



# FISH PASSAGE CENTER

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## MEMORANDUM

To: Charlie Morrill, WDFW

From: Michele DeHart

Date: December 18, 2014

Re: Review of mortality and *Columnaris* data from the Smolt Monitoring Program at Snake River sites

At the Fish Passage Advisory Committee (FPAC) face-to-face meeting on November 18, 2014, you requested that the Fish Passage Center (FPC) staff review mortality and *Columnaris* data from all three of the Smolt Monitoring Program (SMP) sites on the Snake River. This request was in relation to a proposed Fish Passage Plan change form that is being discussed specific to Lower Monumental Dam (LMN). The proposed change form would terminate normal SMP sampling at LMN when *Columnaris* levels are elevated and mortalities of subyearling Chinook exceed some to-be-determined criterion. However, you suggested that perhaps FPAC should consider a similar proposal for Lower Granite (LGR) and Little Goose (LGS) dams. To inform this discussion, the FPC staff has reviewed mortality and *Columnaris* data from LGR, LGS, and LMN over the last seven years (2008–2014). Below is a brief summary of our findings from this review, followed by a more detailed discussion.

- High mortality events at LGR and LGS are much less frequent than those at LMN. Furthermore, levels of *Columnaris* at LGR and LGS are generally lower than what is seen at LMN, particularly at LGR.
- It appears that adopting high mortality criteria at LGR and LGS, as is being proposed for LMN, may not be warranted given the infrequent nature of high mortality events at these sites and generally lower levels of *Columnaris*.

## Overview

In 2008, the FPC incorporated data from the COE condition monitoring program at SMP sites into the SMP data collection and posting protocol. These condition data are available real-time to fisheries managers via the FPC website ([http://www.fpc.org/smolt/SMP\\_queries.html](http://www.fpc.org/smolt/SMP_queries.html)) and are housed as part of the SMP databases. For this review, the FPC staff queried the SMP databases for daily sample mortality and *Columnaris* levels on subyearling Chinook at LGR, LGS, and LMN for the period of July 1 through the end of SMP sampling. Since the FPC has condition data only back to 2008, this review is limited to the period of 2008–2014.

