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UNITED STATES DISTRICT COURT
DISTRICT OF OREGON
PORTLAND DIVISION

NATIONAL WILDLIFE FEDERATION, et al.,

Plaintiffs,

v.

NATIONAL MARINE FISHERIES SERVICE, et al.,

Defendants.

Case No.: 3:01-CV-00640-SI

2015 DECLARATION OF RITCHIE J. GRAVES, NATIONAL MARINE FISHERIES SERVICE, WEST COAST REGION
In support of Federal Defendant's' Cross-Motion for Summary Judgment

I, Ritchie J. Graves, declare and state as follows:

1. I currently serve as Chief of the Columbia Hydropower Branch for the National Marine Fisheries Service's (NMFS) West Coast Region (Interior Columbia Basin Area Office), which includes the states of Oregon, Washington, California, Idaho and Montana. I have been in this position since October, 2013. Previously, from April 2006 until September 2013, I was Chief of the Federal Columbia River Power System (FCRPS) Branch for NMFS' Northwest Region Hydropower Division. I have been employed by NMFS as a fishery biologist, working on the impacts of hydropower projects on salmon and steelhead, since 1993. My current responsibilities include managing FCRPS branch staff, participating as NMFS' senior technical staff in NMFS' regional forum process and related Corps of Engineers work groups, and developing information and recommendations relating to fish passage, water quality, and related facilities and operations at FCRPS dams.

2. I earned an M.A. in Zoology (Aquatic Ecology Emphasis) from the University of Montana in 1993. My masters research concerned the structure and dynamics of crayfish populations within Noxon Rapids Reservoir, Clark Fork River, Montana. I received a B.S. in biology from Centre College of Kentucky in 1989.

3. Since April, 2006, as Chief of NMFS' Columbia Hydropower Branch (formerly the FCRPS Branch), my principal responsibilities, as they relate to the 2008 Biological Opinion [2014 NOAA B281] (2008 Supplemental Comprehensive Analysis [2014 NOAA B282], and 2010 and 2014 supplemental biological opinions[2014 NOAA B286; 2014 NOAA A1]) on Operation of the Federal Columbia River Power System, including the 11 Bureau of Reclamation Projects in the Columbia Basin (hereafter '2008 BiOp,' '2008 SCA,' '2010 Supplemental BiOp,' and '2014 Supplemental BiOp'), was to manage FCRPS staff in 1) collecting and analyzing relevant data, 2) developing and using the COMPASS model 3) drafting portions of the draft and

final biological opinion and supplemental comprehensive analysis (and appendices), 4) managing staff that participate in regional forums to implement hydro and predation actions, and 5) tracking hydro and predation action effectiveness. Since October 2013, I also serve as the NMFS West Coast Region's policy representative concerning fish protection programs for the five public utility district dams on the middle reach of the Columbia River (Priest Rapids, Wanapum, Rock Island, Rocky Reach, and Wells dams, hereafter "Mid-Columbia PUD dams") between the FCRPS' McNary and Chief Joseph dams that are licensed by Federal Energy Regulatory Commission (FERC).

4. As a NMFS staff biologist (1997 to 2006) specializing in hydroelectric and storage projects, I have gained substantial experience assessing the effects of mainstem hydroelectric projects and developing actions to reduce or mitigate these impacts. In particular I have served as NMFS' technical lead on the relicensing of the FERC-licensed Hells Canyon Complex hydroelectric project (since 1997) and in the development and implementation Anadromous Fish Agreements and Habitat Conservation Plans for three of the Mid-Columbia PUD dams (2001 to 2005).

5. Prior to working in NMFS' Portland Office (beginning in March, 1997), I worked in NMFS' Smolt Monitoring Program at John Day Dam (1993-1997), primarily as the project biologist, supervising up to eight biological technicians and contractors. In this capacity, I was responsible for 1) collecting information on the number and condition (descaling, injury, etc.) of juvenile salmon and steelhead, and transmitting this information, along with dam operations information, to the Fish Passage Center, and 2) for preparing annual reports of this work. As a result of this work, over four field seasons, I personally evaluated 10s of thousands of individual Chinook, coho, and sockeye salmon and steelhead smolts for signs of injury.

6. In the summer of 1992, I was employed by the Montana Department of Fish, Wildlife, and Parks as a fisheries fieldworker. This work involved collecting information to assess the losses of juvenile trout to irrigation diversions, estimating population structure and abundance of trout populations in tributaries of the Bitterroot River, and monitoring standard habitat metrics to assess changes to and quality of aquatic habitat in these same tributaries.

7. In preparation for this declaration, I have reviewed 1) NMFS' 2008 Supplemental Comprehensive Analysis (2008 SCA), BiOp, and supporting materials for these documents; 2) the related declarations filed on behalf of the plaintiffs by Mr. Frederick Olney and Mr. Edward Bowles as well as the State of Oregon's Concise Statement of Material Facts; 3) my previous declarations responding to Mr. Olney and Mr. Bowles' declarations; 4) the 2010 FCRPS Supplemental BiOp (and 2009 Adaptive Management and Implementation Plan); 5) the 2014 FCRPS Supplemental BiOp (and 2013 Comprehensive Evaluation [Sections 1, 2, and 3]); 6) Mr. Nigro and Mr. Olney's 2014 declarations filed on behalf of plaintiffs; 7) scientific literature cited by Mr. Nigro and Mr. Olney; and 8) other pertinent documents in NMFS or the Action Agencies' administrative records.

8. This declaration includes information provided and analyses prepared by Mr. Gary Fredricks, Mr. Paul Wagner, Mr. William Hevlin, Mr. Trevor Condor, and Mr. Blane Bellerud of my staff. The purpose of this declaration is to address technical issues raised by Mr. Nigro and Mr. Olney concerning: 1) certain claims about the effects of the FCRPS and efficacy of actions required by the 2008 FCRPS biological opinion, and 2010 and 2014 FCRPS Supplemental biological opinions, 2) questions regarding the efficacy of FCRPS operations and structural modifications for ESA listed salmon and steelhead, 3) claims regarding 2008 FCRPS biological opinion performance standards, 4) claims regarding the efficacy of required predation actions, 5)

claims about the efficacy of the B-run steelhead kelt reconditioning program, and 6) other related issues raised.

I. EFFECTS OF THE FCRPS (NIGRO DECLARATION)

9. Mr. Nigro describes many "Effects of the FCRPS" (Nigro Decl. at ¶¶6-11), claiming the need "to first provide a longer-term perspective and description of the multi-faceted adverse effects of the FCRPS on the habitat that is critical to Columbia and Snake River salmon and steelhead, including adverse effects on outflow, water transit time, high flow, spill and long-term abundance trends" in order "to provide background context to the most recent iteration of the BiOp" (Nigro Decl. at ¶6). Mr. Nigro's information is a much less detailed account of NMFS' own assessment of hydrosystem effects. NMFS' discussion on these topics in the 2008 SCA, Chapter 5 (Environmental Baseline) and Chapter 8 (Effects Analysis for Salmonids), and 2008 BiOp, Chapter 8 (Effects Analysis for Salmonids) is more accurate and comprehensive, covering the following topics: Blocked and Inundated Habitat (2008 SCA, Chapter 5.1.1), Mainstem Habitat & the Migratory Corridor (2008 SCA, Chapter 5.1.2), Mainstem Hydrologic Conditions (2008 SCA, Section 5.1.3), Mainstem Water Quality (2008 SCA, Chapter 5.1.4), Indirect Effects of Hydrosystem Mortality on Nutrients in Tributaries (2008 SCA, Chapter 5.2.1), Estuary & Plume Effects (2008 SCA, Section 5.3), and Predation and Disease (2008 SCA, Chapter 5.4). In short, Mr. Nigro's "background" information provides no useful, additional information that was not already considered by NMFS in its 2008 BiOp (or 2010 and 2014 Supplemental BiOps).

10. NMFS does not dispute that the "FCRPS contribution to the weakened status of interior Columbia River salmon and steelhead is substantial" (Nigro Decl. at ¶7). Indeed, since 1995, with the exception of the 2004 FCRPS BiOp, NMFS has consistently determined that the operation and maintenance of the FCRPS, without additional actions to further reduce or mitigate

for project effects, jeopardizes the continued existence of multiple interior Columbia River salmon and steelhead Evolutionarily Significant Units (ESU) and Distinct Population Segments (DPSs) and adversely modifies their critical habitat (2008 BiOp, Chapter 1). Thus, the 2008 BiOp, and 2010 and 2014 Supplemental BiOps focus on Reasonable and Prudent Alternative (RPA) actions that, together, NMFS has determined would not jeopardize the continued existence of a listed salmon or steelhead ESUs/DPSs or destroy or adversely modify their critical habitat (2008 BiOp, Chapter 8; 2010 Supplemental BiOp, Section 4; 2014 Supplemental BiOp, Section 4).

11. Mr. Nigro's description (Nigro Decl. ¶8) of the effects of the FCRPS (and Canadian storage facilities) on seasonal and daily flows and water velocities, blocked habitat add nothing new to NMFS' previous description of these same factors (see 2008 SCA, Chapter 5.1), though they do add some confusion. NMFS clearly identified blocked passage as a continuing impact of both the FCRPS (Chief Joseph, Grand Coulee, and Dworshak Dams) and other non-Federal dams like Idaho Power Company's Hells Canyon Complex of dams (SCA, Chapter 5.1.1). With regard to seasonal flow effects, Mr. Nigro correctly attributes altered flows to large dams "such as Hungry Horse, Libby, Grand Coulee, Dworshak, Brownlee and Mica dams," but fails to note that other human effects (estimated in Action Agency modeling and summarized in the 2008 SCA) play a substantial role – for example, the diversion of millions of acre-feet of water from the Columbia River basin for multiple private and other non-FCRPS purposes, and millions of acre-feet of this water consumptively lost (2008 SCA, Chapter 5.1.3).

12. Mr. Nigro, chooses to restrict Figure 1 to 1949 through 1985 data (Nigro Decl. ¶8); leaving the reader with the visual (though erroneous) impression that flows are continuing to trend downward in flows at Bonneville Dam. This avoids the need to recognize that 2008 BiOp

RPA actions aimed at water management (e.g., limiting winter drafts for power generation to upper flood control rule curves and obtaining water in dry years to increase spring flows, and making water stored in federal reservoirs available to increase summer flows) have improved conditions for spring and summer migrating smolts compared to hydrosystem operations during the 1970s, 1980s and early 1990s (2008 BiOp, RPA measures 4-17). I am, however, concerned that Corps of Engineers' staff was unable to reproduce Mr. Nigro's graphic using June flow data downloaded from the Columbia River DART website (personal communication from Robert Rose, Corps of Engineers). Figure 1 depicts Mr. Nigro's data (interpolated) with daily June data downloaded at DART and averaged for the month of June in each year. The actual data appears to be far more variable than does Mr. Nigro's, but clearly shows that the flows are no longer trending downward. Lastly, a comparison of Mr. Nigro's Figure 2 and the newer seasonal flow analysis provided in the 2008 SCA (Figure 5.1-2) that better estimates the effect of FCRPS operations (and other human water management activities throughout the basin) in the environmental baseline on flows in the lower Columbia River shows essentially the same pattern: the overall effect of all human water management activities in the basin (the "Current" estimate includes millions of acre-feet of U.S. water withdrawals, Canadian water management, Upper Snake water management, as well as the operation of the FCRPS) is to increase flows from October through March, substantially decrease flows from May through July, and generally provide equivalent flows in April, August, and September (Figure 2).

