

**STATUS REPORT – PINNIPED PREDATION AND HAZING  
AT  
BONNEVILLE DAM IN 2007**

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This report is the first of regular status reports on the pinniped predation and hazing activities being conducted at Bonneville Dam in 2007.

### **Background**

This year it was determined to conduct what amounts to a maximum effort of non-lethal hazing with current tools available and within some restrictions for the use and conduct of hazing relating to fish passage issues and personnel safety concerns. In brief, the Corps has contracted USDA to conduct hazing of pinnipeds from the decks and shorelines of Bonneville Dam from dawn to dusk, seven days a week, beginning March 1 and ending May 31. Initially this was to include two hazers per shift, but USDA was unable to supply manpower to meet that requirement, so one hazer is present at most times and roams the project, although there is some overlap hours where both hazers are present. The states, NOAA, tribes, and others are participating with hazing from boats with the same schedule. Sometimes there will be two or more boats present, but typically one boat. Hazing consists of the use of crackershells, rubber bullets, and seal bombs from the boats only. When salmonid passage reaches 1000 per day, no seal bomb use will be allowed within the boat restricted zone. Other limitations on distance from fishway entrances and structures were determined and are being followed. Working as a team, the intent is to chase animals away from the face of the powerhouse and fishway and the boats can chase them out of the tailrace area.

We are also continuing our observation of predation on salmonids and sturgeon and began regular observations on January 8. Sea Lion Exclusion Devices (SLED's) were installed at Powerhouse 2 entrances on January 10, at Powerhouse 1 and B branch entrances the week of January 22, and Cascades Island today, March 9 (it had been dewatered). The Floating Orifice Gate barriers (FOG's) are to be installed in the next week or so at Powerhouse 2, but the orifices are closed, so no entry can occur. Acoustic deterrents were increased and installed and running at all fishway entrance areas by mid-January.

### **Preliminary Results**

The first Steller sea lion (*Eumetopias jubatus*) was seen at Bonneville on December 10, 2006, the first California sea lion (*Zalophus californianus*) on January 8, 2007, and the first harbor seal (*Phoca vitulina*) on January 18, 2007. This is about one month earlier for the California sea lions to arrive than last year. We have seen as many as 9 Steller sea lions and 10 California sea lions at the dam so far in one day (February 28)(see Figure 1). Most of the California sea lions seen were also observed previous years, with two possible newcomers.

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## Predation Figures

Unexpanded numbers for fish observed taken between January 8 and March 7 are:  
153 salmon/steelhead (116 steelhead, 7 chinook, 30 salmonid)(see Figure 2)  
352 sturgeon (55 larger than 5 feet)(see Figures 3,4)  
8 Lamprey, 2 smolt, 192 unidentified

## Hazing Impacts

Hazing actually began on February 28, for much of the day. February 28 was a practice day for hazing personnel from participating agencies, and full-time daylight hazing began on March 1.

### Comparison of Week Prior to Hazing with First Week of Hazing

We compared observation data from the week prior to hazing activities (Feb. 21 – Feb. 27) with observations from the first week of hazing (Feb. 28 – Mar. 6). Results are outlined below.

## PINNIPED ACTIVITY

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The average hourly estimate of pinnipeds present at Bonneville tailraces declined from 7.0 to 2.7 when hazing activities began. Prior to Mar. 1, we estimated total Steller sea lion abundance at 9 and California sea lion abundance at 10 individuals. Steller sea lion numbers dropped dramatically soon after hazing activities began. As of Mar. 8, observers may be seeing as few as 1 Steller sea lion and 4 or 5 California sea lions. The average number of identified individual California sea lions also declined (3.8 to 1.5) as hazing pressure seemed to encourage sea lions to spend less time at the surface and less time near dam structures (where observers can identify them). Observers reported increased movement between tailraces, as some individual sea lions seem to be chased from one tailrace to another as they are hazed.

