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Of Attorneys for Amicus Curiae, The Confederated Tribes
Of the Warm Springs Reservation of Oregon, Confederated Tribes
Umatilla Indian Reservation, and Yakima Nation

UNITED STATES DISTRICT COURT
DISTRICT OF OREGON

NATIONAL WILDLIFE FEDERATION, et al.,

Plaintiffs

and,

STATE OF OREGON

Intervenor-Plaintiff

v.

NATIONAL MARINE FISHERIES SERVICE, U.S. ARMY CORPS OF ENGINEERS, and U.S. BUREAU OF RECLAMATION,

Defendants,

and

NORTHWEST IRRIGATION UTILITIES, PUBLIC POWER COUNCIL, WASHINGTON

Case No. 01-0640-RE (Lead Case)
CV 05-0023-RE (Consolidated Cases)

DECLARATION OF ROBERT ROSE IN SUPPORT OF MEMORANDUM OF AMICI WARMS SPRINGS, UMATILLA, AND YAKAMA TRIBES IN OPPOSITION TO MOTIONS FOR SUMMARY JUDGMENT

STATE FARM BUREAU FEDERATION, FRANKLIN COUNTY FARM BUREAU FEDERATION, GRANT COUNTY FARM BUREAU FEDERATION, STATE OF IDAHO, INLAND PORTS AND NAVIGATION GROUP, and KOOTENAI TRIBE OF IDAHO,

Intervenor-Defendants.

COLUMBIA SNAKE RIVER IRRIGATORS ASSOCIATION and EASTERN OREGON IRRIGATORS ASSOCIATION,

Plaintiffs,

v.

CARLOS M. GUTIERREZ, in his official capacity as Secretary of Commerce, NOAA FISHERIES, and D. ROBERT LOHN, in his capacity as Regional Director of NOAA FISHERIES,

Defendants.

I, ROBERT ROSE, STATE AND DECLARE AS FOLLOWS:

1. I am currently employed with the Yakama Nation Fisheries Resources Program. I graduated from Oregon State University in 1984 with a B.S. in Fisheries Sciences and have worked in this field since my graduation.

2. Most of my professional career has been dedicated to evaluation, restoration and management of salmonid habitat conditions. This has been a focus of my work for the Yakama Nation, and my involvement with the Lower Columbia River Tribes (Tribes[1]) in the development of the tributary habitat elements of the remanded FCRPS Biological Opinion (BiOp).

3. Within this testimony I address the following points:

- The Tribes' method for identifying habitat protection and restoration actions contained in our Memorandum of Agreement with BPA (MOA) was similar to, and basically an extension of, that used by the BiOp Remand Collaborative Habitat Workgroup.

[1] This declaration is offered in support of the Warm Springs, Umatilla and Yakama Tribes only. The Nez Perce Tribe has taken a differing position in this case.

- The tribal fisheries programs put a substantial amount of effort into the identification of these restoration actions.
- The method used by the BiOp Remand Collaborative Habitat Workgroup was a reasonable procedure given the situation and legitimate constraints.
- Implementing the existing tributary Proposed Actions will be a large undertaking for the tribes, will require adjustments to tribal fisheries programs to accommodate these commitments and will significantly and measurably improve tributary habitat in the next 10-25 years.
- The Tribes recognize that salmonid ecology and biologic responses to habitat restoration is an imperfect science, where data limitations and the need for best professional judgment are understood and accepted.
- The Tribes clearly saw problems inherent in the methodology for selecting actions that was used in the Collaborative Habitat Workgroup as did most all of the Workgroup members, but we could not resolve these problems without significantly added cost in terms of time and manpower. For example, moving to an approach akin to an Ecosystem Diagnosis and Treatment (EDT) would have added significant amount of time and cost to the analysis methods with limited improvements in the accuracy and confidence of the conclusions. The costs were disproportionate to the benefits.
- I do not know of any tribal, state or federal agency satisfactorily employing detailed and widely accepted subbasin-scale quantitative modeling to estimate salmonid benefits resulting from anticipated restoration actions. A SHIRAZ model is currently being developed, but is not widely available or in use. In many subbasins the EDT model has been used to describe aspects towards these considerations. Where this model exists, very few "site-specific" actions have been incorporated in the model; rather, general "action-types" are listed. And, in general, where the model has been employed, I do not believe it is likely that a "Reasonably Certain to Occur" (RCTO) filter has been applied to actions modeled.
- The Tribes recognize that stream reaches need to be addressed to make measurable changes in salmonid egg to smolt biological productivity. Many tribal actions are defined in this larger programmatic context, reflecting a systematic approach that is much larger than a collection of individual projects.

- A substantive portion of salmon habitat lies in exactly the same areas that people have settled, developed and in most cases degraded "from the eyes of the salmon". Gaining access to relatively large portions of private property to implement actions designed is a key issue addressed by the tribal approach.
- Given the above considerations, recognized by many fisheries scientists for many years, I believe that the habitat actions identified in the 2008 BiOp and tribal MOA will contribute significantly towards salmon recovery. In addition, in spite of known technical issues, the analysis method developed and employed by the Collaborative Habitat Workgroup was a reasonable approach, and the survival estimates derived from these estimates are reasonable approximations of salmonid productivity benefits, especially given the complexity of the considerations, limitations on time and resources and the lack of relevant information throughout much of the Columbia Basin.

