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Re: Petition Pursuant to the Endangered Species Act to Designate the Western North Atlantic Subpopulations of the Loggerhead Sea Turtle (*Caretta caretta*) as a Distinct Population Segment and to Reclassify the Western North Atlantic Subpopulations as Endangered

Dear Secretary Gutierrez, Dr. Hogarth, Secretary Kempthorne, and Mr. Hall:

Loggerhead sea turtles (*Caretta caretta*) in the western North Atlantic are in grave peril. We are privileged, in the United States, to be home to one of the world’s largest breeding populations of these beautiful and majestic creatures, yet we are also guilty of heedlessly burdening them with so many injuries that their numbers have plummeted to alarming and historic lows.

There are many well-known threats faced by these sea turtles on U.S. land and in U.S. waters, as well as throughout the Atlantic basin. It used to be thought that the most dangerous threats were human hunting of sea turtle eggs and loss of nesting habitat from coastal development. Over the years has come the widespread recognition that, in fact, the staggering toll taken by the incidental catch from commercial fishing is even more significant. Now we are coming to realize that the impacts of global warming pollutants are placing even more stress on this already significantly declining population, including further loss of nesting habitat from rising sea levels. This bad news is reflected by the latest Government review of the loggerhead’s status, showing a steep and significant decline in the nesting populations along the southeastern U.S. coast that represents the vast majority of the nesting in the Atlantic Ocean. In 2007, the Florida Fish and Wildlife Conservation Commission reported the fewest loggerhead nests in nearly two decades.¹

To address these and other threats, Oceana and the Center for Biological Diversity (“Petitioners”) hereby request, pursuant to Section 4(b) of the Endangered Species Act, 16 U.S.C. §1533(b), Section 553(3) of the Administrative Procedure Act, 5 U.S.C. § 553(e), and 50 C.F.R. §424.14(a), that you recognize the body of scientific evidence showing the discrete and significant characteristics of the western North Atlantic subpopulations and designate them as a discrete population segment. In addition, to recognize the extreme danger of extinction currently facing the western North Atlantic loggerhead, and to act to avoid extinction and begin the process of recovery, Petitioners request that you list the western North Atlantic distinct population segment as endangered and designate critical habitat for it.²

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¹ Florida Fish and Wildlife Conservation Commission, Long-Term Monitoring Program Reveals a Continuing Loggerhead Decline, Increases in Green Turtle and Leatherback Nesting, available at http://research.myfwc.com/features/view_article.asp?id=27537 (last visited Nov. 11, 2007).

² A CD containing copies of all scientific sources cited has been submitted along with the hard copy of this petition.

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BACKGROUND

In this background section, we set forth a description of the Petitioners and their interest in protecting the western North Atlantic loggerhead sea turtle as well as the key scientific information concerning the western North Atlantic loggerhead sea turtle and the current condition of its population that supports the requests in this petition.

I. PETITIONERS

Oceana is a non-profit international advocacy organization dedicated to protecting and restoring the world's oceans through policy, advocacy, science, law, and public education. Oceana has over 280,000 members and supporters around the world. Oceana is organized under the laws of the District of Columbia, and maintains its headquarters in Washington, D.C. It has offices or staff in five states (Alaska, California, Massachusetts, New York, and Oregon) and three foreign countries (Chile, Belgium, and Spain). Through its policy, scientific, litigation, and grass-roots activities, Oceana has been a prominent advocate for protecting threatened and endangered marine species and marine ecosystems. Many of Oceana's members enjoy the esthetic pleasure of observing loggerhead sea turtles, study them as scientists, and/or work to protect their nesting areas and save them when they are stranded. Oceana has worked for years to protect the interests of its members in conserving and recovering loggerhead sea turtles, including defending the closure to longline fishing on the Grand Banks, advocating to enlarge the size of Turtle Excluder Devices, and advocating to improve the monitoring of sea turtle bycatch in U.S. Atlantic trawl and dredge fisheries.

The Center for Biological Diversity is a national 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. 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.

Oceana and The Center submit this petition on behalf of themselves and their adversely affected members.

II. NATURAL HISTORY

In this section, we present the taxonomy of the western North Atlantic loggerhead sea turtle and describe its physical and behavioral characteristics.

A. Taxonomy

The loggerhead sea turtle was formally described and classified by Linnaeus in 1758, who named it *Testudo caretta*.³ While a variety of names have been applied to the species over the years, there is now general agreement that the species should be termed *Caretta caretta*.⁴ There is only one species of loggerhead: the genus *Caretta* is considered monotypic (containing a single species).⁵ While there is only one species, there are multiple genetically distinct nesting populations: North Atlantic loggerheads are genetically distinguished from the South Atlantic, Pacific, and Indian Ocean loggerheads.⁶ Loggerheads from the western Atlantic are also genetically distinct from the nesting population in the Mediterranean.⁷

B. Physical Description

The loggerhead's carapace (the shell on top of the body) is reddish-brown in color while the plastron (the bottom of the body) is a pale yellow.⁸ The neck and flippers are brownish on top and yellow on the sides and bottom.⁹ The carapace is composed of five costal (riblike) scutes (bony plates).¹⁰ Loggerheads have a large head and powerful jaw which assist them in consuming their preferred prey of mollusks and crustaceans.¹¹ Loggerheads also have large flippers that aid them in long migrations.¹² Male loggerheads are larger than females with a larger head and carapace, and a longer tail.¹³

Loggerheads from different continental nesting populations are morphologically distinct.¹⁴ The largest nesting females are found in the Atlantic Ocean, followed by those in the

³ NATIONAL MARINE FISHERIES SERVICE OFFICE AND U.S. FISH AND WILDLIFE SERVICE, RECOVERY PLAN FOR U.S. POPULATION OF LOGGERHEAD TURTLE 1 (1991).

⁴ *Id.*

⁵ Brian W. Bowen, *What is a Loggerhead Turtle? The Genetic Perspective*, in LOGGERHEAD SEA TURTLES 7, 8 (A.B. Bolten & B.E. Witherington eds., Smithsonian Institution Press, 2003).

⁶ Brian W. Bowen et al., *Global phylogeography of the loggerhead turtle (Caretta caretta) as indicated by mitochondrial DNA haplotypes*, 48(6) EVOL. 1820, 1825-1826 (1994); Bowen, *supra* note 5, at 11-12; NATIONAL MARINE FISHERIES SERVICE OFFICE OF PROTECTED RESOURCES AND U.S. FISH AND WILDLIFE SERVICE SOUTHEAST REGION, LOGGERHEAD SEA TURTLE (*CARETTA CARETTA*) 5-YEAR REVIEW: SUMMARY AND EVALUATION 16-17 (2007).

⁷ Brian W. Bowen et al., *Population structure of loggerhead turtles (Caretta caretta) in the Northwestern Atlantic Ocean and Mediterranean Sea*, 7(4) CONSERV. BIO. 834, 841 (1993); NATIONAL MARINE FISHERIES SERVICE OFFICE OF PROTECTED RESOURCES AND U.S. FISH AND WILDLIFE SERVICE SOUTHEAST REGION, *supra* note 6, at 17.

⁸ NATIONAL MARINE FISHERIES SERVICE AND U.S. FISH AND WILDLIFE SERVICE, *supra* note 3, at 1.

⁹ *Id.*

¹⁰ *Id.*

¹¹ *Id.*

¹² Naoki Kamezaki, *What is a Loggerhead Turtle?*, in LOGGERHEAD SEA TURTLES 28, 31 (2003).

¹³ *Id.* at 36-37.

¹⁴ *Id.* at 38-40.

Indian and Pacific Oceans, and those of the Mediterranean.¹⁵ In the southeastern United States, adult loggerheads weigh an average of 250 lbs., with a corresponding average straight carapace length of 36 inches.¹⁶

C. Distribution

Loggerhead sea turtles can be found in the temperate and tropical regions of the Pacific, Atlantic (including the Mediterranean), and Indian Oceans, where they inhabit many different ocean habitats, including open ocean waters, continental shelves, bays, lagoons, and estuaries.¹⁷ In the western North Atlantic, most loggerhead nests are found along the southeastern coast of the United States from North Carolina to Florida.¹⁸ Other important nesting beaches in the western North Atlantic include the eastern Yucatan Peninsula, Cay Sal Bank in the Bahamas, the southwestern coast of Cuba, the coasts of Central America, Colombia, Venezuela, and the eastern Caribbean Islands.¹⁹ In the western south Atlantic, loggerheads nest in Brazil, while in the eastern Atlantic, loggerheads nest in the Cape Verde Islands and along the west coast of Africa.²⁰

D. Life History

Loggerheads start out as eggs in a nest on a sandy beach. Once they hatch, they find the water by moving toward areas of bright light and low elevation, and away from silhouettes of elevated objects, such as trees or dunes that line the landward side of the beach.²¹ The tiny hatchlings crawl across the beach and, if they can avoid the predators and are not disoriented by artificial lights, they swim into the waves, which guide the turtles away from the land toward the open sea.²² The loggerhead hatchlings then enter a period known as the “swim frenzy”, during which they leave U.S. beaches and head for the Gulf Stream, which carries them to the Sargasso Sea, where they take up residence.²³ The Sargasso Sea is a 700-mile wide, 2,000-mile long stretch of the North Atlantic, surrounded by the ocean currents of the North Atlantic gyre²⁴ (including the Gulf Stream), and marked on its western boundary by the island of Bermuda. The Sargasso Sea is home to large floating mats of sargassum seaweed.

¹⁵ *Id.* at 38.

¹⁶ NATIONAL MARINE FISHERIES SERVICE AND U.S. FISH AND WILDLIFE SERVICE, *supra* note 3, at 1.

¹⁷ KENNETH C. DODD, U.S. FISH WILDL. SERV., BIOL. REP., SYNOPSIS OF THE BIOLOGICAL DATA ON THE LOGGERHEAD SEA TURTLE *CARETTA CARETTA* (LINNAEUS 1758) 16 (1988).

¹⁸ NATIONAL MARINE FISHERIES SERVICE OFFICE OF PROTECTED RESOURCES AND U.S. FISH AND WILDLIFE SERVICE SOUTHEAST REGION, *supra* note 6, at 19.

¹⁹ *Id.*

²⁰ *Id.*

²¹ Kenneth J. Lohmann & Catherine M.F. Lohmann, *Orientation Mechanisms of Hatchling Loggerheads*, in *LOGGERHEAD SEA TURTLES* 44, 45-47 (2003).

²² *Id.* at 47.

²³ NATIONAL MARINE FISHERIES SERVICE AND U.S. FISH AND WILDLIFE SERVICE, *supra* note 3, at 4.

²⁴ A great circular current moving clockwise from one side of the North Atlantic basin to the other.

After a few months, the loggerheads enter the juvenile life stage²⁵ and leave the sargassum to follow the North Atlantic gyre north and east to Europe, and then south to the waters of the Mediterranean Sea and the Atlantic Ocean off of southern Europe and the Azores.²⁶ By the age of 8 to 12 the loggerheads migrate back to the near-shore waters of the eastern United States. These juvenile loggerheads occupy the waters of the continental shelf from Cape Cod Bay, Massachusetts, south to Florida, Cuba, the Bahamas, and the Gulf of Mexico.²⁷ Estuarine waters are very important inshore habitat for juvenile loggerheads. Both neritic juveniles and foraging adults occupy the neritic zone.²⁸ Neritic juveniles are active foragers, feeding mainly on the ocean bottom.²⁹

While western North Atlantic loggerheads can reach maturity between the ages of 12-30, most probably do not reach breeding age until they are in the older end of the age range.³⁰ Reproductively mature adults leave the close-in shore areas to migrate to the breeding waters close to the nesting beaches.³¹

E. Foraging Ranges and Feeding Behavior

Western North Atlantic loggerheads are found foraging along the entire continental shelf of the eastern coast of the United States as well as the warmer waters of the Gulf of Mexico.³² Both immature loggerheads and adults forage in the western North Atlantic, with larger immature loggerheads found further south and adults occupying deeper, offshore areas.³³ During the warmer months, loggerheads occupy the New England, Mid-Atlantic, and upper southeastern coastal waters of the United States.³⁴ Loggerheads move south to the offshore shelf waters of central and southern Florida during the colder months.³⁵ Loggerhead foraging is widely dispersed year round in the Gulf of Mexico, Cuba, the Greater Antilles, and the Bahamas.³⁶

Loggerhead food preferences vary by life stage, season, and geographic region.³⁷ Post-hatchling loggerheads begin feeding on macroplankton³⁸ and fragments of crustaceans found

²⁵ Alan B. Bolten, *Active Swimmers – Passive Drifters: The Oceanic Juvenile Stage of Loggerheads in the Atlantic System*, in *LOGGERHEAD SEA TURTLES* 63, 65 (2003).

²⁶ *Id.* at 69.

²⁷ NATIONAL MARINE FISHERIES SERVICE OFFICE OF PROTECTED RESOURCES AND U.S. FISH AND WILDLIFE SERVICE SOUTHEAST REGION, *supra* note 6, at 19.

²⁸ Bolten, *supra* note 25, at 66. “Neritic” refers to the nearshore marine zone.

²⁹ *Id.*

³⁰ Nat B. Frazer & Llewellyn M. Ehrhart, *Preliminary growth models for green, Chelonia mydas, and loggerhead sea turtles*, 1 *COPEIA* 73, 73 (1985).

³¹ NATIONAL MARINE FISHERIES SERVICE AND U.S. FISH AND WILDLIFE SERVICE, *supra* note 3, at 4-5.

³² Sally R. Hopkins-Murphy et al., *Ecology of Immature Loggerheads on Foraging Grounds and Adults in Interesting Habitat in the Eastern United States*, in *LOGGERHEAD SEA TURTLES* 79, 83 (2003).

³³ *Id.*

³⁴ Llewellyn Ehrhart et al., *Loggerhead Turtles in the Atlantic Ocean: Geographic Distribution, Abundance, and Population Status*, in *LOGGERHEAD SEA TURTLES* 157, 168 (2003).

³⁵ NATIONAL MARINE FISHERIES SERVICE OFFICE OF PROTECTED RESOURCES AND U.S. FISH AND WILDLIFE SERVICE SOUTHEAST REGION, *supra* note 6, at 20.

³⁶ NATIONAL MARINE FISHERIES SERVICE AND U.S. FISH AND WILDLIFE SERVICE, *supra* note 3, at 5.

