

Leatherback Sea Turtle Stewardship to Attain Local, Regional, and Global Marine Conservation and Management

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Abstract—The leatherback sea turtle (*Dermochelys coriacea*) is the largest marine reptile with one of the longest known ocean migrations in the world and an important part of marine biodiversity. It is also important to the economies of coastal communities in developing countries, especially in areas where eco-tourism has replaced unsustainable harvest and consumption of turtles and eggs. However, despite increased protection of nesting females, eggs, and hatchlings, Pacific populations have declined 95 percent during the last 20 years due to high adult mortality, caused by coastal gillnetting in South America and industrial pelagic longlining in the high seas, which annually sets approximately two billion hooks worldwide. Scientists project that leatherbacks will go extinct in the region during the next 10 to 30 years if incidental captures and mortalities of juveniles and adults during high seas industrial fishery operations are not greatly reduced. Unfortunately, in spite of the unimpeachable knowledge of the problem of unsustainable fishing practices, no plan has focused on reducing overall fishing efforts in international waters. Stewardship must include implementation of the precautionary principle, proactive efforts on the part of the Regional Fisheries Management Organizations (RFMOs), and a greater voice for local communities impacted by activities of high seas industrial fishers.

The leatherback sea turtle (*Dermochelys coriacea*) is the largest marine reptile, with one of the longest known migrations in the world. It also dives to depths greater than 1,000 m (3,281 ft), in search of its primary food items, cnidarians (Davenport and Balazs 1991). Their eggs have been consumed avidly by the local inhabitants of tropical beaches for generations as a source of protein, and harvested for sale as a source of income. In some places, like Las Baulas National Park in Costa Rica, the unsustainable practice of harvest and consumption of turtle eggs has been replaced by eco-tourism, where local inhabitants, often former poachers, are trained to provide guiding services to view nesting turtles (fig. 1) (Naranjo and Arauz 1994). In fact, this system has demonstrated that non-consumptive use of sea turtles can be far more profitable for local economies than consumptive use (Troëng and Drews 2004).

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In: Watson, Alan; Sproull, Janet; Dean, Liese, comps. 2007. Science and stewardship to protect and sustain wilderness values: eighth World Wilderness Congress symposium: September 30–October 6, 2005; Anchorage, AK. Proceedings RMRS-P-49. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station.

Only 20 years ago, Eastern Pacific leatherbacks were abundant, with scattered nesting beaches from Central Mexico to Costa Rica. Unfortunately, despite increased protection of nesting females, eggs, and hatchlings, Pacific leatherback populations have crashed precipitously in the last 20 years (Spotila and others 1996). The Mexican nesting assemblage, formerly known as the largest nesting population in the world (Pritchard 1982), had a population estimated at over 70,000 females. Sadly, the Mexican population dropped to under 1000 by 1994 (Sarti and others 1996), to fewer than 250 during the 1998 to 1999 season (Eckert unpublished, in Spotila and others 2000), and finally to roughly 50 during the 2001 to 2002 season (Sarti, personal communication, 2003). At Las Baulas National Park in Costa Rica, the number of nesting females has declined from approximately 1500 to only 50 individuals (Steyermark and others 1996). If the trend continues, leatherback sea turtles may be extinct in the Pacific within the next 10 to 30 years (Spotila and others 2000). As a result of this tragedy, leatherback sea turtles are now considered critically endangered by the World Conservation Union (IUCN).

Several factors are responsible for the current extinction trajectory: long term unsustainable harvest of eggs from their nesting beaches; alteration of nesting habitat for coastal development projects; and the high mortality of adults and juveniles during coastal gillnet (Eckert 1997; Frazier and Brito 1990) and pelagic longline operations (Crowder and Myers 2001; Spotila and others 2000).

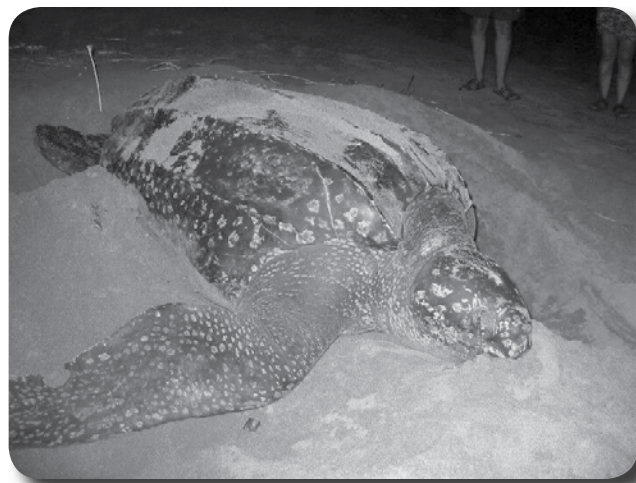


Figure 1—Nesting leatherback sea turtle (photo courtesy of tor-tugamarina.org).

The pelagic longline fishery is the world's most widespread hunting activity, with approximately 5 million baited hooks set each day on 100,000 miles (160,934 km) of line throughout the world's oceans (Crowder and Myers 2001). Incidental capture and mortality of sea turtles associated with industrial longline operations impedes national and international efforts to recover marine turtle populations (Weatherall and others 1993). Fishery managers and sea turtle researchers have been urging the development of conservation strategies that mitigate sea turtle longline interactions (Witzel 1999) for several years. International and regional cooperative efforts are seen as a critical component, due to the highly migratory life history of the species (Sarti and others 1996).