## Methods and Results

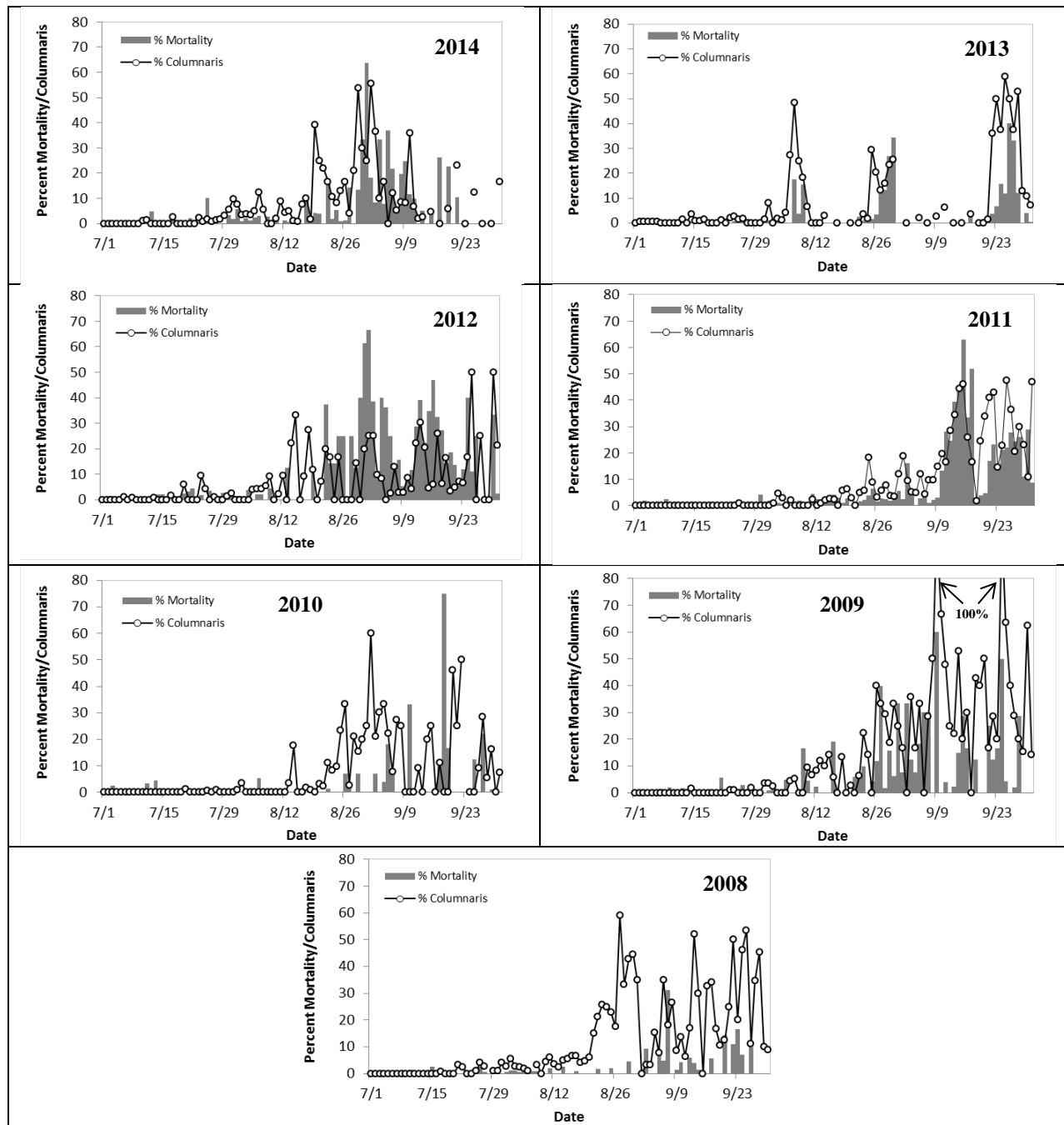
To assess how mortality and *Columnaris* levels at LGR and LGS compared to those at LMN, the FPC staff summarized daily mortalities and *Columnaris* levels (expressed as a percentage) at all three projects for the period of July 1 to the end of the SMP sampling season (October 31 at LGR and LGS, October 1 at LMN). For each site, we then estimated the proportion of sample days where daily mortality rates exceeded 20%, 15%, or 10%. It's important to note that all sample days in the time period specified above were included in these analyses. In other words, we did not filter the sample days by some minimum sample count. Figures 1 through 3 are provided to illustrate the daily mortality levels and how they coincided with daily *Columnaris* levels at LMN (Figure 1), LGS (Figure 2), and LGR (Figure 3).

Based on our review of the data, it appears that high mortality events at LGR and LGS are much less frequent than what occurs at LMN (Table 1, Figures 1–3). Furthermore, for the time period we concentrated on, there were no days at LGR where daily mortality exceeded 20% and only one day when daily mortality exceeded 15% (August 8, 2011) (Figure 3).

Many of the instances when daily mortality exceeded 20%, 15%, or 10% at LGS were days when very few subyearling Chinook were sampled, which is common at that time of year. This is important to note because when sample counts are low, a single dead fish can have a large impact on the estimated percent mortality. For example, in 2014, five of the 123 (4.1%) sample days at LGS had a mortality rate that exceeded 10% (Table 1). However, three of these five days had fewer than 10 total subyearling Chinook in the sample and only one day had a sample count of greater than 20 subyearling Chinook (September 6<sup>th</sup>, 38 total CH0 sampled). In general, subyearling Chinook sample counts at LGR are higher than at LGS and LMN so small sample sizes are less of a concern at this site.

