>Subbasin Objective 2A6: Strategy b:</b> Develop, prioritize, and implement projects and/or research to address identified golden eagle limiting factors by 2007.	1,2,6,7,8,9			1,2,3,4	29,30,31,32,33,34,35
<b>Strategy c for Objective 1A and Sub-objectives 1A1-1A9):</b> Maintain research, monitoring, and evaluation of effectiveness of mitigation for habitat protection.	1,2,6,7,8,9			1,2,3,4	29,30,31,32,33,34,35

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Strategy & Objective	Strategy Type <sup>1</sup>	Monitoring Type <sup>2</sup>	Tier <sup>3</sup>	Scale <sup>4</sup>	Tool Box Tool <sup>5</sup>
<b>Subbasin Objective 1B2:</b> Upon completion of assessment of operational impacts, develop plan for mitigation of effects by year 2010 and implement initial plan measures by year 2015.	1,2,6,7,8,9			1,2,3,4	29,30,31,32,33,34,35
<b>Subbasin Objective 2B3: Strategy j:</b> Develop technical and policy working groups that meet regularly to identify problems and implement solutions for the Rufus Woods Subbasin.	8			1,2,3,4	Coordinated activities
<b>Subbasin Objective 2B2: Strategy f:</b> Inventory existing and historic mule deer habitat and identify limiting factors.	1,2,6,7,8,9			1,2,3,4	29,30,31,32,33,34,35
<b>Subbasin Objective 2B4: Strategy a:</b> Inventory existing and historic upland forest habitat.	1,2,6,7,8,9			1,2,3,4	29,30,31,32,33,34,35
<b>Subbasin Objective 2B4: Strategy d:</b> Monitor upland forest habitat.	1,2,6,7,8,9			1,2,3,4	29,30,31,32,33,34,35
<b>Subbasin Objective 2B5: Strategy f:</b> Identify specific factors limiting/affecting mule deer populations in the Rufus Woods Subbasin.	1,2,6,7,9			1,2,3,4	29,30,31,32,33,34,35
<b>Subbasin Objective 2B1:</b> Identify, maintain, restore, and enhance priority habitats (wetlands, riparian areas, upland forests, steppe and shrub-steppe, cliffs and rock outcrops, caves, and other priority habitats) within the Lake Rufus Woods Subbasin, including their structural attributes, ecological functions, and distribution and connectivity across the landscape.	1,2,6,7,8,9			1,2,3,4	29,30,31,32,33,34,35
<b>Subbasin Objective 2B1: Strategy b:</b> Assess loss due to disruption of habitat continuity, fragmentation, and quality.					
<b>Subbasin Objective 2A5: Strategy a:</b> Assess feasibility of translocating extirpated/historic species.	9			1,2,3,4	Basic Research
<b>Subbasin Objective 2B5: Strategy c:</b> Monitor translocations.	2,9			1,2,3,4	29,30,31,32,33,34,35

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- 2) Population Assessments
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