PETITION TO LIST
THE PACIFIC LEATHERBACK SEA TURTLE (*DERMOCHELYS CORIACEA*)
AS AN ENDANGERED SPECIES UNDER
THE CALIFORNIA ENDANGERED SPECIES ACT

Photo Credit: Peter Winch

CENTER *FOR* BIOLOGICAL DIVERSITY
AND
TURTLE ISLAND RESTORATION NETWORK

January 9, 2019

FGC – 670.1 (3/94)

NOTICE OF PETITION TO THE STATE OF CALIFORNIA FISH AND GAME COMMISSION

For action pursuant to Section 670.1, Title 14, California Code of Regulations (CCR) and sections 2072 and 2073 of the Fish and Game Code relating to listing and delisting endangered and threatened species of plants and animals.

I. SPECIES BEING PETITIONED

Common name: Pacific leatherback sea turtle
Scientific name: (*Dermochelys coriacea*)

II. RECOMMENDED ACTION: List as endangered

The Center for Biological Diversity and Turtle Island Restoration Network submit this petition to list the Pacific leatherback sea turtle as endangered throughout its range in California pursuant to the California Endangered Species Act (California Fish and Game Code §§ 2050 *et seq.*). This petition demonstrates that the Pacific leatherback sea turtle clearly warrants listing based on the factors specified in the statute.

III. AUTHOR OF PETITION

Catherine Kilduff
Center for Biological Diversity
1212 Broadway, Suite 800
Oakland, CA 94612
(202) 780-8862
ckilduff@biologicaldiversity.org

I hereby certify that, to the best of my knowledge, all statements made in this petition are true and complete.

Signature: Catherine Kilduff   Date: January 9, 2020

The **Center *for* Biological Diversity** is a national, nonprofit conservation organization with more than 1.6 million members and online activists dedicated to the protection of endangered species and wild places.

The **Turtle Island Restoration Network** is a nonprofit conservation organization with over 100 thousand members dedicated to the protection of vulnerable marine species worldwide.

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EXECUTIVE SUMMARY

The Center for Biological Diversity and Turtle Island Restoration Network submit this petition to list the Pacific leatherback sea turtle as endangered throughout its range in California pursuant to the California Endangered Species Act (California Fish and Game Code §§ 2050 et seq.).

The leatherback sea turtle in the Pacific Ocean has declined by more than 90% over the past four decades, primarily as a result of drowning in industrial longline and gillnet fisheries targeting swordfish, sharks and tunas. The primary cause of the leatherback decline, and the greatest threat to its continued existence, is entanglement and drowning in longline fishing gear (Tiwari et al. 2013). Such fishing is largely banned in the waters off the California coast during the spring, summer and fall when leatherbacks are present, making these waters a rare refuge for this highly imperiled species. In October 2019, however, longline fishing off the California Coast began for the first time in decades under an "exempted fishing permit" issued by the Trump administration.

In addition, entanglement in vertical lines of groundfish pots, Dungeness crab traps, and numerous other impacts including marine debris, pollution, shipping, and global warming threaten to render this important area unsafe and unsuitable for leatherbacks. As recently as October 18, 2019, a dead leatherback was found entangled in fishing gear off southern California.

The waters off California comprise one of the most important foraging areas identified for the critically endangered Pacific leatherback sea turtle. Each year from mid-summer through the fall, leatherback sea turtles, having completed a journey of thousands of miles from their nesting beaches in Indonesia, arrive off the U.S. West Coast to feed on seasonably abundant jellyfish in the California Current ecosystem. California has named the Pacific leatherback sea turtle as the official state marine reptile and designated October 15 as Pacific Leatherback Sea Turtle Conservation Day.

Two decades ago in its Recovery Plan for the U.S. Pacific populations of the leatherback turtle, the National Marine Fisheries Services (NMFS) acknowledged that prompt, long-term protection of identified foraging habitat is necessary to prevent the extinction of the species. In a 2007 study, NMFS scientists concluded that "the waters off central California are a critical foraging area for one of the largest remaining Pacific nesting populations." Although leatherback sea turtles have been listed on the federal Endangered Species Act for decades, and California's waters have been designated as critical habitat under the federal Endangered Species Act for seven years, the population of Pacific leatherbacks has not rebounded. In 2016, NMFS named the Pacific leatherback as one of eight marine species most likely to go extinct.

The protection of the leatherback sea turtle under the California Endangered Species Act will complement protections under the federal Endangered Species Act and is essential to ensure the continued existence of this critically endangered species. As one example, state listing will prohibit catch of leatherback sea turtles incidental to fishing; vessels participating in California-managed fisheries may apply for an incidental take permit, which would be required unless a federal incidental take statement exists. This will increase state and federal cooperation in addressing threats to leatherback sea turtles.

Scientific evidence indicates that leatherbacks in the Pacific are in imminent danger of extinction. While leatherbacks in the Western Atlantic Ocean have substantially increased in population abundance because of protections under the federal Endangered Species Act and the designation of critical habitat around the U.S. Virgin Islands, the Pacific leatherback turtles are doing extremely poorly.

The Center for Biological Diversity and Turtle Island Restoration Network request that the California Fish and Game Commission list the Pacific leatherback sea turtle as endangered throughout its range in California pursuant to the California Endangered Species Act (California Fish and Game Code §§ 2050 et seq.).

1. THE CALIFORNIA ENDANGERED SPECIES ACT LISTING PROCESS AND STANDARD FOR ACCEPTANCE OF A PETITION

The California Legislature enacted the California Endangered Species Act recognizing that certain species of plants and animals have become extinct "as a consequence of man's activities, untempered by adequate concern for conservation"; that other species are in danger of, or threatened with, extinction because their habitats are threatened with destruction, adverse modification, or severe curtailment, or because of overexploitation, disease, predation, or other factors; and that "[t]hese species of fish, wildlife, and plants are of ecological, educational, historical, recreational, esthetic, economic, and scientific value to the people of this state, and the conservation, protection, and enhancement of these species and their habitat is of statewide concern" (Cal. Fish & Game Code § 2051 (a)-(c)).

The purpose of the California Endangered Species Act is to "conserve, protect, restore, and enhance any endangered species or any threatened species and its habitat..." (Cal. Fish & Game Code § 2052). To this end, it provides for the listing of species as "threatened" and "endangered." "Threatened species" means a native species or subspecies of a bird, mammal, fish, amphibian, reptile, or plant that, although not presently threatened with extinction, is likely to become an endangered species in the foreseeable future in the absence of the special protection and management efforts required by this chapter (Cal. Fish & Game Code § 2067). "Endangered species" means a native species or subspecies of a bird, mammal, fish, amphibian, reptile, or plant which is in serious danger of becoming extinct throughout all, or a significant portion, of its range due to one or more causes, including loss of habitat, change in habitat, overexploitation, predation, competition, or disease (Cal. Fish & Game Code § 2062).

The California Fish and Game Commission ("Commission") is the administrative body that makes all final listing decisions, while the California Department of Fish and Game ("Department") is the expert agency that makes recommendations as to which species warrant listing. The listing process may be set in motion either when "any person" petitions the Commission to list a species, or when the Department on its own initiative submits a species for consideration. In the case of a citizen proposal, the California Endangered Species Act sets forth a process for listing that contains several discrete steps.

Upon receipt of a petition to list a species, a 90-day review period ensues during which the Commission refers the petition to the Department, as the relevant expert agency, to prepare a detailed report. The Department's report must determine whether the petition, along with other relevant information possessed or received by the Department, contains sufficient information indicating that listing may be warranted (Cal. Fish & Game Code § 2073.5). During this period interested persons are notified of the petition and public comments are accepted by the Commission (Cal. Fish & Game Code § 2073.3). After receipt of the Department's report, the Commission considers the petition at a public hearing (Cal. Fish & Game Code § 2074). At this time the Commission is charged with its first substantive decision, to determine whether the petition, together with the Department's written report, and comments and testimony received, present sufficient information to indicate that listing of the species "may be warranted," (Cal. Fish & Game Code § 2074.2). This standard has been interpreted by the courts as the amount of information sufficient to "lead a reasonable person to conclude there is a substantial possibility the requested listing could occur." *Natural Resources Defense Council v. California Fish and Game Comm*. 28 Cal.App.4th at 1125, 1129.

If the petition, together with the Department's report and comments received, indicates that listing "may be warranted," then the Commission must accept the petition and designate the species as a "candidate species" (Cal. Fish & Game Code § 2074.2). "Candidate species" means a native species or subspecies of a bird, mammal, fish, amphibian, reptile, or plant that the Commission has formally noticed as being under review by the Department for addition to either the list of endangered species or the list of threatened species, or a species for which the Commission has published a notice of proposed regulation to add the species to either list (Fish & Game Code § 2068).

Once the petition is accepted by the Commission, a more detailed level of review begins. The Department is given 12 months from the date of the petition's acceptance to complete a full status review of the species and recommend whether such listing "is warranted." Following receipt of the Department's status review, the Commission holds an additional public hearing and determines whether listing of the species "is warranted." If the Commission finds that the species is faced with extinction throughout all or a significant portion of its range, it must list the species as endangered (Cal. Fish & Game Code § 2062). If the Commission finds that the species is likely to become an endangered species in the foreseeable future, it must list the species as threatened (Cal. Fish & Game Code § 2067).

Notwithstanding these listing procedures, the Commission may adopt a regulation that adds a species to the list of threatened or endangered species at any time if the Commission finds that there is any emergency posing a significant threat to the continued existence of the species (Cal. Fish & Game Code § 2076.5).

The California Endangered Species Act is modeled after the federal Endangered Species Act and is intended to provide an additional layer of protection for imperiled species in California. The California Endangered Species Act may be more protective than the federal Endangered Species Act. Fish and Game Code § 2072.3 states:

> To be accepted, a petition shall, at a minimum, include sufficient scientific information that a petitioned action may be warranted. Petitions shall include information regarding the population trend, range, distribution, abundance, and life history of a species, the factors affecting the ability of the population to survive and reproduce, the degree and immediacy of the threat, the impact of existing management efforts, suggestions for future management, and the availability and sources of information. The petition shall also include information regarding the kind of habitat necessary for species survival, a detailed distribution map, and any other factors that the petitioner deems relevant.

2. INTRODUCTION

Leatherback sea turtles are critically endangered in the Pacific and face numerous threats to their continued existence including incidental take by gillnet and longline fisheries, pollution, marine debris, and habitat destruction. Listing the Pacific leatherback sea turtle under the California Endangered Species Act will provide crucial and complementary protection against many of these threats and would aid in ensuring the continued survival and eventual recovery of the species in the Pacific.

This petition reviews the natural history and status of leatherback sea turtles, focusing largely on trends and threats to the critically endangered Pacific population. The petition describes the importance of protecting this population under the California Endangered Species Act and explains why this is crucial for the survival and recovery of the population.

Though the leatherback sea turtle has been federally protected under the Endangered Species Act since 1970 (35 Fed. Reg. 8491), it is still one of the marine animals most at-risk of extinction in the United States. NMFS developed a recovery plan for the Pacific population in 1998 (65 Fed. Reg. 28359). Upon a petition by the Center, NMFS designated critical habitat along the U.S. West Coast in 2012, which include waters off California with sufficient condition, distribution, diversity, abundance and density of prey species necessary to support growth, reproduction, and development of leatherbacks (77 Fed. Reg. 4170). This designation illustrates the importance of waters off California for leatherback foraging success, and the need to conserve those waters through both federal and state efforts. The leatherback sea turtle is listed as endangered also by Oregon and Washington State (Oregon 2018, Sato 2017).

