IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF OREGON

NATIONAL WILDLIFE FEDERATION, *et al.*, Plaintiffs, v. NATIONAL MARINE FISHERIES SERVICE, Defendants.	Civ.No. CV01-00640-RE **DECLARATION OF D. ROBERT LOHN, Regional Administrator, NMFS**

I, D. Robert Lohn, aver as follows:

1. I am the Regional Administrator of the Northwest Region of the National Marine Fisheries Service (NMFS or NOAA Fisheries), an agency within the National Oceanic and Atmospheric Adminstration (NOAA) of the Department of Commerce, a position I have held since October 2001. Prior to coming to NOAA I have, over the past decade, held various positions relevant to Columbia Basin salmon issues. From 1987 to 1994 I served as the General Counsel to the Northwest Power Planning Council, now known as the Northwest Power and Conservation Council. After that I managed the fish and wildlife activities of the Bonneville Power Administration from 1994 to 1999. Most recently, before coming to NOAA Fisheries Service, I held the position of Director of the Fish and Wildlife Division for the Northwest Power and Conservation Council.

2. The NOAA Fisheries' Northwest Region is responsible for the administration of the Endangered Species Act (ESA) for anadromous Pacific salmonids (species of salmon and steelhead) originating within the states of Oregon, Washington and Idaho and for other marine species. These responsibilities include: recommending ESA listings and designation of critical habitat for endangered and threatened marine species to the NOAA Assistant Administrator for Fisheries; preparing recovery plans for listed species; conducting Section 7 consultations and issuing Section 10 permits for activities that may adversely affect or take listed species or modify their critical habitat.

3. This declaration, which is offered in response to the Plaintiffs' Request for a Preliminary or Permanent Injunction, provides an overview of the array of factors influencing decisions about

operating the Federal Columbia River Power System (FCRPS) in a manner that minimizes harm to migrating anadromous salmon during their summer migration. Years of controversy about what is best for these fish is testimony to the complexity and uncertainty of this task. Despite substantial scientific study of the biological requirements of these fish and about the effects of the FCRPS on them, almost every operational decision for the FCRPS is fraught with countervailing considerations and, therefore, controversy especially during the summer migration. This declaration is prepared to offer my perspective as an Endangered Species Act program manager who must advise the operating agencies of the FCRPS, the U.S. Army Corps of Engineers (USACE), the U.S. Bureau of Reclamation (USBR) and the Bonneville Power Administration (BPA). I have reviewed the motions for injunctive relief in this matter and the declarations filed on behalf of those motions.

4. The Columbia River is the fourth largest on the North American continent; it discharges the second largest volume of any river system in the United States. It drains approximately 259,000 square miles, including portions of seven states and British Columbia, Canada. The salmon and steelhead that inhabit the Columbia migrate up and down this system as adults and juveniles; adults from each of the thirteen affected stocks protected by the ESA migrate at different times of year to different parts of the Columbia Basin depending upon their particular biological needs. Within the juvenile lifestage, some, such as Snake River spring and summer Chinook salmon, migrate after spending a year in their spawning habitat, while the Snake River fall Chinook generally migrate as much smaller subyearling fish in the same year they hatch. Some stocks migrate to and from the upper reaches of the watershed, such as the Snake River spring/summer Chinook that spawn and rear in the upper tributaries, some above 5,000 feet in elevation, in Idaho's Salmon River Mountains. In contrast, the Snake River fall Chinook spawn and rear in the large, lower elevation mainstem reaches of the Snake River in Idaho.

