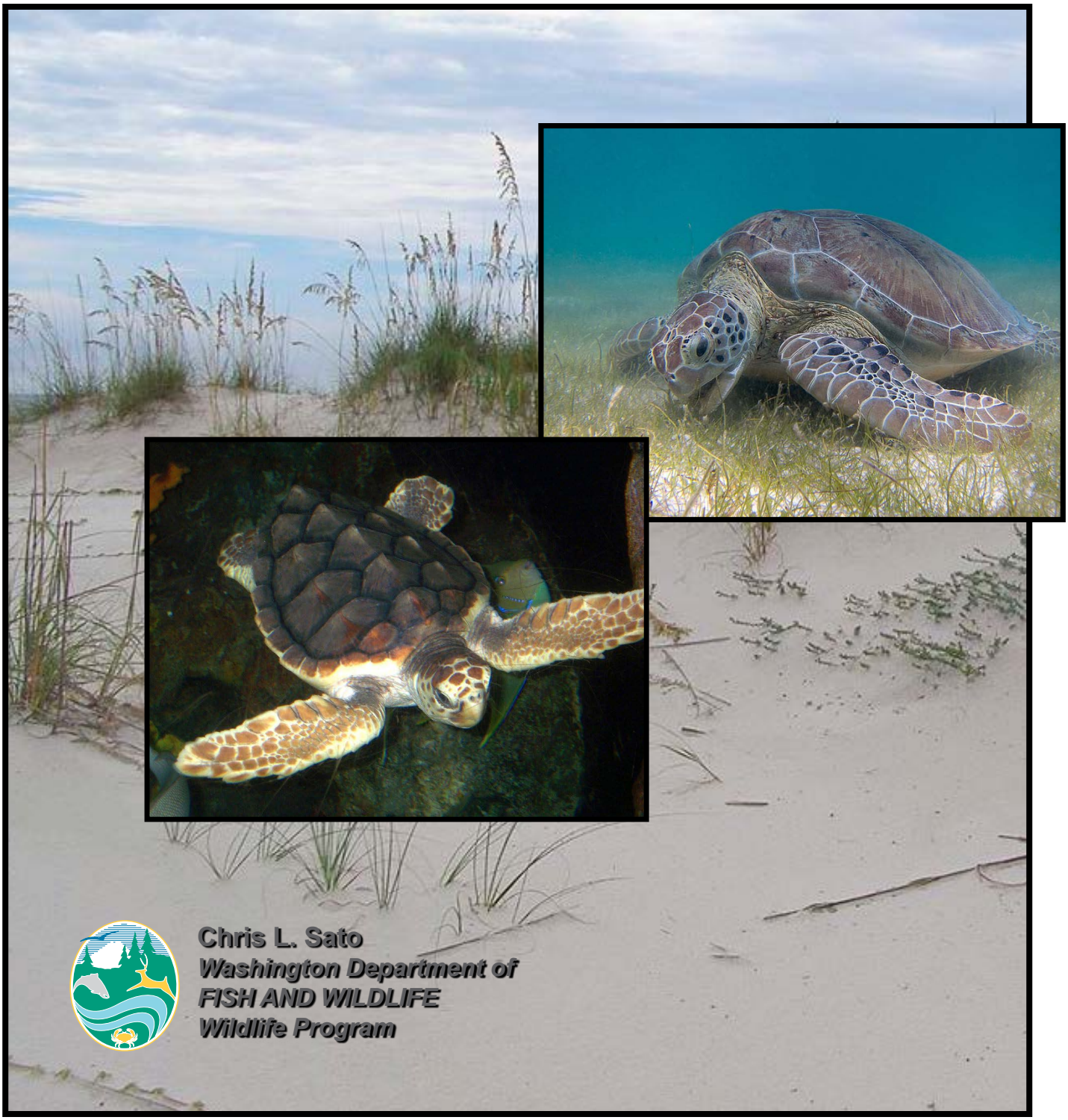
STATE OF WASHINGTON February 2017

Periodic Status Reviews for Green and Loggerhead Sea Turtles



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FISH AND WILDLIFE
Wildlife Program

The Washington Department of Fish and Wildlife maintains a list of endangered, threatened, and sensitive species (Washington Administrative Codes 220-610-010 and 220-200-100). In 1990, the Washington Wildlife Commission adopted listing procedures developed by a group of citizens, interest groups, and state and federal agencies (Washington Administrative Code 220-610-110. The procedures include how species listings will be initiated, criteria for listing and delisting, a requirement for public review, the development of recovery or management plans, and the periodic review of listed species.