### NO-HAZING (FEB. 21-27)

	Hourly Pinnipeds Present	Hourly Unknown California SL	Hourly Identified California SL	Hourly Steller SL	Hourly Harbor Seals
MEAN	7.0	0.65	3.8	4.2	0.05
STD. DEV.	1.9	0.66	1.7	1.6	0.16
MIN	4	0	1	1	0
MAX	12	3	8	9	1

**Table 1.** Observed total project (Powerhouse 1, Powerhouse 2, and Spillway tailraces) pinniped activity at Bonneville Dam tailraces for Feb. 21 – 27 2007. Pinnipeds routinely moved between tailraces during hour blocks, so mean presence and minimum and maximum numbers are overestimated. These numbers are only relative measures of activity.

**HAZING (FEB. 28 - MAR. 6)**

	Hourly Pinnipeds Present	Hourly Unknown California SL	Hourly Identified California SL	Hourly Steller SL	Hourly Harbor Seals
MEAN	2.7	2.1	1.5	1.0	0
STD. DEV.	2.6	1.3	1.5	2.0	0
MIN	0	0	0	0	0
MAX	12	5	7	9	0

**Table 2.** Observed total project (Powerhouse 1, Powerhouse 2, and Spillway tailraces) pinniped activity at Bonneville Dam tailraces for Feb. 28 – Mar. 6, 2007. Pinnipeds routinely moved between tailraces during hour blocks, so mean presence and minimum and maximum numbers are overestimated. These numbers are only relative measures of activity.

**SALMONID AND STURGEON CATCH**

So far, hazing activities did not reduce the total number of salmonids caught. As sea lions often consumed their catch at farther distances from dam structures, observers had more difficulty identifying the species of salmonid caught when hazing began. The beginning of the hazing season is coinciding with the first observed Chinook salmon (*Oncorhynchus tshawytscha*) catches at Bonneville Dam.

Steller sea lions are the primary predators of white sturgeon (*Acipenser transmontanus*) in the Bonneville Dam tailrace (only one taken by California sea lions). As Steller sea lion numbers declined, so did sturgeon catches. Observers recorded 78 sturgeon catches in the week prior to hazing, and only 10 during the first week of hazing. Five of the 10 taken during the first week of hazing were caught on the first day of hazing, Feb. 28, which was a practice day.

**NO-HAZING (FEB. 21-27)**

	Unidentified Adult Salmonids	Adult Chinook	Adult Steelhead	White Sturgeon
TOTAL	4	3	26	78
MEAN (Catch/Hr)	0.05	0.04	0.34	1.0
STD. DEV. (Catch/Hr)	0.22	0.19	0.53	1.1

**Table 3.** Observed total project (Powerhouse 1, Powerhouse 2, and Spillway tailraces) fish catch by pinnipeds at Bonneville Dam tailraces for Feb. 21 – 27, 2007.

**HAZING (FEB. 28 - MAR. 6)**

	Unidentified Adult Salmonids	Adult Chinook	Adult Steelhead	White Sturgeon
TOTAL	9	4	19	10
MEAN (Catch/Hr)	0.11	0.05	0.23	0.12
STD. DEV. (Catch/Hr)	0.32	0.22	0.43	0.43

**Table 4.** Observed total project (Powerhouse 1, Powerhouse 2, and Spillway tailraces) fish catch by pinnipeds at Bonneville Dam tailraces for Feb. 28 – Mar. 6, 2007.

## **Summary**

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Preliminary observations show that hazing activities are having effects on the behavior of sea lions at Bonneville Dam. Steller sea lion presence has been dramatically reduced, resulting in substantial declines in predation on white sturgeon near the dam. Hazing has not been as effective at reducing California sea lion numbers and predation, but observers and hazing personnel have reported changes in sea lion behaviors. These changes include increased travel between tailraces in response to hazing, less time spent at the surface during foraging, and less time spent close to dam structures. Chinook salmon are the primary prey item for California sea lions at Bonneville Dam, are only beginning to arrive, so it is uncertain what impact hazing might have on sea lion predation in the long-term as the run increases and more sea lions travel to Bonneville Dam.