5. The migratory timing of these stocks is particularly important to understand. There are adult salmonids migrating upstream almost all year round. Within one species, such as Chinook salmon, there may be several 'evolutionarily significant units' (ESUs) which are named on the basis of where they originate and which part of the year the adult fish return to spawn. Thus Upper Columbia spring Chinook adults return to their spawning reaches in the upper Columbia River in the spring of each

year while Snake River fall Chinook adults return to the Snake River Basin in the fall. The juveniles of these different stocks, however, generally migrate out between mid-April and early September. The spring and summer Chinook, steelhead and sockeye salmon all migrate as yearling juveniles in the spring, by the middle of June each year. Subyearling fall Chinook are the last of the juveniles to outmigrate, completing their passage down the Columbia River by early September. To complicate matters further, we are also just learning that some juvenile fall Chinook hold over in the river and migrate out early the next year as larger yearling fish though their precise timing is currently not known.

6. The FCRPS, the subject of this suit and motion for injunctive relief, serves a variety of purposes, including flood control, power generation, irrigation, barge transport, and recreation. To achieve these multiple uses, the FCRPS regulates the flows in this river system with storage reservoirs in Montana, Washington and Idaho. It directs river flow past eight mainstem dams on the Snake and Columbia rivers, which are in the migratory path of these listed fish. In addition to the FCRPS there are other water management projects on the river that influence its flow and water quality serving similar objectives. Also storing water in the upper reaches of the watershed are the USBR irrigation projects in the upper Snake River Basin in Idaho, as well as a large storage project below them on the Snake River, Brownlee Reservoir, operated by the Idaho Power Company. On the Columbia there are also three large storage reservoirs in Canada operated by British Columbia Hydro. Affecting water quality and the migration of some of these stocks are the five mid-Columbia hydroelectric projects operated by public utility districts and licensed by the Federal Energy Regulatory Commission (FERC).

7. The focus of the FCRPS summer operations for fish, and the focus of the injunctive relief requested for 2005, is the survival of juvenile salmonids passing the lower Snake and Columbia River mainstem projects. Adult fish survive at approximately the same rates passing these FCRPS projects as they would in an undammed river and thus measures for their passage are not relevant to the controversy here except as they may be adversely affected by measures taken for juvenile fish. Four of the juvenile listed stocks, those inhabiting the Snake River including the summer outmigrating fall chinook, pass all eight mainstem FCRPS projects, (Lower Granite, Little Goose, Lower Monumental,

Ice Harbor, McNary, John Day, The Dalles, and Bonneville Dams) while three other stocks from the upper and middle Columbia River must pass the last four dams on the lower Columbia River. Some Columbia River chum, Lower Columbia River Chinook, Lower Columbia River coho salmon and Lower Columbia River steelhead pass only one FCRPS dam, the Bonneville Dam. There are two other ESUs which reside entirely below Bonneville dam (Upper Willamette River chinook and Upper Willamette River steelhead).

Reservoir Passage

8. As juveniles migrate downriver, the upriver stocks first encounter the impounded water of the reservoir behind each dam, which slows their migration to the ocean and exposes them to predatory fish such as the northern pikeminnow. The eight dams on the mainstem Snake and Columbia Rivers are known as 'run-of-the-river' dams because they do not store significant quantities of water for later release, unlike the upriver storage dams such as Grand Coulee and Dworshak dams. As a result, the size of the reservoir behind each mainstem dam is relatively constant. Lowering reservoir levels at these projects reduces the reservoir's cross section and, to a small extent, its length. In theory, this improves conditions for downriver migrating fish by slightly increasing the average velocity of river water and speeding up the juvenile fish to move somewhat more quickly. The actual biological effect of lower reservoir elevations depends on the extent to which juvenile fish choose to move out of the current for feeding and rearing during their migration, as well as the shape of the river channel and the current within it. The Action Agencies' Updated Proposed Action calls for the operation of these reservoirs at their "minimum operating pool." Minimum operating pool is so named because it represents the minimum design elevation for most of the facilities at a dam, including the fish passage facilities. It does not benefit salmon to reduce the reservoir level below minimum operating pool to the degree requested by the plaintiffs because then the fish, both adults and juveniles, may not be able to pass the dams themselves. Maintaining reservoirs at minimum operating pool is necessary for the proper operation of fish ladders used by adult salmon migrating upriver, and for downstream juvenile fish, it is necessary for operation of the bypass and barge transportation systems, which I discuss below.

