

BEFORE THE SECRETARY OF COMMERCE

PETITION TO RECLASSIFY THE NORTH PACIFIC DISTINCT
POPULATION SEGMENT OF THE LOGGERHEAD SEA TURTLE
(*CARETTA CARETTA*) FROM A THREATENED TO AN ENDANGERED
SPECIES UNDER THE ENDANGERED SPECIES ACT

CENTER FOR BIOLOGICAL DIVERSITY
TURTLE ISLAND RESTORATION NETWORK

JULY 12, 2007

I. NOTICE OF PETITION

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Dated this 12th day of July, 2007

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The Center for Biological Diversity is a non-profit, public interest environmental organization dedicated to the protection of native species and their habitats through science, policy, and environmental law. The Center has over 35,000 members throughout the United States, including Hawai'i and California. The Center and its members are concerned with the conservation of endangered species, including the loggerhead sea turtle, and the effective implementation of the Endangered Species Act.

Turtle Island Restoration Network is a nonprofit, public interest environmental organization with approximately 10,000 members throughout the United States and the world, each of whom shares a commitment to the study, protection, enhancement, conservation, and preservation of the world's marine and terrestrial ecosystems, including protection of sea turtles such as the loggerhead.

B. Action Requested

Pursuant to Section 4(b) of the Endangered Species Act ("ESA"), 16 U.S.C. §1533(b), Section 553(3) of the Administrative Procedures Act, 5 U.S.C. § 553(e), and 50 C.F.R. §424.14(a), the Center for Biological Diversity and Turtle Island Restoration Network (collectively "Petitioners") hereby petition the Secretary of Commerce, through the National Marine Fisheries Service ("NMFS") to separately list, and reclassify from a threatened to an endangered species, the North Pacific distinct population segment of the Loggerhead Sea Turtle (*Caretta caretta*) and to designate critical habitat to ensure its recovery. Alternatively, in the event NMFS determines that the North Pacific population of loggerhead sea turtles does not constitute a distinct population segment, Petitioners request that NMFS separately list, and reclassify from a threatened to an endangered species, the entire Pacific Ocean population of loggerhead sea turtles as a distinct population segment and to designate critical habitat to ensure its recovery.

Jurisdiction under the ESA over sea turtles is split between NMFS and the Secretary of the Interior, through the United States Fish and Wildlife Service ("FWS") pursuant to a Memorandum of Agreement between the agencies. *See e.g.*, 63 Fed. Reg. 28359, May 22, 1998. FWS has jurisdiction over sea turtles on land (i.e. nesting beaches) while NMFS has jurisdiction over sea turtles at sea. *Id.* Because the loggerhead sea turtles in the Pacific are not known to nest anywhere under the jurisdiction of the United States, Petitioners believe that loggerhead sea turtles in the Pacific are managed pursuant to the ESA solely by NMFS. As such, Petitioners believe that NMFS is the proper agency to process this petition. Nevertheless, Petitioners also submit this petition to the Secretary of the Interior and the FWS in the event that the agencies determine that jurisdiction over this petition is shared between NMFS and FWS.

This petition sets in motion a specific process, placing definite response requirements on NMFS. Specifically, NMFS must issue an initial finding as to whether the petition "presents substantial scientific or commercial information indicating that the petitioned action may be warranted." 16 U.S.C. §1533(b)(3)(A). NMFS must make this initial finding "[t]o the maximum extent

practicable, within 90 days after receiving the petition.” *Id.* Petitioners need not demonstrate that the petitioned action *is* warranted, rather, Petitioners must only present information demonstrating that such action *may* be warranted. While Petitioners believe that the best available science demonstrates that reclassifying the North Pacific distinct population segment of loggerhead sea turtles from threatened to endangered *is* in fact warranted, there can be no reasonable dispute that the available information, including NMFS’s own documents, indicates that reclassifying the species as endangered *may* be warranted. As such, NMFS must promptly make a positive initial finding on the petition and commence a status review as required by 16 U.S.C. § 1533(b)(3)(B).

The term “species” is defined broadly under the ESA to include “any subspecies of fish or wildlife or plants and any distinct population segment of any species of vertebrate fish or wildlife which interbreeds when mature.” 16 U.S.C. § 1532 (16). A distinct population segment of a vertebrate species can be protected as a “species” under the ESA even though it has not formally been described as a “species” in the scientific literature. A species may be composed of several distinct population segments, some or all of which warrant listing under the ESA. NMFS and FWS have promulgated a policy setting forth the criteria for determining a distinct population segment. Policy Regarding the Recognition of Distinct Vertebrate Population Segments under the Endangered Species Act, 61 Fed. Reg. 4721 (Feb. 7, 1996).

As described in this petition, the loggerhead sea turtle is currently recognized by most taxonomists as a single species, *Caretta caretta*. The species is currently listed by NMFS and FWS as threatened throughout its range. Petitioners believe that the loggerhead species is comprised of several distinct population segments, some or all of which warrant separate listing under the ESA and reclassification from threatened to endangered. This petition seeks separate listing as a distinct population segment, and reclassification as endangered, all loggerhead sea turtles in the North Pacific Ocean. As described in this petition, the North Pacific loggerhead is both “discrete” and “significant,” thereby meeting the qualifications for separate listing as a distinct population segment under NMFS’s policy. Petitioners also request that critical habitat be designated for the North Pacific distinct population segment of the loggerhead sea turtle concurrently with its listing as endangered, pursuant to 16 U.S.C. § 1533(a)(3)(A) and 50 C.F.R. § 424.12. However, in the event that NMFS determines that North Pacific loggerheads do not qualify as a distinct population segment Petitioners, in the alternative, request that the entire Pacific Ocean population of loggerhead be separately listed as a distinct population segment, and reclassified as endangered under the ESA with designation of critical habitat.

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III. EXECUTIVE SUMMARY

Loggerhead sea turtles (*Caretta caretta*) in the North Pacific Ocean are among the most imperiled of any sea turtle population in any ocean basin on Earth. This population, which counts fewer than 1000 nesting females each year, is also directly impacted by U.S. longline and gillnet fishing vessels operating out of Hawai'i and the U.S. West Coast. While loggerheads are globally listed as "threatened" under the Endangered Species Act ("ESA"), the North Pacific population, which has declined by at least 80% over the last 20 years, warrants separate protection as "endangered" under the statute.

The ESA provides for the protection of distinct population segments ("DPSs") of species. As demonstrated in this petition, the North Pacific population of loggerheads meets the criteria for classification as a DPS and for uplisting from "threatened" to "endangered".

North Pacific loggerheads originate from nesting sites in the Japanese archipelago and forage along the Pacific coast of the North America, from Alaska south to Baja California, Mexico. Within U.S. jurisdiction, loggerheads are frequently encountered at sea, most often within the Southern California Bight and in waters around Hawai'i, and occasionally in the Pacific territories. There is there is no documented nesting of loggerhead sea turtles within the jurisdiction of the U.S. in the North Pacific.

North Pacific loggerheads are genetically distinct and geographically isolated from loggerheads in the Atlantic as well as from loggerheads nesting in the South Pacific and Indian Oceans.

The primary threat to North Pacific loggerheads is drowning from entanglement in longline and gillnet fishing gear. Thousands of adult and juvenile North Pacific loggerheads are caught each year in pelagic longline fisheries operated by the U.S., Japan, China, and other nations. Numerous loggerheads also are caught and killed in coastal fishing gear off Baja California.

Additionally, global warming and its impacts pose an overarching threat to loggerhead sea turtles in the North Pacific and elsewhere. Global warming is likely to cause sea level rise that will inundate nesting beaches. Because the sex-ratio of sea turtle hatchlings depends on temperature, warming may skew sex-ratios and impede reproduction. Ocean warming will likely affect currents, storm frequency and/or intensity, availability of prey, and vulnerability to disease.

Other threats to North Pacific loggerheads include encroachment of nesting beaches by coastal development, plastic pollution and other marine debris, and, in some areas, direct harvesting of adults or eggs.

Absent the enhanced protections provided by separate listing under the ESA, with concurrent designation of critical habitat, and focused action to address the threats facing the species, loggerhead sea turtles in the North Pacific will likely be driven functionally extinct by the mid-Century.

IV. NATURAL HISTORY AND STATUS

A. Taxonomy

The generic name *Caretta* was introduced by Rafinesque in 1814 (NMFS & FWS, Recovery Plan, 1998). The specific name *caretta* was first used by Linnaeus in 1758. *Id.* The genus *Caretta* had been considered monotypic (containing a single species) (Bowen, 2003). Similarly, subspecies of loggerheads have generally not been recognized. However, recent studies suggest that differentiation rising to at least the subspecies level exists between the Pacific and Atlantic populations. *Id.* Furthermore, studies also demonstrate differentiation between the North Pacific and South Pacific loggerhead populations. *Id.* The evidence verifies that North Pacific loggerhead sea turtles are a genetically unique group. The current taxonomic classification of loggerheads as a single species with no subspecies lags behind the best available science on these sea turtles.

NMFS has divided the Pacific populations into two demographically independent northern (Japan) and southern (Australia) populations. The North Pacific loggerhead population originates along the southern Japanese coastline and Ryukyu Archipelago (FAO, 2004). The South Pacific stock originates mostly in Queensland, Australia and New Caledonia. While there is likely substructuring within these regions, NMFS has not yet done further studies to identify these specific populations (NMFS & FWS, Recovery Plan, 1998).

The northern and southern Pacific populations are distinguishable from loggerhead populations in the Atlantic Ocean. Unlike their Atlantic conspecifics, the northern and southern Pacific populations are not reported to mix during the pelagic or benthic stages. Northern and southern loggerheads maintain their genetic-independence because the separate stocks cannot interbreed since their breeding grounds are in distant and separate locations. Scientists suggest that the stocks are kept separate by migratory patterns occurring with the respective ocean gyre within each hemisphere (Dutton *et al.*, 2002). The temporal and geographic isolation of the northern and southern populations has been illustrated through studies. Almost all of the loggerheads sampled in Hawai'i-based and West-Coast-based longline fisheries have been reported as originating from Japanese nesting areas (NMFS, ESA BiOp, 2004). In one study, thirty-three of thirty-four North Pacific driftnet fisheries samples as well as twenty-four of twenty-six samples from turtles captured in Baja California were genetically identified as originating from Japan (Bowen, 2003). All loggerheads caught in the Hawai'ian longline fishery were from the Japanese nesting population (NMFS 2005). These genetic data demonstrate that Japan is the nesting source of benthic and pelagic loggerhead mortalities in the northern Pacific including U.S. waters. *Id.*

B. Species Account

1. Description

Loggerhead sea turtles are adapted to marine habitats. The loggerhead's carapace and head is reddish brown. The plastron is lighter with dark margins. The carapace has five vertebral scutes and there are usually five pairs of costals, but sometimes other scute arrangements occur. Loggerheads have a distinctively large head and beak compared to other sea turtles. This is

thought to be helpful for eating shelled prey such as mollusks and crustaceans. Mature males have a longer tail and curved claw on the forelimb when compared to females. *Id.*

Loggerheads show morphological distinctions among rookeries on separate continents that are based on conditions of different ocean basins (Kamezaki 2003). Carapace size is smaller for North Pacific loggerheads than other loggerhead populations. *Id.* Carapace length in Japanese nesting turtles corresponds with the difference between nesting site and foraging sites. *Id.* North Pacific loggerheads also have an enlarged flipper. This large flipper combined with a smaller carapace is an adaptation for the long Pacific migrations. *Id.*

2. Distribution and Habitat

The habitat of loggerheads varies by population and is determined by natal nesting site. Generally, the loggerhead sea turtle inhabits open ocean waters, continental shelves, bays, lagoons, and estuaries of temperate and tropical regions of the Pacific, Atlantic and Indian Oceans (Dodd, 1988). In the Pacific, the loggerheads nest in the western Pacific (Bowen, 2003). North Pacific loggerheads nest in Japan. Currents then transport hatchlings from the northern nesting grounds eastward to feeding areas off Baja California. *Id.* This trans-Pacific migration of nearly one third of the planet's circumference has been confirmed through DNA analysis and satellite tagging studies. *Id.*

Studies of the Pacific populations are limited in number, such that distribution, abundance and residency characteristics of the juveniles observed in U.S. waters are not completely known (NMFS & FWS, Recovery Plan, 1998). However, because there are no documented nesting sites in the U.S. jurisdiction, and the sightings are typically the result of incidental catch by fisheries, scientists have concluded that U.S. waters, principally off the coast of California, are used as significant foraging grounds and as migratory corridors corresponding to a larger regional movement of the northern Pacific population. *Id.* North Pacific loggerheads migrate from nesting grounds in Japan across the Pacific passing Hawai'i and onto the West Coast of North America.

3. Breeding Behavior

Loggerhead sea turtles exhibit a complex gender-specific dispersal behavior that should form the basis of appropriate management techniques. Loggerheads mate at sea near their maternal nesting beaches and then females come ashore and bury the eggs on the beach. Loggerhead populations are identified based on geographically isolated nesting assemblages (Bowen *et al.*, 1994). Nesting female loggerheads show a strong site fidelity to their natal beaches, returning to the same area in successive reproductive migrations (Bjorndal *et al.*, 1978). The high nesting site fidelity by females leads to low maternal gene flow between nesting assemblages and the existence of genetic subdivisions among regions and ocean basins (Karl *et al.*, 1992). If extirpation of an assemblage occurs, repopulation of the beach through regional dispersal would require thousands of years (Turtle Expert Working Group, 2000). Furthermore, scientists believe that should all of the females of a nesting colony be killed, the nesting colony would cease to exist entirely (Bowen, 2003). This danger requires that nesting populations remain the "fundamental unit of sea turtle management." *Id.*

4. Breeding Locations

The North Pacific population of loggerhead sea turtles nests exclusively in Japan in the western Pacific. These breeding grounds are separated by time and space from the South Pacific population that breeds in the western Pacific as well.

