



## Independent Scientific Advisory Board

*for the Northwest Power and Conservation Council,  
Columbia River Basin Indian Tribes,  
and National Marine Fisheries Service  
851 SW 6<sup>th</sup> Avenue, Suite 1100  
Portland, Oregon 97204*

**Memorandum (ISAB 2011-2)**

**July 15, 2011**

**To:** ISAB Administrative Oversight Panel  
Bruce Measure, Chair, Northwest Power and Conservation Council  
Paul Lumley, Executive Director, Columbia River Inter-Tribal Fish Commission  
John Stein, Science Director, NOAA-Fisheries Northwest Fisheries Science Center

**From:** Rich Alldredge, ISAB Chair

**Subject:** Comments on the Fish Passage Center's draft 2010 Annual Report

### **Background**

The Northwest Power and Conservation Council's 2009 amendments to the Columbia River Basin Fish and Wildlife Program call for the continuation of the fish passage related functions currently conducted by the [Fish Passage Center](#). The primary functions are to provide technical assistance and information to fish and wildlife agencies in particular, and to the public in general, on matters related to water management, spill, and other passage measures. The Program also calls for the Fish Passage Center's Oversight Board to ensure that the functions are implemented consistent with the Program. To do this, the Program specifies that the Oversight Board will work with the Center and the Independent Scientific Advisory Board (ISAB) to organize a regular system of independent and timely science reviews of the Center's analytical products. This regular system of reviews includes evaluations of the Fish Passage Center's draft annual reports, which began last year with our review of the Fish Passage Center's 2009 draft Annual Report ([ISAB 2010-4](#)). Our review of the Fish Passage Center's draft 2010 Annual Report follows below.

### **ISAB General Comments**

The ISAB once again acknowledges the continuing improvement in the organization of recent annual reports, as exemplified in the draft 2010 Fish Passage Center Annual Report. This ISAB review provides technical and selected editorial comments by section on the content of the draft Annual Report. Identification of 2010 Fish Passage Center products for possible ISAB review is continuing and will be presented in the near future.

As a general observation, the ISAB found the writing quality and level of completeness varied across sections. It would help reviewers better focus on the technical content of the draft if all sections were carefully proofread for clarity, grammar, and formatting before distribution. It would also be useful to have the online version of the draft annual report available in separate sections to facilitate downloading due to file size.

## **ISAB Comments on Each Section of the Draft 2010 Annual Report**

### ***Executive Summary***

Overall this is an effective, but brief summary of the Annual Report. The ISAB suggests consideration of the following issues:

Paragraph 2, end: Please clarify if the use of dissolved oxygen (DO) monitors constrain spill or if data from the monitors were used in deciding to constrain spill in order to reduce supersaturation.

Paragraph 3. A question arose concerning the lower survival of yearling Chinook from Rock Island to McNary and the below average spill there. Was the spill below average due to a lack of court ordered regulations? If so, this lack of regulations should be noted because Chinook survival was higher in the Snake where the court has ordered spill.

Paragraph 4, line 7. Please clarify the sentence regarding summer Chinook in the Mid-Columbia. Should the sentence read that the 2010 release was 1.4 million fish greater than the 10-year average of 3.3 million? Please briefly note why the release of coho in the lower Columbia was so low in 2010.

Paragraph 5. Consider commenting on key factors leading to above average runs to most areas. Was it mostly due to improved survival at sea or to improved survival of smolts in the river? If analyses have not yet been performed, perhaps mention that this type of analysis will be forthcoming.

### ***I. Introduction***

The introduction briefly describes the scope of and rationale for the documentation, analysis, and reporting activities undertaken by the Fish Passage Center each year. Passage of adult and juvenile salmon through the hydropower system is described, and the effects on fish passage of environmental conditions, hydrosystem operations, and management decisions are also documented and evaluated. The introduction concisely and clearly outlines the objectives of the Fish Passage Center program and of the Annual Report. It seems unnecessary to begin the Introduction section with ISAB's request last year for an introduction to the Annual Report. Consider deleting this statement.

#### ***Editorial notes:***

Paragraph 3. Please revise to clarify the meaning of the first sentence. The second sentence should be changed to "...the data are updated..."