Figure 1. Daily minimum pinniped abundance.

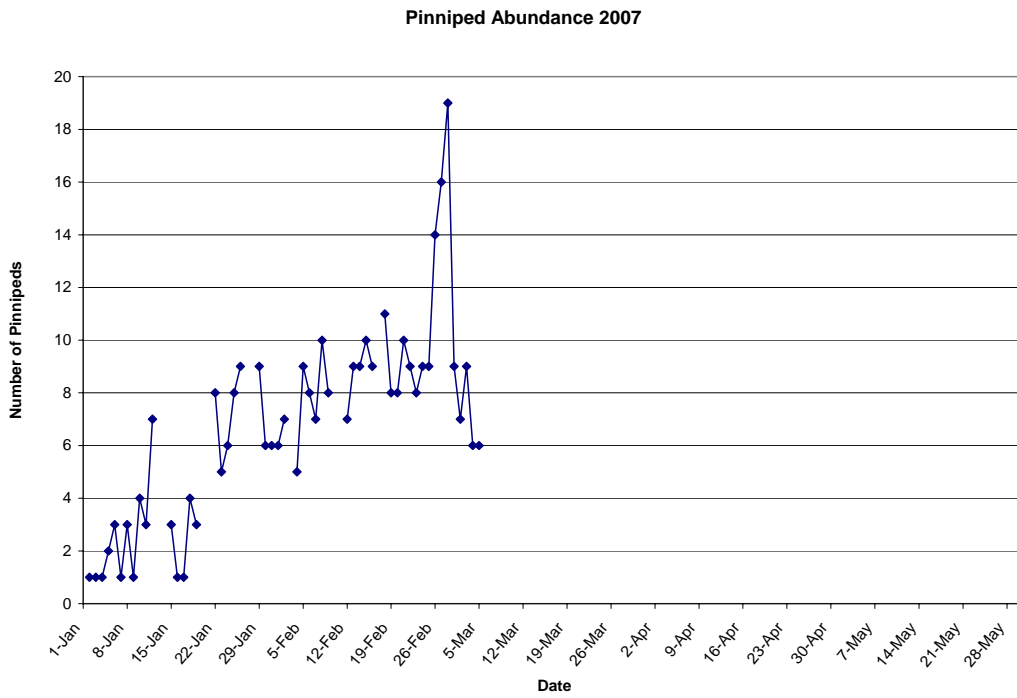


Figure 2. Daily salmonid predation by pinnipeds.

