

Staff summary of Issues & Recommendations

Artificial Production and Harvest

*preliminary draft, please refer to full recommendations for complete review

10/29/2013 10:07 AM

2009 Fish and Wildlife Program Section

Section II. D. 3. Artificial Production Strategies (pg 18-19)

Section II. D. 4. Harvest Strategies (pg 19-20)

Summary

A number of the state agencies, tribes, the Columbia River Inter-Tribal Fish Commission, the Pacific Fishery Management Council, and Bonneville recommend continued support for the use of artificial production as part of the Program's mitigation strategies, including support for the use of artificial production to supplement depressed natural stocks, reintroduce extirpated stocks, and provide alternative fisheries. CRITFC and the Idaho Department of Fish and Game provided the most extensive recommendations and justifications for the value of artificial production and supplementation under the Program as, in CRITFC's view in particular, critical to recover and rebuild the basin's salmon runs.

Setting aside for the moment the provision on the Hatchery Scientific Review Group (HSRG), none of the state, federal or tribal entities recommend significant *revisions* to the rest of the existing language on Artificial Production in the 2009 Program. (Many recommend *additional* language or provisions -- see below.) The Idaho Department of Fish and Game commented in particular that the language on artificial production in the current version of the Program is sound. NOAA Fisheries did recommend a few tweaks in the existing language. Most of these are recommendations to include references to consistency with recovery plans and other ESA decisions, recommendations echoed by other agencies and tribes in part, seeking to make sure production programs are consistent with "recovery plans" as well as "subbasin plans." NOAA also recommends a revision to the Primary Strategy to replace a reference to "carrying capacity" with "ecosystem capacity"; a revision of the provision on "Harvest Hatcheries" to emphasize greater concern about stray rates and take of weak stocks. And NOAA along with many of the state and tribal entities recommend a revision to the Primary Artificial Production Strategy to allow for the use of artificial production to help replace extirpated salmon and steelhead anywhere, not just in blocked areas.

A number of the state and tribal entities recommend the continuation and improved implementation and funding of specific production programs and facilities, including the Montana Department of Fish, Wildlife and Parks (Sekokini Springs and westslope cutthroat trout); Oregon Department of Fish and Wildlife (SAFE program and other off-channel fisheries opportunities -- a recommendation echoed by the Northwest Sportfishing Industry Association and Association of Northwest Steelheaders); Columbia River Inter-Tribal Fish Commission and members Tribes (Accord production projects); Colville Confederated Tribes (same); Spokane Tribe (Lake Roosevelt area artificial production initiatives); and Kootenai Tribe of Idaho (sturgeon and burbot conservation aquaculture program). And a number of the states, tribes and

federal agencies recommend identical language that could expand the role of artificial production to benefit lamprey and sturgeon.

With regard to the work of the HSRG in particular, the Washington Department of Fish and Wildlife and a number of other Washington state agencies recommend that the Council adopt or in some way use the principles, strategies, and recommendations of the HSRG to guide the management of hatcheries in the program and in the basin in an adaptive management style. NOAA Fisheries recommends considering the HSRG principles on a case-by-case basis when evaluating artificial production programs and reforms. The Native Fish Society and Wild Steelhead Coalition, Trout Unlimited, and the Bonneville Customer groups also endorse the incorporation and implementation of the HSRG recommendations in Program and basin hatcheries. So did the Independent Scientific Advisory Board, in the ISAB's review report on the 2009 Fish and Wildlife Program, recommending the development of quantitative objectives for each artificial production program based on HSRG recommendations -- and the ISAB's views in that report have been recommended to the Council by the Washington Department of Fish and Wildlife along with Trout Unlimited and the Native Fish Society and Wild Steelhead Coalition.

The Columbia River Inter-Tribal Fish Commission and two of its member tribes recommend the opposite -- that the Council not adopt the HSRG recommendations into the Program (as part of either the Artificial Production or Harvest strategies), and that the Council, if it does decide to incorporate or make use of the HSRG recommendations, ensure that artificial production strategies are also consistent with *US v. Oregon* management agreements, tribal trust and treaty rights, recovery plans and other legal obligations; do not discriminate against tribal programs; and are not imposed without the comprehensive review by and consultation with the fishery co-managers. These tribal entities recommend that the Council consider instead adopting the Hatchery Genetic Management Plans as approved by NOAA Fisheries or agreed to by the co-managers. Bonneville also supported recognition of the HGMPs, noting that the HGMPs incorporate HSRG principles as well as ESA and recovery needs, and Bonneville also supported recognition of the production commitments and analyses in the *U.S v. Oregon* management agreements, Accords, and biological opinions. The Idaho Department of Fish and Game recommends that the Council not force a decision to adopt or not adopt the recommendations of the HSRG into the Program -- and simply delete references to the HSRG -- noting that the principles already in the Program capture the HSRG's key principles and recommendations, and that specific metrics and objectives from the HSRG are already being integrated where appropriate into operations and evaluations by production managers.

As noted above, the Washington Department of Fish and Wildlife, Trout Unlimited, and the Native Fish Society and Wild Steelhead Coalition, recommend to the Council the entirety of the ISAB's review conclusions and recommendations. In the realm of artificial production, the ISAB is particularly concerned about carrying capacity and density-dependence issues that might limit natural production and about the long-term adverse effects of artificial production on the recovery and sustainability of natural populations. The ISAB's resulting recommendations include (besides implementing the HSRG's recommendations) explicitly addressing carrying capacity for juvenile salmonids when integrating and prioritizing plans for artificial propagation and habitat restoration; conducting empirical investigations and developing bioenergetic models

to estimate demands on food supplies by native and non-native competitors of juvenile salmonids; evaluating whether the multiple objectives of recovering ESA-listed species, establishing healthy natural populations, and mitigating harvest opportunity using artificial production can be reconciled and address any trade-offs explicitly; quantifying the cumulative impacts of artificial production on natural production and ecosystem processes at population, subbasin, and basin scales; treating integrated supplementation (for conservation) and harvest as distinct programs requiring their own standards of operation; specifying that segregated artificial production requires removal of hatchery fish before they reach spawning grounds to maintain the genetic integrity of local populations; committing to establishing more empirical evidence concerning the effect of supplementation on rebuilding natural populations and improving integration between artificial production supplementation and habitat restoration programs; evaluating limiting factors by life-stage, including density-dependent effects of artificial production fish on production of natural-origin adult fish; and developing quantitative goals and basin-scale monitoring for artificial production. The Columbia River Inter-Tribal Fish Commission in turn cautioned that the ISAB's views about the risk of hatchery programs to natural production are not quantified, do not consider all the risks facing salmon across their life-cycle, and are too broad to be applied in every situation and thus generally incorporated into the Program.

