Safeguarding Pacific Sea Turtles in the Oceanic Commons

Invited Testimony before the U.S. Commission on Ocean Policy

13 May 2002

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Opening Remarks

Thank you for the opportunity to speak with you today about sea turtles, their status, and what needs to be done to restore and stabilize depleted populations. While my presentation must be brief, it is important to note from the outset that the situation is biologically and geographically complex. In the time allotted I will make three specific and important points:

- Sea turtles are ancient and valuable participants in the global marine ecosystem,
- Sea turtles are members of "the global commons", and must be managed as such, and
- By neglecting point 2, we will not only fail to restore sea turtle populations, but the consequences will be severe and enduring for domestic industry and policy.

The Legal Status of Sea Turtles

There are seven (7) species of sea turtle. Six (6) of them occur in the Pacific basin, with five (5) of those occurring under U.S. Pacific jurisdiction. These species are the leatherback (Dermochelys coriacea), the green turtle *(*Chelonia mydas), the loggerhead (Caretta caretta), the hawksbill (Eretmochelys imbricata) the olive ridley (Lepidochelys olivacea) and the flatback (Natator depressus).

The flatback is endemic to Australia, so I won't be reviewing that species today. There is a 6th species found in U.S. waters, the Kemp's ridley (Lepidochelys kempii), but its distribution is limited to the Gulf of Mexico and Atlantic Ocean.

All species of sea turtle that occur in U.S. waters are listed as *Threatened* or *Endangered* under the Endangered Species Act (ESA) of 1973, as amended. The authority to list sea turtle species as *Threatened* or *Endangered* is shared by the National Marine Fisheries Service (NMFS) and the Fish and Wildlife Service (FWS). As defined by Section 3(6) of the ESA, "The term 'endangered species' means any species which is in danger of extinction throughout all or a significant portion of its range...". Species determined likely to become endangered in the

foreseeable future are listed as 'threatened'.

In addition to federal protection, two of the five (5) species present in the U.S. Pacific - the leatherback and the hawksbill - are classified as *Critically Endangered* by the global Red List maintained by the World Conservation Union (IUCN). The other three (3) are classified as *Endangered*. By IUCN's definition, *Critically Endangered* species have experienced an 80% reduction in numbers in 10 years or 3 generations, while *Endangered* species have experienced a 50% reduction in numbers in 10 years or 3 generations.

Sea turtles are also protected by a variety of international instruments and conventions, including the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), where all sea turtles are listed on Appendix I (the highest level of protection, which prohibits commercial trade in parts or products); the Convention on the Conservation of Migratory Species of Wild Animals (CMS, or Bonn Convention), where all sea turtles except Natator are listed on Appendix I (obliging Parties to prohibit the taking of these animals, with few exceptions); the Convention on Nature Protection and Wildlife Preservation in the Western Hemisphere (Western Hemisphere Convention), where five (5) species of sea turtle are afforded "strict protection"; and the Inter-American Convention for the Protection and Conservation of Sea Turtles (IAC), which has as its stated objective "to promote the protection, conservation and recovery of sea turtle populations and of the habitats on which they depend, based on the best available scientific evidence, taking into account the environmental, socio-economic and cultural characteristics of the Parties." (Art. II).

Specific to the Pacific Ocean is the Convention for the Protection of the Natural Resources and Environment of the South Pacific Region entered into force in 1990 under the auspices of the South Pacific Regional Environment Programme (SPREP). A Regional Marine Turtle Conservation Programme, developed under SPREP's Natural Resource Conservation Programme, promotes sea turtle conservation and monitoring work in the SPREP region.

Other treaties and agreements, including several to which the U.S. is a Party, encourage the establishment of marine protected areas, prohibit marine pollution, promote the sustainable use of natural resources, and mandate the conservation of biological diversity in general. In some cases there is explicit text obliging Parties to work collaboratively to achieve conservation and management goals.

