

# Executive Summary

## The Early Warning Indicator

Once the most productive salmon producing region in the world, the Columbia River basin has become a fraction of its former self. And the people are taking notice. Over \$1 million per day is spent on salmon recovery efforts. Yes, you read that correctly... \$1 million per day, not a week or month but per day! The hope is that someday, the region's salmon and steelhead will once again return to naturally, self-sustaining populations no longer in need of exorbitant expenditures and further Endangered Species Act protections.

Before the construction of dams in the Columbia watershed, the Snake River produced huge volumes of salmon and steelhead. The last major dam was completed in 1975 — Lower Granite, a federal dam on the Lower Snake River. Coincidentally, the Endangered Species Act was signed into law in 1973. Since then, twelve populations of four species of Columbia River Basin salmon and steelhead have been listed for protection under this important Endangered Species Act.

Congress is currently considering a bill, introduced by Rep. McMorris Rodgers from Eastern Washington, that would galvanize into law the Biological Opinion of 2014 concerning these dams. Taking a prudent, "precautionary approach" this Biological Opinion contains population-based triggers aimed to reduce the inherent risks associated with uncertainties surrounding "climate change, impacts of invasive species and predators, and interactions among the listed species." The details of these triggers are presented herein. Once these established biological triggers are tripped, as has now become the case, a suite of contingency actions will soon follow.

"The effect of these activities and contingencies will be to reduce the overall risk of unforeseen, rapid significant declines to the species posed by the uncertainty of climate change."

Hailed as the savior for the environment, the Endangered Species Act was designed to force necessary sacrifices in the short term for the benefit of society in the long term. That vision is now being taken to task in the Columbia River basin. In the midst, controversy prevails. Some of those that benefit from the status quo have fought to set aside what the vast majority of fish biologists have long seen to be the necessary solution — breaching the Lower Snake River dams, beginning with Lower Granite dam.

The Early Warning Indicator has now been tripped — Snake River Steelhead and Sockeye populations are both in steep decline to numbers last seen in the 1990s. The following pages layout the actions that are now to follow, the end result being the dewatering and mothballing of the Lower Snake River dams.

There will be protests from those currently benefiting from the subsidy of the status quo. They will continue their fight to protect their special interests, to "Save Our Dams". But will the people of this democratic society see the recovery of Columbia Basin's listed salmon and steelhead? What is certain is that the rules to now follow, detailed clearly in the 2014 Biological Opinion, are quite straightforward.

There is only one way out if extinction is to be averted. General Semonite, Chief of Engineers, restated bluefish's basic argument to the Columbia River System Operations process. Put succinctly, "It is easier to mitigate for hydropower, irrigation and navigation than it is to mitigate for a collapsing ecosystem." If you have further questions, contact [redfish@bluefish.org](mailto:redfish@bluefish.org) and I will explain whatever remains unclear.

# The Early Warning Indicator

## Supplemental Biological Opinion

### Consultation of Remand for Operations of the Federal Columbia River Power System

by NOAA Fisheries signed January 17, 2014

Notes and excerpts compiled by [bluefish.org](http://bluefish.org)

## Section 3: RPA Implementation Through 2018 for Salmon and Steelhead

### 3.7 AMIP Contingency Planning (page 419 of [FCRPS 2014 Supplemental BiOp](#))

The 2009 Adaptive Management Implementation Plan (AMIP) required that NOAA Fisheries and the Action Agencies develop biological indicators and contingency actions in case the status of an interior Columbia basin Chinook salmon ESU or steelhead DPS reaches a pre-defined warning level during the term of the Reasonable and Prudent Alternative (RPA). This is a **precautionary approach** to RPA implementation that reduces the risks associated with the scientific and technical uncertainties inherent in a 10-year mitigation program: Climate change, impacts of invasive species and predators, and interactions among the listed species. (Emphasis mine)

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#### 3.7.1 Early Warning Indicator and Significant Decline Trigger

The Early Warning Indicator alerts NOAA Fisheries and the Action Agencies to a decline in a species' natural abundance level that warrants further scrutiny. This indicator is a combination of 5-year abundance trends and rolling 4-year averages of abundance, based on the most recent 20 to 30 years of adult return data, depending on the species.

