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UNITED STATES DISTRICT COURT
DISTRICT OF OREGON

NATIONAL WILDLIFE FEDERATION, et al.,

Civ. No. 01-0640-RE (Lead Case)
CV 05-0023-RE
(Consolidated Cases)

Plaintiffs,

and

STATE OF OREGON,

SECOND DECLARATION OF
STEPHEN W. PETTIT
IN SUPPORT OF MOTION
FOR AN INJUNCTION

Intervenor-Plaintiff,

v.

NATIONAL MARINE FISHERIES SERVICE, U.S.
ARMY CORPS OF ENGINEERS, and U.S. BUREAU
OF RECLAMATION,

Defendants,

and

NORTHWEST IRRIGATION UTILITIES, PUBLIC
POWER COUNCIL, WASHINGTON STATE FARM
BUREAU FEDERATION, FRANKLIN COUNTY

SECOND DECLARATION OF STEPHEN W. PETTIT
IN SUPPORT OF MOTION FOR AN INJUNCTION

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FARM BUREAU FEDERATION, GRANT COUNTY
FARM BUREAU FEDERATION, and STATE OF
IDAHO,

Intervenor-Defendants.

COLUMBIA SNAKE RIVER IRRIGATORS
ASSOCIATION, and EASTERN OREGON
IRRIGATORS ASSOCIATION,

Plaintiffs,

v.

CARLOS M. GUTIERREZ, in his official capacity as
Secretary of Commerce, NOAA FISHERIES, and D.
ROBERT LOHN, in his official capacity as Regional
Director of NOAA Fisheries,

Defendants.

I, STEPHEN W. PETTIT, state and declare as follows:

1. I have previously filed a declaration in this case in support of the plaintiffs' motion for an injunction. In that declaration, I set forth my qualifications and experience in fisheries biology and in operation and management of the Columbia and Snake River hydrosystem.

2. I also described the basis for my conclusion that the measures the plaintiffs have requested for improved water flow and increased spill, if implemented for the summer salmon migration season in 2005, would reduce significantly, even substantially, the harmful effects ESA-listed salmon and steelhead would otherwise experience under the 2004 BiOp. I have reviewed a number of declarations filed by the defendants and intervenor-defendants in opposition to the measures plaintiffs have requested. For the reasons set forth more fully below, I remain convinced that the plaintiffs' request for an injunction for the summer salmon migration season in 2005 would improve the survivability of ESA-listed salmon and steelhead.

3. In preparing this reply declaration, I have again reviewed NOAA's 2004 BiOp and various other documents concerning the Action Agencies 2004/2004-2008 Implementation Plans and remain familiar with the previous series of BiOps which NOAA produced as a requirement under the ESA following the listing of Snake River stocks of salmon and steelhead as well as other relevant materials identified in my prior declaration. I have also reviewed the following materials filed by various parties in opposition to the plaintiffs' motion for an injunction: (1) the Declaration of Roger Schiewe; (2) the Declaration of Don Ponganis; (3) the Declaration of Cynthia Henriksen; (4) the Declaration of Rock Peters; (5) the Declaration of Paul Ocker; (6) the Declaration of D. Robert Lohn; (7) the

Declaration of Sarah McNary; (8) the Declaration of Don Chapman; and (9) the Declaration of John McKern.

4. In this reply declaration, I address the following points: (1) the faster water velocity and increased spill at certain dams that plaintiffs' request will very likely lead to substantially improved survival for juvenile Snake River fall chinook this summer as compared to operations under the 2004 BiOp; (2) operational measures that combine relatively small increases in river flow with modest reservoir drawdown, primarily at Lower Granite reservoir on the Snake River, can accomplish the faster water velocities plaintiffs seek; and, (3) based on my experience with drawdown of Lower Granite Reservoir, the operations necessary to comply with the plaintiffs' injunction request at Lower Granite will benefit juvenile Snake River fall chinook salmon and will not likely harm adults migrating up-stream.

I. THE FLOW AND SPILL MEASURES PLAINTIFFS REQUEST WILL VERY LIKELY IMPROVE THE SURVIVABILITY OF SNAKE RIVER FALL CHINOOK THIS SUMMER

5. In my earlier declaration I explained in broad terms that faster water flow and increased spill at dams are widely recognized operational measures to improve the survival of juvenile salmon migrating through the Snake and Columbia River hydrosystem. The benefits of these measures have been recognized by NOAA and other federal agencies for Snake River fall chinook and are largely beyond dispute.

