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detection of reproductive status in eastern North Pacific blue whales (IA-WP3)

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Detection of Reproductive Status in eastern North Pacific Blue Whales**Shannon Atkinson, Ph.D.****University of Alaska, School of Fisheries and Ocean Science***Introduction:*

Recent advances in endocrinology have provided a mechanism to evaluate the reproductive state and metabolic well-being of large whales based on hormone concentrations in tissues (e.g., blood, blubber; Atkinson et al. 2009, Atkinson and Yoshioka 2007, Atkinson et al. 2015). Using endocrine profiles should provide a physiological ground truthing to anatomical estimates of pregnancy rates, which have historically been established by analysis of ovaries from commercially harvested whales (e.g., Oshumi 1979). More recently sightings of mother-calf pairs in the Gulf of California have provided behavioral data as well as tissue samples from which physiological studies could be conducted (Valenzuela et al, 2013). A better understanding of the reproductive state of large whale populations will contribute to improvements in population assessments, which currently utilize annual pregnancy rates that range from 0.11 to 0.84 (Branch 2008).

Methods:

55 biopsy samples from female blue whales were collected in the Gulf of California between 2002 and 2013. All samples were collected from January through April, during the breeding season. Concentrations of hormones (i.e., progesterone, testosterone, cortisol) were measured for each sample. Standard analytical validations for immunoassays were followed, including parallelism and accuracy. Standard QA/QC protocols were also conducted. The reproductive status of each animal sampled was determined based on sighting histories of cow-calf pairs with known females and endocrine profiles.

Results:

Based on the results of the analytical validations, estimates of progesterone concentrations were both accurate and reliable. (Fig 1).

Of the 55 blues whales sampled, 2 were young of the year and were excluded from further analysis, although absolute hormone concentrations were estimated. Of the remaining 53 animals, 10 were accompanied by young of the year and had progesterone concentrations consistent with not being pregnant. 28 animals were observed not accompanied by young of the year had progesterone concentrations consistent with not being pregnant. 15 animals were observed not accompanied by calves and had progesterone concentrations consistent with being pregnant. Based on these results, non-young of the year female blue whales in this region had a pregnancy rate of approximately 28% (Fig 2).

Efforts are currently underway to use the available time series of sightings of recognizable individuals to determine the approximate age of individuals in the

sample, and to determine which females were observed with calves in the subsequent year.

Figure 1. Eastern North Pacific blue whale analytical validation data for progesterone enzyme immunoassays.

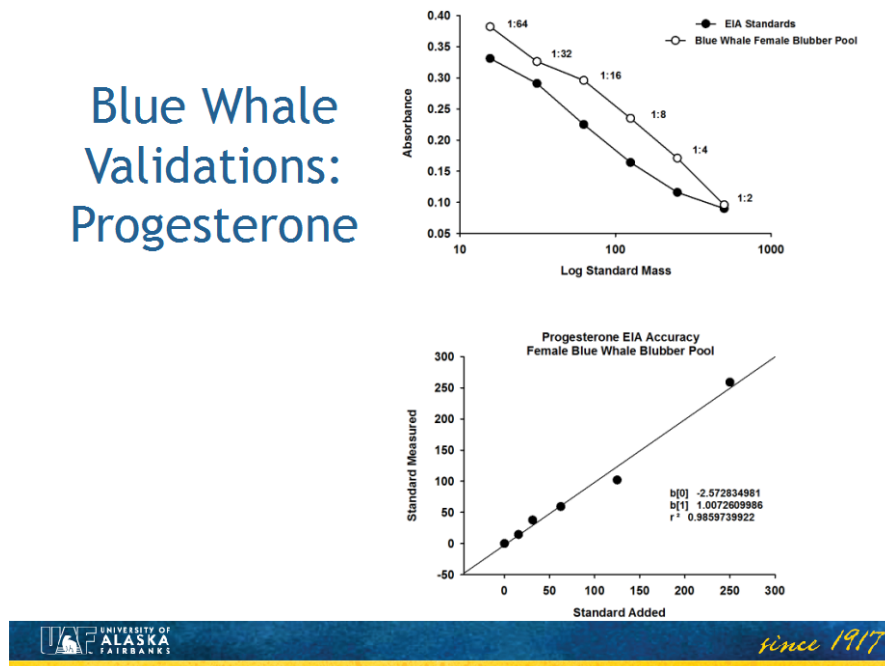
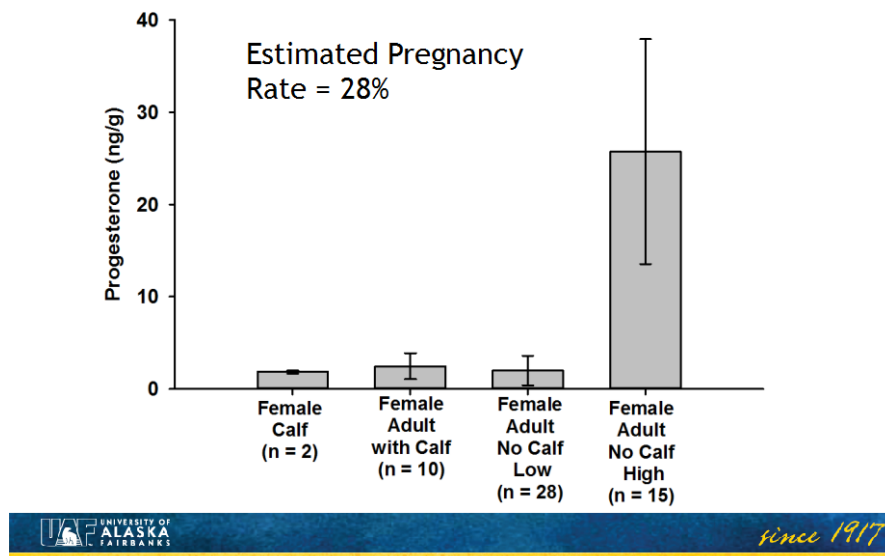


Figure 2. Eastern North Pacific blue whale biological validation of progesterone results to establish pregnancy rates.

Blue Whale Preliminary Data



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