Dovetailing with the ISAB's views, the Idaho Department of Fish and Game, the Washington State Governor's Salmon Recovery Office, and the Upper Columbia Salmon Recovery Board did recommend that the Council be cautious especially about the long-term use of supplementation. These recommendations noted the importance of using supplementation to address imminent demographic risks in the short-term, but also that the growing opinion in the scientific literature is that the benefits are not sustainable long-term, pose risk to natural spawning recovery over the long-term, contribute to carrying capacity and density dependence problems, and need to be combined with and yield to other recovery strategies for long-term recovery. NOAA Fisheries similarly recommends an additional strategy for the Program that recognizes that significant critical uncertainties remain about the effects of integrating hatchery fish with wild populations, which must be addressed in a prioritized manner on a species to species and case-by-case basis. NOAA continues that the Council should include the testing of different integration strategies across the basin; require that artificial production decisions be made within the context of objectives and strategies at different scales, including species, major population groups, and populations; and more generally identify and prioritize research, monitoring and evaluation to address knowledge gaps that contribute to the policy disagreements about the effects of artificial production on the viability of listed species. The Montana Department of Fish, Wildlife and Parks did recommend, however, that hatcheries can be used to help conserve remaining genetic diversity to help restore sensitive native fish species, including the protection of replicate populations for redundancy in case a key population is lost due to disturbance.

In this light, a number of the state agencies and tribes recommend identical language for the Program calling on Bonneville to fund comprehensive hatchery effectiveness monitoring and reporting for Columbia basin hatcheries. The Idaho Department of Fish and Game and Washington Department of Fish and Wildlife specifically recommend that the Program push for the funding and implementation of the CHREET project to establish basinwide monitoring, evaluation and reporting standards for hatchery effectiveness, IDFG noting that the CHREET

concept evolved out of the work of the Ad Hoc Supplementation Workgroup and that the Council needs to provide guidance to get this effort moving forward. Bonneville similarly if more generally recommends support for the development of a basinwide programmatic approach to hatchery research, monitoring and evaluation.

Similar concerns about the potential adverse effects of hatchery production on natural production and species recovery show up in the recommendations from a number of the environmental and conservation groups. Trout Unlimited recommends to the Council both the ISAB and HSRG recommendations (as noted above), and then TU added specific recommendations that repeat or echo the ISAB's concerns. American Rivers, Conservation Northwest and a number of allied individuals similarly and briefly recommend that the Program and fish managers focus on habitat protection and restoration and improvements to dam operations to increase and sustain wild populations and thereby reduce the need for hatcheries, and ensure that hatcheries that do continue to operate are run in such a manner that minimizes negative effects on wild fish populations.

The Native Fish Society and Wild Steelhead Coalition provided the most extensive set of recommendations along these lines. Along with recommending the ISAB and HSRG recommendations to the Council in their entirety, their recommendations include (among many others) developing a conservation requirement for every subbasin and wild salmonid stock based on an estimate of habitat capacity and full utilization of that habitat by natural spawners, with significant (and specifically-outlined) implications for evaluating the effects of and limiting artificial production that might interfere with meeting these conservation goals; determining ecological and genetic impacts on natural production from releases of hatchery fish; genetic and life history inventories and baselines and stock transfer policies that maintain genetic and ecological integrity for natural production; ramped-up efforts to determine the hatchery impacts on wild salmonids and set appropriate standards for different types of hatcheries to maintain genetic, life-history and ecological integrity of locally-adapted natural populations, and including at least one watershed for each population group that is managed solely for wild fish and excluding hatchery fish; designation of larger hatchery-free watersheds (including Wind River, Asotin Creek, Joseph Creek, Jon Day River, and Molalla River); determining through empirical evidence the effect of supplementation on actually rebuilding natural populations; setting stray rate standards that are protective of wild salmonids, using the assistance of independent science panels; develop quantitative objectives for natural production and improved basin-wide monitoring and evaluation of the effects of hatchery production on natural production; and completing the cost evaluations, cost-effectiveness assessments, and economic review of the benefits of hatchery programs, including evaluating the fishery contribution of hatchery steelhead. Note that the US Fish and Wildlife Service also recommended the need for additional research on the relative contribution of hatchery and naturally-spawning populations to steelhead production in the Clearwater River in particular.

The Bonneville Customers similarly recommend that the Council promote hatchery production that supports and does not conflict with conservation and recovery objectives. The Bonneville Customers recommend further that the Council support additional selective harvest methods and policies to reduce incidental catch of ESA-listed fish and increase catch of hatchery

fish, and that the Program assess the extent to which harvest slows recovery of naturally-reproducing populations and implement adaptive management harvest strategies.

State Fish and Wildlife Agencies and Other State Agencies

Idaho Department of Fish and Game

A. Language on artificial production in the current Program (Section II.D.3.) is sound.

B. Idaho recommends following the first opening paragraphs (up to the bulleted Standards) with a more comprehensive review of the investment Council has made over the years to identify and implement best management strategies and to understand and manage artificial production programs to ensure they operate consistent with the broader ecological system they exist in. A brief review of this body of effort would be more useful than one excerpt from the APR document. Brief statements of review (e.g., descriptions of other, relevant, Council-sponsored or supported efforts) could be presented to highlight why these efforts were undertaken and completed.

1. This historical perspective (and review) would logically end with short descriptions of the two most recent collaborative efforts: the Ad Hoc Supplementation Workgroup and Columbia River Hatchery Scientific Review Group efforts. The Program could also reference recent efforts to bring Managers to the Fish Committee in 2012 and 2013 to present policy and implementation perspectives on the use of artificial production. We are not aware whether a summary of these presentations has been produced but one would be useful to develop and make available - by reference in the new Program document.

2. Additionally, the Program should reference the contribution past and current projects, funded through the Council's program, are making towards improving the Region's collective understanding of the potential risks and benefits associated with the implementation of artificial production programs

C. We feel it is fair to establish the expectation that Council and the ISRP rely on this body of work as the foundation for decision making when it comes to approving projects for implementation. Project sponsors (as articulated in project proposals) will be expected to identify how their programs are consistent with the principals and guidelines contained in referenced documents.

D. We do not believe that is necessary to force a decision to adopt or not adopt recommendations of the HSRG

1. Language in the current Program document should be modified to remove reference to this expectation.

2. The first four paragraphs of the current Artificial Production Strategies section do a good job of capturing principles identified by the HSRG and in fact, most APR principals are consistent with HSRG recommendations.

3. Provide clarification on what "segregated" and "integrated" program management means

E. Supplementation

1. Ad Hoc Supplementation Workgroup document identified a strategy to address this question at a broad scale over several habitat types and with multiple species. Evolved

towards the CRHEET project. We encourage Council to provide guidance in the new Program to identify a path forward to help move the Region off of dead center on this issue.

2. Council should be aware of a growing opinion in the scientific literature that successful short-term improvements in abundance or productivity (often identified from relative reproductive success/supplementation studies) may not be sustainable over the long-term. Investigators recommend that supplementation efforts be short-term in nature, be used to address imminent demographic risks, and that additional recover strategies that address threats to the population over the long term also be implemented.

Montana Department of Fish, Wildlife and Parks

A. Sekokini Springs and westslope cutthroat trout. Artificial fish production The Council should be aware that funding for the Sekokini Springs Isolation Facility for genetic conservation of native westslope cutthroat trout, has not been fully allocated to date. Experience gained from the Sekokini Springs Isolation Facility, associated experiments, and field operations show great potential for genetic conservation of westslope cutthroat trout. The isolation

B. Promote Genetic Diversity

Use naturalized hatcheries to conserve remaining genetic diversity to restore sensitive fish species, including the creation of failsafe replicate populations (for redundancy if a given population is lost due to disturbance).