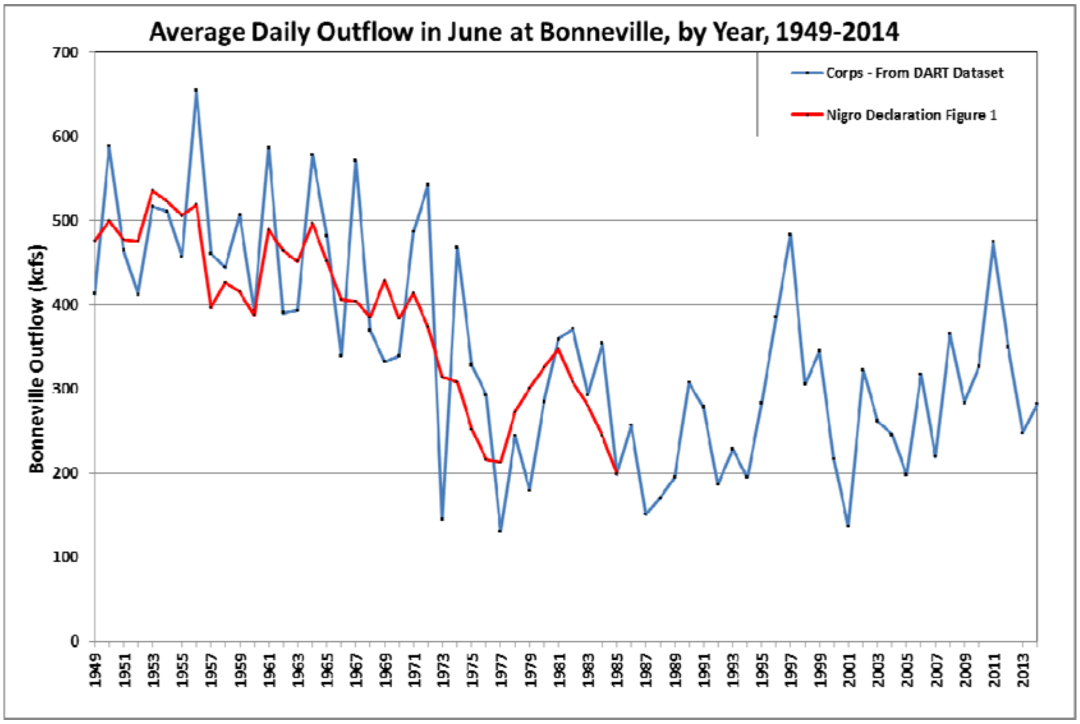
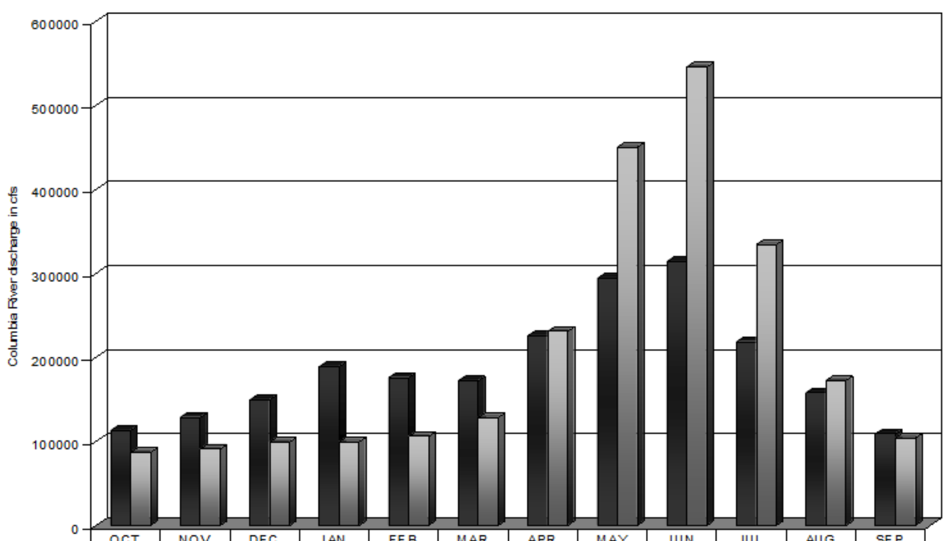


Figure 1. Comparison of average June flows at Bonneville Dam: red line is interpolated data from Mr. Nigro's Declaration; blue line is data downloaded from Columbia River DART and averaged by Corps of Engineers staff.



	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
Current	113017	128641	149403	189076	175921	172150	225689	293948	313930	218523	157935	109020
Natural	87115	91029	99387	99496	106033	128580	231047	450040	545561	334238	172430	104310

Figure 2. Simulated mean monthly Columbia River flows at Bonneville Dam under current conditions and flows that would have occurred without water development (water years 1929 – 1978. Source: Current Condition Flows – Bonneville Power Administration, HYDSIM model run FRIII_07rerun2004biop.xls; Pre-Development Flows – USBR (1999) Cumulative

Hydrologic Effects of Water Use: An Estimate of the Hydrologic Impacts of Water Resource Development in the Columbia River Basin. Source: (2008 SCA, Figure 5.1-2)

13. Mr. Nigro (Nigro Decl. ¶8) does not add any new or useful information with regard to the issue of mainstem reservoirs increasing the cross-sectional area of the Snake and Columbia Rivers, essentially repeating (though far more briefly) NMFS' summary of this effect (reduced travel times for juvenile migrants and likely resultant effects) in the 2008 SCA (Chapter 5.1.2).

14. Mr. Nigro (Nigro Decl. ¶9) provides a laundry list of direct and indirect effects of the FCRPS on salmon and steelhead. All of these topics are covered, in more detail, in the 2008 BiOp, the 2010 and 2014 Supplemental BiOps, and in supporting materials in the Administrative Records of these BiOps. These statements provide no new information that NMFS failed to consider in its previous analysis of the environmental baseline and the effects of the FCRPS (and of other related factors that affect parameters like flow).

15. Mr. Nigro states that many populations (perhaps entire ESUs or DPSs[1]) were lost because of dams in the Columbia River basins (Nigro Declaration, ¶10). This is true, and NMFS has clearly noted this not only in the FCRPS BiOps, but in our final listing decisions (e.g., 2008 NOAA B.330), but it is not particularly relevant to NMFS' consideration of effects to the existing ESUs/DPSs – the subject of the FCRPS BiOps. Mr. Nigro further implies that the development of the FCRPS was primarily responsible for the declining abundance of many populations (Nigro Declaration, ¶10 and Figure 4). As previously noted, (see ¶10 above) NMFS agrees that the FCRPS substantially, and negatively affected interior basin ESUs and DPSs of salmon and steelhead. However, NMFS does not agree with the implication that the development of the FCRPS was the <u>only</u> causative factor behind these declines. Other anthropogenic impacts likely also contributed to these population declines, most notably: degraded habitat conditions

[1] ESU refers to Evolutionary Significant Unit, and DPS refers to Distinct Population Segment. ESUs and DPSs correspond to a "species" as defined under the Endangered Species Act.

stemming from land use and land management practices, overharvest, and relatively poor ocean conditions. For example, the decline depicted by Mr. Nigro's Figure 4 is also consistent with a period of "almost exclusively warm year and poor survival" that extended from 1977 to 1997 (Figure 3 below) (2014 FCRPS Supplemental BiOp, Section 2.1.4).

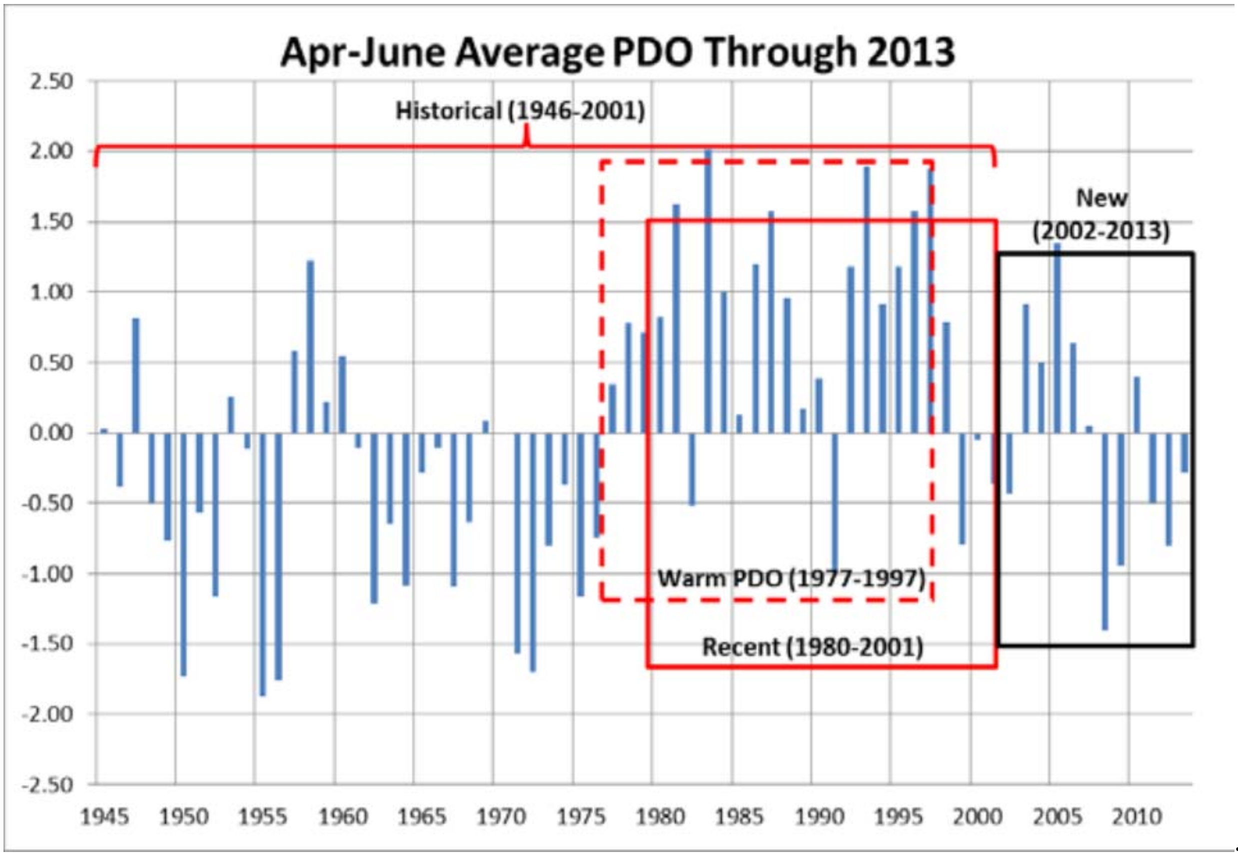


Figure 3 Pacific decadal oscillation (PDO) index 1946–2012. Positive values are warmer than average and are associated with poor survival of Pacific Northwest salmon and steelhead. Negative values are cooler than average and are associated with higher survival of salmon and steelhead (Source: University of Washington PDO web page: http://jisao.washington.edu/pdo/ downloaded August 20, 2013.)

Time periods corresponding to ocean climate scenarios in the 2008 BiOp are displayed. (Source: 2014 FCRPS Supplemental BiOp, Figure 2.1-33 in Section 2.1.4.1).

A. STRUCTURAL MODIFICATIONS

16. Unlike Mr. Nigro, I am confident that the hydrosystem, as currently configured and operated (with dam-specific spill levels for juvenile migrants), has substantially improved

migration and passage conditions and increased the survival of migrating salmon and steelhead smolts compared to the 1970 to mid-1990 period (Nigro Decl. ¶10). The Action Agencies have substantially modified the hydrosystem during this time specifically to improve dam passage survival and migration conditions for juvenile and adult migrants (Action Agencies 2007, Appendix A – Overhaul of the System [2008 NOAA B421], Action Agencies 2013 [2014 NOAA B47], Action Agencies 2014 [2014 NOAA B48]). It is also clear that these improvements have substantially improved migration conditions and survival rates are higher and generally more consistent between years. (2014 Supplemental BiOp, Chapter 3.3.3.3, Figures 3.3-2 to 3.3-7).). The 2008 FCRPS BiOp clearly considers both the past and expected changes in the configuration and operation of the FCRPS (2008 SCA, Chapter 7.1; Chapters 8.3 – 8.8 [Base-to-Current and Current-to-Prospective adjustments]; and Appendix E – Hydro Modeling), and used COMPASS2 modeling in order to estimate the substantial survival improvements that likely resulted from these dam improvements between the Base, Current, and Prospective periods (2008 BiOp, Chapters 8.2.5.1, 8.3.5.1, etc. to 8.8.5.1 and 2008 SCA, Appendix E – Hydro Modeling). The broad implication that there has been no, or very little survival improvement through the lower Snake and lower Columbia rivers over the years is incorrect. Figures 4 demonstrates increasing (and consistent) juvenile survival rates observed for subyearling Snake River fall Chinook from Lower Granite to McNary dams. Figure 5 depicts total returns (hatchery and wild) of adult Snake River fall Chinook salmon counted at Lower Granite Dam (or the uppermost Snake River dam, Little Goose or Lower Monumental dams) from 1969-2014, showing the ESUs rapid decline to

[2] The Northwest Fisheries Science Center developed a comprehensive survival (COMPASS) model to estimate the survival of interior basin smolts migrating through the mainstem FCRPS projects with alternative operations using the Action Agencies 70-year water record. This peer-reviewed model is described further in the 2008 BiOp (Chapter 7.2.1.1 - Quantitative Juvenile Analysis of Hydro Actions on Five Interior ESUs).

near extinction in the early 1990s, and the dramatic increases in abundance experienced after harvest reductions, hatchery supplementation programs, and hydropower actions began to be implemented after ESA-listing.