The Washington Department of Fish and Wildlife is directed to conduct reviews of each endangered, threatened, or sensitive wildlife species at least every five years after the date of its listing by the Washington Fish and Wildlife Commission. The periodic status reviews are designed to include an update of the species status report to determine whether the status of the species warrants its current listing status or deserves reclassification. The agency notifies the general public and specific parties who have expressed their interest to the Department of the periodic status review at least one year prior to the five-year period so that they may submit new scientific data to be included in the review. The agency notifies the public of its recommendation at least 30 days prior to presenting the findings to the Fish and Wildlife Commission. In addition, if the agency determines that new information suggests that the classification of a species should be changed from its present state, the agency prepares documents to determine the environmental consequences of adopting the recommendations pursuant to requirements of the State Environmental Policy Act.

A petition to maintain the green sea turtle as threatened and reclassify the loggerhead sea turtle as endangered was accepted by the Department on February 25, 2015, and information was received from the public to inform the review through February 25, 2016. The draft periodic status review for leatherback sea turtles was reviewed by species experts and state and federal agencies. This was followed by a 90-day public comment period from November 15, 2016 through February 13, 2017. All comments received were considered during the preparation of the final periodic status review. The Department will present the results of this periodic status review to the Fish and Wildlife Commission at the August 4-5, 2017 meeting in Olympia.

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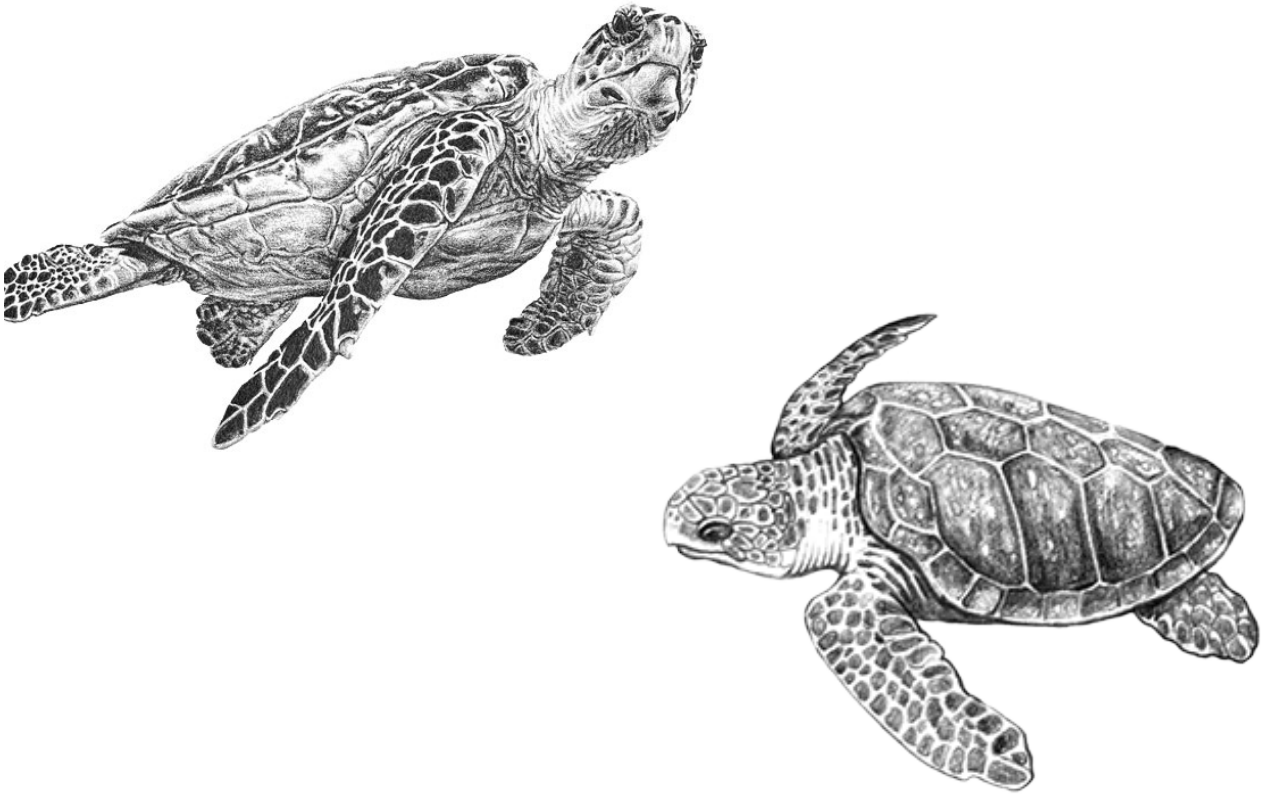
Periodic Status Review for the Green and Loggerhead Sea Turtles in Washington



