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The federal caucus should be congratulated on a well-written paper that conveys a very complex issue in an understandable manner. The text that follows is a summary of criticisms developed after review of the paper and three of the appendices.

CONSERVATION OF COLUMBIA BASIN FISH-BUILDING A CONCEPTUAL RECOVERY PLAN

Options for 4 H's-

HABITAT
Options for Habitat pages 2-7- Both Habitat Option (1) Coordinate and Prioritize Federal Actions and Option (2) Coordinate Regional Plans provide the minimum acceptable strategies for the management of habitat issues in the salmon recovery. There are specific habitat degradation projects that demand immediate attention. These actions could reduce imminent risks and immediately improve survival on local populations. However, there are pristine habitats (i.e. the Middle Fork of the Salmon River) that have been thought to preserve self-sustaining metapopulations. Many of these metapopulations located in 'pristine' areas with undisturbed spawning and rearing habitats have populations that continue to decline (i.e. 1999 no adult returns in Marsh Cr. or Sulpher Cr. tributaries of the Middle Fork of the Salmon River). This indicates that habitat may not be the most important limiting factor of the 4 H's. Thus the focus of a significant increase in effort on habitat issues may not be warranted.

Performance measures and standards page 43, table 2- Performance standards are based on basin, subbasin, ESU, watershed and subwatershed level assesments and plans. The time frame, infrastructure, and cost required to complete the scope of these measures is unrealistic. This table states that at the Basin level there should be an improving trend (>10% per decade) in the number of water sheds with high quality aquatic habitat... by 2005. Even with an aggressive option for habitat improvement and adequate funding this is an unrealistic performance standard due to lack of infrastructure and political obstacles. At the ESU level (Table 2) one ecological criteria is 'identification of habitat conditions within the watersheds identified as critical to support population levels at VSP'. It is unclear what conditions will be identified in many pristine watersheds where there is abundant high quality habitat but salmonid populations continue to decline.

Managerial criteria-Table 2- Basin Level: Fully developed recovery plans for all ESUs listed as endangered and threatened by 2002. There is no infrastructure for the development of these plans nor is the time frame realistic. There are potentially many additional stocks that will be listed in the near future that will also demand recovery plan development, exacerbating infrastructure and time problems. Further more the recovery plans for many projects already implemented are not working to even decrease the rate of population decline.

HARVEST

Options for Harvest pages 2-7- Option (3) provides the best strategy for *critically low stocks. Option* (2) provides a decreased level of protection from in-river harvest. Option (1) only provides a status quo degree of protection that is more a gesture of limitation than actual protection of the resource. Certain stocks, such as the Snake River Sockeye, are at such critically low levels that any take should be avoided. It is not politically and economically feasible to close the fishery therefore the maximum level of control should be implemented. The temporary limitation of in-river mixed stock fishing should be implemented to reduce the risk of incidental take of critically low stocks. Terminal fisheries provide for fishing opportunities that can be quantified and controlled.

HATCHERIES

Options for Hatcheries pages 2-7- In the foreseeable future there are many stocks that will be at critically low levels that will need to be incorporated into a captive rearing program in order to preserve their genetic resources. Hatcheries can only preserve a limited representation of the genetic diversity of a specific stock. The feasibility of long term captive rearing as a means of preserving individual stocks is questionable due to hatchery effects, domestication, and elimination of natural selection. The cost of expanded hatchery operations run in perpetuity should also be considered a limiting factor. In addition there is a lack of infra structure to support expanded long term hatchery operations. Currently some captive rearing programs are short of space. The potential increase in demand for hatchery space as more and more stocks must be preserved in captivity far exceeds the capacity of the hatchery infrastructure. This is further complicated by variation in life history requirements (such as age of maturation) and age to which fish are raised before release or artificial spawning. Option (3) provides the best strategy for long term management of stock specific captive rearing preservation. The other options provide for immediate production of fish but do not provide a viable long-term strategy. Option (2) may be implemented as a transition phase as the project moves toward the incorporation of additional stocks into captive rearing programs.