The Early Warning Indicator would be tripped if

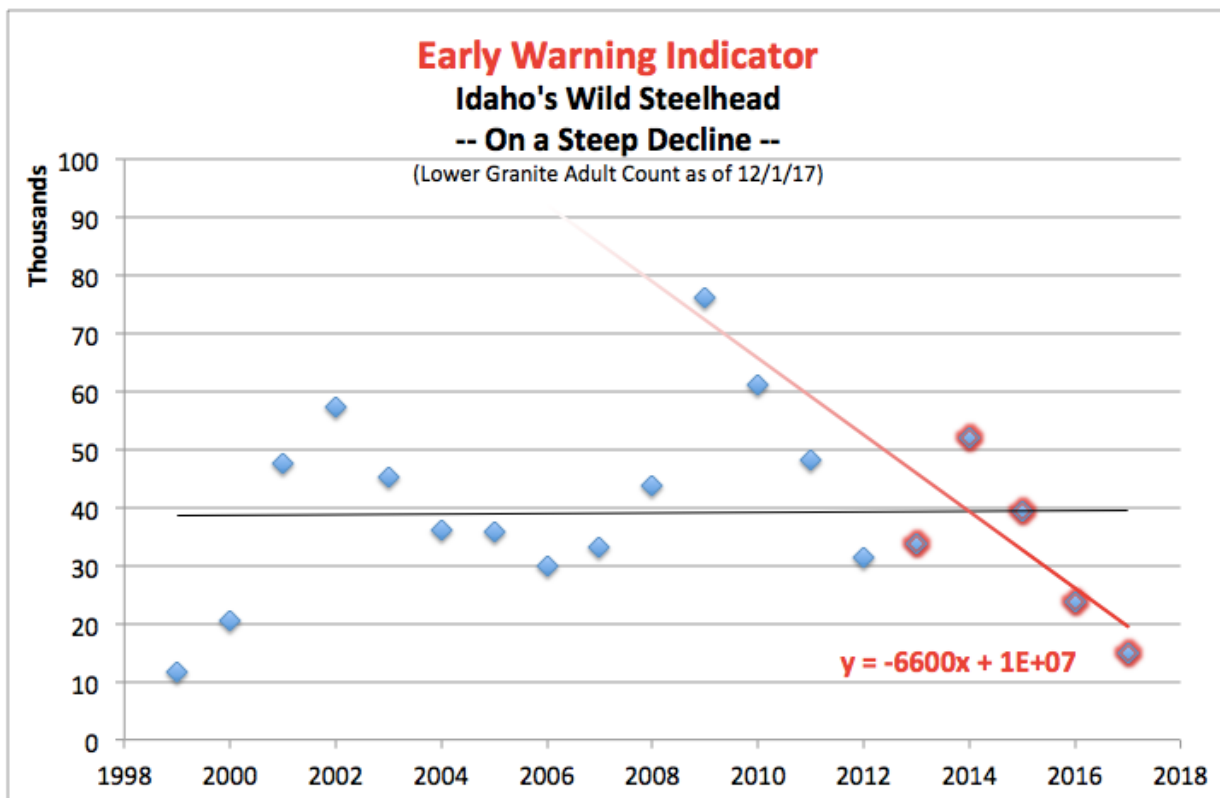
- the running 4-year mean of adult abundance dropped below the 20th percentile,
- or
- if
  - the trend metric dropped below the 10th percentile
  - and
  - the abundance metric was below the 50th percentile.

Tripping this indicator results in an assessment of whether or not a future significant decline is likely to occur in the next 2 years and if so which rapid response actions should be readied for possible implementation.

#### **bluefish notes:**

**5-year abundance trends** are based on the "rate of change", or the "slope" that you learned about in high school algebra. A picture best describes this, figure 1 on next page displays the adult counts of wild Steelhead crossing Lower Granite dam.

The slope of the "best fit" 5-year abundance trend shows that Snake River wild Steelhead are losing 6600 fish yearly. This is the **second** worst slope in the past **two** decades, (i.e. below the 10th percentile). Hence, 2017 will end with the abundance trend metric tripping the Early Warning Indicator. Final counts will be around 14,900 adults, well below the 50th percentile in abundance.



**Figure 1.** Snake River wild Steelhead are on a decline to levels not seen in twenty years. Adult returns in 2017 will mark the second steepest 5-year trend (red line is best fit of the red points) since the 2009-2013 trend. The third worst 5-year trend will be from 2002-2006 adult counts.

### 3.7.2 Decision Framework to Implement Rapid Response and Long-Term Contingency Actions

Within 120 days of NOAA Fisheries' determination that the Early Warning Indicator abundance levels have been observed, the Action Agencies, in coordination with NOAA Fisheries, the Regional Implementation Oversight Group (RIOG), and other parties will more closely evaluate the species' likely status and determine whether and what rapid response actions to take (i.e., actions that minimize or mitigate for the decline). After the Early Warning Indicator has been observed and the early implementation of rapid response actions has been deemed warranted, the rapid response actions will be **implemented as soon as practicable** and not later than 12 months. (Emphasis mine)

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#### bluefish notes:

With the Early Warning Indicator now tripped, the 2014 BiOp prescribes an assessment of whether or not a future Significant Decline Trigger is likely to occur in the next 2 years. Oddly, the result of this assessment will be a negative response.

