Inter-American Convention for the Protection and Conservation of Sea Turtles

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Synopsis of the Leatherback Sea Turtle (*Dermochelys coriacea*)

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Conservation Status:

This sea turtle species is protected under the Inter-American Convention for the Protection and Conservation of Sea Turtles. The World Conservation Union (IUCN) classifies the species as *Critically Endangered* of extinction (Sarti, 2000)[1], experiencing a global decline of at least 80% of its populations over the last 10 years, and the species is included in Appendix I of the Convention on International Trade of Endangered Species of Wild Fauna and Flora (CITES). This species is also protected under the Convention for the Conservation of Migratory Species of Wild Fauna and Flora (also identified as CMS or the Bonn Convention); the Protocol for Specially Protected Areas of Wildlife of the Convention for the Protection and Development of the Marine Environment in the Greater Caribbean Area (SPAW); the Convention of European Natural Habitats and Wildlife (the Bern Convention; Hykle, 1999); and it is also listed in the annexes of the Convention for the Protection and Preservation of Wildlife in the Western Hemisphere.

Particular Diagnosis:

The generic name *Dermochelys* was established by Blainville (1816), whereas Vandelli (1761) designated the specific name *coriacea* adopted later by Linneaus (1766) (Rhodin and Smith, 1982). The binomial makes reference to the characteristic leathery skin where scutes are absent, as evident in adult individuals. The vernacular names for the species are as follows: leatherback, canal, laúd, siete quillas, siete filos, tora, caná, tinglada, machincuepo, garapacho, sietequías, caja de muerto, baúl, tinglar, dorso de cuero, cardón, bufeadora, barriguda, bagra, guascama, chalupa, lomo de cuero, lomo de tronco, *inter alia* (Rueda, Ulloa and Medrano 1992).

Taxonomic Aspects

Phylum:	Chordata
Subphylum:	Vertebrata
Superclass:	Tetrapoda
Class:	Reptilia
Subclass:	Anapsida
Order:	Testudines (Linneus, 1758)
Suborder:	Casichelydia (Gaffney, 1975)
Infraorder:	Cryptodira (Cope, 1868)
Parvorder:	Eucryptodira (Gaffney, 1975)

[1] www.redlist.org/search/details.php?species=6494

Superfamily: Chelonidae (Baur, 1893)
Family: Dermochelyidae
Genera: Dermochelys (Blainville, 1816)
Species: Dermochelys coriacea (Linnaeus, 1766)

Vernacular names for this species vary widely from country to country, as follows:

Belize: Leatherback, trunk, trunkí
Colombia: Tortuga caná.
Costa Rica: Baula, canal
Cuba: Tinglado
El Salvador: Baula
Guatemala: Baule
Honduras: Pejebaúl, baula
México: Laúd
Netherlands Antilles: Leatherback
Nicaragua: Tora
Panama: Canal
Puerto Rico: Tinglar or tinglado
United States of America: Leatherback
Venezuela: Cardón

Other common names are siete filos (seven edges) and siete quillas (seven keels); however, leatherback is the name used in this synopsis.

The leatherback turtle is the only member of the mono-phylum Dermochelyidae. It is also distinctive because it is the largest (Morgan, 1989), dives to the greatest depths (Eckert *et al*, 1989), and exhibits the most extensive distribution (71 N - 47 S; Pritchard and Trebbau, 1984).

The average curved carapace length is 150 cm with a range over 124 to 256 cm. In general, sexually mature females weight between 250-500 kg. One report is on hand for a male specimen captured more than 15 years ago in Wales (Great Britain), weighting approximately 1,000 kg (Morgan, 1989). Leatherback average weights in different parts of the world are as follows:

Costa Rica: 258-506 kg
India: 272-356 kg
Senegal: 200-250 kg
Sri Lanka: 301-448 kg[2]
Surinam: 302-425 kg

[2] www.euroturtle.com

Unlike other sea turtles, the leatherback sea turtle lacks a bony carapace, horny scutes and cornified epidermal structures. The carapace is more like a mosaic of small polygonal bones embedded in a matrix of cartilage and oily dermal tissue. The skin is soft, black and spotted with white; the ratio of light to dark pigmentation varies. The carapace has seven ridges or prominent keels with a markedly tapering shape which is slightly flexible. In general terms, it measures 130-175 cm (curved carapace length).

The large head represents between 17 and 22% of the carapace length. The upper jaw is deeply incised with two W-shaped structures in place of teeth, which are adaptations to its diet. The forelimbs are very well developed and lack claws.

Hatchlings are covered with small polygonal scales and predominantly black in color with white along the borders and crests. Another characteristic of leatherback hatchlings is their very long front flippers, lacking claws, which almost reach the same length as the hatchling. The mean length of the carapace is 60mm (43-63mm) with a mean weight of 45.5g (36-54g). The diameter of full-size eggs varies between 51-55mm with mean weights between 70 and 103g (Chacón 1998).

Ecology and Reproduction:

This species is pelagic and it approaches the coast only during nesting time. Small groups of individuals have been observed swimming near aggregations of jelly fish.

Hodge (1979), Frazier and Salas (1982), and Pritchard (1983), report the species in Japanese, Scandinavian, Liberian, Alaskan as well as southern Chilean, New Zealand, Tasmanian and South African waters.

The structure of the upper jaw and the horny projections found in the area of the esophagus, are two distinctive characteristics of the species specialized diet. Analyses of stomach contents indicate that the diet of this species includes mainly *Cyanea (Scyphomedusae* and *Syphonophore)* and *Tunicates (Salps and Pyrosoma)*. Observations of leatherbacks feeding on the ocean surface are common.

Leatherback turtles exhibit great thermal tolerance. It is common to observe them in temperate waters of eastern as well as western United States of America and Canada. It has been demonstrated that their body temperature remains several degrees above the ambient temperature under these conditions. The reasons behind this ability to retain their body heat may be associated with various characteristics, including thermal inertia derived from their great body mass, the fatty sub-dermal layer acting as an insulator, countercurrent heat exchanges in the flippers, the potential for heat generation due to the fatty brown adipose tissue and the relatively low freezing point of the lipids in their bodies.