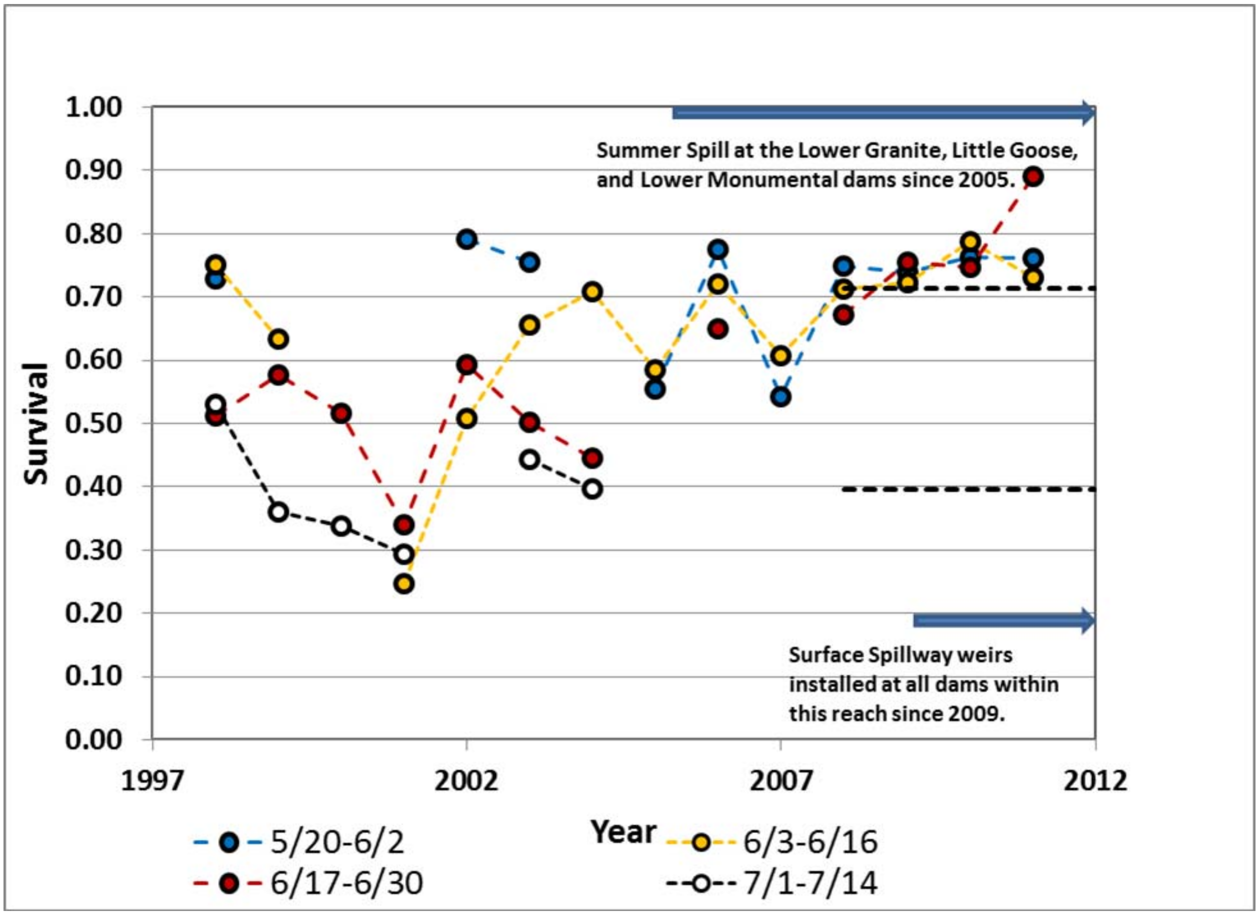


Figure 4 Estimated survival rates from two-week cohorts of juvenile subyearling Snake River fall Chinook salmon between Lower Granite and McNary Dams from 1998 to 2011. Black horizontal dashed lines denote Prospective minimum and maximum average survival rates estimated in the 2008 BiOp; blue arrows denote years in which Court Ordered summer spill occurred at the three Snake River transport projects (top) and years in which all dams in this reach were configured with surface passage routes (bottom) (Source: 2014 Supplemental BiOp, Section 3.3.3.3, figure 3.3-7, pg. 366.

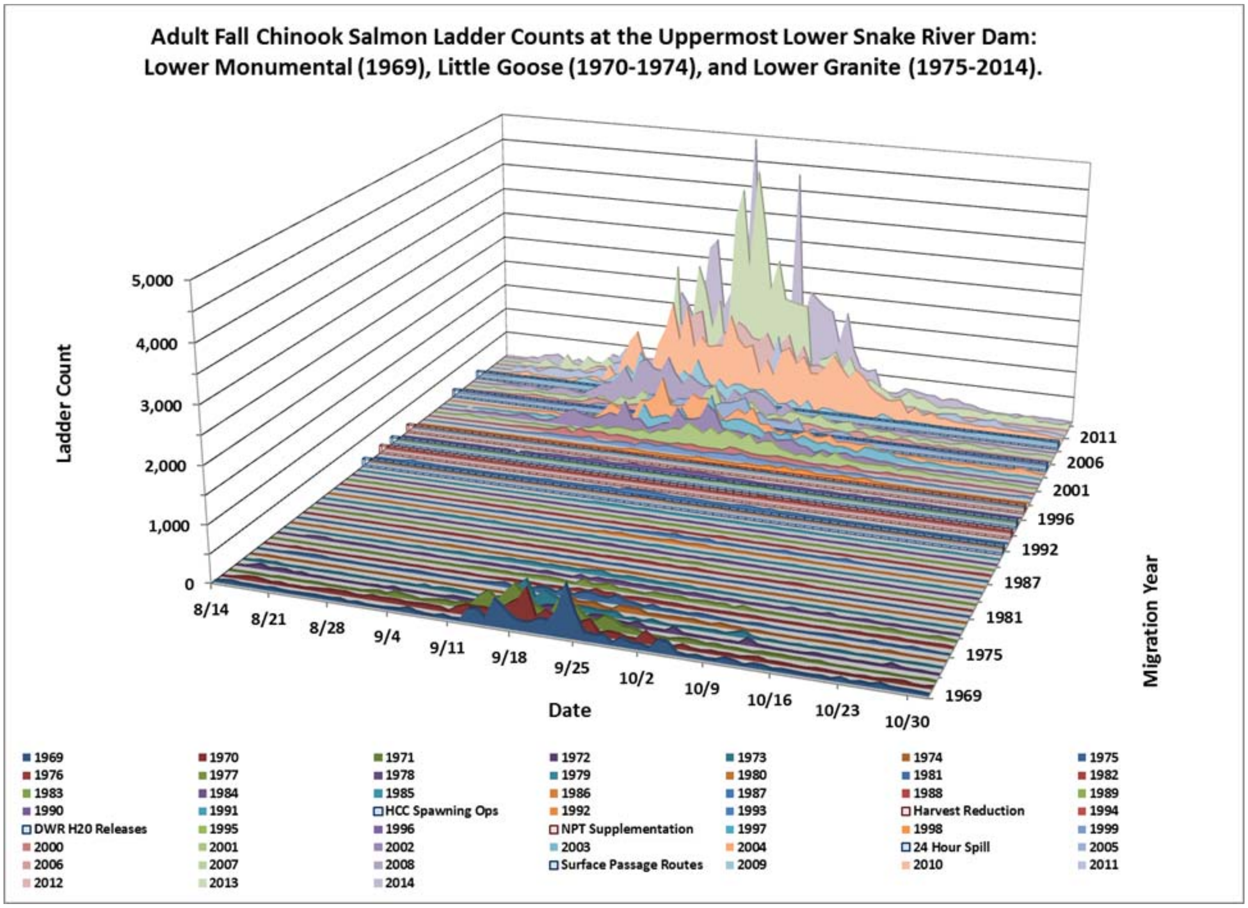


Figure 5. Snake River Fall Chinook adult ladder counts at the uppermost Lower Snake River dam (1969-2014) and timing of important factors contributing to increased abundance. Data Source: Columbia River Data Access in Real Time - http://www.cbr.washington.edu/dart/query/adult_daily, accessed November 2, 2014.

B. FLOW CORRELATIONS

17. Mr. Nigro asserts that "populations are capable of rebuilding under conditions of high flow and spill" based on correlations between 4-year running averages of May-June-July outflows at Bonneville Dam and 4-year running average number of adult returns (Nigro Declaration ¶11, Figure 5 and similar graphics in Appendix A, and Figure 6). While Mr. Nigro's graphics are visually appealing, they are overly simplistic, have several weaknesses, and are therefore misleading.

18. With respect to Mr. Nigro's Figure 5, there are a number of oddities. First, Mr. Nigro's figure includes July flows, which can have no substantial effect on adult returns because the vast

majority (more than 95%) of juvenile spring/summer Chinook salmon, sockeye salmon, and steelhead usually enter the ocean prior to July (from mid-April to mid-June). Second, if flow is such a powerful predictor of adult returns, it should correlate strongly with the number of adults returning from each individual migration year (run reconstructions), not with broader tracking metrics like 4-year running averages. Annual run reconstructions are a more useful tool for assessing annual environmental conditions as they indicate the total number of adults that return from a particular outmigration year (e.g., after spending 1, 2, 3, or 4 years in the ocean), rather than an "average" of several outmigrations where smolts likely experienced different river as well as ocean conditions in each year. If the correlation was as strong as Mr. Nigro suggests, one would anticipate that the collective adult returns from a migration year with high flows vs those with low flows would be evident without the need to average conditions across multiple years. Third, this data spans several major periods of human development: construction of mainstem and upriver water storage projects from the 1950s to roughly 1975; full hydro development when only limited transportation was available, very limited voluntary spill occurred and flow augmentation was limited (lasting from roughly 1976 to 1994); full hydro development with rapidly developing structural and operational fish passage modifications (e.g., surface passage weirs, installation of gas abatement structures at spillways, improved juvenile bypass systems and outfall locations, spill, flow improvements [see RPA Actions 4-32], etc.) to improve inriver migration conditions for fish (lasting from roughly 1995 to present). Lastly, this crude approach makes no attempt to consider other factors that could be auto-correlated with flow like water year type, ocean conditions, or river temperatures. To be clear, I do not dispute that flow is an important factor that has, and will continue to influence the survival rates of juvenile fish and thus, adult returns. I think this is especially true in low flow years (and was even truer prior to

1995 when only very limited spill and additional flow were provided voluntarily and no substantial structural improvements had been made for migrating fish). But I simply do not support the idea that adult returns are substantially determined by a single factor, such as flow or spill, and have learned over the course of my career to consider, but be wary of correlations that do not necessarily demonstrate causation.

