

HEALTH ASSESSMENT OF FREE-RANGING PACIFIC LEATHERBACK SEA TURTLES (*Dermochelys coriacea*) IN MONTEREY BAY, CALIFORNIA

Jonna Mazet and Heather Harris

Wildlife Health Center, University of California, Davis, School of Veterinary Medicine, One Shields Avenue, Davis, CA 95616, (530) 754-9035, jkmazet@ucdavis.edu

HYPOTHESIS

We will test the alternate hypothesis that free-ranging Pacific leatherback sea turtles (*Dermochelys coriacea*) migrating through Monterey Bay, California are exposed to a variety of marine pathogens and contaminants.

OBJECTIVES

- 1) To conduct physical examinations of free-ranging leatherback sea turtles to characterize the health condition of individuals representative of the population that might be treated for petroleum exposure during an oil spill.
- 2) To obtain baseline blood parameters for free-ranging leatherback sea turtles during migration.
- 3) To determine exposure of leatherback sea turtles to select marine pathogens and contaminants in order to provide baseline health information during oil spill response.

EXPERIMENTAL PLAN

Free-ranging adult leatherback sea turtles will be captured in Monterey Bay in September 2005 in collaboration with the National Marine Fisheries Service (NMFS), which is conducting a study of the leatherback sea turtle population using satellite telemetry (Peter Dutton and Scott Benson, principal investigators). Turtles will be spotted via aerial surveys, captured, and brought on board a NMFS research vessel, in accordance with NMFS scientific research permit #1227 (see attached). The maximum number of turtles anticipated for capture and sampling during the fall 2005 field season in Monterey Bay is 12 animals. In addition, approximately 20 banked blood samples collected from previous NMFS leatherback captures in Monterey Bay from 2000-2004 are available for testing in this study. In the event that the number of turtles captured exceeds the maximum expected number, samples will be prioritized for testing chronologically beginning with the most recent.

A physical examination will be conducted on each turtle to assess the following indicators of health: mentation, body temperature, respiratory rate, heart rate, symmetrical use of the head and limbs, abnormalities of the skin and carapace, ectoparasites, and accessible organ systems (Herbst and Jacobson, 2003). Digital photos and biopsies of unusual lesions will be obtained. Health status will be monitored continuously from the time of capture until release.

Biological samples will be collected using established methods for sea turtles (Work, 2002; Deem et al., 2002). Blood will be collected from the dorsal cervical sinus using an 18-gauge 3.5-inch needle rinsed with heparinized saline. Fat will be collected via 4 mm punch biopsy in the fat pad of the fold of the rear flipper. Blood samples will be processed and submitted to the IDEXX laboratories in West Sacramento for complete blood counts and plasma chemistries. This diagnostic lab has run blood work on other leatherback sea turtles (Work, 2002). Blood smears will be prepared in the field for differential analysis and blood parasite evaluation. Hematology results will be used to obtain baseline health parameters for this species. Serologic testing will be completed by Dr. Larry Herbst of the Albert Einstein College of

Medicine to determine exposure to herpesvirus, an infectious agent associated with disease in multiple species of sea turtles (Jacobsen et al., 1986; George, 1997; Herbst et al., 1998; Quackenbush et al., 1998). Blood and fat samples will be analyzed by Dr. Robert Poppenga at the CAHFS Toxicology Laboratory for evidence of exposure to select contaminants including domoic acid, organochlorines, PCBs, heavy metals (Pb, Hg, Zn, and Cd), and cholinesterase activity (Deem et al., 2002). Sterile swabs of the oral, nasal, and cloacal cavities will be collected and archived with remaining plasma at -80°C for molecular evaluation of pathogens that may be identified as important to sea turtle population health in the future. Opportunistically collected feces will be evaluated for gastro-intestinal parasites using fecal flotation and sedimentation by Spencer Jang at the UC Davis Microbiology Laboratory.

All laboratory results will be compiled into spreadsheets using Microsoft Excel and analyzed in conjunction with the MPVM degree program for Heather Harris. Data will be analyzed and summarized using descriptive statistics. Where appropriate, data will also be evaluated to identify associations among blood values and exposure to infectious agents and toxins, as well as clinical findings.

