

Why did the turtle cross the ocean? Pelagic red crabs and loggerhead turtles along the Baja California coast

Hoyt Peckham and Wallace J. Nichols

WILDCOAST, PO Box 324, Davenport, California 95017, USA

The loggerhead turtle (*Caretta caretta*) connects the entire Pacific basin through its developmental and reproductive migrations. Previous studies have demonstrated that the majority of *C. caretta* which occur off of California, USA, and the Baja California peninsula, Mexico are of Japanese origin, and in the midst of their transoceanic developmental migration (Nichols et al. 2000a, Bowen et al. 1995). Despite strong national and international laws and agreements protecting sea turtles and long-term protection efforts on nesting beaches, *C. caretta* numbers continue to decline. Annual censuses on Japanese beaches indicate a grave reduction in the number of nesting *C. caretta* between 1990 and 2000 (Kamezaki et al., in press).

In the northeast Pacific Ocean, *C. caretta* are found primarily along the 1,000 mile Pacific coast of the Baja California peninsula. Rich in nutrients due to upwelling, these waters host a variety of marine algae and invertebrates and once supported vast populations of five different sea turtle species. Hunting and bycatch of *C. caretta* has occurred along the peninsula for nearly a century, leading to severe depletion.

Baja California's shark and halibut fisheries are by far the greatest known cause of loggerhead turtle mortality in the North Pacific. These causes, plus poaching of loggerhead turtles, result in a mortality rate estimated to be in excess of 1,950 loggerhead turtles per year. Mortality off of the Baja California Peninsula is double that of all other reported North Pacific loggerhead turtle mortality sources combined (NMFS 2000).

The impact of this astounding mortality is exacerbated by the fact that loggerhead turtles killed off the Baja California peninsula are immature, and thus never get the chance to reproduce back in Japan. Sampling stranded, consumed, and live-captured loggerhead turtles off Baja California between 1994 and 2001, we found a mean straight carapace length (SCL) of 61.4 cm (N=606; SE=0.41; range 63.6cm). Stranded, consumed, and live-captured *C. caretta* were pooled because no significant differences in length-frequency were found between them. According to recent population modeling, mortality of sub-adult sea turtles does the most harm to populations (Heppell 1998).

Loggerhead turtles primarily feed on pelagic red crabs (*Pleuroncodes planipes*) off Baja California (Nichols et al. 2000b), which makes them especially susceptible to being caught in the nets and longlines of shark and halibut fishermen. Longline and gillnet fishing for sharks and halibut peaks in summer months when loggerhead turtles are most abundant off Baja California (Ramirez-Cruz et al. 1991). Loggerhead turtles are caught on hooks or entangled in nets and drown.

Stomach contents of seven loggerhead turtles collected near Bahía Magdalena, BCS, Mexico, contained only *Pleuroncodes planipes*. This finding echoes results reported by Villanueva that eighteen of nineteen loggerhead turtle stomachs from Baja California which he sampled contained only *P. planipes* (Villanueva 1991). The broad size range of juvenile loggerhead turtles found off the Baja California peninsula combined with their exclusive consumption of *P. planipes* suggests they may remain in the area for extended periods to feed on *P. planipes* before returning to Japanese waters as adults to breed. *P. planipes* is a critical diet component for loggerhead turtles during the North American coastal portion of their transoceanic developmental migration.

Loggerhead turtle movement data, sightings and stranding patterns suggest that foraging patterns off Baja California may be tightly associated with *P. planipes* reproduction and seasonal movement. *P. planipes* has been shown to be the most abundant micronektonic species in the area of the Baja California peninsula, one of the most important consumers of phytoplankton, and the most common prey for many marine vertebrates, includi

ng cetaceans, pinnipeds, birds, fish, and two species of turtle in addition to *C. caretta* (Aurtoles 1992).

In contrast, in the Central North Pacific (CNP), loggerhead turtles appear to be omnivorous, opportunistic predators of the neuston layer. Parker et al. (2000) report that stomach contents of loggerhead turtles caught in the Central North Pacific driftnet fishery include a wide array of floating organisms and organisms riding on floating objects such as the predatory gastropod (*Janthina*) species, its prey (*Velutella velutella*), gooseneck barnacle (*Lepas* species), and the pelagic crab *Planes cysneus*. Through satellite tracking Polovina et al. (In Review and 2000) have shown that loggerhead turtles in the CNP associate with convergent fronts and eddies of high productivity, probably reflecting the distribution of their prey. Proposed trawling for *P. planipes* off the Baja California peninsula would disrupt the feeding of *C. caretta* as well as many other species which depend on *P. planipes*.