**Table 1.** Proportion of sample days (July 1 to end of SMP season) when daily mortality exceeded 20%, 15%, or 10% at LMN, LGS, and LGR in 2008–2014.

| <b>Lower Monumental Dam</b> |                           |                                      |                                      |                                      |
|-----------------------------|---------------------------|--------------------------------------|--------------------------------------|--------------------------------------|
| <b>Year</b>                 | <b>Number Sample Days</b> | <b>Prop. Exceeding 20% Mortality</b> | <b>Prop. Exceeding 15% Mortality</b> | <b>Prop. Exceeding 10% Mortality</b> |
| 2008                        | 92                        | 0.01                                 | 0.02                                 | 0.04                                 |
| 2009                        | 93                        | 0.11                                 | 0.17                                 | 0.23                                 |
| 2010                        | 92                        | 0.03                                 | 0.05                                 | 0.06                                 |
| 2011                        | 93                        | 0.15                                 | 0.17                                 | 0.20                                 |
| 2012                        | 93                        | 0.23                                 | 0.25                                 | 0.38                                 |
| 2013                        | 77                        | 0.05                                 | 0.09                                 | 0.14                                 |
| 2014                        | 84                        | 0.10                                 | 0.13                                 | 0.18                                 |
| <b>Little Goose Dam</b>     |                           |                                      |                                      |                                      |
| <b>Year</b>                 | <b>Number Sample Days</b> | <b>Prop. Exceeding 20% Mortality</b> | <b>Prop. Exceeding 15% Mortality</b> | <b>Prop. Exceeding 10% Mortality</b> |
| 2008                        | 123                       | 0.00                                 | 0.00                                 | 0.00                                 |
| 2009                        | 123                       | 0.02                                 | 0.02                                 | 0.04                                 |
| 2010                        | 123                       | 0.00                                 | 0.01                                 | 0.04                                 |
| 2011                        | 123                       | 0.00                                 | 0.00                                 | 0.02                                 |
| 2012                        | 123                       | 0.01                                 | 0.01                                 | 0.02                                 |
| 2013                        | 123                       | 0.00                                 | 0.00                                 | 0.01                                 |
| 2014                        | 123                       | 0.02                                 | 0.02                                 | 0.04                                 |
| <b>Lower Granite Dam</b>    |                           |                                      |                                      |                                      |
| <b>Year</b>                 | <b>Number Sample Days</b> | <b>Prop. Exceeding 20% Mortality</b> | <b>Prop. Exceeding 15% Mortality</b> | <b>Prop. Exceeding 10% Mortality</b> |
| 2008                        | 123                       | 0.00                                 | 0.00                                 | 0.00                                 |
| 2009                        | 123                       | 0.00                                 | 0.00                                 | 0.00                                 |
| 2010                        | 123                       | 0.00                                 | 0.00                                 | 0.00                                 |
| 2011                        | 123                       | 0.00                                 | 0.01                                 | 0.02                                 |
| 2012                        | 123                       | 0.00                                 | 0.00                                 | 0.00                                 |
| 2013                        | 123                       | 0.00                                 | 0.00                                 | 0.00                                 |
| 2014                        | 123                       | 0.00                                 | 0.00                                 | 0.00                                 |