9. Managing the volume of water flowing in the river is another measure for improving juvenile survival in the reservoirs because it can help the juvenile salmon move downriver faster. Because this is true for all migrating stocks of salmon it raises the need to balance the use of the limited water available among the stocks migrating at different times and between different years. This is particularly true of a low water year as 2005 is shaping up to be; it is now expected to equal the fifth lowest water year on record in the lower Columbia River. **(NOAA, National Weather Service, Northwest River Forecast Center, www.nwrfc.noaa.gov/wsfcst/station/wsfplot.cgi?TDAO3**) The use of stored water in one year may also mean that the lowered storage reservoir does not refill to provide such flows the next year. This is a particularly significant consideration when precipitation is lower than average in a series of back-to-back years.

10. The ability to augment flows through the mainstem Snake and Columbia Rivers in the summer requires storage in upriver reservoirs from which the water is released. In Snake River, only the Dworshak Reservoir is controlled as a part of the FCRPS. If additional water is to be obtained it must come from the irrigation projects separately operated by the USBR in the upper Snake Basin and/or from Brownlee Reservoir, owned by the Idaho Power Company and operated under license from FERC. The USBR Upper Snake Projects this year have begun operating pursuant to a thirty year agreement with the State of Idaho, various irrigation districts with whom USBR is contractually obligated to store and deliver irrigation water, and the Nez Perce Indian Tribe. That agreement, implemented this year by the Idaho Legislature and the U.S. Congress (Snake River Water Rights Act of 2004, Pub.L. 108-447, Div. J, Title X, Dec. 8, 2004, 118 Stat. 3431), provides a viable mechanism for increased flows for salmon in the lower river. The USBR's implementation of that agreement has recently completed ESA § 7(a)(2) consultation for which I signed a biological opinion, concluding that the operation of those projects for irrigation and for augmentation of flows in the lower Snake and Columbia Rivers is not likely to jeopardize the listed species relevant to this litigation. Similarly, the flows into the lower Snake River this year will be influenced by the Idaho Power Company's operation of its Brownlee Reservoir. That FERC project is currently undergoing a process for its relicensing, however, in the meantime, NMFS and other parties interested in that project, including the states of Idaho and Oregon, reached an interim agreement with the Idaho Power Company, filed

with FERC on January 7, 2005, to provide 237 thousand acre feet of water for flow augmentation in the lower Snake and Columbia rivers between June 20th and August 7th in 2005 and to pass USBR flow augmentation water through the Hells Canyon Complex. Thus, while these arrangements with projects beyond the control of the FCRPS operating agencies will result in increased flows for salmon migrants, they are finite agreements. Additional provisions for increased water flows through the FCRPS above these negotiated amounts are not expected in 2005.

11. There are similar considerations for flow measures in the Columbia River. The uppermost reservoirs available to increase flows in the summer are the Montana storage projects of Hungry Horse (USBR) and Libby Dams (USACE). The operation of Libby Dam, however, must be coordinated with the needs of another ESA listed species, the Kootenai white sturgeon, which occupies the river below that project and is under the jurisdiction of the U.S. Fish & Wildlife Service. To a lesser extent water can be provided from the Albeni Falls Dam (USACE) which controls water stored in Lake Pend Oreille, Idaho. Here too the needs of another ESA listed species, bull trout, also complicates the use of water from this project. Water is also stored upstream in Canada on the Columbia River, though its use for flow augmentation is subject to the Columbia River Treaty and other international agreements. Finally, the USBR stores water in Lake Roosevelt behind Grand Coulee Dam to fulfill its irrigation contracts for the Columbia Basin Project.

