



Independent Scientific Review Panel



Review of the U.S. Army Corps of Engineers' draft Research, Monitoring and Evaluation Plan and Proposals for the Willamette Valley Project



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ISRP 2011-26 | December 2011

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# Background

- November 2011 request for the ISRP to review ongoing efforts by the U.S. Army Corps of Engineers and the Northwest Power and Conservation Council to support the National Marine Fisheries Service's 2008 Biological Opinion relative to the Corps Willamette Valley Project's dams and reservoirs;
- Presentation includes review of:
  - Comprehensive Plan For Research, Monitoring and Evaluation of the Willamette Valley Project (RME Plan);
  - Willamette Mitigation Hatchery Program Research, Monitoring and Evaluation Plan (included in the RME Plan);
  - Willamette Hatchery Mitigation Program Three-Year Monitoring and Evaluation Plan (included in the RME Plan).

# RME Plan Purpose

- Provide an overall approach to identify, schedule, and set priorities for Corps-funded studies needed to implement NMFS BiOp measures;
- Ensure Corps-funded RME is efficient and implemented as an integrated program, e.g., no redundant or conflicting studies, full advantage is taken of complementary work;
- Identify critical uncertainties for each major Willamette subbasin affected by the Willamette Valley Project;
- Evaluate the effectiveness of actions implemented to meet BiOp measures.
- Use RME results to inform future studies and management decisions on alternatives to meet BiOp measures;



# Review Approach

- Corps and Willamette Action Team for Ecosystem Restoration (WATER) provided questions to the ISRP to guide the review;
- These questions were aggregated into subject areas for the report:
  - Overall impressions on the RME Plan
  - Adult trap and haul
  - Pre-spawn mortality
  - Re-establishing wild populations above dams
  - Hatchery effects on wild fish
  - Downstream passage of juvenile fish
  - Flow, habitat and water quality
  - Additional study types
  - Adaptive management
  - Evaluation at multiple spatial scales
  - Program structure, timeframe, and effectiveness

# Overall Impressions of the RME Plan

- RME Plan will provide important guidance for the implementation of monitoring efforts in the Willamette;
- Some areas of the plan could be improved in future drafts;
  - Unclear the extent to which the uncertainties identified in the plan were based on studies conducted to date - context based on the current status of salmon and steelhead populations and current water quality and habitat conditions;
  - Uncertainties were not clearly prioritized – difficult to determine whether the projects proposed for 2012 implementation are addressing the most critical uncertainties;
  - Each dam/reservoir tends to be treated independently. Considerable efficiency could be gained if studies were structured to identify general strategies that could be applied across multiple projects;
  - The RME Plan lacks elements focused on habitat-based productive capacities for the key tributaries – what improvements in habitat will be required to support the populations of fish required to achieve recovery?

# Overall Impressions – cont'd

- Some areas of the plan could be improved in future drafts;
  - The Plan for the Willamette Valley Project does not adequately describe how the efforts at the dams and reservoirs are linked to the habitat restoration efforts being implemented throughout the basin - a revised Plan should clearly describe this linkage;
  - Increasing population, climate change, and invasive species are not sufficiently addressed in the RME Plan. Predictions of future environmental conditions in the drainage network could be very useful in prioritizing uncertainties and RME efforts and selecting restoration project types and locations;
  - Greater emphasis on the interaction between hatchery and wild salmon and steelhead;
  - The Plan should include a complete adaptive management framework including a process for encouraging continued public engagement and a communications strategy.

# Adult Fish Trap and Haul/Pre-Spawn Mortality

- Pre-spawn mortality of fish released above dams is a major impediment to re-populating these habitats ;
- Mortality may be related to factors experienced by the fish prior to capture, during capture and transport or post-release;
- Plan includes some of the factors that may be contributing to pre-spawn mortality but some key factors not included;
- Tagging studies will provide some information on some of the environmental conditions to which adult fish are exposed between Willamette Falls and collection at the Willamette Valley Project dams and after release above the dams – but no information on exposure to toxics;
- Some quantitative measure of stress levels of the fish also could be useful in identifying factors contributing to mortality.



# Re-establishing Wild Populations above Dams

- Plan identified four critical uncertainties:
  - Productive capacity of existing habitat;
  - Reproductive success of hatchery fish in wild;
  - Ecological & genetic effects of hatchery on wild fish;
  - Trap & haul program.
- Key priority: Improve trap & haul survival (up to 95% pre-spawn mortality);
  - Use life cycle model to identify survival rates needed for trap & haul and during each life stage to meet  $R/S \gg 1$ ;
- Missing uncertainty: identification of desired population structure, how many stocks, which stocks to be used, genetics of H & W fish.



# Hatchery Effects on Wild Fish

- Plan recognized importance of genetic & ecological effects, but not influence of hatchery fish on harvest rates;
- Uncertainties listed but not prioritized and often no monitoring or research proposed;
  - Goal for hatchery fish to mimic wild but no information provided on wild fish characteristics. Mimicking wild fish may lead to greater ecological interactions - conflict of genetic & ecological goals;
  - Plan could benefit from review of hatchery/wild fish studies in Columbia & elsewhere, including ISRP reviews and ISAB reports;

# Downstream Passage of Juvenile Fish

- Uncertainties related to downstream passage of juvenile fish did not specify which issues were the most critical;
- Highest priority should be on comparative survival rates of the 3 primary life-history patterns:
  - 1) rear above the reservoir;
  - 2) rear in the reservoir;
  - 3) rear below the reservoir;
- Need information on both fry-smolt survival and SARs;
- Implementation issues – e.g., tagging small fish, detection rates of PIT-tagged fish at Willamette Falls is very low;
- Comparative survival rate information required to identify most promising future RME efforts;
- Coordination of efforts among various research groups can significantly enhance understanding of this issue – many opportunities for collaboration.



