| **MPG** | **List of Critical Projects** | **Strategy Statement** | **Prioritized** List of Gaps and Justifications  | RPA Recommendations And Other **Prioritized** Recommendations or consolidations | **Prioritized List of current projects continued/modified** and/or New Funding Proposals with estimated costs |
| --- | --- | --- | --- | --- | --- |
| **(A)** | **(B)** | **(C)** | **(D)** | **(E)** | **(F)** |
| **Snake River Steelhead DPS** |
| **DPS WIDE** | 199602000, 199005500, 200500200, LSRCP hatchery evaluations, Mainstem harvest monitoring, LSRCP M&E IDFG (harvest monitoring), WDFW harvest monitoring, ODFG harvest monitoring, NPT harvest monitoring, 198712700, 199701501CRTIFC Kelt Reconditioning,198909600 | **VSP*** High precision status and trend data (includes fish in and fish out) in at least one population per life history type per (summer run vs. winter run) MPG. Low precision status and trend data in every population per MPG (including populations with high precision monitoring).
* Require TRT viability criteria and metrics for the status assessments.
* Direct harvest or incidental mortality of natural origin adults in mainstem and terminal area fisheries.
* High precision estimation of fish reaching Lower Granite Dam with a CV of 5% or less via run-reconstruction estimates generated from sub-sampling (trapping) fish in the Lower Granite Dam adult ladder.
* High intensity/precision estimation in at least one population per MPG to achieve accurate annual estimates with CVs of 5% or less. Due to population specific sampling challenges high intensity/precision sampling opportunities are limited; primary method will be PIT tag arrays.
* Select populations for high precision monitoring based on maximum synergy between BiOp RPA requirements, TRT must have populations, IMWs (habitat effectiveness monitoring), accord monitoring, hatchery effectiveness monitoring, representativeness of MPG populations, and multiple specie coverage. Initial recommendation for PIT tag arrays is Big Creek, South Fork Salmon River, Lemhi River, Secesh River, Imnaha River, Lolo Creek, and Joseph Creek.
* Low precision achieved by partitioning Lower Granite Dam escapement to MPGs (and populations as able) using Genetic Stock Identification (GSI) to achieve accurate annual estimates with CVs of 30% or less. Use scale samples to estimate age structure at the MPG and population scale. Productivity estimates (smolts per adults and adult to adult) can be made at the MPG and population scale.
* Validate GSI results with radio and/or PIT tag arrays in at least two MPGs.
* Maintain and validate existing index reach redd surveys.
* Establish Snake River Basin Annual run-reconstruction of hatchery returns, harvest, and escapement to known and unknown population areas to provide timely annual run-reconstruction (abundance and age structure) of steelhead escapement to Lower Granite Dam; including description of ultimate disposition of hatchery steelhead upstream of Lower Granite dam. Ultimate disposition alternatives for hatchery-origin fish include; harvest, hatchery rack collections, spawners to known areas, and spawners to unknown areas. Analyses and integrates data collection from numerous ongoing projects.

**Hatchery*** Implementation and compliance monitoring per AHSWG guidelines on every hatchery program and hatchery effectiveness monitoring on select supplementation programs. Require utilization of Ad Hoc Supplementation Work Group (2008) standardized performance measures.

Relative Reproductive Success studies on at least 6 populations per species. Direct harvest of hatchery origin fish in mainstem and terminal area fisheries. Implement basin-wide Parentage-based tagging of all hatchery broodstock. * Sample sport, tribal, and commercial fisheries in the Columbia and Snake rivers to estimate contribution of each hatchery stock using PBT.

**Habitat** Utilize IMWs to collect Habitat status trend monitoring. Maintain watershed assessments using stratified criteria. Implementation and compliance monitoring on every habitat restoration project. Habitat restoration project effectiveness monitoring in terms of fish in/out response on select projects (ISEMP plus key BiOp gaps areas). Habitat restoration project effectiveness in terms of physical habitat condition on ????. **Hydro** Utilize Snake Basin aggregate and one index population per MPG to estimate mainstem system-wide survival (upriver PIT tags), reach/project specific passage and survival (upriver PIT tags, and dam tagging), avian predation, adult survival, latent mortality, SAR’s. * PIT tag numbers and distribution should follow target numbers described in CBFWA FWP amendment recommendation.
* Index populations: Asotin Creek, Imnaha River, South Fork Salmon River, and Lolo Creek.

**Diversity**Genotype wild populations on a rotating five year basis to maintain genetic baseline for GSI and to evaluate genetic population structure and diversity.**Data Management and Access**Maintain up-to-date secure web assessable databases that utilize standardized performance measures. | * Current monitoring efforts in many areas are not applying standardized performance measures holistically.
* Integrated and efficient data dissemination remains elusive.

**VSP*** Population scale abundance and productivity estimates with known accuracy and precision do not exist.
* Estimates of wild origin adult steelhead incidental mortality from sport fisheries upstream of Lower Granite Dam are imprecise at the MPG and population scale.
* Estimates of resident *O. mykiss* contribution to population viability are lacking.
* Number and distribution of PIT-tags applied to wild steelhead juveniles for survival, SAR, and collection efficiency at LGR estimates is insufficient for robust estimates.
* There is no wild origin adult age structure data at the MPG or population scale.
* There is limited wild origin smolt abundance at the MPG or population scale.
* There is limited wild origin smolt age structure data at the MPG or population scale.
* The number and distribution of hatchery origin fish spawning in streams is unknown at the MPG or population scales.
* The Relative Reproductive Success of hatchery origin fish spawning in streams is unknown.
* There are limited SAR estimates at the MPG or population scale.

**Hatchery** * Estimates of natural and hatchery origin steelhead adult harvest from mainstem Snake River and Columbia River sport, tribal, and commercial fisheries are imprecise at the MPG and population scale.
* Estimates of the proportion of hatchery origin fish spawning in streams is generally lacking.

**Habitat*** Common framework and definition for habitat implementation, compliance monitoring vs. habitat effectiveness monitoring, and watershed assessment is lacking.
 | **RPA Workgroup Recommendations:*** DPS-level GSI and age composition for MPG and Population