Because sea turtles are strongly migratory, international cooperation and collaboration among range states is essential to the survival of sea turtles under U.S. Pacific jurisdiction. The ESA specifically provides this mandate. Pursuant to Section 8, the U. S. Government is obligated "as a demonstration of the commitment of the United States to the world-wide protection of endangered species and threatened species" to engage in international cooperation, including technical and financial assistance, as appropriate. The Government is further obligated to encourage "foreign countries to provide for the conservation of fish or wildlife and plants including endangered species and threatened species listed pursuant to section 4 of [the ESA]" (section 8(b)(1)).

All five (5) species of sea turtles occurring in the U.S. Pacific are harvested as a source of food and income in range states outside of the U.S. They are killed for meat, shell, oil, skin, and eggs. The direct harvest has either depleted or exterminated most nesting assemblages. The situation is exacerbated by the fact that sea turtles are accidentally captured in active or abandoned fishing gear, resulting in death to tens of thousands of them every year. Oil spills, chemical waste and persistent plastic debris, as well as the ongoing degradation of important nesting beaches and feeding grounds, also threaten the continued existence of these populations.

The Basic Biology of Sea Turtles

The life history of sea turtles is complex, both temporally and spatially. Sea turtles are hatched on tropical or subtropical beaches and disperse immediately into the open ocean. During their initial crawl to the sea and swim offshore they establish an internal magnetic compass which, combined with the instinct to swim against oncoming waves, carries them into the open sea where they become resident as planktonic organisms.

Loggerhead, hawksbill and olive ridley hatchlings are short, stocky, and darkly colored with no counter-shading, and thus they probably prefer to reside on or around floating debris during the open ocean phase. In contrast, green turtle and leatherback hatchlings have superior hydrodynamic form and are strongly counter-shaded, suggesting that they spend less time around flotsam and comparatively more time in the open sea.

After spending an estimated 2-7 years in pelagic zones (the so-called "lost years"), the young juveniles settle in coastal areas. The known exception is the leatherback, which remains pelagic throughout its life. Juveniles do not reside permanently in any specific area, but move through a series of coastal (or, in the case of the leatherback, pelagic) "developmental habitats" as they grow and age. At maturity a female will return to her natal (birth) beach to lay the eggs of the next generation. Adult sea turtles routinely migrate between nesting and foraging grounds, and are more predictable in their movements than are juveniles.

To give you a better picture of the international character of these species, North Pacific loggerhead turtles hatch primarily in the Japanese archipelago and immediately disperse eastward across the Pacific Ocean. Eventually they fetch up against the Baja California (Mexico) coast where they reside and forage primarily on the pelagic red crab Pleuroncodes and other invertebrates. Growth is relatively rapid until they reach approximately 40 - 50 cm (~ 15 - 20 inches) in carapace (shell) size, at which time they initiate a return journey to Japan.

Satellite-tracking studies have shown that the return journey requires a year or more to complete. The turtles stop to feed along frontal zones or other areas where planktonic organisms are concentrated. They enter the waters of Japan at the point where the Kuroshio current meets the Oyashio current, and then they disperse southward along the coast to settle. Once they reach approximately 80 cm (~ 32 inches) in carapace length - the equivalent of approximately 25 years of age - they are mature and ready to reproduce. Both females and males then migrate to the

vicinity of their natal beaches. Mating takes place, and the females go ashore to deposit multiple clutches of eggs at predictable intervals during a summer nesting season. As far as we know, the adults then remain in Japanese waters, and do not repeat the trans-Pacific journey of their youth.

Leatherbacks have a similar life cycle, but unlike other species they do not settle in coastal areas. Instead they remain pelagic throughout their lives. They are powerful swimmers, strongly tapered in form and clearly adapted to the ocean sea. They are the deepest diving and most migratory of all sea turtles. After entering the open ocean as hatchlings, my global analysis of strandings, captures and other rare sightings of young leatherbacks concludes that individuals up to about 100 cm (~ 40 inches) in carapace length remain in waters warmer than 26 °C. Once they mature beyond that size, they move into temperate and even subarctic environments. My satellite-tracking studies demonstrate that individuals swim more than 15,000 km per year among preferred foraging sites, and that they routinely traverse entire ocean basins. Upon maturity, they, too, will migrate back to natal beaches to reproduce.