It is not mathematically possible for the Significant Decline Trigger to be tripped in the next 2 years. Essentially, the counts would need to be BELOW ZERO in the coming years, which of course is not actually possible. NOAA Fisheries, (to which Federal Judges defer to for expert opinion) apparently did not anticipate a sudden sharp decline from an already low population level. Though here it is. Idaho's wild Steelhead AND Sockeye populations are BOTH heading back to levels of the 1990s.

In the following, nothing is said regarding the Early Warning Indicator but it seems that either of the two "biological indicators" should suffice. If these quantitative BiOp triggers are truly part of a precautionary approach, "further scrutiny" is certainly warranted.

### bluefish continues:

Furthermore, the adult count at Lower Granite Dam is 3,000 more fish than counted at the next dam downstream. How could the be? The discrepancy is generally accounted for by three factors: 1) Steelhead "holding over" a year in the reservoir before proceeding upstream to spawn the following year, 2) fish that mistakenly "fall back" over a spillway only to climb the fish ladder once again, and 3) steelhead kelts that did not journey to the ocean after their first spawning. These factors are accounted for in a "run reconstruction" conducted by NOAA Fisheries. Given that a large number of these fish are likely "fall backs" that were counted twice, the already low count of 14,900 fish will drop yet further. This unexpected, steep decline to numbers last seen in the 1990s is alarming. This is indubitably a very serious situation and agency leaders should realize this for what it is — a call for immediate action on the river. Extinction is not an option. Recovery is.

#### 3.7.2.1 All-H Diagnosis

The Action Agencies will conduct an initial qualitative All-H analysis informed by data provided by NOAA Fisheries and any other available scientific information on the likely factors that cause the Significant Decline Trigger to trip. This initial analysis will be used to inform a proposed list of rapid response actions. Concurrently, the Action Agencies (in coordination with NOAA Fisheries, the RIOG, and other regional parties) must also initiate an All-H diagnosis to

1. Evaluate whether the actions of the FCRPS are on track to meet All-H specific performance targets by 2018;
2. Determine the causes of a species decline (including whether ocean and climate conditions are contributing factors); and
3. Review life-cycle model results of potential long-term contingency actions and identify which H (hydro, predation, hatchery, habitat, and harvest) limiting factors should be addressed in the contingency actions.

The diagnosis must be completed within 4 to 6 months of a Significant Decline Trigger being tripped. The Action Agencies, in consultation with RIOG, will then use the results of the analysis to determine if rapid response actions **are likely to be sufficient**, or if long-term contingency actions will need to be implemented and, if so, which long-term contingency actions will be implemented. (Emphasis mine)

