FISH PASSAGE CENTER

1827 NE 44th Ave., Suite 240, Portland, OR 97213
Phone: (503) 230-4099 Fax: (503) 230-7559
http://www.fpc.org/
e-mail us at fpcstaff@fpc.org

MEMORANDUM

TO: Rich Alldredge, ISAB Vice Chair

FROM: Michele DeHart, Fish Passage Center Manager

DATE: August 31, 2011

RE: Response to "Review of FPC 2010 Annual Report to suggest analyses for further review and to provide comments to improve the Annual Report"

The FPC has included recommendations and responded to comments made by the ISAB in the review of the 2010 FPC Annual Report DRAFT The ISAB comments have been helpful in completing the annual report for 2010 and have provided helpful guidance for inclusion of analysis in future reports. Several modifications were made to the 2010 Annual Report on the basis of ISAB comments. Other comments will be addressed in future reports, such as discussion of Estuary research findings and the relationship with the existing monitoring data. In 2010 the SMP a plan was developed to include lamprey as a target species in the SMP. The plan was implemented for the first time in 2011 and results will be presented in the 2011 Annual Report. Lamprey monitoring data is available at the present time on the FPC web stie.

The following is our response to each of the ISAB comments on the 2010 Annual Report. The comment is followed by our response in bold, italic print.

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.

This paragraph has been re-worded to clarify the discussion. At the beginning of the spill for fish passage mitigation program a dissolved gas level of 120% was established for the tailrace of main stem projects. A different standard of 115% was established for the forebay of each project as a precautionary measure, reflecting the limited fish passage data available at the time. In the following years gas bubble trauma and survival monitoring has taken place which indicates that gas bubble trauma does not occur at the 120% dissolved gas. However, the original 115% forebay standard is utilized by the federal agencies as a basis to manage spill and therefore spill is reduced on the basis of the 115% forebay standard.

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.

Language has been added to this paragraph, which identifies the basis of spill management at the upper Columbia River projects. In addition the actual spill and historic spill at upper Columbia River projects has been included in the spill chapter of the Annual Report. Spill for fish passage is managed according to separate upper Columbia River agreements; the Upper Columbia Habitat Conservation Plans for Douglas and Chelan Counties PUDs; and a license settlement agreement for Grant County PUD projects. The terms of those agreements include juvenile survival performance standards, 93% for each project and a combined adult juvenile survival of 91% for each project. Individual project survival has been estimated with acoustic tagging studies. The spill provided for fish passage has been reduced from historic levels according to the terms of that agreement and the implementation of performance standards at the upper Columbia River hydroelectric projects.

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.

This sentence has been re-worded.

Changes in production goals and practices are a function of the US v Oregon Production Committee and the Hatchery Oversight Team and outside the scope and expertise of the FPC. When applicable, the FPC staff attempt to explain why some changes in production occur, but this is typically limited to documented incidents, such as mass mortalities, closings of hatcheries, or limitations in adult egg take (as in 2007).

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.

The language has been modified, citing recent analyses that have considered ocean conditions and fresh water passage conditions together. In those analyses increases in spill proportion and decreases in water travel time and ocean conditions are the primary variables determining smolt-to-adult return rate. In addition these analyses indicated that fresh water passage conditions also affected first year ocean survival.

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…"

The language in the introduction has been modified as suggested.

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.

As suggested, a brief comparison of the 2010 Water Year to both the 2009 Water Year and the average of the ten years previous to Water Year 2010 has been included.

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.

The River Forecast Center (RFC) issues forecasts over various time periods depending on the project. In table 2.1, attempts were made to use time periods that have been utilized in past annual reports or time periods in which a historical record is available.

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?

The three sites shown in Table 2-3 encompass large portions of the Columbia and Snake River basins, a list of each individual precipitation station that comprise each site can be found at: http://www.nwrfc.noaa.gov/water_supply/data/precip_index.txt. This discussion and link has been added to the document.

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

The suggested change has been made.

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

This suggested column has been added to Table 2-5. Brief discussions of the consequences of not being at the April 10th Biological Opinion Flood Control Elevations can be found in Section 2. As an example:

By failing to meet April 10th Flood Control elevations, operators are typically forced to refill aggressively during the spring flow period and/or not achieve a full reservoir elevation by the beginning of July which also limits the amount of flow augmentation available during the summer months.

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

The suggested change has been made.

