EVOSTC ANNUAL PROJECT REPORT
&
REQUEST FOR INTERIM FUNDING, FY 2009

Project Number: 070808A

Project Title: ..... Nearshore Synthesis: Sea otters and sea ducks

PI Name: ..... Brenda Ballachey & Jim Bodkin

Time period covered: ..... 4/2008 – 8/2008

Date of Report: ..... 5 September 2008

Report prepared by: ..... Brenda Ballachey

Project website (if applicable): ..... N/A

Work Performed:

Objective 1. *Measure the CYP1A biomarker in 5 nearshore species that previously exhibited elevated levels of CYP1A.*

In June 2008, we captured and collected liver samples collected samples from sea otters, masked greenlings, and crescent gunnels, sampling 15 individuals of each species in three areas (heavily, moderately and unoiled areas; total of 135 samples) to analyze for CYP1A induction and, in the case of sea otters, histopathology. Tissues have been archived and samples sent to laboratories (UC Davis and Purdue University). Laboratory analyses for CYP1A are underway and will be completed by the end of 2008; data analyses will continue into the first quarter of 2009. Sea duck captures (40 harlequin ducks and 40 Barrow's goldeneyes, 20 each from oiled and 20 from unoiled areas) are planned for March 2009, targeting birds in oiled areas at northern Knight, Green and Crafton islands, and at Montague Island as an unoiled reference site.

Objective 2. *Estimate frequency and locations of use of soft sediment intertidal habitats by foraging sea otters*

In April and May 2008, we established study sites at 9 random locations (stratified by habitat) in the area of northern Knight Island to estimate the persistence of pits (similar to those excavated by sea otters in the process of foraging) in the intertidal zone. At each site, three transect lines were established at the 0.0 +1.0, and +2.0 m tidal elevations. Five experimental pits, each approximately 25 cm in width and 15 cm in depth, were excavated at 6 m intervals along 50 m transect lines. Each study site was revisited during subsequent periods of minus tides at approximately 10-14 d intervals and was categorized as either present (discernable) or absent (no longer discernible). Our preliminary observations suggest that pit persistence varies in response to exposure to prevailing wind/seas and tidal elevation. Because some pits persisted at least through early September, field work to continue

monitoring pit persistence should continue into FY 2009.

Beginning in April 2008, we began a systematic survey of all intertidal soft sediment beaches between Bay of Isles and Herring Bay at northern Knight Island for the presence of pits likely to have been created by sea otters foraging in the intertidal. Surveys were limited to tidal elevations above or at the 0.0 tidal level. Field work, including sampling of sediments for hydrocarbons, continues and should be completed early in FY 2009.

In our original proposal (January 2008), we had indicated that there could be a second phase (Objective 2, Phase 2) for this objective, in which we assessed the extent of avoidance of contaminated intertidal habitats by sea otters. We have now determined, on the basis of observations during the past six months, that the Phase 2 component, as originally conceived, is not warranted. However, as stated above, there is a need to monitor transects with intertidal pits in fall 2008 and again in spring 2009 (observation periods must be timed, dependent on daylight hours and minus tide cycles). Thus we are requesting funds to support a longer monitoring period than initially anticipated.

Objective 3. *Conduct histopathological examinations of sea otter liver biopsies obtained from 2001-2006.*

Sea otter liver samples (slides) collected from 2001-2007 were sent from Dr. P. Snyder at Purdue University to Dr. C. Mohr at UC Davis in late June 2008. Dr. Mohr has been reading these slides over the past 5 weeks; we anticipate his report on the samples by the end of October. Additionally, both Drs. Snyder and Mohr will be reading the sea otter liver samples collected in the summer of 2008.

Objective 4. *Conduct an analysis of existing data on PCB levels in sea ducks and sea otters.*

Data for this objective, collected in the 1990's from harlequin ducks and sea otters, have been compiled and forwarded for statistical analyses to Mark Ricca, working with Keith Miles at UC Davis. Analyses are underway and expected to be complete before the end of 2008.