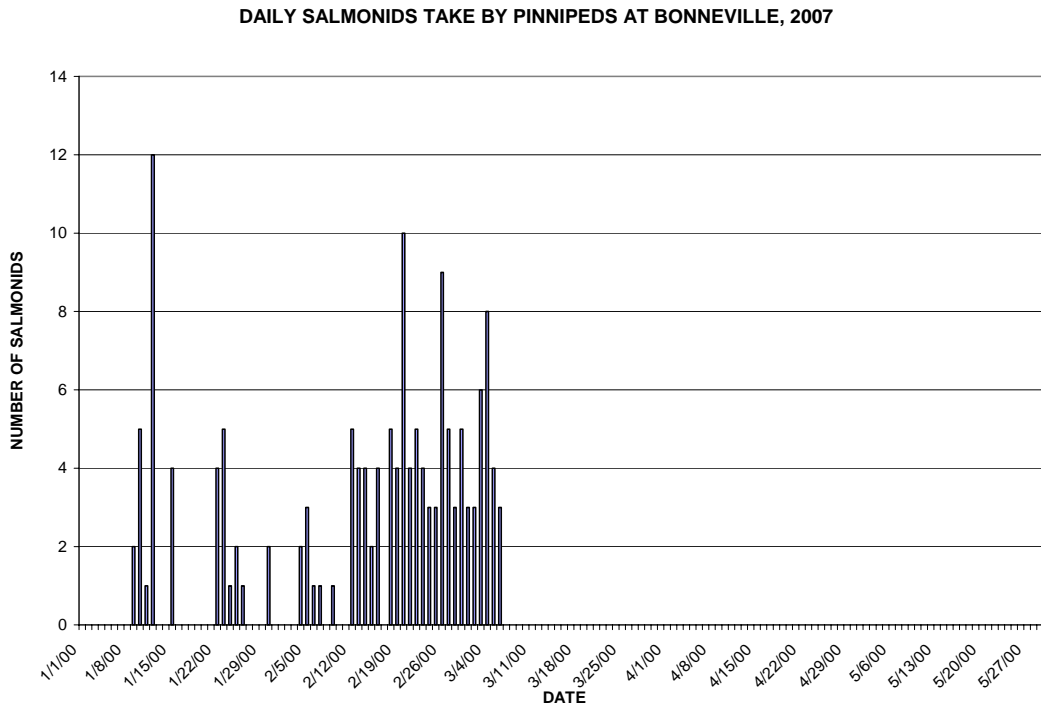


Figure 3. Daily sturgeon take by pinnipeds.

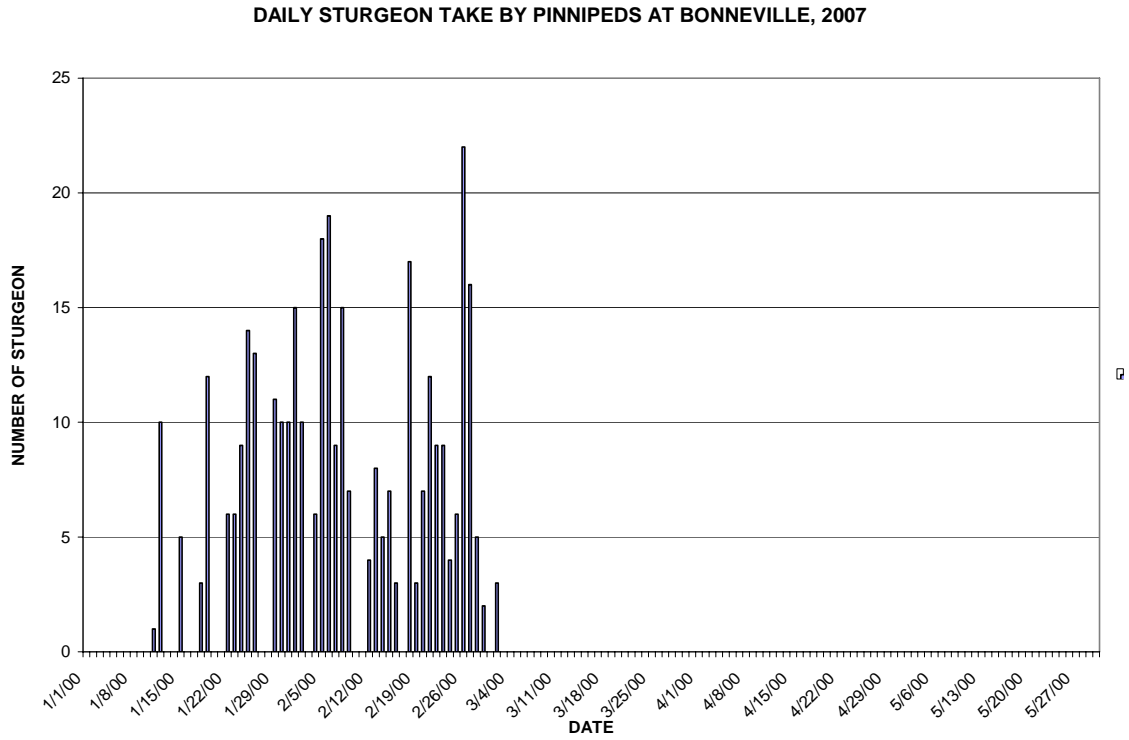


Figure 4. Sturgeon size distribution of those taken by pinnipeds.

