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Bruce A. Measure
Montana

Rhonda Whiting
Montana

April 5, 2005

MEMORANDUM

TO: Council Members

FROM: Bruce Suzumoto

SUBJECT: Hatchery-subbasin plan integration and development of provincial objectives

At the March meeting in Portland, the Council discussed and heard testimony on the proposal to initiate a process better integrate hatchery programs with subbasin plans. Background documents for the proposal are attached. The Council generally agreed with the objectives and approach of the proposal but felt that a cost-sharing scheme with other agencies should be explored further. The Council directed staff to work with NOAA Fisheries and other interested parties to see what possibilities may exist to share the costs of the project. Staff is currently looking into possibilities for cost-sharing and will report what opportunities may exist.

Also, due to contracting constraints and a delay in the decision on this project, we have attached an amended schedule for completion of the project (Table 1A).

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Table 1A: APRE/ Subbasin Planning Integration, Proposed Project Schedule and Tasks

Element	Start	Finish
1. Project Integration	**May-05**	**September-05**
1A. Project Management and Coordination	**May-05**	**September-05**
1B. Regional / Coordination / Integration	**May-05**	**August-05**
1C. Convene Advisory Committee (Key Entities)	**May-05**	**August-05**
1D. Provide Formal Reports on Results	**July-05**	**September-05**
2. Develop Information System and Tools/Conduct Workshops	**May-05**	**August-05**
2A. Refine Implementation Plan	**May-05**	**June-05**
(Establish participants. Implement plan for goal and objective development for each subbasin and long term integration)		
2B. Guidelines / Standards for Process / Methods	**May-05**	**June-05**
(Develop final guidelines document / manual for AHA model, changes to guidelines and standards during process)		
2C. Information System Design, Development, Support (Manage, Maintain Data and Information)	**May-05**	**August-05**
Organize Current Information	May-05	June-05
Develop Short and Long Term Data and Information Needs	May-05	August-05
Develop policy for long term maintenance responsibilities of information system	May-05	June-05
2D. Implement Process to Integrate Regional Activities for Anadromous Stocks	**May-05**	**July-05**
Conduct training workshops with technical staff on the use of tools (3 workshops)	June-05	June-05
Hold subbasin work sessions with co-managers and others to complete data collation (5 work sessions)	June-05	July-05
2E. Conduct Follow-up Review	**August-05**	**September-05**

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March 8, 2005

TO: Council Members

FROM: Bruce Suzumoto
Manager, Special Projects

SUBJECT: Hatchery-subbasin plan integration and development of provincial objectives

PROPOSED ACTION: Approve the attached budget and workplan to fund the initial phase of the hatchery-subbasin plan integration technical exercise. This action will allow Bonneville to negotiate the necessary contracts for project implementation. The costs of these activities should not exceed $300,000 and would be charged against the $900,000 APRE placeholder in the FY05 budget.

PROJECT PURPOSE: The primary purpose of this project is to provide analytical tools to facilitate technical and policy discussions leading to implementation of subbasin plans and the development of provincial objectives and recovery plans. The tools will provide a transparent, consistent structure for analyzing the benefits of proposed actions at multiple levels of resolution. Phasing of the technical exercise will allow the Council to determine whether or not to expand the project more broadly at a later date.

PROJECT DELIVERABLES: 1) A comprehensive, web-based data system that will coordinate and utilize information from existing databases and enable users to generate a variety of reports useful for implementation and policy needs; 2) a series of training sessions and "proof-of-concept" technical workshops aiming to educate individuals on use of analytical tools and improve the data and information used in the process; 3) hatchery and subbasin integration results for at least five subbasins.

SIGNIFICANCE:

- The development of specific biological objectives at the province level is called for in the 2000 Fish and Wildlife Program. The project will help provide a consistent approach for organizing subbasin and hatchery information and provide means to aggregate or "roll-up" anadromous populations to the provincial level. Products from a technical exercise could form the basis for an amendment process to establish provincial objectives in the Council's Program.

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- Many subbasin plans need greater alignment of hatchery production with subbasin habitat conditions and future habitat rehabilitation efforts. The project initiates a technical process that will improve the link between salmon and steelhead hatchery programs with subbasin plans. Improvement in the linkage between hatchery programs and subbasin habitat conditions is important to hatchery reform activities and subbasin planning efforts.
- The project will produce a comprehensive data system that will coordinate and utilize information from existing databases and enable users to generate a variety of reports useful for implementation of subbasin plan strategies and recovery planning. The project will create useful decision support tools that may be used for future policy discussions.
- Quantified objectives, once established, will assist the development of a more effective monitoring and evaluation program. Biological objectives and population benchmarks will assist in determining how well fish and wildlife efforts are progressing.
- The project will help integrate fish production across the "4-H's." Along with better placing production objectives in the context of subbasin plans, the process will take into account harvest objectives and hydrosystem effects on fish production.
- The project will support regional processes such as state and federal recovery planning, the National Environmental Policy Act (NEPA) process for Columbia Basin hatcheries (Mitchell Act hatcheries), and other regional production and harvest planning efforts.

BUDGETARY/ECONOMIC IMPACTS:

- The general approach, schedule and budget are summarized in Tables 1 and 2. The total cost of the project is estimated to be $299,621. It is proposed that these funds come from the remainder of the $900,000 APRE placeholder established in the FY 2005 budget.
- The largest area of the budget is Element 2C: information system design, development and support ($181,782). This element will develop web-enabled software that will assure data integrity, transparency and access to an integrative model for use in technical and policy discussions.
- Proposed schedule for the project is March 2005 through July 2005.
- We anticipate that this comprehensive project will ultimately include all Columbia River subbasins below the blocked areas and encompass approximately 260 hatchery and natural stocks of anadromous fish (Table 3).
- Various state and federal fish and wildlife agencies and tribes are willing to support the project with staff time.
- NOAA Fisheries may be able to provide funds to enhance or expand the project, but at this time no monetary commitment has been made.