The North Pacific loggerhead population originates along the southern Japanese coastline and surrounding Ryukyu Archipelago (FAO, 2004). North Pacific loggerheads nest from Honshu Island south to Yaeyama Islands on beaches across 13 degrees of latitude (24°N to 37°N) (NMFS 2005). Inakahama Beach and Maehama Beach on Yakushima Island account for about 30 percent of all North Pacific loggerhead nesting (NMFS 2005).

In contrast, the southern Pacific population of loggerheads originates primarily from nesting beaches on New Caledonia and Queensland, Australia. The southern Great Barrier Reef population is the largest breeding population of loggerheads in the South Pacific region (Chaloupka, 2003).

5. Foraging Ranges

North Pacific loggerheads migrate across the entire Pacific passing Hawai'i and foraging near the west coast of North America near California and Mexico. Loggerheads spend at least ten years as pelagic juveniles while currents carry them from their Pacific nesting beaches in Japan across the ocean to their foraging grounds in Baja and California (NMFS & FWS, Recovery Plan, 1998). By contrast, the South Pacific populations forage off the coasts of Peru and Chile. Loggerheads originating in Australia migrate to waters off southern Peru and Chile as well as other South Pacific feeding areas (NMFS, ESA BiOp, 2004).

6. Life History

Loggerheads spend most of their adult lives in the ocean as benthic foragers. Generally, loggerhead life-stages can be broken down as follows: 1) egg, 2) beach hatchling, 3) pelagic juvenile, 4) benthic juvenile, 5) benthic adult, and 6) nesting (female) adult.

Once adult females reach reproductive maturity, they migrate from their foraging areas about every two to four years to nest at their natal beaches (NMFS & FWS, Recovery Plan, 1998). As females nest at this natal beach, they deposit clutches of between 60 and 150 eggs each in at least three nests. *Id.* Ambient temperatures during incubation determine the sex of hatchlings. Once loggerheads hatch, they imprint on a characteristic of their natal beach that eventually is as a way for sexually mature sea turtles to return to that same region to reproduce.

Once hatchlings survive the threats confronting them as they attempt to reach the ocean, they require one to three days to swim from the beach to offshore currents. Upon reaching the ocean, they are considered pelagic immatures and float along ocean gyres. Pelagic immatures migrate to foraging areas in the eastern Pacific, where they further develop into benthic juveniles.

7. Diet and Feeding Behavior

Limited studies are available regarding the diet and feeding behavior of Pacific loggerhead sea turtles. However, the available studies demonstrate that loggerheads are omnivores that have a

range of both dietary intake and feeding behaviors. In the Pacific, the one available study of the diet of loggerhead adults described a diet consisting mostly of benthic invertebrates in hard bottom habitats of turtles near Queensland, Australia (NMFS & FWS, Recovery Plan, 1998). Fish and plants were also less frequently found in the loggerhead diet. *Id.* Loggerheads killed by North Pacific driftnets further revealed the range of this sea turtle species' diet, which included other pelagic invertebrates, such as gooseneck barnacles. *Id.*

Large aggregations of juvenile Pacific loggerheads are found at sea off the southwestern tip of Baja California, Mexico (NMFS & FWS, Recovery Plan, 1998). These juvenile loggerheads most likely originated in the western Pacific near Japan. *See Id.* These foraging juveniles are reported to come north into U.S. waters and are susceptible to bycatch by fisheries.

Feeding behavior is important in the vulnerability of North Pacific loggerhead sea turtles. Their omnivorous feeding behavior includes scavenging near fisheries where they are susceptible to bycatch by fisheries. Sometimes loggerheads are attracted to the shiny objects associated with fishing or they follow prey into fishing nets or become entangled in lines or hooks when foraging.

C. Conservation Status

The current listing of the loggerhead sea turtles as “Threatened” on a global basis stems from a July 28, 1978 ESA rulemaking. The species is also now considered "Endangered" by the IUCN (the World Conservation Union). The IUCN is the world's foremost authority on the status of threatened species. The IUCN Red List classification system is widely regarded as the most authoritative list of globally threatened species. It is intended to be an easily and widely understood system for classifying species at high risk of global extinction.

The Convention on International Trade in Endangered Species of Wild Fauna and Flora (“CITES”) is an international treaty to ensure that international trade in wildlife does not threaten their survival. CITES requires licensing of imports and exports of certain protected species. Loggerhead sea turtles are included in Appendix 1 of CITES which is a list of species threatened with extinction.

The northern and southern Pacific populations of the loggerhead sea turtle have continued to decline and the loggerhead's overall numbers (based on the total US and global populations) have decreased. The decline of the North Pacific population coupled with ongoing threats puts it at risk of extinction. However, the loggerhead's status has not yet been changed to endangered from threatened in the U.S. These classifications by the IUCN and CITES are evidence that the petitioned species warrants endangered protection under the ESA.

1. Historic and Current Abundance and Trends

Experts have determined that the number of loggerheads originating from Japan is small in comparison to populations in other ocean basins (Suganuma, 2002). Due to the difficulty assessing population size in the water, the principle assessments have focused on nesting data. Scientists conducting nesting site assessments over the last half-century have determined that there has been a substantial decline in the size of the annual loggerhead nesting population in Japan (Kamezaki *et al.*, 2003). Current estimates are of approximately 1,500 females, some of

which do not return each year during the nesting season (NMFS 2005). Japanese nesting populations have declined 50-90 percent in the last 50 years (NMFS 2005). Most beaches studied showed the lowest nesting numbers during the period from 1997 to 1999. *Id.* For example, in the 1990s Hiwasa beach experienced about 89 percent decline in nesting and Minabe a 74 percent decline. *Id.* This significant decrease in nesting populations is correlated with an increase in high seas fisheries in the North Pacific. *Id.*

The North Pacific population continues to decline as the threats to the loggerheads have yet to be managed. Fewer than 1000 individuals return to Japanese beaches per nesting season (NMFS, 2005; Sukanuma, 2002). Current trends indicate a high probability that North Pacific loggerheads will be quasi-extinct¹ within about 50 years (Snover 2005 in NMFS 2005).

2. Threats to North Pacific Loggerhead Sea Turtles

Loggerhead sea turtles suffer from various anthropocentric mortality sources, both marine and terrestrial. Marine threats include debris entanglement and ingestion, incidental take by fisheries vessels, power plant entrapment, and environmental contamination (NMFS & FWS, Recovery Plan, 1998). Terrestrial threats affecting nesting assemblages include increased human presence, coastal construction, artificial lighting, beach mining and replenishment, as well as non-anthropocentric threats such as predation and exotic vegetation. *Id.* Additionally, global warming is an overarching threat to the North Pacific loggerhead sea turtles. Warming waters, storms, sea level rise, and ocean acidification are likely to adversely affect the loggerheads.

These threats to the survival of the North Pacific loggerhead are described thoroughly in Part VI of this Petition.

V. THE NORTH PACIFIC POPULATION OF LOGGERHEAD SEA TURTLES IS A DISTINCT POPULATION SEGMENT

Under the ESA, 16 U.S.C. § 1533(a)(1), NMFS is required to list a species for protection if it is in danger of extinction or threatened by possible extinction in all or a significant portion of its range. The ESA defines the term “species” broadly to include “any subspecies of fish or wildlife or plants and any distinct population segment of any species of vertebrate fish or wildlife which interbreeds when mature.” 16 U.S.C. § 1532 (16).

The North Pacific population of loggerhead sea turtles satisfies the requirements set forth to be a listable entity under the ESA. NMFS and FWS are guided by a joint policy to define a “distinct population segment” for the purposes of listing, delisting, and reclassifying species under the ESA. 61 Fed. Reg. 4722 (February 7, 1996). Under this policy, once a population segment is found to be both “discrete” and “significant”, then it should be considered for listing under the Act. *Id.* First, a population segment is classified as discrete in relation to the rest of the species with which it is associated. *Id.* Then, the population is classified as biologically or ecologically significant to the larger species. *Id.*, see *Southwest Ctr. for Biological Diversity v. Babbitt*, 980 F. Supp. 1080, 1085 (D. Ariz. 1997). The North Pacific loggerhead sea turtle meets both of these tests and qualifies for protection under the ESA. Therefore, the distinct population

¹ Quasi-extinction is defined as 50 adult females.

segment of North Pacific loggerheads should receive separate treatment from its conspecifics in the other oceanic basins and from the South Pacific population.

A. Discreteness

The joint NMFS and FWS policy states that a population segment of a vertebrate species is discrete if it satisfies either of the following conditions:

1. It is markedly separated from other populations of the same taxon as a consequence of physical, physiological, ecological, or behavioral factors. Quantitative measures of genetic or morphological discontinuity may provide evidence of this separation.
2. It is delimited by international governmental boundaries within which differences in control of exploitation, management of habitat, conservation status, or regulatory mechanisms exist that are significant in light of section 4(a)(1)(D) of the Act.

61 Fed. Reg. 4725. The North Pacific loggerhead sea turtle satisfies the first criteria and the management of the North Pacific population is shared primarily by Japan and North America.

1. North Pacific Loggerheads Are Discrete from Other Loggerhead Sea Turtles.

The North Pacific population of loggerhead sea turtles is a discrete population because it differs markedly from other oceanic populations of the taxon, specifically the Atlantic and South Pacific populations, because of physical, genetic, physiological, ecological and behavioral factors.

a. Physical Factors

The Pacific Ocean and Atlantic Oceans separate the loggerhead sea turtle populations in distinct groups. The physical barrier of the continent of North America further dictates the discrete separation of the Pacific and Atlantic loggerheads. The physical continental barriers limit interactions between the populations. This coincides with the behavioral differences between the two conspecifics. While nesting sites of Atlantic populations are well documented within United States jurisdiction, there are no known nesting sites of Pacific loggerheads. Therefore, their entire life cycles are in contrast, requiring completely different management systems. As mentioned above, NMFS and FWS already recognize the separation of the Atlantic and Pacific populations based on physical constraints and illuminated through genetic testing.

North Pacific loggerhead sea turtles have a range in the North Pacific Ocean in the regions between natal beaches in Japan and foraging grounds along the West Coast of North America. The migration of loggerheads is thought to exceed 10,000 kilometers across the ocean, the longest oceanic migration of any species. North Pacific loggerheads have site fidelity to nesting beaches in Japan and they remain in the northern hemisphere through all stages of their lives. For example, genetic analysis of all loggerheads taken in the Hawai'i-based longline fishery were determined to have originated in Japan (NMFS 2005).

b. Physiological Factors

Genetic analysis distinguishes the North Pacific population of loggerheads from both the Atlantic and South Pacific populations (NMFS 2005). Pacific loggerheads overall are genetically distinct from Atlantic populations. Based on mitochondrial DNA ("mtDNA") analysis there are two main branches in the genetic makeup: one primarily in the Indian and Pacific Oceans, and one primarily in the Mediterranean and Atlantic Oceans (Bowen, 2003).

North Pacific loggerheads are also genetically distinct from South Pacific and Indian Ocean loggerheads. Additional genetic analysis of Pacific loggerhead mtDNA of the northern and southern populations by a minimum of $d=0.017$ from other conspecifics indicates isolation on the scale of a million years. *Id.*

Bowen et al. (1995) reported on mtDNA analysis that revealed that loggerheads in the North Pacific Ocean are genetically separated from an Australian nesting population.

(Kamezaki *et al.*, 2003). Thus, genetic research on the North Pacific loggerhead population in Japan showed that the population is demographically independent from the population originating in Queensland, Australia (i.e., there were no shared genotypes) and there may also be further substructuring within these separate populations (Bowen *et al.*, 1994).

As described above, female loggerheads nesting in Japan are comprised of genetically distinct nesting aggregations with precise natal homing (Hatase et al, 2002 in NMFS 2005). Researchers predict that the loss of one of these genetically distinct aggregations would decrease genetic diversity of the North Pacific loggerheads. *Id.* Genetic analysis of the North Pacific loggerheads shows reproductive isolation from the southern population.

The existing genetic research on the taxonomy of the northern Pacific loggerhead population provides compelling evidence that the population is a separate group. Additional studies should be performed, but sufficient evidence already exists to merit separate treatment of the northern and southern Pacific loggerheads from each other and from the Atlantic loggerhead populations. The Pacific populations should be addressed and listed separately from their Atlantic cohort because of the lack of genetic exchange and the continental barrier to such exchange. The North Pacific population should also be treated separately because there is genetic separation and North Pacific loggerheads remain in the northern hemisphere separated from the southern population.

The Pacific loggerhead populations also differ markedly from the Atlantic populations in morphology. While published growth rates in the wild have been predominately given for Atlantic loggerheads, there have been documented contrasts in growth rate and carapace length between the Atlantic and Pacific loggerheads. Pacific loggerheads measured in Australia grow an average of 1.0 cm/ year, while Atlantic loggerheads measured in Florida have a mean growth rate of 5.9 cm/yr – ranging from 1.8 to 10.1 cm/yr. Based on the collection of data to date, “loggerheads in the west Pacific grow more slowly than do their conspecifics in the west Atlantic.” (NMFS & FWS, Recovery Plan, 1998).

