



# COLUMBIA RIVER INTER-TRIBAL FISH COMMISSION

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April 20, 2016

Dr. Greg Ruggerone, Independent Scientific Advisory Board Chairman  
Northwest Power and Conservation Council  
851 SW 6<sup>th</sup> Avenue, Suite 1100  
Portland, OR 972014-1348

RE: Review and analysis of historic run-size estimates from “Density Dependence and its Implications for Fish Management and Restoration in the Columbia River Basin”

Dr. Ruggerone and Independent Scientific Advisory Board members:

In July 2015, the Columbia River Inter-Tribal Fish Commission (CRITFC) provided comments on the Independent Scientific Advisory Board’s (ISAB) report, “Density Dependence and its Implications for Fish Management and Restoration Programs in the Columbia River Basin,” hereafter referred to as the Report. CRITFC strongly objected to the ISAB’s re-estimate of historical Columbia River salmon and steelhead run-sizes (~ 6 million adults) presented in Chapter III of the Report. Serious concern was expressed by CRITFC staff that the data and assumptions used by the ISAB relied too heavily on work by Chapman (1986) and did not consider other important research. In particular, CRITFC is concerned with the difference in pre-development adult run-sizes between the Report and those developed and adopted by the Northwest Power and Conservation Council (NPCC) in 1987 (10-16 million adults), formerly known as the Northwest Power Planning Council. The Report estimate is substantially lower than the NPCC 1987 estimate and it is inconsistent with tribal oral history. A widespread perception of a lower historical run-size could potentially influence restoration goals within the Columbia River basin.

To provide further insight into the discrepancy between the Report’s pre-development adult run-sizes and those of the NPCC, CRITFC contracted with John Marsh, of Marsh Consulting LLC, to provide a technical analysis of Chapter III in the Report. Mr. Marsh is a policy analyst, attorney, and scientist, who spent 14 years with the NPCC as the Production and Habitat Manager in the Fish and Wildlife Program. During his time with the NPCC, Mr. Marsh was extensively involved in the development of the NPCC’s estimate of Columbia River Basin salmon and steelhead run-sizes.

In CRITFC’s review of Mr. Marsh’s memorandum (attached to this letter), it is apparent that important data and information were not included in the ISAB’s estimate of pre-development salmon and steelhead run-sizes. Specifically, seminal work by Dr. Allan Scholz did not appear to be “meaningfully considered” by the ISAB in its analysis. Further, we agree that the ISAB relied too heavily on Chapman’s (1986) work and seemingly ignored the NPCC’s work. As such,

CRITFC agrees with Mr. Marsh's overall assessment that the ISAB Report does not constitute a sufficiently inclusive reanalysis to warrant modifying the NPCC pre-development run-size estimates. If the NPCC pre-development run-size estimates were ever to be reconsidered, CRITFC would recommend that a careful and extensive literature review and data analysis be conducted within the context of a diverse expert panel that would include consultation with the tribes that have resided in the Columbia River basin since time immemorial.

While CRITFC appreciates new perspectives on historical salmonid abundance, the ISAB's estimates in the Report are inadmissibly low and could potentially "lower the bar" for restoration of what was once considered to be the center of abundance for chinook salmon and steelhead trout.

Thank you for your consideration. If you have any questions please contact me or Dr. Zachary L. Penney, Fishery Science Department Manager (503) 238-0667.

Sincerely,

A handwritten signature in blue ink that reads "B. Paul Lumley". The signature is stylized and cursive.

Babtist Paul Lumley  
Executive Director

Enclosure

Cc: 15 Tribes, Columbia Basin Tribes Coalition  
Michael Ford, Northwest Fisheries Science Center Division Director  
Jim Ruff, Northwest Power and Conservation Council  
Members, Northwest Power and Conservation Council  
Erick Merrill, Independent Scientific Review Program Manager



March 1, 2016

## Final Memorandum

**TO:** Rob Lothrop, CRITFC

**FROM:** John Marsh

**SUBJECT:** Review and Analysis of “Density Dependence and its Implications for Fish Management and Restoration in the Columbia River Basin”

### INTRODUCTION

This memorandum addresses a review and analysis of Chapter III (Pre-development Capacity of the Columbia River Basin) of the document titled “Density Dependence and its Implications for Fish Management and Restoration in the Columbia River Basin” (2015) authored by the Independent Science Advisory Board (ISAB). The purpose of the review was to compare the findings and rationale of the ISAB related to pre-development Columbia Basin salmon run size estimates with those adopted by the Northwest Power Planning Council, now known as the Northwest Power and Conservation Council, (Council) in its Columbia Basin Fish and Wildlife Program in 1987.

