MARCH UPDATE: PINNIPED ABUNDANCE AND SALMON PREDATION AT BONNEVILLE LOCK AND DAM

Fisheries Field Unit

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This is a monthly status report for the pinniped monitoring program at Bonneville Dam and summarizes the observed fish predation and pinniped abundance at Bonneville Dam from 01 March, 2019 through 31 March, 2019. Observations will continue through 31 May 2019, with monthly updates provided throughout the season. A final report will be compiled thereafter.

Previous reports and related PMP information can be found at the link below:

http://pweb.crohms.org/tmt/documents/FPOM/2010/Task%20Groups/Task%20Group%20Pinnipeds/

PLEASE NOTE - All data presented here are preliminary as of the status report date. Predation numbers and abundance estimates are unexpanded and will change as data are proofed and analyzed. Final predation estimate data will be expanded to adjust for hours and days not observed as well as "unknown" prey species consumed for the final report. The final report summarizing the results of the 2019 Pinniped Monitoring Program will be available in the fall of 2019.

BACKGROUND

Concerns regarding an increased number of pinnipeds at Bonneville Dam during the fall and winter and their potential associated impacts on endangered salmonids led to a request by NOAA to monitor the abundance and number of fish killed by these pinnipeds. In response to these concerns, and to fulfill the requirements set forth in the Federal Columbia River Power System Biological Opinion (NMFS 2000, 2008) – which outlines operational criteria for dams to protect ESA-listed fish – the U.S. Army Corps of Engineers, the Fisheries Field Unit initiated a fall and winter pinniped monitoring program to fulfill the Reasonable and Prudent Alternatives defined in the predation management strategy of the Biological Opinion and to provide estimates of pinniped abundance, fish predation, and deterrence strategies. This progress report documents the monitoring of pinniped activities at Bonneville Dam from 08 December, 2018 through 31 January, 2019.

Similar to last year's fall and winter monitoring period, we manipulated previously used spring sampling methods to fit the fall and winter conditions of the Columbia River system. We sampled the priority tailrace (as determined by planned winter outages) and sampled only that tailrace four hours per day in a stratified random fashion whenever the daily abundance counts were greater than 20 pinnipeds (as per study plan provided and approved by NOAA, March 2017). The planned outages for winter maintenance in 2018 are to take place at Power House 2, and as such, Power House 1 tailrace was prioritized for fish predation observations through 31 December, 2018.

The spring sampling period began on 1 January, 2019. As such, both power house tailraces are now being monitored using the same stratified random fashion with the four sampling hours being spread across the two tailraces. Methods and assumptions for observations and estimates of fish predation are captured in the previous year's annual report (Tidwell et al. 2018). These methods consist of visual observation of predation events that are incorporated by fish and pinniped species separately into a probability based estimation calculation to assess the mean level of predation each week. Bootstrap sampling of these estimates provide bounded estimates of predation by week, for each fish species, and by each species of pinniped. Due to the in-season nature of this update and the need to QA/QC data prior to analysis, the estimates provided here are the raw, unadjusted, and un-expanded estimates. Final (bounded) estimates will be provided after the season has completed and the data have been reviewed and analyzed.

Estimates of abundance are made by sampling across the tailrace and at known haul-out sites on Bonneville Project in the early morning hours when animals are most easily observed. Each site is independently counted and aggregated to provide a project wide estimate of pinnipeds each day. Counts are interpolated across weekends and holidays.

Thus, the data provided herein, are the daily project wide abundance estimates and the raw number of observed fish killed between 01 March 2019 and 31 March 2019. A final report with expanded fish predation estimates will be available after 31 May, 2019.

PINNIPED ABUNDANCE

We present abundance data using the maximum number of individuals counted during a comprehensive tailrace point count and interpolated for days not observed. For inter- and intra-year comparison of abundance estimates, we report average daily abundance with standard deviation as measures of variance.

Abundance: 01 March, 2019 – 31 March, 2019

Steller Sea Lion (SSL; *Eumetopias jubatus*) have been observed at the dam every day since March 1, 2019, with an average daily abundance estimate of 3.0 ± SD 3.05 (Table 1). No California Sea Lions (CSL; *Zalophus californianus*) were observed during the same period (Figure 1). No harbor seals (*Phoca vitulina*) have been observed since 24 January, 2018.