Loggerheads found in the southeastern United States are typically <10 cm or >50 cm SCL; intermediate class sizes are found in the waters of the eastern Atlantic, such as the Azores more than 5,000 km to the east. Bolten and Bjorndahl (1991) documented for the first time the pelagic phase of the North Atlantic loggerheads, specifying it to include turtles 8.5 – 65.0 cm SCL. Most turtles take up coastal residence at roughly 50 cm SCL, but transatlantic travel is sometimes undertaken by larger individuals.

(NMFS & FWS, Recovery Plan, 1998). Unlike the Atlantic populations, the Pacific loggerheads do not return to the coastal primary feeding grounds until they reach 70 cm. *Id.*

Morphological characteristics of the northern and southern populations further indicate a marked separation within the Pacific loggerheads. Loggerheads from Japan are smaller and weigh less than those from Australia. Females nesting in Japan average 89.0 cm straight carapace length while females nesting in Australia average a 95.8 cm curved carapace length. Likewise, females nesting in Japan have an average weight of 96.8 kg (range 53 - 125 kg) while females nesting in Australia have an average weight of 100 kg (range 70 - 146 kg). This morphological discontinuity between the northern and southern populations may be consistent with genetic differentiation (NMFS & FWS, Recovery Plan, 1998).

c. Ecological Factors

North Pacific loggerheads are discrete from other populations of loggerheads because they exist in an ecosystem separate and apart from other loggerheads. The northern Pacific population inhabits the northern hemisphere of the Pacific, an ecologically different marine environment than the Atlantic or South Pacific.

The North Pacific habitat of loggerhead sea turtles has currents that are likely responsible for the extensive migration of breeding adults and hatchlings in the western Pacific to foraging grounds of juveniles in the eastern Pacific along the coast of North America. North Pacific loggerheads travel on the California current to their foraging grounds of the West Coast of the United States. Nesting beaches and foraging grounds are specific to this population.

This population of loggerheads plays a role in the North Pacific ecosystem with fidelity to the northern hemisphere. North Pacific loggerheads transport nutrients as they undertake their long migrations (Bjorndal 2003). Additionally, when they feed on shelled prey they break it down, and scientists believe that this may serve an ecological function in the marine ecosystem. *Id.* Loggerheads interact with a variety of species and have a role within the ecosystem.

The species interactions, diversity of species, and habitat are unique to the northern Pacific. North Pacific loggerheads depend upon different ecological factors, forage upon different prey, and travel through marine habitats specific to this population. During both their marine life and terrestrial nesting, the ecological requirements are discrete from other populations.

d. Behavioral Factors

Loggerhead sea turtle populations in the Pacific and the Atlantic maintain behavioral patterns that do not cause significant exchange between their separated oceanic habitats. North Pacific loggerheads are discrete from Atlantic population segments both by the existing physical barriers, and also by the particular behavior patterns that isolate the population in the northern hemisphere of Pacific Ocean.

The migration behaviors of the North Pacific loggerheads maintain the separate mating populations and isolate the population in its North Pacific habitat. As detailed above, the northern population lives its life in the northern hemisphere while the southern populations' migration remains in the southern hemisphere.

Physically and ecologically, a behavioral barrier that compels them to return to their natal beaches separates the loggerheads in the North Pacific from other population segments. The North Pacific population segment is separated not only by the timing of its seasonal breeding behaviors, but also by geographical separation of nesting sites. The northern and southern populations differ significantly in their nesting chronology because they nest in different hemispheres. The nesting season of the northern loggerheads occurs during the warmer months of late May through August (NMFS & FWS, Recovery Plan, 1998). In contrast, the breeding season for the southern populations is from October to March (Limpus, 2003; Miller, 2003). The chronological differences in breeding behavior are additionally separated by physical by a 100-kilometer distance between suitable nesting sites that virtually guarantees demographic independence. These behavioral differences create genetic isolation between Pacific population segments.

The post nesting migratory and foraging behavior of the northern population of Pacific loggerheads is also distinct from that of the southern population; the northern population migrates from Japan to the west coast of California and Baja California, while the southern populations forage around Australia or may journey to coasts off Peru or Chile (NMFS, ESA BiOp, 2004). This marked spatial separation enhances the genetic discontinuity between the two populations by not allowing the two to interbreed.

The combined impact of all these behaviors results in distinct population segments in the northern and southern Pacific. Although these populations inhabit the same ocean, the northern and southern loggerheads exist in separate temporal and physical realms driven by their unique behavioral patterns.

2. North Pacific Loggerhead Sea Turtles Are Delimited by Significant International Government Boundaries.

Of loggerheads in the Pacific Ocean, the North Pacific population is the one that occurs within United States jurisdiction. Treating the North Pacific loggerhead as a distinct population segment is prudent because this is the population of loggerheads needing management in the United States. Starting life in on the beaches of southern Japan, loggerheads migrate to forage as juveniles to the opposite side of the Pacific Ocean near the coast of California and Mexico. The United States will play a crucial role in the management of this population because the North Pacific loggerheads are those encountered by United States fisheries.

B. Significance

The joint NMFS and FWS listing policy requires that once a population is established as discrete, then the biological and ecological significance is next considered. Each population segment's significance must be analyzed on a case-by-case basis. 61 Fed. Reg. 4722. This consideration may include, but is not limited to, the following:

1. Persistence of the discrete population segment in an ecological setting unusual or unique to this taxon.
2. Evidence that loss of the discrete population would result in a significant gap in the range of a taxon.
3. Evidence that the discrete population segment represents the only surviving natural occurrence of a taxon that may be more abundant elsewhere as an introduced population outside its historical range.
4. Evidence that the discrete population segment differs markedly from other populations of the species in its genetic characteristics.

61 Fed. Reg. 4722. The North Pacific population of the loggerhead sea turtle satisfies two of these “significance” criteria, as well as other criteria that highlight the significance of the population.

1. Loss of the North Pacific Loggerhead Population Would Result in a Significant Gap in the Range of the Species.

The North Pacific population of loggerhead sea turtles persists only in its unique range between Japan and the west coast of North America. As described above, the Pacific loggerheads do not interbreed with other breeding populations of the other ocean basins (Limpus *et al.*, 2003). Therefore, the loss of one of the populations would result in a significant gap in the distribution of the species, a clear criterion for biological significance (NMFS, ESA BiOp, 2004).

If lost, the North Pacific population of loggerhead sea turtles would result in a significant gap in the range of the taxon. Individuals from other nesting beaches are unable to replace the North Pacific population. Physical and behavioral characteristics of other loggerheads would prevent recolonization if the North Pacific population were extirpated from its current range.

Both the northern and southern Pacific populations of the loggerhead turtle are significant because the loss of either one would result in a significant gap in the range of the greater Pacific loggerhead population. The breeding populations in Japan and Australia are genetically distinct and do not interbreed with other populations in the other ocean basins (Limpus *et al.*, 2003). If one of the populations were to become extinct, the loggerhead would lose that supply of the genetic variation from its historic range for thousands of years and "is not likely to be reestablished over a time frame relevant to human interests" (Bowen *et al.*, 1993). Therefore, the loss of one of the populations would result in a significant gap in the distribution of the species, a clear criterion for biological significance (NMFS, ESA BiOp, 2004).

2. Genetic Evidence Suggests that the North Pacific Loggerheads Have Markedly Different Genetic Characteristics that Differ from the Other Populations.

The genetic studies described previously demonstrate the markedly different genetic characteristics of the North Pacific population segment. Genetic studies have shown different genetic characteristics in the North Pacific population of loggerhead sea turtles that differ from other loggerhead populations, in both the Pacific and elsewhere. If one of the populations were to become extinct, the loggerhead would lose that supply of the genetic variation from its historic range for thousands of years (Bowen *et al.*, 1993).

At a minimum, the Pacific populations should be listed as separate from the Atlantic populations because the loss the Pacific loggerhead would result in a significant gap in genetic diversity of the species as a whole. Bowen *et al.* (1994) reports that eight primary mtDNA lineages exist worldwide, of which two correspond to the Japanese and Australian nesting populations of the Pacific. Thus, loss of the Pacific loggerheads has the potential to decrease loggerhead genetic diversity overall by 25 percent.

Much of the in-depth genetic analysis of the loggerhead sea turtle has been focused on Atlantic populations. In its 1998 and 2000 Assessments of the Atlantic populations, the Turtle Expert Working Group relied upon Bowen's studies to distinguish between subpopulations based on their genetic difference (NMFS, Atlantic HMS BiOp, 2001). The Working Group was so confident of this distinction that it recommended that "they be considered independent demographically, consistent with the definition of a distinct vertebrate population segment and of a management unit." *Id.*² Relying on this, NMFS elected to manage the genetically distinct Atlantic populations of the loggerhead as a distinct population segment "whose survival and recovery is critical to the survival and recovery of the species." *Id.* The same should be done for northern and southern Pacific populations, which are much more genetically distinct than the Atlantic populations:

The genetic distinction between loggerheads from Australia and Japan is of a qualitatively different kind than the separations observed in the Atlantic. In the NW Atlantic and Mediterranean, we observe significant *genotype frequency* differences between nesting colonies, indicating separate management units. In the Pacific, we see *diagnostic* genetic differences between Japan and Australia. This raises the bar from Management Units to Evolutionarily Significant Units. In other words, the northern and southern nesting populations are two distinct lineages in mtDNA phylogeny, indicating some evolutionary depth to the separations.

(Bowen correspondence, 2005).

² citing 59 Fed. Reg. 65884-65885 (Dec 21, 1994), 61 Fed. Reg. 4722-4725 (Feb 7, 1996), and Nat'l Marine Fisheries Service Southeast Fisheries Science Center, *Stock Assessment of Loggerhead and Leatherback Sea Turtles and an Assessment of the Pelagic Longline Fishery on the Loggerhead and Leatherback Sea Turtles of the Western North Atlantic*, NOAA, NMFS-SEFCS Contribution PRD-00/01-08 Parts I-III and Appendices I-VI (2001)).

Genetic evidence indicates that nesting colonies of the loggerhead sea turtle are demographically independent if separated from each other by 100 km of inappropriate nesting habitat (Bowen, 1995; Bowen *et al.*, 1993). The northern populations, predominately in Japan, and the southern populations, predominately in Australia, show distinctions in their mtDNA that are the result of highly structured nesting site fidelity and the great distances between those nesting habitats. As mentioned previous, mtDNA research on turtles in Japan and Queensland, Australia has shown that the two populations are demographically independent – there are no shared genotypes (NMFS & FWS, Recovery Plan, 1998). As such, females home to their natal nests, creating nesting assemblages that remain isolated. *Id.* In 1993, Bowen *et al.*, discovered that maternally mediated gene flow between nesting populations was very low as a consequence of high fidelity to natal beaches. *Id.* Where such nesting beach fidelity has been observed population status has been defined based on trends at the nesting beaches (NMFS & FWS, Recovery Plan, 1998). Bowen *et al.*, also speculated that there might also be additional substructuring within these populations, because of the high nesting site fidelity (*Id.*; Bowen, 1993). If all of the females of a nesting colony were killed, mtDNA indicates that the nesting colony would cease to exist completely and, thus, nesting populations should remain the "fundamental unit of sea turtle management" (Bowen, 2003).

Adopting this management technique, NMFS has determined that it must address conservation measures by using nesting assemblages as a base unit for overall population protection (NMFS, ESA BiOp, 2004). Without additional protections, NMFS recognizes that anthropogenic activities, such as commercial fisheries and habitat degradation, will cause such a reduction in survival rates as to have a "significant, adverse affect on the trend of ... nesting aggregations" (NMFS, ESA BiOp, 2004).

Biparentally inherited nuclear DNA studies are not yet available. Nuclear DNA studies require much larger sample sizes and technical resources, and have yet to be developed (Bowen, 2003). However, it is clear that the northern and southern Pacific loggerheads do not nest, migrate, or forage in the same areas. Nor do those populations cross oceanic barriers between the northern and southern habitats. Therefore, the possibility of interbreeding indicated by nuclear DNA is unlikely and is not at issue.

In summary, NMFS and FWS should list the northern population of the loggerhead sea turtle as a distinct population segment. This population is clearly distinct, significant, and decreasing in size, thereby mandating separate endangered species protection from the whole. NMFS has already informally recognized the northern and southern Pacific populations as separate by treating them as different management units with different genetic makeup (NMFS, ESA BiOp, 2004). In particular, genetic evidence proves that these loggerhead populations are distinct due to the female nesting site fidelity and migratory patterns, and absence of mixing between the two (Bowen, 1993). If either population were to disappear, it is unlikely that their nesting beaches would be repopulated in less than a few thousand years. *Id.*

VI. THE NORTH PACIFIC POPULATION OF LOGGERHEAD SEA TURTLES MERITS UPLISTING TO ENDANGERED STATUS UNDER THE ESA

Under the ESA, 16 U.S.C. § 1533(a)(1), FWS is required to list a species for protection if it is in danger of extinction or threatened by possible extinction in all or a significant portion of its

range. In making such a determination, FWS must analyze the species' status in light of five statutory listing factors. 16 U.S.C. § 1533(a)(1)(A)-(E); 50 C.F.R. § 424.11(c)(1) - (5). These factors are:

- (A) the present or threatened destruction, modification, or curtailment of its habitat or range;
- (B) over-utilization for commercial, recreational, scientific, or educational purposes;
- (C) disease or predation;
- (D) the inadequacy of existing regulatory mechanisms; or
- (E) other natural or manmade factors affecting its continued survival.