## ***II. Water Supply***

Overall, this section provides a straightforward, useful summary of the annual water supply situation.

Inclusion of a brief comparison of the current water year with the previous year and a summary of the past 10 years would increase the value of the information presented.

### *Editorial notes:*

This section could benefit from some editing to avoid jargon and unclear sentence structure that could hinder understanding of the information by a diverse audience. Issues for consideration follow:

Table 2-1. Explain why months are not consistent across sites.

Paragraph immediately before Table 2-3: Precipitation is usually measured at a specific locale and varies greatly from place to place. Which stations were used to measure precipitation? Also, what is the rationale for these stations being compared?

Table 2-4. Spell out month to avoid confusion.

Table 2-5. Provide a column with differences and give a summary of the consequences of these differences for fish.

Paragraph immediately before Table 2-7. Explain in the text what is going on, rather than only referring to figures.

Table 2-7. Explain why there are no data after July 2 for Priest Rapids Dam.

Section 2, paragraph 2, last sentence. The word “careful” should be deleted because it expresses a judgmental opinion that is not appropriate here.

Figure 2-9. Spell out month to avoid confusion.

Paragraph 1. Runoff, by definition, is a volume so omit volume.

Consider defining acronyms such as FC and Na. Consider defining terms such as drafted, relaxation, sturgeon tests, Sturgeon Pulse Operations, refill their accounts, and headloss payments.

Section 2, paragraph 1, last sentence. Revise the sentence to increase its clarity.

Section 3. Identify “Arrow” as a lake or reservoir.

Conclusions. Reduce the number of bullets by combining information associated with one site.

Conclusions, next to last bullet. Include a brief explanation of why this is important.

Conclusion, last bullet. Revise the sentence to be clearer and more specific.

### ***III: Spill Management***

This section describes the influence of river flows, operational constraints, and studies at various projects on spill levels at the four lower Snake River dams and the four Columbia River dams downstream from the Snake River in the spring and summer of 2010.

- p. 25, paragraph 5: Why is it “problematic” that total dissolved gas (TDG) levels are affected by wind and temperature as well as spill? If a TDG level of 115% is the threshold for sublethal effects, why would it matter if wind or temperature effects are involved? In that circumstance, reduction of spill is the only action that can lower TDG. Have the effects of observed water temperature variations on gas saturation percentage been estimated?
- p. 32, paragraph. 2: This paragraph summarizes a Fish Passage Center tech memo dated February 16, 2011 that recommended “spill should be increased at John Day Dam to increase fish survival.” The reasons for this recommendation are not fully described here, but were apparently based on data for 2009. Should a recommendation (favoring 40% spill over 30% spill in this case) be based on percentage spill in one year, since fish behavior may change in years when flows are higher or lower?

#### *Editorial notes:*

- p. 24, paragraph 1, line 13: add “that are detected in bypasses” after “Chinook and steelhead.”
- p. 25, paragraph. 3, line 1: “While NOAA stated...additional information.” is not a sentence.
- p. 25, paragraph. 3: “Judge Redden signed an order...continued the 2009 operations into 2010...” This doesn’t explain what Judge Redden required (what were the guidelines for spill and transport in 2009?) [Note: this explanation is provided on the following page; should that explanation be moved back to p 25?]
- p. 25, paragraph 5, line 2: Change “requirement” to “limit.”
- p. 26, paragraph 2: The first sentence is too long and difficult to follow.
- p. 26, Table 3.1: Does “45kcf/gas cap” mean “whichever is higher” or “whichever is lower”? Does “30% day/night” mean 30% of flow? Similar questions arise throughout the table.
- p. 27, paragraph. 3: “spill passage efficiency” should be defined.

- p. 28, paragraph. 1: What is doble testing? Just a few words in parentheses would be sufficient. Is it spelled correctly? If so, should it be “Doble”? It is also referenced as doble on p. 29.
- p. 28, Figure 3.2: Axes labeling could be improved to be more informative in this figure and elsewhere.
- p. 30, last paragraph: “The implementation of study like conditions in 2010 was problematic.” It would be useful to add a “due to...” clause to this sentence.
- p. 32, paragraph 1, line 5: “...ended on July 22nd and the project spilled an instantaneous 30% [add “thereafter”?]”
- p. 32, last paragraph, continued on p. 33: Reference is made to “performance standards.” It would be useful to add a short parenthetical statement describing these performance standards (e.g., survival or symptoms of gas bubble disease or others).

