

Biology and Conservation of Loggerhead Turtles (*Caretta caretta*) in Baja California, Mexico

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There is a notable paucity of information available on the life history of loggerhead turtles (*Caretta caretta*) in the eastern Pacific Ocean. In order to contribute to our understanding of the distribution, movement and ecology of loggerheads feeding along the Pacific coast of Baja California Sur, Mexico, we initiated community-based surveys and satellite telemetry research in the region. Our preliminary results indicate that the loggerhead population off the Baja California coast is comprised largely of juvenile turtles (mean SCL=60.8cm, range 35.3-80.4cm, SD=9.3, N=58) feeding predominantly on pelagic red crabs (*Pleuroncodes planipes*). The turtles appear to follow the wide California current southward and may continue westward as they follow the path of the north Pacific gyre. Turtles in the region are caught in a variety of fishing tackle including shark lines, gill nets and shrimp trawls and are occasionally consumed in fishing communities. The success of this project has depended on community involvement and has resulted in the establishment of a long-term sea turtle conservation research and education program in the region.

Introduction

Reports of loggerhead turtles (*C. caretta*) in the eastern Pacific date back over 50 years (Shaw 1947). Apart from several brief descriptions of their occurrence along the coast of Baja California (Márquez 1969, Bartlett 1989, Ramirez-Cruz *et al.* 1991) there had been no studies of their distribution and movement. Recently, several papers and reports have described the genetic affiliation of Baja California loggerheads with loggerheads nesting in Japan (Bowen *et al.* 1995), incidental catch of Pacific loggerheads (Bolten *et al.* 1996) and their trans-Pacific migration from Baja California to Japanese waters (Nichols *et al.* 2000, Resendiz *et al.* 1998, Nichols 1999). It is clear from these studies that some sea turtles born on Japanese nesting beaches make trans-Pacific developmental migrations encompassing the entire North Pacific basin in a manner similar to Atlantic loggerheads (Bolten *et al.* 1998).

Seasonal cold water upwelling along the Pacific coast of Baja California, Mexico, and outwelling from the Bahia Magdalena-Bahia Almejas mangrove system result in a rich assortment of marine life in this region (Auriolles-Gamboa and Perez-Flores 1997). In the spring and summer this region provides food for developing loggerheads who gorge themselves on the abundant pelagic red crabs, *P. planipes* (Villanueva 1991).

This study presents information on seasonal distributions, movement and stranding of loggerhead turtles in this critical developmental region. The many ways that local fishing communities in the region have supported and participated in this project have been critical to its success.

Methods

Sea turtles were located at sea while they were basking at the surface. On calm, sunny days turtles could be located by spotting terns (*Sterna* sp.) perched atop their dry carapaces. Turtles were caught by hand and held on board on rubber matting while measured and tagged. Inconel flipper tags (National Band and Tag Co., Kentucky, USA) were applied to the fore-flippers of each turtle. Satellite transmitters, models ST-3 and ST-6 (Telonics, Inc., Mesa, Arizona, USA), were deployed on a total of three loggerhead turtles along the Pacific coast of Baja California using the attachment technique described by Balazs *et al.* (1996). Open-water surveys for basking loggerhead turtles were conducted during the summer and fall of 1997 and 1998 in waters near Punta Abrejos and Bahia Magdalena, BCS, Mexico. Surveys were conducted up to 30 miles offshore on calm days (Beaufort 0 or 1) from 22-foot fishing "pangas" with outboard motors moving at approximately 15 knots. Boats held two observers and a driver. Surveys for stranded loggerheads were conducted on foot throughout the year on Pacific beaches near Bahia Magdalena, Baja California Sur, between May 1994 and January 1999. Examining and analyzing stomach samples from a total of four stranded loggerhead turtles allowed investigation of the diet of Baja California loggerheads.

Results

Movement. All three loggerheads tracked by this project left the region in a southwestern direction somewhat consistent with the flow of the California Current. Detailed data will be presented elsewhere.

- Loggerhead PAO204 (PTT 01085), 64 cm (SCL), was tracked for a total of 268 days from 3 July 1998 to 18 September 1998.

- Loggerhead PAO205 (PTT 05520), 73.4 cm (SCL), was tracked for a total of 78 days from 11 September 1997 to 5 June 1998.

- Loggerhead BLA099 (PTT 07667), an 83 cm adult female, was tracked for a total of 368 days from 12 August 1996 to 14 August 1997. Bowen *et al.* (1995) had previously determined this turtle to be of Japanese origin.

Abundance and Distribution. Surveys at sea resulted in sightings of loggerhead turtles during all seasons. However, peak numbers occurred during the summer of 1997 (Table 1). During the 1998 summer and fall surveys *P. planipes* were not observed and fishermen indicated that the waters were especially warm and that the fishing was poor. Stranding data indicate a peak in late spring and summer followed by a decline in numbers of stranded turtles in the fall and winter. Stranded turtles encountered in winter months showed advanced decomposition and had likely

been present on the beach for up to several months. None of the stranded turtles appeared to have suffered any type of trauma. Both at sea and stranding surveys always involved the participation of members of the local fishing communities. In the case of Punta Abreojos surveys, the entire fishing cooperative was enlisted to aid in our survey efforts. The range in size for all turtles encountered along the Pacific coast of Baja California during this study was 35-80 cm (SCL) with a mean of 61 cm (N=58). Eleven turtles were captured in the Gulf of California with a mean SCL of 49 cm (28-93 cm).