Oregon Department of Fish and Wildlife

A. Hatchery effectiveness monitoring. The Council should adopt and BPA should fund hatchery effectiveness monitoring and reporting for Columbia Basin hatcheries.

1. Recommendation: Insert a new bullet under Artificial Production Strategies (page 19), or under Reporting and Data Management (page 25) as follows:

“Hatchery Effectiveness Monitoring: The minimum reporting indicators for successful hatcheries to meet the Council’s Artificial Production Review are: 1) the number of juveniles released by life stage, and 2) the components of total adult hatchery production, which include the number of hatchery adults returning to the hatchery, spawning in rivers, and caught in fisheries. These indicators can be used to assess the conservation and/or harvest benefits common of all hatchery programs. In addition to compiling this information for reporting, we also recommend a reporting database for these hatchery indicators be developed and funded to allow tracking of hatchery performance.”

B. Extirpated populations in unblocked areas. Address the reintroduction of extirpated populations in non-blocked areas above Bonneville Dam. Under Artificial Production Strategies, page 18, maintain the current language with the following modifications shown here in bold: “3) to replace lost salmon and steelhead in blocked **and unblocked** areas.”

C. Recovery plans. In addition to subbasin plans, recovery plans also contain hatchery actions to rebuild natural runs. Under Artificial Production Strategies, page 19, at the end of the second sentence under “d. Restoration” insert “and recovery plans.”

D. Sturgeon. Hatchery production of sturgeon can be an appropriate mitigation strategy to supplement populations where natural recruitment is currently limited. This strategy should:

- Be conservative and responsible in establishing protocols for source populations and numbers of hatchery fish released;
- Build on knowledge gained from ongoing hatchery efforts in other areas;
- Utilize experimental hatchery releases and monitoring to assess ecological factors and population productivity limitations; and
- Optimize hatchery production and practices consistent with monitoring natural production and environmental carrying capacity which will most effectively be identified using an experimentally adaptive approach.

E. Lamprey and artificial production.

1. Insert new bullet under Anadromous Fish Losses on Page 11 as follows:

“Continue restoration of Pacific lamprey by (1) restoring lamprey passage and habitat in the mainstem and in tributaries that historically supported spawning lamprey populations, (2) continuing efforts to translocate adult Pacific lamprey to appropriate areas to reduce upstream passage losses, and (3) evaluating artificial propagation as a way to mitigate for lost lamprey production when passage and habitat improvements alone are insufficient. Attain self-sustaining and harvestable populations of lamprey throughout their historic range.”

2. Insert new section g. Pacific Lamprey Production on Page 19:

“The Council recognizes progress in the development of a Framework for Pacific Lamprey Supplementation Research in the Columbia River Basin. Translocation efforts have been successful at increasing adult spawning activity, larval recruitment, and larval distribution and have provided important Pacific lamprey life history information. Current and future translocation actions should be guided by the lessons learned from ongoing efforts. It is not likely that fragmented, isolated or non-existent lamprey groups within the Columbia River Basin will naturally recolonize the upper portions of their range given the paucity of adult returns and numerous threats, including the existing mainstem environment. Therefore, the long-term restoration of Columbia River Basin lamprey may require the structured release of artificially propagated lamprey in priority areas to achieve a variety of management and conservation objectives.

- Continue development and implementation of lamprey translocation in accordance with tribal guidelines as a component of a regional recovery plan
- Evaluate the role of lamprey artificial propagation as a research tool and for supplementation of local groups.”

F. Off-channel mitigation fisheries. Mitigate for lost fisheries opportunities while reducing negative effects of hatchery fish Current Program: Pages 18-19, Artificial Production Strategies:

1. As mitigation for lost fishery opportunities resulting from construction and operation of the hydrosystem, the Program should continue to fund, develop and maintain fisheries in off-channel areas of the Lower Columbia River estuary where impacts from straying are reduced -- given decreased spawning interactions with upriver stocks; and where the return on mitigation investment is improved -- given that fish are not exposed to hydrosystem passage losses.

2. Continue funding of the Select Area Fisheries Enhancement program (SAFE) at a level sufficient to achieve current SAFE deliverables through and beyond 2017 as a mitigation measure for lost fishery opportunities resulting from construction and operation of the hydrosystem.

Washington Department of Fish and Wildlife

A. Lamprey and artificial production. (same as ODFW -- from joint managers' draft recs):

1. Insert new bullet under Anadromous Fish Losses on Page 11 as follows:

“Continue restoration of Pacific lamprey by (1) restoring lamprey passage and habitat in the mainstem and in tributaries that historically supported spawning lamprey populations, (2) continuing efforts to translocate adult Pacific lamprey to appropriate areas to reduce upstream passage losses, and (3) evaluating artificial propagation as a way to mitigate for lost lamprey production when passage and habitat improvements alone are insufficient. Attain self-sustaining and harvestable populations of lamprey throughout their historic range.”

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- Continue development and implementation of lamprey translocation in accordance with tribal guidelines as a component of a regional recovery plan
- Evaluate the role of lamprey artificial propagation as a research tool and for supplementation of local groups.”

B. Sturgeon (same as ODFW -- from joint managers' draft recs): Hatchery production of sturgeon can be an appropriate mitigation strategy to supplement populations where natural recruitment is currently limited. This strategy should:

- Be conservative and responsible in establishing protocols for source populations and numbers of hatchery fish released
- Build on knowledge gained from ongoing hatchery efforts in other areas
- Utilize experimental hatchery releases and monitoring to assess ecological factors and population productivity limitations
- Optimize hatchery production and practices consistent with monitoring natural production and environmental carrying capacity which will most effectively be identified using an experimentally adaptive approach.

C. HSRG recommendations. Adopt the HSRG recommendations to clearly define hatchery goals, and metrics to assess hatchery performance. Adopt language from ISRP 2011 Retrospective Report to include but not limited to:

- For supplementation programs include BACI design (supplemented versus unsupplemented populations) for abundance and productivity controlling for carrying capacity and spawner abundance (i.e., density dependence)
- Determine if life stage specific density dependence is limiting the success of hatchery supplementation programs. If so, correct limiting factors.

We recommend the Council adopt the same language as WDFW adopted for HSRG guidelines. “Use the principles, standards, and recommendations of the Hatchery Scientific Review Group (HSRG) to guide the management of hatcheries operated in the Columbia Basin. In particular, promote the achievement of hatchery goals through adaptive management based on a structured monitoring, evaluation, and research program.”

D. Fund CRHEET to establish basin wide monitoring and evaluation standards to include effectiveness monitoring.

E. Provide funding to measure hatchery effectiveness through monitoring. (same as ODFW -- from joint managers’ draft recs):

The Council should adopt and BPA should fund hatchery effectiveness monitoring and reporting for Columbia Basin hatcheries. The minimum reporting indicators for successful hatcheries to meet the Council’s APR are: (1) the number of juveniles released by life stage, and (2) the components of total adult hatchery production, which include the number of hatchery adults returning to the hatchery, spawning in rivers, and caught in fisheries. These indicators can be used to assess the conservation and/or harvest benefits common of all hatchery programs. In addition to compiling this information for reporting, we also recommend a reporting database for these hatchery indicators be developed and funded to allow tracking of hatchery performance.”