6. As I explained with respect to improved river flows, NOAA itself has said that "consistent and highly significant relationships have been observed between flow and survival for *juvenile fall chinook* (summer migrants) from release points in the free-flowing portion of the Snake River to Lower Granite dam." NOAA 2000b at 56. (emphasis added). More recent

studies have confirmed the strong relationship between water particle travel time and the seaward migration rate of juvenile fall chinook. Williams *et al.* 2004; Connors *et al.* 2003b. In paragraphs 19 through 23 of my prior declaration I described some of the biological reasons that faster water particle travel time is thought to promote juvenile migration survival.

7. Similarly, spilling water past the dams has consistently been shown to provide the safest passage for young salmon. See Declaration of Stephen Pettit at ¶¶ 24-26; 30-32 (citing numerous studies supporting the benefits of spill as the safest dam passage technique) (“Pettit Dec.”). That is why specific spill operations for fish passage have been in place in the Columbia and Snake Rivers since 1988 and it is why, in the 2000 BiOp, NOAA identified passage through the spillways as the safest route for migrating juvenile salmon. In fact, because spill has proven to be so effective in assisting young salmon on their migration to the sea, NOAA prescribed in 2000 that “measures that increase juvenile fish passage over FCRPS spillways are the highest priority” for passage improvements. 2000 BiOp at 9-82.

8. Despite Mr. McKern’s suggestions to the contrary, Declaration of John McKern at ¶ 15 (“McKern Dec.”), more recent studies have also shown that spill provides significant aid to migrating young salmon. For example, in 2004, NOAA scientists conducted studies at Ice Harbor Dam that illustrate spillway passage provides the safest route for migrating subyearling fall chinook. Odgen *et al.*, 2004. NOAA scientists reported subyearling fall chinook survival at 97.5% during spill operations at this one dam while overall project survival for this dam was only 88.3%. The nearly 10% decrease in overall dam survival indicates that turbine passage survival must have been significantly lower than spillway passage.

9. Additionally, in 2004, NOAA researchers reported spillway survival at 97% for spring chinook yearlings. Eppard *et al.* 2004. Unlike past practices, the most recent spillway survival studies were modified to accurately mimic the behavior of actual migrating juvenile chinook as they approach and pass through the dam's spillbays (NOAA scientists released radio-tagged, test fish from Lower Monumental Dam instead of injecting tagged fish directly into the spillway from submerged hoses near the spillway crest). However, these recent findings at Ice Harbor Dam do not support Mr. McKern's claim that subyearling survivals were lower than yearling chinook—they were almost identical at about 97%. These recent spillway survival investigations do not contradict the results of nearly three decades of spillway passage research. Instead, NOAA's most current studies strongly support the salmon managers request for the use of summer spill to improve both juvenile spring and fall chinook survival. In fact, these new investigations continue to support the previous research that shows spill is beneficial to migrating salmon and is the safest dam passage route.

10. In addition to the above considerations, in paragraphs 25, 26, 29-31 of my prior declaration I summarized some of the biological reasons that increased spill benefits juvenile salmon migration. Based on these considerations and the discussion above, I concluded that the plaintiffs' request to decrease water particle travel time by 10% in the Snake and Columbia rivers during the summer salmon migration season, and to complement those improved flows with increased spill at dams where spill would not otherwise occur, likely will improve the survivability of juvenile fall chinook significantly as compared to the biological effects that would occur under 2004 BiOp operations.

11. While in my earlier declaration, I reached this conclusion based on general biological information, my familiarity with numerous scientific analyses of biological effects

for Snake River fall chinook, and some initial quantitative assessments of biological effects for the proposed injunction prepared by the staff at the Columbia River Inter-Tribal Fish Commission, I did not have available a specific, up-to-date analysis that compared likely fall chinook juvenile biological effects under the plaintiffs' proposed injunction with effects under the planned 2004 BiOp operations.