Each species of sea turtle fills a unique niche in oceanic habitats, and plays an important ecological role. For example, pelagic leatherbacks feed exclusively on jelly-bodied animals such as jellyfish, salps and siphonophores. This places them atop a distinctive marine food chain based upon nannoplankton responsible for more than half of the total primary production of pelagic waters. They are the largest of the sea turtles, averaging in excess of 350 kg as adults (the record size is a 916 kg male), and are facultative homeotherms capable of exploiting exceedingly cold and deep waters. Adults have been observed swimming around icebergs in the Barent's Sea and my own research has documented dives deeper than 1200 m (~ 4,000 ft) in tropical latitudes.

Leatherback features clearly support a wide-ranging life on the high seas, where accessible food items of suitable size are sparsely distributed or patchy. Individuals swim almost continuously and, when combined with the large body mass, this means that they have the highest energy requirements of any sea turtle. One study has estimated that they consume their body weight in jellyfish per day. Jellyfish are important predators of fish larvae and some scientists have expressed concern that burgeoning jellyfish populations in the North Atlantic are retarding the recovery of depleted fish stocks. As a major consumer of jellyfish, it should be assumed that leatherbacks are important in sustaining a balanced oceanic ecosystem and enhancing the survival of larval fish.

Another example of how sea turtles support the ecosystem in which they live can be seen from what we know of the foraging ecologies of green and hawksbill turtles in the tropical Pacific Ocean. Green turtles are herbivores as adults, often specializing in seagrasses. Seagrass ecosystems are among the most productive in the world, and it is well established that grazing by green turtles has significant effects on the structure and nutrient cycling in these systems. One estimate from the Caribbean suggests that a seagrass environment can sustain 10,000 100 kg green turtles per square kilometer! Hawksbills, by preying upon sponges in coral reef habitats, may affect diversity, biomass, and succession in complex reef communities. Sponges are major contributors to reef biomass and compete with other reef organisms for space. By keeping

sponge populations in check, hawksbills help to preserve a balance between coral and sponge species in tropical reef ecosystems.

Sea turtles also are important in supporting terrestrial ecosystems. Recent studies suggest that the majority of matter and energy deposited as nests on tropical beaches remains there in the form of undeveloped or broken eggs, their shells, or simply by the eggs being eaten by terrestrial predators who then assimilate that energy and carry it inland. To quote Dr. Nat Frazer[1] of the University of Florida

> "**Envision this with me . . . millions of sea turtles pulsing ashore onto the beaches . . . fertilizing the rims of thousands of islands and two continents. And after this wave of nutrients enters the rims, it is pulsed on up and into the interior lands in successive waves of biological transport. Year after year – tons of nutrients and billions of kiloJoules of energy in a predictable, regular cycle – for tens of millions of years.**
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> **Envision this with me . . . millions of turtles grazing on seagrass beds, stimulating primary productivity at the base of the ocean's food chain. And this surge of increased productivity works its way up the food chain, nourishing shrimp, mollusks, lobsters, and fish – as well as eventually pulsing onto the shore in the annual ballet of nesting activity.**
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> **Envision this with me . . . millions of sea turtles nibbling on sponges – trimming back the invading poriferans that otherwise would overgrow and shut down the coral reef machine. A constant system of checks and balances that also contributes to the gift of energy that sea turtles offer to the land each year in the form of nests and eggs. Year after year, for tens of million of years, the ecosystem engineers, these hawksbill and green and loggerhead and ridley and leatherback turtles, shape and improve and fine-tune the complex and mysterious and marvelous cybernetic machines of the oceans."**

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[1] Frazer, Nat B. 2001. Management and Conservation Goals for Marine Turtles p. 69 - 74. *In*: Eckert, K.L. and F.A. Abreu Grobois (eds.) Proceedings of the Regional Meeting: "Marine Turtle Conservation in the Wider Caribbean Region: A Dialogue for Effective Regional Management, " Santo Domingo, 16 - 18 November 1999. WIDECAST, IUCN-MTSG, WWF, and UNEP-CEP. 154 pp.

