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| **What is the Purpose of a basin-wide monitoring program?** |
| **Purpose:** Provides a long-term dataset/continuum of data for regional fish managers, agencies and tribes that would:* Inform dam operations and management plans
* Inform adaptive management of actions within sub-basins
* Support status and trend monitoring, i.e. the numbers of fish in and out of the basin, including pHOS and other VSP metrics
* Identify and refine understanding of the limiting factors for sub-basin management plans
* Monitor progress of the limiting factors in the basin
* Provides a long-term dataset/continuum of data to inform:
* Adaptive management of Corps’ actions
* Could also inform actions outside the purview/authority of the Corps and/or other WATER partners
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| **What does a basin-wide monitoring program look like?**  |
| Shared responsibility for coordination and implementation of a monitoring program focused on MF Willamette, McKenzie, S Santiam, N Santiam, and mainstem. |
| **What could monitoring include?*** PIT detection arrays near sub-basin confluences and at Willamette Falls for both juvenile and adult fish (at a minimum)
* Visual counts at Willamette Falls
* Tagged fish released for baseline and modified operations in all sub-basins
* Additional monitoring points for juveniles and adults that could show response to management actions
* Biological monitoring, however, more finite physical monitoring (such as additional TDG gauges) could be included in study plans
* Could be used to modify operational and structural passage based on data
 | **What could be measured?*** SARs
* Spawning distribution
* Abundance
* Individual and aggregate survival
* Migration timing
* Growth/condition
* Baseline monitoring of water quality (i.e. TDG) and survival movement using PIT
* There may be a need for TDG gauges to help fill assumptions currently being made in high-value reaches
* Studies using acoustic/radiotags targeted at areas of special concern
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| **Potential Advantages** | **Potential Disadvantages** |
| A basin-wide monitoring program would provide:* Information on individual and aggregate survival and migration timing;
* If subsequently handled: information on growth/condition
* Improvement over synoptic (snapshot) data and guesstimates
* Better adaptive management, leading to higher survival of both juveniles and adults
* Broader access to the data in PTAGIS
* Information in a longer-term time series
* Habitat quality links to fish growth and survival
* A standardized, agreed upon approach to monitoring
* If established as a shared responsibility, it would demonstrate unity among regional partners
 | **Monitoring Infrastructure*** Annual costs of tagging/arrays/upkeep of ongoing monitoring
* Whether it is feasible to place arrays in some locations
* Coordination would be needed with PGE at Willamette Falls
* Could compete for funding in limited budget with O&M and hydro/habitat implementation plans

**Biological*** May still require some surrogates for reduced populations such as winter steelhead; juvenile collection of NORs is difficult
* Adult array (even in subbasin confluence) cannot tell us about spawning distribution or success without further surveys
* May require outplanting of hatchery-reared fish for some study areas and could affect the NOR/HOR ratios
* Large scale PIT tagging program requires collecting and handling fish - which is stressful to fish
* Data will not inform all actions and data needs/gaps
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| **Potential Barriers** | **Potential Opportunities/Capabilities/Areas of Overlap?** |
| **Monitoring Infrastructure*** Coordination and support
* Need for entity to maintain system
* Collecting fish for tagging
* Cost
* Annual cost of tags and antenna upkeep
* Funding
* Authority
* Agreement on methodology

**Biological*** PSM cannot be tracked with PIT tag detections from Willamette Falls to the next point upstream (unclear what happens between Willamette Falls and subbasins)
 | * Full function adult detection already exists at Willamette Falls
* There are arrays and studies being conducted below Cougar
* Some infrastructure already exists in other sub-basins
* New technologies are available and being improved
* WRB fish are 'caught' by barge antennae in estuary
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