16 U.S.C. § 1533(a)(1). Petitioners believe that many of these factors have played a role in bringing the North Pacific loggerhead sea turtle to its current, perilous condition. NMFS must rely "solely on the best scientific and commercial data available" in listing determinations. 16 U.S.C. § 1533(b)(1)(A).

A species is "endangered" if it is "in danger of extinction throughout all or a significant portion of its range" due to one or more of the five listing factors. 16 U.S.C. § 1531(6). A species is "threatened" if it is "likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range." 16 U.S.C. § 1531(20). Under the ESA, a "species" includes any species, subspecies or "distinct population segment" of a vertebrate fish or wildlife. 16 U.S.C. § 1532(16). Here, Petitioners request that NMFS uplist the North Pacific distinct population segment of loggerhead sea turtle from threatened to endangered.

A. Present or Threatened Destruction, Modification, or Curtailment of Habitat or Range

There are both threats to the terrestrial and marine habitat of the North Pacific loggerhead. Terrestrial threats pertain to the hazards associated with the turtle's nesting environment. While there are no Pacific loggerhead nests in U.S. jurisdiction, NMFS recognizes the importance that "the United States participate in restoration efforts of the U.S. sea turtle stocks at their respective (foreign) nesting beaches... so that U.S. resource managers and policy makers can make informed decisions on policies to support turtles in other political jurisdictions." (NMFS & FWS, Recovery Plan, 1998). The Recovery Plan lists the following as terrestrial threats to the nesting environment:

1. Direct take,
2. Increased human presence,
3. Coastal construction,
4. Nest predation,
5. Beach erosion,
6. Artificial lighting,
7. Beach mining,
8. Vehicular driving on beaches,
9. Exotic vegetation,

10. Beach cleaning, and
11. Beach replenishment.

Id.

The North Pacific loggerhead has only about 1000 nesting females in Japan each year. There is little nesting activity by the northern Pacific population and any encroachment into existing nesting habitat will contribute to the rapid decline of the species. Terrestrial activities threaten to destroy, modify, and curtail the habitat of loggerheads. Nesting beaches in Japan suffer from extensive erosion caused by upstream dams and dredging and are obstructed by seawalls (Kamezaki *et al.*, 2003). Fortification to protect property can also prevent females from finding the remaining nesting habitat.

Eggs, hatchlings, and nesting turtles are very sensitive to disturbance. Loggerhead nests are threatened by human trampling and digging. For example, tourism threatens loggerhead nests on the island of Yakushima, which is the primary rookery for the North Pacific loggerhead population with 30 percent of nesting (WPRFMC 2007). Recent accounts found that tourism activities there have caused egg and hatchling mortality. *Id.* Unrestricted access to beaches and poor management put the nesting loggerheads at risk. *Id.* Nighttime beach use disturbs nesting females. Heavy utilization of nesting beaches by humans may also compact the sand, resulting in lowered hatchling success.

Beach nourishment impacts turtles by burying nests, disturbing nesting turtles, and affecting embryo development through increased sand compaction and temperature changes. Since hatchlings are attracted to light, artificial lighting increases their chances of death or injury when it disorients the turtles on their way to the ocean. Additionally, females avoid areas of intense lighting, so highly developed areas may reduce nesting habitat. Repeated mechanical raking of nesting beaches by heavy machinery can result in compacted sand and tire ruts that may hinder or trap hatchlings. Rakes can penetrate the surface to disturb nests, uncover nests, or transfer debris over nests and alter nest temperature.

The placement of physical obstacles on a beach can hamper or deter nesting attempts as well as interfere with incubating eggs and the hatchlings ability to find the sea. For example, the use of off road vehicles on beaches is a serious problem in that it compacts sand, directly kills hatchlings, and leaves tire ruts that increase hatchlings' difficulty in reaching the ocean. Finally, the invasion of a nesting site by non-native beach vegetation can lead to increased erosion and destruction of nesting habitat, and trees can shade nests, in turn lowering temperatures and altering the natural sex ratio of the hatchlings.

If the northern Pacific population were extirpated from its current range, it would reduce a substantial portion of the Pacific habitat of loggerheads. As mentioned previously, most of the northern Pacific loggerheads originate in Japan from just over 40 nesting beaches (Kamezaki *et al.*, 2003). Some loggerhead nesting beaches studied in the 1960s have been extirpated. *Id.* During the 1990s, there has been a marked decline in annual nesting – as much as 89 percent at some beaches. *Id.* Approximately 75 percent of all clutches deposited in Japan occurred on just nine major and six submajor nesting beaches. *Id.* These nesting sites continue to face the terrestrial threats discussed above.

In addition to impacts to nesting beaches, North Pacific loggerheads face a number of threats to their marine habitat. Marine debris poses a serious threat to the survival of the northern Pacific population of loggerheads. Fishing, boating, and garbage debris also degrades the marine habitat of loggerheads and they can be harmed by ingestion or entanglement by debris. *Id.* Production of plastics in the U.S. increased from 3 million tons in 1960 to nearly 48 million tons in 1995, reflecting only a larger worldwide trend (Tickell 2000). Floating plastic on all oceans has increased accordingly, including raw plastic, and the fragmented, weathered remains of manufactured items like bottles, disposable cigarette lighters, toothbrushes, and children's toys. The North Pacific Ocean is said to have the largest quantity, mostly discharged from Japan and the U.S. (Tickell 2000). Moore, *et al.*, (2001) found that in the North Pacific central gyre the mass of plastic was approximately six times that of plankton. Floating plastic may be mistaken for food and sea turtles are often attracted to floating or shiny plastic.

In the eastern Pacific, loggerheads are killed by entanglement and ingestion of persistent marine debris (NMFS & FWS, Recovery Plan, 1998). The ocean is host to large volumes of plastics, monofilaments, and other debris that can be lethal to loggerheads. Much of this is discarded waste from the fishing industry following decades of unsafe dumping practices. Turtles may be entangled in or ingest abandoned fishing gear such as lines, ropes, or nets, prohibiting them from submerging to feed, or come to the surface for air (NMFS & FWS, Recovery Plan, 1998). Plastic fishing lines or other debris can constrict around turtles necks or flippers causing severe injury or death. For example, a juvenile loggerhead was discovered entangled in the hose attached to a five-gallon boat gasoline tank floating in the water off of the California coast. *Id.* Loggerheads are also threatened by the accidental ingestion of plastic debris and other refuse. *Id.* Ingestion of such items may poison the turtles, or suffocate them by obstructing their esophagus. *Id.*

In addition to marine debris, there are other significant threats to North Pacific loggerhead sea turtle's marine habitat. For example, offshore oil and gas development can impact sea turtle habitat (NMFS 2005). Coastal development and dredging contribute to pollution and sediment that degrade the loggerhead habitat. *Id.* Moreover, the proposed construction of a U.S. military airbase at Henoko, Okinawa, Japan could pose a threat to the habitat of loggerheads, as well as other species of sea turtles and the Okinawa dugong. The military base would require landfill in parts of two saltwater bays, and threatens loggerheads with terrestrial pollution runoff including hazardous chemicals, as well as beach disruption, noise pollution, soil erosion, and significantly increased risk of ship strikes in this important loggerhead habitat.

B. Overutilization for Commercial, Recreational, Scientific, or Educational Purposes

1. Longline Fishing

In U.S. waters, North Pacific loggerheads are exposed to trawl, purse seine, hook and line, gillnet, pound net, longline, dredge, and trap fisheries. The most significant source of harm to Pacific loggerheads is pelagic longline fishing. Scientists believe that pelagic longline bycatch is the "proximate cause for regional declines" of loggerheads in the Pacific (Lewison *et al.*, 2004).

Based on turtle bycatch rates documented by fishing vessels in the region, scientists currently estimate that the annual take of loggerheads in the Pacific by the pelagic longlining industry is 60,000 loggerheads. *Id.* Recent research estimated that more than 200,000 loggerhead sea turtles were taken as bycatch in longline fishing efforts globally in 2000 (Lewison *et al.*, 2004). That same year, approximately 30,000 to 75,000 loggerhead turtles were caught as bycatch in the Pacific Ocean (Lewison *et al.*, 2004). Thousands of turtles die each year in Pacific longlines. *Id.* Of these, an estimated 2,600 to 6,000 loggerheads are killed (Lewison *et al.*, 2004; Ovetz, 2005).

Longline fisheries are particularly harmful when loggerheads become entangled or hooked, causing the turtles to drown or suffer debilitating injuries, such as when hoisted aboard by the line hook caught in their throat. Loggerheads become hooked both externally in the flippers, beak, neck or mouth, or internally where the hook is ingested and becomes lodged in the gastrointestinal tract, often tearing tissues and organs and resulting in deadly infections (NMFS, ESA BiOp, 2004). Those that do not immediately drown often suffer serious injury, such as hook ingestion, condemning them to a slower death by starvation, internal bleeding, or infection.

Commercial pelagic longline fishing is an industrial fishing method whereby each vessel, typically seeking tuna or swordfish, reels out up to 60 miles of monofilament line bearing up to several thousand baited hooks on shorter branch lines. The line (or “set”) is suspended in the water by floats. Tuna longlines are fished up to 1,200 feet beneath the surface, while swordfish lines are “shallow set” in the upper 200-300 feet of the water column. In both cases, the hooks soak for hours before being hauled in. In addition to the target fish, they routinely hook a large number and variety of non-target fish, marine mammals, turtles, birds, and sharks (collectively known as “bycatch”) (NMFS 2001). Longline fisheries tend to catch older classes of loggerheads (Lewison *et al.*, 2007). Certain size classes of loggerheads found to be especially vulnerable are taken as bycatch on average once every two years (Lewison *et al.*, 2004). The loss of older loggerheads reduces the reproductive capacity of this imperiled species because population growth depends on the survival of turtles to sexual maturity. *Id.*

Loggerhead mortality from human activities in the Pacific Ocean is not sufficiently documented except for estimates based on NMFS observer data from longline fisheries in Hawai’i. Although international fishing commissions request voluntary reporting of bycatch, onboard observers and fishers' logbooks conduct most of this monitoring and reporting (Lewison *et al.*, 2004). Reports of loggerhead captures in the Hawai’i longline fisheries occur primarily in the winter months, coinciding with the primary fishing effort (NMFS, ESA BiOp, 2004). Most of the observed takes (97 percent) are from longlines targeting swordfish (Crowder *et al.*, 2001).

Since longlining for swordfish within the California Exclusive Economic Zone has been prohibited since at least 1977 most U.S. longline fishing in the Pacific was based out of Hawai’i. From the 1980s to late 1990s, the California-based longline fleet fluctuated in size from about two to a couple dozen boats. However, in March 2001, NMFS issued an ESA Section 7 Biological Opinion on the Hawai’i Fishery Management Plan and concluded that continued longline fishing would jeopardize the continued existence of the leatherback, loggerhead, and green sea turtles and virtually eliminated the Hawai’i-based longline fishery for swordfish for several years. As a result, numerous boats from Hawai’i relocated to California, with up to 48 vessels operating out of California in 2000.

The California-based longline fishery caught and killed numerous federally protected species. From August 1995 through 1999, California-based longline fishing vessels self-reported numerous interactions with sea turtles. Reports acknowledged that 35 leatherback, 21 loggerhead, 19 olive ridley, and 12 green sea turtles were caught during this period. From October 2001 to March 2003, NMFS placed limited observers on some of the California-based longline fishing vessels. These observers, monitoring only a fraction of the fishing effort, recorded entanglements of 23 loggerhead sea turtles, 2 leatherback sea turtles, and 1 olive ridley sea turtle. In August 2003, NMFS predicted (based on prior observer data and assuming that fishing effort remained the same as in 2002) that the California-based longline fishery was entangling 174 loggerhead sea turtles (47 killed) and 53 leatherback sea turtles (14 killed) each year. In light of the numerous interactions with sea turtles, in August 2003, the Ninth Circuit ruled that NMFS was violating the ESA with regards to its management of the California-based longline fishery. *Turtle Island Restoration Network, et al., v. National Marine Fisheries Service*, 340 F.3d 969 (9th Cir. 2003).

Shortly after the court ruled that the California-based longline fishery was operating in violation of the ESA, the Council and NMFS instituted a closure pursuant to its authorities under the ESA. 69 Fed. Reg. 11540 (March 11, 2004); 50 C.F.R. § 223.206(d)(9). A few vessels continued to fish intermittently from California using deep-set longlines to catch tuna outside the Exclusive Economic Zone (“EEZ”). However, deep-set longlining for tuna (either by California or Hawai’i-based vessels) has been suspended east of 150° W long. to address overfishing of bigeye tuna. 71 Fed. Reg. 38297 (July 6, 2006). For the most part, the California-based longline fishers relocated to Hawai’i where the formerly closed swordfish fishery was set to reopen with new management restrictions. Currently, NMFS is considering a proposal to reopen California’s closed areas to longline fishing through an exempted fishing permit. This will likely result in incidental bycatch of the North Pacific loggerheads.