Relevant Past Experience

4. Beginning in 1992 I was employed with the U.S. Forest Service in Northeast Oregon serving the Wallowa-Whitman National Forest (WWNF) for several years and then the Malheur National Forest. During this time, Snake River Spring Chinook recently had been listed under the Endangered Species Act. Many management activities I was involved with on the WWNF were related to site-specific Biological Assessments of management activities. I was actively involved in completing the first Biological Assessments at the subbasin scale for USFS management activities within six subbasins in NE Oregon including the Wallowa River, Lostine River, Minam River, Big Sheep Creek, Imnaha River, and Bear Creek.

5. Another primary role I served with the Forest Service was to coordinate and implement stream habitat surveys. In many cases these surveys provided baseline information that lead to stream protection and restoration activities. Also, while employed with the WWNF, I provided technical information and input used to assess the Grande Ronde subbasin using the Ecosystem and Diagnostic and Treatment (EDT) method, developed by Mobrand Biometrics Inc. The EDT model is designed to estimate stream reach contributions to salmonid productivity as a result of changes in salmonid habitat conditions, specifically, from habitat restoration actions.

6. The EDT methodology is an "expert-based" model. Where specific data are not available a consensus of expert opinion is used to populate the model instead. In the case of the Grande Ronde, the assessment included the expertise of many local scientists and individuals

with experience in the subbasin concerning salmonid habitat conditions and salmonid biology. For each of the many stream reaches included in this modeling effort (e.g. 100 to 300 reaches would not be uncommon in most Columbia basin subbasins) 19 habitat attributes were considered, for both current and historic stream conditions. I mention this level of detail to emphasize two things, 1) application of this model, and eventually the interpretation of the results was a very large effort and 2) this experience exposed me the application of EDT and other assessment methods and related scientific debate.

7. Because of this experience in evaluating salmonid habitat and my involvement in the Grande Ronde EDT modeling, I took a position with the Confederated Tribes of the Warm Springs (CTWS). My primary responsibility was to work with Mobrand Biometics to employ the EDT methodology in the Deschutes subbasin in Oregon. This EDT analysis was used to identify mitigation measures included in the CTWS Final License Application to the Federal Energy Regulatory Commission (FERC) for the CTWS to own and operate the Pelton-Rounde Butte hydroelectric project on the Deschutes River. This analysis included approximately 10 – 20 technical experts, often meeting on a monthly basis, over a period of 18 - 20 months. An additional 2-plus months were required to complete and translate the EDT results into Terms and Conditions for the Final License Application.

8. In March 2000, I was employed by the Yakama Nation as the Assistant to the Environmental Manager. My primary job responsibilities were related to habitat restoration planning and coordination, including substantial involvement in completing the 2004 Subbasin Plans for the Wenatchee, Entiat and to a lesser degree the Methow subbasins in the Upper Columbia. I was also significantly involved with the completion of the Upper Columbia Salmon Recovery Plan (UCSRP), and the Washington State motivated Watershed Plans for the Wenatchee and the Entiat subbasins. Among other things, my efforts led to the design and completion of the detailed Implementation Schedules for habitat restoration actions associated with these planning efforts, especially for the UCSRP. The framework and format of these Implementation Schedules eventually became integral in the development of the habitat actions contained in the 2008 FCRPS Proposed Action and associated Biological Opinion and MOA. In years 2001 – 2002 I also was the lead in developing an EDT assessment in the Entiat subbasins with a focus on Spring and Summer Chinook. The anadromous component of the Entiat is relatively small compared to many Columbia Basin subbasins. In this case, we

dissected the Entiat into 18 stream reaches for the analysis. Regardless of the relatively smaller size of this subbasin, the entire process required over one full year to complete, including support from approximately 8-10 key technical experts and various landowners with extensive knowledge of the stream system. To support the development of the UCSRP, an EDT model was also developed for the Wenatchee and Methow subbasins. I also played a smaller role in these efforts.

9. In addition, a large part of my responsibilities with the Yakama Nation included close involvement with the development and implementation of the Mid-Columbia (ESA Section 10) Habitat Conservation Plans for Chelan and Douglas County Public Utility Districts (PUDs) and also the Salmon and Steelhead Settlement Agreement between Grant County PUD and the relevant state, federal and tribal governments, including the Yakama Nation. As a part of these agreements, the PUDs fund over three million dollars annually for habitat protection and restoration work as a part of their FERC License obligations to mitigate for continued loss of salmonid productivity through habitat protection, mitigation and enhancements. To meet this requirement, each of the PUDs sponsors a Committee whose primary role is to oversee expenditure of these funds to implement salmonid habitat protection, mitigation and enhancements projects in the Upper Columbia region. This region corresponds closely with the Upper Columbia Evolutionary Significant Unit (ESU) for Spring Chinook and the Upper Columbia Distinct Population Segment (DPS) for Summer Steelhead. I have represented the Yakama Nation and have been actively involved with these three Committees since their establishment several years ago.

10. I also represent the Yakama Nation in the various habitat technical teams established in the Wenatchee, Entiat and Methow subbasins. The primary role of these teams is to guide the development of habitat protection, enhancements and restoration within the perspective subbasins. Each of these teams have met for a number of years now on a regular basis, often monthly.

11. And finally I have been a member, since 2001, of the Upper Columbia Regional Technical Team (RTT). The RTT's primary role is to evaluate habitat protection and restoration proposals on the grounds of their technical merits. In a typical year we will evaluate 15 – 20 habitat projects. The RTT is also fundamentally involved in coordinating habitat monitoring and

has played a leadership role in establishing monitoring strategies throughout the Upper Columbia incorporating Columbia Basin regional efforts and protocols.

