

STATUS REPORT – PINNIPED PREDATION AND DETERRENT ACTIVITIES AT BONNEVILLE LOCK AND DAM

April 18, 2017



Prepared by:

Kyle Tidwell, Bjorn van der Leeuw, and Thomas van Hevelingen

Fisheries Field Unit

U.S. Army Corps of Engineers, Bonneville Lock and Dam Cascade Locks, OR
97014

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 2017 Pinniped Monitoring Program will be available in the fall of this year.

This is the first status report for the 2017 pinniped monitoring season and summarizes the observed predation and deterrent activities at Bonneville Dam from 15 August through 7 April 2017. Future updates and status reports will be issued on a bi-weekly basis.

SUMMARY

Using a stratified sampling design of observations from the dam's tailrace, trained observers monitor fish predation and pinniped abundance five days a week during daylight hours. Abundance is monitored year round (when pinnipeds are present), and pinniped-fish predation monitoring began 10 January 2017 and will continue through 31 May 2017. To date, only ten days of sampling days have been missed. Abundance counts from the fall and winter months (15 August – 31 December) show a record high number of Steller sea lions (*Eumetopias jubatus*) ($n \leq 56$, $\bar{x} \pm SD$: 22.9 ± 11.2). The immigration of Steller sea lions during the winter time period appear to align with the recorded passage of steelhead (*Oncorhynchus mykiss*). The number of Steller sea lions has now dropped to a daily average of 6.1 ± 3.9 per day.

Low levels of California sea lions (*Zalophus californianus*) were documented in October and November, and then a few animals began to consistently stay near the dam on 6 February, 2017. Their numbers remained low (i.e. 0.5 ± 0.8 per day), but this last week (April 10 – 14) the number increased to an average of 2.0 ± 1.1 on project each day. No brands were present on the early arriving animals, and as such, we cannot determine if it was the same animals each day, or different animals moving in and out of the system.

Similar to the small number of pinnipeds, the salmonid passage at the dam has remained low. Chinook (*Oncorhynchus tshawytscha*) passage during the month of March was the second lowest on record. The number of observed predation events reflects these low numbers of both predator and prey, whereby, one Spring Chinook, and nine steelhead (*Oncorhynchus mykiss*) have been observed being consumed by pinnipeds during scheduled sampling periods. To date, no Pacific Lamprey (*Entosphenus tridentatus*) or White sturgeon (*Acipenser transmontanus*) predation have been observed during scheduled sampling intervals.

The first Chinook salmon predation event was recorded on 5 April 2017 and recent increases in both fish passage and pinniped numbers suggest that the interactions of predator and prey will soon increase at the dam.

PROGRAM UPDATES

The pinniped monitoring season began with three items that deserve comment: first, a new team lead for pinniped monitoring was hired at the Fish Field Unit (FFU). Kyle Tidwell, who recently completed his PhD in Biology at Portland State University was selected to run the team. Second, as the season was beginning in January, the federal hiring freeze was implemented which severely restricted the ability to hire the positions conventionally used to sample pinniped activity. As such, modeling with previous years data was used to assess what sampling scheme would provide robust estimates of predation and abundance given the small sampling team. The models found that a stratified sampling design, similar to those implemented last year, but with reduced coverage would provide sufficiently robust and bounded estimates of predation. The program has been able to hire a few more observers vital to the study design and will continue with the current reduced sampling scheme to assess the efficacy of the stratified model which will ultimately guide future study of pinniped activity at the dam.

We next highlight a camera trap station that was implemented this year. To continue meeting the requirements of the 2008 Federal Columbia River Power System Biological Opinion and the associated Reasonable and Prudent Alternative number 69, we built and installed a camera trap station to get continuous monitoring and count information on pinniped abundance at Tower Island. The camera traps facilitate a photo-archive (with time and date record) of individual animals. This technology improves the accuracy and duration of sampling while simultaneously documenting nocturnal patterns of pinniped behavior which re-enforces the previously suggested pattern of pinnipeds foraging during the day and resting at night. We would like to recognize the efforts of the State Historic Preservation Office in providing us the permit to proceed with this addition to our monitoring program.