Additional objective: *Surveys of sea otter abundance and carcasses in western PWS* (work performed under Project # 070808):
Surveys were conducted in western Prince William Sound (WPWS) in the summers of 2007 and 2008. In 2007, we obtained an estimate of 2380 (se 372) sea otters for WPWS, which is about 300 animals less than the average of the three prior estimates (2002-2005) but still within 1 se of those estimates (Figure 1). The effect of the 2007 estimate on the long term trend was to reduce the average annual rate of change to 1.1%, although the trend does not appear linear. For northern Knight Island, the 2007 estimate was 71 (se 14; Figure 1). There appears to be an increasing trend during the period since 2002, following a rather precipitous decline in 2002, with the 2007 estimate approximately equal to the long term average between 1993 and 2001 (78).

In July 2008 we completed an aerial survey of western Prince William Sound and 5 replicate

surveys of the northern Knight Island Archipelago area between Bay of Isles and Herring Bay, and 4 replicate surveys of the Montague Island study area. Analyses of the 2008 survey data are under way.

We have also collected sea otter carcasses (skulls or partial skulls) from beaches in western PWS, in springs of 2007 (n = 19) and 2008 (n = 35). The teeth from these carcasses have been submitted to Matson's Laboratory for age determination, and the data will contribute to our long-term data base on sea otter ages-at-death, which is used in modeling studies.

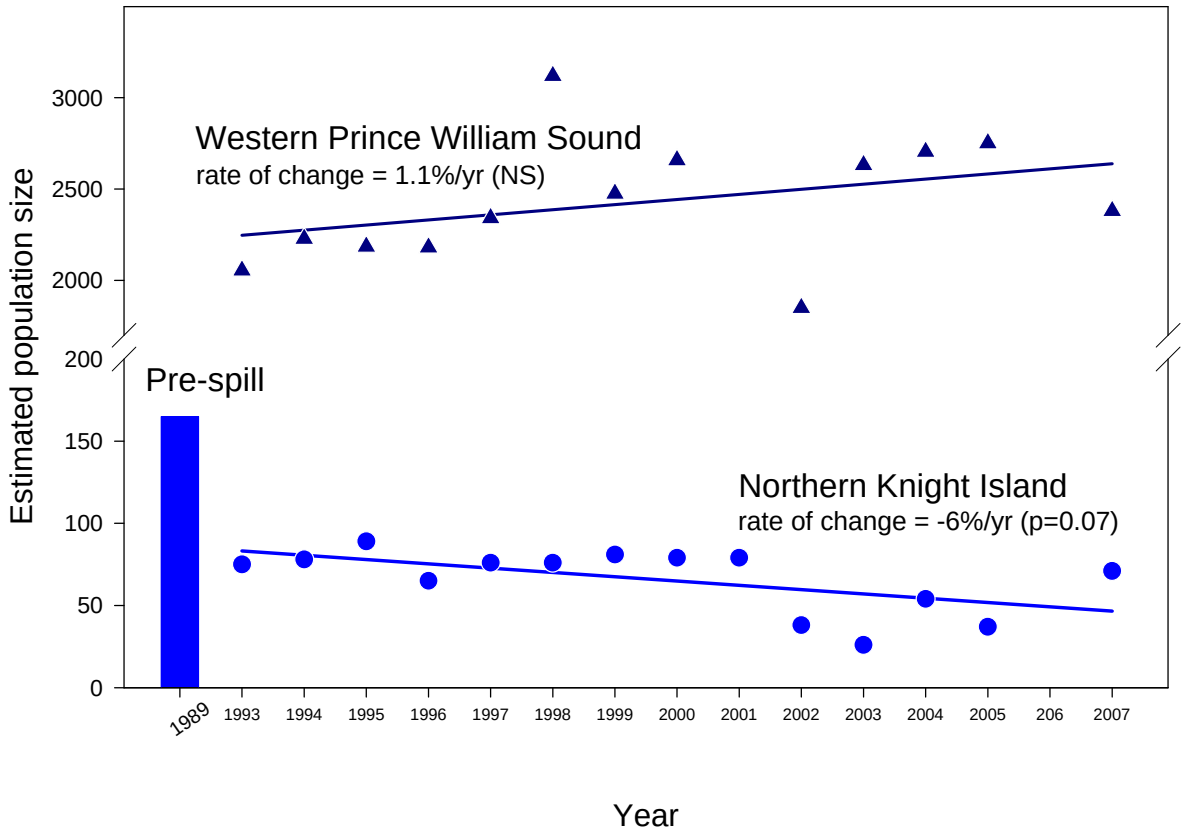

Figure 1. Sea otter post-spill population recovery in western Prince William Sound and at northern Knight Island, as of summer 2007.