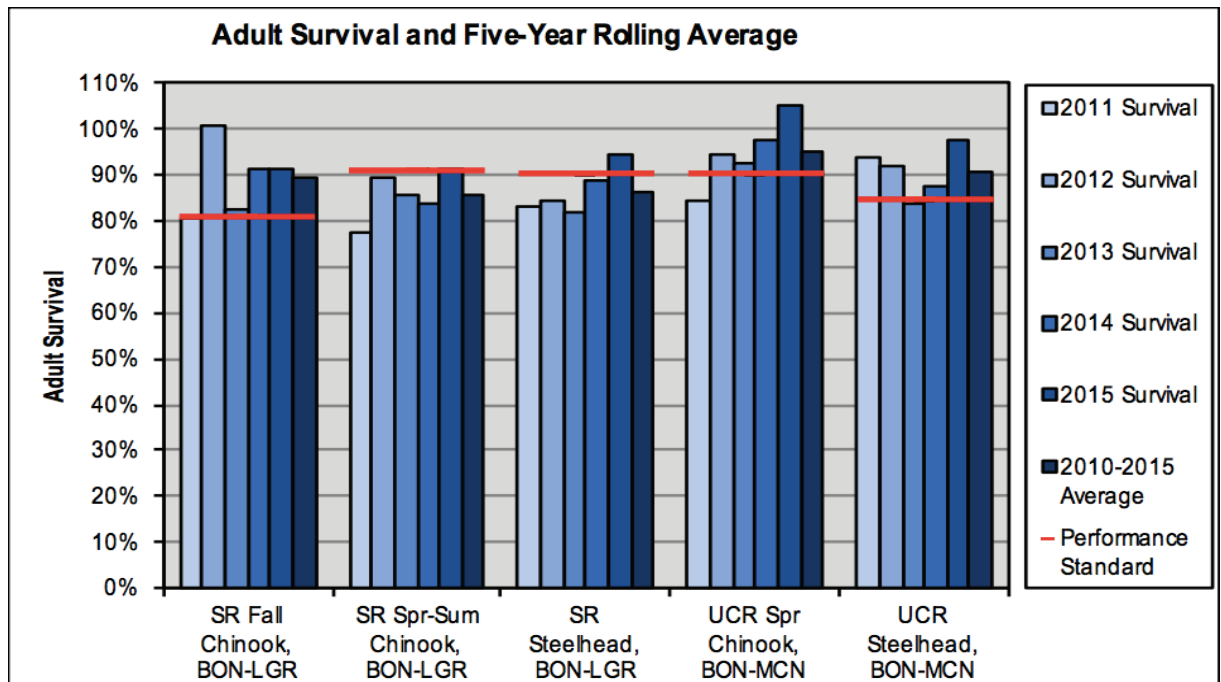


Figure 2. Adult Survival displayed are hydrosystem estimates after 12-15% harvest adjustment.

**bluefish notes:**

Poster boards from last year's [Columbia River System Operations](#) (Figure 2) shows wild Steelhead falling short of the 90.1% adult survival performance standard for migration through the FCRPS hydrosystem. The same is true of Snake River spring/summer Chinook and the Sockeye as well.

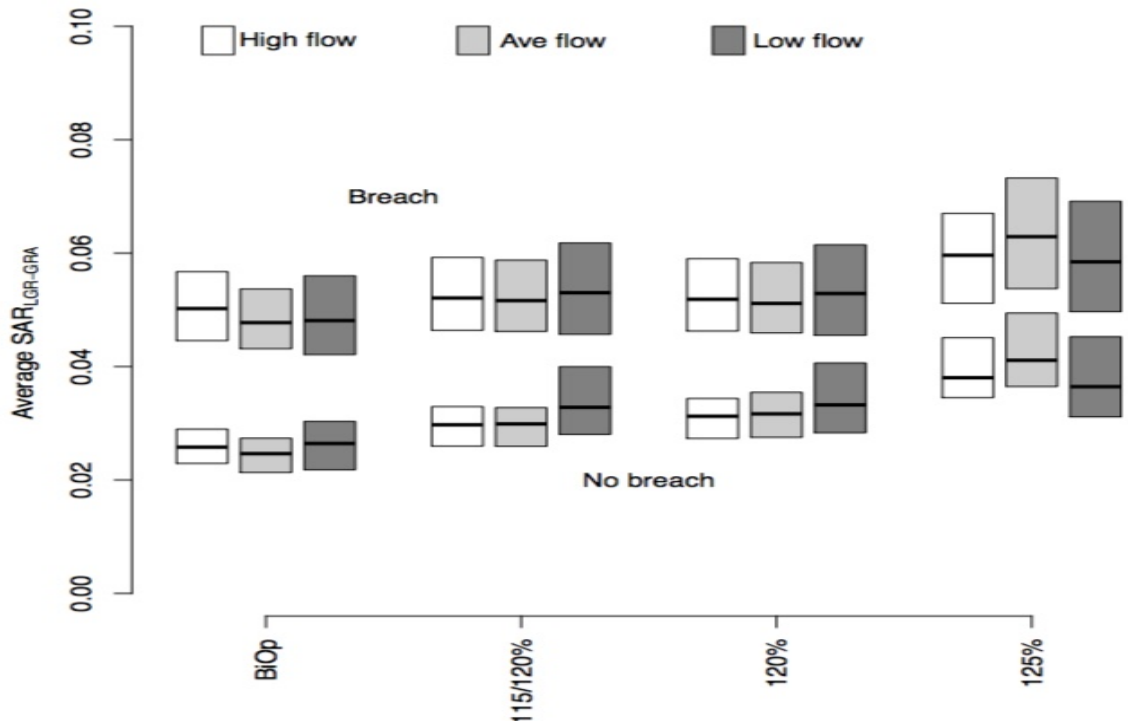
Equally troubling is a look at the region's habitat efforts. In a [recent review](#) by the Independent Science Advisory Board (ISAB) of a study that importantly asks if "the huge investment in habitat restoration projects (is) reflected in improved survival of salmonids in the parr through adult stages." The ISAB first notes "... that there are few studies that quantify benefits of habitat restoration on salmon survival and abundance." Then continuing in their review:

"Linear correlations are quite weak between the three salmon survival metrics (parr-to-smolt, parr-to-adult, smolt-to-adult) and the number of habitat actions (-0.06, 0.18, 0.22), indicating habitat actions **only explained up to 4.8%** of the variability in salmon survival. Furthermore, the negative correlation between parr to Lower Granite Dam survival is **troubling** because it implies **survival declined with increasing number of habitat actions.**" (Emphasis mine)

**3.7.2.2 Life Cycle Analysis and Life Cycle Model**

A key component of the life-cycle analysis is the life-cycle model. Information from this model will be used to determine which rapid response and, if necessary, which long-term contingency actions to take and whether or not the actions are proving effective for the ESU/DPS in decline.