The BiOp Remand Collaborative Habitat Workgroup: Actions and Habitat Benefits

12. Throughout the spring and summer of 2006, I was closely involved with the Remanded Biological Opinion (BiOp) Collaborative Habitat Workgroup (Workgroup) in the identification of potential actions to be included in the FCRPS BiOp Proposed Action and the analysis of their potential benefits to salmonid populations. The Workgroup struggled for several weeks to describe a means for collecting habitat actions throughout the Columbia River basin. The key issues centered on the methodology used for identification of actions and assessment of benefits from these actions. Time was of the essence and a standard methodology did not exist. Because the Yakama Nation had been deeply involved with development of the Upper Columbia Salmon Recovery Plan, which included such a framework for describing habitat actions (but not necessarily assessing biological benefits), I was able to offer the Workgroup the approach used in the Upper Columbia. With some useful modifications the Workgroup adopted this approach and we began the task of identifying potential habitat projects.

13. As the process continued, considerable effort was made to standardize input with detailed definitions and instructions for filling out tables and other formats. The following discussion briefly describes the nature of this process, which is simply a logic path leading from "primary limiting factors" affecting salmonid habitat conditions to various restoration actions and then a description of the cumulative benefits gained by these actions.

14. A computer spreadsheet format was used to inventory potential habitat actions identified by members within the Workgroup. In this table members identified actions at the watershed geographic scale, which is considered by many to be at relatively fine-scale resolution. For example, in the Wenatchee subbasin there are nine distinct watersheds. Most subbasins within the Columbia River are likely to contain between five to fifteen watersheds. Where more site-specificity could be indicated, it was. This scale of resolution is generally consistent with the Implementation Schedule developed in the Upper Columbia region for the UCSRP. However in the UCSRP we were able to offer more specificity than other regions purely because we had been working towards this objective in previous years.

15. As a part of the process, it was my observation that the Workgroup members went back to their perspective geographic areas and solicited information from the "boots on the

ground" individuals – i.e. those individuals closely associated with the streams, providing the Workgroup assurance that the actions identified were 1) real, 2) needed, and 3) implement-able (reasonably certain to occur) in a 10-year timeframe. This was a significant departure from the very modest effort undertaken in the 2000 Biological Opinion that did little more than to identify general limiting factors and very broad action-types that might be implemented at the subbasin scale. In the context provided by the 2000 BiOp, it was impossible to determine the extent of any proposed action or resulting beneficial outcome, or if the actions were remotely or reasonable certain to occur.

16. Potential actions identified by the Workgroup were categorized in a spreadsheet format by 1) subbasin, 2) watershed, and 3) general action types (riparian, in-channel, water quality or passage for example), which would facilitate analysis and sorting of information later in the process. Each potential action was linked to one or more primary limiting factors. In many cases the geographic scale that these actions would potentially affect was noted (e.g. less than 100 feet; greater than 5 miles). Often, members indicated if the action was new or if it was ongoing, estimated a cost for the action (which helped indicate the general extent of implementation anticipated) and indicated who likely would be the implementing entity. The subcommittee clearly was aware that actions needed to be "Reasonably Certain to Occur" and I believe there was a sincere effort to maintain this consideration.

17. Once actions had been identified, the next step was to estimate the potential benefits (changes in habitat functionality, as seen from the eyes of the salmon) these actions would provide to habitat conditions. In the Upper Columbia, I had been working on this procedure with other fishery biologists in the region and developed a general template for these estimates. Working closely with Mr. Phil Miller from the Washington Governors Salmon Recovery Board, we refined the procedure and wrote detailed instructions as to how the Workgroup would develop and characterize this information. As commonly used in an EDT analysis, information was derived from an expert-based forum due to the fact that most of the relevant data either was not readily available or does not exist. These forums occurred outside of the Workgroups regularly scheduled meetings. Within the Yakama Nation Ceded lands, and it is my understanding that in other areas as well, "boots-on-the-ground" type folks, technicians and other staff routinely familiar with stream conditions within their areas of management, were involved providing these estimates.

18. Changes (assumed benefits) to habitat conditions were estimated in the following manner. Using local expertise the Workgroup estimated: 1) the current habitat function (with respect to identified limiting factors that negatively affect salmonid biologic productivity); and, 2) the optimal (or intrinsic) habitat function at the watershed scale. The current habitat function serves as a base-line – or the existing condition. The optimal habitat function relates to the capacity of an area to provide moderate to high quality spawning, holding and juvenile rearing habitat. Both current and optimal conditions were identified using a range from 0% to 100% functionality of the habitat conditions.

19. Once the existing and optimal habitat condition "bookends" were established, the next task was to estimate the extent environmental changes might occur, looking from the "eyes of the salmon", due to the implementation of these actions. This was considered in two timeframes, within a 10-year period and within a 25-year period, recognizing that some actions (riparian re-vegetation for example) were important to implement but could only manifest benefits in the longer timeframe. Again, this was an expert-based analysis and I cannot testify as to exactly how these estimates were concluded by various members of the Workgroup as I was only directly involved in estimating benefits within the Yakama Nations ceded lands and the Okanogan subbasin. However, I saw an impressive amount of time invested by many qualified individuals in providing these estimates, particularly within the Tribal fisheries programs.