12. More recently, the staff at the Columbia River Inter-Tribal Fish Commission has further evaluated the survival of juvenile fall chinook under operations that would comply with the plaintiffs' injunction request and under operations that will occur without an injunction using the SIMPAS hydrosystem juvenile fish passage model that NOAA has frequently employed to assess the effects of different operations on migrating juvenile salmon. I have never run the model myself and do not claim to be a biometrician but because of my experience and background, I am familiar with this model and its uses well beyond the understanding of an ordinary layperson. While SIMPAS has limitations, many of which the plaintiffs have described in other filings in this case, it does afford a rough basis for identifying which of two sets of operations are likely to provide better juvenile biological effects when compared to each other. The details of this kind of comparative SIMPAS analysis for the plaintiffs' injunction operations and operations under the 2004 BiOp and its results are described in the Declaration of Thomas K. Lorz that I understand will be submitted at the same time as this reply declaration. It is important to understand that these SIMPAS results compare the 2004 BiOp, no-spill/low-flow/maximum-transportation operations that will occur this summer to the plaintiffs' request for increased-spill/reduced-transportation (i.e., spread-the-risk) and improved flow operations.

13. I have reviewed Mr. Lorz's declaration and the underlying application of the SIMPAS model. Not surprisingly, this analysis confirms my conclusion that summer operations that provide the decreased water particle travel time and increased spill that plaintiffs seek will increase, likely by more than two-fold, the survival of migrating juvenile fall chinook this summer. This improvement is extremely significant for these salmon.

14. While, as I say, these results are not surprising, what is surprising is that NOAA and the other federal defendants did not prepare a similar SIMPAS analysis of their own to evaluate the relative effects of the injunction the plaintiffs have requested and operations under the 2004 BiOp, given their extensive reliance on SIMPAS in the 2004 BiOp and earlier proposals for altered river operations, such as the 2004 federal proposal to curtail summer spill. Had they done so, it is my belief that their analysis would have shown results very similar to those obtained by Mr. Lorz.

15. In addition, I would note that the plaintiffs' request for improved water particle travel time and increased spill provides for a truer "spread-the-risk" approach to salmon migration than does the approach under the 2004 BiOp. Thus, while several of the federal declarants characterize summer operations under the 2004 BiOp as "spread-the-risk" operations, *see, e.g.*, Lohn at ¶ 18; Ocker at ¶ 22, the 2004 BiOp actually requires maximum transportation regardless of the flow levels this summer. However, that type of approach does not spread the risk among dam passage routes. Instead, it means that as many as 90% of the fall chinook are being transported downstream. Only 10% then are using other passage routes. That type of approach clearly biases the result of a "spread-the-risk" analysis. By contrast, the increased spill that the plaintiffs seek will have the necessary effect of splitting

dam passage and migration more evenly between transportation and in-river travel.¹ As Mr. Lorz explains in his declaration at ¶ 26, the plaintiffs’ approach would result in approximately 50-60% of the juvenile salmon migrating downstream and the rest being transported. This split is clearly more balanced than the federal defendants’ approach under the 2004 BiOp. This is a significant difference between the plaintiffs’ approach and the 2004 BiOp and likely is why the plaintiffs approach achieves the noteworthy comparative improvement in survival reflected by the SIMPAS modeling.

16. In my opinion, perhaps the strongest reason for utilizing the kind of true “spread-the-risk” approach to summer fish passage operations that the plaintiffs’ injunction would cause is the considerable uncertainty surrounding the existing subyearling fall chinook transport data. The salmon managers and NOAA scientists have both analyzed the available data and have generally come to identical conclusions—that subyearling fall chinook data is not showing any benefit in survival for transported fish over in-river migration routes even without improved in-river conditions. FPC 2004a. Williams Memo 2005. In his declaration, Mr. Olney discusses in more detail (and I agree with his assessments) the NOAA conclusions regarding the transportation of Snake River fall chinook migrants. His declaration explores the lack of benefits to these salmon and his concern with the approach in the 2004 BiOp that would maximize transportation of these fish rather than allow a true spread-the-risk migration.

¹ It is important to understand that at all of the collector projects for transportation except Lower Granite, the spill operations the plaintiffs seek would still allow transportation of collected fish and, contrary to Mr. Ocker’s statements (Ocker Dec. at ¶ 22.), would likely lead to more of a balance between collection/transportation and in-river migration (with improved – though certainly not optimal – river conditions from the decreased water particle travel time plaintiffs also seek). Mr. Ocker’s concern that all fish would migrate in-river rather than in barges and trucks is extremely unlikely to occur. Instead, a balance between in-river migration and transportation is the likely result from the plaintiffs’ injunction request.

Declaration of Fred Olney at ¶ 16-20 (“Olney Dec.”). Mr. Lorz’s declaration also discusses this issue in more detail. Lorz Dec. ¶ 26-28.

