

## CONSUMMATE AND CONSUMED PREDATORS

*ASSESSING KILLER WHALE PREDATION ON JUVENILE STELLER SEA LIONS IN THE GULF OF ALASKA*

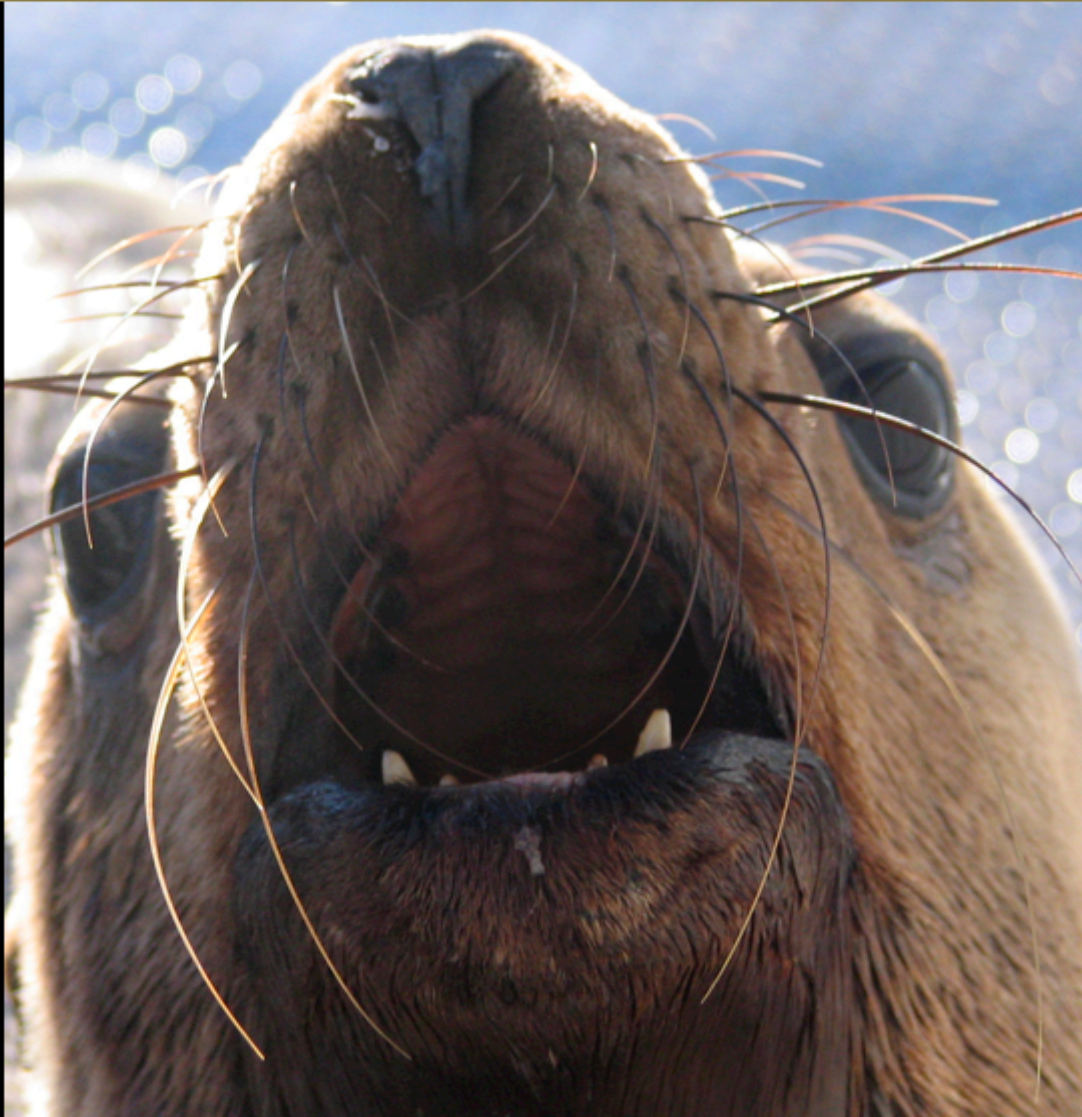
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## ABSTRACT

This project addresses **PCCRC Priority #1**, and will allow us to directly quantify predation on juvenile Steller sea lions in the Gulf of Alaska. We have deployed newly developed, satellite linked Life History Transmitters in 15 juvenile Steller sea lions to date, with an additional twelve animals scheduled for 2008 / 2009 under existing funding. Life History Transmitters allow the determination of individual animal survival and allow distinction of predation from non-traumatic causes of mortality, from satellite-transmitted post-mortems. Data returns from four of fifteen initial deployments prove the viability of the concept, and suggest that predation by killer whales may be the single greatest cause of juvenile sea lion mortality, and that more than 50% of females may be consumed by predators before primiparity. Placing our preliminary findings into the context of a conceptual framework we have developed to integrate bottom up and top down effects, suggests that implications of this level of predation on recovery of the species may be profound, and may require changes more substantial than those that in the past likely contributed to current population status. Here we request support for the vital continuation of satellite monitoring for LHX tag data returns.