³⁷ *Id.* at 3; Hopkins-Murphy et al., *supra* note 32, at 84-85.

within the *Sargassum* raft community.³⁹ As loggerheads age, their dietary preferences change to include crabs, mollusks, fish, echinoderms, and various invertebrates.⁴⁰ Analysis of fecal samples and gut contents of loggerheads foraging within the neritic zone of the eastern United States and the Gulf of Mexico reveals that the primary food selections are benthic invertebrates, especially hard-shelled arthropods and mollusks such as crabs and whelks.⁴¹

Loggerheads' omnivorous feeding includes scavenging near fishing vessels, where the sea turtles are susceptible to bycatch.⁴² Loggerheads eat bait on hooks and get caught, follow prey into fishing nets, or become entangled in fishing lines. Loggerheads may also be forced into, or otherwise injured by, bottom-tending nets and dredges that sweep over their benthic foraging areas.⁴³

F. Western North Atlantic Breeding Behavior and Nesting Populations

Western North Atlantic loggerheads remain in the western North Atlantic for nesting and foraging. Such fidelity to nesting beaches and foraging areas generally separates western North Atlantic loggerheads from other Atlantic populations and inhibits interbreeding.

Western North Atlantic loggerheads primarily breed and nest in the waters off the eastern coast of the United States from North Carolina to Florida and on the coastal beaches. Every two to three years after reaching maturity, adult loggerheads migrate from the foraging grounds to their nesting beaches, where they mate from late March to early June.⁴⁴ From April through September, the females swim ashore at night to lay their eggs, though most egg laying in the southeastern United States happens during June and July.⁴⁵ Female loggerheads can nest between 1 and 7 times per season, with an average internesting period of 14 days.⁴⁶ The females lay a clutch of between 100 and 126 eggs.⁴⁷ Ambient temperatures during incubation determine the sex of hatchlings. Within hours of emerging from the eggs, the hatchlings imprint on a characteristic of their natal beach, thus allowing the older, sexually mature female sea turtle to return to the same beach to lay her eggs.⁴⁸ Tag and recapture studies have verified that most

³⁸ Any free-floating organism in the pelagic zone that is 2-20cm in length (*e.g.* gastropods such as snails and sea butterflies). John Sieburth et al., *Pelagic Ecosystem Structure: Heterotrophic Compartments of the Plankton and Their Relationship to Plankton Size Fractions*, 23(6) *LIMNOLOGY AND OCEANOGRAPHY* 1256, 1261-2 (1978).

³⁹ NATIONAL MARINE FISHERIES SERVICE AND U.S. FISH AND WILDLIFE SERVICE, *supra* note 3, at 2-3.

⁴⁰ Hopkins-Murphy et al., *supra* note 32, at 85.

⁴¹ *Id.* at 84-85; NATIONAL MARINE FISHERIES SERVICE AND U.S. FISH AND WILDLIFE SERVICE, *supra* note 3, at 3.

⁴² NATIONAL MARINE FISHERIES SERVICE AND U.S. FISH AND WILDLIFE SERVICE, *supra* note 3, at 10-4.

⁴³ NATIONAL MARINE FISHERIES SERVICE OFFICE OF PROTECTED RESOURCES AND U.S. FISH AND WILDLIFE SERVICE SOUTHEAST REGION, *supra* note 6, at 36-7.

⁴⁴ A.B. Meylan, *Sea Turtle Migration—evidence from tag returns*, in *BIOLOGY AND CONSERVATION OF SEA TURTLES* 91, 92 (Karen A. Bjorndal ed., rev. ed., Smithsonian Institution Press, 1995); Bowen, *supra* note 7, at 835; NATIONAL MARINE FISHERIES SERVICE AND U.S. FISH AND WILDLIFE SERVICE, *supra* note 3, at 3-4.

⁴⁵ NATIONAL MARINE FISHERIES SERVICE AND U.S. FISH AND WILDLIFE SERVICE, *supra* note 3, at 4.

⁴⁶ *Id.*; Dodd, *supra* note 17, at 35.

⁴⁷ NATIONAL MARINE FISHERIES SERVICE AND U.S. FISH AND WILDLIFE SERVICE, *supra* note 3, at 4.

⁴⁸ Kenneth J. Lohmann et al., *Orientation, Navigation, and Natal Beach Homing in Sea Turtles*, in *THE BIOLOGY OF SEA TURTLES* 107, 125-6 (Peter L. Lutz and John A. Musick eds., CRC Press 1997).

female loggerhead turtles return to the same nesting beaches, usually the beaches where they hatched.⁴⁹

Nesting females' high degree of site fidelity results in genetically distinct populations.⁵⁰ Thus, loggerhead populations are identified based on geographically isolated nesting assemblages.⁵¹ The high nesting site fidelity leads to low maternal gene flow between nesting assemblages, creating genetic subdivisions among regions and ocean basins.⁵² Female loggerheads are essential for carrying genes.⁵³ If the females were eliminated, the corresponding nesting population would become extinct.⁵⁴ Consequently, nesting populations must be considered demographically independent for management purposes.⁵⁵ If an assemblage were extirpated, repopulation of the beach through regional dispersal would require thousands of years.⁵⁶

The Turtle Expert Working Group⁵⁷ identified five different nesting assemblages⁵⁸ of western North Atlantic loggerhead sea turtles,⁵⁹ based on a review of genetic studies of loggerheads' mitochondrial DNA, which is inherited only from the mother.⁶⁰ Natal homing of females has established and maintained the mitochondrial DNA differences among the nesting assemblages.⁶¹ The five nesting assemblages are the Northern subpopulation, occurring from North Carolina to northeast Florida; the South Florida subpopulation, occurring from 29° N. latitude on the east coast to Sarasota on the west coast; the Florida Panhandle subpopulation; the Yucatan subpopulation from the eastern Yucatan Peninsula, Mexico; and the Dry Tortugas

⁴⁹ Bowen, *supra* note 7, at 835.

⁵⁰ Alan B. Bolten et al., *Transatlantic developmental migrations of loggerhead sea turtles demonstrated by mtDNA sequence analysis*, 8(1) ECOL. APP. 1, 2 (1998).

⁵¹ Bowen, *supra* note 6, at 1821.

⁵² *Id.* at 1825.

⁵³ J.C. Avise *Mitochondrial DNA polymorphism and a connection between genetics and demography of relevance to conservation*, 9 CONSERVATION BIOLOGY 686, 686 (1995); Brian W. Bowen et al., *Conservation implications of complex population structure: lessons from the loggerhead turtle*, 14 MOL. ECOL. 2389-2390 (2005).

⁵⁴ Bowen *supra* note 53 at 2397.

⁵⁵ Bowen, *supra* note 7, at 835, 841.

⁵⁶ *Id.* at 841.

⁵⁷ A group of scientific advisors to the National Marine Fisheries Service ("Fisheries Service"). TURTLE EXPERT WORKING GROUP, U.S. DEPT. COMMER. NOAA TECH. MEM. FISHERIES SERVICE-SEFSC-444, ASSESSMENT UPDATE FOR THE KEMP'S RIDLEY AND LOGGERHEAD SEA TURTLE POPULATIONS IN THE WESTERN NORTH ATLANTIC xii (2000).

⁵⁸ Also known as subpopulations.

⁵⁹ 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, 68 Fed. Reg. 53947, 53948 (Sept. 15, 2003) (to be codified at 50 C.F.R. pt. 17).

⁶⁰ TURTLE EXPERT WORKING GROUP, U.S. DEPT. COMMER. NOAA TECH. MEM. FISHERIES SERVICE-SEFSC-444, AN ASSESSMENT OF THE KEMP'S RIDLEY (*LEPIDOCHELYS KEMPII*) AND LOGGERHEAD (*CARETTA CARETTA*) SEA TURTLE POPULATIONS IN THE WESTERN NORTH ATLANTIC 47 (1998); TURTLE EXPERT WORKING GROUP, *supra* note 57 at 41; NATIONAL MARINE FISHERIES SERVICE SOUTHEAST FISHERIES SCIENCE CENTER, U.S. DEPT. COMMER. NOAA TECH. MEM. FISHERIES SERVICE-SEFSC-444, STOCK ASSESSMENTS OF LOGGERHEAD AND LEATHERBACK SEA TURTLES AND AN ASSESSMENT OF THE IMPACT OF THE PELAGIC LONGLINE FISHERY ON THE LOGGERHEAD AND LEATHERBACK SEA TURTLES OF THE WESTERN NORTH ATLANTIC 5 (2001).

⁶¹ 68 Fed. Reg. 53948.

subpopulation from the Dry Tortugas (located west of the Florida Keys), Florida.⁶² Most nesting sites for North Atlantic loggerheads are found on the eastern United States coast between North Carolina and Florida.⁶³

The foraging grounds in the western North Atlantic host sea turtles from these nesting subpopulations.⁶⁴ In Florida Bay, for example, most of the loggerheads are from the South Florida subpopulation (84%), with contributions from the Northern subpopulation (8%), the Yucatan subpopulation (8%), and the Florida Panhandle subpopulation (<1%).⁶⁵ With the Florida nesting populations representing the largest numbers of loggerheads, one might expect that the numbers of foraging loggerheads would remain proportional to the number of nesting females.⁶⁶ Contrary to expectation, in the Charleston Harbor feeding population, 50% of the loggerheads were from Georgia/South Carolina and the other 50% were from Florida.⁶⁷ The non-nesting females of the Northern subpopulation remain along the east coast of the United States and those nesting in the Gulf of Mexico remain in the Gulf of Mexico.⁶⁸ Members of the South Florida subpopulation, on the other hand, have been found throughout the Bahamas, Greater Antilles, Cuba, Yucatan, eastern Gulf of Mexico, and southern Florida.⁶⁹ Since the western North Atlantic subpopulations demonstrate preferences in their foraging ground locations, disturbance of these coastal habitats can disrupt the loggerheads' ability to find food.⁷⁰ Because loggerheads exhibit fidelity towards both nesting beaches and feeding areas, both types of habitat must be protected for each subpopulation in order to ensure that subpopulation's survival.

III. Status of the Western North Atlantic Loggerhead Sea Turtle and Efforts to Conserve and Recover Its Population

On July 28, 1978, the loggerhead sea turtle was listed as "threatened" under the Endangered Species Act. The species is 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.

⁶² *Id.*; Not every known nesting beach is included in these nesting assemblages; nesting also occurs or has been known to occur in Honduras, Nicaragua, Columbia, Venezuela, the Bahamas, Cuba, Jamaica, and Puerto Rico, but the genetic make-up and population size of the nesting members of these beaches has not been adequately studied. TURTLE EXPERT WORKING GROUP, *supra* note 57, at 40.

⁶³ NATIONAL MARINE FISHERIES SERVICE OFFICE OF PROTECTED RESOURCES AND U.S. FISH AND WILDLIFE SERVICE SOUTHEAST REGION, *supra* note 6 at 19.

⁶⁴ NATIONAL MARINE FISHERIES SERVICE SOUTHEAST FISHERIES SCIENCE CENTER, *supra* note 60, at 7.

⁶⁵ *Id.*

⁶⁶ Brian W. Bowen and Stephen A. Karl, *Population genetics, phylogeography, and molecular evolution*, in THE BIOLOGY OF SEA TURTLES 29, 42 (1997);

⁶⁷ *Id.*

⁶⁸ NATIONAL MARINE FISHERIES SERVICE SOUTHEAST FISHERIES SCIENCE CENTER, *supra* note 60, at 8.

⁶⁹ Meylan, *supra* note 44, at 97; NATIONAL MARINE FISHERIES SERVICE SOUTHEAST FISHERIES SCIENCE CENTER, *supra* note 60, at 8.

⁷⁰ Bowen, *supra* note 66, at 42.

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 its survival. CITES requires licensing of imports and exports of certain protected species. Loggerhead sea turtles are included in Appendix 1 of CITES, which lists species threatened with extinction, the CITES classification given to the most imperiled wildlife.

The western North Atlantic population of the loggerhead sea turtle continues to decline. Moreover, the loggerhead’s numbers around the globe are decreasing. The decline of the western North Atlantic population, coupled with continuing threats, puts it at risk of extinction. Nevertheless, the loggerhead’s status has not yet been changed from threatened to endangered in the United States.

A. Historic and Current Abundance and Trends

Loggerhead sea turtles in the western North Atlantic are experiencing a significant population decline. In fact, according to the Government’s own loggerhead five-year review, all of the subpopulations with trend data available in the western North Atlantic are experiencing a decline in their population size.⁷¹ In 2007, the Florida Fish and Wildlife Conservation Commission reported the lowest number of nests among the western North Atlantic loggerhead’s primary nesting beaches in nearly two decades, following a steep decline since 1998.⁷²

Since the Government has not made a strong effort to assess sea turtles in the water, assessments have primarily focused on nesting data. Because it makes up over 90% of the U.S. loggerhead nesting population, the most significant trend is that of the South Florida subpopulation. Since 1998, nesting in that subpopulation has declined by 39.5%.⁷³ These declines are all the more significant, because, until the 2007 status review, they had not been recognized by the Government and Government conservation policy was based on the assumption that this nesting subpopulation was not declining.⁷⁴

From 1983-2005, loggerhead nesting declined at an average annual rate of 1.9% in the Northern subpopulation of North Carolina, South Carolina, and Georgia – a statistically significant trend.⁷⁵ South Carolina exhibited an even larger significant average annual decrease of 3.1 % during 1980-2002.⁷⁶

The Florida Panhandle Nesting Subpopulation had a mean of 910 nests per year from 1995-2006.⁷⁷ This population has declined 6.8% annually from 1995-2005 – a statistically significant trend.⁷⁸

⁷¹ NATIONAL MARINE FISHERIES SERVICE OFFICE OF PROTECTED RESOURCES AND U.S. FISH AND WILDLIFE SERVICE SOUTHEAST REGION, *supra* note 6, at 10-12.

⁷² Florida Fish and Wildlife Conservation Commission, *supra* note 1.

⁷³ *Id.* at 12.

⁷⁴ NATIONAL MARINE FISHERIES SERVICE OFFICE OF PROTECTED RESOURCES AND U.S. FISH AND WILDLIFE SERVICE SOUTHEAST REGION, *supra* note 6, at 10-12; TURTLE EXPERT WORKING GROUP, *supra* note 57, at 50.

⁷⁵ *Id.* at 11.

⁷⁶ *Id.*

⁷⁷ *Id.* at 12.

The Yucatan Nesting subpopulation is also declining.⁷⁹ The loggerheads that once nested in Jamaica have disappeared.⁸⁰

Surveys of the Dry Tortugas Nesting Subpopulation show a mean of 246 nests per year during 1995-2004 (excluding 2002).⁸¹ There has been no recent survey of the Dry Tortugas, so the trend is not known.

