Estimated Habitat Quality Improvement and Survival Benefits of MOA Projects on Populations of Listed Salmon and Steelhead

- *3 Treaty Tribe – Action Agency Agreement*
- *April 21, 2008*

The following attached reports and spreadsheets comprise the 3 Treaty Tribes' estimate of habitat quality improvements and survival benefits of the habitat projects included under the MOA:

- Summary Report: *Population Biological Benefits Summary*
- Populations Reports: *Estimated Biological Benefits from Habitat Actions by Watershed/Population*. Show estimated egg-to-smolt productivity improvements by watershed based on estimated watershed function improvements.
- Watershed Reports*: Estimated Benefits to Primary Limiting Factors (PLFs) from Habitat Actions by Population and Watershed*. Show changes in limiting factor function based on implementation of MOA projects in that watershed
- Project Spreadsheet: *LRT Project X Populations Benefited.* Associates projects with watersheds and populations benefited.

Benefits Analysis:

Benefits were estimated with a method used in an earlier NOAA/Nez Perce assessment of Clearwater habitat. The method conforms to the "Hillman method" which is in use by the action agencies. Tribal biologists considered the positive effects that full implementation of the Tribal MOA projects would have to improve limiting factors at the watershed scale. These estimates were collected and compiled into a database and used to generate the benefit reports. The process of calculating these estimates is as follows:

First, assessments of the improvements to limiting factors for a given watershed are provided from the best professional judgments of local (and in some cases, only Tribal) biologists. Assessments are based on habitat projects included in the MOA that benefit listed salmon and steelhead. The *LRT Project X Populations Benefited* spreadsheet identifies the watersheds and populations associated with each project. [1]

[1] NOTE: The project spreadsheet includes the columns "In BiOp/ Funded (07-09)" and "In PA." A "Y" for yes is indicated in the former if the project / proposal # is identified in the BA's Tributary Habitat Action Tables or the project was otherwise funded for FY07-09. A "Y*" notes a discrepancy in the funding amount. A "N*" notes some funding, but limited (e.g., bridge funding for 2007 only). A "Y" in the "In PA" column indicates that the project is contemplated in the BiOp either specifically or generally (e.g, for out year, habitat restoration efforts in X watershed). This information is included to aid in identification of possible duplicate benefit counting with the BiOp's tributary habitat analysis.

Each limiting factor is weighted proportionally to its overall impact on the population within the watershed. Each limiting factor is estimated at its current function and function in 10 years and 25 years if all MOA actions are implemented to improve habitat. These functions are quantified at a rate that is below a hypothetical non-limited function of 100%. These limiting factor functions are multiplied by their weight and summed for the watershed to produce the overall watershed function (also out of a hypothetical 100% function):

Watershed Function = Σ(Limiting Factor Function * (Limiting Factor Weight/100)).

The example below shows this for summer steelhead in Icicle Creek:

Icicle Creek – Estimated Limiting Factors Function Improvements								
Watershed (WS)	**Limiting Factor (LF)**	**LF_Weight**	**LF_Funct_Current**	**LF_Funct_10Year**	**LF_Funct_25Year**	**WS_Funct_Current**	**WS_Funct_10Year**	**WS_Funct_25Year**
Icicle Creek	In-channel Characteristics	35	70	75	80			
	Passage / Entrainment	10	55	55	55			
	Riparian / Floodplain	20	70	75	85			
	Sediment	20	90	92	95			
	Water Quantity – Flow	15	55	55	55			
						70.2	**73.4**	**77.8**

Estimated limiting factor function improvements and combined watershed function improvements are shown in the reports entitled *Estimated Benefits to Primary Limiting Factors (PLFs) from Habitat Actions by Population and Watershed* (reported by ESU).

Next, the watershed functions are combined to calculate the overall biological egg-to-smolt productivity benefit for a population. All watersheds in a population are weighted according to their intrinsic potential for production, and the overall function for a population is calculated where:

Population Survival = Σ(Watershed Survival * (Watershed Weight/100))).

Because actual egg-to-smolt productivity rates are modeled through more complex means such as EDT or TRT analysis, we did not attempt to estimate these current rates here, but instead simply applied a rate of 1.0 to represent the current rate for each population, and showed 10-yr and 25-yr improvements as percentage increases to productivity above this current rate. In the example below, the Wenatchee River Summer Steelhead population is estimated to show an improved productivity from current conditions of 1.06 (6% improvement) at 10 years and 1.12 (12% improvement) at 25 years, which is derived from the weighted watershed-level benefits of all actions:

Wenatchee River Summer Steelhead – Estimated Egg-to-Smolt Surval Improvements							
Watershed	**WS_Surv_Current**	**WS_Surv_Year10**	**WS_Surv_Year25**	**WS_Weight**	**Pop_Surv_Current**	**Pop_Surv_Year10**	**Pop_Surv_Year25**
Chiwawa River	91.8	93.4	95.1	18			
Chumstick Creek	67.5	68.5	71.5	5			
Icicle Creek	70.2	73.4	77.8	5			

Wenatchee River Summer Steelhead – Estimated Egg-to-Smolt Surval Improvements							
Watershed	**WS_Surv_Current**	**WS_Surv_Year10**	**WS_Surv_Year25**	**WS_Weight**	**Pop_Surv_Current**	**Pop_Surv_Year10**	**Pop_Surv_Year25**
Little Wenatchee	90.2	92.2	94.2	3			
Mission Creek	43.8	43.8	43.8	5			
Nason Creek	65	72.3	78.8	19			
North Side Tributaries	60	60	60	1			
Peshastin Creek	62.8	76.2	80	15			
Wenatchee River (Lower)	68	68	68	7			
Wenatchee River (Upper + Chiwaukum)	80.5	85.2	90	18			
White River	89.8	91.5	93.2	3			
Population Total:					**1.00**	**1.06**	**1.12**

Estimated egg-to-smolt productivity improvements by watershed based on estimated watershed function improvements and combined population productivity improvement are shown in the reports entitled *Estimated Biological Benefits from Habitat Actions by Watershed/Population* (reported by ESU). The estimated productivity improvements of all populations are then show in the report *Population Biological Benefits Summary.*