3. LIFE HISTORY

3.1. Species Description

The leatherback sea turtle's slightly flexible, rubbery-textured carapace, for which *D. coriacea* is named, distinguishes the species from other sea turtles (NMFS & USFWS 1998). Leatherbacks are the largest turtle species in the world and the fourth largest living reptile (McClain et al. 2015 p. 39). Although their size varies regionally, the curved carapace length of adult leatherbacks commonly exceeds 1.5 meters (McClain et al. 2015 p. 41). Adult males and females can reach 2 meters in length while weighing up to 900 kilograms (McClain et al. 2015 p. 39). The largest known leatherback by mass was 916 kg (McClain et al. 2015 p. 39). There are body-size differences between mature turtles from the eastern (smaller) and western Pacific (larger) nesting colonies, which are distinguished on the basis of genetic differentiation discussed in detail below.

The unique characteristics of the leatherback's carapace contribute to broad thermal tolerance in adults and enables the species to forage in water temperatures far lower than the leatherback's core body temperature (NMFS & USFWS 1998 p. 5). Adults have been reported in the Pacific as far north as the Bering Sea in Alaska and as far south as Chile and New Zealand (NMFS & USFWS 1998 p. 5). Previous studies have shown that the core body temperature in adults while in cold waters are several degrees Celsius above ambient, evidence of endothermy (warm blood) in a mostly poikilothermic (cold blood) class, Reptilia (Bostrom et al. 2010). In fact, satellite tagging studies have shown that leatherbacks can dive continuously for several weeks in waters as cold as 0.4ºC (James et al. 2006). Several features such as thermal inertia (due to large body mass and exercise), insulating layer of sub-epidermal fat, countercurrent heat exchangers (in front and back flippers), brown adipose tissue that could generate heat, and high lipid concentration with low freezing point, contribute to extreme cold thermal tolerance (James et al. 2006; Bostrom & Jones 2007; Bostrom et al. 2010).

Leatherbacks have several morphological adaptations advantageous to extraordinary large-scale ocean migrations (Benson et al. 2011), deep dives (Eckert et al. 1989), and sustained residence in the open ocean (NMFS & USFWS 1998 p. 5) (Figure 1). Leatherbacks have strong front flippers that are proportionally longer than those of other sea turtle species and may span up to 270 cm wide in adults (NMFS & USFWS 1998 p. 4). Carapaces of adult leatherbacks are 4 cm thick on average, constituted mainly of tough, oil-saturated connective tissue with seven prominent ridges (NMFS & USFWS 1998 p. 4) (Figure 1). Below the leathery outer skin of the carapace, a quasi-continuous layer of small dermal bones is present (NMFS & USFWS 1998 p. 5).

Leatherbacks have a predominately black coloration with varying degrees of pale spotting that covers the scaleless skin and the sculpted ridges of the carapace (NMFS & USFWS 1998 p. 4) (Figure 1). The underside is often mottled, white to pinkish and black, and the degree of pigmentation is variable (NMFS & USFWS 1998 p. 4). The upper jaw has two tooth-like projections flanked by deep cusps that help in capturing jellyfish, their main food source (NMFS & USFWS 1998 p. 5).

Leatherback hatchlings are mostly black with mottled undersides, and covered with small polygonal bead-like scales. Flippers have a white margin and white scales are present as stripes along the back (Figure 1). In contrast to other sea turtle species, leatherbacks lack claws in both front and rear flippers (NMFS & USFWS 1998 p. 4).

Figure 1. Leatherback sea turtle adult (left) at the Virgin Islands National Park and hatchling at Cape Lookout National Seashore (right). Photo credit: Caroline Rogers (adult leatherback), Sea Turtle Conservancy (hatchling).

3.2. Taxonomy

The generic name *Dermochelys* was introduced by Blainville in 1816 (NMFS & USFWS 1998 p. 4). The specific name c*oriacea* was initially used by Vandelli in 1761 and was later adopted by Linnaeus in 1766 (NMFS & USFWS 1998 p. 4). The species name refers to the unique leathery texture and scaleless skin of adults (NMFS & USFWS 1998 p. 4). The leatherback turtle is the only surviving species of the taxonomic family *Dermochelyidae* (NMFS & USFWS 1998 p. 4). All other sea turtles belong to the family *Cheloniidae* and have bony carapaces plated and covered with horny scutes.

Behavioral, morphological, biochemical and genetic studies have determined that the leatherback bears some relationship to other sea turtles (NMFS & USFWS 1998 p. 4). However, the skeletal morphology of leatherbacks is unique among turtles and karyological studies support the taxonomic classification segregating sea turtle species into two distinct families (Bickham & Carr 1983). For a detailed discussion of taxonomy and synonymy, see Pritchard (1997).

3.3. Population Genetics

Pacific leatherbacks are divided into two genetically distinct eastern and western populations; while both could be present off California, the West Pacific leatherback is far more commonly found feeding in waters off California (Dutton et al. 2007 p. 48). The West Pacific population is known to nest in least at 28 different sites along the tropical shores of Indonesia, Papua New Guinea, the Solomon Islands and Vanuatu. These nesting colonies all share a unique, common haplotype[1] (Dutton et al. 2007). Because of this, plus the lack of differentiation in haplotype frequency among the nesting colonies, the West Pacific population is considered a metapopulation composed of a single genetic stock (*id*.).

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[1] A haplotype is a group of genes that tend to be inherited together from a single parent.

3.4. Reproduction and Growth

Leatherbacks reach sexual maturity at ~9-15 years and reproduce seasonally. (Zug & Parham 1996 p. 244; Dutton et al. 2005 p. 191). Mating takes place in the open ocean, and despite being seldom observed, researchers believe that mating occurs in coastal waters adjacent to nesting beaches, based on studies on Atlantic leatherback sea turtles (James et al. 2005 p. 848). Gravid (pregnant) females then migrate to nest on the same tropical shores where they were born.

Over the course of a single nesting season, female leatherbacks lay an average of five nests (Dutton et al. 2007 p. 48; Hitipeuw et al. 2007 p. 30) at an interval of ~9.3-9.5 days (Reina et al. 2002 p. 658). In the West Pacific, leatherback females nest primarily from June to September and lay roughly 85-95 eggs per nest (PFMC & NMFS 2006 p. 66). The typical interval females spend between migrating to foraging and to breeding grounds for female leatherbacks is every two to seven years, based on studies in the Atlantic, but can vary widely in response to ecological conditions in the foraging areas and interannual climate variability such as La Niña / El Niño events, particularly for sea turtles that nest in the eastern Pacific (Dutton et al. 2005 p. 189; Saba et al. 2007 pp. 398, 401).

Leatherbacks prefer to nest on unobstructed, mildly sloped, sandy, continental shores accompanied by deep offshore waters (NMFS & USFWS 1998 p. 15). Leatherback nesting activity, as in other sea turtles, includes a beach landing, a terrestrial crawl to the selected nest site usually above the high tide line, excavation of a body pit and nest chamber, egg-laying, filling and concealing the hole, and return to the sea (NMFS & USFWS 1998 p. 15). From landing to surf reentry, the total sequence lasts between 80 and 140 minutes (NMFS & USFWS 1998 p. 15).

Hatchling sex depends on the temperature of the nest environment during the 55-75 day incubation period (NMFS & USFWS 1998 p. 15). Studies have found the pivotal temperature to be 29.4° C with females becoming increasingly dominant with increasing temperature (Binckley et al. 1998). Once hatched, leatherback hatchlings cooperatively tunnel out of the submerged nest (NMFS & USFWS 1998 p. 15). This process typically begins in the evening and goes on for several days (NMFS & USFWS 1998 p. 15). Leatherback hatchlings measure approximately 5.64 cm and weigh an average of 41.2 g (NMFS & USFWS 1998 p. 15).

3.5. Diet and Foraging Ecology

Leatherback sea turtles typically feed on marine invertebrates including jellyfish (cnidarians, specifically medusae and siphonophores) and tunicates (pyrosomas and salps) (Bjorndal et al. 1997 p. 209; Wallace et al. 2006). Gelatinous zooplankton, known to develop in aggregations in temperate and boreal latitudes, is the preferred prey of leatherbacks (Houghton et al. 2006). While foraging in the pelagic, leatherbacks are known to exploit convergence zones and areas of upwelling waters where aggregations of prey commonly occur, such as off California (Benson et al. 2007b).

Nematocysts from deep water siphonophores found in leatherback stomach samples suggest that foraging at depth is likely (Den Hartog 1979 p. 6). Leatherbacks can dive in excess of 1,200 meters deep and over one hour in duration (Houghton et al. 2006), yet most recorded leatherback dives range between 50 and 200 meters (Houghton et al. 2006 p. 2568). Leatherbacks spend most of their time at sea submerged and display patterns of continual diving that suggest frequent surveying of the water column for gelatinous prey (Houghton et al. 2006).

Dense aggregations of jellies (scyphomedusae) are common in the summer and fall months throughout the nearshore regions from Central California to Northern Oregon (Graham et al. 2010). Oceanographic retention zones and upwelling shadows, such as those in the neritic waters off Central California, are particularly favorable habitat for leatherback prey (Graham et al. 2010). Leatherbacks are most frequently observed feeding on *Chrysaora fuscescens*, *Chrysaora colorata*, and *Aurelia* spp. which are especially common in retention areas between Point Reyes and Monterey Bay, California (Benson et al. 2007b p. 345). Leatherback predation on high densities of readily-captured jellyfish results in high energy intake at a certain time of the year, consistent with sea turtles gaining weight while in that location (Heaslip et al. 2012).

Studies have shown a positive relationship between leatherback abundance in neritic waters off California and the average annual Northern Oscillation Index (NOI) (Benson et al. 2007b p. 345). Years of positive NOI values appear to correspond with conditions favorable to upwelling along the California coast. This upwelling leads to phytoplankton and zooplankton (including jellyfish) production, which in turn draws in leatherbacks (Benson et al. 2007b p. 345).

3.6. Migration

Leatherbacks spend nearly their entire lives in the ocean's pelagic zone (*i.e.*, the water column). Some females may forage year-round in tropical habitats near nesting beaches; others undertake a lengthy migration to exploit temperate foraging habitats like that off central California (Benson et al. 2011; Lontoh 2014). The latter turtles forage in temperate waters except during the nesting season, when gravid female leatherbacks migrate to tropical beaches to lay eggs (NMFS & USFWS 2013).

The details of lengthy leatherback migrations were largely unknown until recently when researchers discovered distinct migratory corridors followed by the West Pacific leatherback population (Benson et al. 2007a, 2011). Those West Pacific leatherbacks that embark on a trans-Pacific migration to the temperate continental shelf of the U.S. West Coast forage on the seasonally abundant aggregations of gelatinous zooplankton (Benson et al. 2007b p. 345; Block et al. 2011 p. 87; Bailey et al. 2012 p. 739) (see Figure 2). Here, coastal upwelling creates a highly productive and dynamic ecosystem that they efficiently exploit (Benson et al. 2007b). The leatherbacks that forage in California have greater body size than tropical foragers (Benson et al. 2011; Lontoh 2014).