F. Extirpated populations in non-blocked areas (same as ODFW -- from joint managers’ draft recs): Address the reintroduction of extirpated populations in non-blocked areas above Bonneville Dam. Under Artificial Production Strategies, page 18, maintain the current language with the following modifications shown here in bold:

“3) to replace lost salmon and steelhead in blocked **and unblocked** areas.”

G. Recovery plans (same as ODFW -- from joint managers’ draft recs): In addition to subbasin plans, recovery plans also contain hatchery actions to rebuild natural runs. Under Artificial Production Strategies, page 19, at the end of the second sentence under “d. Restoration” insert “and recovery plans.”

H. ISAB’s views and recommendations on artificial production: Earlier this year, the Independent Scientific Advisory Board reviewed the Council’s 2009 Fish and Wildlife Program and provided comprehensive comments and recommendations for a revised program. WDFW supports the implementation of the ISAB’s recommendations. This would include the ISAB’s recommendations with regard to artificial production:

- Explicitly address carrying capacity for juvenile salmonids when integrating and prioritizing plans for artificial propagation and habitat restoration.
- Conduct empirical investigations and develop bioenergetic models to estimate trophic demands on food supplies by native and non-native competitors of juvenile salmonids.
- Evaluate whether the multiple objectives of recovering ESA-listed species, establishing healthy natural populations, and mitigating harvest opportunity using artificial production can be reconciled and address any trade-offs explicitly.
- Recognize and address the need to quantify the cumulative impacts of artificial production on natural production and ecosystem processes at population, subbasin, and basin scales.
- Revise artificial production strategies to incorporate HSRG advice. Recognize and address the need to develop quantitative objectives for each artificial production program based on HSRG recommendations.
- Treat integrated supplementation (for conservation) and harvest as distinct programs requiring their own standards of operation.
- Specify that segregated artificial production requires removal of hatchery fish before they reach spawning grounds to maintain the genetic integrity of local populations.
- Commit to establishing more empirical evidence concerning the effect of supplementation on rebuilding natural populations and improving integration between artificial production supplementation and habitat restoration programs. Address the importance of evaluating limiting factors by life-stage, including density-dependent effects of artificial production fish on production of natural-origin adult fish.
- Adopt guidelines, benchmarks, and a basin-level experimental framework specifically for reintroduction of salmon and steelhead into watersheds from which they have been extirpated.
- Develop quantitative goals and basin-scale monitoring for artificial production.

Washington State Governors Salmon Recovery Office

A. Carrying capacity. Specific to hatchery programs, the Council should work with all partners to assess the carrying capacity that will influence recommendations for artificial production strategies. BPA should fund empirical studies of carrying capacity for watersheds with hatchery supplementation per ISRP recommendation.

B. Monitoring. The Council must provide sufficient funding to monitor the effects of habitat actions and artificial propagation on listed populations. The current level of funding for evaluating population-response to habitat restoration is inadequate and, although hatchery-related monitoring is complementary, additional monitoring is needed. In order to understand population response, continued investments in fish in/fish out monitoring, site scale project effectiveness monitoring and intensively monitoring watersheds are critical. The Council should use emerging life cycle models to understand life stage specific bottlenecks and then direct effort to address those bottlenecks while monitoring for a response. Council needs to direct funds to fill data gaps that limit the effectiveness of the life cycle models. Existing fish and habitat monitoring programs could be improved so that their products are directly applicable to multiple aspects of recovery and mitigation (e.g., habitat restoration, artificial propagation, life-cycle models, etc.).

Upper Columbia Salmon Recovery Board

Hatchery production as part of integrated recovery efforts: Specific to hatchery programs, the Council should work with partners to assess carrying capacity that will influence recommendations for artificial production strategies. Many critical uncertainties related to the cumulative impacts of artificial production on natural production and ecosystem processes at population, subbasin, and basin scales. Given the number of tributary hatchery programs in the region, and the limited ability to control hatchery fish on the spawning grounds, hatchery production may have a major impact on naturally spawning populations. Some tools such as Food Web models and relative reproductive success studies are being used in the Upper Columbia to fill critical data and information gaps. Other tools such as Life Cycle Models can then be used to combine habitat, hatchery, hydropower, harvest, and full life-stage recruitment information to further refine the impacts various programs are having on overall population productivity at a subbasin scale. Monitoring and evaluation in each of the sectors (all H's) is extensive, but to evaluate program effectiveness and progress toward recovery from a regional perspective, a more comprehensive analysis is needed. This analysis needs to be done in relation to well-defined biological objectives for each of the management sectors. In relation to hatchery production, measurable biological objectives with monitoring to track progress toward those objectives would help clarify the role of artificial production in the overall Fish & Wildlife program.

Lower Columbia Fish Recovery Board

A. While hatchery programs can confound efforts to recover natural origin salmon and steelhead populations, they support fisheries that are socially, culturally, and economically important to the region.

B. HSRG. The Washington Department of Fish and Wildlife (WDFW) adopted a policy that calls for the use of the HSRG recommendations to guide the management of hatcheries in the Washington portion of the Columbia Basin. The Council should adopt similar Basin-wide language in F&W program and should provide for the support of efforts to implement hatchery measures consistent with recovery goals. Adopt language that calls for the use of the HSRG recommendations to guide the management of hatcheries in the Columbia Basin.

C. Support implementation of hatchery measures and reforms consistent with recovery plan.

D. Adopt and support funding for hatchery effectiveness monitoring providing the following basic indicators 1) the number of juveniles released by life stage and 2) the components of total adult hatchery production, including the number of hatchery adults returning to the hatchery, spawning in rivers, and caught in fisheries.

Regional Fisheries Enhancement Group Coalition (Washington)

A. Native broodstock. To the extent possible, and consistent with the recommendations from the HSRG, co-managers should strive to utilize native brood stock when possible, with the goal of allowing more fish to return and spawn.

B. Hatchery reform and loss of nutrients. In the Upper Columbia HGMP's are increasingly focused on removing hatchery fish from the system to limit hatchery/wild spawning interactions. The result is fewer nutrients released into the watershed, and likely a net loss in nutrients such as phosphorus and nitrogen. Many of the tributaries in the Columbia River system are naturally low in nutrients and returning salmon provide a fundamental influx of nutrients to fuel the food web.

Indian Tribes and Tribal Organizations

Columbia River Inter-Tribal Fish Commission

A. The region lacks a shared vision on the proper role of artificial propagation to achieve our goals of salmon recovery and full rebuilding. There has been a substantial lack of focus on the detrimental effects of mass marking and mark selective fisheries. The response of steelhead to these programs is nothing more than a sad experience of ESA listings and declining returns. With a new sense of objectivity, the Council should support hatchery programs that make progress to recover and rebuild salmon runs, such as supplementation, and question all other programs as a risky foundation for restoration.

B. Artificial Production strategies .

1. Program should affirmatively support the use of artificial production facilities to a) supplement depressed natural stocks, b) reintroduce extirpated stocks, and c) provide alternative fisheries where lost stocks are not amenable to reintroduction due to loss of habitat that cannot be corrected within the reasonably foreseeable future due to land use or water resources development.