B. Threats to Western North Atlantic Loggerhead Sea Turtles

Humans inflict death and injury on loggerhead sea turtles in many ways, on both land and sea. Marine threats include incidental take by fishing vessels, debris entanglement and ingestion, power plant entrapment, and pollution.⁸² Terrestrial threats affecting loggerheads include increased human presence in nesting areas, coastal construction, artificial lighting, and beach “replenishment.”⁸³ Global warming pollutants create numerous additional threats, including warming waters, storms, sea level rise, and ocean acidification.⁸⁴

WESTERN NORTH ATLANTIC LOGGERHEAD SEA TURTLES ARE A DISTINCT POPULATION SEGMENT WHICH MUST BE LISTED AS ENDANGERED UNDER THE ENDANGERED SPECIES ACT AND GIVEN PROTECTION FOR ITS CRITICAL HABITAT

This petition is filed pursuant to Section 4(b) of the Endangered Species Act, 16 U.S.C. §1533(b), Section 553(3) of the Administrative Procedure Act, 5 U.S.C. § 553(e), and 50 C.F.R. §424.14(a). Petitioners request that the Government list the western North Atlantic loggerhead sea turtle as a distinct population segment, reclassify the distinct population segment as endangered, and designate critical habitat. Endangered Species Act jurisdiction over sea turtles is split between the Fisheries Service and the Fish and Wildlife Service pursuant to a Memorandum of Agreement between the agencies.⁸⁵ The Fish and Wildlife Service has jurisdiction over sea turtles on land while the Fisheries Service has jurisdiction over sea turtles at sea.⁸⁶ Therefore, we submit this petition to both agencies (“the Services” or “the agencies”).

This petition sets in motion a specific process, placing definite response requirements on the Services. The Services must issue an initial finding concerning whether the petition “presents substantial scientific or commercial information indicating that the petitioned action

⁷⁸ *Id.*

⁷⁹ *Id.*

⁸⁰ *Id.* at 10.

⁸¹ *Id.* at 12.

⁸² NATIONAL MARINE FISHERIES SERVICE AND U.S. FISH AND WILDLIFE SERVICE, *supra* note 3, at 10-14; ELIZABETH GRIFFIN ET AL., NET CASUALTIES 8 (Oceana 2006).

⁸³ *Id.* at 5-9.

⁸⁴ ELIZABETH GRIFFIN ET AL., CLIMATE CHANGE AND COMMERCIAL FISHING: A ONE-TWO PUNCH FOR SEA TURTLES 4-8 (Oceana 2007).

⁸⁵ *See, e.g.*, Endangered and Threatened Wildlife: Recovery Plans for Listed Sea Turtles, 63 Fed. Reg. 28359, 28359 (May 22, 1998).

⁸⁶ *Id.*

may be warranted.”⁸⁷ The Services must make this initial finding “[t]o the maximum extent practicable, within 90 days after receiving the petition.”⁸⁸ Petitioners need not demonstrate that the petitioned action *is* warranted. Rather, Petitioners need only present information demonstrating that such action *may* be warranted. Because the best available science demonstrates that reclassifying the western North Atlantic distinct population segment of loggerhead sea turtles from threatened to endangered *is* in fact warranted, it follows *a fortiori*, that there can be no reasonable dispute that the available information, including the Services’ own documents, indicates that reclassifying the species as endangered *may* be warranted. Accordingly, the Services 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 Endangered Species Act 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.”⁸⁹ A distinct population segment of a vertebrate species can be protected as a “species” under the Endangered Species Act 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 Endangered Species Act. The Services have promulgated a policy setting forth the criteria for determining a distinct population segment.⁹⁰

Taxonomists recognize the loggerhead sea turtle as a single species, *Caretta caretta*. The Services currently list the species as threatened throughout its range. Nonetheless, the best available science shows that the loggerhead species is comprised of several distinct population segments, some or all of which warrant separate listing under the Endangered Species Act and reclassification from threatened to endangered. This petition seeks separate listing as a distinct population segment, and reclassification as endangered, of the western North Atlantic loggerhead sea turtle. The western North Atlantic loggerhead population is both “discrete” and “significant,” thereby meeting the qualifications for separate listing as a distinct population segment under the Services’ policies. Petitioners also request that critical habitat be designated for the western North Atlantic 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.

I. THE WESTERN NORTH ATLANTIC POPULATION OF LOGGERHEAD SEA TURTLES IS A DISTINCT POPULATION SEGMENT

The western North Atlantic population of loggerhead sea turtles satisfies the criteria of a “distinct population segment” set forth in the Services’ policy statement. Under this policy, once a population segment is found to be both discrete and significant, it is a distinct population segment that may be considered for listing under the Act.⁹¹ A population segment may be

⁸⁷ 16 U.S.C. §1533(b)(3)(A) (2007)

⁸⁸ *Id.*

⁸⁹ 16 U.S.C. § 1532 (16) (2007)

⁹⁰ Policy Regarding the Recognition of Distinct Vertebrate Population Segments under the Endangered Species Act, 61 Fed. Reg. 4722 (Feb. 7, 1996).

⁹¹ *Id.* at 4725.

classified as discrete in relation to the rest of the species with which it is associated.⁹² A discrete population may be classified as biologically or ecologically significant to the larger species.⁹³ Because the western North Atlantic loggerhead sea turtle meets these tests, it should be classified as a distinct population segment.

A. The Western North Atlantic Loggerhead Constitutes a Discrete Population Segment

The western North Atlantic population of loggerhead sea turtles is “discrete.” The Services’ 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.⁹⁴

The discussion below demonstrates that western North Atlantic loggerheads are discrete relative to the taxon as a whole.

1. Western North Atlantic Loggerheads are Discrete from Other Loggerhead Sea Turtles

The evidence for all the discreteness factors fits together to show that the western North Atlantic loggerhead is discrete because it is distinct from all other population segments.

- a. Physically, the Atlantic is isolated from the other oceans.
- b. Physiologically, mitochondrial DNA shows that western North Atlantic loggerheads are genetically distinct from all other populations. Also physiologically, western North Atlantic loggerheads are morphologically distinct from all populations but the South Atlantic population. Therefore, the western North Atlantic loggerhead is physiologically distinct from all other populations.
- c. Ecologically, western North Atlantic loggerheads occupy a geographically distinct ecosystem with distinct characteristics.

⁹² *Id.*

⁹³ *Id.*; see also *Southwest Ctr. for Biological Diversity v. Babbitt*, 980 F. Supp. 1080, 1085 (D. Ariz. 1997).

⁹⁴ 61 Fed. Reg. 4722, 4725.

- d. Behaviorally, western North Atlantic loggerheads are separated from all other loggerheads except from Mediterranean loggerheads, and have different nesting and adult foraging grounds from Mediterranean loggerheads. In particular, because of behavior patterns, neither western North Atlantic loggerhead females nor western North Atlantic males are likely to interbreed with other populations. Therefore, the western North Atlantic loggerhead is behaviorally distinct from all other populations.

Thus the western North Atlantic loggerhead is physically distinct from loggerheads in other oceans, and distinct on all other factors from all other loggerhead populations.

- a. Physical Factors

Western North Atlantic loggerheads are physically distinct from loggerheads in other oceans. According to the Fisheries Service's own assessment, "Although the Atlantic and Pacific populations are not formally recognized as different subspecies, the best available information indicates that the populations are separated across . . . large oceanic expanses."⁹⁵ The continent of North America physically separates Pacific and Atlantic loggerheads into discrete groups. The continental barrier confines each population of loggerheads to its separate ocean, limiting the interactions between populations. Little is known regarding the life cycle of the Pacific loggerhead, especially compared to the well-documented nesting of the Atlantic population within the United States.

Western North Atlantic loggerhead sea turtles range in the North Atlantic Ocean between natal beaches in the western North Atlantic, particularly the southeastern United States, and foraging grounds in the western North Atlantic and Mediterranean. Loggerheads in the western North Atlantic have site fidelity to the southeastern coast of the United States and the Yucatan Peninsula and remain in the northern hemisphere through all stages of their lives.

- b. Physiological Factors

Western North Atlantic loggerheads are genetically distinct from all other loggerhead populations and morphologically distinct from all populations but the South Atlantic population. Genetic analysis distinguishes the western North Atlantic population of loggerheads from the Pacific, Indian Ocean, Mediterranean, and South Atlantic loggerheads. Based on mitochondrial DNA 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.⁹⁶ In turn, North Atlantic loggerheads are also genetically distinct from South Atlantic and Mediterranean loggerheads. Additional genetic analysis of Atlantic loggerhead mitochondrial DNA of the northern and southern populations shows a divergence in lineages of $d=0.005-0.011$, indicating

⁹⁵ 68 Fed. Reg. 53948.

⁹⁶ Bowen, *supra* note 5, at 11.

approximately a quarter to a half million years of isolation.⁹⁷ Genetic studies also show the Mediterranean nesting population is genetically distinct from the western Atlantic population.⁹⁸ Thus, genetic analyses show that the western North Atlantic loggerhead population is demographically independent from the other loggerhead populations.

The Atlantic loggerhead populations also differ markedly from other populations in morphology. Morphological differences represent changes in genetics and confirm distinctions in nesting populations.⁹⁹ Size is affected by “genetics, energy consumption, food quality and abundance, and age.”¹⁰⁰ Size is a constitutive factor marking “a morphologically distinct nesting population.”¹⁰¹

Loggerheads in the Atlantic are the largest individuals.¹⁰² Pacific loggerheads are intermediate in size.¹⁰³ Even though the published growth rates in the wild have been predominately given for the Atlantic loggerheads, contrasts in growth rate, carapace length, and age of reproduction between the Atlantic and Pacific loggerheads have been documented. Atlantic loggerheads measured in Florida had a mean growth rate of 5.90 cm/yr with values ranging from 1.8-10.1 cm/yr.¹⁰⁴ Loggerheads in Australia were found to grow ≤ 1 cm/yr on average with values ranging from 0.63- 1.38 cm/yr.¹⁰⁵ While growth rates of younger age classes are greater for both the Atlantic and Pacific populations, the data suggest “that loggerheads in the west Pacific grow more slowly than do their conspecifics in the west Atlantic.”¹⁰⁶

In addition to growing at a faster rate, Atlantic loggerheads also mature earlier, between the ages of 12 and 30 compared to those in Australia that mature at 34-37.¹⁰⁷ Pacific loggerheads do not recruit to the primary feeding grounds of eastern Australia until reaching a size of 70cm.¹⁰⁸ Atlantic loggerheads, on the other hand, are found in the southeastern United States at <10 cm or >50 cm straight carapace length (“SCL”), taking up coastal residence at roughly 50cm

⁹⁷ *Id.* at 12.

⁹⁸ Bowen, *supra* note 7, at 841; NATIONAL MARINE FISHERIES SERVICE OFFICE OF PROTECTED RESOURCES AND U.S. FISH AND WILDLIFE SERVICE SOUTHEAST REGION, *supra* note 6, at 17.

⁹⁹ S.E. Encalada et al., *Population structure of the loggerhead turtle (Caretta caretta) nesting colonies in the Atlantic and Mediterranean as inferred from mitochondrial DNA control region sequences*, 130 MARINE BIOL. 567, 568 (1998).

¹⁰⁰ Kamezaki, *supra* note 12, at 38.

¹⁰¹ Daniel Cejudo et al., NOAA TECH. MEM. FISHERIES SERVICE-SEFSC-443, *Population status and beach studies – Africa*, in PROCEEDINGS OF THE NINETEENTH ANNUAL SYMPOSIUM ON SEA TURTLE BIOLOGY AND CONSERVATION 244, 244 (H.J. Kalb and T. Wibbels eds., 2000); *see also, e.g.*, Ehrhart, *supra* note 34, at 158.

¹⁰² Kamezaki, *supra* note 12, at 38.

¹⁰³ *Id.*

¹⁰⁴ Mary T. Mendonca, *Comparative growth rates of wild immature Chelonia mydas and Caretta caretta in Florida*, 15(4) Jour. Herpetology 447, 448 (1981); NATIONAL MARINE FISHERIES SERVICE AND U.S. FISH AND WILDLIFE SERVICE, RECOVERY PLAN FOR U.S. PACIFIC POPULATIONS OF THE LOGGERHEAD TURTLE (CARETTA CARETTA) 13 (1998).

¹⁰⁵ NATIONAL MARINE FISHERIES SERVICE AND U.S. FISH AND WILDLIFE SERVICE, *supra* note 104, at 13.

¹⁰⁶ *Id.*

¹⁰⁷ *Id.*; Frazer, *supra* note 30, at 77;

¹⁰⁸ NATIONAL MARINE FISHERIES SERVICE AND U.S. FISH AND WILDLIFE SERVICE, *supra* note 104, at 12.

SCL.¹⁰⁹ Morphological characteristics further indicate a marked separation within the Atlantic loggerheads. Loggerheads nesting in the Mediterranean are smaller than those nesting in the western Atlantic.¹¹⁰ The eastern Atlantic loggerheads are also a morphologically distinct nesting population.¹¹¹ The loggerheads in the southeastern United States (western North Atlantic) are larger with mean carapace length measuring 92 cm, whereas the Cape Verde nesting females only measure 77.1 cm.¹¹²

c. Ecological Factors

Western North Atlantic loggerheads inhabit an ecologically different terrestrial and marine environment from all other loggerhead populations. The nesting beaches and foraging grounds, mainly found along the coast of the southeastern United States, are specific to this population.

This loggerhead population plays an important role in the ecosystem, both marine and terrestrial, in the western North Atlantic. While all sea turtles undertake migrations at some point in their life cycle, the migration of female loggerheads from the foraging grounds to nesting beaches offers the greatest ecological significance, transporting the largest quantity of nutrients.¹¹³ The energy and nutrients deposited through the eggs is transferred to terrestrial predators and the dune vegetation.¹¹⁴ Female loggerheads are therefore contributing to the stabilization of their nesting habitat.¹¹⁵ In addition, loggerheads break down the shells of their prey into fragments; significantly affecting the rate of nutrient recycling in the benthic ecosystem.¹¹⁶ Loggerheads also serve as prey, predators, and competitors interacting with a variety of species, and thus playing a unique role in the ecosystem. Studies of loggerheads from Daytona Beach, Florida, and Cape Canaveral, Florida, have shown that even the epibiont communities—organisms such as barnacles attached to the carapace—are distinct according to the discrete loggerhead populations.¹¹⁷

The epibiont communities that reside on the loggerhead carapace emphasize the differences as seen by the different organisms that are represented. “Epibiota are acquired through prolonged contact with a particular environment, and therefore are a product of the habitats utilized by females during non-nesting intervals, reflecting differences in feeding areas or migration pathways.”¹¹⁸ “Sessile carapace epibionts can only colonize the carapace when the

¹⁰⁹ *Id.* at 13.

