



October 6, 2008

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Dear Ms. Lut and Mr. Kolosseus:

Northwest RiverPartners appreciates the opportunity to provide the following comments and technical information to the Oregon Department of Environmental Quality (ODEQ) and Washington Department of Ecology (Ecology). Our comments relate to your joint analysis of the Draft "Evaluation of the 115 percent Total Dissolved Gas (TDG) Forebay Requirement" in your synthesis paper.

RiverPartners is a broad coalition of utilities, businesses and river users in the Pacific Northwest dedicated to promoting the use of best science and cost-effectiveness in regional efforts to protect and recover salmon and steelhead species. Massive financial investments are being made by Northwest families and businesses to aid salmon and steelhead listed under the Endangered Species Act including changes in operations of the federal hydrosystem. The issue of spill needs to be approached carefully because it can harm as well as benefit fish and can be an extremely costly mitigation measure.

The results of the federal analysis of found no compelling reason for eliminating the 115% Total Dissolved Gas (TDG) forebay standard at dams in the Lower Snake and Lower Columbia Rivers. Our analysis of the information summarized in this synthesis report also supports the States maintaining the current TDG standard. The U.S. Army Corps of Engineers is working on an extensive program toward meeting water quality standards. Eliminating the 115% TDG standard will not provide any appreciable benefits to salmon and steelhead in the Columbia River Basin and will further reduce protection for fish and other aquatic organisms. The following provides further explanation of our conclusions.

## **BACKGROUND**

The Oregon Environmental Quality Commission directed the ODEQ establish the Adaptive Management Team (AMT) to consider two questions regarding the necessity of maintain the 115% TDG standard in the forebays of the eight federal dams in the lower Snake and Columbia Rivers. The AMT was developed with representatives from dam operators, state fish and wildlife agencies, tribes other interested parties. They were assigned to address the following questions.

Question 1: What are the biological impacts (gas bubble trauma) of eliminating the 115 percent TDG forebay limit on all aquatic life?

Question 2: How many more fish will pass and survive the system if we eliminated the 115 percent limit?

Representatives of the AMT proposed a stepwise process to answer these two questions. First, the AMT would work together to identify the actual volume of water available of the 115% TDG forebay standard was eliminated. Second, the biological effects of this additional volume would be analyzed with current models to represent effects through the four Lower Snake and four Lower Columbia River dams. Unfortunately, representatives of the AMT decided to split into a separate group and conducted their own separate analyses.

The federal agencies including U.S. Army Corps of Engineers (Corps) and the Bonneville Power Administration (BPA) and NOAA-Fisheries (NOAA-F) answered these questions using models and analytical tools currently used to guide operation of the federal hydrosystem. Water volume information was collected from a 70-year record. Power and non-power constraints on the federal hydrosystem were considered at over 70 hydroelectric projects throughout the Columbia River Basin. The effects of the dams on fish passage and survival was collected from the years of specific fish passage and survival evaluations conducted by independent researchers. The benefits of removing the 115% TDG forebay limit was evaluated with tools that has been positively reviewed by the Northwest Power and Conservation Council's Independent Science Advisory Board on four separate occasions.

The Fish Passage Center worked other with some of the fish and wildlife agencies to develop their own separate analysis. This group chose to estimate additional spill volumes utilizing more simplistic analytical tools not developed to properly model the federal hydrosystem. They then provided general information on the benefits of spill. The group did not quantify biological benefits of removing the 115% TDG forebay limit. As a result, their claims on the benefits of spill are exaggerated and based on speculative analysis which should not be given weight in the state's decision.

# 1. Spill Volume Considerations

## Federal Analysis

The Corps and BPA worked together using actual tools used to manage river operations in the federal hydrosystem to identify the volume of water available if the 115% TDG forebay standard was eliminated. Their results represent the most accurate estimate of the actual volume of water that would be available if the 115% TDG forebay standard was removed. For this joint federal analysis, the two agencies ran their water management models consecutively to provide actual spill operations used to assess the difference between operating forebays to 115% versus 120% TDG limitations. The SYSTDG results identify the spill caps under which the dams can theoretically be operated. HYDSIM is then used to produce actual project outflows and total spill volumes based on real world conditions.

