

# DRAFT

Asotin Subbasin Aquatic Research, Monitoring and Evaluation (RME) Plan.

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Local and regional efforts have begun to achieve a coordinated approach in the Columbia River subbasins to recover ESA listed salmon and steelhead. A part of those efforts is the development of Research, monitoring and Evaluation (RME) plans that will help direct limited funds to accomplishing the most critical work.

Within the Asotin subbasin, the subbasin planning process has been the first step toward a coordinated multi-agency effort to develop a comprehensive RM&E plan. The plan will pull from regional RME efforts such as the FCRPS Biop plan being developed under the direction of NOAA, the Washington Comprehensive Monitoring Strategy for Watershed Health and Salmon Recovery (CMS), the Asotin Model Watershed Plan, and other similar strategies and plans currently under development.

The RME plan that follows is an attempt to identify priorities in concepts for implementation in the next three to six years. While it would be desirable to have a completed comprehensive RME plan now, the time allowed for its development under the subbasin planning effort is inadequate. This plan will therefore, serve as an interim set of guidelines that will assure a systematic approach to directing and funding RME will occur. Further, this interim plan will serve to facilitate coordination of RME in Asotin Creek among management entities, and to help dovetail Asotin Creek basin actions within the broader Columbia Basin RME effort.

## **Guiding Principles and Priorities**

- Fill EDT data gaps and establish baseline habitat conditions
  - o Verify attribute values to validate EDT modeling runs
  - o Establish firm baseline of habitat conditions to track change over time or response to habitat improvement actions undertaken in the basin (effectiveness monitoring)
  - o Use systematic habitat characterization provided by EDT as basis for future validation monitoring.
- Focus RME efforts on critical data needs for VSP attributes.
- Implementation and effectiveness monitoring to document actions should be funded/undertaken within the basin (Implementation - how much, how many sites, how often, where: Effectiveness – habitat and localized fish response)
- Critical uncertainties? (Causal relationships among actions and population response, and confounding factors that may affect our understanding of those relationships).
- Coordinate with regional efforts (Tier 3 studies)
- Data management and coordination are crucial to meet regional data accessibility needs.

- Methodologies should provide data of known quality (accuracy and precision)
- Validate EDT model as a reliable measure of habitat and population response to recovery actions taken in the Asotin subbasin (including Tenmile Creek).
- A systematic approach to project selection and funding will be used that is consistent with and complementary to other RME efforts within the Columbia Basin

### **Fill EDT data gaps and establish baseline habitat conditions**

The EDT model was populated without extensive empirical data for the Asotin Cr. subbasin. In all cases empirical data were used if available. However many habitat attributes were rated based on local knowledge and best scientific judgment. It is clear that such data may inadequately represent habitat and fish assemblage conditions. The predictive capacity of EDT to help direct recovery actions and assess their potential beneficial effect could be substantially limited by the data quality. Improving data quality by collecting empirical data should be a priority if the following conditions are met:

- Those attributes with the greatest leverage on EDT model outputs (e.g. max width, gradient, habitat type inventories, large wood, bed scour) (From: *Mobrand Biometrics Quick Guide to Developing the Stream Reach Editor*, 2003)
- Those that are within priority protection or restoration stream reaches
- Data is limited for attributes that have a broad (subbasin wide) effect on population or habitat status (passage at obstructions, water quality, others?)
- Identified in the Hypotheses and Objectives within the subbasin plan

### **Focus RM&E efforts on critical data needs for VSP attributes.**

Four critical areas were identified under NOAA's Viable Salmonid Population (VSP) treatise. Presently an evaluation and rating system for populations within ESUs is being developed by the Interior Columbia TRT. Once the methodology is complete, completing a rating exercise for the basin will be necessary. Beyond that action, specific needs have been identified for each of the four areas of VSP:

#### Abundance

Adult: Run size to the basin (This can be greatly impacted by out-of-subbasin effects but is critical to monitoring population status). Estimates or enumeration of escapement to the spawning grounds, including hatchery interactions in natural spawning areas, is crucial. Harvest within the subbasin including hatchery harvest and incidental hooking mortality of wild fish. Out-of-basin harvest and mortality (up-river subbasins may be prevented from recovering if out-of-basin effects limit adult escapement).

Juvenile - smolt production at the subpopulation level to reflect freshwater survival and production within the basin. It will be critical in modeling population response to habitat restoration actions.