17. There is little the Corps can do to improve summer, juvenile *transport* operations (as opposed to in-river conditions which could be considerably improved). Instead, a different passage technique is required to give summer migrating salmon a better survival rate. For example, if non-transported, in-river migrants were allowed to migrate with improved conditions (i.e., faster water particle travel time and spillway passage alternatives as plaintiffs seek) there is a high likelihood, based on scientific data, that the Snake River fall chinook would experience higher overall return rates. The Williams Memo 2005 that Mr. Lohn attached to his declaration supports this conclusion. That memo indicates that the smolt-to-adult return ratios (SARs) (i.e., the ratio of how many young salmon migrate out to the ocean compared to the number of adult salmon that return to the river to spawn) for fish that migrated in-river in 2001 were higher than the SARs for the fish that were transported down river. Williams Memo 2005. That means, contrary to Mr. Ocker’s statements at ¶ 24, even in a very low flow year, fish survived better (i.e., more adults came back) if they were allowed to remain in the river rather than being put on barges and trucks and transported down river to the estuary.

18. We already know what the outcome of summer migration operations without spill and with no improved flows does for Snake River fall chinook. That is the type of operation we had in place for over 15 years after the FCRPS was completed in 1975, prior to the listing of salmon under the ESA. But, this long-running “experiment” did not help protect Snake River fall chinook. Instead, it resulted in the ESA-listing of the species.

19. Nevertheless, Mr. Lohn at ¶ 19 and Mr. Ocker at ¶ 27 suggest that additional spill and flow might harm a small subgroup of Snake River fall chinook that have been found to over-winter in the river instead of migrating out to sea during the summer. Mr. Lohn also suggests that these fish are important to protect because he asserts that these fish come back as adults at higher levels than other fall chinook. The problem, however, is that the available data do not support the inference contained in these two declarations.

20. The Fish Passage Center reviewed the available data regarding holdover, overwintering fall chinook for the Fish Passage Advisory Committee (FPAC). This review shows that Mr. Lohn's analysis is not supported by the data. FPC 2005. The FPC review illustrates several issues with Mr. Lohn's analysis. First, the data suggests that there is a significant overwintering mortality, which must be factored into the reported SARs for the holdover fish but is not presently included in those calculated SARs. In effect, there is no assessment of how many of these fish we have to begin with (i.e., there is no starting population used in the calculation) and so the SARs for overwintering fall chinook used by Mr. Lohn are likely inflated. Second, the data indicates that the overwintering fish are mainly two subgroups of fall chinook: (1) Clearwater River fall chinook that are smaller than average fall chinook due to the retarded growth caused by current cold water releases from the Dworshak reservoir during the summer migration; and (2) a small subpopulation of hatchery fall chinook that are placed in the river after the normal migration timing of wild fall chinook, often referred to as "back fill" fish. These two groups of fall chinook have reasons why they migrate later, much of which is caused by our own doing – we have changed the river system in a manner that produces smaller fall chinook in the Clearwater River and we place some hatchery fish in the river late in the migration season. Basing management decisions for all

fall chinook around these relatively unique and artificially created conditions would be a much larger and riskier experiment than the straightforward improved flow and spill operations the plaintiffs seek. Finally, the data indicate that wild Snake River fall chinook do not seem to do much overwintering. Again, the point is that the overwintering fish are a product of our making and the SARs presented are likely an overstatement of actual return rates.

21. A number of the declarations filed by the defendants and the defendant-intervenors in this case criticize additional aspects of my prior declaration and my conclusion that the injunction operations the plaintiffs seek will improve juvenile fall chinook survival as compared to operations under the 2004 BiOp. In the paragraphs that follow, I address these criticisms.

22. Contrary to defendants' statements (*see, e.g.*, Ocker at ¶¶ 10-17; Peters at ¶ 18), I used spring chinook migrations studies and empirical data in my previous declaration to provide historical context. There was no attempt to directly apply these results to summer migrating fall chinook. The historical context is important though because to date, except at Ice Harbor Dam, spill has not been provided for summer migrating fall chinook in the Snake River where transport is the only management option.