12. Water quality in the reservoirs on the migration route is also a consideration for salmon survival, in particular the temperature of water. Warm water is detrimental because it causes predatory fish to eat more juvenile salmon, to satisfy their higher metabolic rates. Warmer water also increases the susceptibility of salmon to disease, increases their metabolic rate, and, above certain levels, can be lethal. A measure to address increased temperature is to release water from cold water reservoirs such as Dworshak Reservoir (USACE) in Idaho. Again, cooler water is generally beneficial to all stocks of migrating salmon and steelhead requiring its use be balanced among them. For example, cool water released for juvenile fall Chinook migrants in the summer would not be available for late-migrating fall Chinook or steelhead adults returning later in September. The water from the upper Snake River Basin and Brownlee Reservoir is not typically cold in the summer and thus does not provide a temperature benefit similar to water from Dworshak Reservoir.

Dam Passage

13. After passage through a dam's reservoir, juvenile salmon migrants must pass the dam itself. To illustrate the options for passing each dam, attached as Exhibit A is a graphic representation of a mainstem dam typical of those encountered by these listed salmon. There are three primary routes of passage: 1) spillway passage, 2) bypass screens and conduits, and 3) turbine passage. (There are several other routes of minor significance such as through the barge locks and fish ladders.) Research has shown that these primary routes cause different rates of mortality to juvenile fish; spillway passage generally results in the lowest mortality while turbine passage generally causes the highest rate. Although passage over the spillway results in the highest survival, the falling water over the dam also increases the amount of atmospheric gases that are dissolved in the water, and this can be detrimental to fish if too high. This effect, called 'gas bubble trauma' is similar to the 'bends' for human divers who return to the surface too fast. In our biological opinions and in the Updated Proposed Action the maximum amount of spill provided is always balanced to avoid spillway passage where the adverse effects of dissolved gas would outweigh the relative benefits of such passage.

14. Each of the FCRPS dams is equipped with a bypass system. At most projects the bypass system consists of screens in front of turbine intakes that divert the juvenile salmon otherwise attracted by the turbine water flow, instead into a passageway through the dam that routes the juveniles back to the river downstream or, as discussed below, into barges for transport downriver around the remaining dams. These systems also give researchers the opportunity to identify individual fish by means of computer detectable tags (PIT tags) implanted in the fish upriver. The survival of fish through the bypass systems is generally greater than for fish that pass through the turbines and approximately similar to that of fish that go over the spillway.

Transportation.

15. Transporting juvenile salmon in barges downriver through the reservoirs and navigation locks for release to the river again below the lowest dam, Bonneville, is another measure available to protect salmon from harm. The fish, which are collected in the bypass systems and routed through the dams, can be released into barges fitted with tanks filled with continually-pumped river water. Fish can be collected for transport at the uppermost dam, Lower Granite Dam, and at three of the next

four dams downstream (Little Goose, Lower Monumental and McNary Dams). Fish that pass these dams over the spillway or through a turbine cannot be collected for transportation. The percentage of fish collected for transportation is reduced to the extent that more fish pass by way of spill; turbine passage, with the highest rate of mortality, is generally minimized to the extent possible. Although it is often necessary to pass high springtime river flows that would otherwise exceed the capacity of the dam's turbine intakes via the spillway, in the summer flows are low enough that the dam operators may choose not to spill water over the spillways at the transport collector projects and thereby maximize the collection of juvenile salmon for transportation.

16. To reduce harm to listed salmon, the decision whether to spill fish or collect them for transport depends upon selecting the route with the highest survival. The question of relative survival of transported fish to that of fish that remain in the river has been intensively researched but remains uncertain and controversial. Although about 98% of transported fish survive the barge ride to the point of release into the river below Bonneville Dam, and approximately 50% of the spring migrants left in-river survive to the same point, the research has focused on the rate that these two groups of fish (transported fish versus in-river, non-transported migrants) return as adults from the ocean to spawn in their natal areas. The research has demonstrated that a two-fold survival benefit that transport should provide is not seen in the number of the same fish returning to spawn. This suggests that transported fish may not survive in the ocean to adulthood at the same rate as in river fish. The studies indicate that the ratio at which transported fish return relative to in-river fish varies between ESUs. The ratio is referred to in the 2004 FCRPS Biological Opinion (e.g. p. 5-26) and elsewhere as the "D" value. The "D" value is a "discount" factor that is applied to transported fish to estimate their survival compared to in-river migrants.

