

Spatial and Thermal Habitat Use of East Pacific green turtles (*Chelonia mydas*) in San Diego Bay, California

Bradley MacDonald¹, Sheila V. Madrak¹, Rebecca Lewison¹, Jeffrey Seminoff², Tomoharu Eguchi²

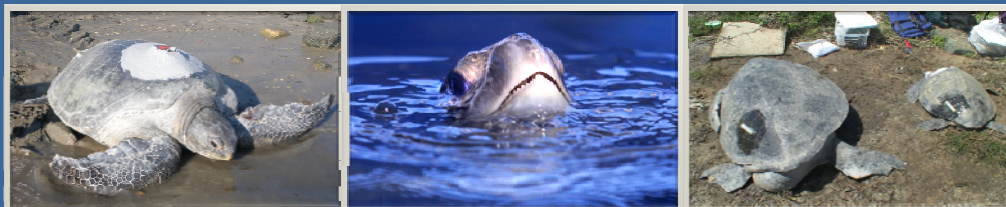
¹Biology Department, San Diego State University, 5500 Campanile Drive, San Diego, CA 92182-4164;

²Southwest Fisheries Science Center - NOAA Fisheries Service Protected Resources Division, La Jolla, CA

ABSTRACT

Home range and habitat characterization are valuable tools for understanding how best to protect threatened marine species, as they can impact the extent and type of protection afforded to core habitat areas. The presence of East Pacific green sea turtles (*Chelonia mydas*) resident to San Diego Bay, CA, has been documented since the late 1970's.

This study will monitor the movements of green turtles in San Diego Bay, an impacted environment, and its findings will aid in the conservation and management of East Pacific green turtles in San Diego Bay. By monitoring turtle movement across the Bay's unique thermal conditions, this project also provides insight into the potential effects of coastal temperature changes on sea turtles.



CONSERVATION IMPLICATIONS & SIGNIFICANCE

EPGTs in San Diego Bay face a number of threats: boat collisions, net entanglement, incidental mortality caused by channel dredging and marina/dock development, and sub-lethal injuries from habitat loss and degradation (NMFS and USFWS 1998). As human-use in and around San Diego Bay increases, the need for effective management of resident EPGTs becomes paramount.

The determination of thermal and physical habitat use of San Diego Bay EPGTs addresses a major data gap by characterizing spatial and temporal habitat requirements. Knowledge of green sea turtle habitat usage in San Diego Bay will determine what degree of overlap they may have with high activity areas in the bay, such as shipping channels, commercial docks, marinas, and Naval testing and training grounds. Emergent behavioral patterns will inform strategies to improve management of EPGTs in San Diego Bay and, more broadly, green sea turtle habitat along urban-wildlife interfaces. The movement of EPGTs in the unique thermal habitat of San Diego Bay will provide insight into the regional and global effects of coastal temperature changes on sea turtles.

TURTLES IN SAN DIEGO BAY

Green sea turtles (*Chelonia mydas*) are found circumglobally in tropical and subtropical marine habitats, and are listed as endangered by the IUCN (Seminoff 2004). Coastal areas play an important role in their life cycle; both juveniles and adults maintain residency in coastal foraging habitats prior to and between inter-annual reproductive migrations (Musick & Limpus 1997). The presence of resident East Pacific green sea turtles (EPGTs) in San Diego Bay has been documented since the late 1970's (Stinson 1984). Habitat degradation, as well as naval, commercial, and recreational boating activities within the Bay pose both direct and indirect threats to this species of conservation concern.

THERMAL HABITAT USE

San Diego Bay contains a thermally altered environment: a warm water effluent outfall produced by the South Bay Power Plant (SBPP), where EPGTs have been documented to spend significant amounts of time (Stinson 1984). As ectotherms at the northern limit of their range, EPGTs are thought to associate with the SBPP warm water effluent as a thermoregulatory response (Eguchi et al., in review). Slated for decommissioning in 2010, closure of the SBPP invites the question of how EPGTs in San Diego Bay will modify their behavior in response to an altered thermal environment. This incidental 'experiment' also provides an opportunity to explore the effects of changes in water temperature on long-lived organisms, an area of particular concern in the context of large-scale climatic change.

METHODS

EPGTs are captured seasonally (November to April) by NOAA biologists (permit # 1591) in the waters adjacent to the SBPP, a unit of the San Diego Bay National Wildlife Refuge. Acoustic transmitters (tags) will be affixed to the posterior carapaces of all captured individuals. Subsequently, the movements of EPGTs in San Diego Bay will be monitored using active and passive acoustic telemetry.

- Active telemetry will involve the systematic visitation to a regularly spaced series of "listening stations" across San Diego Bay to determine the presence and locations of any tagged turtles.
- Research teams will regularly follow the continuous movements of individuals over 24-hour periods to provide high-resolution diurnal and nocturnal movement data.
- Turtles will also be tracked passively using an array of automated, submersible, ultrasonic receivers in order to augment understanding of daily and seasonal patterns in turtle occurrence.

• Temperature data loggers will be used in conjunction with all active and passive telemetry efforts to pair temperature readings with time of detection of tagged turtles.

• Habitat usage by tagged EPGTs will be statistically examined based on size, sex, season, temperature, and association with high-risk areas where density of human activities are highest.



LITERATURE CITED

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SPATIAL HABITAT USE

San Diego Bay is an important foraging site for green turtles, however little is known about the spatial extent of habitat use or high use areas within San Diego Bay. Intense boat traffic and related effects on habitat quality likely impact sea turtle habitat use; the size and shape of a sea turtle's home range can be substantially affected by resource availability, resource density, and the presence of artificial structures such as jetties and shipping channels (Renaud et al. 1994, Whiting and Miller 1998, Seminoff et al. 2002).