Based on behavioral observations of reproductive females diving in search for food in the Caribbean, it has been proposed that leatherbacks dive in the water column following the vertical migration of zooplankton (Eckert *et al,* 1986). Their specialized diet of planktonic Cnidarias *(Medusae)*, places the leatherback turtle on the top of a particular food chain dependent on nano-plankton, separated from other more common and better understood trophic levels, for example those that sustain whales or tuna (Hendrickson, 1980).

The travel pattern of the species is erratic with the main objective being its search for food. Until recently, very little was known about the migrations of this species; however, fitting satellite transmitters on leatherbacks has provided important information regarding this phase of their life cycle.

Nesting sites are distributed globally (approximately between coordinates 40º N and 35º S). Nesting females are seasonal visitors of the Mesoamerican Pacific and the Wider Caribbean regions, whereas males are only occasionally observed. Observations occur between October and February (Pacific), and March and July (Greater Caribbean), coinciding with the nesting months. It is estimated that breeding takes place previous to or during migrations to the nesting areas (Eckert and Eckert, 1988). Females usually nest at intervals of 9 to 10 days, laying an average of 5-7 nests per year with an average remigration rate of 2 to 3 years or more. It has been observed that one female may lay up to 11 nests during one given year in the Wider Caribbean region (St.Croix: Boulon *et al*, 1996), and as many as 13 per year in the Eastern Pacific (Costa Rica: Reina, *et al* 2002).

Eastern Pacific:	October through March
Indian Ocean:	December through April
Western Pacific:	Depends on Latitude
Western Atlantic:	January through July
Caribbean:	April through October
Eastern Atlantic:	Depends on Latitude

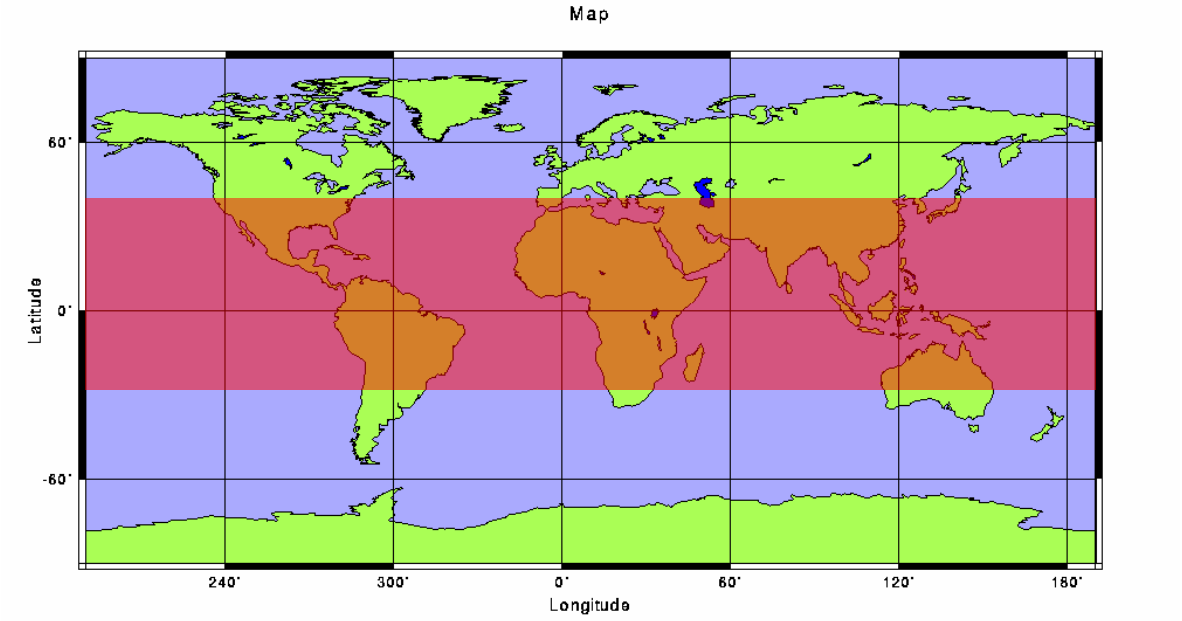


Figure 1: Global map indicating the meridians as a reference to the approximate nesting distribution of the species.

Nesting females prefer beaches with a reduced continental shelf (deep approach), open access free of rocks and abrasive corals, high-energy coastlines, strong currents and high surf. Nesting occurs at nighttime and nests are usually located behind the high-tide line. They lay between 70-90 eggs with yolk, in addition to an indeterminate number of yolkless eggs (about 30%).

Given that the number of nests deposited by any one given female is relatively high and not all tracks on the sand result in one nest (meaning that not all tracks reflect successful nesting), the registry of 100 nesting activities may reflect 80 nests or the reproductive effort of approximately 15 females.

Similar to other species, sex determination for hatchlings depends on the "pivotal temperature" (for which gender proportion is 1:1), and has been estimated between 29.25-29.50c in Suriname and French Guyana (Mrosovsky *et al,* 1984; Rimblot-Baly *et al,* 1986 and 1987). As with other sea turtle species, higher incubating temperatures favor the production of females.

Research on the diving habits of this species indicates that nesting females continually dive around nesting sites, crossing coastal waters to and from the nesting beach. Diving becomes progressively deeper as dawn approaches, following the movements of plankton. A typical dive lasts 15 minutes and rarely reaches depths of more than 200m, although dives deeper than 1,000m have been reported in the Greater Caribbean (Eckert *et al*, 1986, 1989).

Knowledge of hatchlings dispersal patterns or the behavior and movements of juveniles, is lacking. Based on global evaluations of observation registries, evidence at hand suggests a permanence of juveniles in tropical latitudes before reaching a carapace length close to 100cm (Eckert, 1999). However, Luschi *et al* (2003) established with certainty the roles of ocean currents in the distribution of hatchlings.

Survival, growth and longevity rates in the natural environment have not been determined for this species.