BACKGROUND:

- Objectives at the province scale will help to measure progress towards meeting elements of the overall vision and the basin-scale objectives established in the 2000 Fish and Wildlife Program. Clear targets at the provincial level should improve accountability, inform decisions about resource allocation, and provide the basis for a more organized and efficient monitoring and evaluation program. To be effective, provincial objectives must be measurable statements of population performance and take into account effects of the environment or management activities encountered throughout the lifecycle of the target species. Biological objectives at the provincial level were not articulated in the

Council's 2000 Fish and Wildlife Program. The Council intended to develop provincial level objectives once subbasin planning was complete:

> *Upon completion of subbasin planning, the Council expects to amend into the program appropriate visions, objectives, and strategies for the provinces. Biological objectives at the province scale guide development of the program at the subbasin scale. It is likely that there will be some iteration among biological objectives at the various scales as information is developed. However, the Council intends to develop a provisional set of objectives at the province scale to provide planning guidelines for subbasin planning. These may be revisited in the future to reflect the experience gained in planning at the subbasin level. Biological objectives at the province level will be used to 1) "size" the program and describe the amount of change needed across the province; 2) help determine cost effectiveness of program measures; and 3) provide the basis for program accountability and the monitoring, evaluation and research associated with this program. The biological objectives at the province level are not intended to be prescriptive or regulatory in nature. Instead, they provide guidance for planning at the subbasin level* (p.35, Council Document 2000-19).

The need for clear biological objectives at the provincial and basinwide levels is generally accepted. In response to a Council issue paper on subbasin plans, the Council received consistent comment about the need to aggregate the subbasin plan objectives at a provincial and basinwide level, and review or adopt population and habitat objectives at those higher program levels. Similarly, many comments saw a need, using the subbasin plans and any higher level "roll-up," to define more precisely the priorities of the program, to guide the allocation of Bonneville funding, and to define more clearly the next project selection process.

Unfortunately, because biological objectives in many subbasin plans were defined differently, aggregation of objectives to higher levels is difficult. In order to effectively aggregate objectives to the provincial level a "common currency" across subbasins is needed. Subbasin plans need similar performance indicators derived in a consistent manner across subbasins.

- Hatchery production was not as well integrated into most subbasin plans, as the Council would have liked. Although the plans did a good job of assessing habitat conditions, most plans fell short in describing how hatcheries would work with habitat strategies to meet subbasin goals. The Council recognized this issue during the subbasin plans adoption process. It was decided that hatchery integration improvements would be made to subbasin plans in the future.

- Accounting for out of subbasin effects was varied in terms of both quality and completeness in many subbasin plans. In many cases, how harvest and mainstem passage survival could affect results were not clearly defined. Greater transparency of how out of subbasin effects were taken into account is needed in many plans.

- An important finding of the Council's Artificial Production Review and Evaluation (APRE) process was that most basin hatchery programs lacked measurable objectives for

two of their primary purposes— providing for harvest and contributing to natural escapement. Most programs had a variety of operational goals such as numbers of fish released, number of eggs taken or in-hatchery survival objectives, but many did not state how many returning adults were designated for harvest or how many adults were intended to spawn naturally. Without articulating specific objectives for harvest and hatchery contribution to natural escapement, it is difficult to assess how well a particular program is meeting its stated purpose.

ANALYSIS:

Council staff recommends that to address the needs outlined above, the Council initiate a technical exercise that would help clarify habitat and population objectives at the subbasin, provincial and basin-wide levels. This effort would integrate habitat, artificial production, harvest, hydro and other effects and derive how far current and proposed activities can take us toward meeting regional objectives. The exercise would rely strongly on information found in subbasin plans and other sources as the basis for current and future results. The products of this technical effort could then inform a number of planning exercises including a possible Council Program amendment process.

The primary products of the technical exercise will be numerical estimates of how many and what type of salmon and steelhead adults will escape to the spawning grounds, be harvested and return to hatcheries. Current and long-term adult estimates will be made for each stock of fish in all Columbia River anadromous subbasins. Current estimates will be made using existing habitat conditions, hatchery activities, harvest rates and mainstem survival estimates. Long-term adult estimates will be made after assuming future habitat improvements described in subbasin plans and hatchery reform improvements have been completed. Once these numeric subbasin adult estimates are completed, they can then be aggregated to provincial, ESU or basin-wide levels. The products from this effort will likely inform future iterations of subbasin plans.

NOAA Fisheries, U.S. Fish and Wildlife Service and Washington Department of Fish and Wildlife support the effort because they see benefits to ESA recovery planning and the Columbia Basin hatchery NEPA process. We anticipate that this comprehensive project will ultimately include all Columbia River subbasins below the blocked areas and encompass approximately 260 hatchery and natural stocks of anadromous fish (Table 3).

This project proposes an initial step of a possible larger technical exercise that attempts to better integrate hatcheries with subbasin plans while considering out of subbasin impacts.

APPROACH:

Current Project Scope: Phase I (March - June 2005)

1) Develop web-enabled software and information system to assure data integrity, transparency, and access to an integrative model.

2) Conduct three training workshops with technical staff to describe tools, application, and data required.

3) Hold work sessions to complete data collation and proof of concept in various subbasins and provinces (possibly Columbia Cascade Province, Lower Snake planning area, Umatilla, Deschutes, and Clearwater subbasins).

4) Provide products for Council review.

If Phase I is successful and useful staff may return to the Council and request funding to complete a second phase in the technical integration process:

Phase II (possibly July - October 2005)

1) In a series of workshops, complete data review and proof of concept for the remainder of the anadromous stocks in the Basin.

2) Aggregate results to the provincial, ESU and basinwide levels.

The spreadsheet model recommended to assist with the technical exercise is the "All-H-Analyzer" (AHA) developed in the Puget Sound by the Hatchery Scientific Review Group. Using information found in subbasin plans, the APRE database, harvest management plans and the hydro Biological Opinion, the AHA model integrates hatchery production with subbasin habitat conditions and considers the out-of-subbasin impacts. The AHA model is recommended for the following reasons:

- It expresses relationships between hatchery programs and subbasin habitat conditions (past, current, or expected) in an understandable and simple way.
- It can readily accept the information contained in the adopted subbasin plans (particularly with regard to habitat condition) and "scale it up" to a province level.
- It considers fitness for both hatchery broodstock and natural spawning fish in a consistent and transparent way.
- It can accept inputs for and takes into account out-of-basin effects such as harvest and hydro impacts and relate those to habitat and hatchery activities.
- It readily uses existing databases including EDT and APRE/HGMP information.
- It produces results in a "common currency" (number of adults) that can be aggregated to different levels.
- It has been tested in the Puget Sound and Columbia Basin and has proven to be a helpful discussion tool to integrate hatcheries with subbasin habitat conditions.
- Its use in the Columbia Basin is supported by both WDFW and USFWS. These agencies operate the majority of hatchery programs in the Columbia Basin.
- It can accept different inputs for any "H" and act as a decision support tool or "scenario gaming" system for policy makers exploring alternative objectives or ways to possibly achieve them.