¹¹⁰ M. Tiwari and Karen A. Bjorndal, *Variation in morphology and reproduction in loggerheads, Caretta caretta nesting in the United States, Brazil and Greece*, 56(3) HERPETOLOGICA 343, 343 (2000).

¹¹¹ Cejudo, *supra* note 101, at 244; Ehrhart, *supra* note 34, at 163-164..

¹¹² Ehrhart, *supra* note 34, at 158.

¹¹³ Karen A. Bjorndal, *Roles of Loggerhead Sea Turtles in Marine Environments*, in LOGGERHEAD SEA TURTLES 235, 248 (2003).

¹¹⁴ *Id.* at 249.

¹¹⁵ *Id.*; S.S. Bouchard and Karen A. Bjorndal, *Sea turtles as biological transporters of nutrients and energy from marine to terrestrial ecosystems*, 81 ECOL. 2305, 2305 (2000).

¹¹⁶ Bjorndal, *supra* note 113, at 249.

¹¹⁷ Edsel A. Caine, *Carapace epibionts of nesting loggerhead sea turtles: Atlantic coast of U.S.A.*, 95 JOUR. EXPERIMENTAL MAR. BIOL. ECOL. 15, 20-21 (1986)

¹¹⁸ Bowen, *supra* note 5, at 835.

ranges of the turtle and the epibiont overlap, so the territory of the turtle may be reflected in the carapace community. If turtle populations remain discrete in both their feeding and their nesting territories, then carapace epibionts could serve as indicators of separate turtle populations.”¹¹⁹

Thus species interactions, diversity of species, and habitat are unique to the western North Atlantic. Western North Atlantic loggerheads rely on unique ecological factors, forage upon different prey, and travel through marine habitats specific to this population. During both their marine life stages and terrestrial nesting, the ecological requirements are discrete from other populations.

d. Behavioral Factors

The western North Atlantic loggerhead is behaviorally distinct from all other loggerhead populations. In fact, Western North Atlantic loggerheads are not known to interbreed with other populations, because of separate migration patterns and different timing for breeding.

Loggerhead sea turtle populations in the Atlantic and the Pacific and Indian Oceans maintain behavioral patterns that do not cause significant exchange between their separated oceanic habitats. North Atlantic loggerheads are discrete from Pacific population segments in part by virtue of the particular behavioral patterns that isolate the population in the northern hemisphere of the Atlantic Ocean.

The migration behaviors of the western North Atlantic loggerheads maintain the separate mating populations and isolate the population in its North Atlantic habitat. As explained above, the northern population lives its life in the northern hemisphere while the southern populations’ migration and nesting remains in the southern hemisphere. “The significant population differentiation between northern and southern ocean basins in the Atlantic indicates that reproductive migrations do not span the equator and there do not appear to be avenues for routine gene flow between these locations.”¹²⁰

Migration behavior also maintains east-west separation of the Atlantic populations. Although juvenile western Atlantic loggerheads may migrate to foraging grounds in the Mediterranean, as mentioned above, the mature Mediterranean population is composed of only Mediterranean individuals, indicating that non-Mediterranean juveniles return to and remain within the northwestern Atlantic region as sexually mature adults.¹²¹ “Atlantic males seem not to breed in the Mediterranean, which causes a low male-based gene flow between the Atlantic and the Mediterranean.”¹²² This behavior also isolates the western North Atlantic population from the small eastern North Atlantic population.¹²³

¹¹⁹ Caine, *supra* note 117, at 16.

¹²⁰ A.F. Pearce, *Contrasting population structure of the loggerhead turtle (Caretta caretta) using mitochondrial and nuclear DNA markers* 46 (2001) (unpublished Ph.D. dissertation, University of Florida)(on file with university).

¹²¹ L. Laurent et al., *Molecular resolution of marine turtle stock composition in fishery bycatch: a case study in the Mediterranean*, 7 *MOLECULAR ECOLOGY* 1520, 1535-6 (1998); NATIONAL MARINE FISHERIES SERVICE OFFICE OF PROTECTED RESOURCES AND U.S. FISH AND WILDLIFE SERVICE SOUTHEAST REGION, *supra* note 6, at 12-3.

¹²² *Id.* at 1537.

¹²³ Ehrhart, *supra* note 34, at 158.

Since all reproductively mature western North Atlantic loggerheads remain in the western North Atlantic, where they do not mix with other breeding populations, a behavioral barrier separates the loggerheads in the western North Atlantic from all other population segments. Because of this spatial separation, neither male nor female western North Atlantic loggerheads can breed with other populations.¹²⁴ The timing of the seasonal breeding, along with the geographic separation of nesting sites, further maintains the separation of the western North Atlantic population segment. 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 May through August with an extension into September as nesting locations get closer to the tropics.¹²⁵ In contrast the breeding season for the southern population is from October through March,¹²⁶ with the peak season from mid-October to mid-December.¹²⁷ The chronological differences in breeding behavior are additionally separated by the distance between nesting sites, suggesting demographic independence. These behavioral differences create genetic isolation between Atlantic population segments.

The post nesting migratory and foraging behavior of the northern population of Atlantic loggerheads is also distinct from that of the southern population. The northern population migrates along the southeastern coast of the United States and the Bahamas while the southern population remains around Brazil. This marked spatial separation enhances the genetic discontinuity between the two populations by not allowing the two to interbreed. In addition, the post-nesting behavior of the western North Atlantic loggerheads is further distinguished between the subpopulations. The northern subpopulation migrates north while the more southern subpopulations migrate south.¹²⁸

* * *

The combined impact of all these behaviors results in distinct populations in different regions of the Atlantic Ocean (and in the Mediterranean). Although these populations inhabit the same ocean, they exist in separate temporal and physical realms driven by their unique behavioral patterns.

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

If the Services conclude that the first criteria for discreteness is not met for the western North Atlantic loggerheads, then it must find that western North Atlantic loggerheads nesting

¹²⁴ *Id.*; Laurent, *supra* note 121; Pearce, *supra* note 120.

¹²⁵ Dodd, *supra* note 17, at 32.

¹²⁶ *Id.*

¹²⁷ Maria Marcovaldi, NOAA TECH. MEM. FISH. SERVICE-SEFSC-528, *Projeto TAMAR-Ibama: Sharing 20 Years of experience conserving sea turtles in Brazil*, PROCEEDINGS OF THE 21ST ANNUAL SYMPOSIUM ON SEA TURTLE BIOLOGY AND CONSERVATION 139 (M.S. Coyne and R.D. Clark eds., 2004).

¹²⁸ Pamela T. Plotkin and James Spotila, *Post-nesting migrations of loggerhead turtles *Caretta caretta* from Georgia, USA*, 36(4) ORYX 396, 397-8 (2002).

within the United States are delimited by international government boundaries and constitute a distinct population segment. The western North Atlantic loggerheads and the North Pacific loggerheads are the only loggerhead populations that occur within the jurisdiction of the United States. Since the western North Atlantic population is in need of management in the United States, it is prudent to treat the population as a distinct population segment. The loggerheads begin their lives on the beaches of the southeastern United States, spend their post-hatchling and oceanic juvenile years on the high seas and in the waters of other countries, and then return to United States nearshore waters to forage as older juveniles and breed after reaching maturity. The United States will play a crucial role in the management of this population because it controls the nesting beaches and the neritic juvenile and adult foraging and mating habitat.

B. The Western North Atlantic Loggerhead Is a Significant Population Segment

The Services' listing policy requires that once a population is established as discrete, its biological and ecological significance should be considered. Each population segment's significance must be analyzed on a case-by-case basis.¹²⁹ 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 characteristics¹³⁰.

The western North Atlantic population of the loggerhead sea turtle satisfies two of these "significance" criteria.

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

The western North Atlantic population of loggerhead sea turtles persists only in its unique range. As described above, the western North Atlantic loggerheads do not interbreed with other breeding populations.¹³¹ If lost, the western North Atlantic population of loggerhead sea

¹²⁹ 61 Fed. Reg. 4722, 4725.

¹³⁰ *Id.*

¹³¹ Bowen, *supra* note 7, at 841; Bowen, *supra* note 6, at 1824; Encalada, *supra* note 99, at 568; NATIONAL MARINE FISHERIES SERVICE OFFICE OF PROTECTED RESOURCES AND U.S. FISH AND WILDLIFE SERVICE SOUTHEAST REGION, *supra* note 6, at 17; Laurent, *supra* note 121, at 1535-6; Pearce, *supra* note 120, at 46.

turtles would result in a significant gap in the range of the taxon. Individuals from other nesting beaches are unable to replace the North Atlantic population, because they home to their own natal beaches. Physical and behavioral characteristics of other loggerheads would prevent recolonization if the western North Atlantic population were extirpated from its current range.

What is more, the southeast United States nesting aggregation of the western North Atlantic population is the largest in the Atlantic, making up 90% of the Atlantic nesting populations, and second largest in the world after the Oman colony. The western North Atlantic population is even more important since the status of the Oman colony has not been evaluated recently.¹³²

2. Western North Atlantic Loggerheads Have Markedly Different Genetic Characteristics from Other Populations

The genetic studies described previously show the different genetic characteristics of the western North Atlantic population segment. The western North Atlantic population of loggerhead sea turtles has different genetic characteristics than the loggerhead populations in the South Atlantic, Mediterranean, Pacific, and elsewhere.¹³³ 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.¹³⁴ In fact, based on the genetic evidence, the Turtle Expert Working Group recommended that the subpopulations in the western North Atlantic “be considered independent demographically, consistent with the definition of a distinct vertebrate population segment and of a management unit.”¹³⁵ Although the Fisheries Service has not formally recognized the subpopulations, it “treats these genetically distinct loggerhead turtle nesting aggregations as distinct subpopulations whose survival and recovery is critical to the survival and recovery of the species.”¹³⁶

* * *

The western North Atlantic loggerhead is a discrete population segment because, throughout the western North Atlantic loggerhead sea turtles’ life cycle, they remain in the northern hemisphere of the Atlantic Ocean and the Mediterranean Sea, they spend their entire adult lives in the western North Atlantic, they reproduce and breed only in the western North Atlantic, and they do not interbreed with other populations. The extinction of this population would create a significant gap in the range of the loggerhead sea turtle and would be a great loss to the taxon as a whole. The Turtle Expert Working Group of the National Marine Fisheries

¹³² NATIONAL MARINE FISHERIES SERVICE, OFFICE OF SUSTAINABLE FISHERIES, ENDANGERED SPECIES ACT – SECTION 7 CONSULTATION, BIOLOGICAL OPINION: REINITIATION OF CONSULTATION ON THE ATLANTIC HIGHLY MIGRATORY SPECIES FISHERY MANAGEMENT PLAN AND ITS ASSOCIATED FISHERIES 36 (June 14, 2001).

¹³³ Bowen, *supra* note 7, at 841; Bowen, *supra* note 6, at 1824; Encalada, *supra* note 99, at 568; NATIONAL MARINE FISHERIES SERVICE OFFICE OF PROTECTED RESOURCES AND U.S. FISH AND WILDLIFE SERVICE SOUTHEAST REGION, *supra* note 6, at 17; Laurent, *supra* note 121, at 1535-6; Pearce, *supra* note 120, at 46.

¹³⁴ Bowen, *supra* note 7, at 841.

¹³⁵ NATIONAL MARINE FISHERIES SERVICE, OFFICE OF SUSTAINABLE FISHERIES, *supra* note 132, at 33 (citation omitted).

¹³⁶ *Id.*

Service concluded that the western North Atlantic population of loggerheads requires separate management from other populations because of their vulnerability to extinction due to nesting fidelity and low gene flow between nesting groups.¹³⁷ Because of their unique nesting and foraging grounds, western North Atlantic loggerheads must be managed as a separate unit for their conservation. In their recovery planning documents, the Services have already acknowledged the need to manage this population separately by treating them as a different management unit from other loggerhead populations.

II. THE SERVICES MUST CLASSIFY THE WESTERN NORTH ATLANTIC POPULATION OF LOGGERHEAD SEA TURTLES AS ENDANGERED

Under the Endangered Species Act, 16 U.S.C. § 1533(a)(1), the Services are 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, the agencies must analyze the species' status in light of five statutory listing factors.¹³⁸ 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.¹³⁹

Many of these factors have played a role in bringing the western North Atlantic loggerhead sea turtle to its current, perilous condition.

A species is “endangered” if it is “in danger of extinction throughout all or a significant portion of its range” as a result of one or more of the five listing factors.¹⁴⁰ 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.”¹⁴¹ Under the Endangered Species Act, a “species” includes any species, subspecies or “distinct population segment” of a vertebrate fish or wildlife.¹⁴² Here, Petitioners request that the Services uplist the western North Atlantic distinct population segment of loggerhead sea turtle from threatened to endangered, because,

¹³⁷ Llewellyn M. Ehrhart et al., *Loggerheads in the Atlantic Ocean*, in *LOGGERHEAD SEA TURTLES* 157, 162 (2003).

¹³⁸ 16 U.S.C. § 1533(a)(1)(A)-(E); 50 C.F.R. § 424.11(c)(1) - (5)(Oct. 31, 2007).

¹³⁹ 16 U.S.C. § 1533(a)(1).

¹⁴⁰ *Id.* at § 1531(6).

¹⁴¹ *Id.* at § 1531(20).

¹⁴² *Id.* at § 1532(16).

based on three of the five listing factors, it is in danger of extinction throughout all or a significant portion of its range.¹⁴³

A. The Western North Atlantic Loggerhead Is in Danger of Extinction from the Present and Threatened Destruction, Modification, or Curtailment of Its Habitat and Range

The western North Atlantic loggerhead sea turtle faces many threats to both its terrestrial and marine habitat, including rising sea levels caused by global warming; ocean acidification caused by carbon dioxide, a greenhouse gas; terrestrial threats to nesting habitat; and marine debris. These threats place the western North Atlantic loggerhead in danger of extinction.¹⁴⁴

1. Global Warming Pollution Is Threatening the Destruction, Modification, and Curtailment of the Habitat and Range of the Western North Atlantic Loggerhead Sea Turtle

Global warming pollution, and its resulting harmful effects, poses a serious threat to the western North Atlantic loggerhead. There is a wealth of information suggesting that the rate of global warming is occurring even faster than models have projected.

The basic concepts of global warming are well established. The earth is warmed by absorbing heat in the form of radiation from the sun. The radiation is mostly redistributed to the atmosphere and the ocean, with some radiation bouncing back to space.¹⁴⁵ Normally the incoming and outgoing radiation is in a relative balance. Any factor that alters the balance changes the earth's climate.¹⁴⁶

The primary cause of global warming is society's production of massive amounts of "greenhouse gases" such as carbon dioxide, methane, halocarbons¹⁴⁷, and nitrous oxide.¹⁴⁸ Increases in the concentrations of greenhouse gases slow the rate of heat loss back into space and

¹⁴³ Disease and predation are not significant threats imperiling the western North Atlantic loggerhead with extinction. Oceana is not aware of "other natural or manmade factors" that do not fall under the categories enumerated in the statute.