The eastern Pacific population occurs along the coast of California and exhibits some overlap in distribution with the western Pacific population (Tiwari et al. 2013). Eastern Pacific leatherbacks are known to migrate south from the shores of Mexico, Costa Rica and Nicaragua, where they nest, through the Galapagos to feeding sites throughout the southeast Pacific off South America's West Coast (Shillinger et al. 2008 p. 1410; Block et al. 2011 p. 87; Bailey et al. 2012 p. 740).

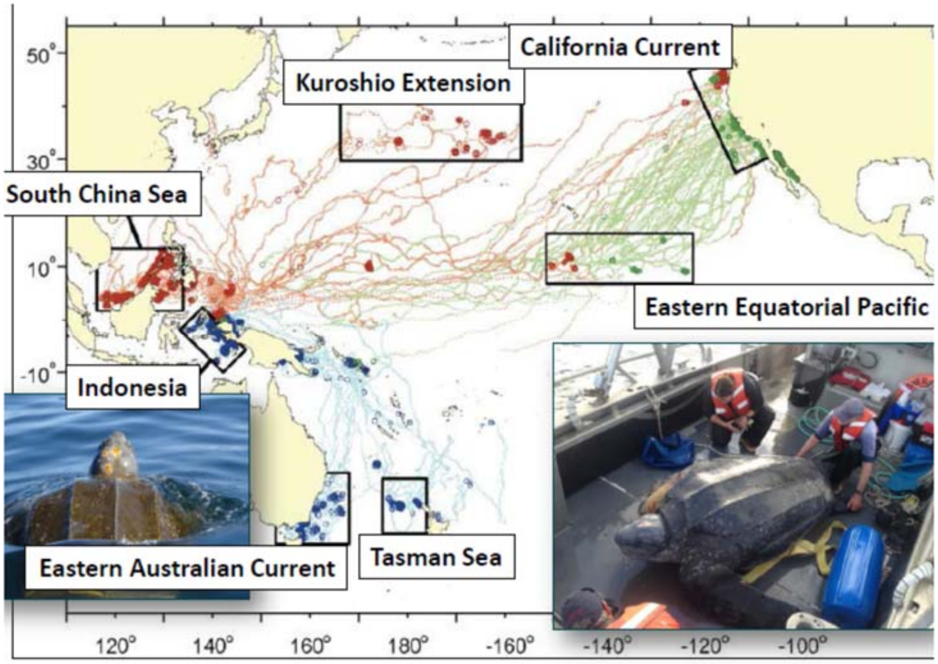

Figure 2. West Pacific leatherback sea turtles' migration and areas of primary foraging habitat (Data source: Benson et al. 2011; photo credit: NMFS 2017a).

4. POPULATION TREND, DISTRIBUTION, AND ABUNDANCE

4.1. Population Trend

The critically endangered West Pacific leatherback turtle population has suffered a catastrophic decline over the last three decades. This population faces extinction mainly as a result of incidental bycatch in commercial and artisanal fisheries, overharvest of eggs and killing of adults at nesting beaches, as well as commercial and residential development on nesting beaches (Kaplan 2005; Tapilatu et al. 2013).

In the Pacific Ocean, leatherback populations have drastically plummeted at all major nesting beaches resulting in more than 95% decline in leatherbacks from the eastern and western populations combined over the last 30 years (Spotila et al. 2000; Tapilatu et al. 2013). If current trends continue, Pacific leatherbacks are predicted to go extinct within the next few decades (Spotila et al. 2000; Tapilatu et al. 2013).

The number of Pacific leatherback sea turtles in California waters has declined consistently with the decline observed in the Pacific population. Scott Benson, NMFS staff and author of *Large-scale movements and high-use areas of western Pacific leatherback turtles*, in 2015 estimated the number of Pacific leatherbacks in California waters from 2005–2014 averaged 54 individuals annually (Benson, *pers. comm.* 2015). The prior estimate, using data from 1990-2003, indicated an annual average of 178 leatherback sea turtles off California (Benson et al. 2007b).

4.2. Historical and Current Distribution

Leatherbacks have the largest geographic range of any living marine reptile, spanning the temperate and tropical waters in all oceans (Hays et al. 2004; James et al. 2006; Benson et al. 2007a, 2011). Adults have been reported in the Pacific as far north as the Bering Sea in Alaska and as far south as Chile and New Zealand (NMFS & USFWS 1998 p. 5).

West Pacific leatherbacks are a highly migratory species and are known to swim over 10,000 km within a single year (Benson et al. 2007a, 2011; Shillinger et al. 2008). The incomparable migratory ability is made possible by the leatherback's morphological adaptations noted above. These adaptations equip leatherbacks for sustained residence at sea and enable them to traverse enormous ocean basins such as the Pacific (Benson et al. 2007a, 2011).

While there exists a small probability that a stranded leatherback off California could be from the eastern Pacific population, satellite tagging studies and genetic analyses of tissue samples thus far (e.g., of stranded leatherbacks on California beaches or incidentally caught in the California swordfish drift gillnet fishery) indicate that individuals foraging in waters off California originate from nesting beaches in the West Pacific (Benson et al. 2007b, 2011 p. 6; Dutton et al. 2007; Harris et al. 2011; Bailey et al. 2012 p. 739).

4.3. Historical and Current Abundance

The Pacific leatherback population has declined dramatically in abundance from historical levels. Population declines have been documented at nesting beaches throughout the Indo-Pacific region (Chan & Liew 1996; Spotila et al. 2000; Hitipeuw et al. 2007; NMFS & USFWS 2013). The total West Pacific leatherback population was estimated in 2007 to include 2,700-4,500 breeding females with 1,100-1,800 female leatherbacks nesting annually (Dutton et al. 2007 pp. 47, 51). More recently, deriving abundance estimates from nest counts gives a conservative West Pacific population estimate of 562 nesting females (NMFS 2017b p. 108). There are expected to be half that amount by 2040, which is too small a population to recover (Tiwari et al. 2013; Wallace et al. 2013).

One of the leatherback's most important nesting areas in the West Pacific (at Terengganu, Malaysia) was virtually eradicated by the mid-1990s from fisheries interactions on the high seas and around Malaysia plus egg exploitation, with nesting populations representing less than 2% of the levels recorded in the 1950s (Chan & Liew 1996). The nesting population in this region declined from 3,103 female leatherbacks estimated in 1968 to only two nesting females in 1994 (Chan & Liew 1996). Currently, leatherback nesting in this region may be close to extirpation (Chan 2006).

The only remaining major nesting areas for the West Pacific leatherback population, which migrates across the Pacific to feed on the rich aggregations of jellyfish off the U.S. West Coast (Benson et al. 2007a, 2011), are on the Bird's Head Peninsula beaches of Jamursba-Medi and Wermon in the Indonesian province of Papua (Hitipeuw et al. 2007; Tapilatu & Tiwari 2007). Yet even at these beaches, leatherback nesting has declined significantly over the last thirty years and no recovery has been observed despite protection efforts of nesting areas initiated in 1992 (Hitipeuw et al. 2007). Counts of leatherbacks at nesting beaches in the West Pacific indicate that the population has been declining at a rate of almost six percent per year since 1984 (Tapilatu et al. 2013).

At one of these remaining leatherback rookeries, Jamursba-Medi, studies estimated that 300-900 female leatherbacks nested annually in 2004, down from 1,000-3,000 prior to 1985 (Hitipeuw et al. 2007 p. 31). The leatherback population on Jamursba-Medi continued to decline after 1993, when scientists first began to consistently record data (Hitipeuw et al. 2007 p. 31). Yet the population has not collapsed to the extent of others in the Pacific basin (Hitipeuw et al. 2007 p. 31).

5. IMPORTANCE OF CALIFORNIA WATERS FOR LEATHERBACKS

The waters off the coasts of California, Oregon, and Washington within the California Current ecosystem comprise one of the most important foraging areas for leatherback sea turtles in the eastern North Pacific Ocean (Benson et al. 2007b; Harris et al. 2011 p. 333). In this region, coastal upwelling creates a dynamic and highly productive ecosystem, ideal for foraging adults (Benson et al. 2007b; Graham et al. 2010). In California, leatherbacks typically forage seasonally, from July to November, on large aggregations of jellyfish (*Scyphomedusae*) along the central coast when sea surface temperatures are 14-17ºC (Benson et al. 2007b p. 345).

Leatherbacks' presence off California is strongly related to seasonal upwelling that spatially drives food availability. The California Current ecosystem exhibits stronger seasonal upwelling between Point Conception and Cape Mendocino between July and October (Huyer 1983 p. 267). Previous studies have shown that leatherback distribution and occurrence in waters off California have been linked to sea surface temperature of 15-16ºC during late summer and early fall (Starbird et al. 1993). For example, sightings of leatherback turtles are often reported in Monterey Bay during August by recreational boaters, whale-watching operators, and researchers (Benson et al. 2007b p. 338). The greatest densities of leatherbacks off central California consistently have been found where upwelling creates favorable habitat for jellyfish production, their main prey (Benson et al. 2007b p. 337).

In the 1998 Recovery Plan, NMFS stated that "the waters off the west coast of the United States may represent some of the most important foraging habitat in the entire world for the leatherback turtle" (NMFS & USFWS 1998 p. 14). Studies have documented substantial numbers of leatherbacks from West Pacific nesting beaches traveling thousands of miles to feed on seasonally abundant aggregations of jellyfish in the California Current ecosystem (Benson et al. 2007b p. 346). The significance of these waters as foraging grounds for West Pacific leatherback cannot be overstated (Benson et al. 2007b p. 346).

Protection of foraging grounds off California is crucial to conserve leatherback turtles. From 1963 to 2016, there have been 151 reported leatherback sea turtle strandings along the U.S. West Coast, including Alaska, Washington, Oregon and California (Eguchi et al. 2017a). From 2013 to 2017, six leatherbacks stranded on the U.S. West Coast, and all occurred in California (NMFS 2018a). This is consistent with the historical trends, which show that nearly all stranded leatherback sea turtles with evidence of human interaction strand in California (Eguchi et al. 2017a, Figure 3). Successful conservation efforts for leatherback turtles must include protecting migration corridors and reducing/eliminating threats in foraging areas off California (Figure 4).

Studies have highlighted that waters off central California are a critical foraging area for one of the largest remaining Pacific nesting populations (Benson et al. 2007b p. 346). Therefore, protecting foraging leatherback sea turtles off California waters from lethal threats such as oil spills, ship strikes and incidental bycatch in commercial and recreational fisheries is of critical importance for the survival and recovery of the species.