20. It should be noted that the difficulty of providing these estimates was clearly apparent to the Workgroup and technical/local experts. There was a range of uncertainty associated with this exercise that could not be denied. But after continued, much and many discussions, it became apparent to participants that there really is not another way of identifying actions and estimating benefits, short of having perfect foresight, short of full scale modeling efforts and short of extensive field time to make detailed measurements. So the process proceeded.

21. To summarize the discussion so far, I provide below a simplified example of our format and brief interpretation for the sake of clarity. This table does not represent actual information used in the analysis, but is used for this illustration purpose only.

Table 1: Example table used by the Collaborative Habitat Workgroup to indicate estimated Current and Optimal Functional Condition of a watershed and estimated changes over time.

Example Creek Subbasin

Watershed	Current Functional Condition	Optimal Functional Condition	Estimated Condition 10-Years	Estimated Condition 25-Years
Fish Creek	80%	95%	85%	90%
Salmon Creek	50%	75%	60%	65%

22. In Table 1, Fish Creek is considered to be in pretty good shape (80% Existing Functional Condition), from the eyes of a salmon and has significant room to improve (up to 95% Optimal Functional Condition) if specified actions are implemented. In this example, improvements in fish passage and riparian condition, that would be accomplished through new culverts will significantly improve 10-Year functionality to 85%. Improvement in riparian condition adds another 5% improvement to 90% functionality, but requires more time to manifest benefits so appears in the 25-year condition.

23. However, Salmon Creek (Table 1) is not considered to be very functional (50%), and it is not realistic to expect (due to social constraints, for example) that habitat conditions will ever exceed 75% functionality. In this example, providing a few in-channel structures and riparian enhancements in the near-term will make a small improvement (to 60% functionality), and over the next 25-years, riparian development will continue to slightly improve habitat conditions (to 65% functionality).

24. In summary, these estimated benefits are subjective, to be sure. But these estimates are based on reasoned and often tedious discussions amongst resource technicians close to the ground. My observation was that estimates were typically conservative and when the work was complete, appeared to pretty well represent common understandings and expectations. Indeed, the Workgroup could have taken this kind of information and directed our efforts towards refining existing EDT models – or other analysis tools, but the effort would have required much more time and it is not likely we would have gained a significant amount of confidence in the derived estimates.

Estimating Population Responses

25. The final step in this process is to link expected population responses to changes in salmonid habitat conditions. This question has always been problematic for salmonid biologists in the Columbia River basin. The problem is simply that there are so many variables

associated with biological productivity and there is considerable uncertainty surrounding most of these variables.

EDT

26. The EDT model demonstrates the complexity of connecting population reponses to habitat condition changes. The most recent version of the EDT model identifies over 40 environmental attributes that need to be quantitatively rated and input. Most of these can have profound affects on salmonids yet we have little data related to the frequency and extent of these potential biological consequences. The Workgroup briefly considered using EDT, or another model such as SHIRAZ, but in both cases, the amount of time consumed in refining existing models and/or populating new models could require a couple years, imposing upon resource professionals that are already over-obligated in their current work loads.

27. To make my point clear, let me describe how the EDT model is applied. The first step in development of the EDT model is to describe the existing and the historic environments (historic in this case is pre-European arrival, and is based purely on best professional judgments and historic observations where available). This means that for every stream reach (assume 100 reaches in this example) the assessment team must provide data points (typically estimates) for 40-plus environmental attributes for all 100 reaches, for both the current and historic conditions – over 800 data points. The "Ecosystem Diagnosis" component of the model is then a modeled comparison of historic and current stream reach and/or watershed contributions to potential salmonid productivity.

28. The intended application of the EDT model is to estimate salmonid productivity benefits by Treating the landscape with habitat restoration. The assessment team must then identify types of restoration actions that might occur on the landscape – at the stream reach scale, and quantitatively estimate the cumulative affect these actions would have on the 40-plus attributes not only in the reach where an activity might occur, but in adjacent downstream reaches as well. Since there are literally hundreds of variations in action scenarios, including where actions are placed and the extent that actions could be implemented over an extensive amount of time, one can begin to appreciate the complexity in developing a variety of "Treatment" scenarios. And, due to the inherent uncertainties associate with even these most basic considerations, it is easy to understand that throughout the Columbia River Basin, very few

EDT models have actually employed relatively complex Treatment scenarios, including the work I managed on the Deschutes and Entiat subbasins.

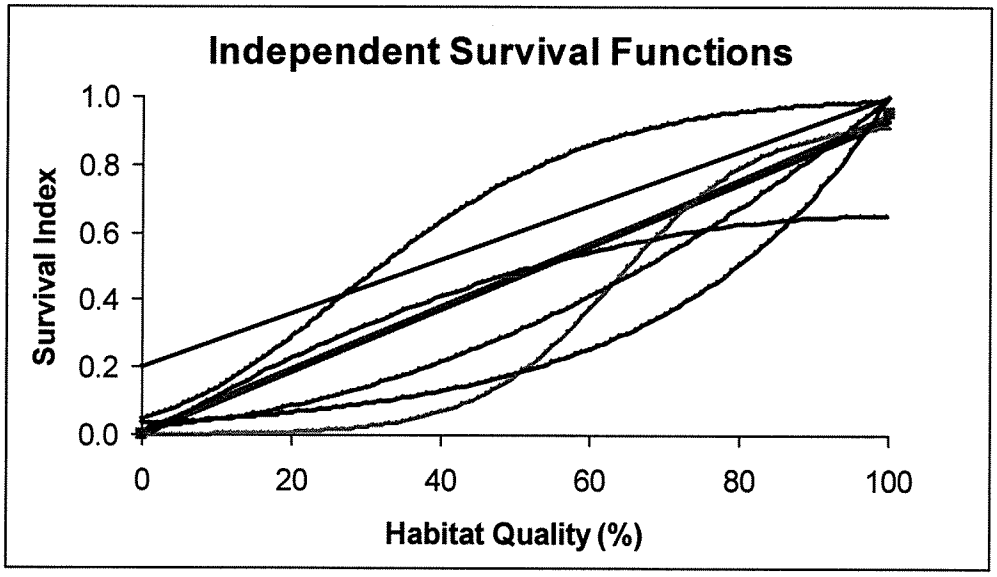
29. Even if complex and/or robust models were employed (SHIRAZ was still mostly a concept and hadn't been fully developed) relatively little certainty is gained compared to the available time the Workgroup was directed to work within. I'm not saying these models should not be employed, as I believe strongly that are very useful tools. But given the situation associated with this BiOp remand it was reasonable for the Workgroup to pursue a more streamlined approach that could provide reasonable estimates that would allow us to move forward.