The ISRP/ISAB reviewed the AHA model in February 2005. While the science group strongly supported the development of clear, measurable objectives for the Council's program, they raised concerns about the AHA tool. Their primary concerns were 1) the model needs better documentation; 2) the model needs to be better adapted to the Columbia Basin; and 3) two or more models are needed to test the validity of the model's outputs.

The ISRP/ISAB concerns are now being addressed. AHA model documentation is now being developed and will be available shortly. The AHA tool is being adapted for use in the Columbia Basin to include a transparent hydropower component, which will allow the user to clearly identify mainstem survival impacts. Finally, staff is reviewing other models that may be helpful in testing the validity of the AHA tool results. These models include the Shiraz model (University of Washington), a life-cycle cohort model (CRITFC) and the Integrated Modeling Framework (Cramer and Associates). Depending on their applicability, one or more of these models may be used in the future to compare AHA results.

ALTERNATIVES: Other alternatives considered and their relative advantages and disadvantages to the proposed action:

1. Initiate a process to integrate hatchery programs with subbasin plans for all anadromous stocks in the Columbia Basin. Develop information system and tools. This action would entail reviewing and integrating all anadromous salmon and steelhead stocks with subbasin plans. Hold provincial/subbasin workshops to organize and improve data used in the technical exercise. The estimated cost for this alternative is approximately $530,000.

   Advantages
   - Work could be completed on a more rapid schedule
   - May be less costly and more efficient to complete the process comprehensively.
   - May have a greater probability of meeting state and federal recovery plan deadlines.

   Disadvantages
   - More difficult process to manage
   - Greater risk because the approach has not been tried at a broader level.
   - Would not be able to as readily to adapt the process from experience gained

Why not recommended: Greater public education or outreach on provincial objective setting process may be needed before attempting to expand technical exercise. The proposed action should increase public understanding of the Council's needs and the provincial objective adoption process.

2. Initiate a process to integrate hatchery programs with subbasin plans for all anadromous stocks in the state of Washington. Develop information system and tools. This action would entail reviewing and integrating all anadromous salmon and steelhead stocks with Washington subbasin plans. Hold provincial/subbasin workshops to organize and improve data used in the technical exercise. The estimated cost for this alternative is approximately $400,000.

   Advantages
   - Because recovery plans in Washington are due in June, there is significant interest in assisting with the technical work.
   - Work would be completed comprehensively for an entire state
   - May be less costly and more efficient to complete the process comprehensively.
   - May have a greater probability of meeting state and federal recovery plan deadlines.

   Disadvantages
   - More difficult process to manage
   - Greater risk because the approach has not been tried at a broader level.
   - Would not be able to as readily to adapt the process from experience gained

Why not recommended: Greater public education or outreach on provincial objective setting process may be needed before attempting to expand technical exercise. Subbasins outside Washington would not benefit as much. The proposed action should increase public understanding of the Council's needs and the provincial objective adoption process.

3. No action or delay action. No financial cost.

   Advantages

   - More time to plan for and schedule technical exercise
   - More time to conduct outreach and public education on how the technical exercise will be used.

   Disadvantages

   - A technical exercise must be completed at some time.
   - Will delay Council needs for provincial objectives and subbasin roll-up.
   - May miss an opportunity to work with willing partners.
   - May lose momentum and support that exists for the process.
   - It will be more difficult to meet state and federal recovery plan deadlines.

Why not recommended: Roll-up of subbasin plans and development of provincial objectives are needed and must be accomplished at some time in the future. No action or delayed action will may make it more difficult to accomplish these tasks. The proposed action keeps the momentum and interest in the technical exercise moving forward in a deliberate way. The proposed action should increase public understanding of the Council's needs and the provincial objective adoption process.

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March 11, 2005

MEMORANDUM

TO: Council Members

FROM: Bruce Suzumoto

SUBJECT: Additional information regarding the hatchery-subbasin plan integration proposal (Council agenda item #9).

After further review of the hatchery-subbasin plan integration proposal dated March 8, 2005, two areas of the memo probably need further elaboration and clarification. These are when and how the ISAB/ISRP comments will be addressed and what is the rationale for selecting the "All-H-Analyzer" (AHA) model over other models.

The ISRP/ISAB science group strongly supported the development of clear, measurable objectives for the Council's program but raised issues about the AHA tool and its usage. Their primary concerns were 1) the model needs better documentation; 2) the model needs to be better adapted to the Columbia Basin; and 3) two or more models are needed to test the validity of the model's outputs. Responding to these concerns:

- Documentation for the AHA model is underway. The documentation for the model should be complete by March 18.
- The AHA tool is being adapted for use in the Columbia Basin to include a transparent hydropower component, which will allow the user to clearly identify mainstem survival assumptions and impacts. The refinements to the model are now complete or nearly complete.
- The staff is reviewing other models that may be helpful in testing the validity of the AHA tool results. We anticipate conducting a comparison of model results when we determine the appropriate model and test subbasin. In the meantime, the Council should know that AHA model results have been validated as reasonable estimates when compared to what is observed "on-the-ground" in many subbasins in the Puget Sound and in the Columbia Basin.

The ISAB/ISRP also suggested that other models or tools be investigated. Council staff reviewed and assessed several alternative models to the AHA tool, and has interviewed individuals with knowledge about them. The other tools investigated included the Shiraz model

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(University of Washington), a cohort life-cycle model (CRITFC), and the Integrated Modeling Framework (Cramer and Associates). Each model had it own particular strengths with regard to the Council's hatchery reform and program development work and applicability to the Columbia Basin. However, each model also had certain shortcomings making it less useful for our projects. For example, certain models are more complex and difficult to use, requiring significant expertise to run (Shiraz). Others do not have an embedded hatchery-natural spawning fitness relationship to examine the size and broodstock composition of the hatchery program in a consistent and transparent way from one hatchery program to the next (CRITFC and Cramer). Some models do not readily use EDT outputs found in most subbasin plans making them more difficult to apply in the basin (Shiraz generally uses empirical data). Finally, some were created for other purposes and need updating (CRITFC).