The Hawai’i-based longline fleet currently has about 110 active vessels, up to 101 feet in length. In 2003, the Hawai’i-based tuna longline fishery alone set about 30 million hooks, and the number continues to climb. *Id.* The Hawai’i-based longline fishery began as early as 1917 (Cousins 2001). The fishery has fluctuated over the decades, peaking in the mid-1950s with landings exceeding 2,000 tons. *Id.* With the establishment of the 200-nautical mile U.S. EEZ in 1976, foreign fleets were removed, allowing further development of the domestic Hawai’ian fisheries. *Id.* The Hawai’i longline fishery grew from 37 vessels in 1987, to 80 in 1989, and then increased again to 144 vessels in 1991. *Id.* The new entrants in the longline fishery were mostly steel-hulled vessels up to 33 meters in length. *Id.* The operators of these vessels were mainly former participants in the U.S. East Coast tuna and swordfish fisheries. *Id.* Because of increased navigation technologies, the range of the longline fishery expanded, with some vessels fishing up to 1,000 nautical miles from the main Hawai’ian islands. *Id.* As discussed above, the expansion of the fishery between 1987 and 1991 was followed by a moratorium on permit issuance in 1991 and a prohibition on fishing within 50 nautical miles of the Northwestern Hawai’ian Islands to prevent interactions between the fishery and endangered populations of monk seals (*Monachus schauinslandi*). *Id.* At present, vessels in the Hawai’i-based longline fishery are categorized in three size classes: small (< 56 ft), medium (56-74 ft), and large (> 74 ft) vessels. *Id.*

The Hawai'i-based longline fishery is comprised of the deep-set tuna fishery and the shallow-set swordfish fishery. The tuna fishery is the largest domestic commercial fishery in the western Pacific region (NMFS 2005). In 2004, there were 1,380 trips setting 15,880 deep sets to catch tuna, and this effort is expected to increase approximately 10 percent annually (NMFS 2005).

The Hawai'i-based longline fishery has historically interacted with North Pacific loggerhead sea turtles hooking them internally or externally (NMFS 2005). All of the loggerheads impacted by this fishery are part of the North Pacific population. Loggerheads often forage near the surface targeting items that float; however, when prey are present they will forage at depths diving as much as 128 meters. *Id.* At these depths loggerheads may encounter the deep set longlines. NMFS determined that the Hawai'i-based deep-set longline fishery may increase the rate of decline for the North Pacific, Japanese nesting, population of loggerhead sea turtles. *Id.* In 2006, the Hawai'i-based swordfish longline fishery was suspended for exceeding authorized take of ESA-listed sea turtles. 71 Fed. Reg. 14416 (March 22, 2006).

In Japan, loggerheads also face longline bycatch threats. While most of the bycatch data from the Japanese longline industry does not discriminate between species, the rates of capture and mortality are alarming. In 2000, the Japanese tuna longline fleet was estimated to take approximately 6,000 turtles, with 50 percent mortality. Little information on species composition was given; however, all species of Pacific sea turtles were taken (NMFS 2004).

As described in this Section, longline fishing is the greatest threat to the survival of the North Pacific loggerheads. This outdated fishing practice entangles and kills thousands of loggerheads placing unbearable pressure on their already low population. This threat alone warrants reclassifying the northern Pacific population of loggerheads from threatened to endangered status.

2. Gillnet Fishing

Recent data also shows that bycatch of turtles from gillnets and trawl fisheries is also a serious threat (Lewison *et al.*, 2007). All loggerhead captures in Oregon and California have occurred during El Niño years, when northward flowing currents of warmer water bring food from Baja California up the coast. Experts believe that up to five loggerheads per year get captured in drift gillnets while following pelagic crabs also moving with the El Niño current (NMFS, ESA BiOp, 2004). According to the NMFS Section 7 Biological Opinion, between 131 and 200 loggerhead turtles were expected to be captured in the west-coast based longline fishery and the California/Oregon drift gillnet fishery — of these captured, 37 to 92 were expected to die. *Id.*

The California/Oregon drift gillnet fishery for shark and swordfish is primarily a federally-managed fishery, with the majority of the fishing effort occurring in federal waters within 200 miles of the coasts of California and Oregon. The gillnet fishery consists of approximately 100 permitted vessels of which approximately 40 are active in a given year. These vessels use nets of approximately one mile in length with mesh sizes of 16 to 22 inches. The nets are generally set in the evening and retrieved in the morning, and theoretically allow small animals to pass through while trapping larger animals. Although termed “gillnets,” the nets used in the fishery actually entangle fish and other animals rather than trap them by the gills. The majority of fishing effort in the fishery occurs between August and the end of January. Although the fishery

originally targeted thresher sharks, today it also targets both swordfish and shortfin mako sharks. Other species commonly caught and kept by this fishery include opah, louver, and various species of tuna. The majority of the targeted catch in the fishery now consists of swordfish taken off the California coast between San Diego and Cape Mendocino.

The gillnet fishery has resulted in the incidental bycatch of many species of marine mammals, sea turtles and seabirds, including threats to the North Pacific loggerheads. Gillnet fishing threatens the existence of the North Pacific loggerheads. Gillnets incidentally entangle sea turtles and can drown or injure sea turtles. From July 1990 to January 2000, the gillnet fishery was observed to take 17 loggerheads (NMFS 2005). NMFS estimates that approximately 33 loggerheads could be incidentally taken by this gillnet fishery each year and found that the gillnet fishery jeopardized their continued existence (NMFS 2005). As a result, NMFS closed areas to the drift gillnet fishing off southern California during El Niño to reduce interactions with loggerheads that follow red crabs into the area. These closures are important to reducing the take of North Pacific loggerheads but are inadequately implemented.

Additionally, there is a halibut set gillnet fishery of 50-70 vessels off the coast of Baja California, Mexico. The nets are generally 4-6 meters high and soak for at least 24 hours. These gillnets have a high incidental catch rate for loggerhead sea turtles (NMFS 2005). Interviews of fishermen in Puerto Adolfo Lopez Mateos, revealed that during the season about four loggerheads were captured each week per boat with 90 percent mortality. *Id.* Researchers estimate that 1,800 loggerheads are killed by this fishery alone, and other fisheries operate in Baja California thus increasing the total loggerhead mortality (Peckham *et al.*, 2004 in NMFS 2005).

Closer to their nesting grounds, gillnets, trawling and pound nets are commonly used in Japan's coastal fisheries. This results in the stranding of approximately 80 loggerheads per year — nearly 10 percent of Japan's nesting population.

Off the coast of Japan, gillnets and pound nets are very common. In addition, there is an intense trawl fishery for anchovy operated offshore of some major loggerhead rookeries during the nesting season. According to the Sea Turtle Association of Japan (2002), approximately 80 mature loggerheads strand every year in Japan — ‘these coastal fisheries might be strongly related with stranding.’ With less than 1,000 female loggerheads nesting annually in Japan, this number of strandings is not insignificant.

(NMFS, BiOp 2004).

As described above, longline and gillnet fisheries are a major threat to the survival of the loggerhead sea turtle. The combined effect of these actions significantly decreases the breeding populations by killing the pelagic juveniles before reaching sexual maturity, in return impacting the species overall. Unmitigated threats, specifically pelagic longlining, will have serious consequences, including sharp declines in all nesting assemblages (Lewison *et al.*, 2004). The combined effect of the commercial and small fisheries in the North Pacific is detrimental to the

survival of the loggerheads. This is an obvious and manageable threat that deserves urgent and stringent regulation.

3. Direct Take

Generally, the threat of direct take of loggerheads is a minor one; however, some turtles are killed for human consumption. Traditionally in Japan, widespread consumption of loggerhead eggs occurred in coastal areas, both as a traditional food and as an aphrodisiac, though it has decreased substantially (Kamezaki *et al.*, 2003). Likewise, sea turtle meat was consumed in some local communities in Kochi and Wakayama prefecture, but is not widely a popular food source. *Id.*

Despite a ban on taking turtles in Mexico, people continue to capture and kill sea turtles for consumption, including North Pacific loggerheads (NMFS 2005). Due to the decline in green turtles, a market for loggerhead meat has developed in several Pacific communities. *Id.* Sea turtles are intentionally harvested for consumption, and sometimes people consume sea turtles found entangled or caught while fishing. *Id.* Sea turtles are consumed both locally and sold to restaurants in Mexican and U.S. cities such as San Diego and Tucson. *Id.* Consumption is highest during holidays (Wildcoast *et al.*, 2003 in NMFS 2005). Sea turtle mortality data in Baja California is estimated at about 1,950 annually from incidental take and direct harvest, and many of those are consumed (Nichols, 2002 in NMFS 2005).

With a dwindling population even small numbers of turtles taken for use can impact the survival of the North Pacific loggerheads.

C. Disease or Predation

Predation of loggerhead sea turtles continues to pose a threat to their survival. For example, in Japan, raccoon dogs (*Nyctereutes procyonoides*) and weasels (*Mustela itatsi*) prey on eggs on some nesting beaches (Kamezaki *et al.*, 2003). Natural predation of loggerheads occurs regularly throughout their habitat by both feral and domestic animals. Hatchlings are also susceptible to terrestrial predation during their journey from the nest to the sea.

Similarly, across the Pacific, loggerhead sea turtles experience threats from predation in the ocean in addition to terrestrial predation. Hatchlings are especially threatened by high rates predation, especially by coastal and pelagic sharks (NMFS & FWS, Recovery Plan, 1998). Some natural predation of Pacific loggerheads occurs by large sharks and orcas. *Id.*

D. Other Natural or Anthropogenic Factors

1. Global Warming

Global warming poses an intensifying threat to North Pacific loggerheads. Despite the complexity involved with the science of global warming and the difficulties making predictions of climate change, there is a wealth of information suggesting that the rate of warming is occurring even faster than models have projected. Several authors have expressed concern about the potential threat posed to marine animals such as sea turtles by climate change and the submergence of coastal areas, changes in marine productivity, and increases in ambient

temperatures and storms. Negative impacts to the loggerhead sea turtle are likely from any such climate change scenario.

Anthropogenic greenhouse gases are causing the climate to warm with serious impacts on the marine and coastal environment that the loggerheads depend upon. First, warming climate and warming waters may stress sea turtles. Because warmer temperatures influence the gender of sea turtle hatchlings, global warming may cause more female and fewer male offspring thus threatening the survival of this imperiled species. Warming waters can also force the poleward migration of species and can reduce the fitness of turtles, making them more vulnerable to disease or other threats. Second, global warming will likely lead to reduced overall productivity, including a reduction in prey eaten by sea turtles. Third, global warming influences the intensity and frequency of El Niño which, in turn, increases the bycatch rate of loggerheads as they follow prey into fishing areas. Fourth, the current trends of sea level rise are likely to inundate important nesting beaches in Japan that North Pacific loggerheads rely upon within decades. Finally, ocean acidification caused by the ocean's absorption of excess carbon dioxide may ultimately render the oceans inhospitable to sea turtles and their prey. Any of these factors alone would be sufficient to warrant listing of the North Pacific loggerhead as endangered. Collectively, unless addressed, they render the future survival of the species doubtful.

a. The Best Available Science and Global Warming

The basic physics underlying global warming are as well established as any phenomena in the planetary sciences. The earth absorbs heat in the form of radiation from the sun, which is then redistributed by atmospheric and oceanic circulations and also radiated back to space (Albritton *et al.*, 2001). The earth's climate is the result of a state in which the amount of incoming and outgoing radiation are approximately in balance (Albritton *et al.*, 2001). Changes in the earth's climate can be caused by any factor that alters the amount of radiation that reaches the earth or the amount that is lost back into space, or that alters the redistribution of energy within the atmosphere and between the atmosphere, land, and ocean (Albritton *et al.*, 2001). A change in the net radiative energy available to the global earth-atmosphere system is called "radiative forcing" (Albritton *et al.*, 2001). Positive radiative forcings tend to warm the earth's surface while negative radiative forcings tend to cool it (Albritton *et al.*, 2001).

Radiative forcings are caused by both natural and manmade factors (Albritton *et al.*, 2001; ACIA 2004). The level of scientific understanding of these different forcings varies widely, and the forcings themselves and interactions between them are complex (Albritton *et al.*, 2001). The primary cause of global warming, however, is society's production of massive amounts of "greenhouse gases" such as carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), and halocarbons that cause positive radiative forcings (Albritton *et al.*, 2001; IPCC 2001; ACIA 2004). Greenhouse gases are, in fact, the radiative forcing mechanism that is currently best understood (Albritton *et al.*, 2001).

The Enhanced Greenhouse Effect is caused by increasing concentrations of these greenhouse gases in the earth's atmosphere. As greenhouse gas concentrations increase, more heat reflected from the earth's surface is absorbed by these greenhouse gases and radiated back into the atmosphere and to the earth's surface. Increases in the concentrations of greenhouse gases slow the rate of heat loss back into space and warm the climate, much like the effect of a common

garden greenhouse (Albritton *et al.*, 2001; ACIA 2004). The higher the level of greenhouse gas concentrations, the larger the degree of warming experienced.

By the time of the Third Assessment Report of the Intergovernmental Panel on Climate Change (IPCC) in 2001,³ the atmospheric concentration of carbon dioxide had increased by 31 percent since 1750, to a level that has not been exceeded during the past 420,000 years and likely not during the past 20 million years (IPCC 2001). The current rate of increase is unprecedented during at least the past 20 million years (IPCC 2001). About three fourths of manmade carbon dioxide emissions come from fossil fuel burning, and most of the remaining emissions are due to land-use changes, primarily deforestation (IPCC 2001). Carbon dioxide is considered the most important greenhouse gas overall because the volumes emitted dwarf those of all the other greenhouse gases combined. As of March, 2006, the atmospheric carbon dioxide concentration was 381 ppm, and rising at over 2 ppm per year (Shukman 2006).