Sea turtles play multiple, unique and vital roles in sustaining the ecosystems in which they live, and they have been playing these roles for uncounted millions of years. The oldest members of the sea turtle lineage believed to have given rise to modern sea turtle species date back 110 million years to the early Cretaceous. In other words, sea turtles precede the great Age of Dinosaurs. And with that I will leave with you the first point that I wanted to make today, and that is that "sea turtles are ancient and valuable participants in the global marine ecosystem**."**

Sea Turtles are a Shared International Resource

That sea turtles are a shared international resource is undisputed. Their movements as juveniles, as well as their more predictable migrations between foraging and breeding grounds as adults, can and do span the entire Pacific basin. Sea turtles are among the most migratory fauna known to science. Movements and migrations are associated with developmental requirements as they age and mature, and may involve temperature preferences and dietary opportunities; movements may also be precipitated by hormonal cycles and the imperative of mating and nesting. I've already noted that leatherbacks may range 15,000 km or more in search of jellyfish and related prey, and the trans-Pacific migrations of subadult loggerhead turtles are well documented. These journeys often carry turtles through the national jurisdictions of many countries, as well as through international waters where no particular country is responsible for their conservation and survival. When the goal is to manage or restore depleted sea turtle populations, ignoring this aspect of sea turtle biology is a recipe for failure.

Let me provide an example from my own experience. My colleague, Laura Sarti, a leatherback sea turtle biologist from Mexico and her colleagues and assistants began monitoring the number of nesting females at one of the largest nesting colonies in Mexico in 1982. I began to work with them in 1986. Between 1983 and 1986 the nest counts generally increased to a high of more than 5,000 nests (an estimated 1,000 females) on the 5 km nesting beach at Mexiquillo in the Pacific Mexican state of Michoacan. Over the following three (3) years, the annual number of leatherbacks nesting fell back to 1983 levels, but, knowing that the number of breeding adults can fluctuate widely under natural circumstances, we were not concerned. Our expectation was that over the *next* three (3) years, we would see the numbers rise once again. That didn't happen.

Between 1990 and 1993, the population plummeted. Particularly worrisome was the rate of the decline. If the decline was simply a delayed response to the collection of eggs before the beach protection program had begun, the rate of decline would not have been so rapid. We knew this because we had a recent and well documented model of population extirpation in peninsular Malaysia. The nesting population at Terengganu on the east coast of Malaysia had declined to virtual extinction between the 1950's and the 1990's, due to an over-exploitation of eggs for more than 50 years. What was different between Malaysia and Mexico, is that Malaysia had a far smaller population and it took almost 50 years to eliminate it. In Mexico we were averaging a decline of 22% per year in a population that was purported to number in excess of 70,000 females.

Models of sea turtle population dynamics consistently show that these species, being slow-growing, late-maturing and long-lived, are particularly vulnerable to mortality in subadult and adult life stages. The rate of decline in Mexico suggested that there had be a source of subadult and/or adult mortality outside of Mexico (where no such mortality was known). One possibility was the large-mesh high-seas pelagic driftnet fleets that were operating in the North Pacific and known to be killing leatherbacks. However, we had little idea where Mexican leatherbacks resided between nesting seasons. We had a few tag returns from south of Mexico, but that was all.