**Other Recommendations or Consolidations*** **(Highest Priority)**DPS-level GSI and age composition for MPG and Population
	+ Complete a comprehensive SNP genetic baseline including conversion.
	+ Maintain and update genetics baseline on 5 year rotating panel basis..
	+ Annual GSI and age composition of adults and smolts at DPS level.
* **(Highest Priority)** DPS level PIT tag studies for MPG and population abundance.
* **(High Priority)** Web assessable database infrastructure and maintenance should be supported for all organizations collecting VSP related data.
* **(High Priority)** Address PHOS DPS wide and hatchery strays by using radio tagging and/or PIT tags. (Lower Priority)Expand CSS study to cover hatchery and natural steelhead (19960200), Integrate with existing juvenile trapping projects.
* **(High Priority)**Snake River DPS run-reconstruction for fish passing Lower Granite Dam and areas downstream ($50,000/yr). Partition hatchery:natural abundance, returns to hatchery racks, harvest, and escapement to known and unknown area.
* **(High Priority)** Implement a pilot study to determine feasibility and cost effectiveness of Parentage Based Tagging (PBT) of Snake River hatchery steelhead broodstock to address multiple management questions including BiOp, AHSWG and HGMP requirements
* **(Lower Priority)** Fund short term study to estimate mortality rates associated with catch and release encounters of unmarked fish in mark selective fisheries (RFP).
 | **Existing/Modified/New Projects To Implement RPA Recommendations****Chinook and Steelhead Genotyping for Genetic Stock Identification (GSI) at Lower Granite Dam (New Proposal). $940K in FY10, $615 in FY11 out…this is lab work only - all steelhead adult and juvenile sample collection at LGR, aging, and analyses rolled into $150K MOA-Accord under RPA recommendation 199005500 (ISMES) at no additional charge…and all Chinook adult and juvenile sample collection at LGR, aging, and analyses rolled under RPA recommendation 199107300 (INPMEP) with additional BPA funding (see below)...all this presumes project 200500200 (LGR Trap Operations) continues to be funded...****Existing/Modified/New to Implement Other Recommendations**(200301700, IDFG GSI) **(Insert here any other proposals for addressing the recommendations for filling priority gaps with a short description of contract, amount/yr, and contractor)** |
| **Lower Snake****WDFW, ODFW, NPT, CTUIR, IDFG** | VSP200205300 LSRCP M&E WDFWHatchery LSRCP M&E WDFW,WDFW harvest monitoringHabitat199401806 199401807199401805 200205400,WA IMW  | * Utilize current rotary migrant traps to estimate juvenile populations for VSP, hatchery effects, and supplementation success. Use PIT tagging of wild emigrants to describe migration performance, life history pathways and where possible (sample size dependent) estimate wild steelhead SAR. Use existing or expanded weir and adult spawner index area surveys for VSP and hatchery effectiveness metrics. Consider the use of expanded GSI samples to assess population structure within the MPG, and to evaluate population behavior within the Snake).
* Monitor to capture population metrics for VSP and to provide data for hatchery mitigation and supplementation evaluations. Use existing PIT tag arrays and expanded PIT tagging and arrays to better determine Adult and Juvenile movement (possible hydrosystem effects on adults) and production in the Tucannon (supplemented) and Asotin (unsupplemented reference) populations.
* Utilize a combination of CWT, fin clips and PIT tags (US v OR production Table) to identify hatchery fish, document out-of-basin harvest, terminal area straying and to calculate hatchery supplementation fish performance (SAR) to the Snake Basin. Estimate harvest of hatchery mitigation fish within the Snake and other Snake tributary rivers to assess hatchery mitigation effectiveness and estimate fishery impacts on wild Tucannon steelhead
* Maintain current array of juvenile population estimates and weir and adult spawner surveys. (GSI may prove effective for the population and evaluate Population structure within the MPG).
* Monitor to capture population metrics for VSP and to improve data for supplementation evaluations. Use existing PIT tag arrays and expanded PIT tags to better determine Adult and Juvenile movement and production in the Tucannon.
* Utilize Asotin Creek as an IMW.
 | 1. Existing adult escapement estimates are based on index spawning ground surveys and temporary trapping facilities. Environmental conditions limit the ability to effectively complete spawner surveys or recover adults to assess hatchery returns and calculate pHOS in some years. Implementing a GRTS adult sampling protocol may improve accuracy and precision of spawner survey results, but environmental limitations and sub sampling for pHOS will remain problematic in the Tucannon River drainage. Poor estimates of wild population size in the Tucannon limits the ability of managers to assess the true wild adult abundance and the effects of incidental catch and release mortality on the wild population. This lack of information on wild fish abundance threatens continuation of a steelhead fishery.
2. Expanded LSRCP monitoring for endemic steelhead (to implement RPA endemic supplementation) will be needed to determine endemic supplementation success – if endemic steelhead program is maintained.
3. Limited BPA funding currently restricts sampling of the Asotin Cr. population for VSP status. Currently only one of the main streams contributing to the Asotin population is being sampled consistently.
4. Expanded PIT tagging of Tucannon steelhead may be required to fully assess the level of straying or stranding of wild and hatchery Tucannon steelhead above LGR Dam.
5. Improved knowledge of the behavior of known Tucannon River steelhead near the mouth of the Tucannon River and Little Goose Dam is needed to evaluate whether fish are avoiding or missing the Tucannon River and how to improve homing.
6. Inconsistent electronic sampling of commercial caught steelhead may be underestimating the interception of non Ad-clipped endemic hatchery steelhead downriver.
7. 10-15% of hatchery??? steelhead are not currently accounted. These fish may be straying or entering small tributaries to the Snake River (e.g. – Alpowa, Tenmile, Couse, Alkali Flat), which may prevent their return to primary spawning habitats in Asotin and Tucannon and affect genetic characteristics of fish in these tributaries.
8. Adult abundance and distribution data for the Tucannon river is imprecise or lacking.

**Hatchery** 1. Lack of pHos data for Tucannon does not currently allow for assessing hatchery effects and VSP status.
2. Effectiveness and impact of supplementation program in Tucannon River uncertain.
 | **RPA Workgroup Recommendations:*** Implement GRTS adult sampling in the Tucannon Basin. (Participants do not agree with method based on environmental feasibility. We propose to install a PIT tag array at the mouth and utilize tagging to evaluate the adult abundance.
* Tucannon River should be monitored for fish in and fish out to complement habitat restoration gap of 5% analysis and modeling for RPA 56.1.
* Evaluate post-release mortality from different types of fisheries across a wide range of natural temperature regimes. Effects need to be tracked to the spawning grounds to determine pre-spawning mortality of fish captured and released (need control group for comparison). The group also recommends that individual coded tags (and associated externally visible tag) are used to assess this. A workshop that focuses on defining goals, objectives, and methodology to measure post-release mortality of fish to the spawning areas should be convened as soon as possible. The information developed in this workshop can then be used to develop a targeted RFP. A preliminary assumption on effort is approximately $1.5 million per year over three years. All efforts should be made to collaborate on this research with other entities, like the USACE or PUDs if they have research needs that could utilize radio tags. Suggest that this be moved to DPS wide recommendations but not included under each MPG. The participants would like to be part of this workshop in determining the methodology. Also noted that this is not considered the highest priority)
* Encourage additional sampling effort on the spawning grounds to ensure that at least 20% of the spawning escapement is sampled (see Hankin et al.[[1]](#footnote-2)). This may require shifting some effort from the ocean fisheries to in-river monitoring. The Workgroup also recommends that contracts include language to improve QA/QC, analysis, and data management. Does not appear appropriate for steelhead. Recommendation appears to be addressed by PIT tag proposal.

**Other Recommendations or Consolidations**1. **(Highest Priority)** Maintain Project 200205300 and LSRCP evaluations
2. **(Highest Priority)** Re-instate full funding to ensure VSP adult escapement monitoring for Asotin steelhead. (200205300).
3. \***(Highest Priority)** Expand existing LSRCP effectiveness monitoring for steelhead to implement RPA endemic supplementation and the intensive supplementation monitoring necessary to determine project success.(LSRCP evaluations). (Is this a site useful for calibrating the supplementation AHA model?)
4. **(High Priority)** On a periodic basis conduct spawning surveys or adult trapping to estimate adult abundance and run composition in small Snake River tributaries that comprise portions of the Tucannon and Asotin populations.
5. **(Lower Priority)** Install and operate a PIT tag array in the fish ladder at Little Goose or Lower Monumental dams to help evaluate the magnitude, timing and behavior of PIT tagged Tucannon steelhead and spring Chinook that are bypassing the Tucannon River in an effort to improve homing.
 | **Existing/Modified/New Projects To Implement RPA Recommendations****Insert here any proposals for implementing the RPA recommendations with short description of contract, amount/yr, and contractor****Existing/Modified/New to Implement Other Recommendations****(Insert here any other proposals for addressing the recommendations for filling priority gaps with a short description of contract, amount/yr, and contractor)** |
| **Grande Ronde****ODFW, WDFW, CTUIR, NPT, CRITFC, NOAA, GR Model Watershed, LSRCP** | **VSP**199800702, 199202604 200708300, 199800703 200205300**HATCHERY**199800704 199801001 200740400 199602000 198805301 HABITAT | **VSP**Improve accuracy and precision of VSP parameter estimates in all four Grande Ronde populations. Currently there are insufficient data to estimate abundance and productivity for two populations—Lower Grande Ronde and Wallowa River—and estimates for the Joseph Creek population are index redd count based. EMAP, index counts, and trapping information are used for the Upper Grande Ronde population.* Participate in development and implementation of DPS-level GSI, PIT tag and radio telemetry approaches for population abundance. These approaches may provide population level abundance for all four populations or only at the MPG level.
* Develop and implement Joseph Creek adult steelhead abundance validation to compare current redd count approach to an alternative PIT tag, GSI, and EMAP redd count approaches.
* Continue ongoing index redd counts, trapping at Lookingglass Creek, Catherine Creek, and Upper Grande Ronde to provide data for current Upper Grande Ronde estimates. Expand Lostine weir operations to cover steelhead adult trapping.
* Continue EMAP (ODFW/NOAA funded) abundance estimates for Upper Grande Ronde River population..
* Implement Grande Ronde steelhead adult abundance EMAP.
* Continue juvenile and smolt abundance estimates for Lostine River, Catherine Creek, and Upper Grande Ronde River.
* Continue surveys on Deer Creek under LSRCP to estimate relationship between abundance and redds.
* Expand survey efforts on Lookingglass Creek to develop relationship between abundance and redds to determine variation in fish/redd and redd count based abundance estimates.

**Hatchery Effectiveness**Improve estimates of the proportion of stray hatchery-origin spawner abundance. There are limited data to estimate the proportion of spawners that are hatchery-origin fish in the Joseph Creek and Wallowa River populations. * Expand redd counts in Joseph Creek to increase live fish observations. Use video monitoring to increase live fish observations.