19. Mr. Nigro's Figure 6 appears to sum the number of adults (from several Snake River spring Chinook populations, though it is unclear which populations are used) estimated by redd counts on spawning grounds, and use run reconstruction techniques (at Lower Granite Dam) to estimate the total adult return from a given migration year (natural log(Recruit/Spawner). Compared to Figure 5, this graphic, while still simplistic, uses a more reasonable index of flow and spill (April 3 to June 20 at Lower Granite Dam). Patterns in this data corresponding to the periods of development that I noted above are evident in this graphic: very limited spill and flow were provided voluntarily through 1994, and maximum transport operations in response to the more recent low flow years of 2001, 2004, and 2005. The data appear to fit very well in the earlier years (through about 1996-1997) which is not surprising given the state of transportation facilities and barges, the lack of any substantial voluntary spill (not just at Lower Granite but at all the other downstream projects) and low inriver survival rates from the late 1970s to mid-1990s (see Base Period survival estimates in the 2008 SCA, Appendix E - Hydro Modeling). However, this pattern appears to correlate less well in more recent years. Instead of closely following the drop in average flow and spill at Lower Granite from 1997 to 2001, the estimates of median ln(R/S) [natural log of Recruit per Spawner ratios] appear to lag behind from 1998 to 2002 (Note – See Figure 3 above which shows that PDO [Pacific Decadal Oscillation] values were below average from 1999 to 2002 – these cooler conditions are often associated with

"good" ocean conditions for salmon and steelhead). Another example can be seen in 2007 and 2008, which were lower flow and spill level years, but had higher estimated median ln(R/S) values than did 2006, a higher flow, higher spill level year. This outcome – an increase in R/S values in a low flow year - is not consistent with Mr. Nigro's simple correlations. In summary, while the Figure 6 graphic is interesting, it can be interpreted in many different ways depending upon one's underlying knowledge of system-wide operations and effects, and I do not agree with Mr. Nigro's interpretation. NMFS considered these arguments, but did not find them persuasive.

C. UP-RIVER AND DOWN-RIVER COMPARISONS

20. Mr. Nigro asserts that "the effects of the FCRPS on SARs of ESA-listed salmon and steelhead can be evaluated by comparing their SARs to SARs for a population that crosses fewer dams" (Nigro Decl. ¶30). He goes on to describe several assumptions that must be met in order to make this comparison: similar adult return and spawn timing, smolt size and emigration timing, similar ocean fishery exploitation rates, etc. (Nigro Decl. ¶¶31-32). He then summarizes several studies comparing the Smolt to Adult Returns (SARs) of Snake River populations to downriver populations of the same species; the comparisons suggest that SARs for Snake River populations range from only 15% to 57% of those for downriver populations like those from the John Day River (Nigro Decl. ¶¶33-34) suggesting that smolts of the upriver populations return at a lower rate than those of the lower river populations. Mr. Nigro ends with a discussion of delayed and latent mortality (including possible mechanisms) and a quote from the 2000 FCRPS BiOp indicating that "NMFS agrees that there may be some non zero minimum level of delayed mortality of nontransported fish" (Nigro Decl. ¶35). There are a number of problems with Mr. Nigro's assertions.

21. NMFS does not agree that the data provided in "up-river and down-river" comparison of populations has provided adequate information to inform the question on the degree of latent

mortality attributable to FCRPS juvenile passage. The debate on this issue has a long history and most scientists who have analyzed this issue have been critical of Mr. Nigro's assumptions.

22. The Northwest Fisheries Science Center[3] has never agreed it was a valid comparison (Varanasi, 2007 cited in 2008 NOAA C.611).

23. The continued emphasis by CSS to compare upstream/downstream population productivity appears misplaced and has limited utility for estimating overall hydropower system impacts. In 2007, the ISAB (ISAB 2007-1 , pg 1 [2014 NOAA B184:015413) disagreed with Mr. Nigro's reasoning:

> "The ISAB concludes that the hydrosystem causes some fish to experience latent mortality, but strongly advises against continuing to try to measure absolute latent mortality. Latent mortality relative to a damless reference is not measurable. Instead, the focus should be on the total mortality of the in-river migrants and transported fish, which is the critical issue for recovery of listed salmonids. Efforts would be better expended on estimation of processes, such as in-river versus transport mortality that can be measured directly."

24. In their review of the CSS 2007 Ten-year Retrospective Analysis Report NMFS' Northwest Fisheries Science Center (Varanasi, 2007 cited in 2008 NOAA C.611) noted that "In addition to the ISAB's comments and flaws of the upsteam/downstream approach have been identified previously" there were two additional issues of concern:

- Weak scientific methodology. The standard scientific method operates by stating a null and alternative hypotheses and considering *all* available information in an effort to reject the null hypothesis. Science does not work by laying out a hypothesis, then saying it is correct unless positive proof exists to show that it is wrong. Yet, this is what has occurred here.

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[3] The NWFSC's mission is to conduct the science necessary to conserve marine and anadromous species and their habitats off the Washington, Oregon, and northern California coasts and in freshwater rivers of Washington, Oregon, and Idaho. Our research provides reliable, relevant, and credible information to help decision-makers and natural resource managers build sustainable fisheries, recover endangered and threatened species, maintain healthy ecosystems, and protect human health. The Center is also dedicated to enhancing public awareness, education, and stewardship of our marine resources.
Source: http://www.nwfsc.noaa.gov/about/mission.cfm.

- Ignores data from other systems. Data on natural sockeye salmon populations in Bristol Bay have shown similar trends in overall productivity as have the upstream/downstream comparisons used by CSS. Overall productivity of the Bristol Bay populations increased and decreased over a period of decades, concomitant with major changes in ocean conditions. However, some of these eight closely related populations demonstrated strikingly divergent temporal patterns. Yet, the analyses comparing Snake River and John Day River Chinook salmon populations assume that changes in temporal patterns do not exist. The Bristol Bay data suggest a lack of foundation for this assumption.

25. The ISAB provided extensive comment on the utility of making upriver-downriver comparisons in their review of the CSS study reports. In 2007 the ISAB's review of the CSS ten year retrospective report (ISAB 2007-6, pg 9), concluded that:

> "Geographical variation in habitat types, productivity, predator populations, and local climatic conditions makes cause and effect interpretation problematic, even if more hatchery and downriver wild stocks could be identified. This is a single river system, without comparative measures of fish performance from before the hydrosystem was constructed, which makes unambiguous assignment of cause(s) impossible even if convincing, statistically significant differences in fish performance were established between upriver and downriver stocks. In sum, the system is too complex, and the possible sampling design necessarily too constrained in time and place, to reach conclusive findings on causation from this type of comparison."

In short, while Mr. Nigro (and Oregon and the other plaintiffs) purport that the upriver downriver comparison is appropriate, there is substantial scientific dissent. NMFS has chosen to heed the ISAB and Northwest Fisheries Science Center's advice on this issue. (See 2008 Declaration of Dr. Richard Zabel, ¶¶17-20 where he explains that the 2008 FCRPS BiOp utilized the COMPASS model which relied upon the methodology explained in Scheuerell and Zabel (2007), [2008 NOAA B.455], implementing the ISAB advice on latent mortality.)

D. SPILL OPERATIONS

26. Mr. Nigro briefly acknowledges proposed changes to juvenile fish transportation strategies and planned spill levels (and timing) at specific dams and asserts generally that "these changes will reduce the number and proportion of ESA-listed juvenile salmon and

steelhead that are passed by the dams over the spillways" (Nigro Decl. ¶¶50-53). Mr. Nigro's assertions are simply not true for most of the mainstem dams, nor does he present information disputing NMFS' assessment of the effect of these changes. There would be no resulting change (compared to recent operations) in spill levels at any of the mainstem dams on the Lower Columbia River (i.e., Bonneville, The Dalles, John Day, McNary), or at Ice Harbor, or Little Goose dams on the Snake River as a result of altering the spring/summer transition dates. At Lower Granite Dam, an earlier spring/summer transition date would result in a 2,000 cfs reduction in spill (about a 10% reduction – 20,000 cfs to 18,000 kcfs). Passage at Lower Monumental Dam would be the most affected as the difference in spring and summer spill targets are larger (about a 37% reduction – 27,000 cfs to 17,000 cfs) (2014 Supplemental BiOp, Figure 1.3-1 RPA Action 29 revised Table 2 on pg 39).

27. NMFS explained in the 2014 Supplemental BiOp that the spring to summer transition date criteria was modified to include a 95% passage date of wild spring juvenile migrants… at Lower Granite Dam," could occur no earlier than June 1, and would stagger the transition dates at the downstream Snake River projects to account for fish travel times. NMFS concluded that these modification "are not expected to differ substantially for any ESU compared with those observed since 2008" based on no or small differences in spill levels (excepting Lower Monumental Dam), the small proportion of migrating juveniles that would be affected (at the projects where there is actually lower spill levels provided prior to June 21), and the similar survival rates expected between the two operations (especially pertinent to Lower Monumental Dam) (2014 Supplemental BiOp, Section 3.3.1.1, pg 346-49). In addition, SARs of transported

yearling Chinook and steelhead tend to be higher later in the migration season (2014 Supplemental BiOp, Section 3.3.3.4 Juvenile Transportation). In summary, direct survival rates of migrating juveniles would not be expected to differ significantly, and slightly higher transport rates (primarily at Lower Monumental Dam) in early to mid-June would be expected to slightly increase the number of adult returns (relative to if this small percentage had migrated in-river at this time of year). That said, in 2014, many sovereigns in the RIOG (Regional Implementation and Oversight Group) advised the Action Agencies to continue using the 2008 BiOp spring/summer transition dates, instead of using the 95% passage date approach in the 2014 Supplemental BiOp. The Action Agencies, in coordination with NOAA, retained the 2008 transition dates for 2014 operations, and have adopted the 2008 transition dates into the 2015 plan as well.

28. Mr. Nigro correctly notes (Nigro Decl. ¶51) that voluntary spill could be curtailed as early as August 1 at Lower Granite Dam depending upon the collection counts of subyearling fall Chinook (< 300 fish per day for 3 consecutive days beginning July 29). Mr. Nigro implies that some negative impact is likely, but provides no analysis to support this contention, nor does he dispute NMFS' assessment of the effect of this proposal on Snake River fall Chinook (e.g., NMFS estimated that this would affect less than 1% of the summer migrating Snake River fall Chinook, that the majority of these fish are not actively migrating in August, that fall Chinook transported in August return at higher rates than those left to migrate inriver, and that substantial numbers of returning adults resided in the Snake River reservoirs during the summer, fall, and winter months before migrating as yearling the following year (meaning that survival rates of these rearing fish

must have been relatively high, or few adults would be expected to return from this group) (2014 Supplemental BiOp, pg 348-49).

29. Mr. Nigro discusses “bulk” and “uniform” spill patterns and correctly identifies several issues that are pertinent to management decisions relating to operations (pattern and levels) (Nigro Decl. ¶54). But Mr. Nigro fails to indicate that the potential benefit of the “bulk” pattern is reduced “edge” effects which could lessen the likelihood of a fish being injured as it passes through the spillway gates. At lower flows, fewer gates would be opened wider with a “bulk” pattern (providing a relatively high surface to perimeter ratio) as opposed to all gates having much narrower gate openings in a “uniform” pattern (providing a relatively low surface to perimeter area - which translates to an increased likelihood of smolts being injured or killed as a result of contact with the concrete spillway chute). Again, it is not clear what Mr. Nigro’s intent is with this discussion, except, perhaps to indicate that more spill could be attained at Lower Monumental if the Action Agencies had adopted the recommended uniform spill pattern. But he has failed to address the biological effects, some of which are potentially adverse.

30. Mr. Nigro asserts that alternative (higher) spill operations could result in substantially increased SARs, averaging 2% or more for Snake River Chinook salmon and steelhead based on Comparative Survival Study (CSS) analysis and presents several assessments predicting modeled outcomes using the Northwest Power and Conservation Council’s Columbia Basin Fish and Wildlife Program goals of “an average SAR of 4% with a range of 2% to 6%) (Nigro Decl. ¶¶55-56). NMFS clearly articulated its current position with regard to this research and a related proposal for a “spill test” in the 2014 Supplemental BiOp (pgs 380 – 382):

> "NOAA Fisheries is not dismissing the results of these modeling efforts and appreciates the progress made in the CSS modeling. NOAA will continue to monitor the effects of project operations on juvenile survival and adult returns as reported by CSS and the NWFSC. We note the adult returns from the year 2011, a year that had high levels of spill and flow, has produced below average adult return rates…"
>
> "Further, NOAA Fisheries recommends that future regional consideration of a spill test or a decision to implement a spill test similar to that being proposed should explicitly consider the following."