The Hillman Method

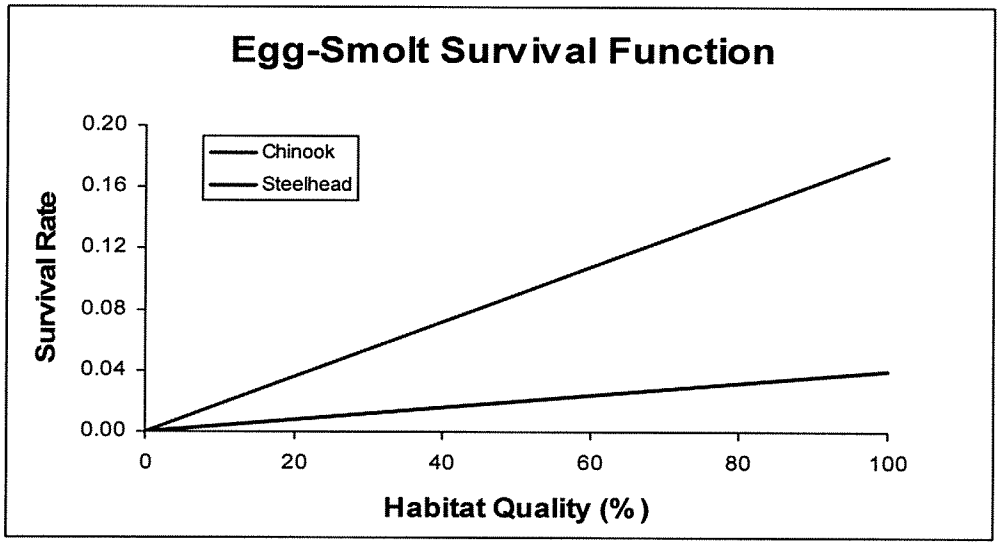
30. In 2006 Dr. Tracy Hilman developed a simple relationship between habitat functionality and salmonid biological productivity, specifically for the egg-to-smolt life stages relevant to tributary habitat. The details of this can be in the document titled "*Approach for Estimating Survival Benefits (03-27-07)*" found in the BiOp Remand website address *https://secure.bpa.gov/SALMONRECOVERY/Default.aspx?FolderID=403*. I will briefly recap the key features from this document, also known as the "Hilman Method", that were employed in this analysis.

31. The basic premise behind the "Hilman Method" is that salmonid productivity will improve as habitat functionality (environmental conditions) improves. Dr. Hilman reviewed existing scientific literature and identified various survival relationships for different juvenile life stages. The Workgroup examined these relationships (Graph 1 below) and did not find an obvious central tendency (or common shape) of the graphs. After examining several ways in which to combine this information into a single relationship, "the workgroup collectively agreed, given the current data, that the linear function [Graph 2 below] was the most realistic and should be used to guide professional judgment." This relationship also fits well with published literature that indicates that more intensive and extensive restoration actions result in greater survival benefits (taken from Hilman, 2006). Below, Graph 1 summarizes the survival results from the literature review and Graph 2 summarizes a final synthesis of these relationships into a simple linear relationship for use by the Workgroup.

Graph 1: Various shapes of functional relationships between habitat quality and survival index as identified in Hilman, 2006.



Graph 2: Linear functions for Chinook and Steelhead egg-smolt survival due to changes in habitat function.



Development of a Tribal Habitat Database

32. During October 2006, the Tribes were fully engaged in identifying and refining potential habitat actions. We carried forward actions identified within the BiOp Workgroup and in some cases expanded upon this list. Because so many actions were now identified, information management became an issue. There was need to move the information out of a

spreadsheet environment and into a relational database format. This was an important technical step for the tribal efforts as once the database worked as designed, it was much faster to organize, analyze and report information. We also anticipated this would be a useful first step in defining a means to track progress (accountability) over the life of the future BiOp. We did not start another process or veer away from the Workgroups process, but simply provided efficiency and value-added to the existing effort.

33. Additional technical features of the Tribal Database allowed for the ability to recognize that 1) certain watersheds within a subbasin had the potential to contribute to biologic productivity more than other watersheds, and similarly 2) primary limiting factors identified within a watershed do not contribute equally to salmonid habitat degradation. Thus, tribal biologists had an opportunity to "weight" various watersheds and limiting factors as needed. As was true for the Workgroup process, habitat functionality was estimated at the watershed scale, and then rolled-up to the subbasin or population scale (often the subbasin boundaries defined the population range, but this is not always the case). Other features were also built into the Tribal Database. Some of the tribal biologists used these refinements more than others, but in short, the Tribes made a significant effort providing additional detail and reality in action identification and estimating improvements to habitat conditions.