In 1992, Laura Sarti and I took advantage of remote-sensing technologies that I had pioneered a few years earlier, and we deployed satellite transmitters on leatherbacks departing from Mexican nesting beaches. To our surprise, virtually every monitored turtle moved thousands of kilometers south before settling in the waters of Chile and Peru. A colleague, Steve Morreale, was getting similar results from leatherbacks tracked from nesting sites in Pacific Costa Rica. The question then became, "What was occurring off South America that could explain why the populations in Mexico were in decline?"

What we discovered was that in the early 1980's, Chile and Peru began promoting the use of large-mesh gillnets as a way to catch swordfish. The fishing effort in Chile alone grew from 500 days at sea in 1983 to 40,000 days at sea by 1993. By our estimates, 2,000 - 3,000 leatherbacks were caught annually in this fishery. The implication was clear - these distant fisheries were the primary cause of the rapid crash in the leatherback breeding populations of the Eastern Tropical Pacific. We published these results in 1997 and the stocks have not yet recovered. Indeed, their slide toward extinction has been the most rapid decline for any significant large vertebrate population in history. Remember that in the early 1980's, this population was reputed to represent 50% - fully one-half - of all nesting by leatherbacks on Earth, involving an estimated 70,000 females in Mexico alone. There are now fewer than 1,000 leatherbacks nesting annually throughout *all of* Mexico and Central America.

The reason for presenting you with this rather long story is that it represents, in an unusually well documented way, so many facets of the challenges we face in trying to manage sea turtle populations in the Pacific today.

First, the primary reason or reasons for population decline are not always obvious. Causal factors can be distant from the areas in which we are working, they can be masked by the pervasive nature of other threats that turn out to be less serious, or they can be defined by synergetic combinations of threats that are simply not clear to us. Sea turtles are long-lived, and their populations may be slow to recover. They inhabit a vast geographic region, there are frustrating gaps in our understanding of their distribution and abundance, and active threats are oftentimes complex mazes of natural and man-inducted factors.

It is this realization that emphasizes the second point I would like to make today, and that is that "Sea turtles are members of 'the global commons' and must be managed as such."

Protecting Sea Turtles requires a Multilateral Approach

The Federal Mandate

The regulatory agencies of the U.S. Government are well aware that sea turtles are members of the global commons, and that not all threats can be effectively mitigated on a unilateral basis. Indeed, the Implementation Schedules published in the Sea Turtle Recovery Plans for the U.S. Pacific rely on international collaboration for the effective implementation of Priority 1 tasks, including the protection and management of nesting beaches, the protection and management of marine habitat, the reduction of mortality due to bycatch and the ingestion of marine debris, participation in relevant international conventions and agreements, and encouraging information exchange and public awareness.

The Sea Turtle Recovery Plans for the U.S. Pacific describe more than two dozen specific threats to the survival of *Endangered* and *Threatened* sea turtles under U.S. Pacific jurisdiction, and include detailed actions that can and should be taken to reduce or eliminate these threats. As Chairman of the U.S. Pacific Sea Turtle Recovery Team, I can say with confidence that little has changed since the plans were published in 1998.

However, recent events have brought home even more firmly the need to act region-wide when it comes to achieving the mandate of the Endangered Species Act, which, as articulated in Section 2(b) of the Act, is to "provide a means whereby the ecosystems upon which endangered species and threatened species depend may be conserved, to provide a program for the conservation of such endangered species and threatened species, and to take such steps as may be appropriate to achieve the purposes of the treaties and conventions set forth in subsection (a) of this section."

With the authority of the ESA, the United States has pledged itself as a sovereign state in the international community to conserve to the extent practicable the various species of fish or wildlife and plants facing extinction, pursuant to, among others, the Convention on Nature Protection and Wildlife Preservation in the Western Hemisphere; the International Convention for the High Seas Fisheries of the North Pacific Ocean; and the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). We further pledge that "to encourage the States and other interested parties, through Federal financial assistance and a system of incentives, to develop and maintain conservation programs which meet national and international standards is a key to meeting the Nation's international commitments and to better safeguarding, for the benefit of all citizens, the Nation's heritage in fish, wildlife, and plants." (Section 2(a)(5)).