Distribution and Tendencies

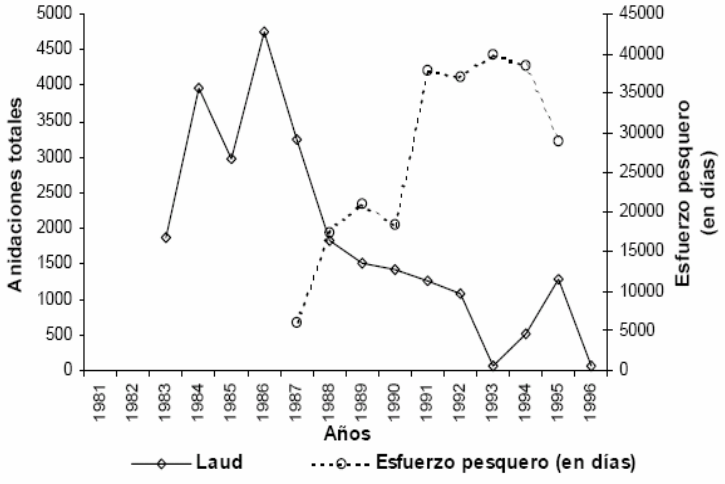
The information compiled in the following section was derived from consulting all types of documents including; scientific articles, governmental reports, institutional reports, project reports and personal communication. It is at the discretion of the reader to decide the importance that this type of information provides. The best available information was used; however, it is accepted that not all existing information was able to be reviewed.

Pacific

Canada: The Strategy and Action Plan for the Recovery of the Leatherback Sea Turtle in Pacific Canadian Waters, concludes that this species is seasonally present in British Columbian waters. The greatest threats for the species are: incidental capture, entanglement, collisions with boats and the ingestion of garbage. Its status is uncertain, but the importance of the area is recognized as the departure point from which females migrate to their nesting areas. According to Dutton *et al* (1999), evidence suggests that leatherbacks feeding in the north Pacific belong to the western Pacific population (Papua, Malaysia, Solomon Islands and Papua New Guinea) (PLTRT, 2003).

Chile: This country, as several other nations in South America, report no nesting for the species along its littoral zones. However, it does maintain important visitation from the species in its waters, particularly migrations in search for food. Several authors like Frazier and Montero (1990), and Eckert and Sarti (1997), have demonstrated the presence of leatherbacks in Chilean waters and the impacts derived because of incidental capture.

Figure 2: Comparison of the leatherback nesting trends (anidaciones totales) and the increase in the Chilean fishing effort (esfuerzo pesquero) in days (Eckert and Sarti 1997).



Costa Rica: Two nesting concentrations are reported in this country. One is located in the northern Nicoya peninsula on the beaches of Nancite, Ostional and Caletas; however, Ventanas, Grande and Langosta beaches are the most significant. To the south, the beaches of Pejeperro, Pejeperrito and Rio Oro make up the second concentration.

During the 1993 to 1995 seasons at Playa Grande, only between 11% and 19% of nesting females returned to nest over the next five years, whereas the re-nesting rate at other sites, such as Sandy Point in the Virgin Islands, is up to 49%. Furthermore, mortality for the females of Playa Grande was estimated at 34.6%, making the critical status of this species evident (Spotila *et al*, 2000).

After nesting, the Costa Rican females, like those in Mexico and Central America, migrate southwards in search of the waters near the Galapagos as a result of the impact of the Humboldt current in that zone.

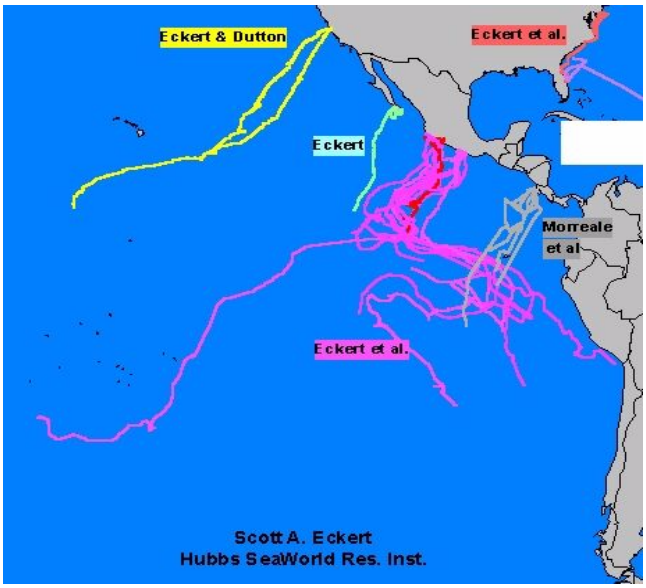


Figure 3: Post-nesting migration routes followed by the Mesoamerican leatherback sea turtles (Contribution by S. Eckert, WIDECAST).

Over the last decade, nesting at Playa Grande has also shown a dramatic decline, as is evident in the trend.

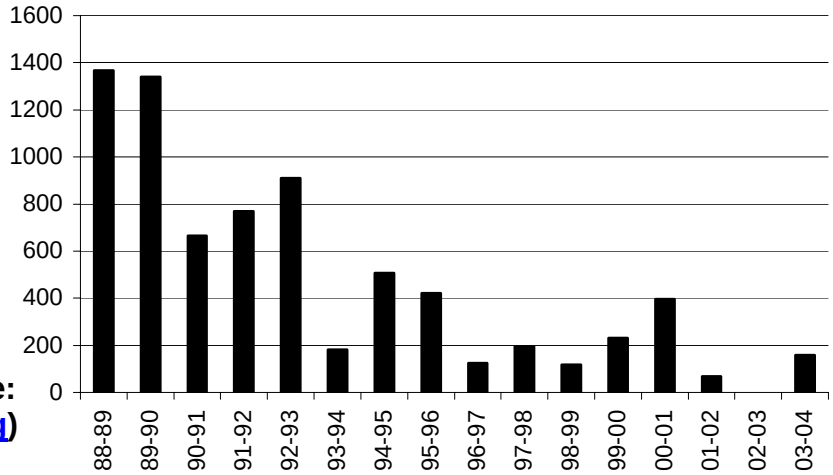


Figure 4: Leatherback nesting in Playa Grande, Costa Rica. (Source: www.leatherback.org)

Ecuador: Nesting of this species is not common in this country; however, an interesting record refers to a female nesting in Atacames, province of Esmeraldas (Salas 1981). The greatest frequency of registries is associated to observations and incidental captures in waters under the jurisdiction of Ecuador. Some of the figures in this synopsis regarding post-nesting migrations clearly show the significance of the Galapagos area.