¹⁴⁴ Other significant pollution threats to western North Atlantic loggerhead sea turtle's marine habitat, not discussed in detail in this section, include the following. Coastal development and dredging contribute to pollution and sediment that directly degrade the loggerhead habitat. NATIONAL MARINE FISHERIES SERVICE OFFICE OF PROTECTED RESOURCES AND U.S. FISH AND WILDLIFE SERVICE SOUTHEAST REGION, *supra* note 6, at 36-7. Dredging is also a source of incidental take of sea turtles. NATIONAL MARINE FISHERIES SERVICE AND U.S. FISH AND WILDLIFE SERVICE, *supra* note 3, at 10. Offshore oil and gas exploration also threatens the marine habitat through the disruption of foraging grounds. *Id.*

¹⁴⁵ D.L. Albritton et al., *Technical Summary of the Working Group 1 Report*, CONTRIBUTION OF WORKING GROUP 1 TO THE THIRD ASSESSMENT REPORT OF THE INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE 24 (J.T. Houghton et al. eds., Cambridge University Press 2001) available at http://www.grida.no/climate/ipcc_tar/wg1/index.htm.

¹⁴⁶ *Id.*

¹⁴⁷ Carbon compounds containing one or more halogen atoms (fluorine, chlorine, bromine, iodine). *Id.* at 42-3.

¹⁴⁸ Black carbon, while not a greenhouse gas, is another major pollutant that contributes to global warming by decreasing snow and surface albedo. *Id.* at 44-5; Intergovernmental Panel on Climate Change, *Climate Change 2001: The Scientific Basis*, in CONTRIBUTION OF WORKING GROUP 1 TO THE THIRD ASSESSMENT REPORT OF THE INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE 92 (2001)

warm the climate, much like the effect of a common garden greenhouse.¹⁴⁹ The higher the level of greenhouse gas concentrations, the larger the degree of warming.

Carbon dioxide is considered the most important greenhouse gas, because people emit more carbon dioxide than all of their other greenhouse gas emissions combined. About three-fourths of manmade carbon dioxide emissions come from fossil fuel burning, with most of the remaining emissions caused by land-use changes, primarily deforestation.¹⁵⁰ According to the IPCC, global average temperature has risen, likely due to the observed increase in anthropogenic greenhouse gas concentrations.¹⁵¹ Because greenhouse gas emissions are continuing to increase, warming is projected to accelerate. 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.

a. Warming Nesting Beaches and Warming Waters Threaten the Habitat of the Western North Atlantic Loggerhead, Placing It in Danger of Extinction

Warming nesting beaches caused by global warming are likely to harm loggerheads, because loggerheads' natal homing subjects them to harm from temperature changes in and around their natal beaches and because the sex of a loggerhead hatchling is dependent on temperature. Loggerheads have a "thermal tolerance" range of 25-35°C. Inside that range, at the "pivotal temperature" of 29°C, 50% of each sex is produced.¹⁵² At higher temperatures more female offspring are produced, while at lower temperatures more male offspring are produced.¹⁵³ Currently, in the warmer temperatures of Florida, the primary nesting beaches for the western North Atlantic loggerhead, the sex ratio is highly skewed towards females, with less than 10% of eggs producing males.¹⁵⁴ With nest temperature determining the sex of the hatchlings, an increase in temperature can further skew the sex ratios of the western North Atlantic loggerheads.¹⁵⁵ An increase in temperatures by 1°C would be sufficient to cause the southern loggerhead population of the United States to be "ultra-biased" towards female production.¹⁵⁶ Without males, sea turtles could not breed, leading to local extinction.¹⁵⁷ Thus, atmospheric

¹⁴⁹ Albritton, *supra* note 145, at 24; ARCTIC CLIMATE IMPACT ASSESSMENT (ACIA), IMPACTS OF A WARMING ARCTIC: ARCTIC CLIMATE IMPACT ASSESSMENT 2 (Cambridge University Press 2004) *available at* <http://amap.no/acia/>.

¹⁵⁰ Intergovernmental Panel on Climate Change, *Summary for Policymakers*, in CLIMATE CHANGE 2007: THE PHYSICAL SCIENCE BASIS. CONTRIBUTION OF WORKING GROUP I TO THE FOURTH ASSESSMENT REPORT OF THE INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE 7 (Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M. Tignor and H.L. Miller eds, Cambridge University Press 2007)..

¹⁵¹ *Id.* at 10

¹⁵² L.A. Hawkes et al., *Investigating the potential impacts of climate change on a marine turtle population*, 13 GLOBAL CHANGE BIOL. 923, 924 (2007).

¹⁵³ *Id.*; Ralph A. Ackerman, *The nest environment and embryonic development of sea turtles*, in THE BIOLOGY OF SEA TURTLES 83, 86 (1997).

¹⁵⁴ Hawkes, *supra* note 152, at 928.

¹⁵⁵ *Id.*

¹⁵⁶ GRIFFIN, *supra* note 84, at 6.

¹⁵⁷ Hawkes, *supra* note 152, at 928.

warming threatens the survival of the western North Atlantic loggerheads by pushing them to their thermal tolerance limits.¹⁵⁸

Increased temperatures can also cause nesting failures for loggerheads. A temperature increase of 3°C would cause many nests in southern Florida to experience incubation temperatures above lethal limits, killing most or all of the eggs.¹⁵⁹ Since the southern Florida nesting beaches provide 90% of the nesting population, global warming is likely to pose a serious threat to the survival of the western North Atlantic loggerhead population.

As the atmosphere warms, sea surface temperatures are also rising.¹⁶⁰ Water temperature is an important factor determining habitat ranges. Even minor changes are seriously disruptive. Water temperature also provides a cue for biological mechanisms, such as breeding, feeding, and migration.¹⁶¹ In response to the increased sea surface temperatures, loggerheads appear to be nesting approximately 10 days earlier.¹⁶² An earlier nesting onset could lead to less time between clutches along with fewer clutches, reducing the overall reproductive success of the loggerheads.¹⁶³

b. Rising Sea Levels and Increasing Storms Caused by Global Warming Threaten Nesting Habitat, Placing the Western North Atlantic Loggerhead in Danger of Extinction.

Sea level rise, one of the most certain consequences of climate change, will injure loggerheads by destroying their nesting habitat. The rising sea will inundate nesting beaches and lead to an increased rate of erosion.¹⁶⁴ Since most of the nesting beaches in the western North Atlantic are along developed shorelines, sea level rise will cause the disappearance of suitable nesting habitat and possibly the entire habitat.¹⁶⁵ The effects of sea level rise on nesting habitats may be accelerated through the increase of storms. An increase in tropical storms from climate change can injure loggerheads since their nesting period overlaps the tropical storm and hurricane season.¹⁶⁶ Global warming is likely to increase the severity of tropical storms and hurricanes which affect the nesting beaches of loggerheads.¹⁶⁷ Strong weather systems in the

¹⁵⁸ *Id.*

¹⁵⁹ *Id.*

¹⁶⁰ Intergovernmental Panel on Climate Change, *Summary for Policymakers*, in CLIMATE CHANGE 2007: THE PHYSICAL SCIENCE BASIS. CONTRIBUTION OF WORKING GROUP I TO THE FOURTH ASSESSMENT REPORT OF THE INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE 16-7 (Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M.Tignor and H.L. Miller eds, Cambridge University Press 2007).

¹⁶¹ GRIFFIN, *supra* note 84, at 6.

¹⁶² John F. Weishampel et al., *Earlier nesting by loggerhead sea turtles following sea surface warming*, 10 GLOBAL CHANGE BIOL. 1424, 1426 (2004).

¹⁶³ *Id.*

¹⁶⁴ GRIFFIN, *supra* note 84, at 5; NATIONAL MARINE FISHERIES SERVICE OFFICE OF PROTECTED RESOURCES AND U.S. FISH AND WILDLIFE SERVICE SOUTHEAST REGION, *supra* note 6, at 38.

¹⁶⁵ NATIONAL MARINE FISHERIES SERVICE OFFICE OF PROTECTED RESOURCES AND U.S. FISH AND WILDLIFE SERVICE SOUTHEAST REGION, *supra* note 6, at 38.

¹⁶⁶ David A. Pike and John C. Stiner, *Sea turtle species vary in their susceptibility to tropical cyclones*, 153 OECOLOGIA 471, 476-7 (2007).

¹⁶⁷ Kyle S. van Houtan and Oron L. Bass, *Stormy oceans are associated with declines in sea turtle hatching*, 17(15) CURRENT BIOL. R590, R591 (2007).

Western Atlantic create enough wave energy to locally erode beaches and flood or expose sea turtle nests buried above the high-water line.¹⁶⁸ Storm surges may injure loggerheads by lowering the number of nests that hatch and the number of hatchlings that emerge from the nests.¹⁶⁹

c. Ocean Acidification Caused by the Greenhouse Gas Carbon Dioxide Threatens Marine Habitat, Placing the Western North Atlantic Loggerhead in Danger of Extinction.

Not only do global warming pollutants change the climate, the most important global warming pollutant, carbon dioxide, also makes the ocean more acidic, further disrupting the loggerhead's habitat. The world's oceans play an important part in the planet's carbon cycle, absorbing large volumes of carbon dioxide and cycling it through various chemical, biological, and hydrological processes.¹⁷⁰ 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 carbon dioxide emissions causes ocean acidification.¹⁷¹

Ocean acidification 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.¹⁷² Laboratory experiments demonstrate harmful changes in 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.¹⁷³

Perhaps most importantly, increasing ocean acidity reduces the availability of calcium carbonate needed by marine life to build shells and skeletons.¹⁷⁴ Phytoplankton, corals, coralline macroalgae, urchins, starfish, clams, oysters, crustaceans and many other organisms preyed upon by sea turtles, rely on calcium carbonate to build skeletons.¹⁷⁵ Normally, ocean waters are saturated with carbonate ions that marine organisms use to build skeletons.¹⁷⁶ Ocean acidification shifts the water chemistry to favor carbonate binding with water and CO₂ to form bicarbonate, reducing the availability of carbonate to marine organisms.¹⁷⁷ Already the ocean surface layer has lost 10 percent of its carbonate as compared to preindustrial levels.¹⁷⁸ Continuing carbon dioxide emissions could result in calcification rates decreasing by up to 60

¹⁶⁸ *Id.* at R590.

¹⁶⁹ Pike, *supra* note 166, at 475-6.

¹⁷⁰ GRIFFIN, *supra* note 84, at 7.

¹⁷¹ R. SCHUBERT ET AL., GERMAN ADVISORY COUNCIL ON GLOBAL CHANGE (WBGU) SPECIAL REPORT, THE FUTURE OCEANS – WARMING UP, RISING HIGH, TURNING SOUR 66 (Berlin 2006) *available at* http://www.wbgu.de/wbgu_sn2006_en.html.

¹⁷² GRIFFIN, *supra* note 84, at 7.

¹⁷³ Schubert, *supra* note 171, at 69-72.

¹⁷⁴ Jacqueline Ruttiman, *Oceanography: Sick seas*, 442(7106) NATURE 978, 978 (2006).

¹⁷⁵ Schubert, *supra* note 171, at 69-70.

¹⁷⁶ *Id.*

¹⁷⁷ *Id.* at 66.

¹⁷⁸ *Id.*

percent by the end of this century.¹⁷⁹ The impacts of ocean acidification are likely to reverberate up the food chain, significantly affecting the loggerhead sea turtles in the western North Atlantic.

2. Terrestrial Threats to Nesting Habitat Place the Western North Atlantic Loggerhead in Danger of Extinction.

Loggerhead sea turtles also face many terrestrial threats to their nesting habitat. In fact, the Recovery Plan¹⁸⁰ listed the following as terrestrial threats to the loggerhead nesting environment:

1. Increased human presence,
2. Nest predation,
3. Coastal development,
4. Beach erosion,
5. Beach nourishment,
6. Artificial lighting,
7. Direct take,
8. Beach cleaning,
9. Recreational beach equipment,
10. Beach Vehicular driving, and
11. Exotic dune and beach vegetation.

Loggerhead sea turtles require “good, high energy nesting beaches” to lay their eggs.¹⁸¹ With more people moving to and visiting coastal areas, human intrusion increasingly disturbs and disrupts loggerhead nesting. In addition, all forms of coastal development, including the construction of roads, buildings, harbors, jetties, and other forms of coastal armoring, alter the nesting habitat of loggerheads by making the terrestrial habitat less suitable for nesting, egg incubation, or hatchling emergence.¹⁸²

Nesting females, eggs, and hatchlings are very sensitive to disturbance. In fact, nests require near perfect conditions to achieve success. The most serious threat caused by increased human presence is the disturbance of females nesting at night.¹⁸³ If a female experiences a disturbance during any stage of nesting, she might shift her nesting beach, delay egg laying, or chose a poor nesting site.¹⁸⁴ The increased number of visitors to the beaches threatens loggerhead nests through sand compaction, nest trampling, and digging.¹⁸⁵ Heavy human use of

¹⁷⁹ Ruttiman, *supra* note 174, at 978.

¹⁸⁰ NATIONAL MARINE FISHERIES SERVICE AND U.S. FISH AND WILDLIFE SERVICE, *supra* note 3, at 5-14.

¹⁸¹ *Id.* at 5.

¹⁸² NATIONAL MARINE FISHERIES SERVICE OFFICE OF PROTECTED RESOURCES AND U.S. FISH AND WILDLIFE SERVICE SOUTHEAST REGION, *supra* note 6, at 23.

¹⁸³ NATIONAL MARINE FISHERIES SERVICE AND U.S. FISH AND WILDLIFE SERVICE, *supra* note 3, at 8.