Feeding. Four stomach content samples of stranded loggerhead turtles were obtained from Bahia Santa Maria, BCS, Mexico in the summer of 1998. All four samples contained only *Pleuroncodes planipes*, the pelagic red crab. Interviews with fishermen who regularly capture and consume loggerhead turtles in the region support these observations. During this same period 15 Humboldt squid (*Dosidicus gigas*) were also examined and were found to be feeding entirely on *P. planipes*.

In the waters near the Pacific coast of Baja California the most common sea turtles appear to be juvenile pelagic loggerheads moving in a generally southwestward direction with the currents. In the spring, with the winds from the north, the California current runs along the Baja California coast, weakening through the summer and into the fall and allowing for the influence of the Davidson current from the south along the coast (Wyrski 1965). This pattern of the surface currents may have been disrupted and/or enhanced during the recent El Niño event, resulting in anomalous warm surface waters and lower productivity—by summer 1998 conditions had begun to return to “normal”.

The loggerhead turtles in this region appear to be feeding primarily on *Pleuroncodes planipes*, the pelagic red crab or “langostilla”, and turtles are likely to be found closer to shore during the spring and summer when aggregations of their prey are most abundant. The standing stock of the benthic phase of this species is estimated to be from 300 to 500 thousand metric tons with densities to 40 crabs/m² (Aurioles-Gamboa and Perez-Flores 1997). The crabs reproduce in spring and the pelagic phase may last for up to two years. After the third year crabs become entirely benthic and retreat to cooler, deep water in the late summer when the influence of the Davidson current prevails along the coast. Stomach content analyses support the observation that these turtles feed on pelagic phase crabs during summer months.

Another location where loggerhead turtles are occasionally found is the Midriff Island region of the Gulf of California, an area known for occasional “blooms” of *P. planipes*. Felger *et al.* (unpublished data) reported that loggerheads in the Canal de Infiernillo region, between mainland Sonora, Mexico and Isla Tiburon, also feed on bivalves such as *Laevicardium elatum*, *Modiolus capax* and *Dosinia ponderosa*, however the turtles in that region were generally not found as close to shore as *Chelonia* commonly are.

Stranding patterns suggest that incidental catch is a hazard for the turtles as they enter these coastal waters in the spring and summer (Table 2). None of the stranded turtles showed signs of hooking or trauma so it seems likely that the cause of mortality is a net-based fishery. Shark and California halibut (*Paralichthys californicus*) fishermen have been cooperative with this study and report regular loggerhead bycatch. Loggerhead turtles caught by shark fishermen are often released alive, whereas those caught in gillnets are typically dead. The halibut fishery coincides with the movement of *P. planipes* to the shallower continental shelf and involves the use of bottom gillnets or “tresmayo”. The shark fishermen utilize hook and line sets from 20+/- km offshore.

Our stranding surveys generally only included the 12 miles of Pacific beach within the area known at Bahia Santa Maria, Baja California Sur. It is notable that the few data available from north of this bay (Cabo San Lazaro and the outer Pacific beaches) suggest that stranding may occur along the entire Pacific coast during the spring and summer months. It seems likely that the total number of stranded loggerheads in Baja California alone could be in the thousands annually.

We plan to continue our studies of the pelagic movement of Baja California loggerhead turtles and to study their foraging, basking and diving behavior. Ongoing efforts will continue to survey stranding rates along the Pacific coast of Baja California near Bahia Magdalena. In the spring and summer of 1999 we will accompany shark and halibut fishermen during their activities to study loggerheads and to work with them to develop methods that minimize impact on turtle populations.

Conclusions

- 1) Loggerhead turtles are the most abundant sea turtle species in pelagic waters near Baja California during spring and summer months.
- 2) The Baja California loggerhead population is comprised of predominantly juvenile turtles feeding principally on *Pleuroncodes planipes*.
- 3) Satellite telemetry provides a useful method for studying the movement and behavior of juvenile Pacific loggerheads, especially due to their tendency to spend long periods of time basking at the surface, and suggests a southwestern trend in loggerhead movement in the region.
- 4) Seasonal incidental catch of loggerhead turtles related to gillnet, halibut and shark fisheries is likely a significant source of mortality in the region.

Further investigation of the movement, abundance and mortality rates of these animals is needed.

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Table 1. At-sea sightings of loggerhead turtles in Baja California Sur, Mexico (1997-1998).

Date	Location	Total hours of survey	# of Sightings
July 1997	Bahia Magdalena, BCS	13	5
Aug 1997	Punta Abreojos, BCS	30	20
July 1998	Bahia Magdalena, BCS	15	4
Aug 1998	Punta Abreojos, BCS	24	1
Nov 1998	Punta Abreojos, BCS	28	1

Table 2. Strandings of loggerhead turtles on Isla Magdalena, Baja California Sur, Mexico (1994-1999).

Date	Location	# of Turtles	MeanSCL (cm)	Range (cm)
May 1994	Pacific coast of Isla Magdalena	210	na	na
June 1997	Bahia Santa Maria, BCS	32	59.5	35.3-80.4
May 1998	Bahia Santa Maria, BCS	7	63	53-73.2
Aug 1998	N. end of Cabo San Lazaro, BCS	40	na	na
Nov 1998	Bahia Santa Maria, BCS	11	60.1	46.8-76.5
Jan 1999	Bahia Santa Maria, BCS	3	59.4	57-62.4



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