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**Figure 2.9: Sensitivity analysis of predicted long-term average SAR at LGR between 2036 and 2045 at all combinations of spill levels and flow levels. Each cluster of three bars represent high flow (white boxes), average flow (light grey boxes), and low flow (dark grey boxes). Boxes represent the 25% -75% quartiles. Median values are shown with dark horizontal lines inside boxes.**

**Figure 3.** A graphic result from a life-cycle analysis looks at LSR dam breaching while increasing spill at the Lower Columbia River dams (McNary, John Day, The Dalles and Bonneville dams). The bottom left set of rectangles displays the current conditions for Chinook from the Grand Ronde watershed. Rectangles to the right reveal results for increases of spill beyond current conditions.

### bluefish notes:

Without a doubt, the upcoming Life Cycle Analysis will point directly at Lower Snake River dam removal as the long-term contingency action that is now necessary to undertake. The 2002 Lower Snake River [Environmental Impact Statement](#) (EIS) reached that very same conclusion and new information does nothing to counter that.

Lower survival rates for (Snake River) steelhead are associated with warmer ocean conditions, reduced upwelling in the spring, and with slower river velocity and warmer river temperatures. Given projections for warming ocean conditions, a precautionary management approach should focus on improving in-river migration conditions by increasing water velocity, relying on increased spill, or other actions that reduce delay of smolts through the river corridor during their seaward migration. (Petrosky & Schaller [2010](#))

Unable to freely speak of Lower Snake River (LSR) dam breaching for fear of losing funding, euphemisms such as "other actions" or "[out of basin effects](#)" have unfortunately become commonplace. Now beyond such financial [threats](#), the Fish Passage Center [recently](#) looked at this Life Cycle Model to compare LSR dam breaching to increases in "spill", where reservoir water is let loose to fall freely over spillways (Figure 3). Gravitational energy is left unharnessed but fewer juvenile salmonids will strike turbine blades or suffer other injuries during powerhouse passage.

Importantly, water travel time is highly correlated with juvenile survival. Spill reduces turbine strikes but does not greatly speed water travel time. In contrast, removing slow moving reservoirs has much higher survival benefit than merely increasing spill. Indeed, the life-cycle model reveals a doubling/tripling of survival following LSR dam breaching. Increasing spill has much less effect.

### 3.7.2.3 Potential Rapid Response and Long-Term Contingency Actions

The Action Agencies and NOAA Fisheries, in collaboration with RIOG, develop a suite of potential rapid response and long-term contingency actions that could be taken if a Significant Decline Trigger is tripped. These serve as a menu of potential actions that could be used to address the needs of a specific ESU or DPS. The Action Agencies in collaboration with NOAA Fisheries, the RIOG, and other regional partners would review and select specific actions with regard to the targeted species, while considering the implications of implementation for other species and on the other authorized FCRPS project purposes. The suite of actions is described in [USACE et al. \(2012\)](#). For example, . . .

(A few examples of rapid response and long-term contingency actions are listed and partially described.)

For harvest, if protection is needed as either a rapid response or long-term contingency measures that is beyond the abundance-based management provisions of the *U.S. v. Oregon* Agreement, NOAA Fisheries will use procedural provisions of existing harvest agreements to seek consensus among the parties to modify the agreements.

The potential survival benefits from a given action can vary considerably depending on the specific conditions that exist for a given year and location (flows, temperatures, numbers of predators, etc.). The survival benefits from all the separate actions considered for a rapid response or long-term contingency plan will be incorporated into a life-cycle model to determine expected increases to adult returns from these actions.