**Habitat Monitoring**Coordinate and integrate ongoing and new proposed projects into an IMW for the Upper Grande Ronde River population. Extensive tributary habitat improvement projects are planned for implementation under ongoing efforts of ODFW, GR Model Watershed, and CTUIR. In addition, CRITFC and CTUIR have new proposed habitat monitoring projects for this population. ODFW has long standing juvenile and smolt abundance monitoring for both the Upper Grande Ronde and Catherine Creek. This population is recommended for BiOp habitat effectiveness monitoring because of the available monitoring data and infrastructure as well as the projected survival **improvement from habitat actions. There is clearly a need for enhanced integration and coordination of ongoing and new proposed implementation and monitoring.*** Develop integrated IMW projects bring together ODFW, CRITFC, CTUIR, BOR and USFS implementation and monitoring efforts.
* Implement new CRITFC Accord habitat monitoring project.
* Implement new CTUIR Accord habitat monitoring project (2009-014-00).
* Continue juvenile and smolt abundance, survival and life history studies.
 | 1. Inadequate adult abundance and productivity information is available for all GR populations
2. Role of resident O. mykiss in population dynamics and resiliency. (see DPS wide recommendations)
3. proportion of natural spawners that are hatchery strays or pHOS is not known.
4. Effectiveness of tributary actions to improve productivity not known.
 | **RPA Workgroup Recommendations:*** Extend trapping period at Lostine weir and install second screw trap on Minam river.
* Fund ODFW 07-09 proposal #20073700 at $400,000/year to implement EMAP for Grande Ronde populations.
* Upper Grande Ronde River and Joseph Creek should be monitored for fish in and fish out to complement habitat **(Participants believe that Joseph Cr is a low priority for fish in and fish out because there is no juvenile trapping)** restoration gap of 4% analysis and modeling for RPA 56.1.

**Other Recommendations or Consolidations**1. (Highest Priority)Redd count correlation and validation in Joseph Creek and Lookingglass Creek relative to escapement is needed.
2. (High Priority) Expand weir operations on the Lostine River to gather Information on natural-origin abundance and hatchery fraction in Lostine River is lacking.
3. (Highest Priority) Develop and implement IMW for Upper Grande Ronde population to integrate CRITFC, CTUIR, ODFW, BOR, USFS and GR Model Watershed efforts.
4. (High Priority) Integrate and implement EMAP habitat status/trends for Grande Ronde populations

for steelhead (20073700) and Chinook (200713200). 1. (Highest Priority) Address feasibility of validating MPG GSI estimates by Installing a PIT tag array in Grande Ronde as expansion of 200301700.
2. (Lower Priority) Implement stream watershed assessments via NPT watershed monitoring plan and integrate with EMAP projects. (NPT will describe this bullet better to address all parties concerned)
 | **Existing/Modified/New Projects To Implement RPA Recommendations**1. NPT proposes to expand 19970300 or 200301700 or 200205300 to validate redd counts in Joseph Creek and Lookingglass Creek at (**$300,000/yr)** for three years
2. ODFW proposes that BPA fund dormant project #20073700 to implement EMAP in the Grande Ronde populations at **($400,000/yr)**
3. Expand project # 199800702 to elongate weir operations on the Lostine River to cover steelhead return period at an annual cost of (**XX/yr)**

**Existing/Modified/New to Implement Other Recommendations**1. NPT proposes to modify 200206800 to include stream watershed assessments per watershed plan and integrate with EMAP projects at (**$291,000/yr)**
 |
| **Imnaha****ODFW, CTUIR, NOAA, NPT** | **VSP**199602000, 199701501, LSRCP M&E NPT, (ODFW redd count funding???)**HATCHERY**199602000, LSRCP M&E ODFW, LSRCP M&E NPT, 198909600, ODFW harvest monitoring?HABITAT | **VSP**Improve accuracy and precision of VSP parameter estimates. There is currently insufficient information to estimate population abundance and productivity. Spatial structure assessments rely on an adult spawner distribution database that was developed based on limited recent information and extensive extrapolation. Implementing monitoring to achieve high precision VSP parameter estimates is high priority for this one population MPG.* Implement adult steelhead escapement monitoring and spawner distribution studies.
* Maintain ongoing long-term index redd counts on Camp Creek.
* Maintain and expand ongoing trapping efforts to improve estimates of proportion of spawners that are hatchery origin.

**Hatchery Effectiveness**Maintain current supplementation and relative reproductive success studies in Little Sheep Creek and improve estimates of stray hatchery spawners. Those studies include assessment of the effects of supplementation on natural-origin abundance , productivity and life history characteristics. In addition, relative reproductive success of hatchery and natural-origin spawners is ongoing.* Continue supplementation evaluation under the LSRCP.
* Continue NOAA RRS study at Little Sheep Creek.

**Habitat Monitoring**There is no population habitat monitoring underway and limited project effectiveness monitoring. The Imnaha subbasin offers limited opportunity for habitat effectiveness monitoring. However, there is a need for implementation of population level habitat status and trends.* **Develop and implement population level habitat status and trends monitoring using EMAP approach.**
 | 1. population scale abundance and productivity information monitoring including VSP parameter precision and accuracy and provide estimates of the proportion of spawners that are hatchery origin. .
2. Estimate of juvenile production.
3. Develop and implement approaches to estimate proportion of stray hatchery spawners throughout population.
4. Efficacy of steelhead supplementation is needed.
5. Habitat status/trends is not known.
 | **RPA Workgroup Recommendations:*** Develop GSI characterization of Imnaha River system (Participants prefer the same wording as for Grande Ronde
* Imnaha River should be monitored for fish in and fish out to complement habitat restoration gap analysis and modeling for RPA 56.1. (Participants note that the potential for habitat improvement levels that are substantial enough to detect change in fish populations is not likely. However, this watershed is a priority for fish in and out for hatchery effectiveness monitoring).

**Other Recommendations or Consolidations**1. (Highest Priority) DPS-level GSI and PIT tag studies including PIT Tag array in the Imnaha subbasin.
2. (High Priority) Implement modified adult escapement monitoring using Pit tags and weirs—Imnaha River subbasin (project 200205600)
3. (Lower Priority) Implement new EMAP habitat status trend n monitoring.
4. (Highest Priority) Maintain ongoing LSRCP hatchery effectiveness, RSS studies, and lower basin tributary trapping efforts.
 | **Existing/Modified/New Projects To Implement RPA Recommendations****Existing/Modified/New to Implement Other Recommendations**1. DPS-level GSI and PIT tag studies including PIT Tag array in the Imnaha subbasin expansion of 200301700 or 199701501
2. Implement modified adult escapement monitoring—Imnaha River subbasin (project 200205600)
3. Implement new EMAP spawner distribution study and habitat status and trends monitoring (integrate with EMAP sampling of Chinook in project 200713200).
4. Expand Imnaha River Smolt to Adult Return Rate and Smolt Monitoring Project (199701501) to provide juvenile production estimate (additional 64,000/yr).
5. Implement stream watershed assessments via NPT watershed monitoring plan (200206800) 291,000/yr integrate with EMAP projects.
 |
| **Clearwater****IDFG, NPT** |  **VSP** ISMES 19905500, INPMEP 199107300, ISS 198909800, 200723300 **HATCHERY**198335000, 198335003 199801004 199102900 200203200 199602000**HABITAT** | * Maintain current array of juvenile population estimates and adult weirs until GSI is proven effective. Continue select index area juvenile snorkel surveys indefinitely for trend, spatial structure, and diversity.
* Assess representativeness of existing MSA escapement estimates relative to population level trends.
* Continue adult and juvenile monitoring at selected index streams for life cycle monitoring (SAR, smolts per spawner, adult productivity). Goal is to monitor one stream in each population.
* Continue habitat effectiveness monitoring in the Potlatch River.
 | * PHOS is not easily determined for Clearwater populations due to difficulty in sampling and identifying hatchery origin spawners.
* Adult abundance trapping efficiency of weirs at some locations (and/or years) is unknown.
* Efficacy of steelhead supplementation is unknown. (Check on wording from previous MPGs)
* The effects of habitat restoration projects influencing juvenile and adult abundance is unknown.
 | **RPA Workgroup Recommendations:*** Maintain current contracts ISMES 199005500, and INPMEP 199107300. ISS 198909800 is scheduled to end in 2014. (Participants recommend deleting the following due ability to address through other projects. This project should be reconfigured at its completion in 2014 based on results of genetic information obtained from the GSI experimental approach to continue to collect adult and juvenile data for strategic locations in the basin or combined with ISMES 199005500.
* Assist in funding full parental genotyping to ascertain results of Snake river DNA strategy. (Participants addresses this at the DPS level)
* If the above strategy is successful, reconfiguring of adult and juvenile monitoring may be appropriate in 2013 (Is this recommendation appropriate? This is an adaptive management issue and will require at least two or more year classes of steelhead).
* Systematically sample returning adult steelhead at Lower Granite Dam for genetics and age structure and mark the fish with PIT tags. Establish remote PIT tag interrogation systems near the mouths of Selway, Lochsa, South Fork, and Lolo Creek populations. As part of 56.2, an interrogation system already exists near the mouth of the SF Salmon River population. Finally place another interrogation system upstream from the mouth of the confluence of the Middle Fork Salmon River. The latter system can be used to determine if B-Run steelhead occur in areas upstream from the MF. These systems can be used to assess the distribution, abundance, and productivity of steelhead within a majority of the B-Run populations. (Participants are concerned that this is not a proven technology.. We recommend an assessment of the cost effectiveness compared to the other strategies. See the comments under the DPS and where the pilot assessments can be made in Big Creek, South Fork Salmon River, Lemhi River, Secesh River, Imnaha River, Lolo Creek, Asotin, Upper Grande Ronde, and Joseph Creek. Participants recommend that wherever possible fish in and fish out should be paired with the PIT Tag arrays. The cost vs. benefit should be addressed between GSI and PIT tag evaluations of TRT populations within the Clearwater.)
* Provide hand-held PIT tag detectors to harvest managers to determine the harvest of steelhead in fisheries upstream of Lower Granite Dam. (Participants do not understand the value of this recommendation for assessing natural steelhead. Harvest of wild origin fish is illegal)
* SF Clearwater River should be monitored for fish in and fish out to complement habitat restoration gap of 14% analysis and modeling for RPA 56.1.( Participants note this will also address supplementation monitoring)
* RFP for specific B-run monitoring (need to determine if CRITFC Accord project 2008-723 fills the gap for abundance and productivity), but "safety net" triggers still need to be investigated.( Determine what this is in regard to hatchery RPA)