The AHA model was selected over other models because it seems to best meet the project's needs and because it has significant regional acceptance. Various characteristics of the AHA tool are outlined in the March 8 memo. The AHA model is transparent and simple to use, has an innovative hatchery/natural spawning fitness relationship imbedded in it, and readily uses existing data sets already developed in the basin (EDT and APRE).

They AHA tool also has by far the greatest regional acceptance and familiarity. It was developed in the Puget Sound by the Hatchery Scientific Review Group and has been used extensively there to better integrate hatchery programs with subbasin habitat. The Washington Department of Fish and Wildlife wishes to apply the AHA tool to the Columbia Basin to ensure a consistent approach throughout the state. The U.S. Fish and Wildlife Service also supports the use of the AHA tool to better integrate their programs with habitat and naturally spawning stocks. These two agencies operate the most of the hatchery programs in the Columbia Basin. The Yakama Tribe has used the tool and wishes to apply the tool in the Yakima and Klickitat subbasins as well as in the Columbia Cascade Province. Members of the Upper Columbia Salmon Recovery Board are also interested in using the AHA tool to assist their recovery planning efforts.

NOAA Fisheries scientists reviewed the AHA tool and believe that it can be useful as part of a suite of tools to inform recovery planning. This is an important point. All the models reviewed and others that may exist can help inform the ongoing decision processes in different ways. There is not a single model that will satisfy everyone's needs. Out of the models that we reviewed, we believe the AHA tool meets most of the Council's needs and has the greatest chance of being used successfully because it uses existing data sets and has broad regional acceptance. As the ISRP/ISAB stated in their review, at some point in the future the outputs of the AHA model should be compared to the outputs of another model to see how they compare. We are hopeful that resources will be provided by others entities to allow for a comparative evaluation. However, at this time we believe that the AHA is the tool best fit for the work that the Council requires, and while that is the real test and reason for selecting it, AHA happens to also enjoy support and have a track record of success in the region.

We hope that this supplemental memorandum might answer questions or address the important issues raised by the ISAB/ISRP that the memo in the packet may have passed by a bit quickly.

Table 1: APRE/ Subbasin Planning Integration, Proposed Project Schedule and Tasks

Element	Start	Finish
1. Project Integration	**March-05**	**July-05**
1A. Project Management and Coordination	**March-05**	**June-05**
1B. Regional / Coordination / Integration	**March-05**	**June-05**
1C. Convene Advisory Committee (Key Entities)	**March-05**	**June-05**
1D. Provide Formal Reports on Results	**March-05**	**July-05**
2. Develop Information System and Tools/Conduct Workshops	**March-05**	**June-05**
2A. Refine Implementation Plan	**March-05**	**April-05**
(Establish participants. Implement plan for goal and objective development for each subbasin and long term integration)		
2B. Guidelines / Standards for Process / Methods	**March-05**	**April-05**
(Develop final guidelines document / manual for AHA model, changes to guidelines and standards during process)		
2C. Information System Design, Development, Support (Manage, Maintain Data and Information)	**March-05**	**June-05**
Organize Current Information	March-05	April-05
Develop Short and Long Term Data and Information Needs	March-05	June-05
Develop policy for long term maintenance responsibilities of information system	March-05	April-05
2D. Implement Process to Integrate Regional Activities for Anadromous Stocks	**March-05**	**June-05**
Conduct training workshops with technical staff on the use of tools (3 workshops)	April-05	April-05
Hold subbasin work sessions with co-managers and others to complete data collation (5 worksessions)	April-05	May-05
2E. Conduct Follow-up Review	**June-05**	**June-05**

Table 2: APRE/ Subbasin Planning Integration, Project Budget

		Proposed Budget March through July 2005			
Work Element	**Work Element Title**	**Labor**	**Travel**	**Supplies, Equip, Printing**	***TOTALS***
Element 1A	Project Management and Coordination	**$32,207**	**$2,327**	**$100**	***$34,634***
Element 1B	Regional / Coordination / Integration	**$9,615**	**$645**	**$50**	***$10,310***
Element 1C	Convene Advisory Committee (Key Entities)	**$5,100**	**$904**	**$150**	***$6,154***
Element 1D	Provide Formal Reports on Results	**$4,921**	**$266**	**$100**	***$5,286***
Element 2A	Refine Implementation Plan	**$10,887**	**$563**	**$100**	***$11,550***
Element 2B	Guidelines / Standards for Process / Methods	**$8,759**	**$271**	**$100**	***$9,130***
Element 2C	Information System Design, Development, Support	**$179,887**	**$1,796**	**$100**	***$181,782***
Element 2D	Implement Process to Integrate Regional Activities for Anadromous Stocks	**$32,907**	**$4,145**	**$1,000**	***$38,052***
Element 2E	Conduct Other Associated Follow-up Review	**$2,472**	**$226**	**$25**	***$2,723***
	Total Dollars	***$286,755***	***$11,141***	***$1,725***	***$299,621***

Table 3: APRE/ Subbasin Planning Integration, Anadromous Stocks Included in Project