The atmospheric concentration of methane, another important greenhouse gas, has increased by about 150 percent since 1750, continues to increase, and has not been exceeded during the past 420,000 years (IPCC 2001). About half of current methane emissions are manmade, and there is also evidence that current carbon monoxide (CO) emissions are a cause of increasing methane concentrations (IPCC 2001). Over a 100-year period, methane will trap about 23 times more heat than an equal amount of carbon dioxide (Albritton *et al.*, 2001).

The atmospheric concentration of nitrous oxide has increased by about 17 percent since 1750, continues to increase, and has not been exceeded during at least the last 1000 years (IPCC 2001). About a third of current nitrous oxide concentrations are manmade. Over a 100-year period, nitrous oxide will trap about 296 times more heat than an equal amount of carbon dioxide (Albritton *et al.*, 2001).

By 2001, the global average temperature has risen by approximately $0.6^{\circ}\text{C} \pm 0.2^{\circ}\text{C}$ ($1.0^{\circ}\text{F} \pm 0.36^{\circ}\text{F}$) during the 20th Century (IPCC 2001). Important advances in the detection and attribution of global warming have demonstrated, beyond any legitimate scientific debate, that a significant portion of this observed warming is due to anthropogenic greenhouse gas emissions (Barnett *et al.*, 2005, IPCC 2001).

Past anthropogenic greenhouse gas emissions have altered the energy balance of the earth by 0.85 ± 0.15 watts per square meter (Hansen *et al.*, 2005). Due to the lag time in the climate system, this energy imbalance commits the earth to additional warming of 0.6°C (1°F) of

³ The IPCC was established by the World Meteorological Organization and the United Nations Environment Programme in 1988 (IPCC 2001a). The IPCC's mission is to assess available scientific and socio-economic information on climate change and its impacts and the options for mitigating climate change and to provide, on request, scientific and technical advice to the Conference of the Parties to the United Nations Framework Convention on Climate Change (IPCC 2001a). Since 1990, the IPCC has produced a series of reports, papers, methodologies, and other products that have become the standard works of reference on climate change (IPCC 2001a). The IPCC's comprehensive Assessment Reports are produced approximately every seven years and build upon and expand past IPCC products. Summaries of the Fourth Assessment Report have been released this year and the forthcoming comprehensive report should be available for the review of the petitioned sea turtle population. This Petition cites from the Third Assessment Report and from many more recent individual peer reviewed publications.

warming that is already “in the pipeline,” even absent additional greenhouse gas emissions (Hansen *et al.*, 2005).

Because greenhouse gas emissions are continuing to increase, warming is projected to accelerate. Based on differing scenarios of future greenhouse gas emissions and the world’s leading climate models, the IPCC has projected between 1.4°and 5.8°C (2.5°-10.4°F) of additional warming by the end of this century. The higher the level of greenhouse gas emissions, the more the world will warm.

As scientific understanding of global warming has advanced, so too has the urgency of the warnings from scientists about the consequences of our greenhouse gas emissions. Scientists are now able to tell us, with a high degree of certainty, that additional warming of more than 1°C (1.8°F) above year 2000 levels will constitute “dangerous climate change,” with particular reference to sea level rise and species extinction (Hansen *et al.*, 2006a,b). Furthermore, scientists are able tell us the atmospheric greenhouse gas level “ceiling” that must not be exceeded in order to prevent additional warming of more than 1°C (1.8°F) above year 2000 levels (Hansen *et al.*, 2006a,b). In turn, scientists can tell us the limitations that must be placed on greenhouse gas emissions in order to not exceed this “ceiling” of approximately 450-475 ppm of carbon dioxide.

In order to stay within the ceiling, emissions must follow the “alternative,” rather than the “business as usual,” greenhouse gas emissions scenario (Hansen 2006; Hansen *et al.*, 2006a,b; Hansen and Sato 2004). In the business as usual scenario, carbon dioxide emissions continue to grow at about 2 percent per year, and other greenhouse gases such as methane and nitrous oxide also continue to increase (Hansen 2006; Hansen *et al.*, 2006a,b). In the alternative scenario, by contrast, carbon dioxide emissions decline moderately between now and 2050, and much more steeply after 2050, so that atmospheric carbon dioxide never exceeds 475 parts per million (Hansen 2006; Hansen *et al.*, 2006a,b). The alternative scenario would limit global warming to less than an additional 1°C in this century (Hansen 2006; Hansen *et al.*, 2006a,b).

Since the year 2000, however, society has not followed the alternative scenario. Instead, carbon dioxide emissions have continued to increase by 2 percent per year since 2000 (Hansen 2006; Hansen *et al.*, 2006a,b). This rate of increase itself appears to be increasing (Black 2006). If this growth continues for just ten more years, the 35 percent increase in CO₂ emissions between 2000 and 2015 will make it impractical if not impossible to achieve the alternative scenario (Hansen *et al.*, 2006a,b). Moreover, the “tripwire” between keeping global warming to less than 1°C, as opposed to having a warming that approaches the range of 2-3°C, may depend upon a relatively small difference in anthropogenic greenhouse gas emissions (Hansen *et al.*, 2006a,b). This is because warming of greater than 1°C may induce positive climate feedbacks, such as the release of large amounts of methane from thawing arctic permafrost, that will further amplify the warming (Hansen *et al.*, 2006a,b).

Just ten more years on current greenhouse gas emissions trajectories will essentially commit us to climate disaster. Dr. James E. Hansen, Director of the NASA Goddard Institute for Space Studies, and NASA’s top climate scientist, has stated: “In my opinion there is no significant doubt (probability > 99 percent) that . . . additional global warming of 2°C would push the earth beyond the tipping point and cause dramatic climate impacts including eventual sea level rise of

at least several meters, extermination of a substantial fraction of the animal and plant species on the planet, and major regional climate disruptions” (Hansen 2006:30).

In order to avoid truly unacceptable consequences of global warming, we must stop the growth of greenhouse gas emissions, and, in relatively short order, begin reducing them. Achieving the reductions necessary to keep additional global warming between the years 2000-2100 within 1°C will be extremely challenging, and will require deep reductions in emissions from industrialized nations such as the United States.

b. Global Warming and Warming Waters

As described above, global warming has already caused an increase in atmospheric temperatures. These temperature changes can have a variety of impacts with potential adverse effects on North Pacific loggerheads. Atmospheric warming threatens the survival of the North Pacific loggerheads because they are near their thermal tolerance limits. Warming temperatures can influence the sex ratio of loggerhead hatchlings because the sex ratio of Japan nesting loggerheads is determined by the temperature of their nest. At temperatures of about 30°C there are male and female hatchlings, while higher temperatures result in mostly females (Yntema *et al.*, 1979). Because of temperature dependent sex determination and natal homing, sea turtles are likely to be adversely affected by global warming (Davenport, 1997). Additionally, increased temperatures can cause nesting failures for sea turtles. Studies show that hatchling success decreases in nests when sand temperatures exceed 33°C during incubation (Matsuzawa *et al.*, 2002). Increased sand temperatures can result in high mortality of sea turtles eggs, which puts the North Pacific loggerheads in an extremely vulnerable state considering that the number of nesting females has decreased rapidly in Japan. *Id.* The loggerhead population at Senri Beach in Japan and others in similar climates are nesting in habitat near their thermal tolerance limits. *Id.* Therefore, global warming is likely to pose a serious threat to the survival of this imperiled population.

Not only is the climate warming, but also the ocean temperatures are rising. Approximately 80 percent of the heat put into the climate system is absorbed by the ocean (IPCC 2007). Sea surface temperatures around Japan have risen as much as three times the world average (Ueno 2007). The increasing temperature of the Pacific Ocean is triggering a meltdown of carefully balanced interactions in the marine community. Water temperature is an important factor determining habitat ranges for many organisms and even minor changes are seriously disruptive. In the last 60 years, average ocean temperatures between 0-300 meters have increased by 0.31°C (0.56°F) (Field *et al.*, 2000). Locally, water temperature increases have been even more significant. In the central part of the Sea of Japan, the surface temperature of the ocean has risen 1.6°C — the largest average annual temperature rise observed (Ueno 2007).

Global warming can also influence ocean currents and scientists predict that the ocean circulation system could slow. Changing currents may influence the migration patterns and behavior of loggerheads. North Pacific loggerheads rely on ocean currents for their vast migration across the Pacific from nesting to foraging grounds. Additionally, global warming is weakening the nutrient rich upwelling off the California coast (Pew 2002). An annual upwelling of cold water usually draws nutrients from the deep water, which in turn causes a bloom of phytoplankton. Increased stratification of surface and depth temperatures and changing weather

have weakened the upwelling and the impacts are alarming. Between 1951 and 1993, researchers observed an 80 percent decline in zooplankton off the California coast due to surface waters warming up to 1.5°C (2.7°F) (McGowan 1998). Because plankton form the base of the marine food web, many marine organisms are affected by the decline.

Tidal pools studied along the Monterey coast of California already demonstrate that species abundance and distribution is changing due to climate change. In just six decades, shoreline ocean temperatures warmed by 0.79°C (1.4°F) and Monterey tide pool species changed significantly with more warm water species present and a decline in cool water species (Sagarin 1999). Similar changes were also observed among southern California reef fish (McCarty 2001). As a result of these changing conditions, California's marine ecosystems are losing diversity and invasive species may gain an advantage over native species (Stachowicz 2002). Warming waters are devastating for species that are unable to migrate toward cooler waters because of habitat requirements, environmental barriers, or lack of mobility (Scavia 2002). These climatic changes are occurring at an unprecedented rate which also hinders the adaptation of many organisms.

Warmer waters also favor different species of phytoplankton, some of which are associated with "red tides" that shade ocean vegetation, deplete oxygen, and often have toxic properties (Smith 2000; Stephens 2006). Additionally, warmer waters hold less oxygen than cooler waters which may limit the range of species that require higher oxygen concentrations (Kennedy et al 2002). Global warming has also been linked to the spread or increased virulence of numerous marine pathogens (Harvell *et al.*, 2002). Sea turtles could become more vulnerable to disease.

Some or all of these repercussions of warming temperatures could adversely affect the North Pacific loggerhead sea turtles. With low population numbers, even minor effects could threaten the survival of this distinct population segment.

c. El Niño Southern Oscillation

The El Niño Southern Oscillation may severely affect North Pacific loggerheads because it can produce changes in much of the near shore and offshore marine communities. For example, bycatch of loggerheads on the California coast increases in El Niño years because loggerheads change their foraging patterns.

El Niño years now appear to occur 2-7 times more frequently than they did 7,000-15,000 years ago, and this recent apparent increase in the frequency (and also severity) of El Niño events poses a threat to the sea turtles. The 1983 and 1998 events were successively labeled the "El Niño of the Century" because the warming in the Eastern Equatorial Pacific was unprecedented in the past 100 years (Hansen *et al.*, 2006a).

While atmospheric science theory does not provide a clear answer on the effect of global warming on El Niño, most climate models yield either a tendency towards a more El Niño-like state or no clear change (Hansen *et al.*, 2006a). Some have hypothesized that during the early Pliocene, when the Earth was 3°C (5.4°F) warmer than today, a permanent El Niño-like condition existed (Hansen *et al.*, 2006a). Leading climate scientists believe that near-term global warming will lead to an increased likelihood of strong El Niño events (Hansen *et al.*, 2006a).

Additionally, El Niño causes a reduction in upwelling of cold, nutrient-rich waters. When this upwelling is reduced, overall productivity declines. Anthropogenic warming, therefore, also has the potential to harm North Pacific loggerheads via increases in the intensity (and possibly in the frequency) of El Niño events. Regardless of the impact of anthropogenic greenhouse gas emission on their frequency and/or intensity, El Niño events threaten loggerheads.

d. Sea Level Rise

Unabated, sea level rise will inundate the remaining nesting beaches for North Pacific loggerheads. Nesting females have extreme fidelity to nesting beaches and sea level rise threatens to cause the disappearance of many important nesting grounds.

In 2001, the IPCC projected that global sea level will likely rise between 10-90 cm in this century (Albritton *et al.*, 2001). One of the most troubling of recent scientific findings is that this projection is almost certainly a substantial underestimate. Melting of the Greenland ice sheet has accelerated far beyond what scientists predicted even just a few years ago, with a more than doubling of the mass loss from Greenland due to melting observed in the past decade alone (Rignot and Kanagaratnam 2006). The acceleration in the rate of melt is due in part to the creation of rivers of melt water, called “moulins,” that flow down several miles to the base of the ice sheet, where they lubricate the area between the ice sheet and the rock, speeding the movement of the ice towards the ocean (Hansen 2006). The IPCC projection of 10-90 cm in this century assumes a negligible contribution to sea level rise by 2100 from loss of Greenland and Antarctic ice, but leading experts have stated that that conclusion is no longer plausible due to multiple positive feedback mechanisms including dynamical processes such as the formation of moulins, reduced surface albedo, loss of buttressing ice shelves, and lowered ice surface altitude (Hansen *et al.*, 2006a). Paleoclimatic evidence also provides strong evidence that the rate of future melting and related sea-level rise could be faster than previously widely believed (Overpeck *et al.*, 2006).