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

Table 2-7 shows the weekly flow averages over the flow objective periods and there is not a flow objective period at Priest Rapids Dam over the July and August summer period (like Lower Granite and McNary). A note was added to the Table 2-7 heading as well as the heading for Table 2-6, which has "N/A" in the Table under Priest Rapids Summer Biological Opinion Flow Objective and Actual Flows.

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

The suggested change has been made.

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

The suggested change has been made.

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

The suggested change has been made.

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.

The acronyms and terms listed have been either defined in the text or definitions/explanations added as footnotes.

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

The suggested change has been made.

Section 3. Identify "Arrow" as a lake or reservoir.

The suggested change has been made.

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.

The suggested changes to the conclusions have been made.

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?

There is no specific data establishing 115% as a threshold for sublethal effects in the riverine system. The original 115% total dissolved gas level was established in the 1995 BIOP. The 1995 BIOP recognized that in deep tank tests salmonids exposed to 115% TDG levels did not experience significant mortality until exposure time exceeded approximately 60 days, and at 120% the exposure time to significant mortality in deep tanks was more than 40 days. Since most fish are out of the system in much less time, NOAA considered

this a very conservative criterion. A forebay monitoring location was considered important since at the time tailraces had not been routinely monitored and there was an unknown regarding the ability to establish a monitoring program.

In the 1998 BIOP it was recognized that the region's understanding of the relation between spill and TDG on the prevalence and severity of gas bubble disease had changed. The BIOP recognized that in 1995 there was some uncertainty about how the TDG levels would juvenile and adult migrants, but after three years of monitoring GBD over a wide range of gas levels (including levels greater than 120%) NOAA NMFS concluded that gas levels in the 115% to 120% range do not threaten the survival of migrating salmonids. In addition to temperature the total dissolved gas levels in the forebay are simultaneously influenced by daily oxygen production due to primary productivity. Dissolved oxygen does not pose an increased threat to the survival of salmonids since it is readily assimilated by these organisms. Any harm to salmonids from diurnal temperature variations that cause some hourly variations in temperature are also difficult to establish, since little impact has been shown to migrating organisms in the 115% to 120% TDG range, when there is depth compensation.

Given all this information, we do see it as problematic that spill levels at projects that can be 40 or more miles upstream are constrained to address excursions as small as tenths of percents above the 115% TDG level.

In response to your last question, an increase in water temperature of 1 ºC will result in a corresponding increase in TDG ranging from 2.2 percent to 2.9 percent, depending upon the initial TDG concentration.

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?

The point of the February 16, 2011 memo was not to say a "recommendation (favoring 40% spill over 30% spill in this case) be based on percentage spill in one year" as you state in your comment. The memo established that the test conducted did not have sufficient power to detect a difference between the 30% and 40% spill levels, so the conclusion that there was no statistical difference between the two spill levels was neither true (since steelhead did have a statistically higher survival under the 40% spill level), nor appropriate. In addition, although performance standards were not met under the 30% spill level in 2010, study results suggested that an increase in spill levels resulted in higher project survival for spring migrants. The data suggested that the 40% spill level achieved the performance standard for steelhead, but even under the 40% spill level the performance standard was not achieved for spring Chinook. Therefore, higher spill levels at John Day are likely necessary to achieve BIOP performance standards and improve overall reach survival rates.

Editorial notes:

p. 24, paragraph 1, line 13: add "that are detected in bypasses" after "Chinook and steelhead."

The language was not changed since the study conclusion relative to arrival timing pertained to transported fish, as well as fish that were detected in bypasses.

p. 25, paragraph. 3, line 1: "While NOAA stated...additional information." is not a sentence.

The original sentence was a direct quotation. The original sentence was removed from the quotation marks and rewritten to be grammatically correct.

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?]

The explanation logically follows the discussion of total dissolved gas limits.

p. 25, paragraph 5, line 2: Change "requirement" to "limit."

The change was made to the text.

p. 26, paragraph 2: The first sentence is too long and difficult to follow.

Several sentences were modified in the paragraph to make it more clear to the reader.

p. 26, Table 3.1: Does "45kcfs/gas cap" mean "whichever is higher" or "whichever is lower"? Does "30% day/night" mean 30% of flow? Similar questions arise throughout the table.

The table has been modified to be more clear.

p. 27, paragraph. 3: "spill passage efficiency" should be defined.

Definition has been added.

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.

Corrections were made and definition added.

p. 28, Figure 3.2: Axes labeling could be improved to be more informative in this figure and elsewhere.

The figure captions have been expanded to be more informative.

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.