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EXECUTIVE SUMMARY

The green sea turtle and the loggerhead sea turtle have been listed as state threatened species in Washington since 1990. Both species make rare appearances along the outer coast of Washington, almost always observed as stranded individuals.

Green sea turtles occurring in Washington are members of the federally threatened East Pacific Distinct Population Segment (DPS). The likely origin of these individuals are nesting beaches in Mexico. Members of this DPS mostly inhabit the coastal waters, lagoons, and bays from San Diego, California, south to Peru and the Galapagos Islands. Although global population trends for the green sea turtle indicate an overall 48 to 67 percent decline in the number of nesting females over the past 100 to 150 years, nesting data for the East Pacific DPS indicate an increasing trend in recent decades, with a current estimate of 20,112 females recorded at 39 nesting sites along the western coast of Mexico.

Loggerhead sea turtles occurring in Washington are part of the federally endangered North Pacific DPS. This DPS migrates from nesting sites in Japan to forage in pelagic and coastal waters off the west coast of North America, mainly in Mexico and southern California, but rarely observed reaching Oregon and Washington. A substantial decline in the North Pacific DPS occurred over the last half of the 20th century and current nesting numbers represent a fraction of historical nesting levels. The estimated number of nests for this DPS averaged 9,050 nests per year from 2009 through 2013. Global population trends for this species indicate a decrease of 47% over the past 100 to 150 years.

Significant known threats to both the East Pacific green sea turtle DPS and North Pacific loggerhead sea turtle DPS are harvest of eggs, juveniles and adults; incidental capture in commercial and recreational fisheries; destruction and modification of nesting habitat; and marine debris. Sea turtles are also particularly vulnerable to climate change, which may impact all stages of their life histories.

Various regulations and management activities implemented by federal, international, and non-governmental entities directly or indirectly benefit both of these populations. These include regulation of commercial fisheries to reduce incidental bycatch of sea turtles, establishment of conservation areas and stranding and disentanglement networks, and projects to monitor and protect nesting beaches in Mexico and Japan.

Despite the rarity of green sea turtles and loggerhead sea turtles in Washington, both are part of federally listed DPSs that face continuing conservation threats. Even the loss of a few individuals holds potential consequences when combined with other impacts. Both populations are wide-ranging and migratory, and threats are widespread across the nesting and marine portions of their ranges. Members of both populations spend the majority of their lives in areas outside of U.S. jurisdiction, so international cooperation is essential for addressing conservation challenges.

For these reasons, it is recommended that the green sea turtle remain listed as a state threatened species in Washington. It is also recommended that the loggerhead sea turtle be uplisted to an endangered species in Washington due to the threats outlined, the documented decline of the North Pacific DPS, and to reflect the recent federal uplisting of this DPS as endangered.