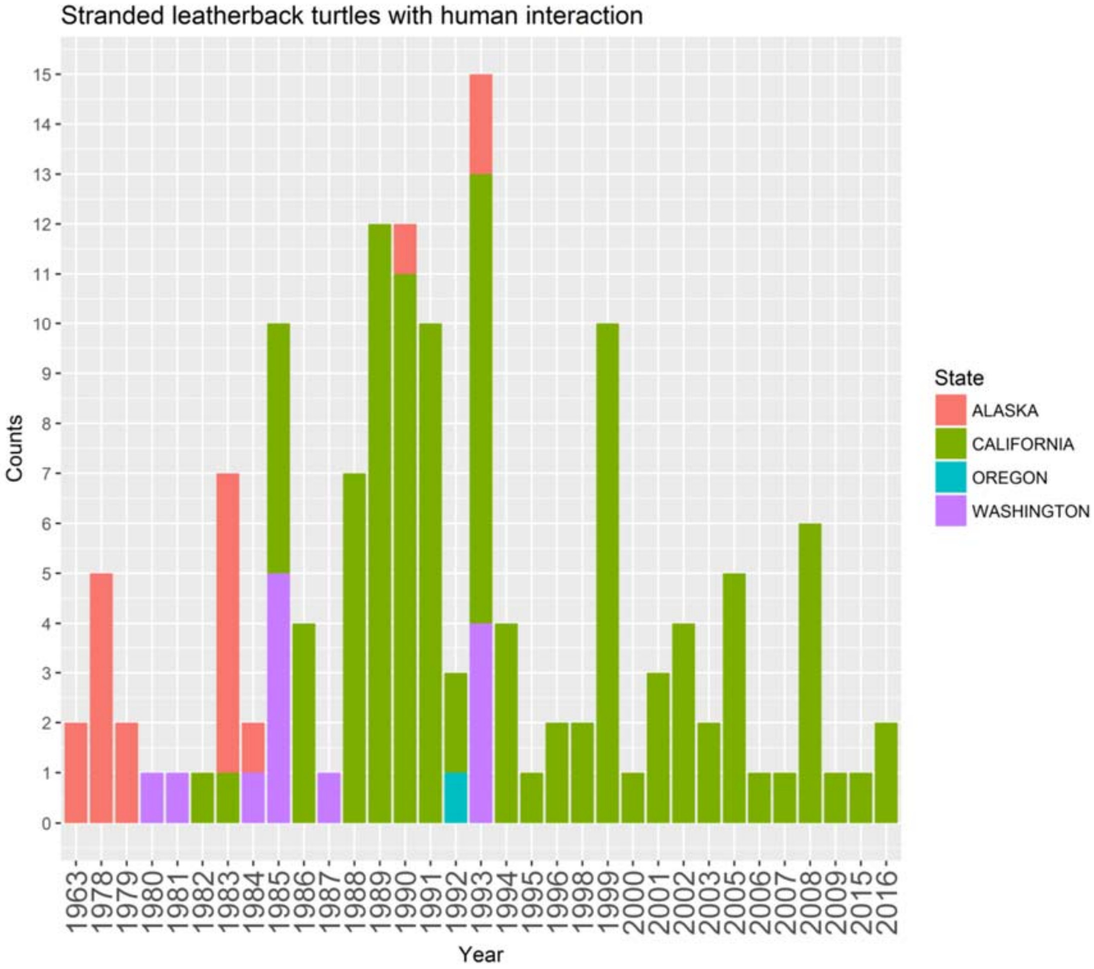

Figure 3. The number of stranded leatherback turtles (excluding those released alive) along the U.S. West Coast from 1963 through 2016. No strandings occurred outside California after 1993. Years without stranding records were omitted from the plot to make it concise (Source: Eguchi et al. 2017a).

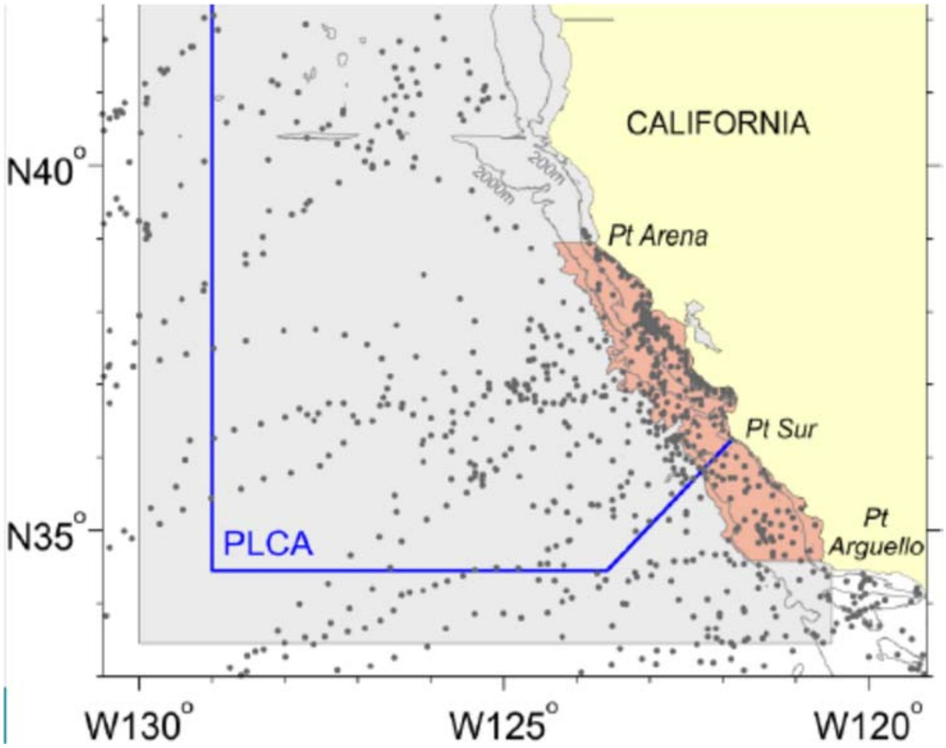

Figure 4. California distribution map of leatherback sea turtles. Black dots are leatherback sea turtle telemetry data. Pink or dark shaded area indicates the leatherback sea turtle critical habitat designation in California (not pictured: critical habitat in Oregon and Washington). "PLCA" is the Pacific Leatherback Conservation Area that excludes the drift gillnet fishery for three months each year (Source: NMFS 2017a).

6. FACTORS AFFECTING THE ABILITY OF THE POPULATION TO SURVIVE AND REPRODUCE

6.1. Present or Threatened Modification or Destruction of Its Habitat

West Pacific leatherbacks expend tremendous time and energy migrating to and along the California coast to forage on jellyfish, demonstrating the importance of this habitat. Among 37 adult leatherbacks tagged in coastal waters off California, the majority moved north and spent time in areas off northern California and Oregon before moving towards the equatorial eastern Pacific, then eventually westward, presumably towards West Pacific Ocean nesting beaches (Benson et al. 2011). While in coastal waters off California these leatherbacks are highly vulnerable to anthropogenic impacts.

Most threats to leatherback sea turtles occur in nearshore marine areas. The cumulative impact of anthropogenic activities on leatherback sea turtles are higher nearshore and within the national marine sanctuaries (Maxwell et al. 2013, Figure 5). Because California maintains jurisdiction offshore to 3 nm – wherein occurs the vast majority of human activities in the marine environment (e.g., fishing, swimming, boating) – it is uniquely situated to mitigate these threats.

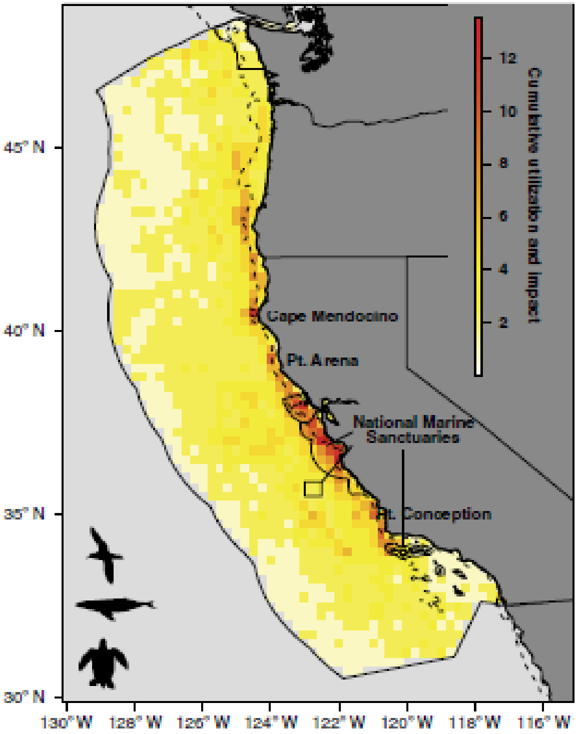

Figure 5. Combined tracking data and cumulative impact data (underlying human stressors weighted by species vulnerability) for leatherback sea turtles, marine mammals and seabirds (Source: Maxwell et al. 2013).

In recognition of the magnitude of coastal impacts, state activities, brochures, maps, and educational resources emphasize actions to protect habitats in California's nearshore coastal zone used by leatherbacks. For example, the California Coastal Commission has active public education and outreach efforts focused on coastal beaches and waters, including an "Adopt-a-Beach" program and "California Coastal Cleanup Day" that annually draws tens of thousands of participants; the California Department of Fish and Game is actively involved in implementing the state's Marine Life Protection Act and the identification of Marine Protected Areas. *Id.* Yet California has established none of these measures on the basis of criteria specifically intended to improve leatherback sea turtle survival.

In part because no state measures specifically protect leatherback prey quality or density, the federal government identified California's offshore waters between the 200- and 3000-meter isobaths from Point Arena to Point Sur, and waters between the coastline and the 3000-meter isobath from Point Sur to Point Arguello, as leatherback critical habitat. *Id.* at 4183, 4186-87. Areas of coastal upwelling produce abundant and dense aggregations of leatherback prey; thus it is critically important to not only protect leatherback prey in these areas but also the sea turtles' ability to get to the prey from hundreds of miles away.

Leatherbacks and their preferred prey are in danger from oil and gas extraction activities on and around the California Coast, aquaculture facilities, coastal development, entanglement by and ingestion of marine debris, and beach erosion. Leatherbacks are also in immediate danger from overexploitation by fisheries, primarily through entanglement and ingestion of marine debris. The State of California is in a unique situation to protect leatherbacks from these threats, which are discussed in greater detail below.

6.1.1. Oil and Gas Activities in California

Juvenile and adult leatherback sea turtles may encounter oil, tar, and spill-related chemicals in the water column, at the surface, and through contaminated prey. Such exposure can lead to declining red blood cell counts and increased white blood cell counts; impaired ability to regulate the internal balance of salt and water; and sloughing of the skin that can lead to infection (NMFS 2003 at 40-43). Sea turtles inhale very deeply before diving and thus can inhale large concentrations of toxic fumes at the surface of an oiled area, which in turn can lead to respiratory impairment (NMFS 2003 at 40). Because sea turtles generally do not avoid oil-contaminated areas, they are very vulnerable to harmful contact with oil and its byproducts. Turtles are particularly prone to ingest oil and tar. Sea turtles are known to indiscriminately ingest tar balls that are about the size of their normal prey. Ingested tar interferes with digestion, sometimes leading to starvation, and can cause buoyancy problems, rendering the turtle more vulnerable to predation and less able to forage. In addition, tar and oil remain in the digestive system for several days, increasing the turtle's absorption of toxins (NMFS 2003 at 39-40).

Oil spills also affect sea turtles in less direct ways. Oil spills can reduce food availability, and ingestion of contaminated food can expose turtles to harmful hydrocarbons. Oil exposure may render turtles more vulnerable to fibropapilloma, a condition that can degrade the turtle's overall health and interfere with feeding and other behaviors (NMFS 2003 at 44). The potential impacts from oil spills are particularly troubling given the highly imperiled status of leatherback sea turtles.