The language in the last 3 paragraphs on that page were re-worded to better explain what was problematic about the operation.

p. 32, paragraph 1, line 5: “...ended on July 22nd and the project spilled an instantaneous 30% [add “thereafter”?]

The word was inserted.

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).

Clarification was added to the text.

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.

Agreed. The sentence was revised to read: However, it is likely that the spill operations that were provided, were largely responsible for the high survivals in 2010 for spring and summer migrants compared to other recent low flow years when no spill or limited spill was provided such as 2001 or 2004.

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)."

Agreed. FPC made the change.

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..."

FPC agree that conclusions would be questionable. But we stand by our description. The COE determined that a block design was impossible with this large and cumbersome piece of equipment. So any comparison unfortunately, has to be year to year. That is why we used the word "appeared" to indicate lack of strong causal link. And indeed, the entire study was likely compromised by the loss of turbine unit 11 during the study.

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.

FPC added the steelhead survivals which were 94.3 for the 30% test and 97.6 during the 40% tests.

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)..."

FPC rewrote the sentence as follows…"Estimates of dam passage survival were 0.964 for yearling Chinook, 0.953 for steelhead and 0.940 for subyearling Chinook (PNNL 2010b and PNNL 2010c). As such, steelhead survival was below the compliance requirement for that project of 0.96 while yearling Chinook met the criteria (0.96) and subyearling Chinook survival also met the lower criteria of 0.93 set for subyearling Chinook."

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.

FPC added explanatory language so that the passage reads…"The Cormack-Jolly-Seber survival estimation methodology was used which estimates both survival probabilities as well as detection probabilities for each capture occasion. In this case individual reaches represent capture occasions

with dams representing the capture detection site. These detection probabilities could be considered a weighted seasonal average estimate of collection efficiency."

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.

See below where FPC made changes to this section to clarify these terms.

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).

FPC rephrased the paragraph to make the comparison to the ten year average explicit. The section reads as follows…The bolded text was added. "…As such, the passage indices in 2010 suggested a higher population size for sockeye and subyearling Chinook when compared to the ten-year average, while for other species indices were lower. Compared to 2009, indices were up for all species at the project"….

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.

FPC added the wild yearling Chinook plot of relative migration rate and agree that it shows concordance with the hatchery fish and indeed indicates that conditions more than hatchery fish condition were responsible for the improved migration rates of yearling Chinook in 2010.

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.

FPC did not attempt to quantify food supply, but given the relatively rapid migration rate of sockeye, we speculate that sockeye feeding is minimal during migration compared to subyearling Chinook migrants, for example.

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).

FPC analyses contained in memorandums 76-05 and 187-08 indicate that holdover or overwintering of fall Chinook is related to fish size and time of release. The analyses indicate that in general fall Chinook that are released late in the year at a small size tend to holdover or overwinter. In addition monitoring data is beginning to indicate that hydrosystem operations also affect overwintering with higher flows and higher spill reducing overwintering. For these reasons the FPC has refrained from utilizing the "stream type" or "reservoir type" fall Chinook terms because they do not capture the possibility that overwintering or holding over may be affected by management actions. These terms infer a different life history instead of a strategy to deal with conditions within the same life history.

We have compared our methods and approaches to those used by other researchers. We have carefully selected our in-river sample groups and date ranges to reflect actively migrating subyearling Chinook and thereby minimize holdover impacts on survival estimates. We have avoided the use of surrogate releases and wild marked fish from the Clearwater River (which have a higher propensity to overwinter) to further minimize the likelihood of confounding survival estimation with holdover probability since our analyses are intended to assess the impacts of hydro-system operations and conditions on juvenile survival.

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.

Agreed. Sentence deleted.

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.

FPC deleted the sentence and replaced it with the following sentence. The acoustic tag survival estimates showed lesser impacts of bypass passage in relation to spillway passage when measuring short reach survival estimates than those from SAR data comparisons.

p. 47, last paragraph: Re "results showed a 2% higher descaling rate for yearling Chinook salmon...etc." What was the reference condition?

Descaling rate averaged roughly 3% for yearling Chinook during the study period perhaps 2.5% for subyearling Chinook so that 2% higher rate would have meant an increase from 2% to 4% for example. Although the research summary did not report these values, we estimated these rates from figures in the report.

p. 49, 1st 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.

FPC replaced "'", with "ft".

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.