2. HSRG. Revise the last paragraph on page 19 to the following: Delete that “The Council will consider adoption of the HSRG recommendations into the Program when completed.” Revise rest to say: “The Council will ensure that artificial production strategies are consistent with U.S. v Oregon management agreements, the Pacific Salmon Treaty, tribal trust and treaty rights, and recovery plans and that they do not discriminate against tribal programs if it decides to incorporate HSRG recommendations into the Program.

3. HSRG. Do not fund the HSRG.

4. Do not fund mass marking and mark selective fisheries programs until there is a well documented Columbia River salmon scientific conclusion that these programs do not harm salmon populations and tribal fisheries.

New information suggests the existence of confounding variables and alternate explanations for the study results used by the HSRG in its models of population responses to PNI management. Accordingly, the measurable benefits of fish production using modern hatchery methods should be given greater consideration than the hypothetical risks of hatchery effects upon which the work of the HSRG was premised, unless empirical evidence demonstrates that hatchery effects have adverse significance to natural populations. The HSRG guidelines may provide a starting point for the discussion of hatchery strategies, but they are not an appropriate constraint on the eventual decisions for individual programs. Hatchery strategies and practices should be shaped to meet local needs.

ISAB recommendations about the risks of hatchery programs are not quantified, are not made in the context of all the risks facing salmon across their life-cycle and are too broad to be applied to every situation.

If the Council limits or reduces the artificial production program funded under the Fish and Wildlife Program, it does not address the primary source of any impacts and also prevents the tribes from implementing their treaty-reserved rights.

C. Harvest strategies:

1. Delete the references to the HSRG recommendations and replace with “The Council will consider adopting the Hatchery Genetic Management Plans (HGMP) as they 1) are approved by NOAA Fisheries (for listed populations) or 2) agreed upon by the fishery co-managers into the Program.”

2. Clarify that any Council decisions on relationship of hatchery practices and harvest (such as HSRG) “would only follow a comprehensive review and consultation with the fishery co-managers to ensure that decisions are consistent with applicable laws and obligations associated with hatchery management.” The HSRG recommendations can be useful as general guidelines but should not be used to set standards for the operation of individual programs or projects. The HSRG recommendations were developed based upon data and model results at a point in time. The analyses used broad assumptions and available data that did not account for differences between populations and programs. This type of analysis needs to be updated periodically to reflect changing conditions and knowledge over time.

D. Lamprey production, sturgeon, and hatchery effectiveness monitoring recommendations in concert with other agencies and tribes -- *see* Oregon and Washington

Yakama Nation

A. Supported recommendations of CRITFC and Bonneville

B. Artificial Production strategies -- consistent with CRITFC (above):

1. Program should affirmatively support the use of artificial production facilities to a) supplement depressed natural stocks, b) reintroduce extirpated stocks, and c) provide alternative fisheries where lost stocks are not amenable to reintroduction due to loss of habitat that cannot be corrected within the reasonably foreseeable future due to land use or water resources development.

2. HSRG. Revise the last paragraph on page 19 to the following: Delete that “The Council will consider adoption of the HSRG recommendations into the Program when completed.” Revise rest to say: “The Council will ensure that artificial production strategies are consistent with U.S. v Oregon management agreements, the Pacific Salmon Treaty, tribal trust and treaty rights, and recovery plans and that they do not discriminate against tribal programs if it decides to incorporate HSRG recommendations into the Program.

C. Harvest strategies: Clarify that any Council decisions on relationship of hatchery practices and harvest (such as HSRG) “would only follow a comprehensive review and consultation with the fishery co-managers to ensure that decisions are consistent with applicable laws and obligations associated with hatchery management.”

D. Same lamprey recommendations as other agencies and tribes -- *see* Oregon and Washington

Confederated Tribes of the Umatilla Indian Reservation

A. Supported recommendations of CRITFC and Bonneville

B. Artificial Production strategies -- consistent with CRITFC (above):

1. Program should affirmatively support the use of artificial production facilities to a) supplement depressed natural stocks, b) reintroduce extirpated stocks, and c) provide alternative fisheries where lost stocks are not amenable to reintroduction due to loss of habitat that cannot be corrected within the reasonably foreseeable future due to land use or water resources development.

2. HSRG. Revise the last paragraph on page 19 to the following: Delete that “The Council will consider adoption of the HSRG recommendations into the Program when completed.” Revise rest to say: “The Council will ensure that artificial production strategies are consistent with U.S. v Oregon management agreements, the Pacific Salmon Treaty, tribal trust and treaty rights, and recovery plans and that they do not discriminate against tribal programs if it decides to incorporate HSRG recommendations into the Program.

C. Harvest strategies:

1. Delete the references to the HSRG recommendations and replace with “The Council will consider adopting the Hatchery Genetic Management Plans (HGMP) as they 1) are approved by NOAA Fisheries (for listed populations) or 2) agreed upon by the fishery co-managers into the Program.”

2. Clarify that any Council decisions on relationship of hatchery practices and harvest (such as HSRG) “would only follow a comprehensive review and consultation with the fishery co-managers to ensure that decisions are consistent with applicable laws and obligations associated with hatchery management.” The HSRG recommendations can be useful as general guidelines but should not be used to set standards for the operation of individual programs or projects. The HSRG recommendations were developed based upon data and model results at a point in time. The analyses used broad assumptions and available data that did not account for differences between populations and programs. This type of analysis needs to be updated periodically to reflect changing conditions and knowledge over time.

D. Same lamprey recommendations as other agencies and tribes -- *see* Oregon and Washington

Confederated Tribes of the Warm Springs Reservation of Oregon

Support CRITFC and Bonneville recommendations.

Nez Perce Tribe

lamprey production and hatchery effectiveness monitoring recommendations in concert with other agencies and tribes -- *see* Oregon and Washington

Colville Confederated Tribes

- A. Recommend continued implementation of Colville Tribes' anadromous and resident fish artificial production initiatives.
- B. Continue supporting existing artificial production (based on species identified by CCT) to substitute for lost salmon and steelhead in blocked areas.

Spokane Tribe of Indians

A. General principle: Administer and increase opportunities for consumptive and non-consumptive fisheries, including hatchery-reared stocks compatible with continued persistence of native resident fish species and their restoration to near historic abundance. Includes intensive fisheries within closed or isolated systems.

- B. Continue to implement specific artificial production initiatives consistent with subbasin plan: Artificially produce sufficient genetically appropriate native and focal species to fulfill management and harvest needs by continuing to operate and maintain/improve Spokane Tribal, Sherman Creek, and Ford Trout Hatcheries, and the Lake Roosevelt Net-Pens to collectively produce kokanee salmon, rainbow trout, and redband trout for release into Lake Roosevelt. This will include the cost of 100% marking all hatchery fish released into Lake Roosevelt as identified by the Independent Scientific Review Panel (ISRP).

Coordinate decisions on hatchery production, stocking and outplanting locations through a committee consisting of representatives from the Spokane Tribe of Indians, the Confederated Tribes of the Colville Reservation, and the Washington Department of fish and Wildlife.