Oil spill response also presents hazards to sea turtles. Approximately 54% (9,198 mi^2 [23,822 km^2]) of the designated critical habitat in California (16,910 mi^2 [43,797 km^2]) is located within the Pre-Approval Zone for use of dispersants in response to an oil spill. Dispersants and dispersed oil in the water column are of equal concern in terms of negative impacts to leatherbacks. Sea turtles may be exposed to dispersants and dispersed oil as they swim and feed in the water column. Leatherback sea turtles migrate over large areas to feed on aggregations of jellyfish, sea nettles, and salps in late summer close to shore (77 FR 4170). They spend over 75% of the time in the upper 5 m (16 ft) of the water column (NMFS 2012), which potentially exposes them to floating oil and dispersant spray. The peak concentration of chemically dispersed oil and dispersants will occur in the top few meters of the water column (typically <33 ft [10 m]) immediately after application of dispersants.

While surfacing to breathe, sea turtles can breathe in fumes from or ingest dispersants and dispersed oil. Monitoring data have indicated that the use of the Corexit dispersants killed up to 25% of all organisms living 500 feet below the surface in areas where the dispersant was used. In sea turtles, dispersants contain components that can interfere with lung function, respiration, digestion, excretion, and salt gland function to a degree "similar to the empirically demonstrated effects of oil alone" (NMFS 2003). According to the Minerals Management Service, dispersant components absorbed by sea turtles can affect their organs and interfere with digestion, excretion, and respiration (MMS 2007). Burning oil at the surface, another potential response to oil spills, can directly harm turtles at the surface, particularly those that are trapped in algae mats, and indirectly harm turtles by causing lung irritation from smoke and formation of ingestible, sinking globs of oil (*id.*).

6.1.2. Aquaculture

The growth of aquaculture off California threatens to obstruct leatherback sea turtle's migration to coastal waters by entangling them in fixed gear. Leatherbacks have been recorded entangled in aquaculture gear several times in the Atlantic (Hamelin et al. 2017 p. 635). Leatherback sea turtles have front flippers that are proportionately larger when compared to similar species, which may make them more vulnerable (NMFS 2012 p. 6). Longlines used in mussel aquaculture are a documented source of mortality to leatherback sea turtles (Price et al. 2017 p. 19, 32). In addition, the federal government has described aquaculture as an activity that may adversely impact leatherback sea turtles' migratory pathway to nearshore waters off the U.S. West Coast. 77 Fed. Reg. 4191. Off California in particular, the 100-acre mussel aquaculture facility six miles offshore poses an entanglement risk to leatherback sea turtles (NMFS 2012 p. 6).

6.1.3. Coastal Development Throughout the West Pacific Leatherbacks' Range

As human populations expand throughout the tropical Pacific at unprecedented rates, commercial and residential development on beachfront property increasingly encroaches on leatherback habitat (NMFS & USFWS 1998 p. 21, 2013). Recreational and commercial use of nesting beaches, litter and other debris on beaches and in the ocean, and the general harassment of turtles all degrade leatherback habitat (NMFS & USFWS 1998 p. 21). Plus, the increased human presence near leatherback habitat tends to increase the direct harvest of leatherbacks and their eggs (*id.*).

6.1.4. Entanglement by and Ingestion of Marine Debris

The entanglement in and ingestion of marine debris constitutes a serious and widespread threat to the leatherback populations (NMFS & USFWS 1998 p. 24; Schuyler et al. 2014 p. 132). Leatherbacks are easily entangled in abandoned fishing gear, lines, ropes, and nets (NMFS & USFWS 1998 p. 24). Leatherbacks also commonly mistake plastic bags, plastic sheets, balloons, latex products, and other refuse for jellyfish, their preferred prey (NMFS & USFWS 1998 p. 24; Bugoni et al. 2001; Nelms et al. 2016). Mortality from marine debris threatens the leatherback population throughout the Pacific including the nesting population at Jamursba-Medi (Hitipeuw et al. 2007 p. 34).

Mrosovsky et al. (2009) estimated that approximately one-third of all adult leatherbacks autopsied from 1968 to 2007 had ingested plastic. Plastic ingestion can interfere with laying eggs through obstruction (Plot and Georges 2010). The ingestion of marine debris can cause suffocation by clogging the esophagus of leatherbacks or lead to forms of poisoning (NMFS & USFWS 1998 p. 24; Nelms et al. 2016).

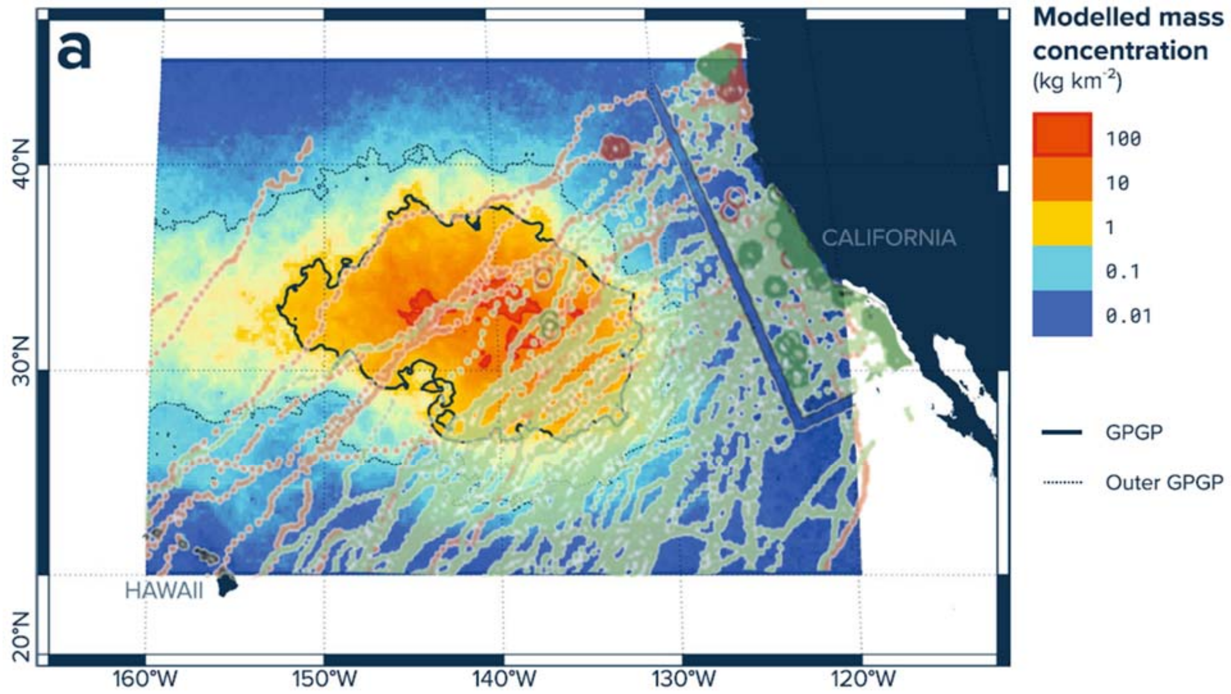

Figure 6. Great Pacific garbage patch modelled plastic concentration (kg km^{-2}) and leatherback turtle migratory routes (green and red dots). (Image credit: The Ocean Cleanup Foundation; leatherback telemetry data from Benson et al. 2011).

6.1.5. Vessel Strikes from Commercial Shipping and Other Boat Traffic

Stranding records provide only a minimum of information about the magnitude of the threat of vessel strikes to leatherback sea turtles. From 1989 through 2014 there have been 12 reported incidents of vessel struck leatherback sea turtles in California, but this is an underestimate because carcasses that sink or strand in an area where they cannot be detected go unreported or unobserved (NMFS 2017c). NMFS has concluded:

> It is impossible to know how many leatherbacks have been affected by ship strikes because it is likely that animals are not seen or their bodies are destroyed as a result of either blunt force trauma or getting caught in a ship's propellers. Large whales, due to their size, are much more likely to be seen after an interaction with a ship; leatherbacks average six feet in length while the large whales . . . may range in size from 40 to 90 feet in length.

(*id.* at 58). Given that NMFS has identified the waters off central California as an important foraging area for leatherbacks during the summer and fall, it is likely that they are affected by ship traffic in that area.

Table 1. Reported incidents of vessel-struck leatherback sea turtles in California 1989-2014 (NMFS 2017c at 58-59).

Year	Month	Day	Location	County
2005	9	16	Beached	Marin
2008	8	9	Floating in Water	San Luis Obispo
2005	8	21	Beached	San Francisco
2001	4	30	Floating in Water	Monterey
1998	10	2	Beached	San Francisco
1990	9	29	Beached	Marin
1990	1	13	Beached	Santa Barbara
1989	6	27	Floating in Water	Los Angeles
1989	8	22	Beached	Marin
1989	7	10	Beached	Los Angeles
1989	10	3	Beached	San Mateo
1989	9	23	Beached	San Mateo

6.1.6. Beach Erosion

Many leatherback nesting beaches are subject to seasonal or storm related erosion and accretion (Hitipeuw et al. 2007 pp. 28, 30). From August through October at Jamursba-Medi, high surf and strong currents erode large numbers of unhatched nests (Hitipeuw et al. 2007 p. 34). At this time of year, only a fraction of the beach at Jamursba-Medi remains between the high water mark and the forest, while some stretches of beach can end up completely eroded (Hitipeuw et al. 2007 p. 34). In April, as nesting begins to increase at Jamursba-Medi, the pattern reverses and sand accretion returns beaches up to 65 meters wide by late August (Hitipeuw et al. 2007 p. 34). Such a delicate balance puts leatherback nesting habitat at serious risk from global climate change. Erosion already destroys an estimated 45% of leatherback nests at Jamursba-Medi, including 80% of the nests at Warmamedi (Hitipeuw et al. 2007 p. 30). At nearby Wermon, 11% of the observed nests were lost to the high tides in 2003-2004 (Hitipeuw et al. 2007 p. 30). As sea levels continue to rise, the leatherback's fragile habitat will only become more at risk of destruction from wave-induced erosion (Van Houtan & Bass 2007).

6.2. Overexploitation

6.2.1. Fisheries bycatch and entanglement in fishing gear

The leatherback's expansive migrations over ocean basins expose the species to a gauntlet of threats from fisheries. Their large pectoral flippers and active behavior make leatherbacks particularly vulnerable to entanglement in fishing gear (James et al. 2005 p. 197). Once entangled, leatherbacks usually continue to try to swim, exhausting themselves until they eventually drown unless surfaced (James et al. 2005 p. 199). In addition, prolonged periods of forced submergence trigger severe metabolic acidosis, which often drains the turtle's strength so significantly that it is unable to recover. As a result, many leatherbacks do not survive even when surfaced before they have drowned (Work & Balazs 2010 p. 422).

Incidental take in fisheries threatens the entire Pacific leatherback population where active and abandoned driftnets and longlines have a long history of entangling and killing leatherbacks (NMFS & USFWS 1998 p. 24). During the 1990s, gillnet and longline fisheries killed at least 1,500 leatherbacks annually in the Pacific (Spotila et al. 2000 p. 530). Off the U.S. West Coast, leatherbacks have been incidentally caught in drift gillnets off California, Oregon and Washington, longlines off California and Hawaii (NMFS & USFWS 1998 p. 24), groundfish pot gear off California in 2008 (Eguchi et al. 2017a, Jannot et al. 2011), and crab trap gear in 2016 (NMFS 2018a; released alive). Recently a leatherback sea turtle was found dead (entangled) on October 18th in unidentified fishing gear, just a few miles off the coast between Malibu and Ventura in Southern CA by NMFS scientists (DFW, *pers. comm.* 2019).