¹⁸⁴ *Id.*

¹⁸⁵ NATIONAL MARINE FISHERIES SERVICE OFFICE OF PROTECTED RESOURCES AND U.S. FISH AND WILDLIFE SERVICE SOUTHEAST REGION, *supra* note 6, at 26.

nesting beaches lowers the hatchling emergence success rate by compacting the sand above the nests. In addition, human tracks can interfere with hatchlings' ability to reach the ocean.¹⁸⁶

Coastal development affects the rate of sand erosion from nesting beaches, resulting in the partial or total loss of suitable nesting habitat.¹⁸⁷ If there is not enough suitable habitat beyond the high tide line, loggerheads may nest below the high tide line. Such nests can be washed away.¹⁸⁸ To combat erosion, people artificially modify beaches, causing further habitat loss for sea turtles. "Beach armoring," the placement of rigid structures parallel to the beach to prevent the loss of buildings, impairs the ability of loggerheads to nest.¹⁸⁹ Large areas of southeastern U.S. coastline were armored as of the early 2000s: 18% (239 km) in Florida, 9% (14 km) in Georgia, 12% (29 km) in South Carolina, and 2% (9 km) in North Carolina.¹⁹⁰ "Beach nourishment," the pumping of sand onto an eroded beach, destroys habitat by affecting the incubation and the nesting success of loggerhead sea turtles.¹⁹¹ While the addition of sand provides a larger area to nest, the quality of the sand tends to differ from the natural beaches. The differences in color and texture of the sand along with changes in compaction and escarpments greatly alter the success of nesting. Texture changes affect site selection and digging behavior while sand color alters the incubation temperature, and thus the sex ratio. Compaction makes it difficult for loggerheads to nest, extending the time to dig nests or inhibiting nest construction.¹⁹² For example, a study of ten renourished east coast beaches in Florida concluded that 50% were hard enough to inhibit nest digging.¹⁹³ The study concluded that it may take 10 years or more for the beaches to reach levels at which nesting can occur.¹⁹⁴ Escarpments prevent females from nesting, causing them to return to shore or lay their eggs where they are more susceptible to danger.¹⁹⁵ In sum, degraded nesting habitat results in decreased nesting success, abnormal nest construction, increased energy demands on the female, and reduced survivorship of eggs and hatchlings.¹⁹⁶

Developments such as high rise hotels, condominiums, and roadways, also create extra light that disorients hatchlings, making it difficult for them to find their way to the ocean. Emergent hatchlings require the visual light cue to find the sea, but when the development on shore overpowers the moon, hatchlings move towards the light of the developed shoreline. The disorientation leads to injury or death, since the hatchlings are delayed in finding or unable to find the ocean. Hatchlings lured in the wrong direction experience dehydration, exhaustion,

¹⁸⁶ NATIONAL MARINE FISHERIES SERVICE AND U.S. FISH AND WILDLIFE SERVICE, *supra* note 3, at 8.

¹⁸⁷ *Id.* at 5.

¹⁸⁸ NATIONAL MARINE FISHERIES SERVICE OFFICE OF PROTECTED RESOURCES AND U.S. FISH AND WILDLIFE SERVICE SOUTHEAST REGION, *supra* note 6, at 24.

¹⁸⁹ *Id.* at 25.

¹⁹⁰ *Id.*

¹⁹¹ *Id.* at 24.

¹⁹² *Id.*

¹⁹³ NATIONAL MARINE FISHERIES SERVICE AND U.S. FISH AND WILDLIFE SERVICE, *supra* note 3, at 6.

¹⁹⁴ *Id.*

¹⁹⁵ NATIONAL MARINE FISHERIES SERVICE OFFICE OF PROTECTED RESOURCES AND U.S. FISH AND WILDLIFE SERVICE SOUTHEAST REGION, *supra* note 6, at 24.

¹⁹⁶ NATIONAL MARINE FISHERIES SERVICE OFFICE OF PROTECTED RESOURCES AND U.S. FISH AND WILDLIFE SERVICE SOUTHEAST REGION, *supra* note 6, at 24-5.

predation, and may be run over by cars.¹⁹⁷ In Florida, reports of disorientation involve several hundreds of nests each year, corresponding to tens of thousands of hatchlings.¹⁹⁸ According to the Services, “this number is likely a vast underestimate.”¹⁹⁹ Thus, the estimate of the number of hatchlings disoriented by lighting in Florida was increased to hundreds of thousands per year. Artificial lighting can even disorient hatchlings who found the water, causing some hatchlings to leave the water and return to shore.²⁰⁰ Artificial lighting also deters nesting females from emerging on the beach.²⁰¹

The placement of physical structures on the beach, along with the use of off-road vehicles on the beach, deters nesting attempts, interferes with incubating eggs, and impedes hatchlings from reaching the ocean. With more recreational beach equipment left on the beach overnight, false crawls, where females attempt to nest but fail to deposit their clutch, are becoming more common.²⁰² Chairs can also trap nesting turtles as well as preventing hatchlings from emerging and destroying the eggs within the nests.²⁰³ Off-road vehicle use compacts the sand and causes erosion, artificial light at night, and tire ruts that hinder hatchling progress towards the sea.²⁰⁴ In the United States, driving is still allowed on some of the beaches in the states of Florida, Georgia, North Carolina, and Texas, including some national seashores.²⁰⁵

3. Threats to Marine Habitat from Other Sources of Pollution Place the Western North Atlantic Loggerhead in Danger of Extinction.

Fishing and boating debris and garbage seriously degrade western North Atlantic loggerhead marine habitat. The biggest cause for concern is that loggerheads ingest or become entangled by marine debris. The ocean is host to large volumes of plastics, monofilaments, and other debris that can be lethal to loggerheads. Much of this debris is discarded waste from the fishing industry, accumulated from decades of unsafe dumping practices. Loggerheads are threatened by the accidental ingestion of plastic debris, such as plastic bags, styrofoam pieces, and balloons.²⁰⁶ Ingestion of plastics may poison the turtles, suffocate them, or directly obstruct the gut.²⁰⁷ In U.S. waters, monofilament line appears to be the principle source of entanglement for loggerheads.²⁰⁸ Turtles may become entangled in fishing gear, which may stop them from submerging to feed, starving them, or stop them from coming to the surface for air, drowning them. Marine debris can also constrict around loggerhead flippers, causing injury.

¹⁹⁷ NATIONAL MARINE FISHERIES SERVICE OFFICE OF PROTECTED RESOURCES AND U.S. FISH AND WILDLIFE SERVICE SOUTHEAST REGION, *supra* note 6, at 26.

¹⁹⁸ *Id.*

¹⁹⁹ *Id.*

²⁰⁰ NATIONAL MARINE FISHERIES SERVICE AND U.S. FISH AND WILDLIFE SERVICE, *supra* note 3, at 7.

²⁰¹ NATIONAL MARINE FISHERIES SERVICE OFFICE OF PROTECTED RESOURCES AND U.S. FISH AND WILDLIFE SERVICE SOUTHEAST REGION, *supra* note 6, at 26.

²⁰² NATIONAL MARINE FISHERIES SERVICE AND U.S. FISH AND WILDLIFE SERVICE, *supra* note 3, at 8.

²⁰³ *Id.*

²⁰⁴ NATIONAL MARINE FISHERIES SERVICE OFFICE OF PROTECTED RESOURCES AND U.S. FISH AND WILDLIFE SERVICE SOUTHEAST REGION, *supra* note 6, at 26-7.

²⁰⁵ *Id.* at 27.

²⁰⁶ NATIONAL MARINE FISHERIES SERVICE AND U.S. FISH AND WILDLIFE SERVICE, *supra* note 3, at 13.

²⁰⁷ *Id.*

²⁰⁸ *Id.*

B. The Western North Atlantic Loggerhead Is in Danger of Extinction from Overutilization for Commercial Purposes

As the Services have forthrightly concluded, “[t]he most significant manmade factor affecting the conservation and recovery of the loggerhead is the incidental capture in commercial and artisanal fisheries”.²⁰⁹ The fishing gears that incidentally catch, injure, and kill loggerheads in the U.S. Atlantic include gillnets, trawls, hook and line, longlines, seines, dredges, and various types of pots and traps.²¹⁰ Tens of thousands of loggerheads die annually in the Atlantic Ocean and Gulf of Mexico as a result of three particularly unselective gears: longlines, gillnets, and trawls.²¹¹ Scallop dredges also catch significant numbers of loggerheads, with a high rate of mortality.²¹²

1. Longline Fishing Kills Loggerhead Sea Turtles

Commercial pelagic longline fishing is an industrial fishing method in which each vessel reels out up to 60 miles of monofilament line targeting sharks, swordfish, and tuna. Each main line supports thousands of baited shorter branch lines. The line (or “set”) is suspended in the water by floats and left for hours to catch its intended target. 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 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”).²¹³ Longlines are often set at downwellings to capitalize on concentrations of commercially valuable fish.²¹⁴ These areas of concentrated fishing activity are also where loggerheads spend much of their first decade.²¹⁵ Loggerhead takes by longlines typically involve the turtle biting the bait, becoming hooked, and then either drowning or being unhooked by a fishermen and released with injuries. If the loggerhead swallows the bait and hook, becoming “gut hooked,” it is unlikely to survive.²¹⁶

Pelagic immature western North Atlantic loggerheads circumnavigate the North Atlantic over several years, exposing themselves to a series of longline fisheries.²¹⁷ Longlines either capture young, oceanic loggerheads or those in transition back to the neritic environment, which

²⁰⁹ NATIONAL MARINE FISHERIES SERVICE OFFICE OF PROTECTED RESOURCES AND U.S. FISH AND WILDLIFE SERVICE SOUTHEAST REGION, *supra* note 6, at 36.

²¹⁰ *Id.* at 27.

²¹¹ *Id.*

²¹² K. T. MURRAY, NORTHEAST FISH. SCI. CENTER REF. DOC. 04-11, BYCATCH OF SEA TURTLES IN THE MID-ATLANTIC SEA SCALLOP (*PLACOPECTEN MAGELLANICUS*) DREDGE FISHERY DURING 2003 9-10 (2004).

²¹³ NATIONAL MARINE FISHERIES SERVICE SOUTHEAST FISHERIES SCIENCE CENTER, *supra* note 60, at .

²¹⁴ Blair E. Witherington, *Biological Conservation of Loggerheads: Challenges and Opportunities*, in *LOGGERHEAD SEA TURTLES* 295, 300 (2003).

²¹⁵ *Id.* at 78.

²¹⁶ NATIONAL MARINE FISHERIES SERVICE, OFFICE OF SUSTAINABLE FISHERIES, *supra* note 132, at 89-90.

²¹⁷ Archie Carr, *New perspective on the pelagic stage of sea turtle development*, 1(2) *CONS. BIOL.* 103, 112-115 (1987).

are the largest loggerheads in the area.²¹⁸ During their migration the immature loggerheads are exposed to longlines in the Mediterranean Sea, and this fishery is found to have a “significant, adverse effect on the survival” of the immature loggerheads from the western North Atlantic.²¹⁹

Researchers have found that gear type, bait type, sea surface temperature, and total soak time may affect the loggerhead turtle catch rate and the subsequent mortality. One Fisheries Service sponsored study found that the use of large circle hooks reduces catch rate and the post-hooking mortality of loggerheads by making it more difficult for the turtle to close its mouth around the hook and more difficult to swallow the hook.²²⁰ The same study found that using fish bait rather than squid bait reduced the rate of loggerhead takes.²²¹

The Fisheries Service did not perfectly implement the findings of its study. While it mandated the use of circle hooks, it allowed longliners to use a smaller size that had not been tested. Furthermore, it continued to allow the use of squid bait. Perhaps as a result, its most recent assessment of longline takes of loggerheads shows that the take rate has not declined.²²²

Throughout the Atlantic, catches of western North Atlantic loggerheads by vessels from all nations are estimated at thousands annually over the different life stages.²²³ In the Atlantic Ocean, longlines are believed to have a higher rate of loggerhead takes than in other ocean basins, further emphasizing the threat of longline gear to the survival of the western North Atlantic loggerhead.²²⁴

Although the damage done by longline fishing is all too clear, the full extent of the impact is unknown, because neither the United States nor other governments require sufficient monitoring of protected species catch and mortality to obtain accurate and precise data. One thing is known: the impact of Atlantic pelagic longline fisheries alone, exclusive of all other threats, causes concern for the potential recovery of the loggerhead population.²²⁵ Unmitigated threats, specifically pelagic longlining, will have serious consequences, including sharp declines in all nesting assemblages.²²⁶

2. Gillnet Fishing

Several gillnet fisheries that catch and kill loggerhead sea turtles operate along the mid- and southeast U.S. Atlantic coastline.²²⁷ According to the Turtle Expert Working Group, “turtles

²¹⁸ John W. Watson et al., *Fishing methods to reduce sea turtle mortality associated with pelagic longlines*, 62 CAN. JOUR. FISH. AQUAT. SCI. 965, 974 (2005).

²¹⁹ NATIONAL MARINE FISHERIES SERVICE, OFFICE OF SUSTAINABLE FISHERIES, *supra* note 132, at 39.

²²⁰ Watson, *supra* note 218, at 976.

²²¹ *Id.* at 974-5.

²²² C. FAIRFIELD-WALSH AND L. GARRISON, NOAA TECH. MEM. NOAA NMFS-SEFSC-560, ESTIMATED BYCATCH OF MARINE MAMMALS AND TURTLES IN THE U.S. ATLANTIC PELAGIC LONGLINE FLEET DURING 2007 10 (2007).

²²³ NATIONAL MARINE FISHERIES SERVICE, OFFICE OF SUSTAINABLE FISHERIES, *supra* note 132, at 38-40.

²²⁴ Rebecca L. Lewison et al., *Quantifying the effects of fisheries on threatened species; the impact of pelagic longlines on loggerhead and leatherback sea turtles*, 7 ECOLOGY LETTERS 221, 225 (2004).

²²⁵ Watson, *supra* note 218, at 974.

²²⁶ Lewison, *supra* note 224, at 226.

²²⁷ TURTLE EXPERT WORKING GROUP, *supra* note 57, at 73-4 (2000).

are particularly susceptible to entanglement and drowning in gillnet gear, especially when nets are set and left unattended”.²²⁸ Gillnets can pose an equal or even greater threat to the survival of loggerheads than longlines, causing 50% of caught turtles to die.²²⁹ Annual peaks in loggerhead strandings coincide with increased gillnetting activity in early summer and late fall.²³⁰ For example, in May 2000, the large mesh monkfish gillnet fishery was closed for 30 days as a result of elevated strandings of loggerheads in North Carolina.²³¹ The “Fisheries Service made a determination that the level of mortality was ‘severely impacting the northern nesting subpopulation of loggerheads’, marking the first time a subpopulation of sea turtles was identified as a management unit.”²³² While many states do not allow gillnetting in their waters, nearshore and inshore gillnet fisheries still operate in the state and federal waters of Rhode Island, Connecticut, New York, New Jersey, Delaware, Maryland, Virginia, and North Carolina.²³³

3. Trawling and Dredging

Trawling and dredging gear also catches and kills substantial numbers of loggerhead sea turtles, placing them in danger of extinction.