**Other Recommendations or Consolidations**1. Highest Priority Maintain ISMES 199005500
2. Highest Priority Maintain INPMEP 199107300 Our strategy assumes that the data collected by these projects will continue to be obtained.
3. Highest Priority ISS 198909800 should be completed by2014. The VSP information obtained for adult and juvenile steelhead abundance needs to be maintained by either modifying this project or combining with another contract
4. (Highest Priority) Implement a supplementation monitoring program of steelhead in the SF Clearwater River and Lolo Creek (PIT tag array and weir in Lolo Creek and PIT tag array and screw trap in SF Clearwater.
5. (Lower Priority) Assess correlation between Potlatch MSA and remainder of Lower Clearwater population In terms of VSP metrics.
 | **Existing/Modified/New Projects To Implement RPA Recommendations****Insert here any proposals for implementing the RPA recommendations with short description of contract, amount/yr, and contractor****Existing/Modified/New to Implement Other Recommendations****(Insert here any other proposals for addressing the recommendations for filling priority gaps with a short description of contract, amount/yr, and contractor)** |
| **Salmon****IDFG, NPT, SBT** | **VSP**ISMES 19905500, INPMEP 199107300 ISS 198909800 198335003,200301700, 199703000**HATCHERY**200740200 198909800 200706400 **HABITAT** | * Maintain current array of juvenile population estimates (GRTS based juvenile:juvenile productivity) and adult weirs until GSI is proven effective. Continue select index area juvenile snorkel surveys indefinitely for trend, spatial structure, and diversity.
* Continue adult and juvenile monitoring at selected index streams for life cycle monitoring (SAR, smolts per spawner, adult productivity). Goal is to monitor one stream in each population.
* Estimate adult escapement into Big Creek using PIT array.
* Implement a supplementation monitoring program in the EF Salmon River and Yankee Fork.
* Continue habitat effectiveness monitoring in the Lemhi River.
 | 1. Eleven percent of the hatchery origin steelhead released in the Snake MPG are not marked (primarily supplementation releases) and those with an adipose fin clip can not be adequately identified to the hatchery stock or release site. .(Modify based on Clearwater)
2. Trapping efficiency of weirs at some locations (and/or years) is unknown.(Modify based on Clearwater)
3. Weir in the EF Salmon River is not in the correct location to manage and monitor the supplementation program using HRSG criteria.
4. The effects of habitat restoration projects influencing juvenile and adult abundance is unknown. .(Modify based on Clearwater)
5. Efficacy of steelhead supplementation is needed. .(Modify based on Clearwater)
 | **RPA Workgroup Recommendations:*** .(Modify all recommendations based on Clearwater)Maintain current contracts ISMES 199005500, and INPMEP 199107300. ISS 198909800 is scheduled to end in 2014. However, the location and information derived from the weirs and traps associated with this project are extremely valuable for evaluating status of B-run steelhead in many tributary streams. This project should be reconfigured in 2014 based on results of genetic information obtained from the full parental genotyping experimental approach to continue to collect adult and juvenile data for strategic locations in the basin or combined with ISMES 199005500.
* Assist in funding full parental genotyping to ascertain results of Snake river DNA strategy.
* If the above strategy is successful, reconfiguring of adult and juvenile monitoring may be appropriate in 2013.
* Systematically sample returning adult steelhead at Lower Granite Dam for genetics and age structure and mark the fish with PIT tags. Establish remote PIT tag interrogation systems near the mouths of Selway, Lochsa, South Fork, and Lolo Creek populations. As part of 56.2, an interrogation system already exists near the mouth of the SF Salmon River population. Finally place another interrogation system upstream from the mouth of the confluence of the Middle Fork Salmon River. The latter system can be used to determine if B-Run steelhead occur in areas upstream from the MF. These systems can be used to assess the distribution, abundance, and productivity of steelhead within a majority of the B-Run populations.
* Provide hand-held PIT tag detectors to harvest managers to determine the harvest of steelhead in fisheries upstream of Lower Granite Dam.
* Lemhi River and SF Salmon River should be monitored for fish in and fish out to complement habitat restoration gap analysis and modeling for RPA 56.1 and because it is required in RPA 50.4.
* RFP for specific B-run monitoring (need to determine if CRITFC Accord project 2008-723 fills the gap for abundance and productivity), but "safety net" triggers still need to be investigated.

**Other Recommendations or Consolidations**1. .(Modify based on Clearwater)ISMES 199005500, INPMEP 199107300 Our strategy assumes that the data collected by these projects will continue to be obtained.
2. .(Modify based on Clearwater)ISS 198909800 is due to sunset in 2014. The VSP information obtained for adult and juvenile abundance needs to be maintained by either modifying this project or combining with another contract.
3. **(High Priority)** Fund temporary weir project in upper Salmon River tributaries on a long-term basis to obtain abundance and proportion hatchery origin adult data.
4. **(Highest Priority)** Fund construction of a weir near the mouth of the EF Salmon River (HSRG recommendation).
5. (**Highest Priority)** Modify the current project to improve PIT-array for Big Creek.
6. **(Highest Priority)**Monitor supplementation implementation in the Yankee Fork and install a permanent weir near the mouth.
7. **(High Priority)** Install screw trap in Panther Creek to assess effectiveness of eyed egg program.
 | **Existing/Modified/New Projects To Implement RPA Recommendations****Insert here any proposals for implementing the RPA recommendations with short description of contract, amount/yr, and contractor****Existing/Modified/New to Implement Other Recommendations****(Insert here any other proposals for addressing the recommendations for filling priority gaps with a short description of contract, amount/yr, and contractor)** |
| **Mid Columbia Steelhead DPS** |
| **Umatilla/Walla Walla****CTUIR, ODFW, WDFW,**  | **VSP**199000501, 198902401 200003300, and 200003900**HATCHERY**199000500 198903500, 200003801**HABITAT**200901400 | **Maintain moderate to high precision estimation monitoring approaches that are currently in place for abundance, productivity, spatial structure and diversity. The Walla Walla Salmonid Monitoring and Evaluation Project is funded per the 2008 Columbia Basin Fish Accords. This collaborative project is conducted by CTUIR and WDFW. The purpose of this study is to strengthen salmonid status and trend monitoring in the basin, improve effectiveness monitoring, and facilitate the implementation of a regionally standardized monitoring and evaluation program. Study objectives are to monitor and evaluate salmonid viability, survival and productivity (VSP) in areas of the Walla Walla, Touchet, and Mill Creek drainages. This project estimates adult returns, spawning abundance and smolt production to describe stock status to and trends in relation t****VSP*** Maintain VSP information obtained at 3 mile dam for Umatilla adult abundance
* Conduct tributary redd counts to detect spawner distribution.
* Have annual smolt abundance estimates and calculate natural origin SAR for the Umatilla basin. Done in order to have freshwater productivity data. Only mid Columbia data for steelhead for productivity and survival rate date.
* Diversity information obtained at 3 mile dam and genetic monitoring sampled periodically from juveniles. Adults sampled during broodstock collections

**HATCHERY.** * Supplement the Umatilla River steelhead and evaluate the response and compare hatchery and natural origin response. Provide fish for tribal and recreational fisheries
* Continue to evaluate the benefits and risks of supplementation by monitoring natural origin abundance, productivity, life history, and make comparisons of hatchery and natural origin fish and compare Umatilla productivity with John Day natural populations**.**

**Habitat*** Implement habitat monitoring to adequately assess status and trends and evaluate overall habitat actions.
* Determine effectiveness of specific habitat actions unique to the Umatilla limiting factors.
 | 1. Smolt abundance monitoring at 3 mile dam is not efficient and limits access to natural origin steelhead. It affects precision estimates. Funding only allows for steelhead analysis and not Chinook.
2. Lack of enough marked juvenile fish (PIT Tags) in the system
3. Need for analysis of backlog of genetic samples collected by NOAA at Montlake.
4. Analysis of comparisons of natural and hatchery fish in Umatilla and John Day is lagging and unfunded.
5. Status/trend for habitat in Umatilla basin not funded.
6. Basin participants need to focus the current habitat effectiveness monitoring plan to determine which limiting factors should be monitored.
7. Need adult abundance returning to Wall Walla to enumerate total adult returns
8. Determine if adult data from Bennington Dam is biased
9. Improve weir system on Touchet at Dayton to enumerate adults (ask Glenn if recent improvements have addressed gap pending answer delete gap or add recommendation)
10. Place juvenile migrant trap near the mouth on Touchet to estimate smolt survival in lower Touchet
11. Improve estimates of freshwater salmonid productivity
12. Maintain and expand population genetic diversity information (Walla Walla River in Oregon) (Assume Touchet endemic program is covered by LRSCP
 | **RPA Workgroup Recommendations:*** Umatilla River should be monitored for fish in and fish out to complement habitat restoration gap analysis and modeling for RPA 56.1.