- Diversity: Genetic characterization, life history pathways (juvenile and adult), artificial propagation effects (hatcheries)
- Spatial Structure Distribution of juveniles and adults within the subbasin, habitat limiting factors.
- Productivity Population Growth rate or potential – juvenile and natural return ratio (NRR) for adults (should be above replacement or 1.0). Hatchery effects should not reduce NRR below 1.0

### **Implementation and Effectiveness monitoring**

Documenting the why, where, how much and whether of habitat recovery actions completed in the basin. (Adopt the SRFB Effectiveness Monitoring Statistical Design criteria (see *SRFB Monitoring and Evaluation Strategy for Habitat Restoration and Acquisition Projects*.) Basic M&E actions for accountability can also capture habitat modifications/changes/improvements for future EDT modeling efforts.

### **Critical uncertainties**

Numerous efforts are presently ongoing within the Columbia Basin to recover ESA listed salmonid. Research is underway to document population response to habitat, hatchery, harvest and hydro modifications. During these actions the general understanding of the biology and ecology of salmon and steelhead populations is increasing. There remain significant data gaps and critical uncertainties regarding recovery actions. Limited funds must be used wisely to help ensure ESA populations receive maximum benefit from actions. Many critical uncertainties remain throughout the region, and within the subbasin. These uncertainties must be answered if populations are to be rebuilt and delisted. Such uncertainties may include habitat/life history stage relationships, causal relationships for degraded habitat and depressed or extirpated populations, and understanding the relationship between resident and anadromous *O. mykiss* subpopulations. These critical uncertainties will be identified in forums such as: Regional salmon recovery planning; Region wide (Columbia Basin) critical needs lists developed by management agencies; NOAA's Comprehensive FCRPS BiOp RME plan; and Washington State's Comprehensive Monitoring Strategy; and the Asotin Ck Subbasin Comprehensive RME Plan.

### **Population management goals**

There have been inconsistent and uncoordinated efforts to establish population abundance goals in many subbasins. Washington, the Columbia River Treaty Tribes, and most

recently the TRT have suggested management goals. Each of these efforts is based on different assumptions and were accomplished for different purposes. We believe that at least two management goals will ultimately be adopted: a population abundance level sufficient to delist from the ESA, and a more robust level (beyond VSP) defined by the states and tribes that will assure preservation of populations, but also provide for harvest opportunity. It is likely that the latter goals will be established under the auspices of the Court as part of the US v OR management plan development process. We believe that RME will be instrumental in answering the uncertainties with establishing these goals, and essential to monitoring the attainment of population management goals.

## **Conclusions and Recommendations**

The Asotin Ck subbasin managers and stakeholders have implemented efforts to coordinate recovery and RME actions within the subbasin. Included in these efforts was an extensive assessment of ongoing and needed RME actions (Table 1). The managers attempted to identify the current level of effort, and a subjective assessment that effort's progress toward meeting data needs within the subbasin. A complete prioritization of actions within the table has not been accomplished. However, all involved parties committed to completing an RME plan that would, eventually address priority actions. Following are broad conclusions and recommendations based on guiding principles and priorities, and the items listed in Table 1. These will serve as generalized high priority (in principle) actions that should be pursued while the more comprehensive RME plan is completed.

1. *Conclusion:* The quality of data used within the EDT attributes and modeling exercise is inadequate. Empirical data of known accuracy and precision is needed for priority areas (habitat inventory using standardized protocols from region that will fit EDT) of the subbasin (see section ???). These data will be used to evaluate the efficacy of EDT in modeling habitat and population response to actions taken within the subbasin, and to evaluate the hypotheses and objectives presented in the subbasin plan.

*Recommendation:* Fund habitat inventories to collect data necessary to fill data gaps for attributes with high EDT model leverage and evaluation of progress toward subbasin plan objectives.

2. *Conclusion:* Population status monitoring must occur in a systematic manner that will allow managers to evaluate their progress toward delisting from ESA. Criteria established by NOAA and the TRTs under VSP will be used within the subbasin. These metrics will be useful within EDT, and provide a direct relationship between the habitat and population monitoring efforts, through model outputs.

*Recommendation:* Continue to fund existing monitoring and evaluation actions within the subbasin that fulfill critical VSP data needs.

*Recommendation:* Fund additional actions to complete basic population status monitoring needs for the subbasin (e.g. Monitor adult escapement into the Asotin subbasin, and the smolt production) as a regional intensive monitoring effort.