Monitor and evaluate the Lake Roosevelt biota to assess the effectiveness and impacts of artificial production measures. Complete annual assessments of the efficacy of Lake Roosevelt artificial production.

Conduct mark-recapture studies of the artificial production program to determine release strategies that maximize harvest and adult returns.

- C. Sturgeon. Continue interim hatchery production, including 100% PIT-tagging of hatchery sturgeon and 100% PIT-tagging and sonic tagging of broodstock collected in the upper Columbia River.

Kootenai Tribe of Idaho

A. Integrated program including artificial production. The Kootenai Tribe's integrated fish and wildlife program includes six complimentary projects designed to address the broad range of factors that limit the recovery and success of native fish and wildlife populations, and that constrain the biological diversity necessary to maintain a resilient ecosystem in the face of

ongoing and future perturbations. These projects include the Kootenai River Native Fish Conservation Aquaculture Program.

B. Kootenai River Native Fish Conservation Aquaculture Program -- sturgeon and burbot: Kootenai River white sturgeon and burbot were keystone species in the Kootenai River and are of immeasurable cultural value to the Kootenai Tribe and were important Treaty fisheries. These native fish once sustained a culturally and religiously important Tribal fishery as well as a valued recreational fishery. A precipitous decline in both populations resulted in the elimination of the Tribe's ability to fish for these culturally important species. Expansion of the Tribal Hatchery program was identified in the Libby Dam BiOp RPA Component 4 (USFWS 2006, clarified in 2008). The construction of a new facility is also critical to advancing the burbot conservation efforts and to meeting the biological objectives identified in the KVRI Burbot Conservation Strategy (KVRI 2005). Eventually restoration of these two keystone species will help to address Tribal Treaty subsistence and cultural harvest. In addition, sturgeon and burbot are critical components of the Kootenai River food web and ecosystem

Specific strategies include: Construction of upgrades to the Tribe's Tribal Sturgeon Hatchery, construction of the new Twin Rivers Hatchery, and implementation of the Tribe Native Fish Conservation Aquaculture Program designed to achieve the following goals:

Kootenai River white sturgeon

- Prevent extinction of Kootenai sturgeon by preserving the locally adapted genotypes, phenotypes, and associated life history traits of the population.
- Restore a healthy age class structure to enhance demographic and genetic viability and persistence of the population.
- Reestablish a sturgeon population capable of future Tribal Treaty subsistence and cultural harvest.

Burbot

- Re-establish a native burbot population in the lower Kootenai River capable of future Tribal Treaty subsistence and cultural harvest and sport harvest once the population reaches sustainable levels.

Upper Snake River Tribes

Lamprey production, sturgeon production, hatchery effectiveness monitoring recommendations in common with other agencies and tribes -- *see* Oregon and Washington

Confederated Tribes of Grand Ronde Community of Oregon

Lamprey and sturgeon production recommendations in concert with other agencies and tribes -- *see* Oregon and Washington

Cowlitz Tribe

Lamprey production, sturgeon production and hatchery effectiveness monitoring recommendations in concert with other agencies and tribes -- *see* Oregon and Washington

Federal Fish and Wildlife Agencies and Other Federal Agencies

NOAA Fisheries

A. Overarching recommendation for the Program's Artificial Production strategies: The artificial production strategies are fairly comprehensive; key is how managers tailor these strategies to work at the local level:

NOAA recommends that the strategies be updated to recognize and endorse the species-specific strategies developed through ESA recovery and regulatory processes completed since the 2009. Apply site-specific strategies that are developed through approved hatchery and genetic management plans and recovery plans. These strategies are tailored to address the specific biological, physical and other factors that influence the artificial propagation facility's performance.

Add a strategy requiring that artificial production decisions should be made within the context of objectives, criteria and strategies at the species, major population group and population scale/

The Council should identify and prioritize research, monitoring and evaluation to address knowledge gaps that contribute to policy disagreements about the effect of artificial propagation on the viability of listed species.

Add Another strategy to recognize that significant critical uncertainties remain about the effects of integrating hatchery fish with wild populations. While some critical uncertainties may apply basin-wide, it is of utmost importance to address them in a prioritized manner on a species by species and case by case basis. NOAA recommends that the strategies include testing of different integration practices across the basin. The Council should support the testing of different goals, strategies and practices for artificial propagation across the basin.

B. Recommended change to the Program's Primary Artificial Production Strategies:

Primary strategies: Artificial production can be used under the following conditions: 1) in an integrated manner to complement habitat improvements by supplementing native fish populations [delete] up to carrying capacity of the habitat with fish that are as similar as possible in genetics and behavior to wild native fish [end delete] [Insert] in a manner consistent with and that does not stress ecosystem capacity with fish that are similar in genetics and behavior to wild native fish [End Insert].

Add replacement of lost salmon and steelhead to unblocked areas as a primary strategy: "3)... to replace lost salmon and steelhead in blocked [Insert] and unblocked [End Insert] areas..."

C. Add the following Strategies;

For threatened and endangered species, decisions on management of artificial production programs need to be made in the context of biological goals and objectives and strategies at the species, major population group, and independent population levels as described in ESA recovery plans and regulatory reviews.

While a diversity of life history types and species is needed in order to sustain populations in the face of environmental variation, historic life history strategies should remain dominant. Climate change may force adjustments to dominant life history strategies, however

D. Revise the strategy on Harvest hatcheries as follows:

Suggested language: Hatcheries must be located and operated in a manner that does not lead to adverse effects on other stocks through [delete] excessive [end delete] [insert] significant [end insert] straying or [delete] excessive [end delete] take of weak stocks in a mixed fishery, [insert] or through other adverse effects such as creating density dependence problems in the habitat and interbreeding with wild fish.”

Harvest should not be viewed in isolation and should be integrated into broader strategies with hatchery and habitat-related considerations.

Develop the capacity to monitor hatchery-origin and natural-origin so that productivity of naturally reproducing population can be more accurately tracked and used to refine harvest management.

In the Harvest strategies, add:

Add a strategy to integrate harvest strategies with the status of current spawning, rearing, migration and ocean habitat and with hatchery reform objectives.

Consider amending the strategy to incorporate consideration of HSRG recommendations. Replace it with: [Insert] Consider HSRG principles on a case-by-case basis when evaluating artificial production programs and reforms. [End Insert]

Consider amending the Harvest strategy pertaining to artificial production. The current statement ignores past commitments by the government to mitigate for lost natural production through artificial production. Many hatcheries were built to mitigate for lost production, often from the construction of dams. While hatchery programs need to evolve to respond to new priorities that emphasize the recovery of natural origin fish, the Council’s strategy should still acknowledge the underlying, long-standing commitment to mitigation.

E. Add to the strategy on Restoration: Incorporate the need for consistency with recovery plans in decisions of whether to employ supplementation for restoration purposes

F. Add to the Experimental Approach language: Add the need to address the relationship of the artificial production activity to ESA recovery plans and biological opinions and permits. Also, address the need to prioritize projects that address critical uncertainties.

