**Pinniped Monitoring at Bonneville Dam: select points for discussion of non-lethal deterrence measures**

California sea lions (CSL: *Zalophus californianus***)** and Steller sea lions (EJU: *Eumetopias jubatus***)** aggregate seasonally at the base of Bonneville Dam, where they feed on several fish species including ESA protected stocks of Pacific salmon and steelhead (*Oncorhynchus spp.*). The U.S. Army Corps of Engineers (USACE) has been monitoring the seasonal presence, abundance, and predation activities of pinnipeds at the dam since 2002. Recently, the responsibility and level of non-lethal deterrence efforts provided by the USACE has been questioned. The following information provides background and scope surrounding the issue.

**Background**

* In 2016, we documented the second largest number of pinnipeds at the dam and the second largest estimate of salmonid predation to date (Madson et al. *in review*).
* Since 2008, with the exception of a 2012 court ordered mandate to freeze operations, the States have staffed a removal program for California sea lions regularly observed eating salmon at Bonneville Dam under section 120 of the Marine Mammal Protection Act.
* As specified in the Biological opinion, only individually identifiable predatory CSL can be permanently removed if they:

1. have been observed eating salmonids in the "observation area" below Bonneville Dam between January 1 and May 3 1 of any year; and
2. have been observed in the observation area below Bonneville Dam on a total of any five days (consecutive days, days within a single season, or days over multiple years) between January 1 and May 31 of any year; and
3. are documented in the observation area below Bonneville Dam after they have been subjected to active non-lethal deterrence.

* The FFU of the USACE provide monitoring data to the states (WDFW and ODFW) to enable quantification of identifiable predatory CSL that meet the above criteria.
* Non-lethal deterrence (i.e. hazing) is performed by the Columbia River Inter-Tribal Fish Commission (CRITFC) personnel and USDA employees under USACE contract. In recent years, CRITFC provided boat based hazing three days per week (Monday, Thursday, and Friday), while USDA personnel provide dam based hazing seven days per week.
* The current interpretation by the states and CRITFC biologists is that the non-lethal deterrence measures (hazing) implemented by either entity are independently sufficient to satisfy the terms and conditions specified by RPA 49 (See below). Thus, the redundancy of hazing efforts is called into question.

RPA 49 states:

*“The Corps will install and improve as needed sea lion excluder gates at all main adult fish ladder entrances at Bonneville dam annually. In addition, the Corps will continue to support land and water based harassment efforts by NOAA Fisheries, Oregon Department of Wildlife (ODFW), Washington Department of Fish and Wildlife (WDFW), and the Tribes to keep sea lions away from the area immediately downstream of Bonneville Dam.”*

* Involved personnel of the Action Agencies and the states suggest that the USACE is satisfying the conditions of the RPA wherein, support is given to NOAA, the tribes, and the states though access to the tail races, spillways, and monitoring platforms.

**Considerations**

* Using only one entity to haze would significantly impact the level and type of hazing. CRITFC exclusively employs boat based hazing and has several restrictions as to where and how they can operate. USDA is limited to operating from the platform of the tail races and therein do not cover the bulk of the survey areas below the tail races.

Caveats to each program:

* CRITFC consistently hazes late in the day, and as a result miss the morning foray of feeding. Moreover, the duration of hazing provided by CRITFC ranges from 3-9 hours, three days a week, for an average of 15 hours/week.
* USDA does not have coverage of the entire observation area, but they do cover the areas most commonly associated with salmonid depredation (i.e. near the ladder entrances).
* Since 2014 the total number of CSL and SSL have increased significantly. Recruitment of new, presumably naïve, animals has grown considerably wherein, >70% of CSL observed in 2015 were unbranded, potentially new Bonneville Dam CSL’s. A reduction in hazing may result in naïve animals imprinting on Bonneville.
* In line with the above point, there is a chance that, with a reduced hazing effort, naïve animals may qualify for removal without being directly exposed to hazing every day they were observed. The current metrics assume there is hazing seven days a week, and therein, any animal sighted in the observation areas is highly likely to be exposed to hazing and thus, every sighting is used to satisfy section B of the above listed Biological Opinion qualification criteria.
* Likewise, habituated animals that consistently forage at Bonneville, may increase foraging efforts near the tail races where boat hazing cannot occur, or conversely, concentrate foraging efforts in areas beyond the range of dam based hazers.