### BACKGROUND

The focus of this analysis is to look at assumptions for differing estimates of total run size of all anadromous Pacific salmon species, including steelhead trout, that returned annually to the Columbia River Basin to spawn, hereafter referred to as adults, prior to the occurrence of development activities (about 1850). The ISAB estimates the maximum pre-development run size as 6 million adults based on the “primary evidence.” The Council program lists average pre-development run size as 10 to 16 million adults. The ISAB and Council took different approaches for arriving at their respective conclusions:

- The Council (1986) estimated run sizes of 10 to 16 million adults based on lower river commercial catch. It also used an “alternative approach” based on lower river commercial catch, upriver Indian and settler catch, and higher catch efficiencies that resulted in an estimate of 12.5 to 13 million adults.
- The ISAB extensively reviewed Chapman (1986) which estimated run sizes of 8 to 10 million adults based on lower river commercial catch.
- Both the Council and the ISAB considered the Pacific Fishery Management Council (PMFC) (1979) estimated run sizes of about 8 million adults using a habitat-based approach.

- The Council, but not the ISAB, considered the report by Scholz, et al. (1985), entitled “Compilation of Information on Salmon and Steelhead Total Run Size, Catch and Hydropower Related Losses in the Upper Columbia Basin, Above Grand Coulee Dam.” Scholz found the Council estimated adult run sizes were appropriate in the context of this study.
- The Council, but not the ISAB, considered the Bonneville Power Administration (1984) estimated run sizes of about 35 million adults using a fish wheel catch-based approach.

#### KEY OBSERVATIONS RELATED TO THE NORTHWEST POWER PLANNING COUNCIL’S AND ISAB’S ESTIMATES OF HISTORIC RUN SIZES

- The Council’s conclusion was adopted by the Council in a formal rule making process based on information developed by Council staff, expert contractors and interested parties including utilities (Chapman), tribes (Scholz, et al; Walker) BPA, and numerous others. The Council’s three-year effort was guided by a technical advisory committee convened under the Federal Advisory Committee Act [Public Law 92-463]. The Council’s processes included publication and review of draft issue papers and the draft final three volume report. The Council held public hearings in Montana, Idaho, Oregon and Washington. By statute, the Council’s decision was required to be based on best available information. [16 US Code §839b(h)(6(A))].
- In adopting the average annual run size, the Council found its catch-based approach to be conservative because of several factors and assumptions.
  - Harvest-based estimates from 1880 to 1928 do not include habitat degradation (hydropower development and operations, logging, mining, grazing, agriculture/irrigation, urbanization/pollution, and other miscellaneous impacts) that had occurred as documented in NPPC (1986). The ISAB did not include this consideration in estimating the historic run size.
  - Ocean harvest in commercial, subsistence and sport fisheries were not included in estimated run size as documented in NPPC 1986. The ISAB did not include this consideration in estimating the historic run size.
  - In-river catch by Indians and non-commercial fisherman was not included in the commercial catch estimates. The ISAB did not include this consideration in estimating the historic run size.

The Council’s “alternative approach” addressed these factors and resulted in an estimate that fell within the 10 to 16 million adult estimate.