El Salvador: This country's nesting population has always been small. Sarti *et al*, 1999, reported a count of six nests in Puntilla beach. As with Guatemala, the harvesting of eggs for human use in El Salvador represents the greatest threat to the species

Guatemala: In this country, nesting represents less than 25 nests per season; the majority being collected for human use. Higginson and Orantes (1987) reported 250 leatherback nests; however, Sarti *et al* (1999) registered only 8 nests for the entire 1998-1999 season. The most important nesting sites for this species are Hawai beach, La Candelaria, Taxico, Santa Rosa and the zone adjacent to the border with El Salvador (Chacón and Aráuz 2001).

Mexico: The first leatherback registry in the Mexican Pacific was reported by Márquez (1976) who determined that San Juan Chacahua beach in Oaxaca was the most important for Mexico with 2,000 females per season. He also determined Maruata, Colola in Michoacán, Piedra de Tlacoyunque in Guerrero and Escobilla in Oaxaca, as nesting sites. In 1981, the same researcher also noted Tierra Colorada, Guerrero and Mexiquillo in Michoacán as major nesting beaches for this species, with approximately 3,000 to 5,000 females nesting throughout the season at each beach (Márquez *et al.,* 1981).

Fritts *et al*. (1982) recorded leatherback nesting on a beach 15Km south of Punta Marques in Baja California, which represents the furthest nesting range of this species in Mexico.

Pritchard (1982) conducted an aerial survey to estimate the size of the population nesting in the Mexican Pacific. However, due to the high nesting density, counting the nests was reported as an impossible feat. Pritchard asserted that the zone between Maruata in Michoacán and the isthmus of Tehuantepec in Oaxca, boasted the largest nesting leatherback population globally. There was an estimated 70,000 to 75,000 females, representing 65.2% of the total population for that year. Since then, the species has experienced a constant decline.

In Mexico, aerial surveys have demonstrated a decrease from 5,354 nests in 1995-1996 to 981 nests in 1996-1997, exhibiting a decline of 1,093 to 236 for those seasons (Sarti, 2003).

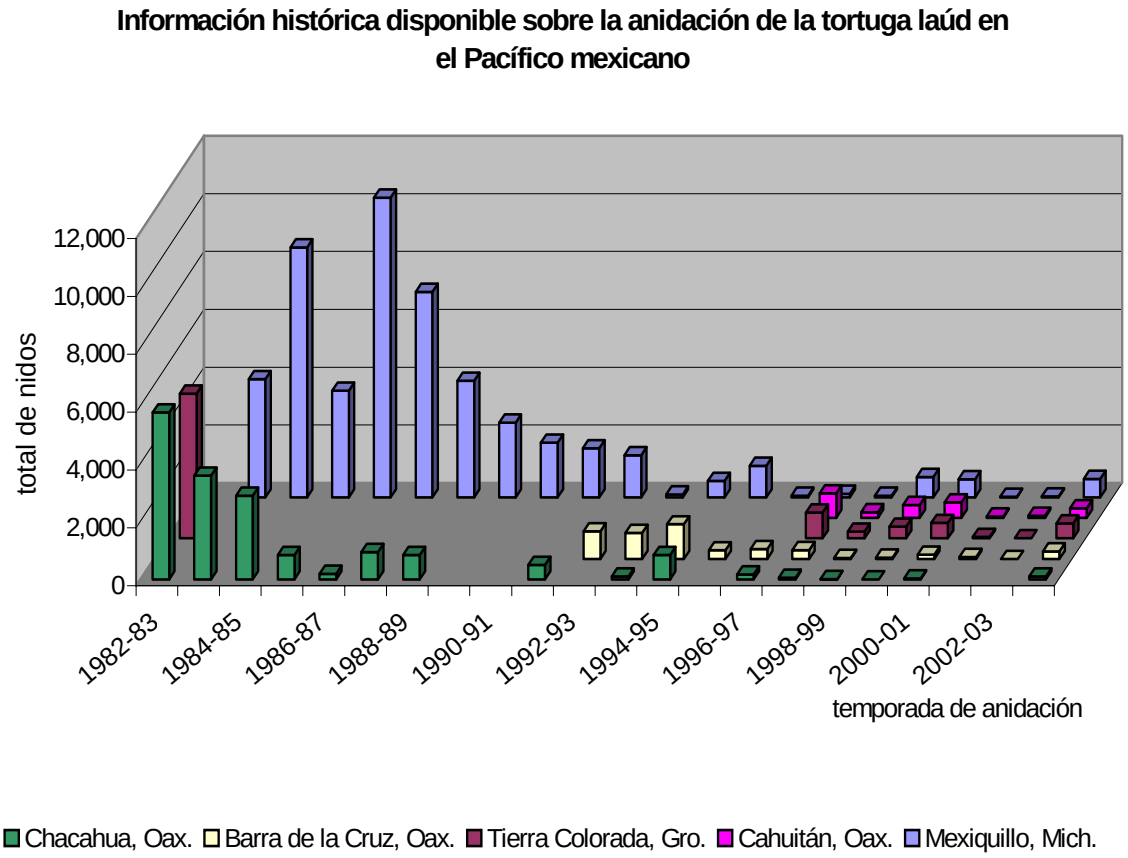


Figure 5: Decline of the leatherback population in the Mexican Pacific. Source: Aguilar *et al*., 1993; Alvarado *et al*., 1994; López *et al*., 1991, 1992; Cruz and Ruiz,1984; Sarti *et al*., 1993 and Sarti *et al*., 1999), (Graph provided by Sarti 2004).

Nicaragua: Unlike the Central American countries located to the north of Nicaragua, it was believed that this nation once possessed substantial nesting until a few years ago.

Beaches such as Castañones, Tecolapa, Masaya-Tepaco, Tecomapa, Popoyo, Isla Juan Venado and Mogote, are areas where nesting has been reported. Around 1983, 85 nests were recorded during the first weeks of the season; in 1999, Sartí *et al* 1999) recorded 81 nesting activities, and during the last two seasons (2002-2003 & 2003-2004) there have been 24 and 73 nests recorded, respectively. (Urteaga 2003a y 2004).