34. The Tribal Database also incorporates the "Hilman Method" for converting estimates of increased habitat quality (functionality) to estimates of increased salmonid biologic productivity without significant variance from the method used by the Workgroup, but with refinements that addressed concerns that the tribes had identified in comments on the draft BiOp.

Project Selection from the Tribal Habitat Database

35. Given the complexity of selecting projects to be included in the FCRPS Proposed Action, over such a wide geographic range, it is clear there were numerous considerations unique for each subbasin and for each of the four tribes. I have no way of knowing how individual tribal representatives came to the specific conclusions that they did. I do know that the Tribal Database was considered our "Universe of Actions", from which all actions were selected. From my many discussions with the staff I believe it is safe to say that at least five key considerations were maintained:

i. tribes looked at existing program needs and insured these objectives were maintained and that planned program expansions would also be included in the Proposed Action,

ii. additional or new habitat actions clearly met the Reasonably Certain to Occur (RCTO) benchmark,

iii. the tribes did not assume the FCRPS is entirely responsible for all facets of salmonid population declines, and that other unrelated factors also contribute to this situation,

iv. subbasins higher in the Columbia River system (Methow and Clearwater for example) required greater levels of tributary mitigation than those areas in the lower River (Klickitat and Hood River for example) due to the fact that there are greater FCRPS impacts on upper river stocks than on the lower river stocks.

v. Picking easily identifiable projects, because they are easily identifiable, is not a surrogate for developing tributary implementation strategies that restore salmon.

36. Within the Yakama Nation, project selection throughout the ceded lands also started with the identification of the "Universe of Actions". Fisheries staff worked many weeks identifying as closely as possible 1) actions that were ongoing, 2) actions that were planned in the foreseeable future and 3) new actions that could be accomplished with additional resources. Each of these steps incorporated the five considerations listed above.

37. In the Upper Columbia, actions identified came specifically from the Upper Columbia Salmon Recovery Plan (UCSRP). Contained in this Plan was a detailed Implementation Schedule which originally contained over 300 habitat restoration actions within the Upper Columbia region (including the Okanogan subbasin). Although the idea evolved over time, development of this Implementation Schedule took two years to complete.

38. The Implementation Schedule is a notable document and I think it is useful to point out a few important details. Its development spanned the efforts initiated by the Northwest Power and Conservation Commission's 2004 Subbasin Planning, the State Watershed Planning Act (House Bill 2514) efforts (ongoing, in Implementation Stage in the Wenatchee and Entiat subbasins) and through the course of NOAA Fisheries sponsored Salmon Recovery Plan (completed June, 2006). The Implementation Schedule required a focused effort from dozens of people from each of the respective subbasins, including resource technicians, citizens groups,

and County Commissioners and their staffs. Iterations are still being made at this date. I mention this primarily to recognize the substantial good work that brought many people together to develop a common framework and strategy to move forward.

39. As an example of the results of the effort discussed above, Tables 2, 3 and 4 (below) list habitat restoration actions, dollars obligated, and salmonid productivity estimates identified within the Entiat, Methow, and Wenatchee subbasins and included in the Columbia Basin Accords. Additional funds were obligated to the Confederated Tribes of the Colville for the Okanogan subbasin, but these are not displayed. This information is included to illustrate the extent of geographic range and diversity of actions that are committed to be implemented. This table does not illustrate the many additional activities, dollars and benefits that are likely to occur and be derived as a result of cost-sharing and enhanced public outreach and involvement.

Table 2. Entiat Subbasin habitat protection and restoration actions and associated financial commitment included in the Columbia Basin Accords.

Estimated Increase in Survival

- Entiat Spring Chinook = 22%
- Entiat Summer Steelhead = 8%

Project Title	Primary Limiting Factor(s) Addressed	2008-2017 Total MOA Budget
Design and build in-channel pool forming structures in main stem Entiat for juvenile rearing and spawning habitat.	• In-Channel Complexity	$1,200,000
Install rock gravel catchers to promote gravel recruitment and spawning gravels on Mad River	• In-Channel Complexity	$100,000
Implement Ecosystem Diagnosis and Treatment (EDT) Alternative 5 related to side-channel options.	• Side-Channel Complexity	$600,000
Work with willing landowners to protect larger, undisturbed riparian areas by first pursuing conservation easement, lease, and options other than outright property acquisition	• Riparian / Floodplain	$1,100,000
Entiat River - UPA - Lower Entiat River Off-Channel Restoration Project	• Side-Channel Complexity	$159,968
UPA Entiat Subbasin Riparian Enhancement Program	• Riparian / Floodplain	$735,567

Table 3. Methow Subbasin habitat protection and restoration actions and associated financial commitment included in the Columbia Basin Accords.