17. For the Snake River fall Chinook salmon, the principal stock migrating as juveniles during the summer, recent research has concluded that there is no apparent difference in adult return rates between fish that are transported and those that remain in river to migrate over the spillways or through the turbines. Ever since the majority of the Snake River fall Chinook outmigration was first transported in 1982, the operating agencies of the FCRPS, with NOAA's concurrence, have maximized the transportation of summer migrating juvenile salmon by not spilling at the collector

dams.[1] At the same time, in the last five years the total numbers of adult Snake River fall Chinook salmon that migrated upriver in the summer has increased significantly, estimated at a 398% increase (when comparing the 2001-2003 geometric mean with the same for the 1996-2000 time period). See 2004 BiOp, §4.3.2.4, p. 4-7. This indicates, at least, that transportation has not prevented population increases. The plaintiffs refer to our July 1, 2004, Findings Report to make the point that the average system survival of this ESU since 2000 has been lower than the 1995-1999 average. At the same time, however, we reported that in-river juvenile survival exceeded the 1994-1999 average in two out of three years since 1999. We also explained that improvements in survival are in-part dependant upon structural changes to the dams, such as removable spillway weirs (RSW), outfall relocations, bypass system improvements and spillway deflector improvements, all of which are not immediately achievable. A second RSW was installed for testing just this year at Ice Harbor Dam on the Snake River. The 2000 Biological Opinion also recognized on page 9-15 that annual environmental and hydrologic conditions may account for lower averages. As explained in the Declaration of Richard Rigby filed in this proceeding, 2000 through 2004 are the lowest five consecutive years on record for the Snake River Basin. The 1994-1999 water years were significantly better.

18. In the 2004 FCRPS Biological Opinion, NOAA evaluated the Action Agencies' proposal to continue maximizing the transportation of summer migrants. The Action Agencies and NOAA considered but rejected an alternative operation that would spill water at the transportation collection projects thereby reducing the number of fish transported and increasing the number of fish migrating in-river, a strategy known as "spread the risk." This choice is one between a course of action under which adult fish have returned in increasing numbers and an untested course of transporting fewer fish and allowing more fish to migrate in river on the theory that the fish might exhibit even stronger adult returns if unprecedented increased levels of flow and spill were also provided. This decision is made in the context of ambiguous science. The most comprehensive evaluation of existing data

[1] Spill has never historically been provided in the summer at the collector projects and so, this issue, should not be confused with the issue before this Court in 2004 concerning summer spill at non-collector projects.

available indicates that transportation neither harms nor helps juvenile fall chinook salmon when compared with leaving the fish to migrate in-river.[2] This study looked at information from the 1995-2000 migration years. Recently it was updated (Exhibit B - Williams memo - April 8, 2005) with preliminary information from the 2001-2002 migration years. The most recent transport study of Snake River fall Chinook used 2001 juveniles and is the first study specifically designed to evaluate transportation's effects on Snake River fall Chinook. (The conclusions from the1995 through 2000 studies were from data about fish that were tagged for other purposes.) The preliminary results from the 2001 and 2002 migrations continue to be inconclusive; transport showed a benefit in one year but not in the other. Thus, this new information provides no reason to change our conclusion that transport neither harms or helps this population. Although the regional fisheries agencies and the FCRPS operating agencies are planning research studies to determine if it is possible to increase juvenile salmon survivals through improved conditions for in-river migrating fish, we cannot now be guided by such a study.