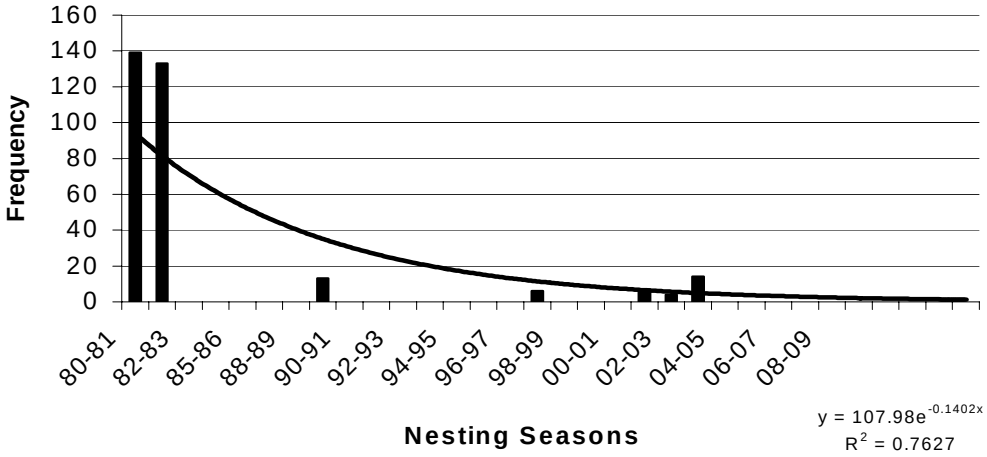


Figure 6: Nesting Trends in Nicaragua at El Mogote, National Wildlife Refuge, Chacocente (Urteaga 2003b).

Panama: Little is known about nesting for the species in this country; however, nesting is documented at the Barqueta National Refuge.

United States of America: No nesting is reported along the Pacific coast of the United States, although important aggregations are present in the marine zones adjacent to California. A program developed by NOAA (Southwest Fisheries Science Center) indicated similar results as Dutton *et al* (1999) determining that leatherbacks in the Pacific waters of the United States move towards the western Pacific.

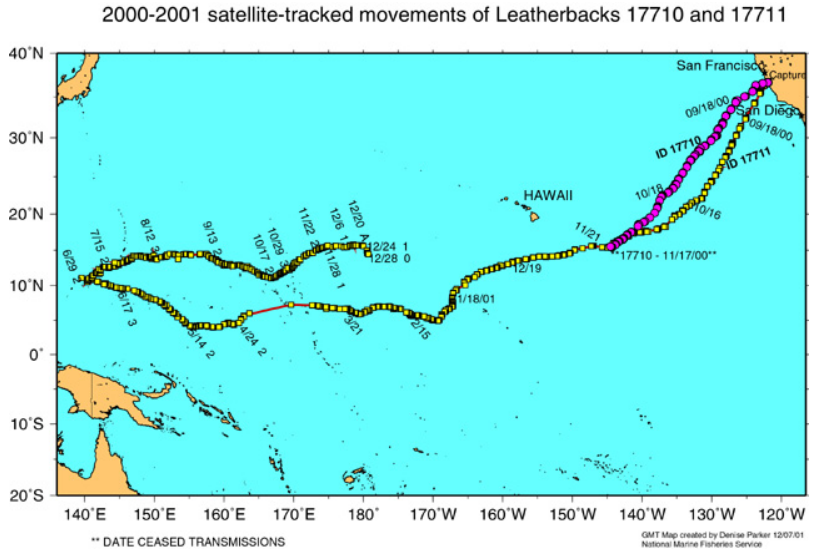


Figure 7: Migratory route of two specimens fitted with satellite transmitters between 2000 and 2001. (Source: swfsc.nmfs.noaa.gov/PRD /Seaturtle/Population_assessment/PapuaNewGuinea_newsflash.htm).

Caribbean-Atlantic

Belize: No nesting sites are identified in Belize (Smith *et al*, 1992).

Brazil: Less than 20 females (1.8-18.4) nested annually between 1988 and 2003 along the Brazilian coast. These nestings are mainly in Plata Comboios along the Espíritu Santo littoral (Thomé *et al* in press). During the period 1988 to 2003, 527 nests were documented. The trend analysis presented by Thomé *et al* (in press), indicates an exponential increase of 20%; however, nesting is concentrated, 91.9% in the months of November to December. It is very probable that specimens migrating southwards from the Guyanas, Venezuela and Trinidad & Tobago, go through waters under Brazilian jurisdiction.

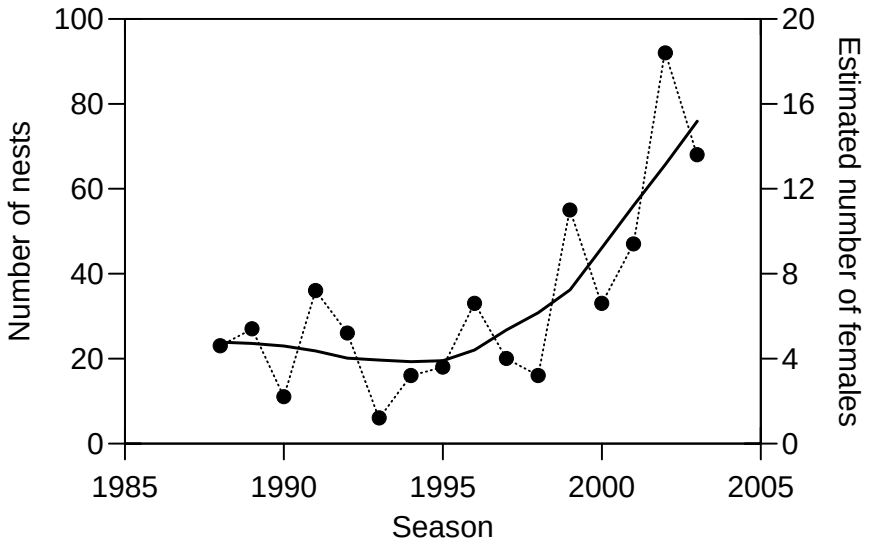


Figure 8: Nesting trend and estimated number of females for the State of Espíritu Santo, Brazil (Thomé *et al*, in press).

British Virgin Islands: Six or more females used to nest each night along the northeast coast of Tortola during the 1920s. The turtles were captured mainly for their oil which was used for medicinal purposes. This remains the case today (Eckert 2001).