The management plan presented in the Conservation of Columbia Basin Fish-Building a Conceptual Recovery Plan intends to determine how artificial propagation can be applied in a manner that avoids harm and assists in conservation and rebuilding of wild runs. Attempts to answer these questions have been limited due to the fact that wild stocks are disappearing at such an accelerated rate research can not be conducted (Idaho Supplementation Study). In many areas much freshwater habitat is blocked or degraded and the hatchery stock represents the only potential production. It should be determined if these stocks are worth the expenditure of preservation when there is no potential for reestablishing a self-sustaining population. Further more artificial propagation produces a large number of individuals representing a limited amount of genetic variation of the target stock. These individuals could swamp the diversity of locally adapted populations altering the genetic structure of the stock.

Hatchery Appendix

Appendix C The purpose of artificial propagation (pages 5-8) is broken down into augmentation, mitigation, restoration, and preservation (Table 1). The augmentation strategy is based on false and untested assumptions. The first is that freshwater habitat is operating at capacity. This is not the case in many instances where populations are at critically low levels. In these instances salmonid densities are well below carrying capacity. Second the strategy assumes that artificially produced populations can coexist with and not jeopardize fitness of natural populations. This has not been demonstrated. There are many uncertainties associated with producing large numbers of fish for augmentation including genetic swamping, straying, decreased fitness, competition, and predation. Augmentation, mitigation, and restoration all assume that mainstem habitat does not limit production. Juvenile and adult migration through the mainstem may be the single most important limiting factor. The preservation strategy is designated as a temporary duration. The duration is more likely permanent due to the number of stocks that will be incorporated into the program. Until the cause of

the decline is identified and rectified these populations cannot be reestablished as naturally self-sustaining populations. An additional problem associated with the preservation strategy is that only a limited amount of genetic diversity of a stock can be preserved. The motivation driving the restoration strategy is to hasten the rebuilding or reintroduction to harvest levels. To date restoration strategies have not been able to stop the decline of populations and have not been demonstrated to rebuild or successfully reintroduce self-sustaining populations.

Appendix D Artificial Production Review report 1997- part II- Policies to guide the use of artificial propagation. In general these policies have not been applied, are too esoteric, and are logistically unrealistic. In the 4 years since the development of these policies they have done little to positively alter the way the hatchery system works. (1) The manner of use and the value of artificial production must be considered in the context of the environment in which it will be used. It is unclear how this policy, developed in 1997, has been applied to current hatchery practices or its degree of success in guiding hatchery operations. (2) Artificial production implemented in adaptive management and evaluation setting. Evaluation has not been conducted to guide adaptive management. (3) Hatcheries must be operated in recognition of ecosystem at basin, region, and global scale. This policy has not been carried out.

Performance standards related to hatchery benefits- In general these performance standards are unattainable under the current system. (2) Achieve genetic and life history conservation. The amount of genetic diversity and life history variation of stocks that are at immediate risk of extinction are beyond the capacity of the hatchery system. In addition there will be many more stocks in the future that the system will not be able to accommodate. (3) Enhance local, tribal, state, regional, and national economies. To date there has been no substantial economic benefit derived from hatchery operations. Compared to historic levels, hatchery operations have only perpetuated a decreased level of economic benefit in fisheries that would have other wise disappeared. (8) Restore and create viable naturally spawning populations. This has not been successfully accomplished.