FPC agree that the term collection count is unclear. We have replace collection count with collection estimate and tried to maintain the use of collection estimate or collection estimates throughout text when referring to dam collections whereas trap counts are actual collection counts since sub-sampling is not done at traps. We have designated trap collections as collection counts while dam collections are termed collection estimates.

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…"

FPC disagree. There are two actions that a trap can take when high flows occur; either the trap moves to a protected lower velocity part of the river and continues to sample; or the trap is disabled and trapping operations cease temporarily; or both actions occur. It is possible to move the trap away from the main channel and still actively sample. So we do believe the description is accurate and should be maintained.

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.

The horizontal lines were removed as suggested and we also removed unnecessary indents.

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.

FPC agree that curves might be more effective but with 8 sites and 5 species we felt that 40 figures would overwhelm the reader and counter the clarity we wished to achieve by adding them.

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

FPC made the correction.

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

Repeat was removed.

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.

The reference should be to Tuomikoski et al. 2009 and was changed in the text.

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.

Made the suggested edits.

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.

Changed table 5.2 to have only one three columns, one column with the dam abbreviation, another column for Chinook race dam reporting dates and a column for historic reporting dates for adult salmon and steelhead.

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.

Changed the sentence found immediately after Table 5.2 to read: The historic counting schedule for each project is presented in Table 5.2. In addition, it lists the dates at each dam when Chinook cross a dam and are counted as spring, summer or fall Chinook. Modified the second sentence in part B, Summer Chinook to read: Table 5.2 lists the dates at each dam when the Chinook pass over the dam and are counted as summer Chinook.

For each species, the ages of when each the salmon return to freshwater to spawn are indicated and the age of when the juvenile fish migrate downstream undergoing the smoltification process in preparation for the ocean phase of their life-cycle are stated in Part B.

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%).

Tick marks showing the locations of 100% were added to the maps.

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.

The circles were not standardized across species or by Chinook race because of the differences in the total number of fish comparing two different species as well as the difference in total fish at various dams. An example of this can be seen on the sockeye maps. There are two maps because the highest count was 386,525 and the smallest count (in the Snake River basin) is 1302 at Ice Harbor Dam. A separate map was created for Snake River sockeye, to make it easier to see the Snake River sockeye dam counts. Details about species life histories are found in Part B.

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?

In Part E, a separate bullet for wild steelhead was added and the following paragraph about wild steelhead counts was also added.

It is important to note that wild steelhead are a subset of steelhead. Wild steelhead are counted separately from hatchery steelhead at Corps dams on the Columbia and Snake Rivers. The wild steelhead data reported in the adult counts are actually unclipped steelhead. Some hatcheries do not clip their released steelhead. Hence, an unclipped steelhead is not necessarily wild.

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.

Added a note to table 5.5f with this information.

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

Corrected

    - line 4: "described" rather than "placed"

Corrected.

    - line 6: fix order as "Grand Coulee Dam (completion in 1941)"

Corrected

    - line 8: "first dam encountered migrating upstream" rather than "lowest" which might refer to dam height

Corrected.

    - line 9: "whether or not" instead of "rather or not"

Corrected.

    - line 10: delete "of"

Corrected.

- 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.

Added Willamette Falls Dam to table 5.1. Changed USACE to COE throughout the section.

- 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.

Changed the verbage to distinguish video counting dates from direct counting dates. Also added "all 8 USACE dams with fish passage facilities…"

- 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.

Added verbage to explain that counting is done 16 hours of the day.

- page 94: italics for species names

Corrected.

- Part B

  "Major spawning areas" rather than "Major watershed production areas"

Corrected.

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.

For each species, the ages of when each the salmon return to freshwater to spawn are indicated and the age of when the juvenile fish migrate downstream undergoing the smoltification process in preparation for the ocean phase of their life-cycle are stated in Part B.

- 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.

Deleted Lower Columbia.

- Fig. 5.2 and 5.7: remove (accidental?) highlighting

Corrected.

- Fig. 5.6: caption reads "Coho" instead of "Sockeye"

Corrected.

- Part C
  - Page 106, line 1: Suggest alternative wording "Fallback is one explanation for discrepancies between dam counts."

Corrected.

- 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.

Added in parenthesis in the citations (UI and NOAA) at the end of University of Idaho and NOAA Fisheries.

- Page 107 and elsewhere (e.g., Figures and Table 5.8): avoid inconsistent (mixed) use of °C and °F

Changed everything to °F.

- Page 110, bottom, first bullet: delete ", and that includes" and "gauges" rather than "gages"

Corrected.

- 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.