## PROJECT OBJECTIVES

**The specific objectives of the work proposed here are to:**

- **Quantify the predation proportion of juvenile Steller sea lion mortality, in the PWS – KF region of the Gulf of Alaska.**
- **Determine season (time of year) of greatest incidence of mortality and predation in juvenile Steller sea lions.**  
**Contribute to the testing of predictive powers of health and condition assessment parameters on individual survival.**  
**Contribute to the assessment of the proportion of female sea lions consumed by predators before primiparity.**

### Specific activities proposed:

To (1) monitor six juvenile Steller sea lions after their release from the ASLC following LHX tag implant surgery, via external satellite data transmitters, (2) continue satellite monitoring of LHX transmitters in deployed juvenile Steller sea lions (current total 27 as of Jan. 2010). Support was granted for ARGOS data recovery fees in the amount of \$5,000 in April 2009. Of this funding, we have utilized 20.2% of the total budget for the billing cycles of September through November 2009. At the current rate of usage, we anticipate PCCRC support to continue through October 2010.

## SUMMARY OF RESULTS

When the proposal for this project was submitted in October of 2008, we had released fifteen juvenile Steller sea lions with LHX tag implants, and had received mortality event data from four of these animals. As outlined in the proposal, we deployed dual LHX tags in an additional twelve juvenile Steller sea lions (this effort was separately, previously funded). Six animals were released in November of 2008, five in July 2009 and one in September of 2009. Eleven of the twelve animals were tracked with external satellite tags. The individual released in September 2009 did not receive an external transmitter due to late-stage molt. This brought the total number

of animals released with LHX tag implants to 27. Mean post-release tracking duration (external tags) for externally tagged animals was 87 days, for the first set of six new animals (Nov 2008) the mean was 99 days, and for the five most recently released animals (2009) the mean was 52 days, likely as a result of being released close to the annual molt. During this tracking period, all juveniles remained in the previously described range for juveniles of Prince William Sound and Kenai Fjords (PWS/KF).

Since the proposal was submitted, we have received data returns from an additional four mortality events, one each in January, October and November of 2009, and one in January of 2010. In all four new events both tags successfully uplinked. The most recent event (2010) occurred between Aghiyuk and Sutwik Islands, and was the first to provide information on a mortality event outside of the previously described home range for the 27 study animals (PWS/KF and Cook Inlet). Thus, this PCCRC funding was used to cover expenses related to satellite uplink fees from eight internal and five external transmitters.

All four recent events provided data that strongly suggest the animals suffered acute death at sea by massive trauma, most likely due to predation. The dual returns allowed us to refine the initial estimate of event detection probability to the current estimate of 0.97, very high by telemetry standards.

The continued monitoring for LHX tag data returns has increased our number of monitored animal days to 13,990 days from 27 animals (Nov 2005 through Jan 2010). From the total of eight mortality events during this period, we have updated our annual survival rate estimates (listed with 95% confidence limits) for the age class 12-24 months to 0.607 (0.39-0.94), for 24-36 months to 0.817 (0.65-1.0), and for a combined period of 12-36 months to 0.496 (0.4-0.62). These estimates were derived from a modified Mayfield method. A comparison of these rates to brand-resight derived rates provided by the NMML / NMFS continue to support the notion that this research approach is not adversely affecting survival of the animals or the data of interest. Since our data shows that at least seven of eight detected mortalities were likely due to predation, this project is also continuing to provide strong evidence for a substantial impact of predation on juvenile survival and recruitment in the PWS/KF region. In fact, this project is still the only project to date to provide a direct measure of predation on Steller sea lions.

## **TIMELINE**

**April 2009:** PCCRC (\$5,000) awarded.

**October 2009:** Support for ARGOS fees begins.

**January 2010:** Presentation by M. Horning to PCCRC annual meeting in Anchorage.

**October 2010:** Anticipated exhaustion of ARGOS fees support. Annual report to PCCRC.

**January 2011:** Final report and presentation to PCCRC at annual meeting in Anchorage.