It is important to recognize that the issue of sea turtle survival is a time-honored federal mandate, and not just the conservation-issue-of-the-month. Sea turtles were among the first species of wildlife protected by the Act, and the language of the Act explicitly demands that Congress take whatever action is necessary, in collaboration with whatever other range states are involved, to "safeguard, for the benefit of all citizens, the Nation's heritage in fish, wildlife, and plants."

When we have failed to do this, we have seen the consequences both to our ecology and to our economy.

Why Unilateral Action can Fail

Most of you are probably familiar with the lawsuit brought against the National Marine Fisheries Service in which the Service was accused of violations of the National Environmental Policy Act (NEPA) and for negligence in carrying out their responsibilities under the ESA. They were found guilty of the NEPA violations, but not of violating their ESA mandated responsibilities. The presiding judge in the case instituted a number of mitigation measures which resulted in the drafting of an Environmental Impact Statement, two (2) Biological Opinions, and severe restrictions on the Hawaii-based longline fishery, particularly for vessels targeting swordfish. Further restrictions in longline fishing are pending for vessels operating from U.S. west coast ports.

While these actions are new and dramatic, the issue of sea turtle bycatch in high seas fisheries, including longline high seas fisheries, is not. From the late 1980's through the early 1990's, the bycatch of sea turtles by pelagic *driftnet* fisheries was of grave concern to biologists and other experts. That concern, and the concern for the mortality of marine mammal and bird populations also caught by that fishery, eventually led to the banning of high seas driftnetting.

The impact of longline fishing was also of concern and, as early as 1993, NMFS was sponsoring workshops to address the problem. But little action was taken, in part, I believe, because NMFS did not consider the incidental mortality of sea turtles by Hawaii-based vessels to be seriously impacting sea turtle populations and partly because issues such as Pacific salmon were demanding the lion's share of NMFS' protected species resources. Compounding a sense of complacency was the lack of reliable bycatch monitoring data from the longline fishery. Fishery observer coverage was far too low to draw any conclusions on the effect the fishery might be having on sea turtles.

But by the late 1990's, the decline of Pacific leatherback and loggerhead populations had reached crisis proportions and federal action was unavoidable. New Biological Opinions recognized that longline fisheries operating from Hawaii were threatening recovery of these populations, 'jeopardy opinions' were issued, and the fishery was curtailed.

What is so frustrating to the parties involved, is that the current restrictions will do little to reverse the decline in Pacific leatherback and loggerhead populations. They do, however, put NMFS and the fishery into compliance with U.S. law. This seems like a disconnect - "Why won't the actions taken by the U.S. to eliminate mortality in this fishery be effective in restoring declining populations?"

The answer is that the U.S. fleet of longline fishing vessels is simply too small when compared to the fleets of China, Taiwan, Japan, Spain and Norway - which are also operating in the Pacific Ocean. The elimination of bycatch by the U.S.-based vessels will have only minimal influence on depleted sea turtle populations; furthermore, any effect will be short-lived because foreign

fleets are growing rapidly. *Finally, unilateral action by the U.S. will have little if any refuge effect, because the mortality of these turtles is almost completely in international waters*. In the end we all lose. The turtles are still subject to mortality within high seas fisheries, and the U.S. longline fishing industry has been placed at a severe disadvantage relative to their competitors.

Why Multilateral Mechanisms are Urgently Required

This situation clearly illustrates the need for international accords that protect or regulate bycatch of non-target species in *international waters*. There are a number of multilateral mechanisms that apply to target (fish) species, and to sea turtle conservation whilst under the jurisdiction of states, but there are few if any effective tools that enable us to effectively address the survival issues of non-target marine species in non-jurisdictional international waters.