Performance standards related to hatchery risks- Many of these performance standards are unattainable under due to limitations of the current system and key uncertainties. (1) Harvest management to protect weak populations where mixed fisheries exist. This would require drastic in-river and ocean fishery restrictions that are politcally and economically not possible. (2) Do not exceed carrying capacities in the different habitats. It is currently not possible to estimate the carrying capacities of the estuary and ocean environments. (3) Assess genetic impacts among hatchery and wild fish. Infrastructure can not support the degree of monitoring needed to quantify the spawning of hatchery fish with wild fish in natal areas much less control for straying of hatchery fish into other areas. (4) Unpredictable egg supply. This is currently a problem in many programs (Idaho Supplementation Study, Snake River Sockeye, Salmon River supplementaion Program.....). (5) Production costs out weight benefits. A good example of this is the Snake River Sockeye recovery program where less than <60,000 fish were produced in 1999 at tremendous cost.

Appendix F- Tables 3 and 4 ESUs potentially requiring hatchery intervention. Table 3 lists 93 populations that may require hatchery preservation actions in the near future. Table 4 lists 28 new populations that currently require hatchery preservation actions. There are potentially many more populations that have yet to be identified that will also need hatchery preservation actions. It is logitically impossible to maintain a fraction of the populations that will require hatchery preservation actions. Many of these stocks will require long term hatchery preservation actions. There is no infrastructure to support these actions and the cost of implementing long term hatchery preservation actions for even the new 28 populations or the potential 93 additional populations is unrealistic.

HYDROPOWER

Options for Hydropower pages 2-7- There have been many improvements made to the hydropower system that have increased the survival of both adult and juvenile salmonids. However these improvements have failed to stop the decline of the majority of stocks much less act as a recovery tool. These improvements have been implemented over the past thirty years at tremendous cost. The proposed improvements (flow augmentation, dam structural modifications, and operational modifications) represent significant additional costs. These additional improvements are founded on efforts to date that have failed to meet recovery goals or any kind of performance standard. Option (1) continues a plan that has demonstrated improvement but not to a degree that will facilitate recovery or stop current trend of decline. Option (2) is based on the unproven assumption that improved fish passage facilities will be successful. This option also relies on additional flow augmentation from the Snake River an expensive, contentious, and unlikely proposition. Option (3) provides the greatest opportunity for recovery and clarification of many key uncertainties.

Integrated alternatives pages 8-10- The Federal Caucus assessment is that current levels of activities in the4 H's will be inadequate to recover Columbia Basin salmonids (page 8). Several of the options presented in this section offer a limited increase in effort that is basically a status quo approach. It is questionable that these options are presented when it is acknowledged that they are inadequate.

Alternative D (Maximum Protections) is the best alternative for Columbia Basin salmonid recovery. However the costs, political, and economic issues associated with Alternative D make it unlikely that it will be implemented. Alternatives B and C further to implement strategies that have failed to have a significant effect on the decline of salmonid populations or to facilitate recovery. These options will allow salmonid populations persist for a period of time past that which no action would allow. Alternative A provides migration corridor improvement that may be the limiting factor inhibiting recovery.

HYDROPOWER APPENDIX
Existing conditions 1. Configurations and operations. page 7- Flow augmentation is one of the primary strategies to mitigate the effects of impoundments and the regulated hydrograph on juvenile passage. Flow augmentation has not been demonstrated to be effective. There is a strong relationship between flow and survival for summer migrants from point of release in free-flowing river to Lower Granite dam. This does nothing to help migration in the section of the river with dams. NMFS research furthermore does not demonstrate a relationship between flow and juvenile survival. Flow augmentation is hyothesized to address the extended time of juvenile emigration associated with the hydro system. Yet it does nothing to mitigate the time required to move through the pools which is where a large portion slow down occurs. The benefits of flow augmentation cannot be isolated from effects of other activities and it is inconclusive how much it helps. It is counter- intuitive for an activity of uncertain effectiveness to be one of the primary strategies for hydrosystem mitigation. In addition flow augmentation is expensive and may not be available in years of low water supply.