**Other Recommendations or Consolidations**1. Need to have genetic samples analyzed
2. Need funding for expanding steelhead smolt marking using PIT tagging basin wide **#199000501** and **#198902401**.
3. Need to expand capacity under BPA **#199000500** to analyze data on hand and being gathered annually to assess supplementation benefits. This is consistent with AHSWG and recovery plans. HSRG recommended.
4. Need a new capital project for upgrading 3 mile dam smolt sampling facility
5. Implement habitat status/trends probabilistic sampling throughout the Umatilla basin.
6. Need for evaluation of effectiveness of flow augmentation in the basin.
7. 1-CTUIR BiOp Accord continues funding for BPA #199000501 and #200003900, #200901400
8. 2-Explore consolidating CTUIR and ODFW video enumeration at Nursery Bridge Dam
9. 5-Incorporate freshwater productivity and genetics into CTUIR into #200003900
10. 4-Explore options to enumerate adult returns including potential top lace weir in lower Walla Walla, or improve rotary trap efficiency combined with PIT tags
11. 3-Install and operate smolt trap in lower Touchet
 | **Existing/Modified/New Projects To Implement RPA Recommendations****Insert here any proposals for implementing the RPA recommendations with short description of contract, amount/yr, and contractor****Existing/Modified/New to Implement Other Recommendations**1. CTUIR BiOp Accord continues funding for BPA **#199000501** and **#200003900**
2. Touchet smolt trap install $24,000 and operate $80,000 annually
 |
| **John Day****ODFW, CTWSIR** | **VSP**199801600 and 200301700NOAA IMW**HATCHERY**None**HABITAT**200301700 | **VSP**1. Maintain ongoing extensive IMW monitoring of MF and SF natural populations
2. Improve monitoring of VSP in the other three populations
3. Determine potential effects of out of basin straying of hatchery fish on the John Day Populations.
4. Improve the information on VSP spatial structure and diversity criteria.
5. Maintain ongoing life stage specific survival (SAR) monitoring for future TRT evaluations

**HATCHERY**Develop better understanding of origin and abundance of hatchery strays in John Day.**HABITAT*** Determine the effectiveness of habitat restoration actions within the JD basin and to detect fish response in the IMWs within the basin.
* Maintain the SF as a reference stream for actions in the MF and Bridge Cr.
 | 1. Maintain probabilistic monitoring of VSP for MF and SF natural populations.
2. More complete information on genetic structure and hatchery introgression of natural populations is needed
3. Inadequate adult abundance and productivity data for Lower Mainstem, NF, and Upper Mainstem populations
4. Confidence intervals around probabilistic monitoring are wide and need to be narrowed to meet NOAA guidance.
5. Need for more specific population SAR and smolt abundance rather than pooled SAR for multiple populations
6. PHOS potentially inaccurate for all populations due to small sample sizes.
7. Need better estimates of cohorts, age, sex ratios due to small sample size.
 | **RPA Workgroup Recommendations:**1. Expand the work to increase density of sampling in project #199801600 to include GRTS sampling of adults and juveniles in the lower and upper Mainstem.
2. Develop short term contract RFP for estimating PHOS and DNA baseline in the MPG
3. Lower mainstem, North Fork, Upper Mainstem, Middle Fork, and South Fork John Day River should be monitored for fish in and fish out to complement habitat restoration gap analysis and modeling for RPA 56.1 and because it is required in RPA 50.4.

**Other Recommendations or Consolidations** | **Existing/Modified/New Projects To Implement RPA Recommendations****Insert here any proposals for implementing the RPA recommendations with short description of contract, amount/yr, and contractor****Existing/Modified/New to Implement Other Recommendations****(Insert here any other proposals for addressing the recommendations for filling priority gaps with a short description of contract, amount/yr, and contractor)** |
| **Yakima****YN, WDFW** | **VSP**199603501 and 199506325**HATCHERY**200203100 199701325 198811525**HABITAT** | * Maintain existing facilities and counts at Chandler and Roza and monitoring component of the Yakama watersheds program and monitoring associated with kelt reconditioning program. Explore the potential to PIT tag all handled adults. There may be logistic and permitting issues
* Build Genetic stock ID capability: Finalize baseline; conduct power analysis/define required sample of run, collect representative sample of MPG at Prosser (will require spring denil samples) and use genetics to make population-specific adult abundance estimates.
* Adult tracking: Radio-track fish sampled at Prosser to spawning to determine holding patterns, spawning locations and potentially pre-spawn mortality. Use data to ground-truth genetic-based pop estimates; only required on a periodic basis
* Spatial Distribution: Install PIT tag arrays strategically throughout basin. Maintain existing redd surveys in Satus, Toppenish and Ahtanum watersheds; improve distribution info in the Naches basin (maintain/expand redd surveys, periodic aerial survey & tagging studies and Upper Yakima (implement limited redd surveys if feasible; use tagging capacity at Roza and detectors in tribs to track distribution).
* Juvenile productivity: Improve estimates of juvenile productivity for all populations through improvement of smolt enumeration at Chandler, maintain and increase tributary screw traps and PIT-tagging. Understand resident and anadromous O. mykiss relationships
* Understand factors limiting out migrating smolt migration in mainstem
 | 1. Inability to allocate population level abundance from MPG estimates
2. Unknown precision estimates for redd counts
3. Limited ability to estimate juvenile productivity and smolt estimates
4. Limited information on Naches, mainstem and Upper Yakima spawner distribution
5. Limited understanding of resident/anadromous O mykiss relationships
6. Limited understanding of factors affecting smolt outmigration (predation, water quality, flow and infrastructure etc)
7. Limited understanding of mainstem adult migration patterns and potential affects on returns to the Yakima
 | **RPA Workgroup Recommendations:*** Develop GRTS juvenile sampling in the tributaries to determine steelhead distribution and abundance.
* Conduct additional DNA evaluations at Prosser Dam and lower river tributaries to accurately parse out adult steelhead spawners
* Upper Yakima River should be monitored for fish in and fish out to complement habitat restoration gap analysis and modeling for RPA 56.1 at Roza Dam.
* Evaluate the Yakama Nation proposal to determine if it adequately addresses this RPA (63.1).

**Critique of RPA Recommendations*** Marking all hatchery fish is irrelevant for steelhead in the Yakima as there are no hatchery releases
* RPA recommendation bullet 1 is not considered the best approach in the Basin. Inability to identify anadromous and resident O.mykiss makes determining juvenile steelhead abundance and distribution problematic. Local recommendation is to improve adult abundance and distribution estimates as outlined below