NOAA Fisheries Manchester

A. The proper use of hatcheries for supplementation and conservation purposes remains an important topic in the Columbia River Basin -- the Program should include measures focused on understanding and improving hatchery effectiveness, including:

1. Improving fish quality and health to achieve appropriate survival and fitness of salmon after release
2. Testing the effectiveness of supplementation in rebuilding depleted salmon populations
3. Identifying the scale of hatchery effects on natural populations compared to habitat loss, harvest, and changes in ocean productivity.
4. Developing hatchery methodologies and strategies to maintain life history types in hatchery, natural and composite hatchery/natural populations.

B. Best management practices/HSRG. The Council's plan should also include actions that endorse the use of best management practices (e.g., Hatchery Scientific Reform Group (HSRG) type recommendations) to balance conservation and sustainable fisheries goals.

U.S. Fish and Wildlife Service

A. Lamprey. Same production-related lamprey recommendations as other managers. *See* Oregon and Washington.

B. Sturgeon. Incorporate and implement sturgeon management framework, including production.

C. Steelhead production. Additional research is needed on the relative hatchery and natural contribution to steelhead production in the Clearwater River. For example, it is important to understand whether supplementation and non-supplementation hatchery steelhead contributing to natural production within the Clearwater River.

USGS

Sturgeon management framework. Includes better methods for storing and analyzing sturgeon information, including coordinated marking: There is now no requirement for coordinated marking of sturgeon captured in stock assessment activities or marking of hatchery produced sturgeon released for supplementation. Without coordinated marking, there may be duplication in external marks used or uncertainty in origin of fish captured in downstream fisheries.

Pacific Fishery Management Council

Recommend the Program supports hatchery program reviews to ensure compliance with regional mitigation, conservation and recovery goals, using performance indicators and adaptive management measures, and a structured monitoring, evaluation, and research program. Because biological uncertainties remain and salmon production benefits are high, adequate funding to support adaptive management should remain a priority.

Bonneville Power Administration

Program should continue to support a balanced and flexible approach to the use of hatcheries, including the current artificial production strategies for minimizing potential adverse hatchery effects, using supplementation and conservation hatcheries, using hatcheries for reintroduction

and reestablishment of extirpated runs, and species substitution in blocked areas. The ongoing and planned artificial production work throughout the Basin is substantially addressing salmon survival and productivity and responding to science based concerns while increasing salmon abundance in the Basin in recognition of the social, economic, and historical realities that constrain us.

B. HGMPs/ESA. The program should continue to recognize that hatchery mitigation programs and ESA efforts are both legal mandates, and so must be balanced and considered together. This includes acknowledging that many hatcheries in the Basin produce fish that are included by NOAA in an ESA- listed ESU or Distinct Population Segment (DPS). This includes the fact that operators of 44 Action Agency-funded hatchery programs have recently completed HGMPs. Many of the recommendations from the (HSRG) reviews have been incorporated into the HGMPs.

C. US v. Oregon. The Management Agreement is integral to many of the Accords and to the Biological Opinions, and the Program should reflect this clearly.

D. Resident Fish. The Program should support the processes needed for Bonneville to make final decisions on the resident fish artificial production facilities currently in the proposal or planning stages.

E. Process Improvements: The Council should encourage improved processes for planning and reviewing artificial production projects and consider incorporating energy efficiency and conservation measures in the 3-step planning process. Recommend convening an expert work group to explore ways to streamline the hatchery planning, review, and permitting processes to eliminate duplication, reduce cost, and save time.

F. Basinwide programmatic hatchery RME: Support the development of a basinwide programmatic approach to hatchery RME

Bonneville Customers, Other Utilities

Bonneville Customers Public Power Council/Northwest RiverPartners/PNGC Power/Northwest Requirement Utilities

Adaptive management, hatchery and harvest recommendations - The Council should address the recent ISAB review of the Program with respect to adaptive management, hatchery policies and harvest practices:

1. The Council should promote hatchery production that supports and does not conflict with conservation objectives. The Council should require implementation of the Hatchery Science Review Group recommendations as well as explicitly incorporating adaptive management strategies for Program-funded hatchery programs.
2. The Council should support selective harvest methods and policies that reduce the incidental catch of ESA listed and naturally spawning fish but increase harvest of hatchery origin stocks. The Program should assess the extent to which harvest slows recovery of naturally-reproducing populations and implement adaptive management strategies for harvest measures in the Program.

Environmental and Fishing Groups

Native Fish Society and Wild Steelhead Coalition

A. ISAB recommendations. Submit the ISAB recommendations to the Council for adoption by reference (*see* a summary under WDFW). It is unlikely that the scope, competence and scientific rigor provided to the Council by the ISAB in their review and recommendations for improving the Fish and Wildlife Program could be duplicated by the public.

B. Conservation requirement for every subbasin and wild salmonid race/implications for artificial production: The Council should develop a conservation requirement for each subbasin for each species and race of wild salmonids using it. The conservation requirement is based on an estimate of habitat capacity and managed for a spawning population that fully utilizes that habitat. Monitoring, evaluation and research refinements should be used to improve management objectives related to harvest, achievement of spawner abundance objectives, life history and genetic diversity, productivity and distribution objectives in each subbasin. Specifics that relate to artificial production.:

1. Establish spawner abundance goals (escapement) for each species and race in each watershed based on an estimate of the carrying capacity of each watershed (subbasin plans). This process would be refined with additional monitoring and evaluation.
2. Determine the ecological and genetic impact on natural production of wild salmonids in each watershed from releases of hatchery fish, and stray hatchery fish. This would include impacts from hatchery releases of juvenile fish including smolts that residualize in streams and compete with wild fish for food and habitat. It would also include the impact of stray hatchery fish and residualized hatchery fish on the survival and reproductive success of wild salmonids that are spawning and rearing with hatchery fish strays. Introgression of hatchery fish and hybridization is controlled so that the reproductive success and adaptive capacity of wild salmonids is enhanced.
3. Develop a stock transfer policy that maintains the genetic integrity of wild populations and their reproductive success in each watershed (subbasin) within the Columbia River basin. Because wild salmonids are locally adapted to their home streams for reproduction, transfer of stocks from other watersheds cause wild salmonid population performance to degrade. Reproductive success of wild salmonids is also affected by stock transfers through ecological impacts related to competition, predation and predator attraction.
4. Complete a genetic and life history inventory of each wild salmonid population by watershed (subbasin) in order to establish a benchmark snap shot of wild salmonid biological diversity that could be used to evaluate harvest, hatchery and habitat management in the Columbia River basin.
5. Establish “Hatchery Free Zones” watersheds such as Wind River, Asotin Creek, Joseph Creek, John Day River, and Molalla River and implement a monitoring and evaluation of the biological response for wild native salmonid populations in these streams to provide a scientific basis for evaluating the hatchery experiment in the Columbia River Basin.

6. Manage the hatchery production in the Columbia River basin so that the nutrient budget in the tributaries, mainstem, estuary and near- shore ocean environments benefit wild salmonid recovery, and control hatchery releases so that predator attraction and predation by hatchery fish, birds and mammals no longer block wild salmonid recovery.

C. Stray rates. The Council should recognize the risk to wild salmonid conservation and recovery from naturally spawning hatchery origin fish in each subbasin. The Council asks the appropriate independent science panel to determine the scientific basis for existing stray rate standards and propose a standard that is protective of ESA-listed wild salmonids in the Columbia River basin. Council and management agencies should explicitly describe the tradeoffs associated with hatchery production including stray rate impacts on native, wild salmonid productivity and recovery.