#### ***IV. Smolt Monitoring***

This section describes the Smolt Monitoring Program (SMP) which provides data on the timing of the juvenile out-migration, estimates of relative fish abundance at the dams, migration timing at traps and dams, fish travel times, and estimates of survival through index reaches. The report on the SMP could benefit from some reorganization. If the section is meant to stand alone, readers should not have to read the whole report to grasp what the SMP is reporting. For example, in the summary on page 46 readers are referred to decision frameworks, BiOp compliance criteria, and Fish Accord criteria. It would be helpful to provide links to such items. There are several places, for example on page 49 concerning the Behavioral Guidance Structure, where differences in catches and other data are claimed without presentation of statistical results.

The Fish Passage Center conducted a multiyear analysis of survival for subyearling Chinook in the Lower Granite Dam to McNary Dam reach (Section I). Was this done for a particular reason or client? An explanation would help set the context for the results.

- p. 46, paragraph 1: This paragraph states that: “Given the low flows, there was some concern that survivals would be low. However, as a result of the spill operations that were provided, survivals in 2010 were relatively high for spring and summer migrants.” The sentence implies causality only to spill operations, but there may be other factors that influence survivals. The sentence should be revised.
- p. 46, paragraph 1: Consider rewording of sentence “In their annual analysis of survival, NOAA credited the high spill proportions for improving in-river survival as well as the full compliment [sic; should be complement] of surface passage structures at nearly all of the projects (Ferguson, 2010)” to “In their annual analysis of survival, NOAA credited high spill proportions and the presence of surface passage structures at nearly all of the dams for improvements in survival of in-river migrants (Ferguson, 2010).”

p. 49, paragraph 1: It's not clear from this description if the only available comparison was between guidance with the BGS installed in 2010 vs. earlier years with the BGS not installed (apparently this was not a within-year blocked design?). If so, any conclusions would be questionable, especially since "It should be noted that turbine unit 11 was out of service again in 2010 and that unit is near the corner collector and likely affected study results..."

p. 48, 2nd paragraph: Regarding the statement "In 2010, overall survival for steelhead was significantly higher during the 40% spill test compared to the 30% test.", no data are provided for survival of steelhead under the two test conditions, yet survival data are provided for yearling and subyearling Chinook, although differences between treatments were not significant for tests with those species.

p. 48, last paragraph: Something is misplaced in the sentence: "Estimates of dam passage survival were 0.964 for steelhead, 0.953 for yearling Chinook...As such steelhead survival was below the compliance requirement for that project of 0.96 while yearling Chinook met the criteria (0.96)..."

p. 56, last paragraph: More complete explanations should be provided describing how collection efficiency is estimated (the text states only that "Collection efficiencies in the tables were derived from survival estimates from SMP traps to McNary Dam") and how it is used to scale up the passage index to a population estimate.

It would be useful to the reader to add short definitions for "population index", "population estimate" and "passage index" as footnotes to the first of the four tables (Table 4.5-4.8) which compares the three indices. All are defined in the text, but not on the same page making it difficult to find definitions.

p. 58, first paragraph: The text states "the passage indices in 2010 suggested a higher population size for sockeye and subyearling Chinook while for other species indices were lower." The preceding sentences addressed between-year comparisons for Rock Island Dam, but the statement is not correct for between-year comparisons. If intended to be a within-year comparison between passage indices for different species, the statement is not correct because the passage index for coho was higher than for sockeye (although coho are not mentioned in the text here).

The reach survival analyses section is well written and benefits from excellent figures that make the multiple-year data sets quickly intelligible. The metric "fish travel velocity/water travel velocity" is interesting as a potential indicator of between-year differences in fish migratory behavior. This measure progressively increased for steelhead in the LGR-MCN reach during the 2000-2010 decade, and the report reasonably speculates that this trend is attributable to the installation of surface bypass structures at Snake River dams. However, a similar trend was not seen for hatchery Chinook; to the contrary, this metric declined in the 2005-2009 period, during the time interval when bypasses were installed at the dams. This metric is not plotted for wild Chinook salmon but doing so might be useful: concordance between hatchery and wild Chinook would suggest that environmental conditions were responsible for

the decline rather than changes in hatchery fish size/condition or hatchery rearing/release practices. This metric deserves further evaluation.