Only one nest was registered in 1988 in Tortola and none in 1989 (Cambers and Lima, 1990). Recently, nesting has experienced an apparent increase, attributed to the benefits derived from a local moratorium declared in 1993 and the long-term protection of the neighboring US Virgin Islands. In 1997, 28 turtle tracks were registered in Tortola (nests and false crawls), 10 in 1998 and 39 in 1999; these results indicate the existence of a group of 2 to 6 nesting females per year (Eckert 2001).

Canada: The leatherback working group in Canada has determined the importance of the marine zone adjacent to Nova Scotia, where leatherbacks migrate from South and Central America. As a result of such working groups, the role of the North Atlantic Oscillation in the ecology of the species has now been established. Moreover, it has been possible to determine links among various nesting sites and the Atlantic zone of Canada, including Trinidad and Tobago and Costa Rica. Females nesting primarily at beaches in Central America, South America, South Caribbean and West Africa, are observed in the Atlantic waters of Canada (PLTRT 2003).

Colombia: The most important nesting beaches for the leatherbacks in Colombia lie in the region of the Gulf of Urabá, Acandí and Playona. Over eleven weeks of monitoring the 3Km nesting area in Playona beach, 71 females were tagged and 162 nests confirmed (Duque *et al*, 1998). During the 1999 season, 180 females were tagged and 193 nests confirmed (Higuita and Páez, 1999). The conservation status of the colony is unknown, however, tagging records confirm previous estimates of 100 nesting females per year by Ross (1982) and 200-250 nesting females/year by the USFWS (1981). Included among the current threats are egg collecting, incidental capture, pollution, deforestation at higher altitudes and coastal development (Eckert 2001).

Costa Rica: In the Caribbean of Costa Rica the leatherback turtle nests in Tortuguero, Parismina, Pacuare, Matina, Playa Negra and Gandoca. Total nesting estimates for Costa Rica's Caribbean are 3,000 to 7,000 nests/year or 1,152 to 2,579 nesting females (Troëng, Chacón and Dick, in press). Relying on these numbers, the authors consider the leatherback colony nesting in the country's Caribbean coasts as the fourth in importance worldwide, but declare the tendency indicates stability with a slight decline. The main problem for the species is the persistent illegal taking of eggs and incidental capture.

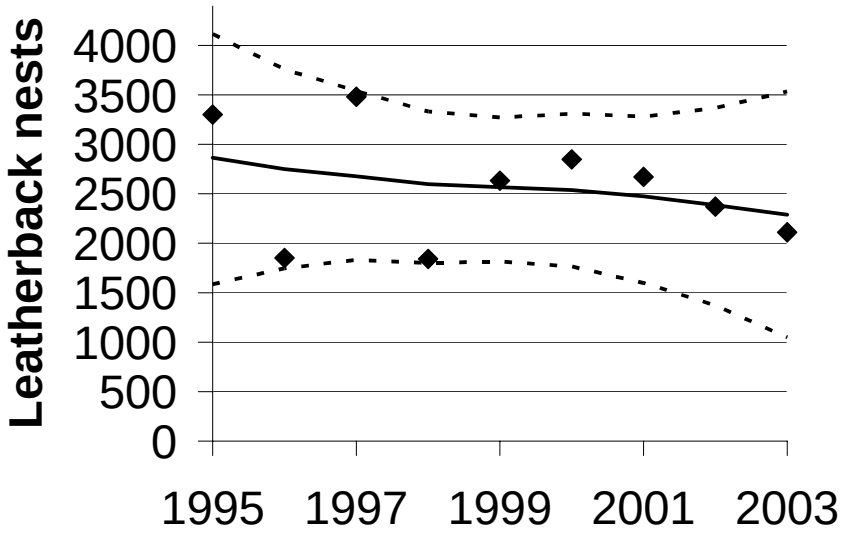


Figure 9: Nesting trends for three index beaches in the Caribbean Costa Rica (Tortuguero, Pacuare and Gandoca), (Troëng, Chacón and Dick, in press).

It has been estimated that 70% of all leatherback sea turtles nesting in the Caribbean of Costa Rica converge in the protected zones of the Gandoca Manzanillo National Wildlife Refuge, the Pacuare Nature Reserve, and the Tortuguero National Park (Eckert 2001). Two beaches in Costa Rica have shown an increase: Pacuare beach of 2.7% and Gandoca beach of 3.6%, whereas Tortuguero has shown a decrease of 5.0% (Troëng, Chacón and Dick 2002).

Dominican Republic: Ross (1981) estimated nesting at 300 nests on beaches such as Muertos, Macao, San Luis, Las Aguilas, Cabo Engaño and Cabo Samana. No data is available for the status of recent nesting.

French Guyana: The largest nesting colony of leatherback sea turtles of the Greater Caribbean region is found in Ya:lima:po, French Guyana. Data for French Guyana exhibits enormous fluctuations in the number of nests deposited each year. The sequence of nest densities (registered since 1978), ranges from over 50,000 to under 10,000 nests (Girondot and Fretey, 1996). The number of nests laid in Ya:lima:po since 1992, indicates a constant decline (Chevalier and Girondot 2000, Eckert 2001).

Despite the fact that the magnitude and the reasons behind the decline are difficult to identify (because of beach dynamics and the resulting change in nesting patterns), the trend is clear. Averaging the nesting data in groups including several years each (to lessen the effects of yearly fluctuations) it is possible to observe that the average nesting per year for the 1987-1992 period was 40,950 and 8,100 for the 1993-1998 period, indicating a decline greater than 50%.

Guyana: Leatherbacks have been utilized in this nation for many generations. The most important nesting site is Almond beach in the northwest district. Aerial surveys conducted in 1982 made evident the slaughter of the majority of the females and egg collection (Hart, 1984). Pritchard (1986) estimated that 80% of all females that tried to nest during the season were slaughtered. In 1989, an intensive tagging program started in conjunction with help from the local residents. Since the program began, mortality indexes have decreased. The number of nests at Almond beach showed annual variations ranging from 90-247 over the 1989-1994 period. It appears that populations are remaining stable (Eckert 2001).