19. This decision is further complicated by recent research indicating that not all Snake River fall Chinook migrate to the ocean in their first year of life, i.e., as subyearlings. This research calls into question some of the findings in the research noted in paragraphs 16, 17, and 18 above. Based on evidence of fish scales from returning adults, researchers have determined that a significant number of fall chinook hold over in freshwater and migrate to salt water in their second year of life, when they are larger.[3] What the most recent data show is that fall chinook that holdover and enter the ocean as larger fish, return as adults at a much higher rate than subyearling migrants. See Exhibit B, Williams to Toole Memo, 4/8/2004. The research conclusion drawn from this data is that "it is not obvious that hastening subyearlings downstream is beneficial." Id. As of now, this research has not clearly determined where these fish hold over, whether in the river above the mainstem dams, such as

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[2] See Williams, J. G., S. G. Smith, R. W. Zabel, W. D. Muir, M. D. Scheuerell, B. P. Sandford, D. M. Marsh, R. A. McNatt, S. Achord. 2005. "Effects of the Federal Columbia River Power System on Salmonid Populations." U.S. Dept. of Commerce, NOAA Tech. Memo., NMFS-NWFSC-63, 150 p.

[3] Connor, W. P., J. G. Sneva, K. F. Tiffan, R. K. Steinhorst, and D. Ross. In press. Two alternative juvenile life histories for fall Chinook salmon in the Snake River basin. Trans. Am. Fish. Soc.

the pool behind Lower Granite Dam, the uppermost project on the Lower Snake River, or in one of the down river reservoirs or, even, below Bonneville Dam. Thus, we do not know whether aggressive measures to move the fish to the lower river would encourage fish to hold over or not. In fact, as Exhibit B indicates, fish that were marked as part of the 2001 juvenile migration but which held over to complete their migration the next year returned as adults at a substantially higher rate than did fish holding over from the 2000 outmigration. This leaves a salmon manager faced with the dilemma of competing strategies either to 1) maximize transport and not spill, 2) spread the risk and leave more fish in river through spill while increasing river velocity, (both strategies for moving summer migrants downriver faster) or 3) (an option no one is suggesting) curtail transport and spill so as not to be "hastening subyearlings downstream." The Updated Proposed Action follows the most prudent course of staying with the strategy under which the runs have increased, while committing to fund research to better understand the biological phenomenon of yearling life history strategy of fall chinook. [4]

20. To choose an untried operation in such a critically low water year would be to experiment with this threatened species running the risk that any speculative increases in survival through inriver migration do not materialize. A prudent salmon manager should simply not gamble with species at risk. While the plaintiffs have not described with specificity the particular operations of the hydro system they would undertake to achieve their goal, based on my knowledge and experience it appears that the operations necessary to achieve the water particle travel time goal this summer would cause greater mortality to listed fish than those in the current biological opinion.