23. I provide this historical context because there is a parallel between what the action agencies did historically as knowledge was gained for spring chinook passage in the Snake River. In the case of spring chinook, transportation was initially assumed to mitigate for the effects of dam passage. However, as we gained more knowledge about these fish, we found that a "spread-the-risk" approach and improved in-river conditions (i.e., increase spill and flow) provided better protection. This knowledge led the federal agencies to rely less on

transportation and more on improved river conditions in the action agencies' biological opinions from 1995 to the present. While transportation for spring chinook has not totally disappeared, the decreased emphasis on transportation came due to the acquisition of more survival data associated with these fish. It is now apparent that we have similar information for subyearling fall chinook. Namely, that transportation is not providing the expected benefits and so a similar sequence of actions (i.e., improved in-river conditions with increase flow and spill) is appropriate to provide improved migration conditions for in-river fall chinook migrants. In fact, if there is anything that is strikingly different about these two situations, it is that we know that transportation is actually *worse* for fall chinook than it is for spring chinook. A number of studies confirm this point. *See Williams et al. 2004* (summarize studies regarding migration conditions for different salmon species). At its basis, the plaintiffs' request for injunctive relief simply follows application of data in a way that is very similar to what has occurred for spring chinook.

24. In his declaration, Dr. Chapman suggests that because plaintiffs' injunctive relief request will not ensure river temperatures that comply with Clean Water Act standards what the plaintiffs request is imprudent. Chapman Dec. at ¶ 31. Mr. Ocker also states that plaintiffs' request may create temperature issues. Ocker Dec. at ¶ 17. These suggestions miss the mark. Plaintiffs' injunctive relief request, while it may or may not ensure that we actually meet Clean Water Act temperature standards in the Snake and Columbia rivers, will certainly provide a *better* chance of meeting those standards than will operations under the 2004 BiOp. As has been done for years, fishery managers would control increased water flows to ensure we get as close to meeting the temperature standards as possible. With the augmented flows and lower reservoir levels the plaintiffs seek, our chances of success in this effort increase.

For example, operations to meet the plaintiffs' injunction request would use water from the Upper Snake River Basin as early as possible when it is coolest, given that it tends to be warmer later in the summer. Because there would be more of this water than under the 2004 BiOp, there would not be as much need to supplement the Snake River flows with additional water from Dworshak early in the season just to maintain better flow volumes. This would allow the action agencies to use more of the cool water available from Dworshak later in the summer to help keep the rivers cooler than they would be without that water. *See, e.g.*, System Operation Request , 2004-SOR 2004-17; System Operation Request, 2003-SOR 2003-11 (setting forth requests from fishery managers to use Dworshak water to help cool the river) [available at http://www.fpc.org/documents/sors/sor_currentyear.html].

25. What's more, under the plaintiffs' injunctive relief request, we would have salmon moving through the rivers faster, and with the increased spill, past dams faster as well. So even if the rivers are not meeting temperature standards, the fish will be spending less time in the warmer water than they would without the plaintiffs' request in place. The point is that while the relief request may not make the situation perfect, it will no doubt make the situation significantly better for listed salmon.

26. In summary, the plaintiffs' injunctive relief request will be a more protective set of measures for salmon migrants this summer than the operations that will otherwise occur under the 2004 BiOp. The plaintiffs' injunction would lead to a true "spread-the-risk" approach to salmon migration instead of a maximum transportation approach. Again, while the plaintiffs' request will not make the situation perfect for salmon, it will make it significantly better. As Mr. Lorz's SIMPAS analysis confirms, plaintiffs' request may in fact increase the likelihood of survival of summer fall chinook migrants by two-fold or more.

This is the type of management we should be implementing if we are serious about salmon protection and restoration.

II. THERE ARE COMBINATIONS OF OPERATIONAL MEASURES AVAILABLE TO DECREASE WATER PARTICLE TRAVEL TIME IN THE SNAKE AND COLUMBIA RIVER AS PLAINTIFFS REQUEST

27. As I explained in my earlier declaration and discuss above, the plaintiffs seek a 10% decrease in water particle travel time in the Snake and Columbia rivers during the 2005 summer salmon migration season as part of their injunction motion. Pettit Dec. at ¶ 43. I also explained that in my opinion a combination of modest reservoir drawdowns and modest increases in flow augmentation from up-river reservoirs could accomplish the decrease in water particle travel time plaintiffs seek. *Id.* at ¶¶ 52-58. Much to my surprise, none of the federal declarations even attempts to identify, let alone evaluate, a reasonable combination of drawdowns and increased flows that would meet a decreased water particle travel time standard. Instead, the agency declarations describe the two most extreme ways to comply with this aspect of the plaintiffs' injunction, achieving the decreased water particle travel time only with reservoir drawdown or only with increased flows. *See, e.g.,* Schiewe Dec. at ¶ 7; Henriksen Dec. ¶¶ 27-32; Ponganis Dec. at ¶¶ 32-35, 50-56.. Not surprisingly, this approach produces some extreme results but it does not reflect a reasonable effort to assess how best to comply with the improved river flow conditions the plaintiffs request.