31. The CSS contention that increases in spill will result in achieving SAR values approaching the 2-6% range is based on modeling results. But Mr. Nigro presents the CSS information as if the outcome of higher SARs were certain. After the 2014 Supplemental BiOp was completed, the ISAB reviewed the proposed spill experiment supported by the State of Oregon and other regional parties. Like NMFS in its 2014 Supplemental BiOp, the ISAB questioned whether spill alone would achieve the high SARs estimated with the CSS analysis:

> It is unlikely that overall changes in SARs can be isolated to conclude that spill is the causative factor for the system. The CSS approach uses correlations which do not by themselves determine cause and effect. There are many confounding factors and indirect effects of spill on fish survival including predation and other mortality in the reservoirs, deployment of new spillway weirs, delayed mortality, ocean conditions, habitat restoration activities, changes in toxic contaminants and other factors." (ISAB 2014)

32. The ISAB (2014) also recognized that a test of providing spill at a level of 125% TDG is not without biological risk, stating that it could:

- result in unintended consequences, including: greater adverse gas bubble disease (GBD) effects on salmonids, native resident fish and/or aquatic life;
- increase delay and/or predation of juvenile fish in tailraces;
- increase fallback and/or passage delays of adult salmon at the dams;
- increase spillway erosion problems;
- cause possible navigation issues for commercial and juvenile fish transportation barges at dams; and
- have an effect on the Federal Columbia River Power System (FCRPS) Biological Opinion (BiOp) operations or smolt transportation actions because increasing spill will reduce the number of fish collected for transportation.

33. The Northwest Power and Conservation Council's 2-6% SAR goal referenced by Mr. Nigro, is just that, a goal. It is not a surrogate for NMFS' jeopardy standard under the Endangered Species Act [Section 7(a)(2) consultations]. A 2-6% SAR goal was included in the Northwest Power and Conservation Council's 1999 Fish and Wildlife plan (NPCC 2009-09) which noted that "in the process of assessing the value of the smolt-to-adult return goal, the Council should consider metrics that are consistent with the biological opinions and productivity metrics that measure adult fish returns relative to juvenile outmigration." The ISAB (2013-4) also commented on the 2-6% SAR goal in its review of the 2013 CSS Annual Report: "A detailed reevaluation of SAR objectives (2-6%) is warranted. These objectives should be reevaluated for each species and Evolutionarily Significant Unit (ESU) of salmon and steelhead based on realistic values needed to support robust viable populations. Discrepancies in SARs between PIT-tagged and non-PIT-tagged fish reported in other publications raise two important issues…"

34. In sum, NMFS evaluated Oregon's (and Mr. Nigro's) statements that increased spill would result in the SAR increases projected by the CSS reports. NMFS found substantial weaknesses in the analysis that have not been fully addressed or resolved. It is also clear that there are potential negative effects of high continuous spill levels at multiple projects on adult and juvenile survival and fitness (e.g., increased fallback and resultant mortalities of adults, greater exposure to higher levels of total dissolved gas, etc.), and these potential negative effects cannot be ignored. Finally, NMFS is confident that the existing RPA, including its required spill measures, ensures that the operation and maintenance of the FCRPS complies with the ESA, as explained more fully in the 2008 BiOp and its supplements.

E. TRANSPORTATION

35. Mr. Nigro correctly describes that the 2014 Supplemental BiOp directed the Corps to take actions intended to slightly increase, up to about 50%, the proportion of juvenile fish (especially Snake River steelhead) collected and transported at Lower Granite, Little Goose, and Lower Monumental dams (Nigro Decl. ¶57). However, Mr. Nigro fails to provide important context. Transport rates in recent years (roughly 20 to 40% for both wild spring Chinook and steelhead) have been far below those originally estimated in the 2008 BiOp (averages of about 60 to 70% for spring Chinook and 75 to 90% for steelhead) during the Base, Current, or Prospective Periods. (2014 Supplemental BiOp, Section 3.3.3.4 Juvenile Transportation pgs 367-376; see especially Tables 3.3-3 and 3.3-4, and Figure3.3-8). Also, after reviewing the available information and consulting with the Action Agencies and co-managers, NMFS has eliminated transport as a strategy at McNary Dam because it no longer appears to positively affect adult return rates (compared to fish returned to the river via the juvenile bypass system). (see modification to RPA 31, 2014 Supplemental BiOp, Table 3.3-6). NMFS believes that transporting 50% or less of the Snake River juvenile salmon and steelhead smolts is consistent with the ISAB's (2008-5, pg 3) continued recommendation to "spread the risk."

36. Mr. Nigro describes uncertainties regarding the benefits of transportation and briefly describes effects of transport (lower homing rates, higher straying rates, higher fallback rates, and higher unaccounted losses on returning adults that were transported as juveniles compared to inriver migrating fish) (Nigro Decl. ¶58). Mr. Nigro fails to indicate that some level of straying is natural (this is, in fact, how wild population colonize new habitat). But more importantly, Mr. Nigro provides no substantial new information that was not already considered in either the 2008 SCA [and 2008 BiOp] (Chapter 8.1.1.2 Spill & Transportation Programs, and Appendix A, Adult

Survival Estimates), 2010 Supplemental BiOp (Section 2.2.2.4 Smolt to Adult Returns, pgs 72 – 78), and 2014 Supplemental BiOp (3.3.3.4 Juvenile Transportation, pgs 367-376).

37. NMFS considered all of these issues in its 2014 Supplemental BiOp (3.3.3.4 Juvenile Transportation, pgs 367-376). As stated in the 2014 Supplemental BiOp, the RPA in NMFS' 2008 FCRPS BiOp directed the Corps to not provide spill for selected periods at Snake River projects (after April 20 on low flow years, and during the periods of May 7 – 20 in all years) because COMPASS modeling results indicated this would increase adult return rates – especially for steelhead. However, NMFS agreed to have this action reviewed by the ISAB, which is the technical workshop (ISAB 2008-5) referenced by Mr. Nigro. This workshop included a discussion of the effects of transport on stray rates, lamprey, and sockeye. The ISAB did not support NMFS's proposed operation of providing periods of no voluntary spill, and NMFS adopted their recommendation to provide spill throughout the transport period. The planning dates in the 2014 Supplemental BiOp April 21 to 25 or no later than May 1 are consistent with the ISAB's recommendation.

38. NMFS believes that the current transport operations are consistent with the ISAB's (2008) recommendations and increases the potential benefits while reducing the uncertainties. The question of when it is most beneficial to initiate transport remains an area of study. Ongoing research is directed at answering this question. While stray rates remain an area of concern, the dramatic reduction in transport rates since 2006 has reduced the potential for straying (Figure 6). Mr. Nigro does not acknowledge that these substantially reduced transport rates (compared to earlier years in the Base Period) should substantially reduce the impacts of transportation on both Snake River and mid-Columbia ESUs/DPSs that he describes in his declaration. Instead he chooses to focus solely on the much smaller increase in transportation rates that would result

from the modified actions in the 2014 Supplemental BiOp. NMFS, the Action Agencies, and regional co-managers review prior years' transportation information annually in the Technical Management Team and in the Regional Implementation and Oversight Group forum to consider whether adjustments in transportation operations should be implemented each year. Following these discussions, the Corps initiated transport from all lower Snake River projects on May 1 in 2014, [which reflects regional consensus on this issue]. A similar plan is anticipated for 2015.

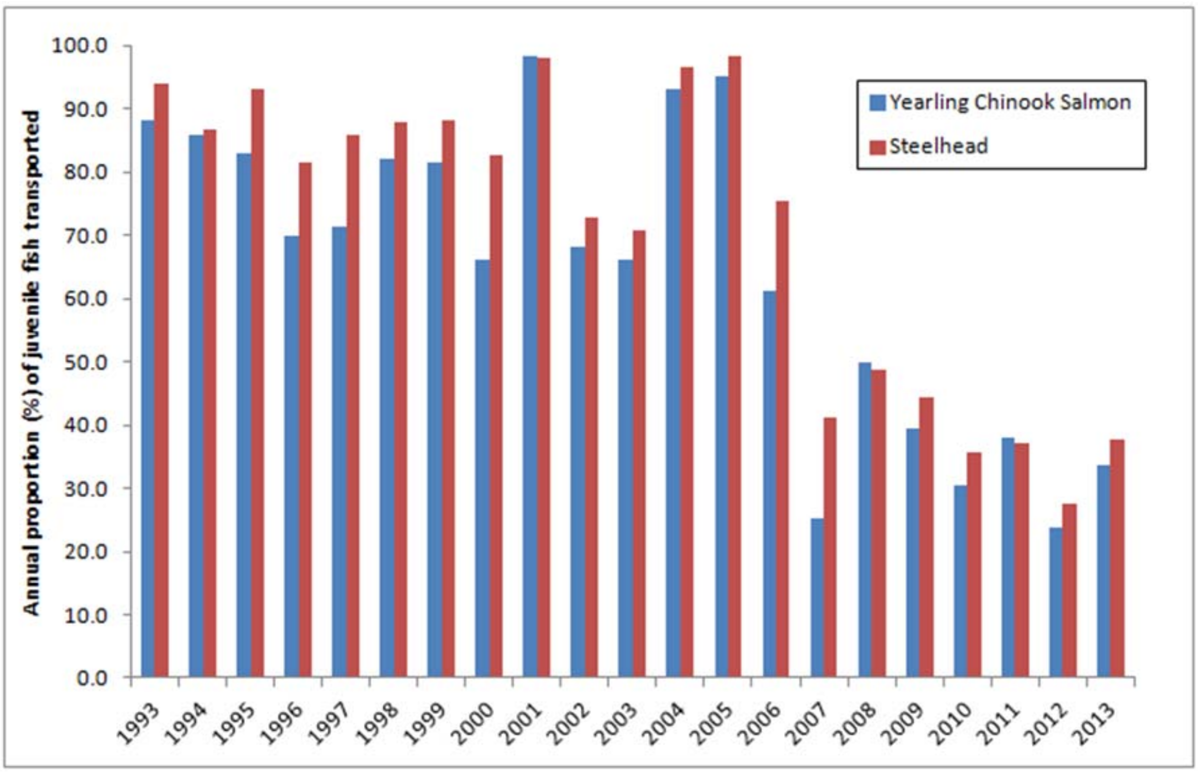

Figure 6. Annual proportion of wild and hatchery Snake River yearling Chinook salmon and steelhead transported in the Juvenile Fish Transportation Program, 1993-2013. (Source: Steve Smith [Northwest Fisheries Science Center] presentation to the Technical Management Team, December 3, 2014.)

II. DAM PASSAGE PERFORMANCE

39. Mr. Nigro incorrectly asserts that the 2014 Supplemental BiOp "uses "forebay-to-tailrace" survival at individual dams as an important metric for evaluating the effects of the FCRPS on juvenile salmon and steelhead (Nigro Decl. ¶60). However, NMFS also estimates

juvenile survival rates across longer reaches of the Snake and Columbia rivers (2014 Supplemental BiOp, pg 360-363), as well as other COMPASS parameters (see generally, 2008 Declaration of Dr. Richard Zabel). The Juvenile Dam Passage Performance Standard is an important evaluation metric in the 2008 BiOp (RPA Table, RM&E Strategy 2 – Hydrosystem Research, Monitoring, and Evaluation, pg 72 of 98), but is simply intended to estimate the direct survival of juvenile salmon and steelhead migrating through each dam (and through each passage route) so as to evaluate the efficacy of structural improvements and operations against a benchmark of 96% average dam survival for spring Chinook and steelhead and 93% for subyearling Chinook. NMFS has never represented this metric "as representing the overall impacts of passage through the FCRPS" as suggested by Mr. Nigro. NMFS does, however, believe that requiring the Action Agencies to attain a dam survival standard has led to many specific improvements (surface passage weirs, guidance walls, modified sluiceways, upgraded bypass systems, and operations for improved egress) that have been quantitatively shown to improve survival at specific projects. For example, at The Dalles Dam, the installation of the spillwall, avian lines, and avian hazing appear to have increased juvenile steelhead survival from about 92.3% to 97.4%. At Little Goose Dam, the addition of the spillway weir appears to have increased juvenile steelhead survival from about 95.7% to 99.5%. Expected survival improvements from all prospective hydropower related actions were assessed by NMFS in the 2008 BiOp (see SCA, Chapter 7 – Analytical Methods for Salmonids).