### 3.7.3 Relevance to the 2008/2010 RPA

The 2009 AMIP established biological triggers that, if tripped, will activate a suite of short-term and long-term contingency actions. The effect of these activities and contingencies will be to reduce the overall risk of **unforeseen, rapid significant declines** to the species posed by the uncertainty of climate change. At this time, neither the Early Warning Indicator nor the Significant Decline Trigger has been tripped for any of the interior Columbia Basin ESUs or DPSs. (emphasis both mine)

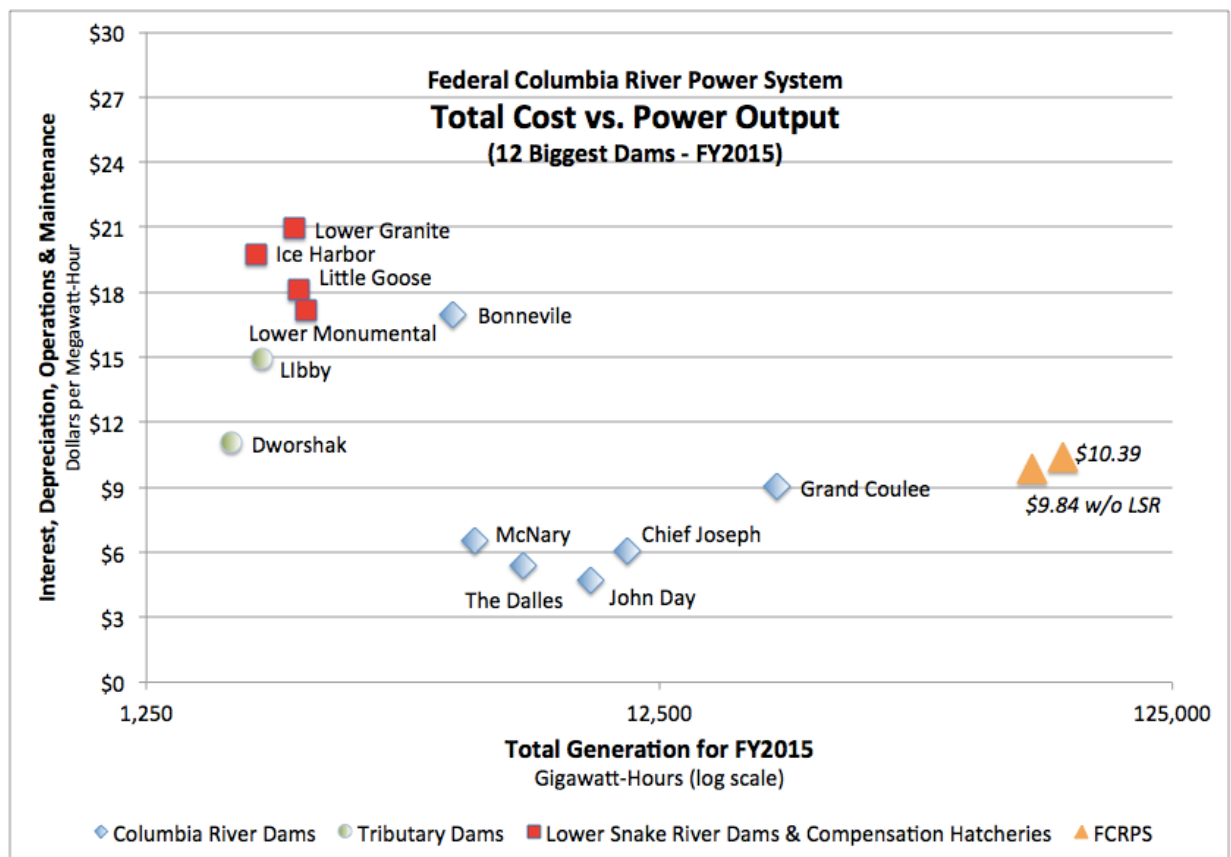
With section 3.7 AMIP Contingency Planning now concluded,

**bluefish adds further commentary:**

One readily sees that there are decision points where insincere decision-makers can opt out of doing "the right thing", that is, making decision based on the best information available.

Past is past, but what is different this time around is that the four Lower Snake River dams are no longer economically viable (Figure 4). Bonneville Power Administration (BPA) ratepayers could see a reduction in electricity rates if the costly LSR dams were dewatered and mothballed and their "compensation" hatcheries shuttered. At the end of their design life, the four federal dams on the Lower Snake River have become an unnecessary drain on the region's economy. Are you skeptical?

Consider that operations and maintenance costs of LSR Compensation Plan hatcheries alongside operations and maintenance costs of LSR dams have a combined cost greater than the prices typically seen in the "surplus market". The LSR dams are costing more than their output is worth.



Source: [www.bpa.gov/Finance/FinancialPublicProcesses/IPR/2016IPRDocuments/2016-IPR-CIR-Hydro-Draft-Asset-Strategy.pdf](http://www.bpa.gov/Finance/FinancialPublicProcesses/IPR/2016IPRDocuments/2016-IPR-CIR-Hydro-Draft-Asset-Strategy.pdf)

**Figure 4.** Operations and Maintenance of Lower Snake River dams and [compensation hatcheries](#) are burdensome to BPA ratepayers. Columbia River Fish Mitigation costs have added \$1 billion of debt (principal last paid in 1996) to BPA's already exorbitant interest costs of \$1 million per day.