To date, we have documented 26 SSLs as uniquely identifiable individuals. The number of unique individuals for this period (1 March – 31 March) is at least nine, but the number of individually identifiable SSL based on brands and unique markers is nine animals. The number of individually identifiable pinnipeds is difficult to estimate due to the limited branding effort for the SSL.

Figure 1. Comparison of estimated abundance of each pinniped species at Bonneville Dam between the 10-year running average and the current year.

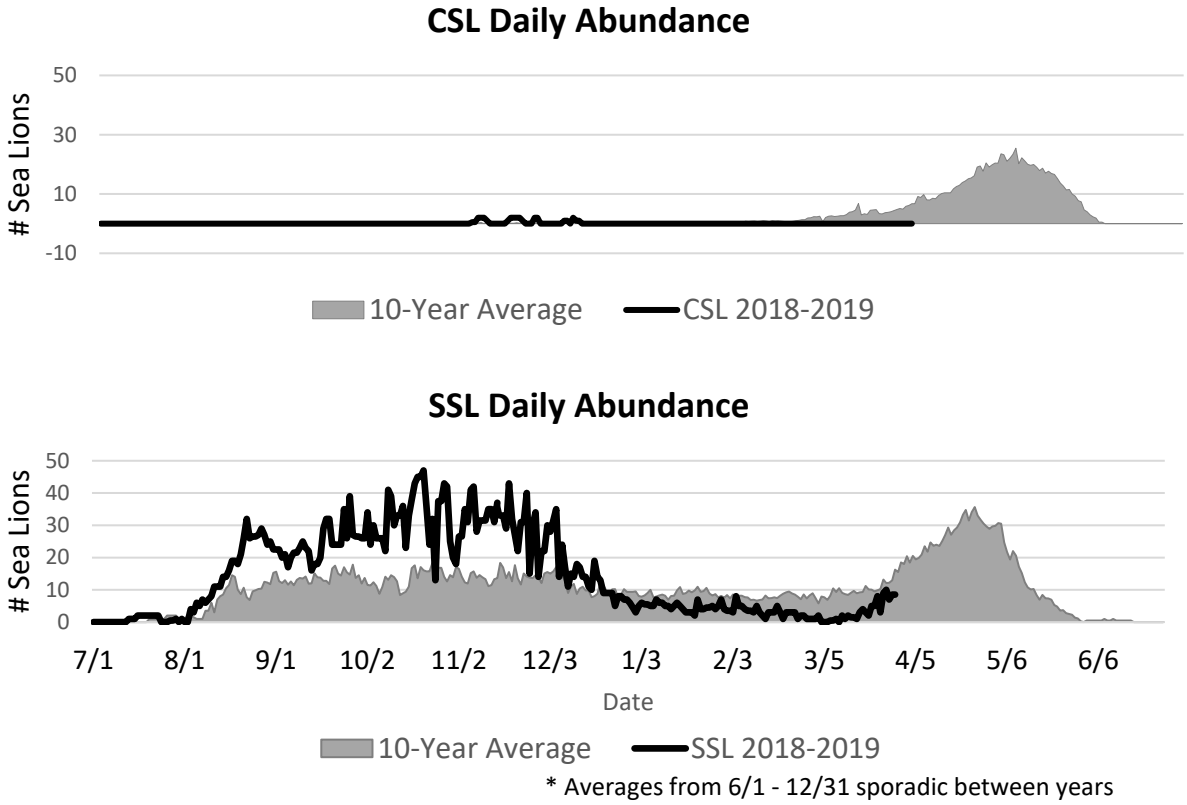

Table 1. Interpolated daily minimum counts of pinnipeds at Bonneville Dam tailraces between 01 March, 2019 and 31 March, 2019.

Species	$\bar{x} \pm$ S.D.	Range	n days $= 0$
SSL	3.0 ± 3.5	1 - 10	0
CSL	-	-	31

FISH PASSAGE & PREDATION

Salmonid passage for March was below the 10-year average (Figure 2). A total of 971 steelhead (*Oncorhynchus mykiss*) passed in March, which is approximately 63% of the 10-year average. There have been 44 Chinook Salmon over Bonneville as of 31 March 2019, which is approximately 12% of the 10-year average.