While it has been commonly assumed that the response time of ice sheets is millennia, this may reflect the time scale of the forcings that cause the changes, rather than the inherent response time of the ice sheets (Hansen *et al.*, 2006b). The forcing from continued unabated greenhouse gas emissions in this century could yield sea level rise of one meter or more and a dynamically changing ice sheet that is out of our control (Hansen *et al.*, 2006b).

Even sea level rise in line with the past underestimate from the IPCC would still inundate substantial areas of the coast and have far-reaching consequences for the North Pacific loggerheads. Yet just 2-3°C (3.6-5.4°F) of warming would likely cause sea level to rise by at least 6 m (18 feet) within a century (Hansen 2006). Temperature changes of 2-3°C (3.6-5.4°F) are well within the range of estimates for this century provided by the IPCC (2001). For these reasons, sea level rise must be considered a very real threat to the North Pacific loggerhead.

e. Ocean Acidification

The world’s oceans are an important part of the planet’s carbon cycle, absorbing large volumes of carbon dioxide and cycling it through various chemical, biological, and hydrological processes. The oceans have thus far absorbed approximately 30 percent of the excess carbon dioxide emitted since the beginning of the industrial revolution (Feely *et al.*, 2004; WBGU,

2006). The world's oceans, in fact, store about 50 times more carbon dioxide than the atmosphere (WBGU, 2006), and most carbon dioxide released into the atmosphere from the use of fossil fuels will eventually be absorbed by the ocean (Caldeira and Wickett, 2003). As the ocean absorbs carbon dioxide from the atmosphere it changes the chemistry of the sea water by lowering its pH. The oceans' uptake of these excess anthropogenic carbon dioxide emissions, therefore, is causing ocean acidification (WBGU 2006).

Surface ocean pH has already dropped by about 0.1 units on the pH scale, from 8.16 in preindustrial times to 8.05 today — a rise in acidity of about 30 percent (Orr *et al.*, 2005; Ruttimann, 2006). The pH of the ocean is currently changing rapidly at a rate 100 times anything seen in hundreds of millennia, and may drop to 7.9 by the end of this century (Ruttimann 2006). If carbon dioxide emissions continue unabated, resulting changes in ocean acidity could exceed anything experienced in the past 300 million years (Caldeira & Wickett, 2003). Even if carbon dioxide emissions stopped immediately, the ocean would continue to absorb the excess carbon dioxide in the atmosphere, resulting in further acidification until the planet's carbon budget returned to equilibrium.

Ocean acidification from unabated anthropogenic carbon dioxide emissions poses a profound threat to marine ecosystems because it affects the physiology of numerous marine organisms, causing detrimental impacts that may ripple up the food chain. Changes that have been observed in laboratory experiments include impacts to the productivity of algae, photosynthesis of phytoplankton, metabolic rates of zooplankton and fish, oxygen supply of squid, reproduction of clams, nitrification by microorganisms, and the uptake of metals (WBGU, 2006).

Perhaps most importantly, increasing ocean acidity also reduces the availability of calcium carbonate needed by marine life to build shells and skeletons (Ruttimann, 2006). Phytoplankton, corals, coralline macroalgae, urchins, starfish, clams, oysters, crustaceans and many other organisms, preyed upon by sea turtles, rely on calcium carbonate in the ocean to build skeletons (WBGU, 2006). Normally, ocean waters are saturated with carbonate ions that marine organisms use to build skeletons. *Id.* However, the acidification of the oceans shifts the water chemistry to favor bicarbonate, thus reducing the availability of carbonate to marine organisms. *Id.* Already the ocean surface layer has lost 10 percent of its carbonate compared to preindustrial levels. *Id.* Continuing carbon dioxide emissions could result in calcification rates decreasing by up to 60 percent by the end of this century (Ruttimann, 2006). Sea turtles prey upon a variety of calcifying organisms that are threatened by ocean acidification. The impacts of ocean acidification are likely to reverberate up the food chain.

Even marine animals that do not calcify are threatened by carbon dioxide increases in their habitat. Changes in the ocean's carbon dioxide concentration result in accumulation of carbon dioxide in the tissues and fluids of fish and other marine animals, called hypercapnia, and increased acidity in the body fluids, called acidosis. These impacts can cause a variety of problems for marine animals including difficulty with acid-base regulation, growth, respiration, energy turnover, and mode of metabolism (Pörtner, 2004). Changes in ocean pH may adversely affect loggerhead sea turtles in similar ways exhibited by laboratory studies on other marine species.

As described here, anthropogenic greenhouse gases are a future threat to the North Pacific loggerhead. Some of these changes we are already committed to experiencing because of the lag between greenhouse gas emissions and its effects. It is not too late to prevent climate disaster, regulation of greenhouse gas emissions is essential to prevent the worst effects of global warming and ocean acidification.

2. Lack of Information

More research on the marine habitat of loggerheads is necessary to save the Pacific populations from extinction. There is limited knowledge of the pelagic stages of loggerheads because of the difficulty of performing research on sea turtles in the ocean. Few studies have been performed and this has left significant gaps in information on these populations (Witherington, 2003).

[A]lthough there are many pieces of information that compose a picture of loggerhead distribution at sea (e.g., strandings, aerial surveys, and in-water captures), the actual abundance and genetic identity loggerheads is only beginning to be understood. The places loggerheads can travel to are known (from tag returns and limited remote tracking), but current understandings of the actual migration routes and behavior of traveling loggerheads remains rudimentary.

Id. Much of the information gathered on loggerheads is relatively recent, but, in the last thirty years, scientists have begun to focus more studies on this previously ignored species, realizing that immediate action is needed to avoid extinction in substantial portions of the loggerhead's current range.

E. Inadequacy of Existing Regulatory Mechanisms

Existing regulatory mechanisms have been ineffective at preventing the decline of the loggerhead sea turtle or addressing any of the threats to the species. In particular, no mechanism has effectively eliminated or sufficiently reduced mortality from fishing. The very fact that the species has declined, and is projected to continue to decline, is itself the best evidence of the inadequacy of such mechanisms. Several of these regulatory schemes are discussed further below.

1. Federal Law

Currently, the northern Pacific population segment of the loggerhead turtle is treated collectively with all loggerheads as a threatened species. The lack of a specific management plan for this discrete and significant population threatens its survival.

It is clear that the cause of the declines is largely the result of commercial fishing within the loggerhead's range. Such destructive practices are the byproduct of an inadequate existing regulatory mechanism as well as numerous manmade factors affecting its existence, such as large hooks hanging for miles and miles in the open ocean.

The seasonal closure of the Pacific Leatherback Conservation Area also potentially benefits the North Pacific loggerhead by restricting gillnet fishing of central and northern California during the fall months. However, given most interactions with loggerheads occur south of this area, this annual closure is insufficient to protect loggerheads. The loggerhead specific closure in El Nino years has never been invoked even though NOAA has declared several El Nino years since the jeopardy biological opinion requiring its institution.

Additionally, the closure to longline fishing is also a benefit to the population. NMFS instituted the closure of shallow-set longlining east of 150° W long. in part to protect the Pacific loggerhead sea turtles. 69 Fed. Reg. 11540 (March 11, 2004); 50 C.F.R. § 223.206(d)(9). However, these protections are at risk as NMFS contemplates exempted fishing permits. Under pressure from scientists and conservation groups, NMFS denied a proposal to allow drift gillnet vessels to operate in the closed area off the California and Oregon coasts for 2007. However, NMFS has not made a determination on a similar longline fishing permit. Exempted fishing permits put the loggerhead sea turtles at risk. Given the take of loggerheads increases in El Niño years, and the National Oceanic and Atmospheric Administration has declared El Niño conditions will continue to develop into 2007, the odds of a vessel fishing pursuant to the longline exempted fishing permit taking loggerheads are greatly increased. NMFS will likely face the same request for an exempted fishing permit in 2008 or beyond. While, NMFS should keep the area closed to protect sea turtles, the issue is likely to rear up repeatedly. Moreover, the closure is also inadequate to protect sea turtles from interactions with the Hawai'i-based longline fishery.

Circle hooks have been found to reduce mortality rates of sea turtle bycatch because their shape and size decreases hook ingestion and capture rates, particularly for loggerheads (Read 2007). The use of this gear, however, does not prevent bycatch entirely, but reduces swallowing of the hook. It can only prevent mortality if rapid and safe handling frees turtles. *Id.* Additionally, circle hooks are not required gear for all fisheries interacting with the North Pacific loggerheads. While the Hawai'i longline fishery for swordfish requires circle hooks, the tuna fishery does not. Even if all fisheries used circle hooks, the limited improvement of this technology is inadequate for a population that numbers so few.

Longline and gillnet fisheries continue to be a threat to the survival of the North Pacific loggerhead whose population is already critically imperiled. Current restrictions, although beneficial, are insufficient to ensure the conservation and recovery of this population of sea turtles. Unfortunately, the limited bycatch mitigation measures required by U.S. federal regulators do not effectively prevent the drowning of sea turtles. Federal bycatch mitigation requirements do not rely on the best scientific data available, do not address the needs of the loggerhead sea turtle in the North Pacific Ocean, and are not consistently enforced for lack of infrastructure and personnel. Generally, mitigation measures are not required in the international fleets, which account for a significant portion of loggerhead sea turtle bycatch.

Moreover, efforts to control bycatch of loggerheads will be insufficient to conserve the sea turtles so long as greenhouse gas emissions continue unabated. The United States is responsible for nearly a quarter of worldwide carbon dioxide emissions, yet it lacks any comprehensive regulation of greenhouse gas emissions. As early as 1978, the United States took steps to

research and improve understanding of climate change. The National Climate Program Act, the Energy Security Act, the Global Change Research Act, The Energy Policy Act, and the Global Climate Protection Act are among Congress' efforts to promote research and understanding of global warming. Despite these laws, there are no regulatory measures to reduce greenhouse gas emissions. Thus far, the Environmental Protection Agency's ("EPA") implementation of the Clean Air Act has also failed to regulate carbon dioxide emissions. In 2007, the Supreme Court ordered EPA to determine if carbon dioxide may endanger public welfare and therefore must be regulated under the Clean Air Act. *Mass. v. EPA*, Slip Opinion 05-1120 (2007). This ruling could mark the beginning of greenhouse gas regulation in the United States or could prompt new legislative action on regulation of greenhouse gas emissions. Nonetheless, at present the current regulatory mechanisms are inadequate to abate greenhouse gas emissions. The absence of regulatory mechanisms in the United States to address global warming means that greenhouse gas concentrations in the atmosphere will continue to increase and threaten the existence loggerhead sea turtles.

2. International Law

International sea turtle protections also fall short of preventing the decline of the loggerheads. As mentioned previously, loggerhead sea turtles are listed in Appendix 1 of CITES. However, CITES protections have not sufficiently slowed or stopped the precipitous decline of the northern Pacific population of the loggerhead or other related populations. While beneficial to the species, conservation actions under CITES are incomplete. CITES largely controls the import and export of endangered wildlife, but since loggerheads are primarily threatened by inadvertent bycatch rather than taken for trade, CITES provides little relief for the North Pacific loggerheads. ESA listing, however, strengthens the measures taken by the CITES parties. *See* 69 Fed. Reg. 21436. In the past, the United States has listed under the ESA species already protected under CITES. While actions taken by CITES parties to reduce illegal trade are helpful they are incomplete and bycatch continues to be a serious problem. Listing can strengthen the conservations measures in place and increase information about the species.

In Japan, there are limited and recent efforts to protect nesting beaches. Although efforts to protect loggerhead nests in Japan are beneficial, anthropogenic and natural threats to the North Pacific loggerhead continue (NMFS 2005). Japanese national law protects sea turtles on the beach but other laws ensure unblocked beach access thus frustrating protections (WPRFMC 2007).

Loggerheads are also exposed to a series of offshore fisheries throughout their migration across the Pacific Ocean (NMFS 2005). Additionally, incidental bycatch and illegal harvest remains a problem even where fisheries are regulated to minimize interactions with sea turtles.

Even if other threats are managed, global warming will likely continue to pose a threat to the North Pacific loggerhead. At present, international efforts provide inadequate regulatory mechanisms to address the threats that global warming poses to the North Pacific loggerhead sea turtles. The primary international regulatory mechanisms addressing global warming are the United Nations Framework Convention on Climate Change ("UN Framework") and the Kyoto Protocol.

The UN Framework assigned parties to the treaty different responsibilities to address climate change depending on their level of economic development. The most developed countries set a goal to return to 1990 emission levels by 2000 however, this was not a binding requirement. Lesser-developed countries agreed to respond to climate change. The non-binding nature of the UN Framework makes it insufficient to address global warming. So far, it has not effectively controlled greenhouse gas emissions.

While the Kyoto Protocol is a significant step forward towards the regulation of greenhouse gases it is inadequate to protect the loggerheads and the habitat upon which it depends. First, the Protocol's overall emissions targets are highly unlikely to be met, due in large part to the refusal of the United States to ratify the agreement. The United States is one of the largest contributors to greenhouse gases and therefore its participation is essential to stabilize greenhouse gas emissions. Second, even if the Kyoto Protocol targets were met, they are too modest to impact greenhouse gas concentrations and global warming to ensure the conservation of sea turtles. Even in the unlikely event that the Kyoto Protocol targets were fully met by the year 2012, emissions rates would only be reduced, not stabilized. With 2012 approaching rapidly, it is unlikely that the reductions needed will come to fruition and there are no existing regulatory mechanisms governing emissions beyond that year.