28. Accordingly, I describe below at least one set of operations which I believe is feasible and which combines reservoir drawdown and increased flows to achieve the decreased water particle travel time the plaintiffs seek. I also suggested similar measures in my earlier declaration but the agencies did not address them. Pettit Dec. at ¶¶ 53, 54. These are the operational measures that Mr. Lorz has employed in his SIMPAS modeling and they

are the measures that Robert Heinith also addresses in his declaration (which will be filed along with this reply declaration). Mr. Heinith's declaration provides additional detail about these operations among other things.

29. Briefly, the Snake River operations that hold all reservoirs, except Lower Granite, at Minimum Operating Pool ("MOP") elevation for the summer migration season, together with a deeper drawdown of 10 feet below MOP at Lower Granite, should be sufficient to decrease water particle travel time by 10% if combined with the base flows the federal defendants have indicated they anticipate and additional flow augmentation from the upper Snake River Basin of approximately 143,000 acre feet. These base flows include 200,000 acre feet of water from the BOR's upper Snake projects and 237,000 acre feet of water from Brownlee reservoir. *See Schiewe Dec. at ¶ 6* (stating that "Plaintiffs' flow assumptions were very similar to our own . . ."). The major difference between the 2004 BiOp operations and the operations sought by plaintiffs would be the deeper drawdown of the Lower Granite reservoir. 2004 UPA at 47. Actually operating the other Snake River reservoirs at MOP elevation also would be a change from the operations expected this summer (which would allow reservoir operations at elevations of MOP plus one foot). Mr. Heinith also addresses this point in his declaration. Meeting the 10% water particle travel time improvement in the plaintiffs' request will still not be enough to meet the flow targets set forth in the 2004 BiOp. Nevertheless, as Mr. Lorz's declaration makes clear, the modest improvement in water flows the plaintiffs seek will have significant positive benefits for salmon. *Lorz Dec. at ¶ 17*.

30. The analysis to show that these operations will decrease water particle travel time in the Snake River by 10% is also set forth in Mr. Lorz's declaration. However, contrary

to federal defendant declarations (*see, e.g.,* Poganis Dec. at ¶ 27), I would like to reiterate that I have not, nor have plaintiffs, suggested that a drawdown of Dworshak reservoir below elevation 1535 by the end of August should be employed. It is surprising that the Action Agencies have assumed such a measure would need to be put in place to meet plaintiffs' request. That simply is not the case. This is an example of the type of extreme and unnecessary position that the Action Agencies have suggested plaintiffs' injunctive relief request could require on both spill and water particle travel time when there are much more simple and appropriate management actions they could and should take to meet the plaintiffs' request.

31. In the Columbia River, operations that drawdown McNary Reservoir to MOP and John Day Reservoir to minimal irrigation pool (MIP), and hold The Dalles reservoir at average pool elevation, together with additional flows of approximately 920,000 acre feet should be sufficient to decrease water particle travel time by 10% as the plaintiffs request. Again, this 10% improvement will not meet the flow targets set forth in the 2004 BiOp, but will have significant benefits for salmon. Mr. Heinith's declaration discusses how these operations will decrease water particle travel time in the Columbia as the plaintiffs request. Heinith Dec. at ¶ 13-18.

32. I did not see in the opposing declarations that I have reviewed any discussion to indicate that the additional spill the plaintiffs request at the lower Snake River dams and at McNary is not feasible. Rather some of these declarations raise concerns about the effects of this increased spill on juvenile fall chinook. I address some of these concerns below. Mr. Olney, Mr. Lorz, and Mr. Heinith also address these concerns, as well as others, in their declarations.

33. A number of declarations prepared for the federal defendants (*see, e.g.*, Henriksen Dec. at ¶¶ 23-26; Peters Dec. at ¶¶ 21-22; McKern Dec. at ¶ 14; Dr. Chapman Dec. at ¶¶ 44-46) predict that implementation of the plaintiffs' requested summer spill will result in levels of total dissolved gas (TDG) that exceed water quality waiver standards and harm migrating Snake River fall chinook. These claims are reminiscent of similarly dire consequences predicted by the COE when the spill program was expanded in the mid 1990s to its existing levels (spilling to the TDG cap at 115/120 percent). At that time, fishery agencies and tribes prepared a comprehensive assessment of the risk associated with implementing an expanded spill program and concluded that spilling to a 115/120 percent gas cap (the existing spill program) was actually conservative, and that higher spill levels would be possible without risk to migrating salmon. *See, e.g.*, ISAB 1998 (discussing a series of studies showing that TDG levels of 120% were acceptable for migrating salmon). This finding has since been reaffirmed by NOAA in the 2000 BiOp after reviewing additional data and studies collected after the 1995 assessment by fishery agencies and tribes. 2000 BiOp at 9-121 – 122.