- The ISAB relies heavily on Chapman (1986) in developing its estimate. This paper was published in the *Transactions of the American Fisheries Society*. The other papers listed above, although voluminous, were not published in technical journals. The Chapman paper was commissioned by the hydropower interests as a rebuttal and critique of the Council estimates. Chapman (1986) was considered by the Council in arriving at the decision that the average historic run size was 10 to 16 million adults. Chapman considered estimates to be “potential” annual run size, not maximum or average run size. Chapman’s assumptions include:
  - The 1915 to 1919 harvest of fall Chinook was not significantly influenced by habitat degradation. It is pointed out by the ISAB that Swan Falls Dam blocked 253 km of fall

Chinook habitat starting in 1901. As noted above, habitat degradation significantly affected run sizes prior to 1915.

- Chapman's estimates do not include non-commercial harvest. Chapman believed Indian populations had been decimated by disease and, therefore, Indian harvest was too low to be significant. This assumption is not confirmed by any references.
- Chapman speculated reduced Indian fishing from 1825 to 1850 led to high spawner returns and density dependent effects that resulted in a decline in salmon abundance. Further, after that, the population overcompensated so the harvest levels later in the 1800s were higher than they would have been otherwise. This assumption needs further investigation before it can be relied upon.
- ISAB findings (*paraphrased and italicized*) include:
  - *Harvest prior to mid-1920s was largely driven by market conditions in addition to abundance.* Response: This assumption would lead to a conclusion that the lower catch efficiencies considered in the Council estimates (50%, 67%) might be more accurate in many years. Peak catches were probably higher than recorded because some fish were not sold and processed in the lower Columbia River as cannery capacity was exceeded at times. This resulted in fish being transported elsewhere for processing. In addition, it is likely that some canneries may not have reported all of the fish processed.
  - *Ocean and inland environmental conditions are a big unknown, but the ISAB states that they were probably very good during the late 1800s to early 1900s compared to present.* This assumption needs further investigation.

#### FURTHER OBSERVATIONS RELATED TO THE NORTHWEST POWER PLANNING COUNCIL'S AND ISAB'S ESTIMATES OF HISTORIC RUN SIZES

- Tribal consumption estimates for ISAB and Chapman do not address the tribal use report by Dr. Randall Schalk, contracted by the Council for the losses assessment in 1985.
- The Council approach assumed that the historical fishery targeted summer Chinook in earlier years and was closed during fall and spring periods. As summer Chinook populations declined, the fishery targeted fall Chinook. The Council estimated that the spring Chinook run size would have been similar to fall-run abundance, although the spring runs were not targeted or included in catch during the time period analyzed. The ISAB has similar assumptions, except it assumed spring Chinook was included in overall reported catch which results in a lower estimated adult run size.
- Figure III.1. – The ISAB only includes Chapman numbers, not Council numbers, or those from Scholz et al. (1985).
- The ISAB used Chapman's larger average fish size in pounds as opposed to the Council's average. Pounds per fish is a significant factor for determining numbers of fish in the catch.
- Chapman used the Fraser River Basin (British Columbia) as a comparison to the Columbia Basin (no dams and much smaller basin). The Council did not find this comparison compelling.
- It is unclear what effect, if any, hatchery production had on estimates of pre-development run sizes.
- The ISAB does not identify the basis of the "significant ocean harvests" for all Chinook races and coho that have occurred from 1910 to the present. The ISAB makes this statement, but

does not cite a reference. Also, the ISAB asserts that ocean harvest was insignificant until 1910 and would have had a negligible effect on estimates. Again, there is no citation for this assertion.