Selective feeding of juvenile loggerhead turtles off the Baja California peninsula on *P. planipes* may represent a shift in both feeding preference and foraging ecology. Elucidating the ecological relationships between loggerhead turtles and pelagic red crabs will be of importance in reversing the decline of loggerhead turtle populations of the North Pacific.

LITERATURE CITED

- Aurtoles-Gamboa, D. 1992. Inshore-offshore movements of pelagic red crabs *Pleuroncodes planipes* off the Pacific coast of Baja California Sur, Mexico. *Crustaceana* 62:71-84.
- Bowen, B.W., F.A. Abreu-Grobois, G.H. Balazs, N. Kamezaki, C.J. Limpus and R.J. Perl. 1995. Trans Pacific migrations of the loggerhead turtle (*Caretta caretta*) demonstrated with mitochondrial DNA markers. *Proc. Natl. Acad. Sci.* 92:3731-3734.
- Heppell, S. 1998. Application of life-history theory and population analysis to turtle conservation. *Copeia* 1998:367-375.
- Kamezaki, N. et al. In press. Current status of Japanese loggerhead turtles, *Caretta caretta*. In: A. Bolten and B. Witherington, eds. *Biology and Conservation of Loggerhead Sea Turtles*, Smithsonian Institution Press.
- National Marine Fisheries Service. 2000. Section 7 Consultation on Authorization to take Listed Marine Mammals Incidental to Commercial Fishing Operations under Section 101(a)(5)(E) of the Marine Mammal Protection Act for the California/Oregon Drift Gillnet Fishery. 2000.
- Nichols, W.J., A. Resendiz, J.A. Seminoff, and B. Resendiz. 2000a. Transpacific migration of a loggerhead turtle monitored by satellite telemetry. *Bull. Mar. Sci.* 67:937-947.
- Nichols, W.J., A. Resendiz, and C. Mayoral-Rousseau. 2000b. Biology and Conservation of Loggerhead Turtles in Baja California, Mexico. In: H.J. Kalb and T. Wibbels, comps. *Proceedings of the Nineteenth Annual Symposium on Biology and Conservation*. NOAA Tech. Memo. NMFS-SEFSC-443. p. 169-171.
- Parker, D.M., Cooke, W., and Balazs G.H. 2000. Dietary components of pelagic loggerhead turtles in the north Pacific Ocean. In: A. Mosier, A. Foley, and B. Brost, comps. *Proceedings of the Twentieth Annual Symposium on Biology and Conservation*. NOAA Tech. Memo. NMFS-SEFSC-477. p. 148-151.
- Polovina, J.J., D.R. Kobayashi, D.M. Parker, M.P. Seki and G.H. Balazs. 2000. Turtles on the edge: movement of loggerhead turtles (*Caretta caretta*) along oceanic fronts spanning longline fishing grounds in the Central North Pacific, 1997-1998. *Fish. Oceanogr.* Vol 9.

Ramírez-Cruz, J.C., Ramírez, L.P. and Flores, D.V. 1991. Distribución y abundancia de la tortuga perica, *Caretta caretta* en la costa occidental de Baja California Sur, Mexico. *Archelon* 1:1-4.

Villanueva, D. 1991. La tortuga perica *Caretta caretta gigas* (Deraniyagala 1939) en la costa de Pacifico de Baja California Sur, Mexico. Departamento de Biología Marina. Univ. Autónoma de Baja California Sur, La Paz, BCS, Mexico. Tesis de Licenciatura. 68 p.



NOAA Technical Memorandum NMFS-SEFSC-503

PROCEEDINGS
OF THE TWENTY-SECOND ANNUAL
SYMPOSIUM ON SEA TURTLE
BIOLOGY AND CONSERVATION



M i a m i . U S A

4 to 7 April 2002
Miami, Florida, USA

Compiled by:
Jeffrey A. Seminoff

U.S. Department of Commerce
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
Southeast Fisheries Science Center
75 Virginia Beach Drive
Miami, FL 33149 USA

August 2003