Shrimp trawling catches very large numbers of loggerheads. When a loggerhead is caught in the trawl net, it is forcibly submerged. As a result it can drown.²³⁴ In 1990, the National Research Council classified shrimp trawling as the single biggest human-induced threat to sea turtles in U.S. coastal waters, causing more deaths than all other human activities combined.²³⁵ The Fisheries Service has developed a sea turtle conservation program including the use of turtle excluder devices (“TEDs”) (essentially a turtle trap door that is installed in trawling nets) to reduce this threat.

For Fisheries Service approval, a TED must exclude 97% of turtles encountered, where the rate is based on the size of sea turtles encountered in the area where the TED is intended to be used. Enforcement is a major problem. The Fisheries Service has documented cases of TED escape openings being sewn shut.²³⁶ In some circumstance, the Fisheries Service imposes restrictions on tow times to prevent drowning loggerheads, rather than requiring the use of TEDs, but compliance has been poor. The Fisheries Service has received comments where individuals readily admit to violating the maximum tow time.²³⁷

²²⁸ *Id.*

²²⁹ Rebecca L. Lewison and Larry B. Crowder, *Putting longline bycatch of sea turtles into perspective*, 21 *CONS. BIOL.* 79, 82 (2007).

²³⁰ *TURTLE EXPERT WORKING GROUP, supra* note 57, at 74 (2000).

²³¹ *Id.*

²³² *Id.*

²³³ *NATIONAL MARINE FISHERIES SERVICE, OFFICE OF SUSTAINABLE FISHERIES, supra* note 132, at 60-2.

²³⁴ *Sea Turtle Conservation; Shrimp Trawling Requirements*, 52 *Fed. Reg.* 24244, 24244 (June 29, 1987).

²³⁵ *NATIONAL RESOURCE COUNCIL, DECLINE OF THE SEA TURTLE: CAUSES AND PREVENTION* 82 (National Academy Press 1990).

²³⁶ *Threatened Fish and Wildlife; Threatened Marine Reptiles; Revisions to Enhance and Facilitate Compliance With Sea Turtle Conservation Requirements Applicable to Shrimp Trawlers; Restrictions Applicable to Shrimp Trawlers and Other Fisheries*, 57 *Fed. Reg.* 40861, 40861 (Sept. 8, 1992).

²³⁷ *Id.*

Though TEDs reduce turtle drownings, a turtle swimming through the escape hatch of a TED is still a take since the definition of a take includes not only killing but also “to harass, harm, pursue, hunt...trap, capture, or collect.”²³⁸ Forced submergence for even short time periods can result in significant physiological stress on sea turtles.²³⁹ Turtles that are repeatedly captured and excluded become stressed and may drown, accounting for the occurrence of turtle mortality even in trawls with TEDs.²⁴⁰ Non-lethal takes from TEDs are not typically observed and can easily be forgotten, but it is important that maximum take limits consider not only lethal takes but also account for non-lethal ones.

Trawl nets are also used to catch a variety of fish species in the Mid-Atlantic including summer flounder, croaker, weakfish, groundfish, and squid. The fisheries using trawl gear in the Mid-Atlantic are permitted to catch a total of 49 loggerhead sea turtles, but the Marine Fisheries Service estimated the annual bycatch rate of loggerheads to be 616 animals during the years 1996-2004²⁴¹, more than 12 times the current authorized limit.²⁴² Forty-three percent of the takes resulted in death or serious injury.²⁴³

The Fisheries Service analyzed the incidental catch of sea turtles in scallop trawls separately from its analysis of trawling for other fish. A recent Fisheries Service report estimated average annual loggerhead sea turtle catch in Mid-Atlantic scallop trawl gear to range from 81 to 191 turtles, while only 5 annual scallop trawl takes are authorized.²⁴⁴

The scallop dredge fishery operates from Maine to North Carolina, towing heavy steel bags called dredges along the sea floor. The dredge is typically a 15-foot wide frame that tows a metal-ring chain bag which sweeps scallops and other catch into the bag.²⁴⁵ A standard frame weighs about 2500 pounds and the chain bag (empty) weighs an additional 2000 pounds.²⁴⁶ Scallop vessels typically tow two dredges. Each year, hundreds of turtles are caught, drowned, or bludgeoned by the dredges. Estimates of bycatch in this fishery vary extensively from year to year, but are as high as 749 turtles captured, 579 of which were considered dead or seriously injured in one year.²⁴⁷

²³⁸ 16 U.S.C. § 1532(19)

²³⁹ C.A. Harms et al., *Venous blood gases and lactates of wild loggerhead sea turtles (Caretta caretta) following two capture techniques*, 39 JOUR. WILDLIFE DISEASES 366, 371-2 (2003).

²⁴⁰ Witherington, *supra* note 214, at 302.

²⁴¹ K.T. MURRAY, NORTHEAST FISHERIES SCIENCE CENTER REFERENCE DOCUMENT 06-19, ESTIMATED AVERAGE ANNUAL BYCATCH OF LOGGERHEAD SEA TURTLES (CARETTA CARETTA) IN U.S. MID-ATLANTIC BOTTOM OTTER TRAWL GEAR; 1996-2004 11 (2006).

²⁴² GRIFFIN, *supra* note 82, at 18.

²⁴³ MURRAY, *supra* note 241, at 9.

²⁴⁴ K.T. MURRAY, U.S. DEP. COMMER., NORTHEAST FISH. SCI. CENT. REF. DOC. 07-04, ESTIMATED BYCATCH OF LOGGERHEAD SEA TURTLES (CARETTA CARETTA) IN U.S. MID-ATLANTIC SCALLOP TRAWL GEAR 2004-2005, AND IN SEA SCALLOP DREDGE GEAR, 2005 11 (2007); NATIONAL MARINE FISHERIES SERVICE, CONSULTATION NO. F/NER/2005/06066, ENDANGERED SPECIES ACT SECTION 7 CONSULTATION ON THE ATLANTIC SEA SCALLOP FISHERY MANAGEMENT PLAN 86 (Sept. 18, 2006).

²⁴⁵ NATIONAL MARINE FISHERIES SERVICE, *supra* note 241, at 52-3.

²⁴⁶ *Id.* at 53.

²⁴⁷ MURRAY, *supra* note 212, at 9-10.

In August 2006, the Fisheries Service issued a rule requiring scallop dredge vessels to screen off the mouth of the dredge bag with “turtle chains.” These heavyweight chains cross horizontally and vertically across the mouth of a dredge with the stated purpose of protecting turtles from harm by keeping them out of the dredge. Unfortunately, the Fisheries Service does not currently know, and has decided not to monitor, what happens to the sea turtles when they are hit by the chains. While the chains will prevent harm caused by capture in the dredge gear, the Government’s own scientists acknowledge that the same number of sea turtles will likely sustain serious injuries or die with the turtle chains in place as without them.²⁴⁸ Instead of being swept into the dredge, the turtles will likely be run over by the 4,500-pound dredge.²⁴⁹ In addition, any injury to the sea turtles from the chains will be out of sight, undocumented and not subject to monitoring. As a result, it will be impossible for the Fisheries Service to accurately assess the impact of this fishery on sea turtles.

C. The Western North Atlantic Loggerhead Is in Danger of Extinction from the Inadequacy of Existing Regulatory Mechanisms

The best evidence of the inadequacy of existing regulatory mechanisms is the continuing dramatic decline of the western North Atlantic loggerhead sea turtle population.²⁵⁰ Indeed, existing regulatory mechanisms have failed to adequately address any of the threats to this distinct population segment.²⁵¹ No mechanism has effectively eliminated or sufficiently reduced mortality from fishing, nor has any mechanism been put in place to address the threats from global warming pollution.²⁵² Several of these inadequate regulatory schemes are discussed further below.

1. Federal Law

The “most significant manmade factor affecting the conservation and recovery of loggerheads is incidental capture” in fisheries.²⁵³ The continued decline of loggerheads is largely a result of inadequate regulatory mechanisms failing to adequately monitor or control destructive fishing practices.

Existing regulatory mechanisms are inadequate to track the status of loggerhead sea turtles and fail to monitor the impacts of fishing on the populations. The Fisheries Service neither adequately monitors the bycatch of the western North Atlantic loggerhead sea turtle nor imposes sufficient controls on fisheries bycatch to address the continued dramatic decline of its population.²⁵⁴ Observer coverage levels are often too low to develop accurate and precise

²⁴⁸ NATIONAL MARINE FISHERIES SERVICE, FINAL ENVIRONMENTAL ASSESSMENT AND REGULATORY IMPACT REVIEW REGULATORY FLEXIBILITY ACT ANALYSIS OF SEA TURTLE CONSERVATION MEASURES FOR THE MID-ATLANTIC SEA SCALLOP DREDGE FISHERY 64 (2006).

²⁴⁹ *Id.* at 63.

²⁵⁰ NATIONAL MARINE FISHERIES SERVICE OFFICE OF PROTECTED RESOURCES AND U.S. FISH AND WILDLIFE SERVICE SOUTHEAST REGION, *supra* note 6, at 11.

²⁵¹ *Id.* at 31.

²⁵² *Id.* at 32-36.

²⁵³ NATIONAL MARINE FISHERIES SERVICE OFFICE OF PROTECTED RESOURCES AND U.S. FISH AND WILDLIFE SERVICE SOUTHEAST REGION, *supra* note 6, at 36.

²⁵⁴ TURTLE EXPERT WORKING GROUP, *supra* note 57, at 80-81; GRIFFIN, *supra* note 84, at 8.

bycatch estimates.²⁵⁵ Some fisheries suspected of having sea turtle bycatch issues have never been subject to any independent bycatch monitoring.²⁵⁶

Because of inadequate monitoring and inadequate control mechanisms, the Fisheries Service does not actually monitor and limit fishing to incidental take levels, but allows fishing to go forward unabated when a take level is reached and exceeded.²⁵⁷ Thus the estimated numbers of takes continues to dramatically exceed the authorizations, as shown above. For example, Mid-Atlantic otter trawls take 12 times the authorized number of loggerheads.²⁵⁸

To exacerbate the problem of inadequate data on population status and environmental impacts, the Fisheries Service uses a jeopardy determination method that is not scientifically valid and is not, as the task requires, quantitative. Even were the model to be valid, its key assumption, that the South Florida nesting population is stable or increasing, is false.²⁵⁹ In addition, the Fisheries Service fails to consider the cumulative impact of all anthropogenic threats on loggerhead sea turtles.²⁶⁰

Existing regulatory mechanisms are inadequate to address the threat to loggerheads from longlining. Current gear requirements are insufficient to address the problem of the very large number of U.S. fishery takes and kills. As a result, the latest evidence shows that gear modifications have failed to reduce the rate at which longlines catch loggerheads.²⁶¹ Moreover, although time/area closures are a well known means of avoiding protected species takes, there are no such areas to protect loggerheads from longline bycatch.²⁶²

Current regulations are also inadequate to protect loggerheads from the impact of trawl fishing. While all shrimp trawls within the United States, and some summer flounder trawls, are required to use TEDs to minimize bycatch, the size of the required TEDs in summer flounder trawls does not allow the largest size classes of turtles to escape.²⁶³ Furthermore, TEDs are not required in other trawl fisheries, even though these have significant take levels.²⁶⁴

Regulatory mechanisms are also inadequate to protect loggerheads from the threat of scallop dredging. In August 2006, the government issued a rule requiring vessels in the Atlantic sea scallop fishery using dredge gear to screen off the mouth of the dredge bag with “turtle chains.”²⁶⁵ Unfortunately, the government has no data on what happens to the sea turtles when they are hit by the chains. While the chains will prevent harm caused by capture in the dredge

²⁵⁵ TURTLE EXPERT WORKING GROUP, *supra* note 57, at 80-81

²⁵⁶ GRIFFIN, *supra* note 82, at 8.

²⁵⁷ *Id.* at 18.

²⁵⁸ *Id.*; MURRAY, *supra* note 241, at 11.

²⁵⁹ NATIONAL MARINE FISHERIES SERVICE OFFICE OF PROTECTED RESOURCES AND U.S. FISH AND WILDLIFE SERVICE SOUTHEAST REGION, *supra* note 6, at 11.

²⁶⁰ GRIFFIN, *supra* note 82, at 21.

²⁶¹ FAIRFIELD-WALSH, *supra* note 222, at 10.

²⁶² *Id.* at 2.

²⁶³ TURTLE EXPERT WORKING GROUP, *supra* note 57, at 49.

²⁶⁴ Blair Witherington et al., *Caretta caretta—Loggerhead sea turtle*, 3 CHELONIAN RESEARCH MONOGRAPHS 74, 84 (2006). See also Griffin, *supra* note 84, at 18.

²⁶⁵ Endangered and Threatened Wildlife; Sea Turtle Conservation, 71 Fed. Reg. 50361, 50363 (Aug. 25, 2006).

gear, by physically preventing capture, the government's own scientists acknowledge that the same number of sea turtles that are injured or killed without chains in place will likely sustain serious injuries or die with the turtle chains in place, because instead of being swept into the dredge, the turtles will likely be run over by the 4,500-pound dredge.²⁶⁶ In addition, any injury to the sea turtles from the chains will be out of sight, undocumented, and not subject to monitoring. As a result, it will be impossible for the government to accurately assess the impact of this fishery on sea turtles.²⁶⁷

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,²⁶⁸ the Energy Security Act,²⁶⁹ the Global Change Research Act,²⁷⁰ The Energy Policy Act,²⁷¹ and the Global Climate Protection Act²⁷² 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. 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 of loggerhead sea turtles.

Additionally, there are inadequate regulatory measures to prevent marine debris which entangles, chokes, and poisons sea turtles.

2. International Law

International sea turtle protections also fall short of preventing the decline of the loggerheads. While loggerhead sea turtles are listed in Appendix 1 of CITES, CITES protections have not sufficiently slowed or stopped the precipitous decline of the western North Atlantic population of the loggerhead. CITES largely controls the import and export of endangered wildlife, but since loggerheads are primarily threatened by incidental catch rather than taken for trade, CITES provides little relief for the western North Atlantic loggerheads.²⁷³

The western North Atlantic loggerhead is exposed to a series of offshore fisheries throughout its migration across the Atlantic Ocean.²⁷⁴ While many of these fisheries, such as the North Atlantic longline tuna and swordfish fisheries, are subject to regional fishery management

²⁶⁶ NATIONAL MARINE FISHERIES SERVICE, *supra* note 248, at 63-4.

²⁶⁷ There is a limited time/area closure for the benefit of loggerheads in the scallop dredge fishery, but the New England Fishery Management Council recently proposed to eliminate that measure.

²⁶⁸ Pub. L. No. 108-204, 118 Stat. 2004.

²⁶⁹ Pub. L. No. 96-294, 94 Stat. 1980.