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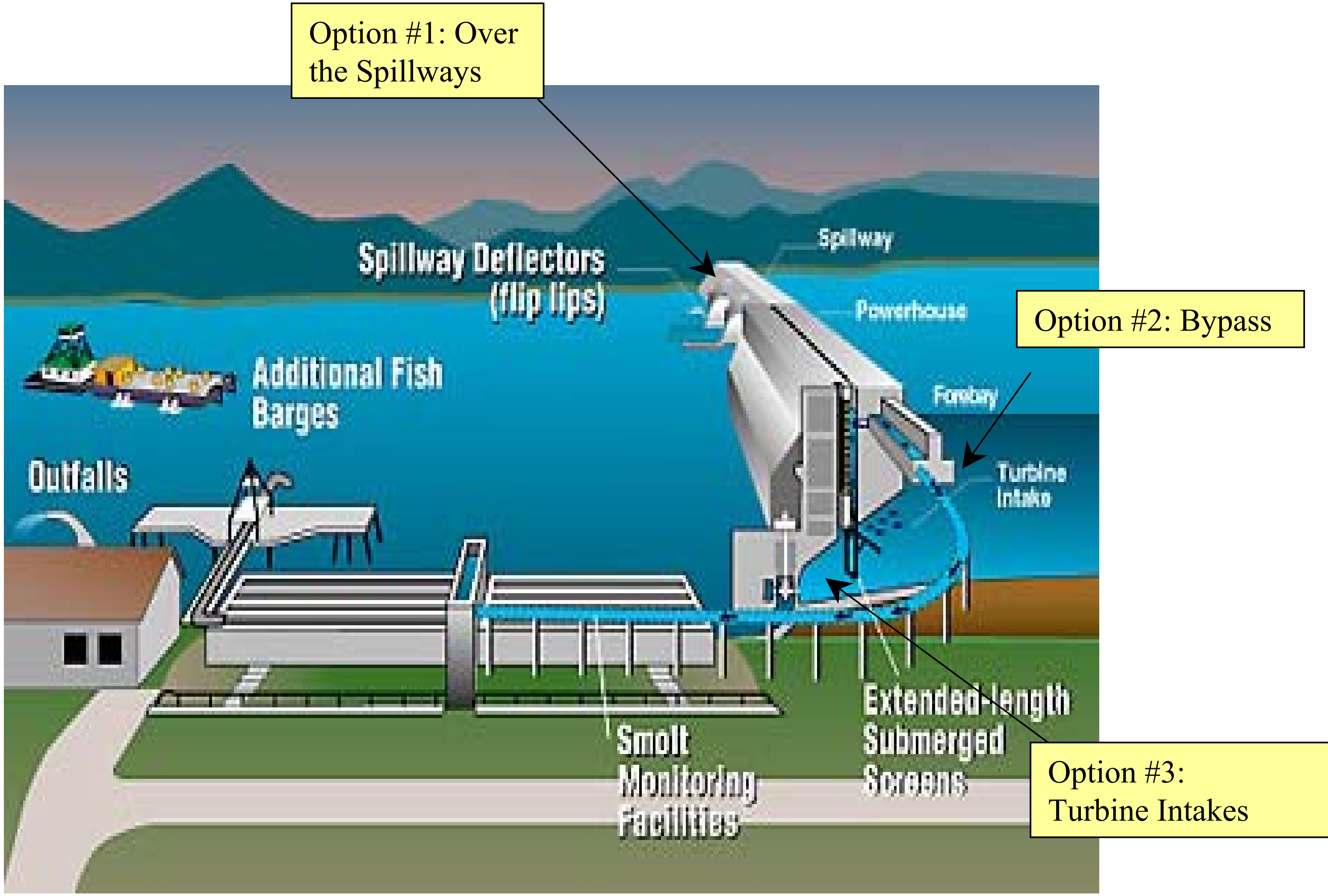
[4] Updated Proposed Action, 2004 AR C. 289, p. 90.

I declare under penalty of perjury that the foregoing is true and correct. Executed on April 22, 2005, in Portland, Oregon.

D. Robert Lohn



Declaration of D. Robert Lohn - Exhibit A

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Northwest Fisheries Science Center
2725 Montlake Boulevard East
Seattle, WA 98112-2097

8 April 2005

MEMORANDUM FOR: F/NWR5 – Chris Toole

FROM: F/NWC3 - John Williams

SUBJECT: Additional information on Snake River fall Chinook salmon returns

This memo provides additional updated information not included in my 5 April 2005 memo related to returns of adult fall Chinook fish that migrated from the Snake River basin in 2000, 2001 and 2002.

Methods

We used Lyons Ferry Hatchery subyearling Chinook salmon released upstream from Lower Granite Dam by NOAA Fisheries Service and the Nez Perce Tribe. Fish were tagged at the hatchery, and then trucked to various release locations in the Snake River Basin. From these fish, we used the PTAGIS database to determine numbers of smolts detected and bypassed or transported and the number of adults returning from each group. Fish in the undetected category represent all of those not detected and include both successful migrants and those that did not survive. Below we refer to age-of-return of adults, rather than the number of years spent in the ocean, as ocean-type and reservoir-type adults of the same age spend different numbers of years in the ocean.