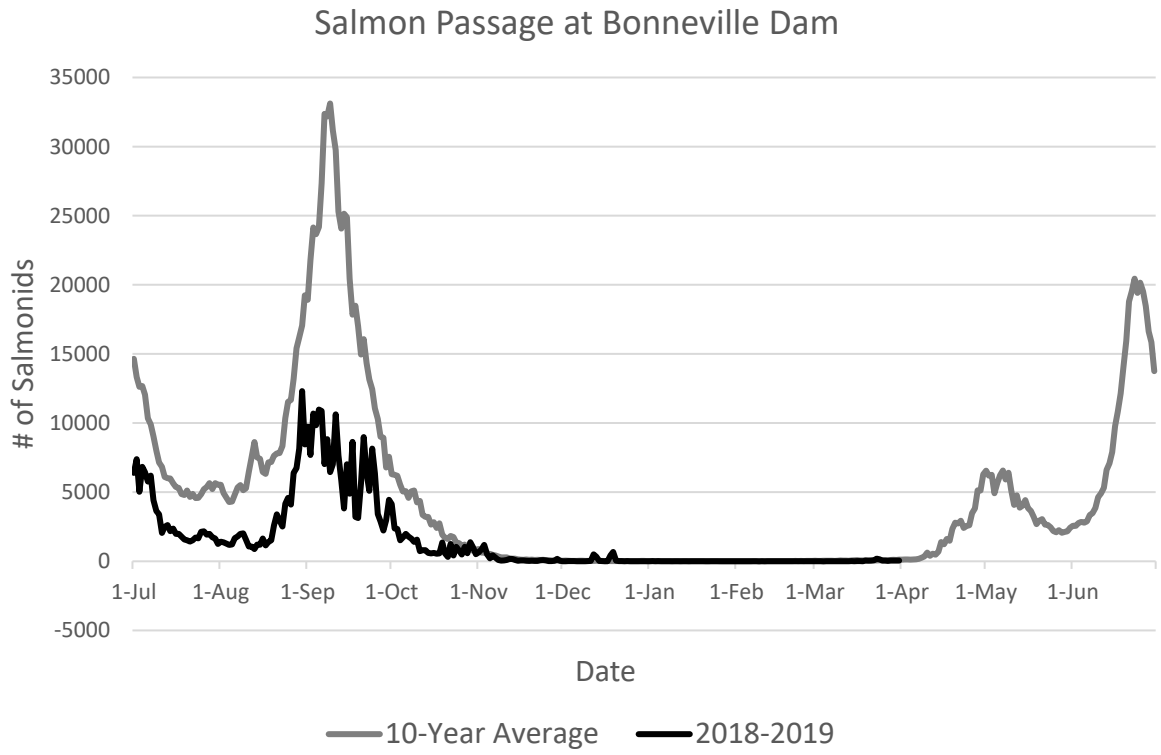

Figure 2. Comparison of the ten year average and current passage of all salmonids over Bonneville Dam between 08 December, 2018 and 31 March, 2019. Data obtained from USACE, FPC – www.FPC.org.

Fish Predation: 01 March, 2019 – 31 March, 2019

From 01 March, 2019 to 31 March, 2019, a total of four steelhead and two "unknown" predation events by pinnipeds have been documented (Table 2). Upon review and expansion for hours not observed and unknown fish predation events, the estimated number of fish killed will increase.

Table 2. Observed fish consumption by both species of pinniped at Bonneville Dam from 01 March, 2019 and 31 March, 2019.

Species	Chinook	Coho	Steelhead	Sturgeon	Lamprey	Other	Unknown	Total
SSL	0	0	4	0	0	0	2	0
CSL	0	0	0	0	0	0	0	0
Total	0	0	4	0	0	0	6	6

DISCUSSION

Relative to the March monitoring conducted last year, both SSL and CSL abundance is are similar. However, both species are below the ten year average for the time period. Low levels of SSL are observed daily and no CSL. Fish predation is also similar to the previous year and are likely indicative of the low fish abundance near BON during this time of year. Abundance and predation monitoring will continue until the end date of 31 May, 2019 is reached.

LITERATURE

NMFS (National Marine Fisheries Service). 2000. Federal Columbia River Power System Biological Opinion.

NMFS (National Marine Fisheries Service). 2008. Federal Columbia River Power System Biological Opinion.

Tidwell, K.S., B.K. van der Leeuw, L.N. Magill, B.A. Carrothers, and R. H. Wertheimer. 2018. Evaluation of pinniped predation on adult salmonids and other fish in the Bonneville Dam tailrace, 2017. U.S. Army Corps of Engineers, Portland District Fisheries Field Unit. Cascade Locks, OR. 54pp.