For the first step in the federal analysis, the Corps used their SYSTDG model to identify spill caps with and without the 115% TDG forebay requirement. They analyzed high, medium and low water years to develop a range of operations that represent real-world conditions. BPA then incorporated these spill caps in the HYDSIM analysis to identify project outflows and total spill volumes under existing market and physical conditions.

Analyzing the Corps' calculated spill caps through HYDSIM is necessary because BPA's model considers both power and non-power requirements at the dams. Non-power operating requirements include obligations for International Treaties, flood control, navigation, irrigation, recreation and spill for fish passage. Once non-power priorities are met, the remaining generation available is compared to what's needed in the region. If all remaining generation available at a dam is not needed, the additional water is spilled; this is *forced spill*.

BPA analyzed the spill caps developed by the Corps through their HYDSIM model to assess power and non-power requirements under 70 years of historical inflow at 70 hydroelectric projects in the Columbia River Basin. The results demonstrate the difference in spill volumes by removing the 115% TDG forebay limitation. This systematic approach provided a comprehensive federal analysis that represents actual conditions observed in the Columbia River.

## Fish Passage Center Analysis

Spill volumes calculated by the Fish Passage Center were made without proper consideration of both power and non-power constraints to the federal hydrosystem (See Corps comments, document 404). The FPC admitted they did not consider overgeneration spill (forced spill) because they suppose that BPA could not guarantee this type of spill would occur in future years. FPC opinions on future market conditions are based on conjecture and should be disregarded. Theirs was a theoretical exercise based on selective data; the results should not be considered in your decision making process.

## 2. Fish Passage and Survivability Impacts

Based on NOAA-F analysis, these appears to be very little if any benefit to the number of adult salmon and steelhead returning to the Columbia River by removing the 115% TDG fore bay limit. In fact, this proposed operation will likely reduce the number of ESA-listed Snake River steelhead returning to the river. Proponents of more spill speculate that increasing spill volumes will improve survival for juvenile salmon and steelhead passing through the federal hydrosystem. While this may be true for some stocks, it will not likely result in higher juvenile survival and adult returns than those observed under current operations.

### NOAA-F COMPASS Analysis

NOAA-F incorporated the results of the federal analysis of additional spill available if the 115% TDG limit is removed into the COMPASS fish survival model. The COMPASS (Comprehensive Fish Passage) model was developed by the fish and wildlife managers in the region. COMPASS is a simple, Excel spreadsheet model based on actual measurements of fish survival at the dams. NOAA-F recently stated that the COMPASS model provides the best scientific information available for the purposes of assessing the biological effects of alternative hydrosystem operations (NOAA-F 2008b). Also, the Council's ISAB (2008b) noted in their most recent review that the COMPASS model realistically portrays the hydro-system and variable river conditions.

NOAA-F found that overall survival of juvenile Snake River spring/summer chinook and steelhead would decrease by about 1% if spill was managed to 120% in the forebays. The adult return rates for these two stocks were estimated to respond differently. The adult return rate for Snake River steelhead would *decrease* an estimated 1.1%. The survival to adult return rate for Snake River spring/summer chinook was estimated to increase 0.8%. Juvenile salmon and steelhead originating from the Upper and Mid Columbia River were estimated to experience a neutral effect or slight positive (<0.2%) increase in in-river survival and adult return rates (<0.8%) from the increased spill volumes.