**Other Recommendations or Consolidations**1. Implement GSI to population level capability by trapping fish at Prosser combined with radio tagging and PIT tagging. Lower River (downstream of Prosser) tributaries as identified in RPA bullet 2 are not a priority
2. Improve smolt abundance estimates at Prosser. Will require better flow/entrainment estimates and use of genetics to determine subpopulation estimates
3. Research proposal to understand anadromous/resident interactions and potential recovery implications
4. Research proposal to better understand factors affecting smolt outmigration (predation, water quality, flow and infrastructure etc)
5. Strategically install PIT tag arrays. Estimate will need 5-10 arrays. Maintain and expand redd detection in the Naches, mainstem Yakima and Upper Yakima. Explore cost-effective alternatives to better determine spawning distribution
6. Recommend RPA bullet 3 likely infeasible for Upper Yakima or Naches. Suggest for fish in and fish out, a habitat status and trend program be implemented in Satus or Toppenish Creek where significant habitat improvement work is planned. Adult and smolt trapping feasibility needs to be assessed.
 | **Existing/Modified/New Projects To Implement RPA Recommendations****Insert here any proposals for implementing the RPA recommendations with short description of contract, amount/yr, and contractor****Existing/Modified/New to Implement Other Recommendations**1. Priorities 1 and 2 are partially covered by current BPA projects.
2. Priority 1- Estimate an additional $60,000 to clear backlog of existing DNA samples. An additional $50,000/yr for five years is estimated need to collect and process samples to complete baseline. Approximately $50,000/yr is needed to sample and process a subset of adults at Prosser and another $50,000/yr to sample and process juveniles at Chandler.
3. Priority 2- An estimated $50,000 is needed annually to “shore up” flow/entrainment estimates. It may be possible to use some Accord money to help fund a portion of the above work.
4. Priority 3- Estimated $230,000 (total) for three year radio tracking project, with YKFP funds and BOR funds as cost share. (Acoustic tracking may be an alternative that needs further exploration)
5. Priority 3-- $200,000/yr for three years, (tagging) $100,000/yr for three years for tracking and analysis of resident-nanadromous interactions (There is potential to cost share crew time with ongoing work) May be partially included in BOR BiOp.
6. Priority 4- Some work currently being conducted on smolt migration factors but no comprehensive approach. May be partially included in BOR BiOp.
7. Priority 5- $40,000 per array plus maintenance plus about $20,000/year to improve redd surveys.
8. Priority 6 – We believe this priority may not be feasible from a cost-benefit perspective.
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| **Cascade East Slope****CTWSIR, ODFW, YN, WDFW** | **VSP**199506335 200715600 199811535 199506425 199404200 198805303**HATCHERY**200831000 200830700198811535**HABITAT**White Salmon River Proposal from FY 2007 BPA project solicitation #200712200n | **WASHINGTON STRATEGY****Klickitat River*** VSP Adult abundance is estimated using mark-recapture population estimates via floy tagging at Lyle Falls adult trap)
* VSP Juvenile outmigrant abundance and productivity will rely on development of rotary screw traps
* Spatial distribution of spawners monitored via redd surveys
* Ongoing genetic sampling and analysis of returning adults is occurring at Lyle Falls adult trap (has identified subpopulation structure and relative contributions of various spawning tributary habitats)
* PIT tagging of wild and hatchery juveniles is planned for near future (at screw traps and Skamania Hatchery) for SAR estimates
* PIT tagging of wild juveniles in White Creek watershed (major spawning trib), along with an instream reader in lower White Cr., is occurring (to determine migration patterns, survival, and habitat project effectiveness)
* Some genetic sampling of juveniles has occurred, more could occur in near future
* PIT tag detection will be built in with planned improvements at Lyle and Castile Falls
* Radio telemetry monitoring occurring soon to determine hatchery vs. wild spawning distribution, winter vs. summer spawning distribution, passage problems

**White Salmon River Strategy**Existing habitat conditions and fish populations within the White Salmon River subbasin are to be measured in preparation for salmon and steelhead reintroduction above Condit Dam and before major habitat restoration related to their reintroduction. Information regarding the existing salmonid stock composition, needed to make decisions regarding the appropriate strategies for reintroduction, is lacking. This project is a multi-agency effort designed to assess the abundance, spatial structure, and genetics of adult and juvenile salmon and steelhead below Condit Dam and the fish habitat and characteristics of resident salmonids above Condit Dam. **OREGON STRATEGY****VSP*** Sustain tributary weir trapping and counting at Buckhollow and Bakeoven for adult abundance. Estimate abundance of spawners in the mainstem Deschutes only.
* Determine spatial distribution through radio tagging and tributary weirs.
* Shearers Falls is used as adult abundance counting for natural and hatchery fish for nearly 100% of basin. Part of strategy is to be able to know what proportion remain in Deschutes and those that fall back.
* Determine the impact and percentage of resident rainbow to overall production.
* Determine origin, distribution, and abundance of mainstem spawners in the Deschutes
* Proposed smolt monitoring strategy focuses on collecting migrant data in tributaries at Bakeoven, Warm Springs, Shitike, Buckhollow and Trout Creek tributary where primary spawning takes place.
* Life history diversity relies old sampling. Desired strategy is to obtain annual age structure and PHOS form adult trapping proposed. Juvenile information would be collected from proposed and ongoing smolt traps.
* Ongoing GSI project should provide important genetic diversity information.
* Current strategy is to determine the change in distribution and abundance/productivity of steelhead based upon reintroductions into previously empty habitat where recovery requires re-establishing production in the unoccupied area of westside population.

**HATCHERY*** Use the hatchery program as a tool for reintroducing steelhead into unoccupied Westside Deschutes area and Crooked River.
* Continue harvest augmentation and mitigation roles.
* Assess the success of reintroducing and developing sustained and natural production above the Pelton-Round Butte complex through monitoring monitoring adult and juvenile hatchery products and natural production.
* Mark all hatchery fish.

**HABITAT*** CTWSRO monitors habitat status/trends on the reservation using full census of riparian habitat
* Intent is to extend habitat status/trend data throughout the MPG.
* Collective impacts of habitat treatments are being evaluated through some project specific monitoring, that looks at changes in limiting factors in the basin and paired with fish response.
 | **WASHINGTON GAPS**1. Need Klickitat juvenile outmigration abundance estimates (difficult with screw traps due to flow and large hatchery releases)
2. Need refined and ongoing Klickitat adult abundance estimates
3. Need survival estimates for Klickitat smolt-to-adult returns for wild fish
4. Need Spawner abundance in upper Klickitat.
5. Additional data is needed on the current distribution of adult spawning steelhead throughout the Rock Creek subbasin. Two years of spawning surveys have been conducted for 2007 & 2008 spawning seasons.
6. No direct estimates of abundance and productivity for steelhead throughout the subbasin. Also presence and absence surveys need to be conducted in lower mainstem and its tributaries.
7. Additional evaluation of population phenotypic and genetic variation of Rock Creek steelhead

**OREGON GAPS**1. Fallback rates at Shearers is not known.
2. Fifteen mile Creek has inadequate estimates of cohorts, age, sex ratios and PHOS
3. Better annual estimates of mainstem spawner abundance and distribution for Deschutes for hatchery and natural fish
4. Need improved sampling of natural origin fish for age structure at weir and trap locations where access to fish occur. Adult age structure and other life history information should be collected at ongoing sampling sites in Deschutes.
5. Influence of stray hatchery fish on productivity is not known.
6. Identified smolt and adult trapping is needed at tributary sites at Bakeoven and Buckhollow Creeks.
7. Need to know what impact reintroductions have on viability for West Side Deschutes
8. Currently do not have adequate information of PHOS and PNOS and the origin of the PHOS on the spawning grounds.
9. No MPG scale status/trend habitat monitoring funded at this time.
10. Role of resident fish upon anadromous production is not understood.
 | **RPA Workgroup Recommendations:*** Combine #199506425 with #19881205 or #19950633
* Complete modification of Lyle falls trap and Castile Falls traps in Klickitat under 198811535
* Klickitat River and Fifteen Mile Creek should be monitored for fish in and fish out to complement habitat restoration gap analysis of 4% in Klickitat River and because Fifteen Mile Creek contains winter steelhead per RPA 56.1.

**Other Recommendations or Consolidations****WASHINGTON RECOMMENDATIONS**1. Complete modification of Lyle falls trap and Castile Falls traps in Klickitat under 198811535
2. Additional mark-recapture estimates for Klickitat smolt and returning adult abundance
3. PIT tagging/survival estimates for Klickitat smolt-to-adult returns for wild fish
4. Klickitat PIT detection and video and/or DIDSON monitoring at Castile Falls (planned with upcoming improvements) for upper basin spawner abundance
5. YN obtained expanded funding for Rock Creek under BPA #200715600 at $291,307.00 for fish assessment work per BiOp Accord MOA.
6. Operate Rock Cr Screw trap in lower mainstem to obtain specific information about juvenile production, movement, and smolt outmigration.
7. Consultation of specific environmental and natural resource specialist for stream rehabilitation design for key locations in Rock Creek.