PINNIPED ABUNDANCE

We first present the abundance of pinnipeds during the autumn and winter months and then the abundance counts for our focal sampling period to date, 1 January – 31 May. Although not conventionally done this way, the basis for partitioning the sampling periods and presenting the winter abundance counts is two-fold: first, increased pinniped abundance and activity during the autumn and winter months has become of potential concern to management and as such, documentation need be provided to identify any potential patterns that may be emerging; and second, the seasonal flux of pinnipeds at the dam now extends beyond the historical focal sampling period and must now include these autumn and winter months to more accurately describe pinniped activity and presence.

For purposes of clarity and translation to previous years, we present abundance data using the most conservative estimate possible. That is, the maximum number of individuals counted during a point count of the primary observation stations (Power House 1 and 2, Spillway, Tower

Island, and Tanner Creek) used during the predation sampling period. These are areas that are known foraging and haul-out zones for the pinnipeds and provide a clear view of the observation area. For times not observed (e.g. weekends, harsh weather events, and federal holidays), we interpolated point counts by species of the last count of the previously sampled day, and the first count of the next sampled day. We recognize that this measure may not capture animals in transition between sites, or animals that have been in the tailrace area and then emigrated downstream beyond the observation locations, and therein, may be skewed towards underestimating the total number present, but elect to use this measure as it is the most conservative abundance metric. For translation of inter and intra-year comparison of abundance estimates, we report average daily abundance with standard deviation and coefficients of variation as measures of spread.

Abundance 15 August – December, 2016

Pinniped abundance was monitored during the fall and winter months of 15 August – 31 December 31. During these months, California sea lions (CSL; *Zalophus californianus*) are not commonly documented, but Steller sea lions (SSL; *Eumetopias jubatus*) have become increasingly common near the dam. The first SSL lion documented on project on 15 August 2016. Point counts were conducted at all locations known to be used by pinnipeds during morning and evening hours – a time period when the animals are often on land and easier to count. During the fall and winter period, the daily average number of SSL was 21.3 ± 11.5 (Table 1). The daily number of SSL increased from August 2016 (15 August 2016: $n = 3$) through October 2016 when it peaked (19 October 2016: $n = 56$), and then receded to lower numbers by the end of December (31 December 2016: $n = 13$) (Figure 1). This increase of SSL abundance appears to align with the dam passage of steelhead (presumably the Summer B run and a component of the initial winter run). We sporadically documented at least one non-branded CSL from October 19 – December 15, 2016 and one group of five CSL were recorded on October 27, 2016, but were not observed any other day. The lack of identifiable markers on these animals make it unclear whether they were the same animals or different individuals.

Species	$\bar{x} \pm \text{S.D.}$	C.V.	Range
SSL	21.3 ± 11.5	0.49	0 - 56
CSL	0.6 ± 1.03	1.61	0 - 5

Table 1. Expanded daily minimum counts of pinnipeds at Bonneville Dam tailraces between 15 August and 31 December 2016.