No	Stock	Natural / Hatchery	Subbasin	Province
1	Summer Steelhead-Natural	Natural	Asotin	Blue Mountain
2	Fall Chinook Tule-Natural	Natural	Big White Salmon	Columbia Gorge
3	Summer Steelhead-Natural	Natural	Big White Salmon	Columbia Gorge
4	Winter Steelhead-Natural	Natural	Big White Salmon	Columbia Gorge
5	Spring Chinook-Natural	Natural	Clearwater	Mountain Snake
6	Steelhead A-Natural	Natural	Clearwater	Mountain Snake
7	Steelhead B-Natural	Natural	Clearwater	Mountain Snake
8	Coho (Clatskanie) - Natural	Natural	Columbia Estuary	Columbia Estuary
9	Coho (Youngs Bay)- Natural	Natural	Columbia Estuary	Columbia Estuary
10	Winter Steelhead (Scappoose/Clatskanie) - Natural	Natural	Columbia Estuary	Columbia Estuary
11	Winter Steelhead (Youngs Bay) - Natural	Natural	Columbia Estuary	Columbia Estuary
12	Chum- Natural	Natural	Cowlitz	Lower Columbia
13	Coweeman Fall Chinook-Natural	Natural	Cowlitz	Lower Columbia
14	Fall Chinook - Natural	Natural	Deschutes	Columbia Plateau
15	Chum- Natural	Natural	Elochoman	Columbia River Estuary
16	Late Winter Steelhead-Natural	Natural	Elochoman	Columbia River Estuary
17	Spring Chinook-Natural	Natural	Entiat	Columbia Cascade
18	Steelhead-Natural	Natural	Entiat	Columbia Cascade
19	Cutthroat-Natural	Natural	Fifteenmile Creek	Columbia Gorge
20	Winter Steelhead-Natural	Natural	Fifteenmile Creek	Columbia Gorge
21	Fall Chinook-Natural	Natural	Grande Ronde	Blue Mountain
22	Spring Chinook-Natural	Natural	Grande Ronde	Blue Mountain
23	Summer Steelhead-Natural	Natural	Grande Ronde	Blue Mountain
24	Fall Chinook-Natural	Natural	Grays	Columbia River Estuary
25	Late Winter Steelhead-Natural	Natural	Grays	Columbia River Estuary
26	Searun Cutthroat- Natural	Natural	Grays	Columbia River Estuary
27	Coho-Natural	Natural	Hood	Columbia Gorge
28	Fall Chinook-Natural	Natural	Hood	Columbia Gorge
29	Sea Run Cutthroat-Natural	Natural	Hood	Columbia Gorge
30	Spring Chinook-Natural	Natural	Hood	Columbia Gorge
31	Fall Chinook (SRB)-Natural	Natural	Imnaha	Blue Mountain
32	Spring Chinook Natural	Natural	John Day	Columbia Plateau
33	Summer Steelhead Natural	Natural	John Day	Columbia Plateau
34	Coho (Early)-Natural	Natural	Kalama	Lower Columbia
35	Coho (Late)-Natural	Natural	Kalama	Lower Columbia
36	Fall Chinook (Tule)-Natural	Natural	Klickitat	Columbia Gorge
37	Summer Chinook-Natural	Natural	Klickitat	Columbia Gorge
38	Summer Steelhead-Natural	Natural	Klickitat	Columbia Gorge
39	Winter Steelhead-Natural	Natural	Klickitat	Columbia Gorge
40	Chum- Natural	Natural	Lewis	Lower Columbia
41	Fall Chinook LRB-Natural	Natural	Lewis	Lower Columbia
42	Fall Chinook Tule-Natural	Natural	Lewis	Lower Columbia
43	Late Winter Steelhead-Natural	Natural	Lewis	Lower Columbia
44	Searun Cutthroat-Natural	Natural	Lewis	Lower Columbia
45	Chum (Lower Columbia Tribs) - Natural	Natural	Lower Columbia	Lower Columbia
46	Coho (Big/Gnat) - Natural	Natural	Lower Columbia	Lower Columbia
47	Coho (Gorge) - Natural	Natural	Lower Columbia	Lower Columbia
48	Coho (Hood River) - Natural	Natural	Lower Columbia	Lower Columbia
49	Fall Chinook (Tule LCR Tribs) - Natural	Natural	Lower Columbia	Lower Columbia
50	Winter Steelhead (Big/Gnat) - Natural	Natural	Lower Columbia	Lower Columbia
51	Winter Steelhead (Gorge) - Natural	Natural	Lower Columbia	Lower Columbia
52	Spring Chinook - Natural	Natural	Salmon	Mountain Snake
53	Steelhead A-Natural	Natural	Salmon	Mountain Snake
54	Steelhead B-Natural	Natural	Salmon	Mountain Snake
55	Summer Chinook - Natural	Natural	Salmon	Mountain Snake
56	Coho - Natural	Natural	Sandy	Lower Columbia
57	Early Fall Chinook- Natural	Natural	Sandy	Lower Columbia
58	Late Fall Chinook - Natural	Natural	Sandy	Lower Columbia

Table 3: APRE/ Subbasin Planning Integration, Anadromous Stocks Included in Project