Future Work:

An aerial survey of sea otter abundance in WPWS is planned for FY2009; estimated cost is $24K. We had discussed the need for additional work in 2009 on the use of contaminated intertidal areas by sea otters (estimated cost of about $250K), but have decided that this effort is not warranted. However, there is a need for continued monitoring of pit transects (Objective 2) through 2009, and we request additional funds ($55K) for this effort. A final report for Projects # 070808 and 070808A (all components except aerial surveys and the pit/intertidal use study) will be submitted to the EVOSTC in April 2009, and a final report for Project 070808A (aerial surveys and pit/intertidal use study) will be submitted by 30th September 2009. We request an additional $18K of salary time for efforts to compile and complete the final reports.

Coordination/Collaboration with other projects:

This project (#070808A) is closely allied with Project #070808, and although the two efforts are administratively separate, they effectively have been conducted as a continuing project. Final Reports for the 2 projects will be combined, with the first section, covering work through December 2008, submitted in April 2009, and the second section, covering work conducted into 2009, submitted at the end of September 2009.

Information Transfer, FY2008:

Ballachey, B.E., J.L. Bodkin, J.J. Stegeman, P.W. Snyder, B. Woodin, D. Esler, S. Jewett, T.A. Dean, K.A. Trust, G.M. Blundell, G.H. Golet, L. Holland-Bartels, and L. McDonald. Long-term exposure of wildlife in Prince William Sound, Alaska, to spilled *Exxon Valdez* oil revealed by spatial and temporal patterns of CYP1A induction. Manuscript submitted to *Integrated Environmental Assessment and Management*, September 2008.

Bodkin, J.L. 2007. Assessing Effects of Spilled Oil on Sea Otters. Presentation at: Shipwreck Emergency Response: Spill response/NRDAR/Rodents and implications for Wildlife Resources. Homer, AK November 2007.

Larson, S., D. Monson, B. Ballachey, R. Jameson and S. K. Wasser. Stress related hormones and genetic diversity in sea otters (*Enhydra lutris*). Manuscript accepted for publication in *Marine Mammal Science*, August 2008.

Murray, M., Snyder, P., Bodkin, J., Miller, M., Monson, D., Esslinger, G., Tinker, M. T. 2008. A novel approach to abdominal implantation of time-depth recorders in the sea otter (*Enhydra lutris*). Presentation at: Third International Bio-logging Science Symposium, Monterey, CA September, 2008.

Tinker, M.T., J. Bodkin, M. Staedler, G. Esslinger, D. Monson, G. Bentall, and M.Murray. 2008. Using TDR records to detect reproductive events in sea otters. Presentation at: Third International Bio-logging Science Symposium, Monterey, CA September, 2008.

Budget, FY2009:

We had initially anticipated a need for $279K for FY 2009, for 1) aerial surveys and 2) evaluating use of intertidal areas by sea otters. However, based on 2008 preliminary results, we have determined that the second component of the project, examining use of intertidal areas by sea otters, is not warranted. We do recommend continued monitoring of the pit transects that were established in western PWS in spring and summer of 2008, into the fall of 2008 and again in spring 2009. A revised budget request for FY 2009 is below:

Aerial survey, WPWS, summer 2009:……..……..……..$24K
Charter vessel, monitoring pit transects:……..$16K
(2 trips, 4 days each, 2K/day)
Salary, pit persistence study…… …..$39K
(1 month scientist @9K, 6 months biotechnician @5K/m)
Salary, preparation of final reports……$18K
(2 months, scientist)
Overhead at 9%.....$8.7K
TOTAL, including OH:……...…….…….$105.7K