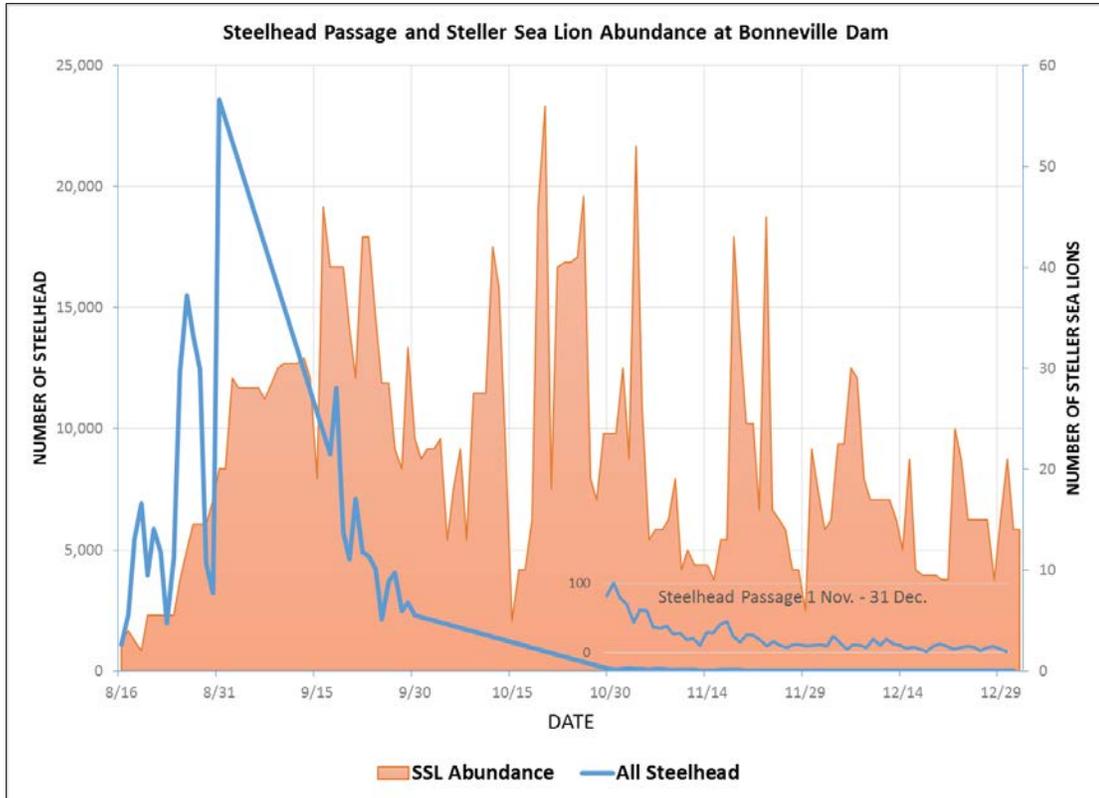


Figure 1. Steelhead (*Oncorhynchus mykiss*) passage and Steller Sea Lion (SSL) abundance at Bonneville Dam over the interval 15 August – 31 December 2016. Insert depicts all steelhead over the dam between 1 November and 31 December with a refined interval of fish numbers to show these data.

Abundance January – April 7th, 2017

The combined pinniped numbers at Bonneville Dam between 1 January and 7 April, 2017 are significantly lower than the long term average (Mann-Whitney $U = -3.601$, $P < 0.0003$, Fig. 2). This being the focal sampling period for predation, it is unique that the SSL continues to be the dominate species in the system, wherein daily counts of all pinnipeds from 1 January – 7 April, 2017 averaged 6.6 ± 4.4 animals, the bulk of which were SSL (6.1 ± 3.9) and the balance, CSL (0.5 ± 0.8) and one Harbor Seal (*Phoca vitulina*) (Table 2). The daily maximum count of 19 SSLs and three CSLs occurred on April 3rd and April 6, respectively.

To date, we have documented eight SSL and five CSL as uniquely identifiable individuals, all of which have been observed on project in previous years. All eight SSL have been recorded during both observation periods.