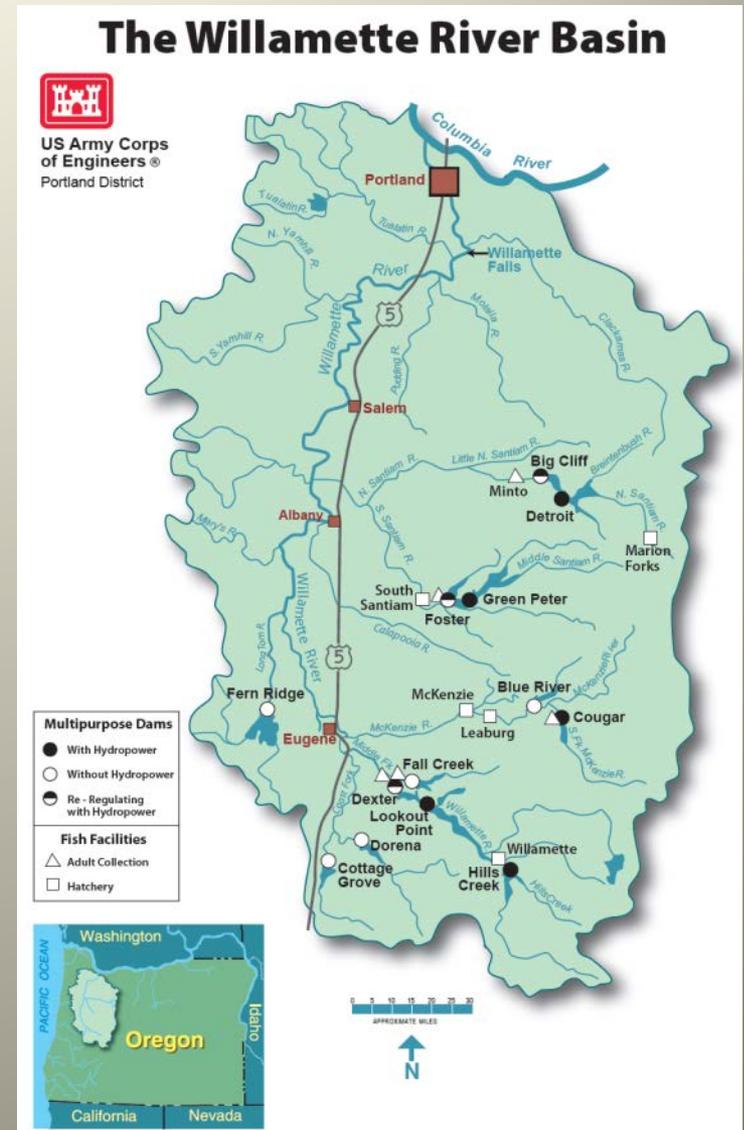
# Flow, Habitat and Water Quality

- Focused on water quality and habitat responses to varying levels of release from project dams – site-specific;
- Basic approach is coupling models with field data collection;
- PHABSIM model will be used to assess the effect of changing flow rates on habitat availability:
  - Should provide some useful information;
  - Water depth and velocity are insufficient to describe some key habitats (refuge habitats);
  - PHABSIM assessment should be augmented with a process that will capture these other habitat types.
- Need to develop methods to relate assessments of biological response near the projects to population level responses;
- Releases from wastewater treatment facilities to the Willamette River not being considered but may have a significant effect.



# Evaluation at Multiple Spatial Scales

- Scaling site level results to larger spatial scales will rely heavily on physical models (HEC-ResSim, CE-QUAL-W2) – need to incorporate methods for linking habitat to biological responses;
- Considerable experience in the Columbia Basin in the use of models that link habitat condition to biological response – experience useful in incorporating a biological link to the physical models to be applied in the Willamette;
- The manner in which results from various projects will be integrated to provide an indication of progress against population or ESU goals was not completely described.



# Adaptive Management/Program Structure and Timeframe

- Adaptive management process described in the RME Plan is incomplete and fails to discuss timelines;
- It may take multiple years to collect sufficient data to resolve many of the important uncertainties in the Willamette - response to restoration actions may require several generations to become detectable;
- RPA timelines are very tight - implementation of actions to occur within several years;
- Restoration process will be inefficient until understanding of uncertainties and effectiveness of various restoration approaches has improved;
- Maintain strong public outreach effort;
- Data storage and retention;
- Streamline organizational structure to enhance information exchange between science and policy.

# Conclusions

- The RME Plan for the Willamette Valley Project represents a useful guidance framework for identifying knowledge gaps;
- The Plan identifies many critical uncertainties, but there are some gaps in coverage and the relative importance of the uncertainties is not well addressed;
- The next draft of the RME Plan would become more useful by including:
  - Prioritization of proposed RME activities;
  - More thorough evaluation of carrying capacity of tributaries;
  - Inclusion of methodologies to assess biological responses at a landscape scale;
  - More emphasis on impacts of hatchery stocks on wild fish;
  - Development of a more complete adaptive management framework and communications plan.