For MY 2000, 2001, and 2002, returns are incomplete. We used historical age-at-return data to project the eventual complete return percentage. Based on data from MY 1995-1998, the average distribution of age-at-return for each migration year is:

2-year-old: 23.0%
3-year-old: 30.8%
4-year-old: 32.4%
5-year-old: 13.5%
6-year-old: 0.3%

The incomplete return to date from MY 2001 (brood year 2000) represents adults detected at Lower Granite Dam in 2002, 2003, and 2004 (i.e., 2- 3- and 4-year-old fish, both ocean- and reservoir-type). Based on the historical data, we estimate that the return to date represents 86.2% of the eventual total. Similarly, for MY 2002, we estimate that the return to date (2- and 3-year-olds) represents 53.8% of the eventual total. The projection has almost no effect on the return percentage for MY 2000, as very few 6-year-olds are expected.

Results

In each of the categories fish had somewhat lower SARs from MY 2001 than from MY 2002, with the exception of non-detected fish (Table 1). The percentage of fish that held over was also slightly lower for 2001. Hold-over fish from MY2001 had a substantially higher SAR than those from MY2000.

Table 1. Snake River subyearling fall Chinook salmon released upstream of Lower Granite Dam: numbers of smolts by different categories. Not detected = number never seen as juveniles (includes mortality, fish passing through turbines and possibly some spill). Transport-all in 2000 = all fish transported as a subyearling at any dam. Transport in 2001 and 2002 = all subyearlings transported at Lower Granite Dam (LGR) and Little Goose Dam (LGO). Return to river = all subyearling fish returned to the river at any dam (and not transported subsequently). Holdover = fish detected and returned to the river at any dam as a subyearling and subsequently detected at a dam as a yearling the following spring.

Migration category	Number of juveniles	Number of adults	SAR	Projected SAR
2000				
Not detected	20,358	9	0.04	0.04
Transport-all	659	7	1.06	1.06
Return to river	3,244	28	0.86	0.86
Holdover	565	9	1.59	1.59
2001				
Not detected	45,543	66	0.14	0.17
Transport-LGR	18,904	43	0.23	0.26
Transport-LGO	3,998	13	0.33	0.38
Return to river	2,439	11	0.45	0.53
Holdover	333	20	6.01	6.97
2002				
Not detected	75,235	67	0.09	0.17
Transport-LGR	12,337	96	0.78	1.45
Transport-LGO	2,550	5	0.20	0.36
Return to river	3,990	28	0.70	1.30
Holdover	525	23	4.38	8.14

Discussion

The projected return rates for migration years 2000-2002 indicate that fish that hold over returned at rates substantially higher than fish returned to the river in 2001 and 2002, but not 2000. As identified in Williams et al. (2005 [2004 in BiOp record]) for the period 1995-2000, the projected return rates for 2001 and 2002 would not change the conclusion that transportation appears to neither help nor harm subyearling migrant fall Chinook salmon.

As holdover fish in 2001 and 2002 returned at substantially higher rates than fish in other categories, efforts to increase migration rates of subyearling fish might actually lead to *lower* overall return rates than would occur if larger numbers of fish were allowed to reside in reservoirs and migrate as yearlings.

This would occur if the apparent benefit of migrating as a yearling outweighed the increased mortality incurred in the reservoirs over the winter. We do not have data to answer this question, but because of the dramatically higher SARs for fish that migrated as yearlings, it is not obvious that hastening subyearlings downstream is beneficial.

cc: F/NWR5 - Ruff
F/NWC – Varanasi
F/NWC – Stein
F/NWC3 – Ferguson
F/NWC3 – Smith
F/NWO - Gorman