Added bullets to enhance readability. The numbers reinforce the information without the reader having to constantly refer back to the tables and figures. Not all numbers are repeated in the conclusions, only the major trends are repeated.

- Page 112, Fall Chinook, line 6: says 95% but 98% is shown in Map 5.3 3

Corrected.

- 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."

Where applicable, FPC has inserted language into figure and table captions to better clarify that release numbers are for those intended for out-migration in 2010 (not including egg and fry 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.

The FPC has added a table for each release zone that provides a break-down of marking information, by species (Tables 6-3, 6-5, 6-7, and 6-10). It is important to note that unmarked fish are those fish that do not receive any mark at all. Therefore, fish that are marked with internal marks that require special equipment to detect (e.g., coded-wire tags, blank wire tags, PIT-tags) or are not visible until after sacrifice (e.g. otolith marks) were considered marked. As in previous annual reports, more detailed marking information is available for each release in Appendix F. The information in Appendix F allows the reader to determine which release groups are marked with internal marks or tags only and may, therefore, be indistinguishable from wild fish.

Editorial notes:

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

The title of this chapter has been changed to: VI: 2010 COLUMBIA RIVER BASIN HATCHERY RELEASES OF ANADROMOUS SALMON SPECIES

p.146, part B: For each species/life history type, include a summary of the proportions in each zone that were released without marks.

See response to comments from Introductory Section related to providing marking information (above).

p. 151. Coho. Why was the release of coho below Bonneville Dam only 60% of that in 2009?

We assume the ISAB is referring to the fact that the 2010 release from Bonneville Hatchery (below the dam) was 60% of the 2009 release total. Changes in production goals and practices are a function of the US v Oregon Production Committee and the Hatchery Oversight Team and outside the scope and expertise of the FPC. When applicable, the FPC staff attempt to explain why some changes in production occur, but this is typically limited to documented incidents, such as mass mortalities, closings of hatcheries, or limitations in adult egg take (as in 2007). We are not aware of why Bonneville Hatchery reared and released fewer coho in 2010 than 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.

Steelhead releases to this zone were broken into sections: Bonneville Dam to the Willamette, tributaries of the Willamette, Willamette River to Astoria, and west of Astoria. The Klatskanine and Skipanon rivers are the only rivers that empty into the Columbia

between Astoria and the mouth of the Columbia. We have included language to clarify this point.

p. 155, 3rd line from bottom: P. 155. Typo "ware" should be "were"

Corrected.

p. 162, paragraph 2: "large portion" should be quantified as much as possible.

This statement is qualified by the sentence immediately following, which reads, "In 2010, approximately 31% of the subyearling and yearling fall Chinook released in the Snake River Zone were unmarked and unclipped."

p. 163, line 2: "which ***is*** the highest release…"

Corrected.

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.

Corrected.

p. 168, top: Were adult sockeye released into Redfish Lake sampled for genetic markers that could later be used to identify their progeny?

This information is not provided to the FPC with release information. At this time, we have no way of knowing this.

Appendices

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

Acronyms for dams were added to the list.

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.

The FPC has utilized estuary studies, and data in separate analyses regarding specific mainstem passage issues. These memorandums were completed in 2010 and in 2011. The 2010 memorandums that include some estuary data are included in Appendix A. These are included in the appendix of the Annual Report and also listed on the FPC web site. Specifically we have used at site project survival studies utilizing acoustic tag data, being conducted by the Corps of Engineers, related to performance standard testing. Some of these studies extend to the estuary. These analyses indicate that smolt mortality in the estuary is related to upstream passage experience. Specifically that passage through powerhouses results in delayed mortality later in the life cycle. Some of these studies indicate that this mortality occurs in the Estuary. Acoustic tag data, is not available to the public, therefore we rely on data presentations in draft and final reports of this work. We will develop a specific section of the annual report in the future which will discuss the work presented in the annual and draft reports as they become available.

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.

This Annual Report covers the SMP Monitoring that took place in 2010. During 2010 we worked with USFWS and agencies and tribes Lamprey Technical Committee to develop a protocol to include Lamprey as a target species in the Annual monitoring Program. We first implemented the lamprey monitoring with standard protocols in 2011, this year. We have added lamprey to the FPC web site as a target species. The results of the lamprey monitoring will be included in the Annual Report for 2011, draft target date June 1, 2012. The lamprey data may be reviewed prior to that report on the FPC web site. In addition the FPC can provide a preliminary report in advance of the Annual Report if desired.