34. Importantly, the federal declarants fail to recognize that TDG levels are scrupulously managed in the river through a comprehensive in-season monitoring program that has been collecting both physical and biological monitoring information since the spill program was expanded in the mid 1990s (and in some cases prior to that). This already in-place monitoring program would be an invaluable tool to provide assurance that the summer spill requested by the plaintiffs would not harm salmon because if dissolved gas levels do actually reach an unsafe level – and they are not likely to as explained in other tribal declarations – spill can be temporarily limited to avoid exceeding the gas caps.

35. Regardless, Henriksen and Peters base their prediction on results generated from a model known as SYSTDG. Although this complex model may be used to indicate changes in the levels of dissolved gas relative to changes in spill, it's predicative capability is highly variable. Mr. Lorz discusses this issue at more length in his declaration.

36. In summary, I offer the operations described above not because they are the specific operations that must be implemented to comply with the plaintiffs' injunction request but to show that there is a reasonable combination of modest increases in river flow levels and modest reservoir drawdowns that would meet the requirements of the plaintiffs' injunction and benefit juvenile Snake River chinook migrating this summer.

III. DRAWDOWN OF LOWER GRANITE RESERVOIR TO TEN FEET BELOW MINIMUM OPERATING POOL WILL BENEFIT MIGRATING JUVENILE FALL CHINOOK AND WILL NOT BE LIKELY TO HARM UP-STREAM MIGRATING ADULTS

37. One of the measures I have suggested to comply with the plaintiffs' injunction request is a drawdown of Lower Granite Reservoir to ten feet below MOP. I suggested this particular operation based on my experience with operations of this reservoir and Lower Granite dam and their combined effects on migrating juvenile salmon.² It is important to recognize that Lower Granite Reservoir is the longest and largest reservoir on the lower Snake River. For this reason, changing its elevation has the greatest effect on the velocity of water flows in the Snake River, all else being equal. In addition, there is significant scientific evidence that indicates that juvenile salmon mortality is particularly high in this reservoir.

² As Mr. McKern points out, I did not continuously chair the Fish Transport Oversight Team (FTOT). I was indeed chair for several of those initial years and then was a member of the Team until the team dissolved. My extensive amount of time as a member of that committee has given me considerable knowledge about the scientific pros and cons surrounding the transportation system.

See 2004 BiOp at D3-16, Table 5 (showing that for Snake River fall chinook mortality associated with the Lower Granite Reservoir has been higher than in any other reservoir in the Columbia and Snake rivers and approached almost 79% in 2001). Thus, reducing the amount of time juvenile salmon spend traversing this reservoir has significant survival benefits, again all else being equal. Indeed, according to the analysis in Mr. Lorz's declaration, the drawdown of Lower Granite Reservoir to ten feet below MOP provides approximately 7% of the total 10% decrease in water particle travel time that the plaintiffs seek under the operations I have suggested. Lorz Dec. at ¶ 13. Obviously, a different combination of operations could also decrease water particle travel time to comply with the plaintiffs' injunction but it is my opinion that, on balance, the short-term deeper draft of Lower Granite reservoir is an extremely effective way to decrease water particle travel time.

38. Despite the likely biological benefits of a deeper drawdown at Lower Granite (i.e., to a level ten feet below MOP), a number of the declarations I have reviewed object to this measure because of the allegedly harmful biological effects it might have. For example, these declarations assert that the use of the existing emergency adult fishway exits would potentially be a major impediment to upstream adult salmon passage during the time plaintiffs are requesting improved flows for fall chinook. In the declarations submitted by Mr. Ocker at ¶¶ 38-41 and Mr. McKern at ¶ 20, both make the assertion that the emergency fish ladder exit's false weir has the potential to significantly delay adult fish passage. In my reviews of existing adult fish passage facilities, false weirs are presently used successfully, without apparent passage problems, at other projects such as Bonneville's adult fish trap. Unlike the use of a false weir at Lower Granite, most of the adult salmon returns to the entire Columbia Basin must come past the Bonneville Dam and are subject to collection at the Bonneville

adult trap with the use of a false weir similar to that at Lower Granite. So if there is a problem with this technology – which as I say, I have not observed – it should have appeared in the adult passage facilities at Bonneville. To my knowledge, these facilities have not been identified as a significant or serious – or even noticeable – source of delay in upstream adult migration.