Estimated Increase in Survival

- Methow Spring Chinook = 6%
- Methow Summer Steelhead = 4%

Project Title	Primary Limiting Factor(s) Addressed	2008-2017 Total MOA Budget

BOR Reach Complex Side channel reconnection, LWD recruitment, levee removal, riparian restoration with an emphasis in the lower Twisp River.	• Side-Channel Complexity • Riparian / Floodplain	$800,000
Add log and rock complexes to identified small tributary channels at key stream locations to reactivate floodplain where appropriate.	• In-Channel Complexity	$300,000
BOR Reach Complex riparian reconnection / floodplain function – side channel improvements for the Methow River with an emphasis on reaches between Carlton to Weeman Bridge.	• Side-Channel Complexity • Riparian / Floodplain	$600,000
BOR Reach complexity and side channel development, Early Winters fan to Gate Creek	• Side-Channel Complexity	$2,000,000
BOR Reach Complex – Restore Primarily side channel and increase habitat complexity in the Chewuch River.	• Side-Channel Complexity	$1,300,000
Assess and inventory mill ponds in Middle Methow River reaches (and others) in relationship to providing additional main stem spawning and rearing habitat (acclimation, off-channel habitat, etc)	• Assessment • Side-Channel Complexity	$75,000
BOR Reach Complex – Modify levees, riparian restoration, LWD recruitment and side channel reconnection with an emphasis in the upper Twisp River Watershed.	• Side-Channel Complexity • Riparian / Floodplain	$800,000
Assess potential temperature refugia, (using FLIR and temperature profiles) to identify important summer/winter juvenile rearing areas for future protection and restoration actions.	• Assessment • Water Temperature	$175,000
Protect cottonwood forests, and replant unused riparian agricultural areas where feasible in lower Methow River reaches.	• Protection • Riparian • Water Temperature	$500,000
Protection Riparian and Floodplain in Middle Methow River with general emphasis from Carlton to Weeman Bridge.	• Protection	$2,000,000
Riparian Floodplain Habitat Protection Program with an emphasis in lower reaches of Methow River.	• Protection	$12,000,000
UPA Project – Programmatic Methow Basin Riparian Enhancement and re-establishment with an emphasis in key tributary streams.	• Riparian / Floodplain	$1,108,639
UPA Project – Programmatic Implementation of Habitat Complexity Projects in the Methow River Subbasin in areas not already identified.	• In-Channel Complexity	$4,995,000
Design and implement Engineered Log Jams in the Upper Methow, Early Winters Creek and Lost River; identify areas, to increase and diversify key spawning and rearing habitat.	• In-Channel Complexity	$600,000
Assess, design and implement Instream structures in various smaller tributary streams	• In-Channel Complexity	$140,000
Identify, Protect and Restore areas providing thermal refugia in the lower Methow reaches.	• Protection • Water Temperature	$250,000
Riparian Floodplain Habitat Protection Program with an emphasis in upper reaches/tributaries of Methow River.	• Protection	$1,300,000
Restoration 30%+ of lineal stream area – Upper Methow tributaries with emphasis on Wolf Creek and Hancock	• In-Channel Complexity	$120,000

Springs.	• Riparian / Floodplain	

Table 4. Wenatchee Subbasin habitat protection and restoration actions and associated financial commitment included in the Columbia Basin Accords.

Estimated Increase in Survival

- Wenatchee Spring Chinook = 3%
- Wenatchee Summer Steelhead = 4%

Project Title	Primary Limiting Factor(s) Addressed	2008-2017 Total MOA Budget
Reconnect main stem Wenatchee River side channel at Monitor in Lower Wenatchee Watershed.	• Side-Channel Complexity	$500,000
Install stream structures to increase thalwag depth on lower Peshastin Creek.	• In-Channel Complexity	$300,000
Culvert Replacement (11-13 structures) at private landowner access in Chumstick watershed.	• Passage	$830,000
Culvert replacement Clear Creek (2)	• Passage	$60,000
Improve Irrigation delivery and use efficiency at Dryden Ditch, Pioneer and Jones/Shotwell (Efficiency)	• Water Quantity	$500,000
Culvert replacement Alder Creek and Misc. for Chiwawa Watershed.	• Passage	$450,000
Programmatic Riparian Floodplain Habitat Protection Program for Wenatchee Subbasin.	• Riparian / Floodplain	$12,000,000
Reconnect main stem Wenatchee River side channel at Sleepy Hollow in Lower Wenatchee Watershed.	• Side-Channel Complexity	$500,000
Develop lower Nason Creek Restoration Plan	• Plan and Design • In-Channel Complexity	$410,000
Restoration (on National Forests and Private lands) of riparian and channel conditions to relieve sediment inputs in Chiwawa River Watershed.	• Riparian / Floodplain	$60,000
Assess, design and build large wood structures for habitat diversity in Upper Wenatchee Watershed.	• In-Channel Complexity	$2,180,000
Reconnect main stem Wenatchee River side channel Cashmere in Lower Wenatchee Watershed.	• Side-Channel Complexity	$500,000
North Road culvert passage: provide year-around passage through North Road culvert on Chumstick Creek.	• Passage	$500,000
Evaluate NF (National Forest) riparian roads and develop restoration plan in upper Peshastin Watershed.	• Assessment	$150,000
Culvert replacement Clear Creek (1)	• Passage	$30,000
Programmatic Stream Bank Restoration in the Icicle Creek Watershed.	• Riparian / Floodplain • In-Channel Complexity	$650,000
Replace culverts at Beaver Creek in Upper Wenatchee Watershed.	• Passage	$200,000
Increase irrigation delivery and on-site efficiencies in Peshastin Creek watershed.	• Water Quantity	$545,000

Increase pool quality and quantity in Nason Creek Watershed by installing in-channel structures.	• In-Channel Complexity	$2,500,000
Programmatic Side/Off channel reconnections and restoration in the Nason Creek Watershed.	• Side-Channel Complexity • Riparian / Floodplain	$1,100,000
	Total MOA Budget	**$56,924,174**

40. As can be seen in Tables 2, 3 and 4, many actions identified were not literally site specific, but were general types of actions, to be implemented in a programmatic manner. Through this effort, in spite of the very best intentions of biologists like myself, it was impractical, if not impossible to point to areas on the map, particularly within private ownership, and say with reasonable certainty a specific action will occur in that exact spot. There is a fine line - and a critical balance between being overly general, and overly specific.