Also, the ODEQ and WDOE need to take into account that fish transportation is a necessary strategy to safely pass juvenile salmon and steelhead through the federal hydrosystem. Transportation is an important mitigation action that assures that juvenile salmon and steelhead get safely to the ocean under the variety of conditions experienced in the Snake and Columbia Rivers. Spill volumes and fish transportation are inextricably linked. Increasing spill will result in decreased collection of fish for transport. Transported fish have a 98% survival rate to below Bonneville Dam. The most recent estimates indicate that in-river migrating Snake River spring/summer chinook had a survival rate of 41.6% from Lower Granite to Bonneville Dam (NOAA-F 2008a). Snake River steelhead had an in-river survival rate of 45.5% over the same portion of river. Increasing spill will expose more juvenile fish to lower in-river survival

rates; thereby reducing the total number of juvenile salmon and steelhead reaching the ocean.

NOAA-F has developed a “spread the risk” strategy which allows a portion of juvenile fish to migrate in-river and sets aside a portion to be transported in order to balance the risks associated with each route of passage. The Northwest Power and Conservation Council’s Independent Science Advisory Board (ISAB) recently reviewed the NOAA-F recommended spill and transport program (ISAB 2008). In summary, the ISAB found that barging benefits the survival of Snake River spring/summer chinook and steelhead. Furthermore, they stated their support of the NOAA-F “spread the risk” strategy in which a portion of fish are transported and a portion are allowed to migrate in-river (ISAB 2008a).

### **Fish Passage Center Importance of Spill Analysis**

The FPC also did not provide a quantitative estimate of the benefit additional spill volumes. Instead, they inferred significant benefits to fish survival through small increases in spill. Dr. Jim Anderson, of the University of Washington, School of Aquatic and Fishery Sciences, stated in his May 3, 2008 comments on the FPC analysis that a 28% increase in spill resulting in a 1000% increase SAR for steelhead was “exceedingly optimistic.” Dr. Anderson concluded his summary by stating that...*“It is noteworthy that to the best of my recollection the proposed benefits of spill in this analysis exceed all claims ever made by any agency over the past 25 years.”*

Dr. John Skalski, also of the University of Washington, School of Aquatic and Fishery Sciences, conducted a review of the statistical analyses of the FPC presentation. He noted in his March 3, 2008 review that...*“The resulting conclusion that spill is a good predictor [of juvenile fish survival] is circular in logic, and thus cannot be supported.”*

Analyses on the benefits of spill provided by the FPC and USFWS are based on conjecture and greatly exaggerate the benefits of spill. Further, the FPC did not provide the requested quantitative estimate of the benefits to fish by removing the 115% TDG forebay limit. The results of these analyses should not be considered in your decision making process.

### **USFWS Comparative Survival Study (CSS) Analysis**

The USFWS also presented an analysis of the benefits of additional spill volumes based on the Comparative Survival Study (CSS). The CSS has been critically reviewed by several independent research organizations in the region. In a June 29, 2007 review of the CSS study, Dr. Usha Varanasi, Science and Research Director for the NOAA-F Northwest Fisheries Science Center stated that:

*“The data presented, and the discussion and conclusion section all seem focused through the lens of specific positions favored by the authors: hydropower-system related latent mortality is large in magnitude, transportation*

*is not beneficial, management actions directed at the hydropower system have generally failed,”... and  
“Results that do not support desired positions are usually discounted by carefully placed language.”*

Dr. Varanasi concluded by stating that the CSS study was based on “*weak scientific methodology*” and that the FPC “*Ignores data from other systems*” (NOAA-F 2007).

NOAA-F recently completed analyses necessary to assess the effects of various river operations on ESA listed salmon and steelhead stocks in preparation of the 2008 Biological Opinion for the federal hydrosystem. NOAA-F (2008b) stated that the CSS had not received independent scientific review, and is not a functional model that would allow the types of analyses required by the FCRPS Biological Opinion. They concluded that the CSS is neither practical nor appropriate for BiOp analyses of the effects of various river operations on salmon and steelhead in the Columbia River basin (NOAA-F 2008c).

The estimated benefits of additional spill volumes developed by the USFWS are based on analytical tools which are not well received in the region. Furthermore, the USFWS did not provide the requested quantitative estimate of the benefits to fish by removing the 115% TDG forebay limit. The results of these analyses should not be considered in your decision making process.