The groundfish pot fishery shows well the difficulty in monitoring and mitigating catch of West Pacific leatherbacks in U.S. West Coast fisheries. Extrapolating from the observer coverage rate of approximately 3%, this produces an estimate of 35 individuals caught by the groundfish pot fleet during the 2006-10 period (Eguchi et al. 2017a). This extrapolation, however, results in large uncertainty regarding the actual interactions based on only a single bycatch incident in all U.S. west coast groundfish fisheries in the 14 years of observation (2002-2015). Conclusive statements about leatherback turtle bycatch in this fishery cannot be made without more data on the fishery (bycatch or no bycatch) and on the overlap between the fishery and leatherback turtles. Because the population consists of so few individuals, and is declining rapidly, even rare instances of leatherback bycatch necessitates measures to reduce deaths (*id.* p. 19).

In addition to the leatherbacks that are directly observed in fishing gear, some leatherbacks strand with evidence of fishing gear entanglements. Of all the strandings of dead leatherback sea turtles since 1963, five indicated evidence of fishery interactions (1993, 1998, 2003, 2008, and 2015), and all five were found in central and southern California (*id.*). Stranding records are based on discoveries of turtles, which underrepresents the total number stranded and gives little information about where the fishery gear entanglement occurred. Nevertheless, it shows the persistence of the fishing gear threat to leatherbacks in California.

Interactions of fisheries with leatherback sea turtles off California, Oregon, and Washington, have a particularly large impact to the population based on the likelihood that the turtles are adult females. Based on aerial surveys conducted off central California from 1990-2003, the majority of leatherbacks observed were larger subadults or adults (Benson et al. 2007). The sex ratio of the West Pacific population is unknown, but researchers that have captured leatherbacks in-water off central California have documented that approximately 2 out of 3 leatherbacks were females (~66 percent) (*id.*). Thus, for management purposes NMFS has assumed that fisheries interact with adult female leatherback sea turtles off California (NMFS 2018b p. 52). Given the current estimate of 562 adult nesting leatherbacks in the West Pacific population (NMFS 2017b), any interaction with an adult female is significant to the population.

6.2.1.1. California's Pelagic Fisheries Threaten Leatherback Sea Turtles

Both drift gillnets and longline fishing for swordfish, tuna, and sharks off California interact with and threaten the persistence of leatherback sea turtles. Observed captures of leatherback sea turtles in the drift gillnet and longline fisheries coincide with the leatherback's seasonal foraging in the neritic waters off the U.S. West Coast (Benson et al. 2007b p. 4). All of the leatherback takes in the California/Oregon drift gillnet fishery occurred from September to January, with the majority of the takes occurring in October (NMFS Biological Opinion 2004 p. 182). Similarly, leatherback takes in the former West Coast-based longline fishery also occurred in October and November (NMFS 2004 p. 182).

Based on studies showing that ocean fronts and eddies attract both swordfish and leatherback sea turtles into the same areas, fishing gear interactions will continue to be problematic in California leatherback habitat (Scales et al. 2018; Hazen et al. 2018). Unless effective mitigation measures are implemented, the diversity of pelagic fishing gears proposed for use off California present a real and persistent threat to leatherback sea turtles.

The California drift gillnet fishery has been the primary threat to leatherback sea turtles off of California in recent decades. Between 1990 and 2001, twenty-three leatherbacks were observed taken in the drift gillnet fishery (PFMC & NMFS 2006 p. 121). Of the twenty-three taken, sixteen leatherbacks died from their capture, constituting a mortality rate of 70% (PFMC & NMFS 2006 p. 122). These observed interactions, when added to interactions with the longline fishery, led to an estimate of up to 60 annual leatherback takes for the drift gillnet and West Coast longline fisheries (NMFS 2004 pp. 202, 203).

In 2000, an Endangered Species Act section 7 consultation and biological opinion concluded that the incidental leatherback mortality in the California/Oregon drift gillnet fishery would jeopardize the survival and recovery of the endangered leatherback (PFMC & NMFS 2006 p. 159). In 2001, the drift gillnet fishery was consequently prohibited between August 15th and November 15th annually in the area where most leatherback interactions occurred (81 Fed. Reg. 70660). The seasonally closed area, designated the "Pacific Leatherback Conservation Area," spans diagonally from Pt. Sur to a point due west of Pt. Conception, out to 129° west longitude and north to 45° north latitude (PFMC & NMFS 2006 p. 122).

Since management measures to reduce leatherback interactions were put in place in 2001 (the Pacific Leatherback Conservation Area), two leatherbacks were observed taken and released alive in the California drift gillnet fishery, one in 2009 and one in 2012 (NMFS 2013). In 2013, NMFS issued a biological opinion on the continued authorization of the West Coast drift gillnet fishery anticipating incidental interactions with ten leatherback sea turtles over a five-year period, including up to seven lethal interactions (*id.*).

These anticipated interactions with the drift gillnet fishery will have a population-level impact; NMFS scientists have determined that any more than one leatherback mortality per seven years will delay the population's recovery (Curtis et al. 2015). As mentioned above, almost all of the leatherbacks foraging off the U.S. West Coast are from the Jamursba-Medi's nesting population of females (Benson et al. 2011 p. 6) (Figure 2).

In part due to the impacts of the fishery on leatherback sea turtles, in September 2018, the California Governor signed a bill that would phase-out the use drift gillnets over four years (S.B. 1017). The Department will notify fishermen of their eligibility for the transition program when funding is available (14-Z Cal. Regulatory Notice Reg. 532, 533, Apr. 5, 2019).

Highly migratory species longline fisheries are currently prohibited in the U.S. Exclusive Economic Zone, but industry efforts to introduce longlines, buoy gear and linked buoy gear to catch pelagic fish like swordfish to the U.S. West Coast continue. Recently a number of longline vessels that land catch in California ports have organized as the California Pelagic Fisheries Association (NMFS 2016). Members have expressed interest in fishing in the future as part of a California-based fishery (*id.*). The Pacific Fishery Management Council discussed authorizing a shallow-set longline fishery under the Highly Migratory Species Fishery Management Plan as recently as the November 2019 meeting, but delayed the agenda item until the Highly Migratory Species Management Team reported on three questions from the Council. In April 2019 NMFS issued exempted fishing permits to use the gear in the Exclusive Economic Zone off California (84 Fed. Reg. 20,108 (May 8, 2019)).

The history of longlines provides evidence that this gear is a threat to the persistence of leatherback sea turtles. In Pacific longline fisheries, 27% of captured leatherbacks are estimated killed (Kaplan 2005). In 2000, pelagic longlines in the Pacific captured an estimated 20,000 leatherbacks, resulting in the mortality of an estimated 1,000-3,200 leatherbacks (Lewison et al. 2004).

6.2.1.2. Foreign Fishing Threatens Pacific Leatherbacks

Leatherbacks are also highly vulnerable to threats from fishing gear near their nesting habitats (PFMC & NMFS 2006 p. 122; NMFS & USFWS 2013; Tapilatu 2017 p. 131). In the West Pacific Ocean, illegal fishing occurs in the waters off Indonesia's most important nesting beaches and communities in the area have reported dead leatherbacks entangled in fishing nets and marine debris (Hitipeuw et al. 2007 p. 34). In addition, the waters adjacent to Jamursba-Medi are increasingly being targeted by national and foreign fishing fleets (Lewison et al. 2004 p. 225).

Many countries' commercial fleets operate in areas beyond national jurisdiction (ABNJ) and interact with leatherback sea turtles. From 1989-2015, 331 leatherback interactions were reported by 16 countries that operate in the West and Central Pacific Ocean (ABNJ 2017). Based on these reports NMFS estimated that the total leatherback interactions were approximately 6620 – or 245 annually – for those 16 countries that participated in the ABNJ exercise in 2017 (NMFS 2019;

Table 2). Other estimates of leatherback interactions are higher, with two estimating that between 200 and 700 leatherbacks are caught annually in the North Pacific Ocean (*id.*).

Table 2. Summary of estimated interactions of leatherback sea turtles in the North Pacific Ocean (Source: NMFS 2019 p. 255).

Source	Estimate	Time Frame	Annual Average
Beverly and Chapman 2008	200-640 juveniles and adults	Annually	200-640
Lewison et al. 2004	1,000-3,200	Year 2000	1,000-3,200
ABNJ 2017	6,620	1989-2015	245
Peatman et al. 2018	9,923 median	2003-2017	709

International measures to reduce the threat of shallow-set longline fisheries to leatherback sea turtles may not be working as well as hoped. For example, the Western and Central Pacific Fisheries Commission (WCPFC) considered in 2008 that the threat to sea turtles was sufficiently severe to warrant the adoption of a measure specifically requiring mitigation to reduce sea turtle mortality from longline interactions (CMM 2008-03); there is no evidence to suggest that those threats have appreciably diminished (ABNJ 2017). One reason for this is that though approximately 20% of the fishing effort uses shallow-set longlines, analysis indicates that <1% of fishing effort is subject to mitigation (*id.*). Each country establishes and enforces their definition of "shallow-set," creating flexibility in the conservation measure that weakens its effectiveness (*id.*).

Even if all shallow-set longlines were compliant with CMM 2008-03, the conservation benefits would be less than if the Commission reduced mortality and interactions in deep-set longlines (NMFS 2017d). First, sea turtle mortality reductions would be greater if measures applied to deep-set longlines because sea turtles caught in deep sets have a higher probability of asphyxiation (*id.*). Second, reducing overall interactions would have a larger benefit in the deep-set fishery because there are four times as many deep-set hooks set as shallow-set hooks. Even though shallow-set longlines are more likely to interact with leatherback sea turtles, the scale of the deep-set longline fishery means that the maximum interaction reduction possible through mitigation is greater than the maximum reduction possibly obtained with shallow-set mitigation (*id.*).

Low observer coverage hinders creation of measures specific to mitigating leatherback sea turtle interactions and mortality in longlines in the North Pacific Ocean (ABNJ 2018 p. 10). To detect relatively rare bycatch events requires close to 100% observer coverage; yet in the North Pacific Ocean, longline coverage is between 1.0-4.5% (*id.*).

6.2.2. Harvest of Adults and Eggs at Nesting Beaches

The harvest of leatherbacks and/or their eggs at nesting and marine environments constitutes a widespread threat to these turtles in the tropical Pacific (NMFS & USFWS 1998, 2013 pp. 21, 23). Historically, female leatherbacks have been severely harvested at their nesting beaches and have been subjected to harvest at sea (NMFS & USFWS 1998 p. 21). Leatherbacks are harvested for subsistence on West Pacific islands (PFMC & NMFS 2006 p. 71) and in the eastern Pacific, leatherback meat can still be found for sale on occasion in local Chilean, Peruvian, and Mexican markets (NMFS & USFWS 1998 p. 23).

Across the Pacific, leatherback populations have yet to recover from years of historical egg harvests that depleted recruitment of their populations (Hitipeuw et al. 2007 p. 23). Population declines are exacerbated by the removal of large juveniles and mature individuals while the persistent harvest of eggs inhibits the recruitment of the next generation of leatherbacks (NMFS & USFWS 1998 p. 21). A large-scale leatherback egg harvest persisted on Jamursba-Medi during the 1980s where 50,000-75,000 eggs were observed taken weekly by several boats in 1984 and 1985 (NMFS & USFWS 1998 p. 23). Incidental mortality from fishing along with the severe harvest of leatherback eggs are the two major factors responsible for the collapse of the Pacific leatherback population (PFMC & NMFS 2006 p. 67).