D. Cost evaluation.

1. The Council should evaluate the hatchery programs in the Columbia River basin to determine the cost to provide hatchery fish for harvest. Since these hatchery programs are for the purpose of providing mitigation for wild salmonid losses related to development of the Columbia River for hydroelectric purposes, the funding for these hatchery programs is paid for with public utility rates and taxes, so it is only appropriate for the public to know how much it costs to provide a benefit from the public investment in artificial propagation of salmonids. In addition, the cost related to hatchery impacts on wild salmon recovery should be included in this evaluation.

2. The Council should direct the IEAB to complete phase II of the economic review of the Columbia River hatchery programs. This review would evaluate the benefits provided by these hatchery programs and the cost to provide those benefits. Phase II of the hatchery cost-benefit analysis is completed for each hatchery program in the Columbia River Basin and published on the Council's web page.

E. Hatchery impacts on wild salmonids.

1. In each ESU, MPG, DPS, SMU designate at least one watershed that is managed for wild salmonids by excluding hatchery fish. The purpose is to monitor and evaluate the effect on the wild native salmonids and to provide non-hatchery reference watershed to compare with the watersheds that allow naturally spawning hatchery fish.

2. Recognize and quantify the cumulative impacts of artificial production on natural production and ecosystem processes at population, subbasin, basin and estuary scales.

3. Treat integrated hatchery supplementation and harvest as distinct programs requiring their own standards of operation.

4. Specify that segregated artificial production requires removal of hatchery fish before they reach spawning grounds to maintain the genetic and life history diversity of locally adapted populations.

5. Establish empirical evidence concerning the effect of hatchery supplementation on rebuilding natural populations and improve integration between hatchery supplementation and habitat restoration programs. Evaluate limiting factors by life stage, including density dependent effects of hatchery produced fish on productivity, abundance, and diversity of natural origin salmonids.

6. Develop quantitative objectives and basin-wide monitoring for hatchery production.

7. Evaluate the fishery contribution of hatchery summer steelhead in the Columbia River and tributaries to determine whether mitigation hatcheries are providing a harvest benefit equal to wild summer steelhead. Determine the cost to produce a hatchery summer steelhead to the catch for each hatchery program. The Council should ask their scientific and economic advisory panels for an evaluation and to make recommendations to correct problems. The Council can then use these recommendations to develop changes in the hatchery practices that would cause the contribution of hatchery fish to the sport fishery to be equal to or better than that provided by wild steelhead. This evaluation and the corrective measures would be available for public review.

8. Evaluate the population status for wild salmon and steelhead in the Columbia River by species and run for each ESU and as a whole compared to the aggregate run composed of hatchery and wild fish to determine whether hatchery fish are replacing wild salmon and steelhead in the Columbia River basin. An annual report shall be provided to the public, media and agencies on the status of ESA-listed and non-listed wild salmon and steelhead in the Columbia River. This status report shall provide graphics that show the time series trend line for each wild salmon and steelhead ESU compared to and relative to hatchery salmon and steelhead. An annual accounting by species and ESU shall be conducted for the public and agency records that show the status of wild salmonids in each aggregate run.

F. HSRG.

1. Incorporate the recommendations of the HSRG and ISAB. Recognize and address the need to develop quantitative objectives for each artificial production program based on HSRG recommendations. For each hatchery program and proposed hatchery programs conduct a risk analysis of hatchery impacts and tradeoffs for wild salmonids. These trade-offs need to be explicitly described so that they can be evaluated. The trade-off evaluation would include impacts of stray hatchery fish on wild salmonids, harvest impacts to wild salmonids in fisheries targeted on hatchery fish, and impacts related to predation, predator attraction, and ecological impacts of competition among wild and hatchery fish for rearing space and on nutrient budgets in the mainstem, tributaries and estuary. The risk analysis and tradeoff analysis would be conducted every five years to incorporate advances in scientific information and technologies to conduct such evaluations.

2. Evaluate whether the multiple objectives of recovering ESA-listed and non-listed wild salmonids to establish healthy natural populations, and mitigating harvest opportunity using artificial propagation are in conflict and can be reconciled. If they cannot be reconciled explicitly address any trade-offs for wild salmonid conservation and recovery.

G. Reintroduction. Adopt guidelines, benchmarks, and a basin-level experimental framework specifically for reintroduction of salmon and steelhead into watersheds from which they have been extirpated.

Trout Unlimited

Implement ISAB's recommendations, including on artificial production (*see* a summary under WDFW): Overhaul the artificial production element of the fish and wildlife program so it supports, not undermines, recovery of naturally reproducing, locally adapted populations"

- a. Incorporate changes recommended by the Hatchery Scientific Review Group;
- b. Integrate artificial production with existing habitat conditions and efforts to increase freshwater habitat productivity and capacity; determine limiting factors by life stage and use that information to avoid artificial production-driven density dependence that limits production of natural-origin fish;
- c. Make artificial production consistent with the need to maintain the diversity of heterogeneous populations and habitats that confer resilience;
- d. Explicitly identify and describe trade-offs between artificial production and natural production so that they can be adequately evaluated;
- e. Require that hatchery fish be removed from the natural spawning grounds to maintain genetic integrity;
- f. Explicitly address carrying capacity for juvenile salmonids when considering artificial production.

Northwest Sportfishing Industry Association and Association of Northwest Steelheaders

Recommend continued funding for the SAFE areas in the lower Columbia. Recent legislation and decisions of the Fish and Wildlife Commissions of Washington and Oregon will require the continuation and expansion of SAFE areas to implement the removal of commercial gill net fishing in the mainstem. Continued funding within the program is essential to full implementation of hatchery and harvest reforms that will be beneficial to wild stocks while providing enhanced economic utilization of hatchery fish.

American Rivers

Hatcheries: Important that fish managers take advantage of healthier habitat by reducing our dependence on hatcheries. In other words, functional, restored, occupied habitat for wild, self-sustaining salmon and steelhead populations should mean fewer hatcheries, which is a desirable goal for fisheries health, electricity ratepayers, and taxpayers alike. Hatcheries that do continue to operate should be run in a manner to minimize and ideally eliminate negative effects on wild fish populations.

Conservation Northwest

Focus on improvements to dam operations and habitat protection and restoration that increase natural salmon and steelhead production, thereby reducing the need for hatcheries. Ensure that

hatcheries continuing to operate are run in a manner that minimizes negative effects on wild fish populations.

Individual commenters, in support of American Rivers:

A number of individuals submitted the following: Focus on improvements to dam operations and habitat protection and restoration that increase natural salmon and steelhead production, thereby reducing the need for hatcheries. Ensure that hatcheries continuing to operate are run in a manner that minimizes negative effects on wild fish populations.

Snake River Salmon Solutions

An accurate accounting and reporting system to enumerate by species and ESU wild/natural and hatchery origin salmon and steelhead returning to the Columbia River for public consumption. Graphics need to include earlier (1960s) returns rather than using NOAA's 1990s baseline.

Michael Smith

Recommends more hatchery spring chinook to fish for on the lower Snake River.