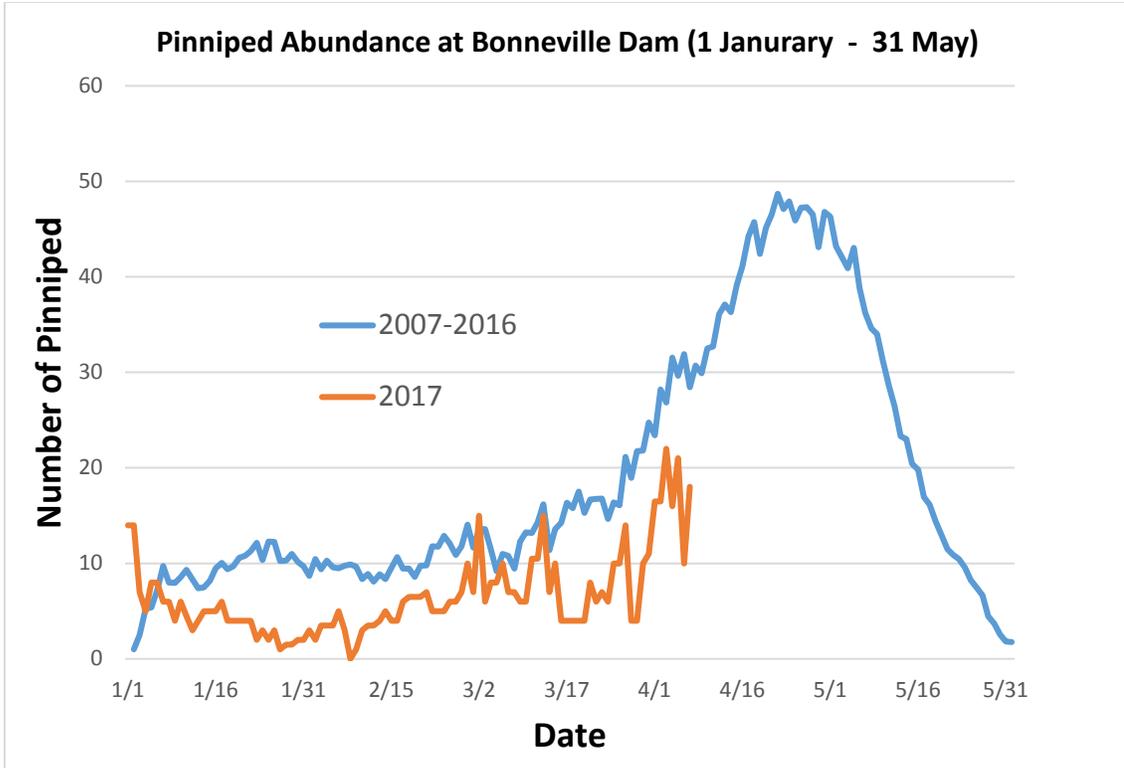


Figure 2. Comparison of estimated abundance of all pinniped species at Bonneville Dam between the 10 year running average and the current year. To date, this years pinniped numbers are significantly lower than the historical average (Mann-Whitney $U = -3.601$, $P < 0.0003$).

Species	$\bar{x} \pm S.D.$	C.V.	Range
SSL	6.1 ± 3.9	0.65	0 - 19
CSL	0.5 ± 0.8	1.72	0 - 3

Table 2. Expanded daily minimum counts of pinnipeds at Bonneville Dam tailraces between 1 January and 7 April 2017.

PREDATION DATA

We have documented less pinniped predation on all species of fish relative to previous years. At this time last year there had been 51 total fish predation events documented, the bulk of which were Steelhead (*Oncorhynchus mykiss*, $n = 21$) and Chinook Salmon (*Oncorhynchus tshawytscha*, $n = 11$). This year (as of April 7th) we have documented nine steelhead and one Chinook predation events during the scheduled sampling intervals. White sturgeon (*Acipenser transmontanus*), which historically represented a large portion of the total documented predation events, have yet to be observed being consumed this year during the scheduled sampling intervals.

Observations outside of scheduled sampling frame by FFU staff and Bonneville project employees (e.g. security guards, hazers, and non-FFU USACE personnel) have yielded additional reports of predation events of a limited number of White Sturgeon (n = 2) and Steelhead (n = 3). The low number of these anecdotal observations re-affirm that predation levels, to date, are very low and suggest that sturgeon are no longer contributing in any significant fashion to the pinniped diet at the dam.

A review of the Spring Chinook passage data for the month of March indicates that 2017 was the second lowest passage on record which may contribute to the very low predation observations on the species. (Fig. 3).

It should be noted that as of the writing of this report more salmonid predation events have been recorded and will be included on the next bi-weekly report. It is likely given the increasing fish counts over the dam, angler fishing reports, and recent sightings of pinnipeds near the mouth of the river, that predation activity is increasing as more adult salmonids are migrating upriver. Thus, there is a high likelihood that the busy season is just starting.