**OREGON RECOMMENDATIONS****Deschutes System**1. Develop and implement Fall Back study at Shearer Falls.
2. Implement stray impact proposal for Bakeoven and Buckhollow wiers.
3. Implement population scale GRTS sampling for Deschutes MPG
4. Increase effort to obtain diversity information (age, origin, etc.) at Warm Springs, Shitike, Buckhollow, and Bakeoven.
5. Develop a study plan for addressing the interactions and impacts of resident and anadromous forms of O mykiss on basin productivity and distribution.
6. Develop an approach for determining abundance and origin of mainstem spawners.
 | **Existing/Modified/New Projects To Implement RPA Recommendations****Insert here any proposals for implementing the RPA recommendations with short description of contract, amount/yr, and contractor****Existing/Modified/New to Implement Other Recommendations**1. Three Tribes BiOp Accord MOA for Klickitat maintains existing **BPA #199506335 at $520,000/yr and expands it**
2. CTWSRO propose to continue to fund **BPA #198805303 at $502,103/y**r under BiOp Accord MOA for lower Deschutes (Check on this statement
3. YN obtained expanded funding for Rock Creek under BPA #200715600 at $ for fish assessment work per BiOp Accord MOA
4. BiOp Accord funding for BPA #200715600 will fund most monitoring needs for Rock Creek
5. Additional funding is needed to cover cost for Rock Cr. stream rehabilitation consulting (~$100,000.00).
 |
| **Upper Columbia Steelhead DPS** |
| **North Cascade Slope****WDFW, CCT, YCT** | **VSP**199604000 200301700 200303900 200850300 200900200 200302200 200850300 Chelan, Douglas, and Grant PUD agreements**HATCHERY**200900100 199604000200845800 200302200 200721200**HABITAT**200301700 | **VSP STRATEGY**1. Current strategy for multi-year VSP tracking TRT employs dam counts with spawners parsed out to tributary populations based upon previous radio telemetry studies.
2. Concurrently moving toward annual estimates of adult abundance based on non-random redd surveys based on some measure of precision and accuracy. A variety of approaches varying between full census to index sites. Currently using a variety of approaches until one or more is adopted. Within 3-5 years be able to have better understanding of which approach is most precise and accurate.
3. Use PIT tag arrays to determine PHOS and PNOS.
4. Smolt traps in all four primary populations. For the most part enumerate most of juvenile migrant production in the watersheds.
5. Strategy emphasizes the primary populations, but little or no VSP work in smaller tributaries to the Columbia.
6. Distribution estimates rely upon periodic random adult sampling outside of index areas in Wenatchee. Okanogan is nearly a census survey for adults. Entiat is using a census.

HATCHERY STRATEGY1. Supplementation of Methow, Wenatchee, and Okanogan for both conservation and harvest opportunities.
2. No plans at this time to cease supplementation in any of the watersheds based upon AHSWG recommendations
3. Monitoring for VSP is used to determine hatchery presence. Currently using treatment and reference comparisons. Intent is to have reference populations as areas where supplementation is not occurring.
4. Relative reproductive success is being tested to determine whether supplemented fish is changing RRS percentage.
5. Kelt reconditioning is being used to increase adult respawners above current rate of 2%. Monitoring will occur at dams and on spawning grounds through PIT tagging.

Genetic monitoring within and among populations every 10 years to detect genetic draft and effective population size. **HABITAT STRATEGY**1. The strategy is to use GRTS probabilistic sampling for determining habitat status and trends throughout the Upper Columbia River using ISEMP and OBMEP as the projects sponsoring this strategy
2. AREMP and PiBO implemented on USFS and BLM lands in Upper Columbia River for habitat status trends using GRTS probabilistic sampling and remote sensing.
3. Effectiveness monitoring in upper Columbia is geared toward ISEMP evaluations in the Wenatchee and Entiat. BOR and USGS effectiveness monitoring in the Methow, and OBMEP effectiveness monitoring in the Okanogan coupled with SRFB reach scale effectiveness monitoring in selected locations for all the basins
4. Identify reference areas and ensure that they are maintained as such and that the monitoring in those areas are continued as a long term data set.
 | 1. Lack of steelhead monitoring in the Entiat, Methow, and Okanogan. Data needed includes sex ratio, origin, and age so that VSP can be monitored in these basins. Currently no facilities or methods available.
2. Determine relative performance and reproductive success if hatchery and naturally produced fish in the wild. DPUD and Action Agencies are required to measure for the Methow and CPUD for the Wenatchee.
3. Determine the effects of exotic species and predatory native species on recovery of steelhead and the feasibility to eradicate or control their numbers.
4. Develop a reference condition for genetic variation for steelhead.
5. Determine the link between habitat creation, restoration and fish use and productivity.
6. Need to validate steelhead redd surveys and spawning escapement estimates. Use of mark recapture is recommended.
7. Assess if hatchery programs increase the incidence of predation on naturally produced steelhead.
8. Assess if hatchery programs increase the incidence of disease on naturally produced steelhead.
9. A reference condition metric is needed for the phenotypic variation metric for steelhead.
10. Assess the interactions between hatchery and naturally produced steelhead.
11. Understand the need and magnitude of adding nutrients as part of an ESU wide plan to determine where and how, and how much nutrient supplementation is required.
12. Options and effectiveness of actions to reduce water temperature is not known
13. Examine the feasibility and effectiveness of steelhead kelt reconditioning
14. Need more complete origin and age structure for all populations in order to properly expand natural origin abundance and productivity
15. Steelhead redd surveys and spawning escapement estimates are not validated. Recommend validation of redd surveys using mark recapture techniques. Validate estimated pre-spawn mortality rates.
16. VSP evaluation is reliant on Upper Columbia hatchery supplementation.
17. Determine relative performance (survival and productivity) and reproductive success of hatchery and naturally produced fish in wild.
18. Status and trend habitat monitoring in the Methow
19. Potential future gap: water quality and quantity sampling in the Wenatchee and Entiat because the WECY is looking to reduce monitoring sites.
20. Define appropriate metrics for assessing status and trends of habitat
 | **RPA Workgroup Recommendations:**[Assumptions of the workgroup in evaluating whether the current program met RPA requirements were that the following four recommendations were additions to current monitoring conducted under the various projects**.]*** Estimate precision and accuracy of redd counts wherever these counts are used to estimate spawning escapements. This work could be conducted within smaller watersheds within the three basins. There also needs to be research on the number of redds per female and estimates of fish/redd which are used to estimate spawning escapements.
* Increase the number of PIT tagged naturally produced steelhead in the Entiat and Methow systems to better estimate migration timing, residence, and life stage survivals.
* Increase accuracy and precision of abundance estimates of steelhead smolts produced in the Wenatchee, Methow, Okanogan, and Entiat basins. Current estimates have very wide confidence intervals.
* Funding for 3 year telemetry study in Wenatchee, Methow, Okanogan and Entiat basins. Adult steelhead would be tagged at Priest Rapids Dam. (Note: given the current and proposed installation of PIT-tag interrogation systems in the UC tributaries, the use of PIT-tags may be useful in estimating steelhead origin and spawning escapement.)
* Evaluate the Yakama Nation proposal to determine if it adequately addresses this RPA (63.1).
* PIT tagging efforts should be included in the USFWS plan for monitoring steelhead spawners. In addition, ensure differential tagging (with PIT tags) of 1-yr and 2-yr smolt experiment.Develop RFPs for both populations, with potential cost sharing for Methow steelhead. For Methow steelhead, there is a need to coordinate with Douglas PUD through their HCP Hatchery Coordinating Committee (and potentially the USFWS). BPA has initiated discussions.
* The workgroup recommends convening a meeting with appropriate stakeholders to determine goals, objectives, and methods. Additional discussion will need to take place to determine potential cost sharing. The results of the meetings will aid in the development of a targeted RFP.

**Other Recommendations or Consolidations**1. 200301700 is a crucial contract for maintaining VSP information in the Wenatchee and Entiat.
2. 200302200 OBMEP is crucial project for enumerating VSP on the Okanogan R.
3. Methow is dependent upon PUD funding and the BOR.
4. 200845800 is crucial project for YN M&E in upper Columbia River for supplementation.
5. Ensure continuation of WECY water quality and quantity gauges.
6. Evaluation of resident populations and the interactions between resident and anadromous forms.
7. Increase the detection arrays and analysis of PIT Tags in the overall Upper Columbia basin.
8. Implement habitat status and trend monitoring in the Methow
 | **Existing/Modified/New Projects To Implement RPA Recommendations**1. WDFW proposes to conduct a 3 year radio telemetry study in Wenatchee, Methow, and Okanogan and Entiat basins to determine distribution from mainstem dams at $250K/yr for 3 years.

**Existing/Modified/New to Implement Other Recommendations**1. Modify project 200302200 OBMEP by increasing annual amount by $225,000 to implement PIT tagging in the Okanogan River.
2. New project to study reproductive success of hatchery and natural origin steelhead in the Wenatchee, Methow and Okanogan at $500K/yr but could have savings if combined with ongoing DPUD project and CRITFC study.
3. Begin new project that implements habitat status/trend monitoring in the MEthow watershed at $200K/yr.
 |
| **Lower Columbia Steelhead DPS** |
| **Coast****ODFW, WDFW** | **VSP**NOAA Mitchell ActOregon LotteryWDFW State FundsSRFB**HATCHERY****HABITAT** | **ODFW Strategy*** ODFW has implemented either GRTS-based or census-based spawning surveys to provide population level information on abundance (spawners), productivity (recruits/spawner), diversity (occurrence of hatchery strays on spawning grounds, run timing, size, age, genetics), and distribution. Goal is to provide annual spawner abundance estimates at the DPS TRT population scale with a precision of + 30% or better.
* Where field protocols are not amenable, ODFW uses information from existing or new adult trapping facilities to provide abundance, productivity, and diversity for sub-watershed areas. In these instances ODFW is not able to assess spatial distribution.
* Where field protocols for juvenile surveys provide acceptable precision and bias, and access is possible, ODFW has implemented GRTS-based surveys to provide strata level information on an index of abundance (fish/m2), productivity (juveniles per mile/spawners per mile), and distribution. Goal is to provide annual estimates of juvenile density at the ESA strata scale with a precision of + 30% or greater.
* In at least one sub-watershed per strata, ODFW traps adults in and juveniles out to provide estimates of marine and freshwater productivity (i.e. Life Cycle Monitoring sites). Goal is to provide annual estimates of adults in and adults out of selected watersheds with a precision of + 30% or better confidence interval.