SIGNIFICANCE TO OILED WILDLIFE HEALTH

The Pacific leatherback sea turtle is a federally listed endangered species threatened primarily by anthropogenic factors including incidental fisheries entanglements, harvesting of nesting females and eggs, loss of nesting habitat due to coastal development, and human induced contamination of the marine environment including oil spills, toxin exposure, pathogen pollution, and ingestion of marine debris (NMFS, 1998). Health assessments of free-ranging leatherbacks have been limited to sampling females on nesting beaches, individuals brought into captivity for rehabilitation, and post-mortem studies. The OWCN is mandated to care for this species in the case of an oil spill, yet very little information is available to ensure the best achievable treatment is delivered. Loggerhead sea turtles (*Caretta caretta*) experimentally exposed to crude oil developed blood cell abnormalities and epidermal changes that could increase their susceptibility to infection (Lutcavage et al., 1995). This collaborative study presents an unprecedented opportunity to obtain health data on wild leatherbacks during their migration at a very low cost to the OWCN. Compiling biomedical health parameters and investigating pre-existing medical conditions that may affect the care of individuals in captivity will allow us to be better prepared to treat these animals if they are affected by an oil spill off the California coast.

PROJECT DURATION

This is a one-year project, from October 1, 2005 until Nov 30, 2006. A preliminary final report will be delivered at the completion of the project; however, we request to add the resulting scientific publication to the preliminary final report upon completion of Heather Harris' MPVM program in June 2007.

ESTIMATED BUDGET

I. Personnel- \$0

II. Equipment-\$0

III. Laboratory fees:

Hematology/ Chemistries- \$60/turtle x 20 turtles = \$1200

Herpesvirus- \$70/turtle x 20 turtles = \$1400

Toxicology- \$330/ turtle x 20 turtles = \$6600

IV. Supplies (sample collection, shipping supplies)- \$800

V. Travel- \$0

Total budget request = \$10,000

LITERATURE CITED

- Deem, S.L., Starr, L., Norton, T.M., and Karesh, W.B. 2002. Sea turtle health assessment program in the Caribbean and Atlantic. Proceedings 22nd annual symposium on sea turtle biology and conservation, Miami, FL.
- George, R.H. 1997. Health problems and diseases of sea turtles, in *The Biology of Sea Turtles*. P.L. Lutz and J.A. Musick (Eds.), CRC Press, New York, NY. Pp.363-86.
- Herbst, L.H., Greiner, E.C., Ehrhart, L.M., Bagley, D.A., and Klein, P.A. 1998. Serological association between spirorchidiasis, herpesvirus, and fibropapillomatosis in green turtles from Florida. *Journal of Wildlife Diseases* 34(3):496-507.
- Herbst, L.H. and Jacobson, E.R. 2003. Practical approaches for studying sea turtle health and disease, in *The Biology of Sea Turtles, Volume II*. P.L. Lutz, J.A. Musick, and J. Wyneken (Eds.), CRC Press, New York, NY. Pp.385-410.
- Jacobson, E.R., Gaskin, J.M., Roelke, M., Greiner, E.C., and Allen, J. 1986. Conjunctivitis, tracheitis, and pneumonia associated with herpesvirus infection in green sea turtles. *JAVMA* 189(9): 1020-3.
- Lutcavage, M.E., Lutz, P.L., Bossart, G.D., and Hudson, D.M. 1995. Physiologic and clinicopathologic effects of crude oil on loggerhead sea turtles. *Arch Environ Contam Toxicol* 28(4):417-22.
- National Marine Fisheries Service and U.S. Fish and Wildlife Service. 1998. Recovery plan for U.S. Pacific populations of the leatherback turtle (*Dermochelys coriacea*). National Marine Fisheries Service, Silver Spring Maryland, pp.1-65.
- Quackenbush, S.L., Work, T.M., Balazs, G.H., Casey, R.N., Rovnak, J., Chaves, A., DuToit, L., Baines, J.D., Parrish, C.R., Bowser, P.R., and Casey, J.W. 1998. Three closely related herpesviruses are associated with fibropapillomatosis in marine turtles. *Virology* 246:392-9.
- Work, T.M. 2002. Pacific leatherback health assessment project. USGS Final Report, 1-27.