However, leatherbacks are not the only marine species at risk from these practices, and some scientists have described this species as "the canary in the ocean coalmine." Other species, many of which are also highly migratory, such as bluefin and bigeye tuna, white marlin, false killer whales, black-footed albatross, and sharks, are also threatened by unsustainable fishery practices (Crowder and Myers 2001). In the Pacific alone, incidental captures include 4.4 million sea turtles, sharks, billfish, seabirds, and marine mammals (Ovetz 2005). Large predatory fish biomass today is only about 10 percent of pre-industrial levels 50 years ago, with potential serious consequences for marine ecosystems (Myers and Worm 2003).

Recent research using satellite telemetry is providing insights into leatherback post-nesting movements and migrations in the Eastern Pacific that may serve to establish additional conservation measures (fig. 2). Morreale and others (1996) and Eckert (1997) have demonstrated the existence of a corridor for leatherbacks of the Central American region

and Southern Mexico on their southward post-nesting migration toward South America. Turtles have been tracked using satellites heading towards the Galapagos Islands, where they "taper" into higher concentrations of turtles in space and time, to disperse again towards South American waters. The clustering of many individuals in space and time along migratory corridors greatly increases the vulnerability of the species, but could also facilitate protection of regional and world stocks, simply by restricting potentially harmful activities within the spatial and temporal corridors (Morreale and others 1996).

Certain diplomatic initiatives are now being pursued to integrally conserve and manage marine resources in the Pacific. For instance, a recent diplomatic initiative called the Eastern Tropical Pacific Seascape (ETPS), seeks to implement regional management and conservation of marine habitats of Costa Rica (Cocos Island), Panama (Coiba Island), Colombia (Malpelo and Gorgona Islands) and Ecuador (Galapagos), an initiative that may greatly benefit leatherback sea turtles.

Last November, the United Nations Food and Agriculture Organization (FAO) held a Technical Consultation on Sea Turtle Conservation and Fisheries, and provided voluntary technical guidelines to reduce sea turtle mortality in Fishing Operations (FAO 2004). Bolder measures have been implemented in the United States, where aggressive litigation has resulted in increased regulation of U.S. longline vessels, limitations on incidental captures, and a four-year closure of the Hawaii swordfish longline fishery (Turtle Island Restoration Network and others versus National Marine Fisheries Service, 340 F.3d 969, 9th Cir. 2003). Fisheries research is being carried out to attempt to improve certain fishing technologies and practices, such as the use of "circle"



Figure 2—The leatherback sea turtle is the largest marine reptile (photo by Seapics.com).

hooks or the deployment of longlines at depths beyond 40 m (131 ft), where the possibility of reducing injury and/or the rate of hooking turtles is diminished (Watson and others 2005).

Unfortunately, diplomatic initiatives such as the ETPS are still vague concepts, and negotiations to attain consensus with all sectors of the governments involved (Environment and Fisheries sectors alike) are proving to be difficult. Ecuador, for instance, is threatening to pull out of the initiative due to the pressure from the industrial fishery sector. The United Nations FAO guidelines remain voluntary, and initiatives to strengthen the language at the General Assembly have been blocked by industrialized fishing nations, such as Japan (Robert Ovetz, personal communication, 2005). The litigation in the United States, which has resulted in more effective limitations on turtle catch and closures, is imposed only on U.S. vessels, which only represents less than 6 percent of the vessels operating in the Pacific (Crowder and Myers 2001). Furthermore, even if a combination of hook designs, type of bait, and gear deployment can be found that reduce overall leatherback capture and mortality, these new techniques may actually cause higher takes of other species of special concern, including other turtle species. It is also widely acknowledged that the applicability of experiments carried out in one ocean basin may not prove applicable to other basins. There is a great need to expand these studies to other geographic areas and to actively exchange research results (FAO 2004).

Thus, diplomatic initiatives and scientific research, although worthy, will take time to negotiate and consolidate in a regional and global framework, time that leatherback turtles do not have. Unfortunately, in spite of the unimpeachable knowledge of the problem of unsustainable fishing practices, no plan has focused on reducing overall fishing efforts. The critical situation of the leatherback calls for immediate and urgent national and international action. Currently, 1,007 scientists from 97 countries and 281 non-governmental organizations from 62 nations are urging the United Nations to declare a temporary moratorium on high seas longline fishing in the Pacific to protect leatherbacks and other marine wildlife species (Bloomberg Press 2005).

Stewardship must include implementation of the precautionary principle, proactive efforts on the part of the Regional Fisheries Management Organizations (RFMOs), and a greater voice for local communities impacted by activities of high seas industrial fishers. The critically endangered leatherback should serve as the flagship species to implement an international network of Marine Protected Areas in the Pacific under the administration of nations and stakeholders. Furthermore, the general public must be made aware of the threat to our oceans and the connection between unsustainable fishing practices, human, and environmental health concerns.

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