Further, because of the nature of high seas fisheries, a state may have no jurisdictional zones within the affected region and therefore little incentive to participate meaningfully in conservation mandates. For example, Spain has a large longline fleet operating in the South-East Pacific and the impact on populations in that region are essentially invisible to Spain from the standpoint of ecological or political consequence. Their motivation to participate in reducing this impact is, therefore, limited.

What is greatly and urgently needed is an inclusive mechanism by which species who spend a large part of their time in "the commons" are properly protected by all relevant parties and stakeholders. It is my hope that this can be one of the Commission's strongest recommendations. This recommendation would certainly be supported by the Precautionary Principle, as well as the FAO's 1995 "Code of Conduct for Responsible Fisheries." which under Article 6.2 states "Management measures should not only ensure the conservation of target species but also of species belonging to the same ecosystem or associated with or dependent upon the target species", and under Article 6.5 "... The absence of adequate scientific information should not be used as a reason for the postponing of failing to take measures to conserve target species, associated or dependent species and non-target species and their environment."

I will leave you with Garret Hardin's prophetic words, "Ruin is the destination toward which all men rush, each pursuing his own best interest in a society that believes in the freedom of the commons. Freedom in a commons brings ruin to all."[2] And I will note that this brings me to my third and final point, and that is that if we continue to neglect the reality that sea turtles are

[2] Hardin, G.. 1977. The Tragedy of the Commons. p. 16 - 30. *In:* Managing the Commons. G. Hardin and J. Baden (eds.). W.H. Freeman and Co. San Francisco. 294 p.

members of "the global commons", and a shared high seas resource, we will not only fail to restore their depleted populations, but the consequences will be severe and enduring for domestic industry as demonstrated by what has happened to the longline fishing industry in Hawaii.

Closing Remarks

I am grateful to the Commission for giving me the opportunity to share my thoughts with you today. In addition to these necessarily brief remarks, I've included materials and references in my Appendixes that should provide you with more detailed information if you need it.

Appendix:

Supporting material can be found referenced below or at the following URLs

Pacific Sea Turtle Recovery Plans: http://www.nmfs.noaa.gov/prot_res/PR3/recovery.html
Leatherback
http://www.nmfs.noaa.gov/prot_res/readingrm/Recoverplans/Pacific_Leatherback_Recovery_Plan.pdf
Green Turtle
http://www.nmfs.noaa.gov/prot_res/readingrm/Recoverplans/Pacific_Green_Recovery_Plan.pdf
East Pacific Green Turtle
http://www.nmfs.noaa.gov/prot_res/readingrm/Recoverplans/East_Pacific_Green_Recovery_Plan.pdf
Loggerhead
http://www.nmfs.noaa.gov/prot_res/readingrm/Recoverplans/Pacific_Loggerhead_Recovery_Plan.pdf
Hawksbill Turtle
http://www.nmfs.noaa.gov/prot_res/readingrm/Recoverplans/Pacific_Hawksbill_Recovery_Plan.pdf
Olive Ridley
http://www.nmfs.noaa.gov/prot_res/readingrm/Recoverplans/Olive_Ridley_Recovery_Plan.pdf

Biological Opinions:

Biological Opinion on Proposed Authorization of Pelagic Fisheries under the Fishery Management Plan for the Pelagic Fisheries of the Western Pacific Region:
http://swr.nmfs.noaa.gov/piao/wpfbofinal/wpfbo.htm

California Oregon Drift Gillnet Fishery Biological Opinion:
http://www.nmfs.noaa.gov/prot_res/readingrm/ESAsec7/Caor.pdf

Other important materials:

Marine Turtle Conservation in the Wider Caribbean Region – A Dialogue for Effective Regional Management : http://www.tortugas.unam.mx/mtsg/mtsg_publications.htm#DR_Proceedings

ECKERT, K. L. 1993. The biology and population status of marine turtles in the North Pacific Ocean, p. 155. U.S. Department of Commerce, NOAA-TM-NMFS-SWFSC-186, Honolulu, HI.