### bluefish continues:

Oversupplied, the Northwest typically exports 4,200 megawatts of electricity annually into Western markets where supplies of renewable energy are ever increasing. The BPA's surplus of electricity, that was once a benefit, has become a detriment. The market price for BPA's surplus power is now less than BPA's cost of production (Figure 6). Admitting this situation, the BPA has [increased power rates 35%](#) over the past several years as surplus power revenues haven't fallen [short of expectations](#).

Are there other reasons for keeping the LSR dams? Are they necessary for grid stability, voltage regulation or other ancillary services? That is certainly a good question to ask. The interested reader will find these issues, and more, thoroughly addressed in the [bluefish comment](#) to the Columbia River Systems Operations process. General Semonite, Chief of Engineers, has reiterated the bluefish argument, stating that it is easier to mitigate for hydropower, irrigation and navigation than it is to mitigate for a collapsing ecosystem. Seeking a balanced view on the issue, General Semonite has asked to know of anything that might have been left out of the discussion. Wisely, he seeks to be well informed. I applaud him. With that said, if anything at all comes to mind as to why the LSR dams should not be breached, let him know without further delay. He wants to know.

What is now "the right thing" to do? That is the pressing question. As informed by Steve Barton, Chief of the Water Management for USACE, "the right thing" would be to follow the usual course whenever a chosen alternative from an Environmental Impact Statement (EIS) falls short of its goal.

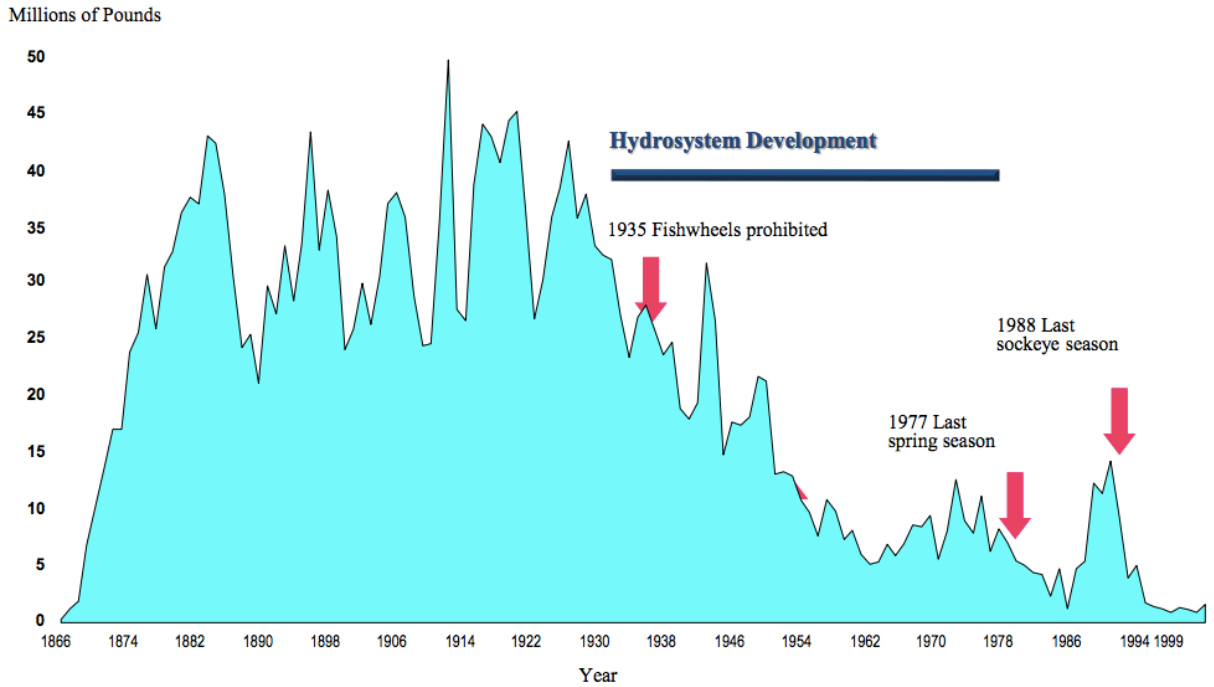
"Back to your question, you have a proposed alternative and then it plays out over time and either it is successful or not or anyone wants to revisit some of the other things that were studied, it will depend on the complexity of the next best alternative or selection of any of the other alternatives that wasn't incorporated. And depending on what that is, would depend on the level of effort it would take to actually switch to incorporate an alternative or aspects of alternatives that weren't in the proposed. Because if it is something, well we already analyzed it, maybe it's just dusting off the numbers. Or maybe, it's you know, the world has changed so much that that one would have to be completely reanalyzed."