40. Mr. Nigro alludes to "serious technical concerns raised by regional scientists about these estimates" and a review of the Corps' study design by the ISRP (2009-43) (Nigro Decl. ¶61). Mr. Nigro fails to acknowledge that, while the ISRP correctly identified that tagging effects are a key uncertainty and provided several other suggestions to further improve the study design, they

were supportive of the proposed methodology and ultimately recommended that this study design meets scientific review criteria. The ISRP (2009-43, pg 2) [2014 Corps at 29949] states that:

> "The proposal is a thoughtfully prepared plan to evaluate how well the structural and operations improvements mandated for the Lower Columbia River (John Day, The Dalles, and Bonneville) projects are meeting the 2008 FCRPS BiOp and Columbia River Fish Accords survival targets for yearling and subyearling Chinook and Steelhead. The supporting material, providing details of the statistical design and analysis, is comprehensive and useful. The survival model is grounded in standard statistical methods and uses advances that have recently appeared in the literature. The authors have sought outside advice, have done preliminary experiments, have learned from those experiments, and have adjusted the protocols to reflect that experience."

41. Mr Nigro states that "that forebay-to-tailrace survival estimates do not represent the full range of environmental conditions present when juvenile fish pass the dams and are biased high" and provides three examples in support of his contention (Nigro Decl. ¶62). I disagree with Mr. Nigro's characterization.

42. Mr. Nigro argues that "most performance standards tests have been conducted during 2011 and 2012 when flows were above average and at times exceeded powerhouse capacity" resulting in some involuntary spill (Nigro Decl. ¶62a) and "performance standards testing has not generally been conducted under the conditions prescribed by the FCRPS Biological Opinion" (Nigro Decl. ¶62b). To clarify, there are no dams where the performance standard results have been accepted by NMFS at this time. In all cases, studies are either yet to occur, are ongoing, or the results are under review. The evaluations have to occur in the ten year period of the 2008 BiOp. The studies are conducted once the project is deemed ready for testing by the Action Agencies and are developed in coordination with the regional fish managers. The average flow that occurs during the evaluations is a matter of chance (as the studies are scheduled well before any runoff forecast information becomes available), only the specific project operations are targeted. Tests are not biased because actual conditions differ from planned conditions. The tests

measure juvenile survival through the dam (by passage route; important ancillary data includes survival estimates through the forebay before passing the dam and through the tailrace after passing the dam) at the flow and spill conditions that actually occurred at the time fish were passing. How test results are applied (e.g., what spill level they represent) is a distinct issue, which is specifically addressed in the performance standards paper (2014 NMFS B417).

43. The FCRPS Juvenile Dam Passage Performance Standard and Metrics document (2014 NMFS B417) was developed by the Action Agencies with help and review by regional resource agencies, including NMFS, specifically to address applicability given variable environmental conditions. For example, it defines limits to qualifying high and low flow years, necessary differences between flow years for consecutive tests, and procedures for determining future operations when evaluated operations deviate from target operations. Two consecutive successful evaluations that meet all the modeling assumptions indicate that a dam has achieved its targeted goal. Additional evaluations can be conducted but may be impractical due to extreme expense (~$4 to $10 million per study) and the handling and tagging impact on thousands of ESA-listed juvenile salmon that are necessary for the study.

44. Mr. Nigro is correct that "performance standards tests use radio and acoustic tags" and do not [fully] "represent at-large populations of juvenile salmon and steelhead" (Nigro Decl. ¶62c). There is no estimate that we know of that can provide the "true survival" for the population of inference. Unless all fish within a population can be directly observed and survival measured without influencing their behavior, survival will have to be estimated from a representative sample group. No method of estimating survival is unbiased or perfect as sample fish need to be captured, tagged, and released which can potentially bias survival and behavior. Further, not all fish within a population can be tagged because some fish are too small and their tag burden is too

high, some are previously tagged, and some are moribund which can bias results low or high. These are the same issues present in every fish tagging study, including the CSS study (2014 NMFS B408:40830-40832 and C15186) and extensive measures have been taken to account for them. These measures to reduce bias were also reviewed and approved during the ISAB's review of the study design. We have continuously worked with the region and Action Agencies to address these study concerns and improve the study design through the Corps' Study Review Work Group. Through this regional coordination, the Corps, in coordination with NMFS and other regional co-managers, has modified the fish rejection criteria, developed smaller tags, and made JSATS data available to the region http://jsite.cbr.washington.edu/.

45. Mr. Nigro suggests that performance standards were not met (survival was estimated at 95%, less than the 96% average dam survival targeted in the Juvenile Dam Passage Performance Standard) for steelhead at The Dalles Dam in 2010 because lower flows did not cause average spill levels to exceed the targeted 40% spill rates for the purpose of testing) (Nigro Decl. ¶62b and Table 2). NMFS disagrees with this overly simplistic assessment. High predatory bird concentrations in the TDA tailrace and known higher susceptibility of steelhead to avian predation caused managers to speculate that the lower steelhead survival rates may have been due to bird predation in the tailrace rather than lower spill volumes. More extensive bird wires and hazing (including boat based hazing) were implemented for 2011. Foraging predatory bird concentrations at the project were much lower (over 50%) in 2011 (Corps analysis presented at Jan 8, 2015, FPOM meeting).

46. Nothing else in the study results would suggest a substantial steelhead survival advantage for the 2011 study year. Spill Passage Efficiency was actually lower in 2011, the higher flow year, (75.4%) than in 2010 (87.7%), and mean (and median) tailrace residence times were

similar: 1.17 hours in 2010 and 1.97 hours in 2011. (No tailrace survival estimate is available due to the fish release locations.) Finally, the lower river (John Day Dam to Bonneville Dam) reach survival estimates (based on PIT tags) for mixed stock steelhead were similar in 2010 and 2011, 84.0% and 85.8%, respectively. Survival estimates for Upper Columbia River hatchery steelhead were actually higher in 2010 (62.8%) than in 2011 (54.2%) through the John Day to Bonneville Dam reach (2014 NMFS B114:9270 and 9278). Thus NMFS is confident that the reduced juvenile steelhead survival estimated in 2010 juvenile dam passage survival study, compared to 2011, was primarily caused by higher numbers of avian predators, not lower spill levels or flow volumes at The Dalles Dam.

III. PREDATION

A. CASPIAN TERNS

47. Mr. Olney (2014 Olney Declaration ¶39) correctly summarizes the goal of RPA Action 45 to reduce predation on juvenile salmon by Caspian terns in the estuary (3.4% survival increase for all listed steelhead populations, a 2% survival increase for all listed spring/summer Chinook populations, and a 0.8% survival increase for listed fall Chinook) by reducing the number of breeding pairs at East Sand Island from about 9,000 pairs to 2,500 to 3,125 pairs.[4]

48. Mr. Olney (¶40) correctly summarizes information presented in the 2014 FCRPS BiOp (Section3.5.2, pg 411-413) relating to past efforts to build alternative nesting sites for Caspian terns. At the time the BiOp was written, the Action Agencies had reduced the area of habitat available to the East Sand Island tern colony from about 6 acres in 2008 to 1.58 acres in 2012. The Action Agencies also "created 8.3 acres of alternative nesting habitat at nine locations

[4] The 2014 mistakenly indicates that the goal of the action is the "reduction to 3,500 to 4,000 pairs that was anticipated by the management plan and assessed in the 2008 BiOp's analysis" (2014 Supplemental BiOp, pg 411). The correct numbers, and the goal of U.S. Fish and Wildlife Service's 2005 Caspian Tern Management FEIS, is 2,500 to 3,125 pairs (2008 BiOp, Chapter 7.2.5.1, pg 7-48).

elsewhere but 'no coastal sites have been developed," and several of these sites have been of limited use to nesting terns due to recent environmental factors like drought and limited food resources. Mr. Olney (¶41) goes on to summarize information in the 2014 FCRPS BiOp (Section 3.5.2 pg. 411-413) describing the response of Caspian terns to reductions of nesting habitat at East Sand Island.

49. Mr. Olney correctly points out that the salmon and steelhead survival improvements required by RPA Action 45 had not yet been met by January, 2014 when the 2014 Supplemental FCRPS BiOp was completed (2014 Olney Decl. ¶42) and states that NOAA does not explain why it expects the acquisition of an additional alternative nesting acreage and further reductions in East Sand Island habitat will now reduce the number of Caspian terns and correspondingly reduce smolt predation levels targeted in the 2008 FCRPS BiOp (2014 Olney Decl. ¶43).

50. I disagree with Mr. Olney's assessment. At the time the 2014 Supplemental FCRPS BiOp was being written (until January, 2014), the tern management action was ongoing and the Action Agencies and NMFS were applying knowledge gained from monitoring (RPA Action 66) to accomplish the objective of RPA Action 45. As of January 2015, islands are being developed at coastal sites in San Francisco Bay (Don Edwards National Wildlife Refuge) with two tern islands completed at this time and three more under construction. All are scheduled for completion in March 2015.

51. It is pre-mature to draw conclusions about the overall efficacy of RPA Action 45 measures at this time. Lower numbers of terns nesting on East Sand Island (roughly 6,400 to 7,400 pairs in 2011-13 compared to the peak of 10,668 pairs in 2012) (Roby et al. 2014; Table

D1, pg. 243)[5] indicates that reducing nesting habitat may be working, but that terns are tolerating higher nesting densities and slower to abandon habitat (especially when no other high quality habitat is available nearby) than expected by consulting seabird experts. The Corps is moving forward with preparations to reduce the tern breeding habitat on East Sand Island from 1.58 acre to approximately 1 acre before the 2015 nesting season. Once fully implemented, the efficacy of actions to reduce predation by Caspian terns at East Sand Island will take several years to determine. But ongoing monitoring, used to track progress to date, is sufficient for this task. It is anticipated that this action will substantially facilitate tern movement and, in combination with the high quality habitat being made available at Don Edwards National Wildlife Refuge, will reduce the number of Caspian terns nesting on the island (and thereby improve the survival rate of juvenile salmon and steelhead migrating past the colony) to levels required by the 2008 BiOp.

B. DOUBLE-CRESTED CORMORANTS

52. Mr. Olney correctly summarizes the intent of modifications to RPA Action 46 in the 2014 Supplemental BiOp, which is to reduce current juvenile salmon and steelhead losses due to increased numbers of double-crested cormorants in the Columbia River estuary back to Base Period levels (Olney Decl. ¶44). Mr. Olney then recites the number of birds that NMFS estimated in the 2014 Supplemental BiOp (Section 3.5.2, pg 410) would need to be eliminated to achieve this goals (Olney Decl. ¶45), and quotes several statements from the 2014 Supplemental BiOp relating to the Corps' need to obtain permits and complete an Environmental Impact Statement before actions could be taken and a program that was implemented at Leech Lake,

[5] Roby, D., K. Collis, and 28 additional authors. 2014. Research, Monitoring, and Evaluation of Avian Predation on Salmonid Smolts in the Lower and Mid-Columbia River. Final 2013 Annual Report prepared for the Bonneville Power Administration and the U.S. Army Corps of Engineers. July 31, 2014.

Minnesota starting in 2005 to reduce cormorant predation on walleye (Olney Decl. ¶46) (2014 Supplemental BiOp, Section 3.5.2, pg 411).

53. Mr. Olney (¶47) then presents a research paper (Shulz et al. 2013 – provided as Exhibit A in his 2014 Declaration) and provides several quotes from this paper relating to the difficulty of assessing the effectiveness of the avian control measures in light of the many management actions that were taking place at Leech Lake at the same time. Mr. Olney correctly notes that "NOAA does not describe or discuss any of these findings from the Schultz et al. 2013 studies of the Leech Lake cormorant control program or address the differences in scale between the program at Leech Lake and the program that would be required at East Sand Island to reduce the cormorant colony there by 6,500 to 7,000 pairs or more" in the 2014 Supplemental BiOp (Olney Decl. ¶47). Mr. Olney implies that the Schulz et al (2013) paper is a key piece of information that casts doubt on NMFS' assessment of the likely effectiveness of control measures in the 2014 Supplemental BiOp.