No	Stock	Natural / Hatchery	Subbasin	Province
59	Summer Steelhead - Natural	Natural	Snake Hells Canyon	Blue Mountain
60	Spring Chinook- Natural	Natural	Walla Walla	Columbia Plateau
61	Summer Steelhead-Natural	Natural	Walla Walla	Columbia Plateau
62	Chum- Natural	Natural	Washougal	Lower Columbia
63	Late Winter Steelhead-Natural	Natural	Washougal	Lower Columbia
64	Calapooia Winter Steelhead - Natural	Natural	Willamette	Lower Columbia
65	Clackamas Early Coho - Natural	Natural	Willamette	Lower Columbia
66	Clackamas Fall Chinook - Natural	Natural	Willamette	Lower Columbia
67	Clackamas Late Coho - Natural	Natural	Willamette	Lower Columbia
68	Luckiamute Winter Steelhead - Natural	Natural	Willamette	Lower Columbia
69	Molalla Winter Steelhead - Natural	Natural	Willamette	Lower Columbia
70	North Santiam Winter Steelhead - Natural	Natural	Willamette	Lower Columbia
71	Rickreall Winter Steelhead - Natural	Natural	Willamette	Lower Columbia
72	South Santiam Winter Steelhead - Natural	Natural	Willamette	Lower Columbia
73	Tualatin Winter Steelhead - Natural	Natural	Willamette	Lower Columbia
74	Upper Willamette Fall Chinook Non-native - Natural	Natural	Willamette	Lower Columbia
75	Yamhill Winter Steelhead - Natural	Natural	Willamette	Lower Columbia
76	Fall Chinook (Tule) Natural	Natural	Wind	Columbia Gorge
77	Fall Chinook (URB)-Natural	Natural	Wind	Columbia Gorge
78	Summer Steelhead Natural	Natural	Wind	Columbia Gorge
79	Winter Steelhead Natural	Natural	Wind	Columbia Gorge
80	American River Spring Chinook-Natural	Natural	Yakima	Columbia Plateau
81	Naches Spring Chinook-Natural	Natural	Yakima	Columbia Plateau
82	Naches Steelhead-Natural	Natural	Yakima	Columbia Plateau
83	Satus Steelhead-Natural	Natural	Yakima	Columbia Plateau
84	Toppenish Steelhead-Natural	Natural	Yakima	Columbia Plateau
85	Upper Yakima Steelhead-Natural	Natural	Yakima	Columbia Plateau
86	Yakima Summer Chinook-Natural	Natural	Yakima	Columbia Plateau
87	Winter Steelhead (Skamania)-Hatchery	Hatchery	Big White Salmon	Columbia Gorge
88	Coho	Hatchery	Clearwater	Mountain Snake
89	Fall Chinook (Big Canyon)-Integrated	Hatchery	Clearwater	Mountain Snake
90	Fall Chinook (NP Cherry Lane)- Integrated	Hatchery	Clearwater	Mountain Snake
91	Spring Chinook (Clearwater Hatchery)-Hatchery	Hatchery	Clearwater	Mountain Snake
92	Spring Chinook (Dworshak)-Hatchery	Hatchery	Clearwater	Mountain Snake
93	Spring Chinook (Kooskia)-Integrated	Hatchery	Clearwater	Mountain Snake
94	Spring Chinook (Nez Perce)	Hatchery	Clearwater	Mountain Snake
95	Summer Steelhead B-Run (Clearwater)- Hatchery	Hatchery	Clearwater	Mountain Snake
96	Summer Steelhead B-Run (Dworshak)- Integrated	Hatchery	Clearwater	Mountain Snake
97	Chum (Sea Resources)- Integrated	Hatchery	Columbia Estuary	Columbia Estuary
98	Coho (Big Creek) - Hatchery	Hatchery	Columbia Estuary	Columbia Estuary
99	Coho (CEDC Sandy River)- Hatchery	Hatchery	Columbia Estuary	Columbia Estuary
100	Coho (SAFE Tanner Creek) - Hatchery	Hatchery	Columbia Estuary	Columbia Estuary
101	Coho (Steamboat Slough)- Hatchery	Hatchery	Columbia Estuary	Columbia Estuary
102	Early Coho (Sea Resources)- Integrated	Hatchery	Columbia Estuary	Columbia Estuary
103	Fall Chinook (Rogue CEDC) - Hatchery	Hatchery	Columbia Estuary	Columbia Estuary
104	Fall Chinook (Sea Resources)- Integrated	Hatchery	Columbia Estuary	Columbia Estuary
105	Fall Chinook Tule (Big Creek) - Integrated	Hatchery	Columbia Estuary	Columbia Estuary
106	Grays-Deep River Coho	Hatchery	Columbia Estuary	Columbia Estuary
107	Grays-Deep River Spring Chinook	Hatchery	Columbia Estuary	Columbia Estuary
108	Spring Chinook CEDC (SAFE Willamette Hat.) - Hatchery	Hatchery	Columbia Estuary	Columbia Estuary
109	Spring Chinook CEDC (South Santiam Hat.) - Hatchery	Hatchery	Columbia Estuary	Columbia Estuary
110	Type N Coho (Cathlament HS - FFA)	Hatchery	Columbia Estuary	Columbia Estuary
111	Winter Steelhead (Big Creek) - Hatchery	Hatchery	Columbia Estuary	Columbia Estuary
112	Fall Chinook Tule-Hatchery	Hatchery	Columbia Gorge	Columbia Gorge
113	Fall Chinook (Priest Rapids URB) - Integrated	Hatchery	Columbia Lower Mid	Columbia Plateau
114	Summer Steelhead (Ringold)- Integrated	Hatchery	Columbia Lower Mid	Columbia Plateau
115	Cowlitz Coho (Late)	Hatchery	Cowlitz	Lower Columbia
116	Cowlitz Fall Chinook	Hatchery	Cowlitz	Lower Columbia

Table 3: APRE/ Subbasin Planning Integration, Anadromous Stocks Included in Project