— Steve Barton, Columbia River System Operations public meeting, October 27, 2016

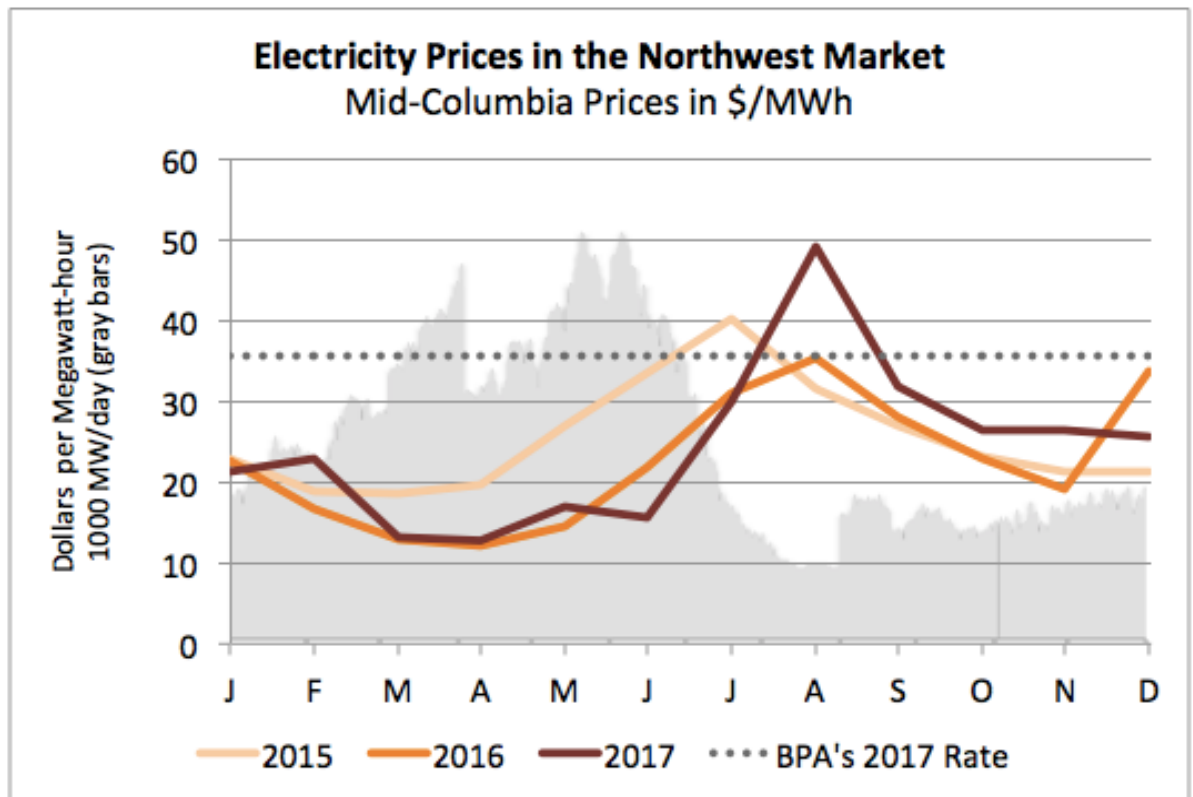
Operational since February 2002, the Lower Snake River [EIS](#) to which Steve Barton is essentially referring, made the determination that "breaching is not necessary at this time to recover listed salmon and steelhead stocks." Moreover, this determination was guided by NOAA Fisheries' 2000 BiOp that "concluded that dam breaching is not necessary at this time, but reserved this action as a **contingency management alternative** if the listed stocks continue to decline in the near future." And here we are. This is precisely the situation at hand. It would be difficult to argue otherwise.



# Commercial Landings of Salmon & Steelhead from the Columbia River 1866-1999



**Figure 5.** Commercial harvest of Salmon and Steelhead from the Columbia River was once abundant and now heavily regulated due to dwindling populations. Most recently, harvest is restricted to protect wild Steelhead, protected by the Endangered Species Act since 1997. (Source: Tony Grover, Director of Fish & Wildlife [presentation](#) to Northwest Power & Conservation Council)



**Figure 6.** Electricity Prices in northwestern United States nearest to the Columbia River dams and the 10-year average output of Lower Snake River dams (in gray) peaking near 50,000 megawatts.