*To fulfill this example, the specific actions or improvements listed below is needed.*

1. Complete the adult ladder and trap at Headgate Dam

*Recommendation: Fund additional actions to complete basic population status monitoring needs for the subbasin (e.g low intensity sampling to estimate adult abundance based on redds or passive enumeration, and periodic assessment of juvenile abundance and distribution or genetic characterization..*

*Additional VSP related action may be required/recommended as the full RME plan is completed.*

3. *Conclusion:* Basic monitoring of restoration actions undertaken within the subbasin needs to occur to ensure that they were completed in accordance with expectations (Implementation monitoring). However, the effects of those actions on the habitat and salmonid populations (Effectiveness monitoring) is costly and should be done on only a portion of completed projects.

*Recommendation: Accountability for restoration actions needs to occur for each project. Basic documentation should be completed in a cost efficient manner. A systematic approach to documenting effectiveness is required that provides sufficient accountability without unnecessary redundancy. (e.g. classes of actions may be represented by monitoring a small portion of similar projects)*

4. *Conclusion:* Critical uncertainties will be identified in the Comprehensive RME plan and coordinated with other regional forums. Uncertainties must be understood and answered if population recovery is to occur. ESU wide uncertainties may be addressed in the subbasin as part of a regional RME effort. Subbasin specific factors may need localized RME efforts to answer.

*Recommendation: Fund research on critical uncertainties unique to the Aostin Ck Subbasin as a priority for recovery actions in the subbasin. (direct need)*

*Recommendation: Fund research on critical uncertainties represented in the Asotin Ck subbasin with a broader ESU relevance if not being funded or conducted in other subbasins. (opportunity for coordinated regional effort)*

*Conclusion:* The managers have not established comprehensive population abundance goals for the subbasin. Interim escapement and spawning goals are inconsistent in definition and basis. The subbasin plan and its RME section can provide critical data for establishing these goals in a coordinated and scientifically defensible fashion.

*Recommendations: Fund and implement RME that shows a clear link to resolving uncertainty regarding population abundance and management goals.*

Table 1. Identified RME opportunities in the Asotin Subbasin, 2004.

Metric	Life Stage	Performance Measure	Collaboration	Current Effort	Desired Future Effort	Current Funding
Abundance	Adult	Adult returns to Asotin	WDFW,	Redd counts and expansions. Efforts to construct a ladder and trap for enumeration are underway	Total counts at Headgate trap and expanded redd counts in remainder of the subbasin.	BPA, LSRCP
		Run to mainstem dams	USACOE and Columbia River compact	Passive detections and radio detections are made at all mainstem dams and the estuary.	The current effort is sufficient.	BPA, LSRCP
		Spawner Escapement	WDFW	Standardized spawner surveys are divided across geographical boundaries, and conducted with low intensity.	Stratified randomized georeferenced surveys.	BPA, LSRCP,
	Juvenile	Parr and pre-smolt Abundance	WDFW, USFS	Electrofishing, snorkel surveys are conducted by multiple agencies with some coordination.	Stratified randomized georeferenced survey design with increased collaboration and coordination.	ACD, LSRCP, USFS, BPA
		Smolt Abundance	WDFW	Screw-trap collections at Headgate.	Additional screw-trap or PIT-tagging effort, plus increased effort in the mainstem to develop total outmigration estimate.	BPA,

	Residual Abundance		No current effort		
	Smolt-to-Adult Return	WDFW,	Broodyear specific adult returns and smolt to adult returns	Increased PIT-tagging effort to develop SURPH and CRiSP models.	BPA,
	Smolt-to-Adult Survival	WDFW,	Metric derived from independent assessments of smolt survival, age at return, adult mortality, and spawner densities.	Increased PIT-tagging effort to develop SURPH and CRiSP models.	BPA,
	Parent Progeny Ratio (adult to adult)	WDFW,	Broodyear specific adult returns and smolt to adult returns	Increased PIT-tagging effort to develop SURPH and CRiSP models.	BPA
	Pre-spawn Mortality		No current efforts	Stratified, randomized, georeferenced carcass surveys with increased coverage.	
Juvenile	Egg to Fry Survival	not assessed	not assessed	Should be derived from higher resolution studies of spawners, parr, and smolts.	unfunded
	Fry to parr and parr to smolt survival	not assessed	not assessed	Derived from higher resolution studies of spawners, parr, and smolts.	unfunded