- “Chapman (1986) provides a detailed analysis based on fishery science concepts and approximates ‘potential’ salmon abundance in the Basin prior to significant development” (ISAB Ch. III). This is a significant ISAB finding. Note that regional debate in 1987 resulted in the Council finding Chapman’s estimates too low.
- Chapman uses 5-year peak harvest averages versus 1-year peak used by the Council. The ISAB looked at another approach using single 5-year period peak harvest by species. The ISAB states, “The key point here is that the five-year period of peak catch varies among species, therefore the sum of the peak five-year average catches for individual species derived from different five-year periods greatly overestimates the average catch of all salmon that can be expected in any given five-year period.” (ISAB p. 41). The ISAB approach does not recognize that the fishery shifted among species based on declines in abundance from overfishing individual species, seasonal races, or discrete populations (NPPC 1986).
- “The most abundant species, based on the more probable harvest rates, were Chinook (3.75 million) and sockeye (2.25 million), followed by coho, chum, and steelhead (approximately 0.5 million each). These abundance values were based on the landed weight of each species (derived from records of canned, frozen, and mild-cured salmon, adjusted for percentage of the fish carcass utilized) and average weight of each species in the late 1800s (Craig and Hacker 1940).” (ISAB pgs 42-43) This statement is based on only one citation, which seems inadequate.
- The ISAB section on “Tribal Harvests Prior to 1800” is inadequate. A more thorough treatment of this topic would require consultation with tribes and a meaningful opportunity for the tribes to present their scientific and cultural evidence.
- The ISAB section on “Habitat-based Estimates of Abundance” needs further review before acceptance.
- It should be noted that original Council catch percentage rates included a 33% catch rate. This estimated rate was considered too low based on comments by the Pacific Northwest Utilities Conference Committee (NPPC, Appendix C), and was subsequently eliminated.

## CONCLUSIONS

- Significantly, the ISAB did not meaningfully consider work done by Dr. Allan Scholz et al [Compilation of Information on Salmon and Steelhead Total Run Size, Catch and Hydropower Related Losses in the Upper Columbia River Basin above Bonneville Dam]. This work was considered as one of the compelling factors by the Council in adopting the 10 to 15 million adult pre-development run size estimate. Dr. Scholz’ work estimated average pre-development run size at 12 to 16 million adults using a lower river catch-based approach.
- The ISAB relies heavily on Chapman’s work and does not give much credibility to the Council’s work. The Council fully considered Chapman’s work, as well as analyzes by its’ staff and others, in adopting the 10 to 16 million adult run size in the mid-1980s.

- Considerable foundational work for the Council’s determination on pre-development run sizes is not contained in the 1987 Program including issue papers and other documents. A better picture of the basis of the Council’s decision can be found by reviewing all of this information.
- As noted above, the Council also used an “alternative approach” to reaching the decisions that pre-development run sizes were 10 to 16 million adults on average. This alternative approach took into account many of the ISAB concerns, but was not addressed by the ISAB in its report.
- Several factors were very important in estimating pre-development run size. These include:
  - Catch number
  - Pounds per fish
  - Catch percentage of total run size
  - Market effects on catch such as World War I demand
  - Efficiency of the fisheries and harvest methods
  - Number of years and what years are considered in assessing peak harvest in the lower river or any other fishery considered in the analysis
- I do not believe the ISAB presents an adequate case to modify the Council’s Fish and Wildlife Program pre-development run size estimates. If it is desired that the Council-adopted pre-development run size of 10 to 16 million adults be re-evaluated, I would recommend it be done comprehensively over several years and include all interested sovereigns and stakeholders.

#### **PRIMARY DOCUMENTS ADDRESSED IN THIS MEMORANDUM**

Bonneville Power Administration. 1984. Environment and Power Issue Backgrounder: Enhancing Our Fish & Wildlife Resources. Portland, OR.

Chapman, D.W. 1986. Salmon and Steelhead Abundance in the Columbia River in the Nineteenth Century. Transactions of the American Fisheries Society 115:662-670.

NPPC (Northwest Power and Conservation Council). 1986. Compilation of information on salmon and steelhead losses in the Columbia River Basin. Northwest Power Planning Council. Portland, OR.

NPPC (Northwest Power and Conservation Council). 1987. Columbia River Basin Fish and Wildlife Program. Northwest Power Planning Council. Portland, OR.

PFMC (Pacific Fishery Management Council). 1979. Freshwater habitat, salmon produced, and escapements for natural spawning along the Pacific coast of the U.S. Prepared by the Anadromous Salmonid Environmental Task Force of the Pacific Fishery Management Council. Portland, OR.

Scholz, A. et al. 1985. Compilation of Information on Salmon and Steelhead Total Run Size, Catch and Hydropower Related Losses in the Upper Columbia River Basin above Bonneville Dam. Upper Columbia United Tribes Fisheries Center. Cheney, WA.