- p. 78: The assumption that faster travel times equates with higher survival is contradicted for some reaches and species, for example Rock Island to John Day sockeye (Figure 4.10). It would be interesting to see if there were any differences in food supply in 2010 relative to other years.
- p. 79, paragraph 5: Are the holdover fall Chinook reservoir type Chinook? If so it would be useful for the authors to compare their results to data in publications such as Connor et al., 2005 (also mentioned in the last ISAB review). Apparently the last time the Fish Passage Center reviewed the matter was in 2005 (citation for DeHart 2005 on page 79 of the present report).

The overall conclusions seem to follow the analyses and conclusions in the body of the section.

*Editorial notes:*

- p. 46, paragraph. 1, last sentence: This is redundant and weakens the impression made by the preceding sentences.
- p. 46, last paragraph: The meaning of the statement that “acoustic tag data results at the project did not reflect the smolt to adult return rate by route of passage. The acoustic tag results were more optimistic.” is unclear. We suggest dropping the second sentence and adding a more descriptive explanation.
- p. 47, last paragraph: Re “results showed a 2% higher descaling rate for yearling Chinook salmon...etc.” What was the reference condition?
- p. 49, 1<sup>st</sup> paragraph: A single quotation mark (‘) is used here to indicate the unit “foot.” A prime symbol (not on keyboard, requires inserting a symbol) or “ft” should be used.
- Page 52: The term collection count is defined, but later on the same page the “count” is dropped and the word collection is used. Consistency would help clarity.
- Page 54, last paragraph: The sentence containing the following should be revised, “...During high flow events the trap typically has to move out of the main channel and suspend sampling...”
- p. 58, Table 4.9: This table is difficult to read due to the unnecessary horizontal lines between species. Horizontal lines should be used only to separate data for the different dams. Also some species names are indented while others are not.
- p. 59 to 61 and Table 4.10. The table summarizes data for 10%, 50%, and 90% passage dates in a compact format, but the data are difficult to envision. Cumulative-passage curves would be preferable (perhaps just the current year passage versus the 10-year average). The text does not help clarify comparisons.

p. 65, paragraph. 1, line 8: “on” should be “no”

p. 68, lines 10-14: Sentence “This could reflect increased propensity...” is repeated.

p. 80: The reference to Tuomikoski et al. 2010 does not appear in references in this section but rather appears in the Appendix references as Tuomikoski et al. 2009.

## ***V. 2010 Adult Fish Passage***

Information on adult abundance and timing in the year being reviewed (2010) is documented and presented in a way that facilitates comparison with the previous year (2009) and the recent 10-year average. Unusual observations that warrant further investigation are highlighted appropriately, without preliminary analysis or speculation about possible causes.

The section begins by providing background information about the history of operation and monitoring of fish passage facilities at the mainstem dams. This background is useful but the text reads awkwardly or is confusing in places and can benefit from editing. See specific comments below.

Table 5.2 provides a useful summary of the seasonal period of enumeration at each dam and indicates how the life history types of Chinook are distinguished. However, the table could be reorganized to better separate these two objectives. One column is sufficient to indicate dates of operation. The other two other columns could be used to specify the cut points that distinguish spring, summer, and fall run Chinook. Better still, the information could be summarized in a figure with date on the x-axis and distance upstream on the y-axis, such that period of adult enumeration at each dam is presented as a horizontal bar. Ticks or shading could be added to the horizontal bar to indicate the transition in life history types.

Part B describes the anadromous salmon species and their spawning distributions. It would be useful to explain how the Chinook life history types are actually *defined* – is it date of dam passage at Bonneville or some other biological feature? The text (e.g., under Summer Chinook on page 95) is not explicit and “considered to be” could mean either “defined as” or “assumed to be and counted as.” Presumably it means the latter, or else a fish defined as a spring Chinook at Bonneville, for example, might end up being redefined as a summer Chinook at a dam further upstream. Also, to the extent possible, it would be useful to indicate the primary year(s) of sea entry for each species and life history type that returned as an adult in 2010.