54. As Mr. Olney correctly notes ¶44), he did make assertions relating to the growth of cormorant colonies in 2008 (Onley Decl. ¶¶76-80). I explained that Mr. Olney was only partially correct (2008 Graves Decl. ¶¶47-50), stating "a review of our analysis indicates that NMFS, inadvertently, did not fully account for the increasing numbers of cormorants in the estuary from the 1980s through the 1990s in its Base-to-Current adjustment.[6] The post-Bonneville survival module of the COMPASS model used to estimate Current SARs does include two years of data from the "Base" period for steelhead (1999 and 2000) and three years of data for yearling

[6] The issue of Base-to-Current adjustments for estuary populations of cormorants was not raised in comments provided to NMFS regarding the October 31, 2007 draft BiOp. The comments NMFS received relating to cormorants were focused on the likely effectiveness of prospective measures to reduce avian predation or concerns about the potential future impacts of populations upstream of Bonneville Dam (Graves Decl. ¶47).

Chinook (1998-2000). However, these years would represent some of the highest predation estimates that likely would have occurred during the Base period."

55. The issue was not only addressed in my 2008 declaration, but also in the 2014 Supplemental BiOp (Section 2.2.4, pgs. 198-199). NMFS clearly recognizes that the double crested cormorant population has been increasing since the Current Period defined in the 2008 BiOp. Our analysis was based on specific average populations for the base and current periods used in the original 2008 BiOp jeopardy analysis. However, our recommendation in the 2014 Supplemental BiOp was not to reduce a specific number of birds but to get to the base period population level of between 5,380 and 5,939 nesting pairs, regardless of the population level when the management action actually begins. The Corps is under no illusion that this will be an easy task and there is an adaptive management strategy laid out in the Final Environmental Impact Statement[7] to address issues that arise during the course of plan implementation.

56. As Mr. Olney seems to understand (Olney Decl. ¶¶46-47), the point of mentioning the Leach Lake example in the 2014 Supplemental BiOp was to point out that large scale cormorant management actions have been successfully carried out in other parts of the country. The statements in the BiOp accurately reflect the Schultz 2010 and 2012 references. The Shultz 2013 paper is an article on cormorant population and fish consumption modeling that used Leach Lake as an example. This may have been why it was not included in our literature search. However, after reviewing it, NMFS came to the same conclusion regarding the value of the Leach Lake example. There are no statements in this paper that would refute the statements made in the 2010 or 2012 references. The authors do point out that feeding effort and total consumption of fish by

[7] Corps of Engineers, Portland District. 2015. Double-crested Cormorant Management Plan to Reduce Predation of Juvenile Salmonids in the Columbia River Estuary. Final Environmental Impact Statement. February 6, 2015.

cormorants was reduced 90% since control began and they go on to say that cormorant management has likely positively affected the walleye fishery. NMFS recognized that cormorants may move from the East Sand Island area and the Corps' management plan addresses this through monitoring and the implementation of dissuasion methods, if needed (Corps 2015).

57. NMFS reviewed the pertinent studies and resolved this issue with a reasonable conclusion. The modified RPA set forth in 2014 specified a reduction in the number of double-crested cormorants on East Sand Island to no more than 5,380 to 5,929 nesting pairs. The Corps' Double-crested Cormorant Management Plan (Corps 2015) includes alternative actions that, if implemented, should reduce the number of Double-crested cormorants to the specified levels. Double-crested cormorant management actions have been implemented in a timely manner in other parts of the U.S. and have proven successful. (2014 Supplemental BiOp, Section 3.5.2, pg 413).

58. Mr. Olney summarizes his arguments from 2008 (2008 Olney Dec. ¶¶77-78; 2008 Olney Reply Decl. ¶¶16-21) relating to "compensatory mortality" in relation to avian predation in the estuary. Compensatory mortality refers to mortality that would have occurred for another reason (2008 SCA, Terms and Definitions pg xxvi).[8] I addressed Mr. Olney's comments in my earlier 2008 Declarations (2008 Graves Decl. ¶¶45-50; 2008 Graves Reply Decl. ¶¶51-56), pointing out that "Mr. Olney is inconsistent in his application of compensatory mortality. He does not argue

[8] The idea of compensatory predation mortality is that 'at least some portion of the fish consumed by predators would have died from other factors subsequent to the predation event. As explained by the ISAB (2011), "losses to predation early in the life history might be compensated for by reduced losses during later life stages. Such compensation would be expected if predators selectively remove the most vulnerable individuals." The corollary is that reducing mortality caused by one predator may not translate directly into a corresponding increase in the rate of survival to adulthood because another species' predation rate may increase (e.g., because of a higher proportion of vulnerable fish remaining in its prey population)' (2014 Supplemental BiOp, Section 3.5.2, pg 409).

that the negative impacts resulting from cormorant predation should be reduced to reflect compensatory mortality (Olney Reply Declaration at ¶¶23-26) – despite arguing that a reduction in the much smaller positive effects of reducing tern predation is warranted (Olney Reply Declaration at ¶¶16-20)"

59. Mr. Olney cites comments from the State of Idaho and National Wildlife Federation on the draft 2014 Supplemental BiOp urging NMFS to assume some level of compensatory mortality in its assessment of the effectiveness of measures to address avian predation in the Columbia River Basin. Mr. Olney asserts that "Not addressing the effects of a recognized ecological principle…is actually a failure to consider a relevant factor where information is available to do so." Again, as I previously responded in 2008 (¶58) what Mr. Olney (and those commenting on the draft 2014 Supplemental BiOp) fail to grasp is that compensatory mortality, at whatever level it may be occurring, must be applied equally to both 1) the assessment of the impact of predation and 2) the effectiveness of the actions taken to address it.

60. As an example, with no assumption of compensatory mortality, if a cormorant colony consumes 6% of the juveniles migrating past it, and actions reduced this impact to 3%, the impact would be reduced by 50% (3%/6%). However, if NMFS were to assume that compensatory mortality was about 50%, then half of the impact of the cormorant colony would have occurred anyway (e.g., other predators fed on the weak or injured fish that survived the cormorants) and the impact of the cormorants would be only about 3% (1/2 of the initial 6%). Action effectiveness would then only be 1.5%, similarly discounted because of compensatory mortality (1/2 of the initial 3%). However, the actions would still have reduced mortality by 50% (1.5% / 3% instead of 3% / 6%) relative to the assessed impact.

61. Unless one assumes that compensatory mortality is somehow unequal between the impact and the actions taken to address the impact (which there is no scientific support for), this issue is largely moot; unless one's goal is to maximize the apparent impacts of environmental factors like avian predation and minimize the apparent efficacy of actions to address them.

C. KELT RECONDITIONING

62. As Mr. Olney indicates (¶51), issues surrounding implementation of the Snake River steelhead kelt management plan (2008 BiOp, RPA Action 33, Reasonable and Prudent Alternative Table, pg 39) were thoroughly discussed in declarations supporting litigation of the 2008 BiOp. It is clear that Mr. Olney believes that kelt reconditioning is not a viable means of improving productivity for populations of Snake River steelhead with "B-run" components (Olney Decl. ¶¶51-61). Mr. Olney chooses quotes from several reviews by the Independent Scientific Review Panel (ISRP 2009-39; ISRP 2011-25; ISRP 2014-9) and from NMFS' 2014 Supplemental BiOp to support his thesis that the benefits of implementing RPA Action 33 are uncertain to occur, and unlikely to achieve the 6% survival increase for the targeted Snake River steelhead populations (those with B-run components) (Olney Decl. ¶¶51-56).

63. It is equally clear that NMFS has assessed the progress that the Action Agencies, through the work of the Nez Perce Tribe and Columbia River Intertribal Fish Commission, have made to date; the expected improvements resulting from the construction of new, permanent facilities for holding kelts; and improvements at mainstem projects that will increase the number of adult steelhead on the spawning ground (the overarching goal of the kelt management plan) and concluded that implementation of this plan is still reasonably certain to increase the number of spawners by the required 180 female fish (a 6% survival increase compared to baseline

conditions) (2014 Supplemental BiOp, Section 3.3.4, pgs 383-387; 2008 SCA, Appendix J - Snake River Steelhead Kelt).

64. Mr. Olney (Olney Decl. ¶53 and ¶56) is correct that the ISRP's 2009 and 2010 reviews (ISRP 2009-39 and (2007-401-00), see 2007-401-00-ISRP-20101015 (available at www.cbfish.org)) laid out a number of concerns with respect to the kelt reconditioning program in the Yakima River basin. Chief among these was that the program failed to include any means of assessing if "reconditioned kelts can successfully spawn and produce viable offspring and yield an increase in NOR [Natural Origin Spawners] steelhead in the following generation" (ISRP 2009-39, pg 2). NMFS agrees that the goal of any such program should be to increase the number of viable spawners on the spawning ground. Preliminary results indicate reconditioned spawners are equivalent or better than first time spawners (i.e. fecundity, fertilization rates, fry growth weights) (Hatch 2014).[9]

65. Mr. Olney (Olney Decl. ¶¶54-55 and ¶60) cites a passage from the ISRP's 2011 review (ISRP 2011-25) of the kelt reconditioning work in the Yakima, Okanogan, and Deschutes River basins. This review concluded that "long-term reconditioning has demonstrated some promise" and acknowledged that project proponents were responsive to earlier critiques in that some of the information called for in the ISRP 2009 review was becoming available:

> "Kelt gamete and progeny viability evaluated at Parkdale Fish facility on the Hood River demonstrated that egg quantity/quality were similar when comparing maiden spawning Skamania summer steelhead with their subsequent performance as reconditioned kelts. Successful natural reproduction has been confirmed for 3 of 4 reconditioned kelts in Omak Creek, Washington."

Again, this is evidence that uncertainties are being resolved, the program is maturing, and there is reason to believe that the targeted benefits will be obtained.

[9] Hatch, Doug (CRITFC). 2014. Kelt Reconditioning and Reproductive Success Evaluation Research: 2013 Annual Technical Report. BPA Project # 2007-401-00. Pg 100-104.

66. Mr. Olney contends that because fewer numbers of kelts appear to be available at Lower Granite Dam than was originally estimated in the 2008 BiOp, sufficient numbers of kelts will not be available to achieve the targeted 6% productivity improvement (Olney Decl. ¶57), citing discussion of this topic in the 2014 Supplemental BiOp (Section 3.3.4, pgs 383-387). It is important to keep in mind that NMFS' original analysis (see 2008 SCA, Appendix J) estimated that about 180 additional, viable females would be needed to increase productivity of the 8 targeted populations by 6% (0.06 * 3,000 = 180), compared to the base period estimate of about 3,000 females. The 2014 Supplemental BiOp assessed current and planned activities that could affect the number of fish that could be produced. Since 2013, outmigrating kelts have been collected with weirs in the South Fork Clearwater and Fish Creek tributaries. These fish are from known B-run tributaries and are in better condition than those currently caught at Lower Granite Dam. Future improvements to the Lower Granite Dam juvenile bypass system should result in a much higher fraction of "good" condition kelts suitable for reconditioning in future years and the planned construction of a more permanent kelt reconditioning facility should greatly enhance the programs capability to hold fish long-term. NMFS believes that these actions are sufficient to collect enough fish to produce the requisite viable 180 females (2014 Supplemental BiOp, Section 3.3.4, pgs 383-387 and Section 3.11.1, pg 453).

67. Mr. Olney questions that a combination of increased survival for inriver migrating kelts and long-term reconditioning will "consistently produce the kelt numbers, spawning success and other steps that must occur to achieve the 6% survival improvement for steelhead" (Olney Decl. ¶58). I disagree. It is true that the Snake River Steelhead Kelt Management Plan (2008 BiOp, RPA Action 33) has been in an experimental phase. Work is underway to answer many of the questions from ongoing ISRP reviews (ISRP 2009-39; ISRP 2011-25; ISRP 2014-9) that are part

of all studies funded as part of the Fish and Wildlife program. The Nez Perce Tribe and Columbia River Intertribal Fish Commission staff, funded by BPA, have been assessing the potential for the various strategies identified in the 2008 SCA (Appendix J) to contribute to achieving the targeted 6% productivity increase, and new capture strategies and holding facilities are about to be implemented. After reviewing this information, NMFS is convinced that these measures, once implemented, are likely to produce 180 viable females annually.