Honduras: A small reproductive population occurs along the northern coast of this nation (25-75 nests/year) at Plapaya, which has been protected since 1995 by the non-governmental organization MOPAWI and the Garifuna community. No data are available to create a trend, although the greatest problem remains the collecting of eggs for human use.

Mexico: Nesting of the species is considered “rare” in the Mexican Caribbean and the Gulf of Mexico, with estimates of less than 20 nests/year along the Caribbean coast and the Gulf of Mexico (Eckert 2001).

Netherlands Antillas: Aruba is one of the islands included in the Antilles where nesting of the species occurs. During the 2003 season, nesting was recorded at Eagle Beach (47 nests), Boca Grandi, Arashi and the Arikok National Park (Van Der Wal, R. personal commentary).

Nicaragua: The Caribbean of Nicaragua harbors just one nesting site for the species which is located at Cocal beach along the border with Costa Rica. This site gets 100-150 nests per season (C. Lagueux, personal commentary).

Panama: In this nation, a significant part of the nesting effort is conducted at San San, Changuinola, Soropta, Bluff, Larga and Chiriqui beaches. During the 2004 season, more than 2,000 nests were registered at Chiriqui making it an important site for conservation purposes (Troëng, personal commentary).

Recent surveys confirmed 200 nests per year at Bluff beach on Colon Island. Between Costa Rica's border and Bocas del Drago, between 35 to 100 reproductive females are slaughtered illegally each year and the illegal collecting of eggs is estimated at 85%.

Other nesting beaches to the south are Pito beach, Aglatomate bay and Colorada beach along the eastern coast of Panama (Meylan *et al*, 1985; Pritchard, 1989).

Puerto Rico: At the Culebra Wildlife Refuge in Puerto Rico (Resaca and Brava beaches), an average of 19 females were observed between 1984-1986. These females laid approximately 142 nests. This number increased to an average of 76 nesting females per year and 375 nests (Eckert 2001).

Surinam: As persistent erosion alters the nesting beach in French Guyana, the colony continues to shift towards Suriname, where sandy beach conditions are on the increase as a result of beach dynamics. In 1967, less than 100 leatherback turtles nested in Suriname, but these annual results have increased consistently, reaching a maximum of 12,401 nests in 1985. Since 1985, very marked fluctuations have been present (Reichart and Fretey, 1993). At least 4,000 nests were laid in 1999, of which 50% were furtively collected (Eckert 2001). Decreasing nesting in French Guyana results in an increase of nesting in Suriname(10,000 nests in 1999 and up to 30,000 in 2001). The long term analysis of the nesting trends in French Guyana and Suriname indicated an apparent increase (Hilterman and Goverse, 2003); however, the same authors recorded a minimum of 12,000 nests and 2,236 individuals for the 2003 season.

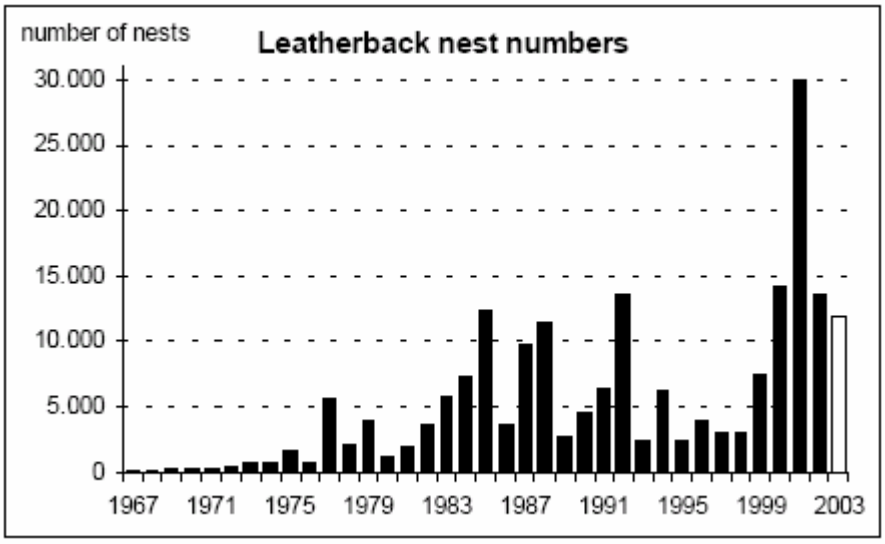


Figure 10: Nesting of the leatherback sea turtle in Suriname since 1967 (Source: Hilterman and Goverse, 2003).

Trinidad and Tobago: Trinidad has two main nesting beaches, Matura beach (east coast) and Grande Riviere (north coast), which were declared protected areas in 1990 and 1997 respectively. Systematic tagging was initiated at Matura in 1999 tagging 862 females. However, the whole beach was not completely surveyed and it is probable the total number of females laying eggs during that year along the almost 10 kilometers included in those beaches, is closer to 1,000 (Sammy, 1999). It is believed that a similar number of reproductive females (800-1,000 per year) nest in Grand Riviere. The status of the nesting colony in Trinidad is unknown. Local patrols have reduced the annual loss of females to almost zero (the estimate was 30-50% per year on the east coast and close to 100% on the north coast). However, persistently high numbers of incidental capture play a significant role in further impacting the decreasing numbers of the colony.

United States of America: Nesting of the species occurs in the Atlantic coast of the United States, particularly in Florida. The number of identified nests has been on the increase since 1988, when systematic monitoring was established. For 2002, 42% of the total nesting in Florida occurred in Palm Beach County, where nesting density was 8-13 nests/Km, for a total of 250 nests. Tagging over the last three years has identified 116 different individuals (www.floridaleatherbacks.com).

Uruguay: This is one other nation which due to its location does not harbor nesting areas, although sightings of individuals are frequent in its waters.

US Virgin Islands: The leatherbacks nesting at the Sandy Point National Refuge in the US Virgin Islands has been protected for three decades and the trend is clearly increasing. Between 1982-1986, an average of 26 females nested annually (an average of 133 nests). Between 1995 and 1999, an average of 70 females

nested each year (with an average of 423 nests). During the 20 years of conservation, the number of nests has increased almost threefold (Eckert 2001).