No	Stock	Natural / Hatchery	Subbasin	Province
117	Early Winter Steelhead (Chambers)-Hatchery	Hatchery	Cowlitz	Lower Columbia
118	Early Winter Steelhead (Coweeman)- Hatchery	Hatchery	Cowlitz	Lower Columbia
119	Late Winter Steelhead	Hatchery	Cowlitz	Lower Columbia
120	Searun Cutthroat- Integrated	Hatchery	Cowlitz	Lower Columbia
121	Skamania Summer Steelhead (S.F. Toutle)- Hatchery	Hatchery	Cowlitz	Lower Columbia
122	Spring Chinook	Hatchery	Cowlitz	Lower Columbia
123	Summer Steelhead Skamania-Hatchery	Hatchery	Cowlitz	Lower Columbia
124	Toutle Coho (Early)	Hatchery	Cowlitz	Lower Columbia
125	Toutle Fall Chinook	Hatchery	Cowlitz	Lower Columbia
126	Round Butte Spring Chinook - Hatchery	Hatchery	Deschutes	Columbia Plateau
127	Steelhead-Integrated	Hatchery	Deschutes	Columbia Plateau
128	Warm Springs Spring Chinook- Integrated	Hatchery	Deschutes	Columbia Plateau
129	Early Coho	Hatchery	Elochoman	Columbia Estuary
130	Early Winter Steelhead-Hatchery	Hatchery	Elochoman	Columbia Estuary
131	Fall Chinook	Hatchery	Elochoman	Columbia Estuary
132	Late Coho	Hatchery	Elochoman	Columbia Estuary
133	Late Winter Steelhead- Integrated	Hatchery	Elochoman	Columbia Estuary
134	Summer Steelhead- Hatchery	Hatchery	Elochoman	Columbia Estuary
135	Spring Chinook-Hatchery	Hatchery	Entiat	Columbia Cascade
136	Spring Chinook (Captive Brood)- Catherine Creek	Hatchery	Grande Ronde	Blue Mountain
137	Spring Chinook (Captive Brood)- Grande Ronde	Hatchery	Grande Ronde	Blue Mountain
138	Spring Chinook (Captive Brood)- Lostine	Hatchery	Grande Ronde	Blue Mountain
139	Spring Chinook (Catherine Creek)-Integrated	Hatchery	Grande Ronde	Blue Mountain
140	Spring Chinook (Lostine)-Integrated	Hatchery	Grande Ronde	Blue Mountain
141	Spring Chinook (Upper Grande Ronde)-Integrated	Hatchery	Grande Ronde	Blue Mountain
142	Summer Steelhead (Cottonwood Creek)-Hatchery	Hatchery	Grande Ronde	Blue Mountain
143	Summer Steelhead (Steelhead-Rainbow CrossResearch)	Hatchery	Grande Ronde	Blue Mountain
144	Summer Steelhead- Wallowa	Hatchery	Grande Ronde	Blue Mountain
145	Chum	Hatchery	Grays	Coumbia Estuary
146	Early Coho	Hatchery	Grays	Coumbia Estuary
147	Early Winter Steelhead-Hatchery	Hatchery	Grays	Coumbia Estuary
148	Spring Chinook (Round Butte)- Integrated	Hatchery	Hood	Columbia Gorge
149	Summer Steelhead (Native)- Integrated	Hatchery	Hood	Columbia Gorge
150	Summer Steelhead (Skamania)- Hatchery	Hatchery	Hood	Columbia Gorge
151	Winter Steelhead	Hatchery	Hood	Columbia Gorge
152	Spring/Summer Chinook-Integrated	Hatchery	Imnaha	Blue Mountain
153	Summer Steelhead-Integrated	Hatchery	Imnaha	Blue Mountain
154	Coho (Early)-Hatchery	Hatchery	Kalama	Lower Columbia
155	Coho (Late)-Hatchery	Hatchery	Kalama	Lower Columbia
156	Fall Chinook	Hatchery	Kalama	Lower Columbia
157	Spring Chinook	Hatchery	Kalama	Lower Columbia
158	Summer Steelhead (Local)	Hatchery	Kalama	Lower Columbia
159	Summer Steelhead (Skamania)-Hatchery	Hatchery	Kalama	Lower Columbia
160	Winter Steelhead (Chambers)-Hatchery	Hatchery	Kalama	Lower Columbia
161	Winter Steelhead (Local)	Hatchery	Kalama	Lower Columbia
162	Coho N (Klickitat Hatchery)- Hatchery	Hatchery	Klickitat	Columbia Gorge
163	Coho N (Washougal Hatchery)- Hatchery	Hatchery	Klickitat	Columbia Gorge
164	Fall Chinook (URB)- Hatchery	Hatchery	Klickitat	Columbia Gorge
165	Skamania Summer Steelhead- Hatchery	Hatchery	Klickitat	Columbia Gorge
166	Spring Chinook	Hatchery	Klickitat	Columbia Gorge
167	Early Coho	Hatchery	Lewis	Lower Columbia
168	Early Winter Steelhead (Chambers)-Hatchery	Hatchery	Lewis	Lower Columbia
169	Late Coho	Hatchery	Lewis	Lower Columbia
170	Skamania Summer Steelhead (E.F. Lewis)- Hatchery	Hatchery	Lewis	Lower Columbia
171	Skamania Summer Steelhead (N.F. Lewis)- Hatchery (Fish First-Volu	Hatchery	Lewis	Lower Columbia
172	Skamania Winter Steelhead (E.F. Lewis)- Hatchery	Hatchery	Lewis	Lower Columbia
173	Spring Chinook-Hatchery	Hatchery	Lewis	Lower Columbia
174	Summer Steelhead (Skamania)-Hatchery	Hatchery	Lewis	Lower Columbia

Table 3: APRE/ Subbasin Planning Integration, Anadromous Stocks Included in Project