68. Mr. Olney suggests that NMFS has credited the Action Agencies for releasing 9 rehabilitated fish (Olney Decl. ¶59). This is not true. To date, NMFS has only accepted the 0.9% estimated contribution for sluiceway operations at The Dalles Dam (2014 Supplemental BiOp, Section 3.3.4, pg 383), as credit towards the 6% survival improvement goal (about 180 viable females from B-run tributaries). While the Action Agencies may be assessing the progress of their actions in their annual progress reports, NMFS has not credited any other kelt rehabilitation actions. As I stated earlier, the kelt reconditioning program has been in an experimental phase. Only after the production facilities have demonstrated that they can produce viable female spawners (generally as reproductively fit as first time spawners, or discounted to the extent they are not equally fit) will NMFS agree to a value for additional (beyond the 0.9% credited for The Dalles Dam sluiceway operations) kelt rehabilitation actions contributing towards the targeted 6% survival improvement goal. If the production facilities do not provide this level of benefit, the Action Agencies will be required under the BiOp to implement other actions to meet the targeted 6% productivity increase.

69. Furthermore, Mr. Olney appears to misunderstand that the primary benefit of operating the ice and trash sluiceway at the The Dalles Dam was not to increase the survival of downstream migrating kelts. Rather, the primary benefit was to increase the survival of relatively

large numbers of adult Snake River B-run steelhead (first-time spawners) that were otherwise falling back through the project's turbine units [2014 Corps 496, starting at 48197]. NMFS has accepted that this action will contribute 0.9% to the targeted 6% survival improvement goal (the equivalent of about 27 additional B-run females on the spawning grounds (0.15*180)). A similarly scaled benefit would likely accrue to most Snake River steelhead populations as a result of this action.

70. Finally, Mr. Olney reiterates that he has previously, and continued to raise, issues relating to the efficacy of long-term kelt rehabilitation, and suggests that NMFs has not done enough to explain how these factors affect its analysis of the likely efficacy of RPA 33 implementation actions. I disagree. NMFS has clearly documented the basis for a 6% improvement in productivity resulting from this action (and inriver survival improvements like The Dalles ice and trash sluiceway) (2008 SCA, Appendix J), has openly and honestly discussed issues that remain before crediting can be demonstrated, has documented that the Nez Perce Tribe and CRITFC have been diligently working to address the concerns raised by the ISRP (shared by Mr. Olney), has documented that additional research is underway to assess remaining issues, and clearly indicated that, in the agency's opinion, these programs will ultimately achieve the productivity goals. NMFS summarized its conclusions in the 2014 Supplemental BiOp (Section 3.3.4.4, pg 387):

> "Overall, substantial progress has already been made to attain the goals of RPA Action 33, and the Action Agencies are funding the facilities and research necessary to provide a high level of certainty that some combination of operations to improve the survival of inriver migrants, kelt transportation, or longer-term reconditioning will achieve the 6% survival improvement goal by 2018".

71. Mr. Olney (¶¶66-69) correctly notes that the 2014 Supplemental BiOp indicated that recent Passive Integrated Transponder (PIT) tag based adult conversion rate estimates for Snake

River spring/summer Chinook and steelhead have been lower (7.5% and 5.8%, respectively) than estimated in the 2008 BiOp based on 2002 to 2006-7 data available at that time (2008 SCA, Appendix A – Adult Survival Estimates; 2008 BiOp, Reasonable and Prudent Alternative Table, pg 73-74; 2014 Supplemental BiOp, Section 3.3.3.1, pg 351-358). [10] Mr. Olney claims that NMFS "Does not discuss why these recent survival rates… are lower (or higher) than the assumptions it used in the 2008 BiOp" and "does not describe or discuss the implications of these new survival rates for its analysis of the effects of the RPA."

72. I disagree. NMFS discusses these issues in the 2014 Supplemental BiOp (Section 3.3.3.1, pg 351-358) and 2010 Supplemental BiOp (Section 2.2.2.3, pg 69-72). NMFS clearly indicates that "the 2008 BiOp's implicit assumption was that Base Period survival was the same as that estimated from PIT tags in 2002 to 2006–2007" (2014 Supplemental BiOp, pg. 351). NMFS also specifies the factors that can affect adult survival (conversion rates):

> "Adult ladder systems are operated to specific criteria to provide effective passage conditions within the ladder itself and sufficient attraction flows at the ladder entrances. Aside from passage through the ladders at each dam, other factors can also affect the survival of adults through mainstem reaches of the Columbia and Snake rivers: recreational and tribal fisheries, environmental conditions (spillway operations, flows, and temperature), fallback of adults at the dams (through spillways, turbines, or juvenile bypass systems), straying (adults spawning in river basins other than their natal streams), injuries resulting from attacks by marine mammals, etc." (2014 Supplemental BiOp, pg 351).

NMFS (pg 351) ruled out changes in adult fishway operations "as they have been operated in the same way for several decades, particularly since 2002." The fact that some species are surviving

[10] Although reported in the 2008 BiOp (81.1%), NOAA Fisheries thought this estimate was too uncertain to use as a performance standard. Enough known-origin adult SR sockeye salmon returned to the Columbia basin in 2010–2012 to make PIT tag-based direct (rather than extrapolated) conversion rate estimates for the Bonneville to Lower Granite reach. Average conversion rates for these years averaged 70.9%, which is more than 10% lower than our 2008 BiOp estimate. Recent average conversion rates in the lower Columbia River reach (76.3%) were over 15% lower than the 2008 BiOp estimate for this reach (91.4%), while the recent average conversion rate for the lower Snake River reach (93.0%) was over 4% higher than the 2008 BiOp estimate (88.7%) (2014 Supplemental BiOp, pg 354).

at higher rates than NMFS initially estimated would also indicate that fishway operations are not likely to be a causative factor. NMFS previously indicated that interactions between straying, use of thermal refugia, and fisheries; and delayed mortalities associated with injuries from marine mammal attacks were "factors that would affect conversion rate estimates" (2010 Supplemental BiOp, pg 70-71). NMFS further summarized other factors that could affect conversion rate estimates: "environmental factors (flows, spill operations, temperature, etc.), structural modifications, errors in the harvest or stray rate estimation methods, variability in stock run timing, or some combination of these factors" (2014 Supplemental BiOp, pg 357).

73. NMFS (2014 Supplemental BiOp, pg 357) concludes that "this is not yet considered a RPA implementation deficiency because:

> We are uncertain whether new estimates represent a true difference from base survival rates, or are within the Base Period's range of variation, because we do not have estimates of survival during the 2008 BiOp's Base Period prior to 2002 using PIT tags.
>
> There is uncertainty about the meaning of the new estimates because there is no obvious explanation (i.e., no changes in dam configuration or ladder operations, reported harvest, or river environmental conditions). At this time NOAA Fisheries cannot identify the factor that is responsible for the lower than expected conversion rates noted earlier in this section.
>
> ◊ Adult ladder operations have been consistent since at least 2002. This, and the fact that PIT-tag–based conversion rate estimates for SR fall Chinook salmon and UCR spring Chinook salmon and steelhead are achieving or exceeding expectations, make it unlikely that the fishways themselves are responsible.
>
> ◊ Harvest management has been implemented in accordance with the abundance-based harvest rate schedules identified in the 2008 Harvest BiOp."

74. NMFS discusses the potential for recent improvements in the adult PIT tag detection system (new detectors at The Dalles, Lower Monumental, and Little Goose dams) that should "assist efforts to better isolate the subreaches where losses are occurring so that managers can assess the potential causes of reduced conversion rates" (2014 Supplemental BiOp, pg 355). NMFS also specifies that steps that are being taken (jointly with the US vs Oregon Technical

Advisory Committee) to evaluate the potential factors so that, if appropriate, managers can "develop modified actions to address contributing factors within the Action Agencies' jurisdiction and authority prior to 2018" (2014 Supplemental BiOp, pg 358; Dygart and Graves 2013, 2014 NOAA B99).

D. AFFECT OF JUVENILE TRANSPORT OPERATIONS ON ADULT CONVERSION RATES

75. Mr. Olney (¶¶70-71) correctly notes that NMFS thoroughly described transportation operations and discussed the effects of transportation on Snake River adult returns and straying (adult conversion rates), and how impacts to Mid-Columbia steelhead populations were likely substantially reduced (compared to transport operations in the 2008 BiOp) as a result of the lower transport rates recently observed (Olney Declaration,) in the 2008 BiOp and 2010 Supplemental BiOp.

76. Mr. Olney implies that the 2014 Supplemental BiOp's goal of "transporting about 50% of juvenile steelhead" would substantially alter this determination (¶75 above). This is simply not the case. Mr Olney (¶71) claims that "transporting 50% of juvenile steelhead is a significant change from the 28-49% of juvenile steelhead that were transported between 2007 and 2013." Average wild steelhead transport rates were about 40% between 2008 to 2013 (see 2014 Supplemental BiOp, Table 3.3-4). Thus, the actual effect of implementing the transport operation in the 2014 Supplemental BiOp would likely be a modest 5-10% increase in wild steelhead transport rates – still a substantially reduction compared to the 74% or higher transport rates assessed in the 2008 BiOp. Thus, compared to the 2008 BiOp's assessment, the effect of transported fish straying into mid-Columbia steelhead populations will still be substantially reduced.

77. Mr. Olney (¶71) implies that additional assessments of inriver vs transported conversion rates are necessary. I disagree. NMFS clearly articulated that there is a difference in the conversion rates of adult fish transported as juveniles compared to those that migrated inriver. It is unlikely that the relative difference (about 6.8%) in conversion rates identifed in the 2008 BiOp (2008 SCA, Appendix A) between transported (average of 83.3% - ranging from 73.1% to 89.8%) and inriver migrating steelhead (average of 90.1% - ranging from 84.6% to 93.8%) would vary substantially. In the context of conversion rates, adjusted transport vs inriver estimates simply mean that these fish did not, ultimately, reach the uppermost dam they were expected to pass (Lower Granite Dam in this instance). It is inappropriate to assume that all, or even most of these fish, ultimately spawn within the Mid-Columbia steelhead populations. For example: active tag studies indicate that part of this differential is due to "increased migration mortality for transported fish" (Keefer et al. 2009, cited in 2010 Supplemental BiOp [2010 NMFS BB196]), and these dead fish would obviously not be available to spawn. Mr. Olney also fails to consider that inriver migrating fish also stray ("natural" stray rates were estimated to be about 4.7% in these reaches) which would tend to further minimize the relative difference that a slight increase in transportation rate would make (e.g., the effect of more inriver migrants is not zero).

78. Mr. Olney(¶72) asserts that increasing transport rates would "significantly reduce the population migrating in-river which would reduce the effects of swamping and consequently increase predation rates on juvenile fish migrating in-river." I responded to previous assertions about "predator swamping" in my previous declarations (2008 Graves Declaration ¶¶25-27, and Graves Reply Declaration ¶¶26-31). Simply put, NMFS acknowledges that some predator swamping is likely to occur in any given year, however, given that millions of juveniles that are

being left to migrate inriver, increasing transport rates by an average of 5-10 percent (see ¶76 above) are unlikely to substantially affect observed survival rates. Comparing inriver survival estimates for Snake River juveniles and estimated transport rates (see 2014 Supplemental BiOp Figures 3.3-2 to 3.3-7 for juvenile reach survival estimates and Figure 3.3-8 for estimates transport rates) supports this assertion as survival rates do not seem to be strongly influenced by the transport rates in the ranges that have been observed since 2008. However, this was likely not the case in past maximum transport years (e.g., 2001, 2004, 2005) which resulted in only a few migrants plus research fish diverted back to the river being left to migrate through the lower river, with relatively low estimated survival.

I declare under penalty of perjury that the foregoing is true and correct. Executed on March 4, 2015, in Portland, Oregon.

Ritchie J. Graves

Ritchie J. Graves