**WDFW Strategy Statement*** Washington has a statewide monitoring strategy for listed salmon and steelhead recovery. Strategy includes juvenile and adult abundance for one primary population per MPG associated with habitat evaluations.
* Lower Columbia Fish Recovery Board has a monitoring plan associated with the Recovery Plan that is being implemented.
* An IMW was implemented in the Lower Columbia in 2003 and is now having habitat restoration treatments. This IMW should be continued until results are available. Funding is through the PCSRF and Washington Salmon Recovery Funding Board.
* Adult abundance is estimated mostly using redd surveys with a few weirs.
* Adult productivity is determined by cohort analysis from sex ratio, origin, and age-structure of spawners from traps on Cowlitz, Toutle, Kalama, Lewis, and Wind. Wild Steelhead Release (WSR) for all LCR fisheries but impacts are not monitored.
* Juvenile productivity is estimated from 1 primary population per strata (Grays-Coast, Coweeman-Cascade, and Wind-Gorge) but is complicated by the inability to distinguish winter and summer steelhead smolts in the Wind, and the Wind is a subpopulation of the Upper Gorge population. Juvenile productivity is also estimated from IMW project. Cowlitz Falls juvenile sampling is for aggregate and Mayfield trap efficiency is over 40 yrs old.
* Adult spatial distribution is monitored for high use areas and periodically for lower use areas.
* Adult diversity is monitored by spawning time from redds.
* WDFW is participating in the ISTM project and will implement monitoring recommendations obtained from that project.

**ISTM Statement**The goal of the Integrated Status and Trends Monitoring (ISTM) project is to develop a coordinated VSP monitoring program that address key regional monitoring questions and develop study designs of sufficient quality and quantity to determine status of Lower Columbia River salmon and steelhead. In this process we will provide entities tasked with monitoring fish populations with a roadmap of the steps needed to develop an integrated, scientifically sound monitoring program that meet the needs of regional decision makers and managers. The objectives include: (1) indentify and prioritize decisions, questions, and objectives; (2) Evaluate extent to which existing programs align with these decisions, questions, and objectives; (3) Identify most appropriate monitoring design to inform priority decisions; (4) Use trade off analysis to develop specific recommendations for monitoring based on outcomes of objectives 1-3 and; (5) recommend implementation and reporting mechanisms.Results of this project for application by ODFW and WDFW to current monitoring approaches is projected for 2011.The Lower Columbia River Fish Recovery Board plans to integrate the recovery planning process results into the study. | **ODFW**1. Need for a coordinated approach to VSP evaluations and habitat across the ESU
2. Implement GRTS redd sampling in Oregon tributaries
3. Mark recapture studies to determine GRTS and Index bias
4. Implement juvenile trapping in areas where adult abundance is known for fish moving into hatchery exclusion areas.

**WDFW**1. PHOS/gene flow cannot be estimated
2. Some key assumptions are untested in the mark-recapture methodology, spatial distribution, and race differentiation.
3. Incidental harvest component of adult productivity from non-targeted fisheries is not precise.
 | **RPA Workgroup Recommendations:*** Fund Lower Columbia ISTM coordinated by PNAMP

**Other Recommendations or Consolidations****ODFW**1. Adequately fund the current ISTM project **200400200** for integrated fish and habitat status and trend monitoring for the entire Lower Columbia Domain. Gaps addressed in this study include:
	1. Improved estimates of hatchery spawners and estimates of all population indicators
	2. Development of spatial distribution monitoring program for adults
	3. Power analysis of juvenile and adult monitoring programs.
	4. Infrastructure to support data storage, analysis, reporting, and dissemination
2. Funding for implementation of the results of the ISTM project by 2011.
3. Fund proposals consistent with the Oregon Recovery Plan for the Lower Columbia.

**WDFW**1. Continue funding critical VSP monitoring within the MPG and ESU until the ISTM project is completed ie **200871000**.
2. Adequately fund the current ISTM project **200400200** for integrated fish and habitat status and trend monitoring for the entire Lower Columbia Domain. Gaps addressed in this study include:
3. Improved estimates of hatchery spawners and estimates of all population indicators
4. Development of spatial distribution monitoring program for adults
5. Power analysis of juvenile and adult monitoring programs.
6. Infrastructure to support data storage, analysis, reporting, and dissemination
7. Funding for implementation of the results of the ISTM project by 2011.
8. Fund proposals consistent with the Washington Forum statewide strategy for monitoring and LCFRB Recovery Plan
 | **Existing/Modified/New Projects To Implement RPA Recommendations**1. WDFW 200871000 Chum Salmon Enhancement RPA 63.1
2. PNAMP 200400200 RPA 71, 72

**Existing/Modified/New to Implement Other Recommendations****ODFW**1. Few changes to existing VSP monitoring until ISTM recommendations are obtained.

**WDFW**1. Few changes to existing VSP monitoring until ISTM recommendations are obtained.
 |
| **Cascade****ODFW, WDFW, SRR, PNAMP** | **VSP**NOAA Mitchell ActOregon LotteryTacoma PowerPG&EPacificorp**HATCHERY****HABITAT** | ODFW Strategy* See Coast Strategy Statement
 | 1. Increase number of smolt traps
2. Determine precision of spatial distribution estimates in Washington
3. Stabilize funding for GRTS-based surveys.
4. Analyze existing genetic samples.
5. Estimate incidental mortality in LCR mainstem and tributary fisheries
 | **RPA Workgroup Recommendations:**None**Other Recommendations or Consolidations** | **Existing/Modified/New Projects To Implement RPA Recommendations****Existing/Modified/New to Implement Other Recommendations**1. Funding for reproductive success study Kalama
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| **Gorge****ODFW, WDFW, CTWSRO** | **VSP**NOAA Mitchell ActOregon Lottery199801900 198805303 198805304 **HATCHERY**198805315 198805308 198805307 200305400**HABITAT**198805304 | ODFW Strategy* See Coast Strategy Statement
 | 1. Implement GRTS redd sampling in Oregon and Washington tributaries
2. Dam on Hood River will be removed. Current adult data depends upon the dam trapsite.
 | **RPA Workgroup Recommendations:**1. Fund a floating weir in WF Hood River

**Other Recommendations or Consolidations** | **Existing/Modified/New Projects To Implement RPA Recommendations****Existing/Modified/New to Implement Other Recommendations**ODFWInsert WARM SPRINGS COMMENTS**WDFW**1. Funding for BACI design in Wind River to assess removal of Hemlock Dam on USFS land per contract #**199801900**.
 |
| **TABLE METADATA DESCRIPTION** | **Include in this column all BPA contracts and other fund sources crucial for continued VSP and hatchery evaluations.** | **Include in this column a summary statement of your strategy for obtaining VSP information and how supplementation, if any, is used. If the strategy is different between the co-managers indicate where they differ.** | **Include in this column significant information gaps that if funded would provide significant improvement to data quality or will provide new VSP or hatchery information not currently available** | **Included in this column (E) are the RPA Recommendations that address specific RPAs and any recommendations that would end, modify, or consolidate projects.** **Also list any significant new funding proposals that if funded would address a significant VSP or Hatchery gap in priority order 1 through N where 1 is the highest priority.**  | **Describe how the recommendations described in column E can be fulfilled through maintaining existing projects, modifications/consolidations/enhancements of existing projects, adding new projects, or a combination thereof. For existing BPA-funded projects please include the project number.****In parentheses provide cost estimates for additional costs for project modifications/enhancements, reduced costs of project modifications/consolidations, and additional costs for new proposals.****Rank order all new proposals, existing contracts with no changes, and existing contracts with additions or subtractions and new proposed contracts, 1 through N with 1 being the most important to fund** |

1. Hankin, D.G., J.H. Clark, G.S. Morshima, B.E. Riddell, R.B. Deriso, C. Schwarz, J.C. Garza, and J.B. Scott. 2005. Report for the expert panel on the future of the coded wire tag recovery program for Pacific Salmon. Pacific Salmon Commission, Vancouver, B.C. [↑](#footnote-ref-2)