### **3. Synthesis of FPC, USFWS, NOAA and CRITFC Analyses**

The synthesis of results prepared by ODEQ and Ecology incorrectly summarized the results of the NOAA-F COMPASS analysis. While there may be a small relative benefit to in-river survival, the authors did not consider the results that are most likely to occur under real world conditions.

Not all stocks experienced an improvement in in-river survival by removing the 115% TDG standard.

- The survival of steelhead originating from the Mid-Columbia River decreased due to removal of the 115% TDG standard.
- The overall (system) juvenile survival rate of ESA-listed Snake River spring/summer chinook and steelhead would be reduced.
- The adult return rate for Snake River steelhead would be reduced by over 1%.

### **4. Gas Bubble Trauma Impacts**

The authors correctly find that long-term effects of elevated TDG have not been properly studied. The effects of long-term exposure on fish and other aquatic biota are unknown at this time. Under current spill operations, the 110% TDG level is exceeded for several months each year. These analyses do not adequately assess long-term

chronic effects on fish and other aquatic organisms. Removing the 115% TDG forebay constraint would only exacerbate any negative effects we have yet to identify.

## 5. Summary

There is no compelling biological reason to eliminate the 115% TDG forebay limit from dams in the Lower Snake and Columbia Rivers. NOAA-F found that the response of listed salmon and steelhead to the changes in spill would be small. Snake River steelhead adult returns would be reduced by an estimated 1.1% under the proposed scenario. These results are based on careful analyses of empirical data using management and analytical tools currently use to operate the federal hydrosystem.

Spill volumes developed by the Fish Passage Center are the result of a theoretical exercise based on selective use of data; the results should not be considered in your decision making process. Also, FPC and USFWS did not provide a quantitative estimate of the benefit of additional spill volumes

Lastly, the Corps is required to meet water quality standards for total dissolved gas at the dams in the federal hydrosystem to protect fish and other aquatic organisms in the Snake and Columbia Rivers. They are working with the State water quality agencies to develop operations and physical improvements at dams to meet these requirements. Extensive progress has been made in meeting water quality standards. Reducing protections, such as removing the 115% TDG forebay limitation, is a step in the wrong direction.

Thank you for the opportunity to comment on this important public policy issue. We hope our comments are insightful and helpful. If you have any questions or need further information please do not hesitate to contact me at (503) 274-7792.

Sincerely,

A handwritten signature in cursive script that reads "Terry Flores".

Terry Flores, Director  
Northwest RiverPartners

## References

- ISAB 2008a. Independent Scientific Advisory Board. Snake River Spill-Transport Review. Document ISAB 2008-5. September 16, 2008. <http://www.nwcouncil.org/library/isab/isab2008-5.htm>
- ISAB 2008b. Independent Science Advisory Board Review of the Comprehensive Passage (COMPASS) Model – Version 1.1. June 2, 2008. Document ISAB 2008-3. <http://www.nwcouncil.org/library/isab/isab2008-3.htm>
- NOAA-F Northwest Fisheries Science Center 2007. Memorandum from Dr, Usha Varanasi, Science and Research Director for the NOAA-F Northwest Fisheries Science Center to Bruce Suzumoto, Asst. Regional Director Division NOAA-F Northwest Division dated, June 29, 2007. Portland, OR.
- NOAA-F 2008a. MEMORANDUM FOR: F/NWR5 – Bruce Suzumoto. FROM: F/NWC3 – John Ferguson. Subject: Preliminary survival estimates for passage during the spring outmigration of juvenile salmonids through the Snake and Columbia River reservoirs and dams, 2008. Dated September 8, 2008.
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- NOAA-F 2008c. Memorandum for the Administrative Record. From: D. Robert Lohn, Regional Director NOAA-Fisheries, Northwest Division. Response to Comments on the 2007 Draft FCRPS Biological Opinion. Dated, May 2, 2008. <http://www.nwr.noaa.gov/Salmon-Hydropower/Columbia-Snake-Basin/Final-BOs.cfm>