No	Stock	Natural / Hatchery	Subbasin	Province
175	Coho- Hatchery	Hatchery	Little White Salmon	Columbia Gorge
176	Fall Chinook (URB) - Hatchery	Hatchery	Little White Salmon	Columbia Gorge
177	Spring Chinook-Hatchery	Hatchery	Little White Salmon	Columbia Gorge
178	Summer Steelhead (Skamania)-Hatchery	Hatchery	Little White Salmon	Columbia Gorge
179	Chum (Duncan Creek)- Integrated	Hatchery	Lower Columbia	Lower Columbia
180	Coho (Bonneville) - Hatchery	Hatchery	Lower Columbia	Lower Columbia
181	Fall Chinook (Bonneville) - Hatchery	Hatchery	Lower Columbia	Lower Columbia
182	Skamania Winter Steelhead (Salmon Cr. Netpens)- Hatchery	Hatchery	Lower Columbia	Lower Columbia
183	Coho- Integrated	Hatchery	Methow	Columbia Cascade
184	Spring Chinook (Methow H.)- Integrated	Hatchery	Methow	Columbia Cascade
185	Spring Chinook (NFH)- Integrated	Hatchery	Methow	Columbia Cascade
186	Summer Chinook- Integrated	Hatchery	Methow	Columbia Cascade
187	Summer Steelhead (Wells)- Integrated	Hatchery	Methow	Columbia Cascade
188	Summer Steelhead (Winthrop)- Integrated	Hatchery	Methow	Columbia Cascade
189	Summer Chinook- Integrated	Hatchery	Okanogan	Columbia Cascade
190	Summer Steelhead (L.Similkameen)	Hatchery	Okanogan	Columbia Cascade
191	Summer Steelhead (Okanogan)	Hatchery	Okanogan	Columbia Cascade
192	Lemhi River Spring Chinook	Hatchery	Salmon	Mountain Snake
193	Redfish Lake Sockeye	Hatchery	Salmon	Mountain Snake
194	Spring Chinook (East Fork Salmon River)- Integrated	Hatchery	Salmon	Mountain Snake
195	Spring Chinook (Rapid River) - Hatchery	Hatchery	Salmon	Mountain Snake
196	Spring Chinook (Upper Salmon/Sawtooth)	Hatchery	Salmon	Mountain Snake
197	Spring Chinook (W. Fork Yankee Fork- Salmon River)- Integrated	Hatchery	Salmon	Mountain Snake
198	Steelhead A-Run (Pahsimeroi)- Hatchery	Hatchery	Salmon	Mountain Snake
199	Steelhead A-Run (Sawtooth)- Hatchery	Hatchery	Salmon	Mountain Snake
200	Steelhead B (Dworshak)-Hatchery	Hatchery	Salmon	Mountain Snake
201	Steelhead B (East Fork) - Integrated	Hatchery	Salmon	Mountain Snake
202	Summer Chinook (Johnson Creek)	Hatchery	Salmon	Mountain Snake
203	Summer Chinook (McCall Hatchery)	Hatchery	Salmon	Mountain Snake
204	Summer Chinook (Pahsimeroi)	Hatchery	Salmon	Mountain Snake
205	Coho - Hatchery	Hatchery	Sandy	Lower Columbia
206	Spring Chinook- Integrated	Hatchery	Sandy	Lower Columbia
207	Summer Steelhead (Skamania) - Hatchery	Hatchery	Sandy	Lower Columbia
208	Winter Steelhead - Integrated	Hatchery	Sandy	Lower Columbia
209	Fall Chinook (Captain John)-Integrated	Hatchery	Snake Hells Canyon	Blue Mountain
210	Fall Chinook (IPC)- Integrated	Hatchery	Snake Hells Canyon	Blue Mountain
211	Fall Chinook (Oxbow)	Hatchery	Snake Hells Canyon	Blue Mountain
212	Fall Chinook (Pittsburg Landing)-Integrated	Hatchery	Snake Hells Canyon	Blue Mountain
213	Spring Chinook - Hatchery	Hatchery	Snake Hells Canyon	Blue Mountain
214	Summer Steelhead - Hatchery	Hatchery	Snake Hells Canyon	Blue Mountain
215	Fall Chinook (LF)- Integrated	Hatchery	Snake Lower	Columbia Plateau
216	Summer Steelhead (LF)- Hatchery	Hatchery	Snake Lower	Columbia Plateau
217	Spring Chinook- Integrated	Hatchery	Tucannon	Columbia Plateau
218	Spring Chinook-Captive Brood	Hatchery	Tucannon	Columbia Plateau
219	Summer Steelhead (LF)-Hatchery	Hatchery	Tucannon	Columbia Plateau
220	Summer Steelhead- Integrated	Hatchery	Tucannon	Columbia Plateau
221	Coho- Integrated	Hatchery	Umatilla	Columbia Plateau
222	Fall Chinook- Integrated	Hatchery	Umatilla	Columbia Plateau
223	Spring Chinook- Integrated	Hatchery	Umatilla	Columbia Plateau
224	Summer Steelhead- Integrated	Hatchery	Umatilla	Columbia Plateau
225	Fall Chinook- Ringold	Hatchery	Upper Middle Columl	Columbia Cascade
226	Summer Chinook (Wells Hatchery)	Hatchery	Upper Middle Columl	Columbia Cascade
227	Summer Chinook- Hatchery	Hatchery	Upper Middle Columl	Columbia Cascade
228	Summer Steelhead (LF)-Hatchery	Hatchery	Walla Walla	Columbia Plateau
229	Touchet Summer Steelhead-Endemic	Hatchery	Walla Walla	Columbia Plateau
230	Early Winter Steelhead-Hatchery	Hatchery	Washougal	Lower Columbia
231	Fall Chinook	Hatchery	Washougal	Lower Columbia
232	Late Coho	Hatchery	Washougal	Lower Columbia

Table 3: APRE/ Subbasin Planning Integration, Anadromous Stocks Included in Project

No	Stock	Natural / Hatchery	Subbasin	Province
233	Summer Steelhead	Hatchery	Washougal	Lower Columbia
234	Coho- Integrated	Hatchery	Wenatchee	Columbia Cascade
235	Sockeye	Hatchery	Wenatchee	Columbia Cascade
236	Spring Chinook (Chiwawa R.)	Hatchery	Wenatchee	Columbia Cascade
237	Spring Chinook (White River)	Hatchery	Wenatchee	Columbia Cascade
238	Spring Chinook-Hatchery	Hatchery	Wenatchee	Columbia Cascade
239	Summer Chinook	Hatchery	Wenatchee	Columbia Cascade
240	Summer Steelhead	Hatchery	Wenatchee	Columbia Cascade
241	Clackamas Early Coho - Hatchery	Hatchery	Willamette	Lower Columbia
242	Clackamas Early Winter Steelhead - Hatchery	Hatchery	Willamette	Lower Columbia
243	Clackamas Late Winter Steelhead - Integrated	Hatchery	Willamette	Lower Columbia
244	Clackamas Spring Chinook - Integrated	Hatchery	Willamette	Lower Columbia
245	Clackamas Summer Steelhead - Hatchery	Hatchery	Willamette	Lower Columbia
246	McKenzie Spring Chinook- Integrated	Hatchery	Willamette	Lower Columbia
247	McKenzie Summer Steelhead - Hatchery	Hatchery	Willamette	Lower Columbia
248	MF Willamette Spring Chinook - Integrated	Hatchery	Willamette	Lower Columbia
249	MF Willamette Summer Steelhead - Hatchery	Hatchery	Willamette	Lower Columbia
250	Molalla Spring Chinook - Integrated	Hatchery	Willamette	Lower Columbia
251	N. Santiam Spring Chinook - Integrated	Hatchery	Willamette	Lower Columbia
252	North Santiam Summer Steelhead - Hatchery	Hatchery	Willamette	Lower Columbia
253	South Santiam Spring Chinook - Integrated	Hatchery	Willamette	Lower Columbia
254	South Santiam Summer Steelhead - Hatchery	Hatchery	Willamette	Lower Columbia
255	Spring Chinook-Hatchery	Hatchery	Wind	Columbia Gorge
256	Marion Drain Fall Chinook	Hatchery	Yakima	Columbia Plateau
257	Naches Coho	Hatchery	Yakima	Columbia Plateau
258	Upper Yakima Coho	Hatchery	Yakima	Columbia Plateau
259	Upper Yakima Spring Chinook	Hatchery	Yakima	Columbia Plateau
260	Yakima Fall Chinook	Hatchery	Yakima	Columbia Plateau