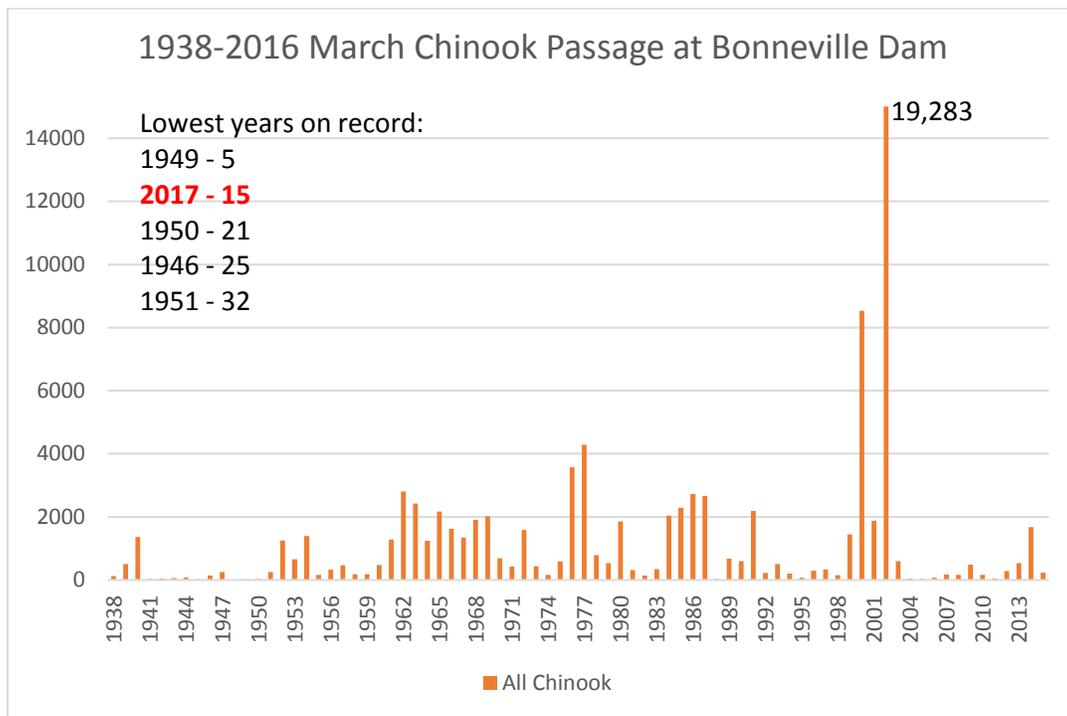


Figure 3. Number of Spring Chinook (*Oncorhynchus tshawytscha*) passing Bonneville Dam during the month of March.

PINNIPED DETERRENCE AND TRAPPING

Sea lion exclusion devices (SLEDs) have been deployed on all fish ladders since November 2016. In response to several Steller sea lions climbing over the floating orifice gates (FOGs) at powerhouse 2 last year, wood panels were placed on the top to prevent this behavior from recurring. This year one of the wood panels at Power House 2 was damaged and cannot currently be repaired due to high water. The high water in the tailraces have swelled the river such that the SLEDs were barely above water level, however, despite the high water and broken wood panel, no pinnipeds have been documented entering any of the fish ladders this monitoring season.

Boat-based hazing by Columbia River Inter-Tribal Fish Commission (CRITFC) began on March 6. CRITFC hazed Mondays, Thursdays, and Fridays and reported down-stream catches and point counts of pinnipeds. Tragedy struck on 7 April 2017 when the research vessel carrying the crew capsized and crew member Greg George lost his life. Plans to restore boat-based hazing have not been discussed, but will be addressed soon.

Dam-based hazing by USDA began on March 6. USDA will be hazing seven days a week for 8 hour shifts during daylight hours. Thus far, hazing efforts appear to be as effective as previous years at deterring predation and foraging behaviors for the period of time that the hazer's are actively working. As observed in past years, once hazing ceases in an area, the pinnipeds that departed due to hazing activity have a tendency to come back to the near-dam area and begin foraging again.

Under Section 120 of the Marine Mammal Protection Act, NOAA has issued a new Letter of Authorization to the States (ODFW, WDFW, and IDFG) to remove up to 69 CSLs. The States have deployed the floating pinniped traps near Tower Island, but have not utilized them given the low numbers of CSLs. They are monitoring the situation and will operationalize a trapping effort when CSLs start using the traps.