²⁷⁰ Pub. L. No. 101-606, 104 Stat. 1990.

²⁷¹ Pub. L. No. 109-58, 119 Stat. 2005.

²⁷² Pub. L. No. 100-204, 101 Stat. 1987.

²⁷³ NATIONAL MARINE FISHERIES SERVICE OFFICE OF PROTECTED RESOURCES AND U.S. FISH AND WILDLIFE SERVICE SOUTHEAST REGION, *supra* note 6, at 33-34.

²⁷⁴ NATIONAL MARINE FISHERIES SERVICE, OFFICE OF SUSTAINABLE FISHERIES, *supra* note 132, at 39.

organizations, such as ICCAT,²⁷⁵ those organizations fail to require meaningful monitoring of loggerhead catch, fail to set meaningful limits on loggerhead catch, and fail to impose meaningful conservation measures such as imposing habitat protections. Furthermore, none of the countries whose vessels are engaged in the catch of loggerheads impose meaningful conservation measures.²⁷⁶

Even if other threats are managed, global warming will likely continue to pose a threat to the Western North Atlantic loggerhead. At present, international efforts provide inadequate regulatory mechanisms to address the threats that global warming poses to the western North Atlantic 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 to the UN Framework. Because of the failure of major international contributors to climate change, like the United States, to ratify the Kyoto Protocol or to show any meaningful progress in addressing the harmful effects of global warming pollution, international efforts do not provide effective protections for the loggerhead.

III. THE SERVICES MUST DESIGNATE CRITICAL HABITAT CONCURRENTLY WITH CLASSIFYING THE WESTERN NORTH ATLANTIC LOGGERHEAD AS ENDANGERED

The Endangered Species Act mandates that, when the Services list 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 Endangered Species Act requires that, “to the maximum extent prudent and determinable,” the agency:

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 . . .²⁷⁷

The Endangered Species Act 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.²⁷⁸

²⁷⁵ International Commission for the Conservation of Atlantic Tunas.

²⁷⁶ NATIONAL MARINE FISHERIES SERVICE OFFICE OF PROTECTED RESOURCES AND U.S. FISH AND WILDLIFE SERVICE SOUTHEAST REGION, *supra* note 6, at 31.

²⁷⁷ 16 U.S.C. § 1533(a)(3)(A)(i); *see also id.* at § 1533(b)(6)(C) (requiring the final regulation designating critical habitat for a species to be published at the same time as the final determination of endangered or threatened status).

The Services must comply with this unambiguous mandate and designate critical habitat concurrent with the listing of the western North Atlantic loggerhead sea turtle. All state and federal land and waters, including areas of the Exclusive Economic Zone (“EEZ”), used by the species for foraging, migration, mating, and nesting²⁷⁹, both currently and historically, meet the criteria for designation as critical habitat and must be so designated.

IV. IN THE ALTERNATIVE, THE ATLANTIC POPULATION OF LOGGERHEAD SEA TURTLES SHOULD BE DESIGNATED AS A DISTINCT POPULATION SEGMENT, LISTED AS ENDANGERED, AND HAVE CRITICAL HABITAT DESIGNATED FOR IT

This Petition requests that Fish and Wildlife Service and Fisheries Service separately list, and reclassify from a threatened to an endangered species, the western North Atlantic 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 above. Alternatively, if the Services determine that the western North Atlantic population of loggerhead sea turtles does not constitute a distinct population segment, Petitioners request that the agencies separately list, and reclassify from a threatened to an endangered species, the entire population of loggerhead sea turtles in the Atlantic Ocean as a distinct population segment and designate critical habitat to ensure its recovery.

A. Atlantic Loggerheads Constitute a Distinct Population Segment

The Atlantic population of loggerhead sea turtles satisfies the requirements to be a “distinct population segment,” namely that it be both “discrete” and “significant.”

1. The Atlantic Loggerhead is a Discrete Population

As set forth in Section I, above, a discrete population segment must either be markedly separate from other populations or be delimited by international governmental boundaries with significant differences in light of Section 4(a)(1)(D) of the Act.²⁸⁰ The Atlantic loggerhead sea turtle satisfies both criteria.

²⁷⁸ *Id.* at § 1532(5)(A).

²⁷⁹ All known and historic nesting beaches subject to US jurisdiction should be designated as critical habitat, from the tideline sufficiently inland to encompass all sandy areas in which loggerheads nest, as well as adjacent upland habitat necessary to maintain the functionality of such habitat. Additionally, since a significant percentage of current loggerhead nesting habitat will be lost from ongoing, projected and unavoidable sea-level rise associated with global warming, sufficient upslope habitat must be designated so as to provide for the protection and development of suitable nesting habitat in the face of these changes.

²⁸⁰ 61 Fed. Reg. 4725.

a. Atlantic Loggerheads Are Markedly Separate from Other Loggerhead Sea Turtles

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

i. Physical Factors

According to Fisheries Service's own assessment, "[a]lthough the Atlantic and Pacific populations are not formally recognized as different subspecies, the best available information indicates that the populations are separated across these large oceanic expanses."²⁸¹ The continent of North America functions as a physical barrier separating the Pacific and Atlantic loggerheads into discrete groups. The continental barrier confines each population of loggerheads to its separate ocean, limiting the interactions between populations.

ii. Physiological Factors

Atlantic loggerheads are genetically distinct from Pacific populations.²⁸² Based on mitochondrial DNA 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.²⁸³

The Atlantic loggerhead populations also differ markedly from the Pacific populations in morphology. Loggerheads in the Atlantic are the largest individuals in size while the Pacific loggerheads are intermediate in size.²⁸⁴ While growth rates of younger age classes are greater for both the Atlantic and Pacific populations, the data suggest "that loggerheads in the west Pacific grow more slowly than do their conspecifics in the west Atlantic".²⁸⁵ In addition to growing at a faster rate, Atlantic loggerheads also mature earlier, between the ages of 12 and 30 compared to those in Australia that mature at 34-37.²⁸⁶ Differences in growth rate, carapace length, and age of reproduction between the Atlantic and Pacific loggerheads have been documented.

iii. Ecological Factors

Atlantic loggerheads inhabit an ecologically different marine environment than do the loggerheads in the Pacific Ocean or Indian Ocean. Nesting beaches and foraging grounds mainly found along the coast of the southeastern United States are specific to this population.

This loggerhead population plays an important role in the ecosystem, both marine and terrestrial, in the Atlantic. Female loggerheads undergo long migrations during which they

²⁸¹ 68 Fed. Reg. 53948.

²⁸² Bowen, *supra* note 6, at 1825.

²⁸³ Bowen, *supra* note 5, at 11.

²⁸⁴ Kamezaki, *supra* note 12, at 38.

²⁸⁵ NATIONAL MARINE FISHERIES SERVICE AND U.S. FISH AND WILDLIFE SERVICE, *supra* note 104, at 13.

²⁸⁶ *Id.*; Frazer, *supra* note 30, at 78.

transport energy and nutrients that are deposited in their eggs and later transferred to terrestrial predators and dune vegetation.²⁸⁷ Female loggerheads are therefore contributing to the stabilization of their nesting habitat.²⁸⁸ In addition, loggerheads break down the shells of their prey into fragments, significantly affecting the rate of nutrient recycling in the benthic ecosystem.²⁸⁹ Loggerheads also serve as prey, predators, and competitors interacting with a variety of species, and thus exhibit a unique role in the ecosystem. Studies have shown even the epibiont communities attached to loggerheads are distinct according to the discrete loggerhead populations as exhibited by the differences noted in loggerheads from Daytona Beach, FL, and Cape Canaveral, FL.²⁹⁰

Atlantic loggerheads rely on unique ecological factors, forage upon different prey, and travel through marine habitats specific to this population. During both their marine life stages and terrestrial nesting, the ecological requirements are discrete from other populations.

iv. Behavioral Factors

Loggerhead sea turtle populations in the Atlantic, Pacific, and Indian Oceans maintain behavioral patterns that do not cause significant exchange between their separated oceanic habitats. Atlantic loggerheads are separated from Pacific population segments, as mentioned previously, both by the existing physical barriers, and also by the particular behavioral patterns that isolate the population in the Atlantic Ocean. The migration, mating and nesting behaviors of the Atlantic loggerheads maintain the discrete mating populations and isolate the population in its Atlantic habitat.

b. Atlantic Loggerhead Sea Turtles Are Delimited by Significant International Government Boundaries

The western North Atlantic loggerheads and the North Pacific loggerheads are the only loggerhead populations that occur within the jurisdiction of the United States. Since the western North Atlantic population makes up 90% of the nesting in the Atlantic Ocean, and requires management in the United States, it is prudent to treat the Atlantic population as a distinct population segment. As stated above, the loggerheads begin their lives on the beaches of the southeastern United States, spend their post-hatchling and oceanic juvenile years on the high seas and in the waters of other countries, and then return to United States nearshore waters to forage as older juveniles and nest after reaching maturity. The United States will play a crucial role in the management of this population because it controls the nesting beaches and the neritic juvenile and adult foraging and mating habitat.

²⁸⁷ Bjorndal, *supra* note 113, at 248.

²⁸⁸ *Id.* at 249.

²⁸⁹ *Id.*

²⁹⁰ *Id.* at 247-8; Caine, *supra* note 117, at 21.

2. Atlantic Loggerheads Are a Significant Population Segment

As discussed in Section I above, the Services listing policy requires that once a population is established as discrete, biological and ecological significance is next considered. Each population segment's significance must be analyzed on a case-by-case basis.²⁹¹ This consideration may include factors such as “[e]vidence that loss of the discrete population would result in a significant gap in the range of a taxon” and “[e]vidence that the discrete population segment differs markedly from other populations of the species in its genetic characteristics.”²⁹² The Atlantic population of the loggerhead sea turtle satisfies these “significance” criteria.

a. Loss of the Atlantic Loggerhead Population Would Result in a Significant Gap in the Range of the Species

The Atlantic population of loggerhead sea turtles persists only in its unique range of the Atlantic Ocean. As described above, the Atlantic loggerheads do not interbreed with breeding populations of the other ocean basins.²⁹³ Therefore, the loss of the Atlantic population would result in a significant gap in the distribution of the species, a clear criterion for biological significance.

b. Genetic Evidence Suggests that the Western North Atlantic Loggerheads Have Markedly Different Genetic Characteristics That Differ from the Other Populations

At the very least, the Atlantic populations should be listed as separate from the Pacific and Indian Ocean populations, because the loss of the Atlantic loggerhead would result in a significant gap in the genetic diversity of the species as a whole. In addition to the previously mentioned nesting in the western North Atlantic, nesting also occurs in the eastern and South Atlantic. These nesting populations are genetically distinct from the western North Atlantic loggerheads. The majority of nesting in the South Atlantic occurs along the coast of Brazil from Rio de Janeiro to Sergipe. There is an intermediate loggerhead nesting assemblage, found mainly on the Cape Verde Islands and minor nesting levels²⁹⁴ along the western coast of South Africa.²⁹⁵ The nesting aggregation found along the coast of the southeastern United States represents 35-40% of loggerheads globally and from a global perspective is considered a “critical component of this species”.²⁹⁶

²⁹¹ 61 Fed. Reg. 4725

²⁹² *Id.*

²⁹³ Bowen, *supra* note 7, at 841; Bowen, *supra* note 6, at 1824; Encalada, *supra* note 99, at 568; NATIONAL MARINE FISHERIES SERVICE OFFICE OF PROTECTED RESOURCES AND U.S. FISH AND WILDLIFE SERVICE SOUTHEAST REGION, *supra* note 6, at 17; Laurent, *supra* note 121, at 1535-6; Pearce, *supra* note 120, at 46.

²⁹⁴ Intermediate nesting refers to assemblages producing 1,000-5,000 nests annually regionwide. If there are fewer than 1,000 nests annually in a region then the nesting assemblage is considered “minor”. Ehrhart, *supra* note 34, at 157-8.

²⁹⁵ Ehrhart, *supra* note 34, at 158-9; NATIONAL MARINE FISHERIES SERVICE OFFICE OF PROTECTED RESOURCES AND U.S. FISH AND WILDLIFE SERVICE SOUTHEAST REGION, *supra* note 6, at 10,14.

²⁹⁶ NATIONAL MARINE FISHERIES SERVICE, OFFICE OF SUSTAINABLE FISHERIES, *supra* note 132, at 36.

Genetic evidence proves that these loggerhead populations are distinct due to female nesting site fidelity and migratory patterns and the absence of mixing between the two populations.²⁹⁷

B. The Services Must Classify the Atlantic Loggerhead Sea Turtles as Endangered

Under the Endangered Species Act, 16 U.S.C. § 1533(a)(1), the Services are 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, the agencies must analyze the species' status in light of five statutory listing factors.²⁹⁸ The discussion in Background Section III, *supra* at pp. 10-12, above concerning the status of the western North Atlantic loggerhead applies equally to the larger Atlantic loggerhead population. Specifically, the western North Atlantic loggerhead represents 90% of the entire Atlantic nesting population. The other Atlantic nesting populations are found in the Mediterranean, and along the East Coast of South America and the West Coast of South Africa.²⁹⁹ Regardless of their status, the significant declines in the southeastern U.S. nesting populations documented above, and the significant threats to those populations documented above, show that the entire Atlantic population must be listed as endangered.

C. The Services Must Designate Critical Habitat for the Atlantic Loggerhead Concurrent with Listing

For the reasons set forth, *supra*, at p. 37, the Services must designate critical habitat for the Atlantic loggerhead for all state and federal land and waters, including areas of beaches and the EEZ used by the species for foraging, migration, mating, and nesting, both currently and historically.

CONCLUSION

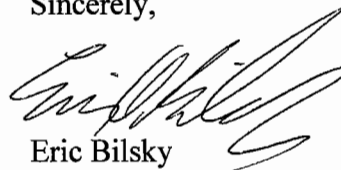
The western North Atlantic population of loggerhead sea turtles requires special protection as an endangered distinct population segment under the Endangered Species Act. This population is discrete, significant, and decreasing in abundance at an alarming rate, while the numerous threats to this population remain unaddressed by domestic and international regulatory regimes. Accordingly, the Services must make a positive 90-day finding and promptly conduct a status review for this distinct population segment.

²⁹⁷ Bowen, *supra* note 7, at 839.

²⁹⁸ 16 U.S.C. § 1533(a)(1)(A)-(E); 50 C.F.R. § 424.11(c)(1) - (5).

²⁹⁹ NATIONAL MARINE FISHERIES SERVICE OFFICE OF PROTECTED RESOURCES AND U.S. FISH AND WILDLIFE SERVICE SOUTHEAST REGION, *supra* note 6, at 10-2.

Sincerely,



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