The annotated maps with graphical summaries and run timing figures are particularly useful and easy to read. Maps 5.1 to 5.7 are nicely enriched by adding the bars expressing counts as a percentage of values in 2009 and the 10-year average. These annotations could be made easier to grasp if a reference point indicating 100% was added (perhaps a tick mark or different shading above 100%). Also, the series of maps might provide an even broader perspective about the relative magnitude and distribution of all releases if the circle sizes representing abundance



categories were standardized across species, or at least across the life history types of Chinook. It would also be helpful to indicate the primary year(s) of sea entry in the caption for each figure.

Counts at the dams for hatchery and wild fish are distinguished, presumably based on fin clips that are visible. It would be desirable to know something about the accuracy and precision of these separate counts. Also, are any adjustments made to the counts for hatchery fish that are not fin clipped? Mention should be made of steelhead that divert into non-natal streams during the summer, but go back to the mainstem and swim upstream to natal streams late in the year and early winter when dam counts are not done, will not be counted at upstream dams.

*Editorial notes:*

Pagination in Table of Contents is incorrect (Section V starts on page 90)

- Introduction
  - line 1: “from one to nine dams” should be “up to nine dams” given that some fish spawn below Bonneville Dam
  - line 4: “described” rather than “placed”
  - line 6: fix order as “Grand Coulee Dam (completion in 1941)”
  - line 8: “first dam encountered migrating upstream” rather than “lowest” which might refer to dam height.
  - line 9: “whether or not” instead of “rather or not”
  - line 10: delete “of”
  - inconsistent use of USACE in Table 5.1 and COE in text; also Willamette Falls Dam is mentioned in the text but is not included in the table.
  - page 92: hard to follow discussion of monitoring at USACE dams – 10 USACE dams in table, Bonneville mentioned in first paragraph with dates Nov to Mar, then “all 8 COE...” dams mentioned in next paragraph with different dates.
  - page 92: Duration of breaks does not seem to add up: counting 50 min each hour implies a 10 min break each hour. Multiplying by 24 hours/day yields 240 min of break time each day, but text says 160 min.
  - page 94: italics for species names
- Part B
  - “Major spawning areas” rather than “Major watershed production areas”
  - It might be better to summarize the differences between Chinook life history types in a single (first) paragraph, including how they are defined, their typical age at seaward migration and adult return. Also summarize for each species and life history type, the primary year(s) of seaward migration of adults returning in 2010.
  - Page 96 under Sockeye: The list of “major production areas” is confusing because for the other species, the focus has been just on spawning areas. If the focus for sockeye is also on spawning area, the Lower Columbia should not be listed.
  - Fig. 5.2 and 5.7: remove (accidental?) highlighting
  - Fig. 5.6: caption reads “Coho” instead of “Sockeye”
- Part C
  - Page 106, line 1: Suggest alternative wording “Fallback is one explanation for discrepancies between dam counts.”

- Part D
  - First line: Is the date “2011” from a missing citation for the UI/NOAA study? Presumably the study could not yet have been done in 2011.
  - Page 107 and elsewhere (e.g., Figures and Table 5.8): avoid inconsistent (mixed) use of °C and °F
  - Page 110, bottom, first bullet: delete “, and that includes” and “gauges” rather than “gages”
- Part E
  - Good use of parallel structure in each case (adult counts, jack counts, then duration of run as compared to 2009 and 10-year mean). These could be made even clearer by using bullets (or new paragraphs) for adults, jacks, and run duration. Details of numbers and percents detract from readability and seem redundant to the excellent tables and figures. It also seems redundant to repeat these numbers in the Conclusions.
  - Page 112, Fall Chinook, line 6: says 95% but 98% is shown in Map 5.3
  - Figures 5.2 to 5.11 are especially rich and easy to comprehend

## ***VI. 2010 Columbia River Basin Hatchery releases***

Information on hatchery releases in the year being reviewed (2010) is documented and presented in a way that facilitates comparison with the previous year (2009) and the recent 10-year average. Unusual observations that warrant further investigation are highlighted appropriately without preliminary analyses or speculations about possible causes.