41. Being overly specific implies landowner acceptance (or land manager acceptance on publicly owned properties). Being overly prescriptive will be perceived as a threat to many landowners if they are not fully engaged in the discussion leading to this conclusion. Identification of actions without the explicit consent of landowners will only create suspicion and resentment and it is unlikely the landowner will ever play a positive role in future habitat restoration.

42. Identifying actions within a more general framework can provide greater assurance that the action(s) will be implemented and it provides more flexibility where actions can be located due to the many technical and social considerations. I think the tribes in general recognize that just the identification of "site-specific" areas to be restored was only a small piece of the overall need. To gain reasonable assurance that meaningful habitat restoration will occur, the real need was an adequate funding stream and plenty of time to initiate a long-term strategic approach that brings reach-scale planning, social constraints and public outreach, engineering and permitting, and long-term monitoring into one comprehensive package. This has long been recognized by the tribal fisheries staffs, but until the recent Columbia Basin Accords, we have never had all the pieces in place to initiate such an endeavor. We now believe that we do.

Final Observations and Conclusions

Methodology:

43. Early in the process I recognized that there was not a linear relationship between the amount of useful information to be gained relative to the amount of time and resources invested in the forthcoming assessment. EDT or something akin to it would have required a huge commitment of time. Regardless of the methods, we would still be forced to use the same information base – with the same uncertainties and data gaps. And a different process, preformed in a timely manner, still does not address central and common issues like access to public or private lands to implement restoration actions. If there was a better methodology than what the Workgroup used, it was not realistically available to us.

44. Some would argue that we may not have applied "best available science" in our methods and final determinations. But to me, particularly in this situation, the terms best and available are relative. Science by its nature creates disagreement, so who determines what is "best"? There are countless offices and drawers of "available" information – survey forms still wet and smudged from rain and technical notes yellow with age. Does all of this need to be made "available" and how would this available information be used? From my view, best available science came in the form of experience, common sense, an appreciation for what realistically can and cannot be done and ultimately, best professional judgments. That was the best we could do given the available resources we had at the time. And, speaking for the Tribes at least, we fully expect to continue this work and improve it over time.

45. It also was my observation that Tribal biologists clearly saw problems with the methodology and analysis used to evaluate habitat conditions and changes attributable to future restoration. I am more aware these limitations. We had concerns relying on the Hilman Method for describing the relationship between habitat changes and biologic productivity changes. There is nothing new about this. Describing this relationship with confidence is the elusive "Holy Grail" of salmonid ecology within the tributary systems. Unfortunately, a relatively simple, scientifically robust and defensible model, applicable to the many subbasins and populations within the interior Columbia Basin simply does not exist. It would be great if salmonid ecology was as simple and predictable as Newtonian physics, but it is not and given the circumstances, this was the best the Workgroup could do. Other ideas were put on the table, but in the end, I did not consider them viable. The substantial investment and required interruptions to resource professionals to inappropriately speculate on details that cannot be supported by science or common sense was not justifiable given the relatively small gains in information quality and

confidence. I think most of these ideas brought to the table, especially a continuation and advancement of the EDT and SHIRAZ models are important and should move forward over the next 10-years, and I hope our monitoring program is robust enough to bring additional scientific certainty to light.

Specificity of Action Identification and Benefit Analysis:

46. As mentioned above, I believe the majority of habitat restoration needs to occur on private lands, as this is where human activities have caused the greatest impairments in some of the inherently most productive stream reaches. My experiences in the Grand Ronde, in the Deschutes and more recent involvements throughout the Yakama Nation ceded lands has clearly demonstrated to me that it is not practical to believe that one can simply identify a bunch of actions and expect salmon recovery to occur. A long-term programmatic approach is needed, one that cannot simply be defined in a table or by a model, but must be developed with adequate and long-term funding commitments. The approach that the tribes have been drawn to (and currently being developed in the Upper Columbia) looks at restoration, not one project at a time, but from the geographically larger (stream) reach scale. We recognize that entire stream reaches need to be restored, not just sticking a single project in the river anywhere it is simply convenient to do so. This will require time, money, cooperation and public outreach more than additional squabbling over methods, tables and unsubstantiated details.

47. To conclude, in a broad sense the results of the work from the Workgroup and the additional work provided by the Tribes, i.e. estimates of increased habitat benefits and resulting salmonid survival appear to me to be reasonable and useful approximations. The Workgroup and the tribal biologists were able to derive these estimates with "boots-on-the-ground" experts, using common sense, using best professional judgment and using a straight-forward methodology, within a reasonable timeframe and without significant disruption to the many biologists that would have been needed to complete a more robust technical exercise. I anticipate that future efforts and monitoring will help fill in data gaps and refine future estimates.

I hereby declare that the above statement is true to the best of my knowledge and belief, and that I understand it is made for use as evidence in court and is subject to penalty for perjury.

DATED this 24th day of September, 2008.

s/Robert Rose
ROBERT ROSE