For the reasons discussed above, existing regulatory mechanisms both domestically and internationally that relate to fishing and global warming are inadequate to ensure the continued survival of the North Pacific loggerhead sea turtle.

In light of the five listing criteria for endangered species listing, longline fishing is a sufficient threat to the survival of the northern Pacific population of loggerheads to warrant listing of this population as an endangered species. In addition to the longline threat, the other five criteria are met to a certain degree with global warming posing a significant future threat to the species. NMFS must consider uplisting the North Pacific loggerheads to ensure their conservation and recovery.

VII. CRITICAL HABITAT

The ESA mandates that, when NMFS lists a species as endangered or threatened, the agency must also concurrently designate critical habitat for that species. Section 4(a)(3)(A)(i) of the ESA states that, "to the maximum extent prudent and determinable," NMFS:

shall, concurrently with making a determination . . . that a species is an endangered species or threatened species, designate any habitat of such species which is then considered to be critical habitat

16 U.S.C. § 1533(a)(3)(A)(i); see also *id.* at § 1533(b)(6)(C). The ESA defines the term "critical habitat" to mean:

i. the specific areas within the geographical area occupied by the species, at the time it is listed . . . , on which are found those physical or biological features (I) essential to the conservation of

the species and (II) which may require special management considerations or protection; and

ii. specific areas outside the geographical area occupied by the species at the time it is listed . . . , upon a determination by the Secretary that such areas are essential for the conservation of the species.

Id. at § 1532(5)(A).

Petitioners expect that NMFS will comply with this unambiguous mandate and designate critical habitat concurrent with the listing of the North Pacific loggerhead sea turtle. We believe that all state and federal waters and EEZ utilized by the species for foraging off Hawai'i and the U.S. West Coast meet the criteria for designation as critical habitat and must therefore be designated as such.

VIII. CONCLUSION

The North Pacific population of loggerhead sea turtles requires special protection as an endangered DPS under the ESA. This population is clearly distinct, significant, and decreasing in size, while the numerous threats to this population also necessitate changing its status from “threatened” to “endangered”.

Management of this population as a separate entity is critical to its conservation. It is a discrete and significant population segment because it is genetically distinct and reproductively isolated from other populations of loggerheads. It has a unique physiology and it inhabits a specific range. Females exhibit fidelity to nesting beaches in the Japanese archipelago and this population travels across the northern Pacific to forage off the West Coast of the U.S. Loss of this population would be significant — diminishing genetic diversity of loggerheads and constricting the range substantially by eliminating loggerheads in the northern hemisphere in the Pacific.

The North Pacific loggerhead sea turtle is at a critical juncture between forced extinction and future existence. Federal law requires NMFS to list any species in danger of extinction in all or a significant portion of its range. 16 U.S.C. § 1533(a)(1). If the pelagic longline fishing industry, and other fisheries continues to kill thousands of North Pacific loggerhead sea turtles every year, then this species is surely doomed. Delaying protection of this species until its population decline is more substantial will only undermine any future conservation efforts. The primary threat of longline fishing is adequate to warrant uplisting this population to an endangered species. Moreover, other threats such as global warming and habitat degradation further threaten the North Pacific loggerhead.

The data presented in this petition and supporting documents about the North Pacific loggerhead sea turtle demonstrates that a positive 90-day finding is warranted and NMFS should promptly conduct a status review for this distinct population segment.

IX. IN THE ALTERNATIVE, THE PACIFIC POPULATION OF LOGGERHEAD SEA TURTLES SHOULD BE LISTED AS AN ENDANGERED DISTINCT POPULATION SEGMENT

This Petition requests that NMFS separately list, and reclassify from a threatened to an endangered species, the North Pacific distinct population segment of the loggerhead sea turtle (*Caretta caretta*) and to designate critical habitat to ensure its recovery. The case for such reclassification is made in the body of this Petition. Alternatively, in the event NMFS determines that the North Pacific population of loggerhead sea turtles does not constitute a distinct population segment, Petitioners request that NMFS separately list, and reclassify from a threatened to an endangered species, the entire population of loggerhead sea turtles in the Pacific Ocean as a distinct population segment and designate critical habitat to ensure its recovery.

NMFS cannot reasonably conclude that the North Pacific loggerheads are not sufficiently imperiled to qualify as “endangered” under the ESA. We also believe that North Pacific loggerheads constitute a distinct population segment as they are both “discrete” from all other loggerheads and “significant” to the taxon as a whole. However, in the event that NMFS concludes that North Pacific loggerheads are either not “discrete” or not “significant,” we request that NMFS analyze whether all Pacific loggerheads collectively constitute a “discrete” and “significant” listable entity and whether such entity warrants uplisting to endangered from the current threatened status maintained by the species as a whole.

A. Pacific Loggerheads Constitute a Distinct Population Segment

The Pacific loggerheads are separated by a land mass from the Atlantic loggerheads. These populations are genetically distinct and have many other factors that constitute discreteness and significance as described above.

At a minimum, Pacific and Atlantic populations of loggerhead sea turtles should be separately listed under the ESA. NMFS has already informally recognized the dissociated oceanic populations of Pacific and Atlantic loggerheads as separate by drafting individual recovery plans and treating them as different management units with different genetic makeup (NMFS, ESA BiOp, 2004). In particular, genetic evidence proves that these loggerhead populations are distinct due to the female nesting site fidelity and migratory patterns, and large oceanic gaps between the two ocean basins (Bowen, 1993). Additionally, these loggerhead populations are significant because they extend the range of the overall loggerhead population in the Pacific and Atlantic. If either were extirpated, reestablishment of populations in the extirpated basin by members of the other oceanic basin could possibly depend on a rare colonization effect possibly enhanced by glacial cycles (Bowen, 1993; Bowen correspondence, 2005); such a possibility is unreasonable in the context of their small numbers and human pressures. Nonetheless, the sensitive populations continue to decline in the absence of heightened protection.

In previous recovery plans, status reviews, listing determinations, and biological opinions NMFS has repeatedly concluded that loggerheads in the Pacific constitute a distinct population segment that should be treated separately for management purposes. For example, in the biological opinion for the West Coast Highly Migratory Species Fisheries Management Plan (NMFS 2004), NMFS acknowledged that the “loss of sea turtle populations in the Pacific Ocean would result in a significant gap in the distribution of each turtle species, thus making these populations

biologically significant.” Similarly in making a negative 12-month finding on a petition to uplist certain populations of the loggerhead in the Atlantic, NMFS acknowledged that the "best available information indicates that the populations are separated across these large oceanic expanses." 68 Fed. Reg. 178 at 53948 (NMFS & FWS, Endangered and Threatened Wildlife and Plants; 12 Month Finding on a Petition to List the Northern and Florida Panhandle Loggerhead Sea Turtle (*Caretta caretta*) Subpopulations as Endangered (Sept. 13, 2003); *see also* NMFS & FWS, *Recovery Plan for the U.S. Pacific Populations of the Loggerhead Turtle* (1998)).

Given that NMFS has previously recognized that Pacific loggerheads are both “discrete” and “significant” it would be arbitrary and capricious to deny that the Pacific loggerhead constitutes a distinct population segment.

B. Status of the South Pacific Population of Loggerheads

Unfortunately, southern Pacific loggerheads are faring no better than their North Pacific counterparts. As such all loggerheads in the Pacific Ocean basin clearly meet the statutory requirements for reclassification as “endangered” under the ESA. Even when combined with North Pacific loggerheads, the overall Pacific population of loggerheads is dangerously small and rapidly declining. Given that the status and threats to the northern population were previously articulated, this Section focuses on the status of the South Pacific population.

The southern population of loggerheads nest primarily in Australia and New Caledonia. They forage throughout the South Pacific and the Indian Ocean. The southern population of loggerheads has dramatically declined. Additionally, in the southern areas of the Great Barrier Reef, the other significant nesting area of South Pacific populations, scientists have reported an annual decline of 8 percent since the mid-1980s (NMFS, ESA BiOp, 2004). Declines in Australia are quantified at 50-80 percent since the 1970's (Limpus, 1995).

Loggerheads originating from eastern Australia nest on nearly all beaches along the mainland and large barrier sand islands from South Stradbroke Island (27.6°S) northwards to Bustard Head (24.0°S) and islands of the Capricorn Bunker Group and Swain reefs in the southern Great Barrier Reef and on Bushy Island in the central Great Barrier Reef. Within this area, there are five major rookeries which account for approximately 70 percent of nesting loggerheads in eastern Australia. Long-term census data has been collected at some rookeries since the late 1960s and early 1970s, and nearly all the data show marked declines in nesting populations since the mid-1980s (Limpus and Limpus, 2003). In eastern Australia, Limpus and Riemer (1994) reported an estimated 3,500 loggerheads nesting annually during the late 1970s. Since that time, there has been a substantial decline in nesting populations at all sites. Currently, less than 500 female loggerheads nest annually in eastern Australia, representing an 86 percent reduction within less than one generation (Limpus and Limpus, 2003). In Queensland, one of the main nesting sites in the South Pacific, only 300 loggerheads now return annually to nest (Dobbs, 2002). The largest nesting site, Wreck Island, has exhibited a decline of 70 to 90 percent in the last few decades. *Id.*

The decline of loggerheads in Australia can generally be attributed to incidental catch in trawl, net and drumline fisheries, boat strikes, ingestion/ entanglement of marine debris, and fox

predation of mainland nests (Dobbs, 2002). However, the dramatic decline since the 1970s is primarily the result of incidental catch in longline fisheries (Limpus, 1995).

In New Caledonia, loggerheads are the most common nesting sea turtle in the Île de Pins area of southern New Caledonia, yet there is no quantitative information available, and surveys in the late 1990s failed to locate regular nesting. However, anecdotal information from locals indicate that there may be more substantial loggerhead nesting occurring on peripheral small coral cays offshore of the main island. Limpus and Limpus (2003) estimate that the annual nesting population in the Île de Pins area may be in the “tens or the low hundreds.”

Scattered loggerhead nesting has also been reported on Papua New Guinea, New Zealand, and Indonesia (NMFS and USFWS, 1998d); however, Limpus and Limpus (2003) state that reports have not been confirmed, and in some cases, sea turtles species have been misidentified.

Overall, loggerhead populations throughout the Pacific have continued in a steep decline. The Pacific Ocean is home to the smallest population of loggerhead sea turtles. The survival of which will depend on managing the key threats to sea turtles in this ocean basin.

C. Threats to the Pacific Population of Loggerheads

The entire Pacific population of loggerhead sea turtles are in trouble and on a trajectory toward extinction. The entire Pacific population of nesting females has declined 80 percent in just 20 years and it continues to decline (Lewison 2007). In light of the five listing criteria in the ESA, the Pacific population warrants listing as an endangered species.

Threats to the Pacific population are detailed above because the North Pacific population is a subset of the entire Pacific population. This discussion makes clear that longline fishing, gillnet fishing, and other fisheries take a substantial number of loggerhead sea turtles. This factor alone is sufficient to warrant listing the Pacific loggerheads as an endangered species. In addition to the threats to the North Pacific population enumerated above, there are additional threats to the South Pacific population that should be accounted for when considering the status of the entire Pacific population of loggerheads. NMFS and FWS described many of the threats to the Pacific loggerheads in the Recovery Plan developed for the Pacific loggerheads (NMFS, FWS, 1998).

Fisheries bycatch has been the most significant factor in South Pacific mortality rates (Limpus *et al.*, 2003). The prawn trawling industry in Australia is one of the main culprits. In an attempt to mitigate this take, the Australian government has enacted regulations requiring the use of Turtle Exclusion Devices in all trawl nets in eastern Queensland fisheries. *Id.* While these devices reduce some loggerhead mortality, they do not protect all turtles equally because even nets with turtle excluder devices can retain and drown larger turtles while smaller turtles pass through the opening. Even with the use of Turtle Exclusion Devices in trawl nets, the Pacific populations of loggerhead sea turtles require greater protection than they are currently receiving. Other sources of mortality include drowning in Australian otter trawl fisheries and incidental capture in longline fisheries operating in the South Pacific, including the southeast Pacific (Squires & Dutton, 2003).

Habitat modification is a significant factor that puts all Pacific loggerheads at risk of extinction. In addition to the risks to Japanese nesting beaches, nesting beaches in Australia and New Caledonia are at risk from coastal development and pollution. As described above, beach nourishment, recreation on beaches, driving on beaches, lighting of beaches and other modification to beaches can reduce the success of loggerhead reproduction as important nesting beaches are lost or nests are disturbed. Moreover, global warming poses an overarching threat to the entire Pacific population of loggerheads. As detailed above, sea level rise, warming temperatures, and other effects of global warming threaten the habitat and lifecycle of Pacific loggerheads.

These and other threats meet the listing criteria of the ESA. The threats to the entire Pacific population mirror those of the North Pacific population. While it is most prudent to manage the North Pacific and the South Pacific as separate distinct population segments, if NMFS declines to classify the North Pacific population as a distinct population segment then it must find that the Pacific population is a distinct population segment. Already, NMFS, in its recovery plans and other documents, has found that the Pacific and Atlantic loggerheads are discrete and require separate management. Petitioners request, in the alternative to listing the North Pacific population, that NMFS and uplist the Pacific Ocean loggerheads as endangered under the ESA and designate their critical habitat.

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