This section is well written. The text clearly and consistently distinguishes between releases intended for outmigration in 2010 and releases that will lead to outmigration in subsequent years. The captions to figures and tables could be improved by using similarly explicit language instead of “total production releases.”

The numbers (or proportions) of marked versus unmarked hatchery fish released are explicitly stated in many paragraphs, particularly for the Snake River Zone, but not in all cases. This documentation is useful and should be included for all areas where the mark rate is known, or stated as uncertain where it is not known. Marking and tagging of hatchery salmon provides an important tool in the basin and some but not all sections of this chapter reported the percentage of fish that were fin-clipped or that received a coded-wire-tag. It would be useful to provide a table showing the percentage of released hatchery fish by species, river zone, and in total that received external marks (fin clip) or internal tags (CWT, PIT, otolith marks). This information would be useful, for example, to researchers that are sampling juvenile salmon in the lower river, Columbia estuary and plume, and in the ocean. It would also facilitate identification of hatchery versus wild salmon in each river zone. It would also be useful to summarize information on the biomass released (or average size at release) for each species and life history type in each zone.

### *Editorial notes:*

p.144, Title: Perhaps include “of anadromous salmonids” and capitalize all words in Chapter VI title (i.e., release).

- p.146, part B: For each species/life history type, include a summary of the proportions in each zone that were released without marks.
- p. 151. Coho. Why was the release of coho below Bonneville Dam only 60% of that in 2009?
- p. 152. What is the significance of reporting that 495 summer steelhead released into the Skipanon River by the school program? The reporting of this small release seems inconsistent with other text.
- p. 155, 3<sup>rd</sup> line from bottom: P. 155. Typo “ware” should be “were”
- p. 162, paragraph 2: “large portion” should be quantified as much as possible.
- p. 163, line 2: “which *is* the highest release...”
- p. 167: A good summary of releases of eggs, fry and adults, including fish released by Canada is provided. However, the Mid-Columbia Zone: sockeye fry plant to Skaha Lake was not done by Fisheries and Oceans Canada (although they were involved with monitoring). The fry planting was done by Okanagan Nations Alliance in collaboration with the Grant and Chelan county PUDs.
- p. 168, top: Were adult sockeye released into Redfish Lake sampled for genetic markers that could later be used to identify their progeny?

## ***Appendices***

Acronyms for dams that are mentioned, for example WFA, should be included in appendix K, List of Acronyms.

## ***Comments on Responses from Last Year***

Page A-131

ISAB comment #1

Recent evidence shows a high rate of smolt mortality in the lower river/estuary. Connections between the smolt monitoring program and efforts in those reaches should be strengthened.

***RESPONSE:*** *The SMP does not extend to the river reach below Bonneville Dam and does not estimate survival below Bonneville Dam. The SMP was designed to provide data for fish passage management decisions at mainstem hydro system projects. However, the FPC will coordinate with and collaborate with any activities in the estuary when requested.*

Comment on the response: It appears no one asked the Fish Passage Center to coordinate or collaborate with any activities in the estuary as there is no mention of same in the 2010 Report. The

ISAB encourages the Fish Passage Center to look for ways to initiate coordination and collaboration with suitable activities in the estuary.

ISAB Comment #2

Lamprey passage at dams such as Bonneville was not reported in the main report. Apparently Fish Passage Center maintains lamprey passage data, as shown in their response to a request from the Oregonian (Appendix A). Lamprey are a species of concern, so annual reporting might be worthwhile. Likewise counts of kelts were not documented. A section covering miscellaneous species that are enumerated at the dams could be useful.

***RESPONSE** We agree, and will raise this question with the FPAC regarding adding a lamprey passage section. Since concern about lamprey have been growing perhaps a section on lamprey passage would be useful. There are many incidental species encountered in the monitoring. It may be useful to remind readers that data are available via the FPC web page for those that find web access a good method for retrieving/reviewing the data.*

Comment on the response: The FPAC recommendation is unknown, but there is no mention of lamprey in the SMP section. The ISAB encourages the Fish Passage Center to improve the visibility of lamprey data as well as data from other incidental species encountered in monitoring, including kelts.