39. Mr. Ocker uses the fact that few fish were seen using the false weir system during the Lower Granite Dam drawdown in 1992 as an argument for why the plaintiffs' request should be denied. Ocker Dec. ¶39. Mr. Ocker's analysis misses two important points, however. First, the drawdown in 1992 happened in March of that year, a time when very few adult salmon and steelhead are migrating through the rivers. So, one would expect to see few fish during that drawdown experiment. Second, I recall standing at the dam during the drawdown period watching how fish responded to the new circumstances. I can say with assurance that I saw fish successfully use the false weir system on at least two separate occasions.

40. In declarations provided by Mr. Ocker at ¶¶ 34-35 and Mr. McKern at ¶¶ 21-22, drafting Lower Granite Dam's forebay to elevation 723' (i.e., 10 feet below MOP) is discussed in relationship to the operation of the project's juvenile by-pass system. These declarations suggest drafting Lower Granite to this elevation would have adverse impacts on young salmon migrating downstream because of problems associated with the fish screens at such low levels. However, the gateway orifices at Lower Granite cannot operate at the 723' elevation level, and in my first declaration, I was clear that the fish screens should be pulled at any operating turbine, thereby preventing the young salmon from entering the gateway's hostile environment and from subjecting these fish to additional handling impacts associated

with gatewell dipping (i.e., a process of netting fish out of a gatewell area). *See* Pettit Dec. at ¶55. My recommendation to pull the screens would alleviate the potential harm identified by Mr. Ocker and Mr. McKern. While I understand that this means that some fish would pass the dam through the turbines, the overall salmon survival will likely be higher with the screens pulled at this dam and the vast majority of the fish moving through the spillway than would otherwise be the case with no spill. Lorz Dec. at ¶ 14.

41. Further, Mr. McKern and Mr. Ocker raise concern about adult salmon delay in their upstream migration due largely to what these declarants suggest will be the formation of a tailrace eddy that confuses the adult salmon in their upstream migration. If plaintiffs were requesting that the Corps spill 100% of the river flow at Lower Granite, Mr. McKern and Mr. Ocker's concerns might be legitimate. However, that is not the case. As I discussed in my first declaration, summer operations at Lower Granite should be limited to the operation of a single turbine unit (specifically Unit 2) to avoid adult delay and fallback through Unit 1. In addition, using Unit 2 would provide adequate training and attraction discharge for the adult fishway entrance and would also allow for young salmon to effectively migrate through the tailrace (i.e., provide adequate juvenile egress), thereby eliminating the problem these declarations raise. In his declaration, Mr. Lorz explains why this issue is not a problem in more detail. Lorz Dec. at ¶ 37-42.

42. In summary, the federal declarants' concerns in response to plaintiffs' injunction request are based on a mix of extreme positions that neither the plaintiffs' nor I have suggested, misunderstanding or misinterpretation of the most recent science, and a misleading assessment of how changes in river operations could be made. If the Court grants the relief the plaintiffs seek, and any significant harm is detected by any one of the potential

measures adopted to meet the relief, the federal agencies could change those operations in consultation with the state and tribal salmon managers as long as the over all standards are still met. And as pointed out in Mr. Lorz's declaration, both juvenile and adult passage through the hydrosystem are very well monitored by the salmon managers and any potential harms would be immediately identified and addressed. Lorz Dec. at ¶¶ 22, 36. Thus, the fear that any of these specific harms would come to pass and have any significant impact on listed salmon species is highly unlikely.

43. Based on the foregoing discussion, it is my opinion that the requirements for improved water flow and increased spill the plaintiffs have requested – if implemented reasonably and thoughtfully for the summer salmon migration season in 2005 in a manner similar to the operations I have discussed above – will reduce significantly, even substantially, the harmful effects ESA-listed salmon and steelhead would otherwise experience under the 2004 BiOp.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge. Executed this 16th day of May, 2005, at Cherrylane, Idaho.



STEPHEN W. PETTIT

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