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CHELONIA IN AND OUT OF THE JACUZZI: DIEL MOVEMENTS OF EAST PACIFIC GREEN TURTLES IN SAN DIEGO BAY, USA

Boyd Lyon[1], Jeffrey A. Seminoff[2], Tomoharu Eguchi[2], and Peter H. Dutton[2]

[1] Department of Biology, San Diego State University, 5500 Campanile Dr., San Diego, CA 92185, USA; NOAA – National Marine Fisheries Service, Southwest Fisheries Science Center, 8604 La Jolla Shores Dr., La Jolla, CA 92037, USA
[2] NOAA – National Marine Fisheries Service, Southwest Fisheries Science Center, 8604 La Jolla Shores Dr., La Jolla, CA 92037, USA

East Pacific green turtles (a.k.a. black turtles, *Chelonia mydas*) are a subpopulation of the pan-tropical green turtle, ranging from the United States to Chile. San Diego Bay (SDB) USA is the northern-most major foraging area, and hosts a resident population of green turtles that congregate near the artificially heated effluent channel of a local power plant. Whereas sonic tracking, capture data, and visual observations indicate that turtles are moving between the warmer water of the effluent and the cooler water further from the power plant, diel movement patterns have yet to be investigated. In this study we deployed Time-Depth Recorders (TDR's) on green turtles to determine diel movements in this unique group. All turtles were captured using entanglement nets deployed near the heated effluent of the power plant. TDR's were deployed on five turtles from January 2004 to May 2005, logging time of day, depth, light levels, and temperature. TDR's were seated in tubular-shaped, slightly buoyant, syntactic foam drogues. The drogues were attached to the turtle's carapace and had an automatic release mechanism. Drogues were fitted with radio and sonic transmitters to enable recovery. Sea surface temperatures (SST) were recorded at 14 sites throughout the bay. Circular statistics and nonlinear regression analyses were used. A best fit SIN function ($yTemp=c+\alpha*SIN[xTime+\beta]$) described mean hourly temperature and time of day (transformed to radians) for each deployment. T-tests were used to test amplitude significance ($\alpha = 0.05$). SST varied substantially throughout the bay; ranging from 19.7 – 31.6°C at the power plant effluent to 14.4 - 33.9°C at the other sites. SCL ranged from 62.8 - 94.1 cm (μ=84.4 ±12.8cm, n=5). Deployment durations ranged from 2 – 17 d (μ =9.0 ±5.4 d, n=5). Scatter plots of hour vs mean temp for each turtle illustrated similar movement patterns. Temperature patterns fit a 24-h unimodal SIN function ($r2 = 0.59 – 0.96$). Mean temperature variations recorded by TDR's ranged from 4.0–13.3°C and all showed significant amplitude ($p<0.001$). Based on temperature measurements throughout the SDB, were able to use temperature as a relative location indicator. Our graphical illustrations and high regression (r2) values show a pattern of movement generally characterized by late evening and early mornings spent in the cooler water away from the power plant and late morning and afternoon hours spent near the warm effluent near the power plant. Our results are based on hourly means over the course of multiple days and we found variation among individuals. The turtles from November and January had less pronounced temperature amplitude and peak temperatures occurred between 19:00-20:00h. Turtles from March, April, and May had greater amplitude and an earlier peak temperature period, occurring between 13:30-15:30h. Although the sample size was small in this study, the cyclical behavior of turtles was apparent. Turtles in San Diego Bay exhibit diel movement patterns between warmer water of the effluent and the cooler waters further away from the power plant; furthermore, temperature loggers can be utilized in predicting the movements and behavior of sea turtles.

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COMPILERS:
Mike Frick, Aliki Panagopoulou, Alan F. Rees, Kris Williams

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