Venezuela: Guada (2004) reports nesting of this species along the insular littoral of the northeastern region, as well as the rest of the continent. Nesting has been reported at El Banquillo, Chirere, Maspana, Laguna de Tacarigua National Park (9 nests and 21 tracks in 2002), Margarita island (78 estimated females, 293 total nests in 2002), and Parguito beach (35-43 estimated females, 68 total nests for the 2002 season). Data for the State of Sucre indicates that for the period 1999-2003, 206 females were tagged in Querepare and Cipara beaches where nesting interchange has been reported. This means that females indiscriminately use both beaches to nest. This nesting interchange also occurs at sites such as Las Galdonas and San Juan de Unare. For the 2004 season, 90 females and 170 nests were registered at Cipara and Querepare. Without a doubt the above represents the most important nesting sites for this species in South America.

No historical data are available for Venezuela, although it is feasible that the Paria peninsula presently represents the most important nesting site. The feeding areas of the surrounding waters of the National Parks Morrocoy and Laguna de Tacarigua are more widely understood (Guada and Solé, 2000).

Other nesting sites occur in the Caribbean which are not included in this synopsis; however, it is important to note that these small nesting colonies do exist and their monitoring and protection is necessary.

It is clear that increasing trends correspond to small colonies such as those at Sandy Point and Gandoca, where the number of individuals is not above 500 females. Colonies with large numbers of nesting females have shown a persistent decreasing trend when little protection exists. The combined effect of egg poaching on the beach coupled with the loss of eggs as a result of the elimination of reproductive females before they have a chance to nest, contributes substantially to the decline of nesting colonies.

Table 1: Sizes for some nesting colonies globally

Site	Nests Year^{-1}	Nesting Frequency	Females Year^{-1}	Reference
French Guyana and Suriname	18,481 55,654	7.5	2,464 7,421	Girondot and Fretey, 1996 Girondot *et al,* 2002
Gabon (southern coast)	29,000	5	5,800	Fretey and Billes, 2000
Trinidad and Tobago (north)	9,000 10,000		1,800 2,000	Eckert, 2001
Costa Rica and Panama	5,759		1,152	Troëng, Chacón and

(Caribbean)	12,893		2,579	Dick, in press
Papua, Indonesia	3,000+		600+	Putrawidjaja, 2000
Gran Nicobar Island, India	1,690	5	338	Andrews and Shanker, 2002
Mexico (Pacific coast)	<1,250		<250	Eckert and Sarti, 1997
Playa Grande, Costa Rica (Pacific coast)	1,220	4.3-7.0	231	Reina *et al,* 2002
St. Croix, Virgin Islands	95-289	5.26	18-55	Boulon *et al,* 1996

Source: Troëng, Chacón and Dick (in press)

For management purposes, it is important to recognize that individuals nesting along Caribbean beaches migrate towards eastern United States and Canada. In the same manner, individuals nesting in Pacific Mesoamerica (Mexico-Panama) may migrate towards equatorial waters adjacent to the Galapagos.

Throughout the continent, the littorals of Canada and the United States are important feeding grounds for western Pacific and western African populations.

Threats:

Even though legal protection for the species is in place in many nations and several treaties seek conservation at the international level, low trends prevail. These trends are evident for the Pacific and developing in the Caribbean.

Two of the most important factors causing this decline are incidental capture in feeding areas which coincide with fishing zones, and the intensive collection of eggs. Both of these activities increase anthropogenic causes of mortality to the point where regeneration of the species may be impossible.

Publications about incidental capture are scarce, yet, the incidental capture of leatherbacks in long-lines, for example, is documented for the region northeast of the Caribbean Sea (Cambers and Lima, 1990; Tobias, 1991; Fuller *et al.*, 1992), Gulf of Mexico (Hildebrand, 1987), and the eastern coast of the United States and Canada (NMFS, 2000; Witzell, 1984). At southern latitudes of the Caribbean Sea Region, the largest colonies globally are evidently threatened by incidental capture in long-lines. Eckert and Lien (1999) estimated an annual capture of more than 1,000 leatherback turtles (including multiple captures of the same individual), in the marine area of Trinidad's nesting sites.

It is noteworthy that in several places in America, utilization of the species is associated with certain beliefs (e.g. oil production for medicine and eggs as aphrodisiacs); however, none of these properties is proven.

The killing of females on the beach represents a serious problem as it deteriorates the reproductive capacity of the population and accentuates the loss of very

important individuals for the population structure. Sites as Changuinola beach in Panama represent areas where the mitigation of these actions must be emphasized.

The ingestion of marine residues with a low degradation potential, particularly plastic bags which are frequently confused with jellyfish, represents a persistent threat encompassing the global distribution range of the species (Balazs, 1985; Witzell and Teas, 1994). As with other species of sea turtles, habitat loss as a consequence of coastal development (particularly sandy beaches which are important nesting habitat), also constitutes a threat for the survival of the species.

Marine Corridors and Feeding Areas:

As a result of the information derived from tag returns and satellite tracking, it is possible to report the presence of "marine passages" where leatherbacks coincide in time and space with other members of the species, possibly due to feeding requirements. It is necessary, therefore, that all efforts developed for the conservation of this species, contemplate the following:

1. Leatherbacks are a shared resource which migrates through several marine borders.

2. The species is slow to mature, long-lived and undergoes high mortality during its early stages.

3. Many of its nesting colonies are critically endangered because of low population numbers.

4. Some of the causes for high mortality are anthropogenic in origin.

5. Feeding, ocean current or convergent areas for the species must be protected as one more conservation mechanism.

It was once thought that Mexico maintained more than half of the leatherback sea turtles nesting in the Planet (Pritchard 1982). By 1999, in less than 20 years, the population declined at a rate of 250 turtles per year (Sarti *et al*, 1996). What happened and why so abruptly?

The lessons learned from the Mexican case are as follows:

A. Even when populations are considered infinitely large, they can be destroyed so rapidly that any mitigation efforts on the part of conservation entities protecting them are impeded.

B. Threats might be taking place in areas far removed from the nesting sites and may be unknown realities for the administrators of natural resources. Mexico no doubt has invested millions of pesos protecting the leatherback

sea turtles at their nesting beaches, and all this effort may collapse because of management decisions adopted by other nations affecting areas within the distribution range of the species. Acknowledging these basic connections is the *raison d'être* of such international instruments as the Inter American Convention for the Protection and Conservation of Sea Turtles (Eckert 2001).

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