		Smolt Survival to Lower Granite Dam	WDFW,	Currently not funded. Derived from PIT-tag detections	Increased PIT-tagging effort to develop SURPH and CRiSP models, plus increased screw-trap effort or PIT tagging to estimate total smolt outmigration	
		Smolt Survival through Mainstem Columbia River		Derived from PIT-tag detections and other regional efforts		
Distribution and Movement	Adult	Spawner Spatial Distribution	WDFW,	Standardized spawner surveys are divided across geographical boundaries, and conducted with low intensity.	Stratified randomized georeferenced surveys.	LSRCP, BPA, ACD
		Stray Rate	WDFW,	Documenting hatchery strays at the adult ladder and on spawning surveys	.	
	Juvenile	Rearing Distribution	WDFW, USFS	Electrofishing, snorkel, surveys are conducted by multiple agencies with some coordination.	Stratified randomized georeferenced survey design with increased collaboration and coordination.	BPA, USFS,
		Resident trout Distribution	WDFW, USFS	Limited coverage using electrofishing or snorkeling.	Stratified randomized georeferenced assessment .	BPA, ACD, USFS



Life History	Adult	Run Timing		Not currently funded	. PIT-tag detections, ladder counts, and spawning surveys	
		Age of spawners	WDFW,	CWT recoveries, scale analysis.	Increased PIT-tagging efforts and scale analysis.	BPA, WDFW
		Size of spawners	WDFW,	Trapping and spawning or carcass surveys.  Not currently funded, but planned		BPA, ACD
		Sex Ratio of spawners	WDFW,	Trapping and spawning or carcass surveys.  Not currently funded, but planned.		BPA, ACD
		Spawn-timing	WDFW,	spawner surveys, and carcass surveys.		BPA, ACD
		Emigration Timing	WDFW	screw-trap collections.	Additional screw-trap or PIT-tagging effort .	BPA
		Age at Emigration	WDFW	screw-trap collections.	Additional screw-trap or PIT-tagging effort .	BPA
		Size at Emigration	WDFW	screw-trap collections.	Additional screw-trap or PIT-tagging effort .	BPA
		Condition at Emigration	WDFW	screw-trap collections.	Additional screw-trap or PIT-tagging effort .	BPA

Fish Health	Adult and Juvenile	Disease Incidence				
		Disease Severity				
Genetic	Adult and Juvenile	Genetic Diversity and Integrity	WDFW,	Collection of samples and preliminary analyses	Coordinated assessment of genetic analyses	LSRCP, WDFW
		Reproductive Success				
		Effective population size				
Fisheries	Adult	In-basin harvest		Not currently assessing trout fisheries or their impacts on listed fish		
		Out-of-basin harvest				
		Hooking rate				
		Handling mortality				
Habitat	Adult and Juvenile	Instream flow	USGS, DOE	Guage sites in place and active		USGS, DOE

Water temperature	WDFW, ACD, USFS	Numerous monitors in place and active		BPA, USFS, ACD
Water quality	ACD, DOE	Periodic sampling		ACD, BPA, USFS
Physical habitat conditions	USFS, ACD, NRCS	Modified Hankin & Reeves or Rosgen surveys.	Addition of EDT-derived metrics such as bed-scour and embeddedness, plus georeferenced survey design.	BPA, USFS,
Biological habitat conditions	USFS, ACD, NRCS	For riparian conditions, modified Hankin & Reeves or Rosgen surveys.	Addition of regular benthic macroinvertebrate sampling	BPA, USFS,
Habitat Quantity	USFS, ACD, NRCS	Modified Hankin & Reeves or Rosgen surveys.	Addition of EDT-derived habitat types, plus georeferenced survey design.	BPA, USFS,
Passage barriers and diversions	WDFW, USFS, NPT, ACD, NRCS	spawner surveys and visual surveys.	The current effort is sufficient.	BPA, LSRCP
Habitat utilization	WDFW, USFS,	Derived from juvenile and adult abundance and distribution surveys.	Georeferenced survey design for fish population studies	BPA, ACD, USFS,
Smolt production of habitat	WDFW, USFS,	Derived from juvenile and adult abundance and distribution surveys.	Georeferenced survey design for fish population studies	BPA, USFS,

Ecosystem	Juvenile and Adult	Trophic relationships	not assessed	Stable isotope assessments plus mass-balance models	unfunded
		Competition	not assessed	Stable isotope assessments plus mass-balance models	unfunded
		Natural mortality	not assessed	Stable isotope assessments plus mass-balance models	unfunded
		Marine ecology	not assessed	Archival tag studies	unfunded
		Redd impacts	not assessed	Stable isotope assessments plus mass-balance models	unfunded
		Carcass impacts	not assessed	Stable isotope assessments plus mass-balance models	unfunded