3. Strategies and actions for improving passage. Page 10- (a) Screens are designed and tested to guide fish through non-turbine routes. Screens have different effects on different species. They have been demonstrated to readily impinge pacific lamprey and it is unclear how effective they are in routing sockeye. While they may assist in limiting direct turbine mortality it is still unclear how much delayed mortality may be incurred due to cumulative stress associated with bypass systems. The screen modifications are expensive and provide uncertain benefits.

(b) Transportaion- The T/I ratios are estimated from a biased sample of in-river migrants. In-river migrant survival rates were estimated using multiple detections of tagged fish that were channeled through multiple bypasses. There may have been significant delayed mortality associated with these fish compared to fish that migrated through the hydrosystem with limited mechanical handling. Furthermore transportation has failed to increase SARs to pre-hydrosystem levels nor has it stopped the

continuing trend of population declines. There may also be an unknown level of delayed mortality for transported fish.

(c) Spill- Spill has been used since the late 1970's. After 20+ years of voluntary spill at differing levels for each dam it has not been demonstrated to provide significant benfit to fish survival. The reliance on this action to improve passage is unrealistic.

(d) Surface Bypass- This strategy is expensive, untested, and cannot be expected to provide the level of benefit to fish passage throughout the system that would result in meaningful recovery.

3.4.7 Evaluation of hydropower options-Social and economic evaluation-This is a biased presentation with the costs of the Breach option having a detailed presentation including a breakdown of power, navigation, and irrigation losses. The costs associated with the Current program are summarized as serious social and economic impacts. The costs associated with the Aggressive program options have not been evaluated. The current program has been acknowledged as being unable to meet recovery goals so at a minimum the aggressive program option will be selected. The cost of the current program is listed at $185-800 million. The aggressive program has a cost estimate of $850 million to $1 billion and the Breach option cost is estimated at $1.2-1.9 billion. The current annual BPA budget is listed as $252 million for Fish and Wildlife. It is reasonable to anticipate a long-term minimum expenditure of $252 million per year, which is not expected to provide a measurable benefit. The Breach option, which offers the greatest chance of meeting recovery goals, will be a one time cost of $1.2-1.9 billion. An amount equal to that will be generated in the next four years under the current program, which will not meet recovery goals. The cost estimates of the current and aggressive programs represent only a fraction of total costs as they do not include BOR, COE, or state expenditures.

Integrated Alternatives
Section 4.1.1 Snake River ESUs- This is a biased presentation where unequal emphasis is placed on the Cumulative Risk Initiative (CRI) compared to the Plan for Analyzing and Testing Hypotheses (PATH). In the Snake River spring/summer chinook section of this report the CRI analysis is given a detailed representation, a page in length, while the PATH analysis is given one short paragraph. Furthermore the report does not provide comparable results of the analysis. The CRI presentation gives percent chance of reaching quasi-extinction in a given time frame while the PATH analysis presentation suggests that certain actions may come close to meeting NMFS recovery goals. These can not be compared or contrasted. It is unclear why the CRI is predicting extinction probabilities when it should be evaluating actions ability to achieve recovery goals.

There are some serious problems with the CRI analysis. The response by G. Oosterhout 'Seven questions about the Cumulative Risk Initiative' provides one detailed criticism of the CRI process. Some of these problems include the use of SARs that are 4 times higher than what has been measured, the exclusion of all population data after 1990, selection of an extinction threshold lower than commonly used, and lack of model validation or sensitivity analysis.

The CRI analysis indicates that removing the dams by itself would yield little improvements in population growth rates based on the assumption that there is no significant delayed mortality associated with transportation and dam passage. This assumption is highly questionable and is based on one of the greatest uncertainties associated with salmon recovery. The CRI indicates that there is no single action that is sufficient to reduce extinction risks assuming that there is no significant delayed mortality associated with transportation and dam passage. Again this assumption is highly questionable and is based on one of the greatest uncertainties associated with the hydrosystem and salmon recovery. The CRI most optimistic projections using strategies in all 4 H's with and without dam breaching do not meet recovery goals.