6.3. Predation

6.3.1. Nest Predation

At some nesting beaches, predation upon leatherback eggs by feral pigs and other animals can be a serious problem (Hitipeuw et al. 2007 p. 30). Jamursba-Medi suffers from extensive egg predation from wild pigs, resulting in the destruction of an estimated 14%-93% of leatherback nests (Hitipeuw et al. 2007 p. 34). At nearby Wermon, feral pigs and dogs accounted for the destruction of 17.5% of the observed nests in 2003-04 (Hitipeuw et al. 2007 p. 30). Elsewhere in the Pacific, leatherback nests are destroyed by predation from domestic animals and wild species including rats, mongoose, birds, monitor lizards, snakes, crabs, ants and other invertebrates (NMFS & USFWS 1998).

6.4. Disease

The first leatherback with the tumor-forming disease fibropapillomatosis was seen in Mexico on the Pacific coast in 1997 (Huerta et al. 2002). Likely caused by a herpesvirus (Ene et al. 2005), internal and external tumors (fibropapillomas) may grow large enough to hamper swimming, vision, feeding, and potential escape from predators (Herbst 1994). Other sea turtle species are more commonly afflicted.

6.5. Other Natural Events or Human-Related Activities

6.5.1. Climate Change

Global warming represents perhaps the greatest long-term threat to the leatherback sea turtle's survival. Conservation gains for the species coming from reductions in fisheries bycatch and protection in nesting beaches may be offset by inundation of nesting beaches from rising sea levels and increased storminess; reduction in hatching success and skewed sex ratios due to warmer nesting temperatures; and declines in ocean productivity from warming waters and ocean acidification. Each of these impacts is briefly described below.

6.5.1.1. Ocean Warming Affects Pacific Leatherback Sea Turtles

The global oceans are warming rapidly and at unprecedented magnitude (IPCC 2013). The average global temperature across land and ocean surfaces in 2016 was +0.94ºC (1.69ºF) above the 20th century average of 13.9ºC (57.0ºF) (NCEI 2017). The year 2017 was the third warmest year on record and 2018 is also expected to be among the warmest (NCEI 2017). Most of this record in average global temperatures is attributed to record warmth in the global oceans. Since 1955, the global oceans have absorbed over 90% of the excess heat trapped by greenhouse gas emissions (Levitus et al. 2012).

Notably, the largest increases in global ocean temperature have occurred in the upper ocean where primary production is concentrated and appears to be affecting global ocean productivity (Behrenfeld et al. 2006). Global ocean temperatures have increased by 0.31 °C on average in the upper 300 m during the past 60 years (1948-1998) with some ocean basins experiencing even greater warming (Levitus et al. 2000). Significant global declines in net primary production between 1997-2005 were attributed to reduced nutrient enhancement due to ocean surface warming (Behrenfeld et al. 2006).

Ocean warming has already affected the California Current System, the main foraging area for leatherbacks in the Northeast Pacific. The temperature of the upper 100m of the southern California Current System increased by 1.2-1.6ºC between the 1950s and 1990s (Roemmich & McGowan 1995), a trend that continued through the late 1990s (Lynn et al. 1997), mid 2000s (Peterson et al. 2006) and mid 2010s (Peterson et al. 2015). This surface warming is weakening the upwelling of nutrient-rich waters off the California coast. Surface warming causes increased stratification of the water column by intensifying the density differences between the warmer surface layer and deeper, cold, nutrient-rich layer (Behrenfeld et al. 2006). Surface warming is also associated with the deepening of the thermocline (i.e. a deepening of warmer waters) in coastal regions of the California Current System in the last 50 years (Palacios 2004). In short, stronger thermal stratification and a deepening of the thermocline inhibit cool, nutrient-rich waters from being upwelled leading to lower productivity and less prey for leatherback turtles.

Warming ocean waters are already having measurable negative effects on marine turtles and their habitat, including leatherback turtles. Water temperature is an important factor determining quality of foraging areas, phenology, and nesting success of leatherback turtles. Even small changes in ambient temperature outside the natural range can substantially disrupt population growth.

Foraging areas of leatherbacks within the California Current System are affected by warming. The California Current System runs along the west coast of North America from southern British Columbia to northern Baja California and is already affected by ocean warming and changes in the El Niño Southern Oscillation (ENSO) events (Di Lorenzo et al. 2005; Jacox et al. 2016; Frischknecht et al. 2017). The main foraging habitat of leatherbacks in California waters is part of the California Current System (Block et al. 2011; NMFS & USFWS 2013 p. 7). This highly productive coastal upwelling ecosystem relies on seasonal, wind-driven upwelling of deep, cold, nutrient-rich water to the surface layer that drives phytoplankton and zooplankton production (Huyer 1983). This system is highly sensitive to changes in the strength and timing of seasonal upwelling that can drive changes in ocean primary productivity and prey availability for leatherback turtles.

Disruption of coastal upwelling in the California Current System due to warming anomalies can affect the distribution and availability of plankton, including key leatherback prey species. Slackening of upwelling-favorable winds coupled with the northward transport of warm water results in weakening of coastal upwelling along the California coast (Bograd et al. 2009), leading to lower plankton productivity and less jellyfish (Roemmich & McGowan 1995; Ruzicka et al. 2012), the primary prey of leatherbacks. Delays in the onset of upwelling can also have severe ecosystem consequences in the pelagic food change within the California Current System (Fisher et al. 2015). For example, a month delay in the onset of spring upwelling during the warm conditions of 2005 resulted in reduced nutrient levels, lower primary production (Thomas & Brickley 2006) and reduced biomass of zooplankton (Mackas et al. 2006) accompanied by low recruitment of rocky intertidal organisms (Barth et al. 2007) and breeding failures of seabirds (Sydeman et al. 2006).

Warming anomalies and reduced upwelling in the California Current System have also resulted in marked ecological effects including decreased productivity and altered ecosystem structure. Between 1951 and 1993, macrozooplankton off the California coast declined by 80% due to surface water warming up to 1.5°C (Roemmich & McGowan 1995). The composition of coastal and pelagic forage species, including euphausiid and larval fish assemblages, has also shifted (Brinton & Townsend 2003). The decreased productivity of the California Current System due to ocean warming has also affected the distribution and productivity of the seabird community (Hyrenbach & Veit 2003) and prey availability for sea lions causing unusual pup mortality (Leising et al. 2015 p. 60). Similarly, availability of leatherback prey is potentially reduced during warming anomalies and reduced upwelling when these turtles are foraging in waters of California and Oregon during spring and summer (Benson et al. 2007b).

Phenology shifts in leatherback turtles are already happening due to changes in sea surface temperature (Neeman et al. 2015). Changes of water temperature in foraging grounds delays the timing of the nesting season in some nesting beaches of the Central Atlantic and the eastern Pacific (Neeman et al. 2015). It is likely that leatherback turtles spend substantially more time in foraging grounds when prey distribution and availability is disrupted during warming conditions (Neeman et al. 2015 p. 121).The implications of delaying nesting seasons on hatchling success and survival for leatherbacks nesting in the West Pacific require further study. Yet, if the current trend (~0.3 day/yr) of delayed nesting season in the eastern Pacific (e.g., Playa Grande, Costa Rica) holds in the future, nesting females will experience increasingly adverse conditions for hatching success (Robinson et al. 2014).

Reproductive success of leatherback turtles in nesting areas of the Pacific also is affected by global warming. A study of Eastern Pacific nesting leatherback turtles found significantly reduced reproductive output in El Niño years (Reina et al. 2009; Santidrián Tomillo et al. 2012), conditions that are likely to become more common with global warming (Saba et al. 2012). Studies of Atlantic leatherbacks have also documented changing distributions of the species as the climate warms (Patino-Martinez et al. 2011). A study predicting severity of the threat of global warming to leatherback sea turtles found that incubation temperatures would be high enough to induce uncoordinated movement in adults, leading them to leave some regions (Dudley and Porter 2014).

Skewing of sex ratios driven by warming temperatures at nesting beaches are more prevalent given the temperature-dependent nature of egg development (Davenport 1997). The effects of global warming on sea turtle sex ratios has been studied for green, loggerheads, hawksbill, and leatherbacks sea turtles (Hays et al. 2003; Fuller et al. 2013; Hawkes et al. 2013; Santidrián Tomillo et al. 2014; Laloë et al. 2016). In Pacific leatherbacks, high temperatures in nesting beaches at Playa Grande in Costa Rica already are producing 70-90% females and experts predict that 100% of hatchlings will be females (or there will be major hatching failures) with continuing warming (Santidrián Tomillo et al. 2014). Increasing nest temperatures also are taking a toll on West Pacific nesting populations. At Jamursba-Medi in Indonesia, where California/Oregon leatherbacks nest, reduced hatching success has been documented with hatch rates of protected nests of 50-85% until 2003 and only 10-15% in 2004-2006 (Tapilatu & Tiwari 2007). Reduction of hatching success has likely contributed in part to the long term decline in this important nesting leatherback population (Tapilatu et al. 2013).

In sum, warmer foraging waters and nesting beach temperatures already are adversely affecting leatherback sea turtles both in U.S. waters off California and throughout the Pacific. These impacts are severe and currently ocean warming represents an unmanaged threat to the continued viability of the species. Unfortunately, ocean warming is not the only climate change-related threat to leatherbacks. Sea level rise will inundate nesting beaches while ocean acidification affects the pelagic food web upon which leatherbacks are dependent.

6.5.1.2. Sea Level Rise Affects Nesting Success of Pacific Leatherback Sea Turtles

The last and fifth assessment report (AR5) of the Intergovernmental Panel on Climate Change (IPCC) predicts that global mean sea level is “likely” to rise between 0.52 to 0.98 m on average by 2100 under the highest emission scenario (Church et al. 2013; IPCC 2013). Current and less conservative climate models predict that sea levels have actually increased at a much higher rate in the 20th century (e.g., 1.2 mm/year in 1901-1990 and 3.0 mm/year in 1993-2010) (Hay et al. 2015). Experts estimate that the magnitude of future sea-level rise, given the higher contribution of the loss of Greenland and Antarctic ice sheets (Rignot et al. 2011), is estimated to be much higher with a likely range of 0.7-1.2 m by 2100 (Horton et al. 2014). In fact, Antarctica alone can potentially contribute to more than one meter of sea-level rise by the end of the century if emissions continue at the current levels (DeConto & Pollard 2016). Multiple positive feedback mechanisms including reduced surface albedo, loss of buttressing ice shelves, increasing and lowered ice surface altitude will accelerate the rate and magnitude of sea level rise (Hansen et al. 2006).

Sea-level rise will inundate low-lying beaches where sand depth is a limiting factor for leatherbacks. Leatherback turtles are particularly vulnerable to sea level rise due to their tendency to nest in the cooler tide zone of beaches (Patino-Martinez et al. 2014). Flooded nesting sites will decrease available nesting habitat (Fuentes et al. 2009; Von Holle et al. 2019). In addition to inundating nesting sites, climate will also affect nesting success of leatherbacks due to the increase in the severity of storms and changes in the prevailing currents that could lead to increased beach erosion and loss of suitable nesting habitat (Fuentes & Abbs 2010). Moreover, sea level rise is likely to promote more shoreline stabilization activities that will further increase the loss of potential nesting habitat (NMFS & USFWS 2013 p. 46). The capacity of female leatherbacks to occupy new nesting habitat will determine whether this species adapts to rapid sea level rise. Thus, sea level rise must be viewed as a significant long-term threat to the survival of the species.