**Figure 1.** Daily percent mortality and percent *Columnaris* for subyearling Chinook at LMN, 2008–2014.

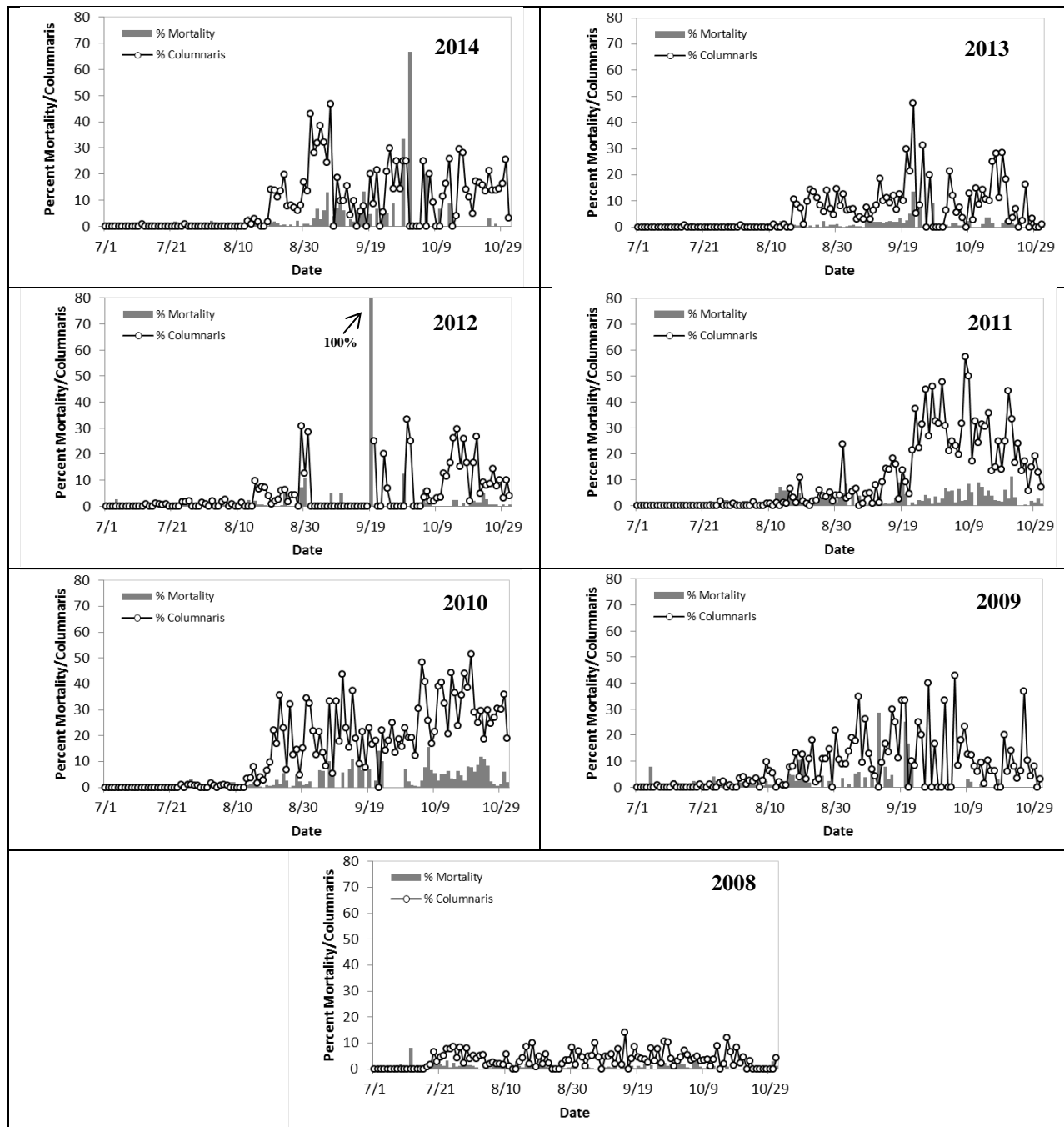
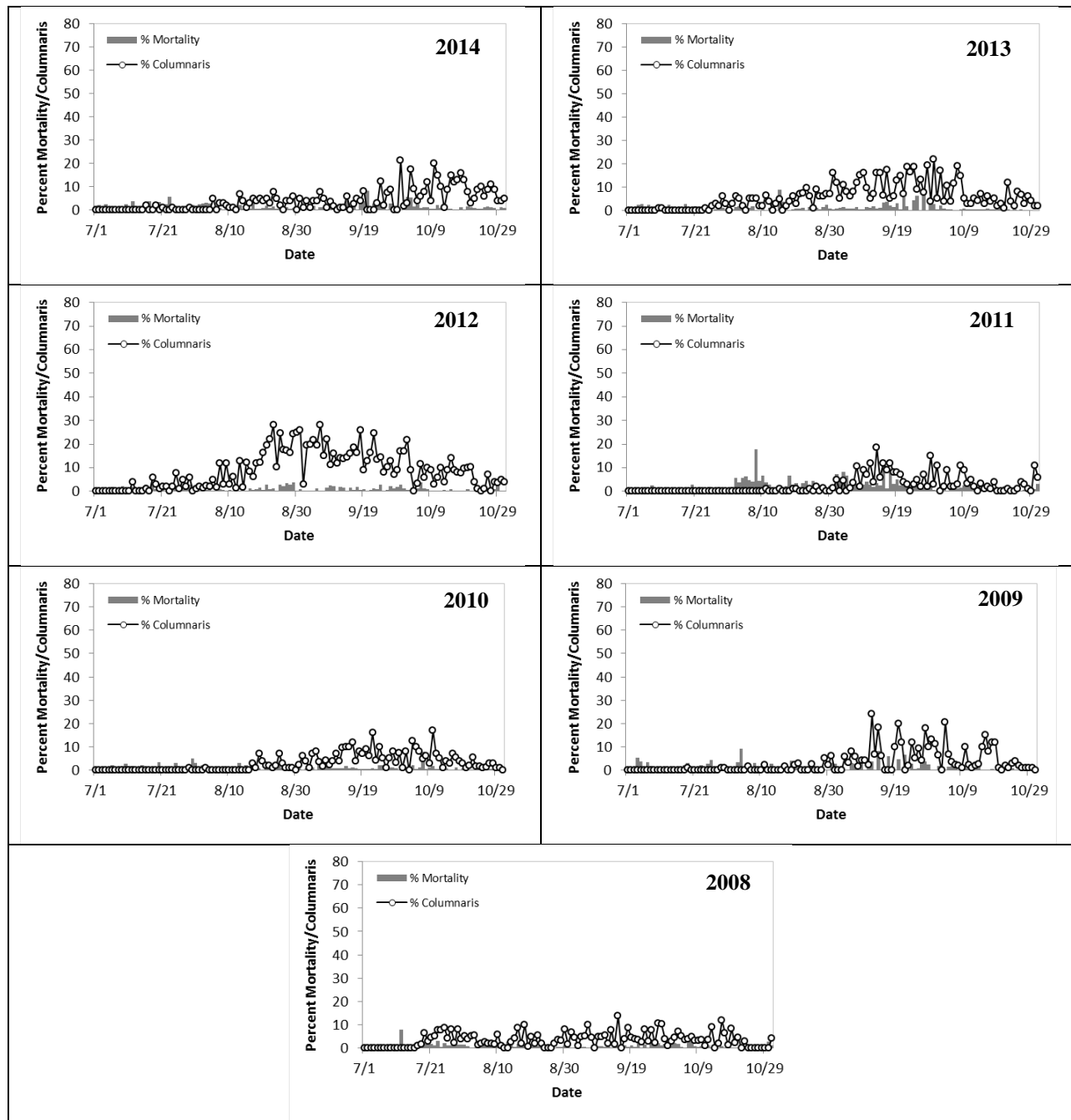


Figure 2. Daily percent mortality and percent *Columnaris* for subyearling Chinook at LGS, 2008–2014.



**Figure 3.** Daily percent mortality and percent *Columnaris* for subyearling Chinook at LGR, 2008–2014.

Not only does it appear that elevated mortalities are less frequent at LGS and LGR, but it also appears that *Columnaris* levels are generally lower at these sites when compared to LMN. This is particularly true for LGR (Figures 1, 2, and 3). Based on our review of the mortality and *Columnaris* data at LGR and LGS, it does not seem necessary to adopt similar criteria at these two sites, given that high mortality events are very rare at these sites.