6.5.1.3. Ocean Acidification

The California Current system is already affected by ocean acidification (Hauri et al. 2009, 2013; Gruber et al. 2012; Feely et al. 2017), potentially disrupting the food web on which leatherbacks rely for foraging (Ruzicka et al. 2012 p. 29). Ocean acidification can be an indirect threat to leatherbacks in foraging areas because their primary prey (jellyfish) belongs to a complex food web (Ruzicka et al. 2012 p. 29) where several taxa are highly vulnerable to acidic conditions. Phytoplankton, pteropods, shelled zooplankton, euphausiids, and larvae of invertebrates and fish are all potential prey for small and large jellyfish (Ruzicka et al. 2012 p. 29). Some of these groups (e.g., pteropods) are known to be highly susceptible to ocean acidification within the California Current system (Bednaršek & Ohman 2015; Hodgson et al. 2018). A decline in jellyfish production can affect food availability for leatherbacks along the U.S. West Coast during summer and autumn, when dense aggregations of jellyfish historically have been present (Graham et al. 2010; Benson et al. 2007b).

Ocean acidification is directly related to the increase in atmospheric CO_2 emissions globally. Atmospheric CO_2 concentrations reached average annual levels of over 406.5 parts per million (ppm) globally in 2017 (NASA Global Climate Change 2018), which is higher than at any point during the last 800,000 years (Lüthi et al. 2008). Over the past 200 years, the global oceans have absorbed approximately 25% of the anthropogenic CO_2 released to the atmosphere (Canadell et al. 2007; IPCC 2014). Anthropogenic CO_2 emissions from burning fossil fuels, cement production, and land use increased globally at a rate of 10.3 giga tones of CO_2 equivalent per year (GtC yr^{-1}) from 2006 to 2015 (Le Quéré et al. 2016), reaching over 40 $GtCO_2$ in 2015 (Rogelj et al. 2016). Approximately 2.6 GtC yr^{-1} (i.e., 26% of total emissions) entered the global oceans in the last decade (Le Quéré et al. 2016).

As the global oceans uptake the excess of CO_2, seawater chemistry profoundly changes and the oceans become more acidic (Orr et al. 2005; Fabry et al. 2008; Fabry 2009; Doney et al. 2009; Gattuso & Hansson 2011; Carter et al. 2016, 2017). The average pH of the global surface ocean has already decreased by 0.1 units (from 8.2 to 8.1 pH units) which represent a 30 % increase acidity and a 10% decrease in carbonate ion concentration in comparison with pre-industrial levels (Feely et al. 2004; Caldeira & Wickett 2005; Orr et al. 2005; Cao & Caldeira 2008; Doney et al. 2009; Byrne et al. 2010). Once anthropogenic CO_2 enters the oceans it is impossible to remove it and the global oceans may require thousands of years to naturally return to a higher pH state (Solomon et al. 2009).

Changes in ocean chemistry due to increasing absorption of carbon dioxide concentration emitted by human activities is unprecedented in the geological record (Honisch et al. 2012). The oceans are becoming acidic at a rate faster than they have in the past ~300 million years, a period that includes three major mass extinctions (Zeebe 2012; Hönisch et al. 2012). The current change in seawater chemistry is an order of magnitude faster than what occurred 55 million years ago during Paleocene-Eocene Thermal Maximum, which is considered to be the closest analogue to the present, when 96% of marine species went extinct (Zeebe 2012; Hönisch et al. 2012). Long term monitoring and modeling studies of waters across the Pacific West Coast of the United States show a clear pH decline over the past decades (Beman et al. 2011; Friedrich et al. 2012; Chan et al. 2016, 2017; Feely et al. 2016, 2017). In fact, anthropogenic ocean acidification already exceeds the natural variability on regional scales and is detectable in several Pacific regions (Friedrich et al. 2012; McLaughlin et al. 2015; Takeshita et al. 2015).

In sum, climate change is expected to alter the abundance and distribution of leatherback sea turtle prey via changes to ocean acidity.

7. THE DEGREE AND IMMEDIACY OF THREAT

Indicate the immediacy of the threat and the magnitude of loss or rate of decline that has occurred to the present or is expected to occur without protective measures.

Pacific leatherback sea turtles are in such dire straits that the National Marine Fisheries Service named them one of eight "Species in the Spotlight" that are most at-risk of extinction. With only around 550 annually nesting adult, female West Pacific leatherbacks left, every individual in waters off California is significant.

Without additional California protective measures, federal government efforts to introduce longlines to the West Coast exclusive economic zone (EEZ) are likely to continue. As discussed above, NMFS has issued a Longline Exempted Fishing Permit to target swordfish and other highly migratory species (HMS) in the West Coast EEZ. 84 Fed. Reg. 20,108. This controversial permit allowed deep-set and shallow-set longline fishing inside the West Coast EEZ, even though state law banned this type of fishing method. *See* Cal. Fish & Game Code § 9028. NMFS anticipated that the exempted fishing proposed would capture two leatherback sea turtles; the risk of an interaction is relatively high because fishing will occur during a time and in the area encompassed by the Pacific Leatherback Conservation Area (NMFS 2018b). Despite the predicted interactions, the federal government has denied the California Coastal Commission's request to review of the EFP application under the Coastal Zone Management Act. (Kuipers 2019).

8. INADEQUACY OF EXISTING REGULATORY MECHANISMS

Despite protections both domestically and internationally, Pacific leatherback sea turtle populations continue to decline. The suite of federal environmental conservation actions includes the Endangered Species Act's identification of critical habitat and prohibition on take, national marine sanctuaries, and fishing restrictions in the Pacific Leatherback Conservation Area. Nonetheless, these protections have not sufficiently mitigated the cumulative impact of anthropogenic activities on leatherback sea turtles (Maxwell et al. 2013). In particular, anthropogenic activity around the central coast of California has high cumulative impacts on leatherback sea turtles (*id.*). Leatherback sea turtles are more vulnerable to ocean pollution, shipping, and fishing than other protected species off the coast of California (*id.*). Protections remain inadequate.

Fisheries remains the primary threat to leatherback sea turtles despite a suite of national and international laws designed to protect them, as discussed in detail above. Obstacles to overcome include monitoring and aggregating bycatch data over the large geographic area that West Pacific leatherbacks migrate. That in turn contributes to the problem that fisheries managers lack data to justify discouraging fishing to the degree needed to save Pacific leatherback sea turtles.

Plastic pollution remains largely unmitigated. The amount of plastic debris entering the ocean is expected to increase by an order of magnitude by 2025 (Iverson 2019). A large coastal population and a high waste production per capita means that the United States, and likely California specifically, impacts total marine debris in the global ocean (*id.*). Regulations to address this issue on the scale at which it is growing do not yet exist (*id.*).

Fishing nets make up almost half of the plastic pollution by size in the Great Pacific Garbage Patch alone (Lebreton et al. 2018). In the United States, the largest sources of derelict fishing gear are gillnets and crab pots (Iverson 2019). While efforts in Washington and California are underway to retrieve derelict pots at the end of the season, these efforts are limited compared to the scale of the problem, do not include measures to prevent gear loss, and do not mitigate the impact of gear loss by requiring use of biodegradable materials.

Climate change remains an existential threat to leatherback sea turtles, as well as other marine animals, due to the inadequacy of regulatory mechanisms in controlling emissions of carbon dioxide. As stated above, unless carbon dioxide emissions are significantly reduced in the near-term future, global warming and the related threat of ocean acidification are likely to pose a serious threat to the critically endangered leatherback sea turtle.

9. RECOMMENDED FUTURE MANAGEMENT AND RECOVERY ACTIONS

Management actions in California can address threats to the leatherback sea turtle such as plastic pollution, fisheries, aquaculture, and climate change. All these threats, as discussed above, can and should be mitigated at the State level.

Recommendations for the management and recovery of the Pacific leatherback sea turtle include, at a minimum:

- California Department of Fish and Wildlife protects leatherback sea turtles as an endangered species under the California Endangered Species Act;

- California Department of Fish and Wildlife prepares a recovery plan for Pacific leatherback sea turtles pursuant to Cal. Fish & Game Code § 2079.1, including management efforts aimed at reducing toxins in the habitat and impacts from ocean warming and acidification.

- California Department of Fish and Wildlife improves monitoring of leatherback sea turtle abundance and population trends;

- California Department of Fish and Wildlife increases coordination and management with other governments – such as the National Park Service, National Marine Sanctuaries, Department of Defense, and others – to research movements of leatherback sea turtles off the U.S. West Coast;

- California Department of Fish and Wildlife and the California Fish and Game Commission manage California fisheries to reduce interactions (gear modifications, limited soak time for fixed gears, time and area closures, etc.);

- California Department of Fish and Wildlife encourages the Pacific Fisheries Management Council (PFMC) to address continued bycatch of endangered sea turtles and adopt practices to avoid sea turtle entanglements, including phasing out current gear associated with entanglements, particularly in federal gillnet, longline, and pot fisheries;

- California Department of Fish and Wildlife, working with the California Fish and Game Commission, sets a hard limit on the incidental capture of leatherback sea turtles in California-managed fisheries that historically have interacted with leatherback sea turtles or by analogy to fishing gear that has interacted with leatherback sea turtles, and require 100% observer coverage or electronic monitoring to accurately enforce the limit;

- California Department of Fish and Wildlife utilizes existing legal and regulatory frameworks to minimize local contributors to ocean acidification (*e.g.,* eutrophication); and

- The governor declares a climate emergency and takes all necessary action to set California on a path to full decarbonization of our economy by no later than 2045 (for example, banning the sale of new fossil fuel vehicles by 2030 and requiring the generation of all electricity from carbon-free sources by 2030).

We look forward to discussing additional state actions that can protect leatherback sea turtles.

10. CONCLUSION

The Pacific leatherback sea turtle is an iconic California treasure. The State Legislature recognized as much by designating it as the official marine reptile. Cal. Govt. Code § 422.5. The 2012 Pacific Leatherback Sea Turtle Act describes the leatherback sea turtle as "a central component of California's natural heritage and marine biodiversity."[2] The California Legislature, Governor, and citizens honor and celebrate California's leatherbacks during Pacific leatherback sea turtle day every October 15. Cal. Govt. Code § 7593.5. It is imperative that California afford every protection to save the leatherback from extinction.

As detailed above, in conformance with the requirements of Cal. Code Regs., tit. 14, § 670.1, this petition presents scientific information regarding the Pacific leatherback's life history,

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[2] AB 1776, § 1(b), available at https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201120120AB1776.

population trend, range, distribution, abundance, kind of habitat necessary for survival, factors affecting the ability to survive and reproduce, degree and immediacy of threat, impact of existing management efforts, suggestions for future management, availability of sources and information, and detailed distribution maps.[3] That information clearly demonstrates that the Pacific leatherback sea turtle is eligible for and warrants listing under CESA based on the factors specified in the statute and implementing regulations.

The California Endangered Species Act would bestow additional protections and safeguards to leatherback sea turtles. In addition to these protections, the designation would increase the visibility of the leatherback sea turtle's plight state-wide and nationally.

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[3] Information on suggestions for future management and availability of sources and information are contained in the Management Recommendations and References sections *infra*.

11. LITERATURE CITED

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