INTRODUCTION

This periodic status review summarizes the biology, population status, threats, and recent management actions directed at the green sea turtle (*Chelonia mydas*) East Pacific DPS and loggerhead sea turtle (*Caretta caretta*) North Pacific DPS that occur off the outer coast of Washington. It also assesses and provides recommendations regarding the state listing status of both species. Both were added to the state list of threatened species in 1990 (WAC 220-200-100).

DESCRIPTION AND LEGAL STATUS

Green sea turtle. The green sea turtle is the largest of the hard-shelled sea turtles (family Cheloniidae). It grows to a length of about 1 m and a weight of 200 kg. The carapace (dorsal shell) is smooth, heart-shaped or oval. The head is relatively small and rounded with a serrated lower jaw. Unlike other marine turtle species, each front flipper has one claw. The carapace and head are olive brown to black; scutes may have mottled, radiating, or wavy patterns. Hatchlings are black above with flippers outlined in white. Sighting and stranding reports of green sea turtles along the west coast of the U.S. are likely individuals of the East Pacific Distinct Population Segment (DPS) (Stinson 1984, NMFS and USFWS 1998a).

Figure 1. Green sea turtle (Photo: Mark Sullivan, NOAA).

The green sea turtle was originally listed under the federal Endangered Species Act (ESA) as threatened in 1978, with the exception of two breeding populations in Florida and along the Pacific Coast of Mexico, that were listed as endangered. In 2016, the National Marine Fisheries Service (NMFS) and United States Fish and Wildlife Service (USFWS) recognized 11 DPSs (NMFS and USFWS 2016). Three DPSs are now federally listed as endangered, and eight DPSs, including the East Pacific DPS, are federally listed as threatened (Figure 3).

Figure 2. Loggerhead sea turtle. (Photo: Wikimedia Commons).

Loggerhead sea turtle. Loggerhead sea turtles are also members of Cheloniidae and are named for their relatively large heads, which support powerful jaws and enable them to feed on hard-shelled prey such as whelks and conches. They grow in length to about 1 m and a weight of 113 kg. The loggerhead's carapace and head are yellow-orange to reddish-brown, and often covered by barnacles and algae. There are two claws

on each forelimb. Hatchlings vary from light to dark brown to almost black. Loggerheads occurring in the North Pacific are genetically distinct and geographically isolated from loggerheads in the Atlantic, South Pacific and Indian Oceans (Kamezaki et al. 2003) and have smaller carapace size and enlarged flippers in comparison to other loggerhead DPSs. Sightings and stranding reports likely involve individuals of this North Pacific DPS (NMFS and USFWS 1998b).

The loggerhead sea turtle was originally listed under the federal ESA as threatened in 1978. In 2011, NMFS and USFWS recognized nine loggerhead DPSs (NMFS and USFWS 2011). Five DPSs, including the North Pacific DPS, are now federally listed as endangered, and four DPSs are federally listed as threatened. The loggerhead sea turtle was listed as threatened under Washington law (WAC 220-200-100) in 1990.

DISTRIBUTION

Green sea turtle. The green sea turtle has a circumglobal distribution, occurring throughout tropical and, to a lesser extent, subtropical waters (Figure 3). Nesting occurs in more than 80 countries (Hirth 1997). Green sea turtles in the East Pacific DPS have been sighted as far north as southern Alaska, but most commonly occur from San Diego south to Peru. They are mostly found in coastal waters, lagoons, and bays along Baja California and the Gulf of California to southern Peru and the Galapagos Islands (NMFS and USFWS 1998a). Rare sightings are reported from the coasts of Washington and Oregon (Appendix 1; Pitman 1990). There is no known nesting by the East Pacific DPS in the United States or any U.S. territory. Green sea turtles found along the Northwest Coast of the U.S. likely nest in Mexico at Michoacán, the Revillagigedos Islands, and the Trés Marias Islands (J. Seminoff pers. comm. 2016).

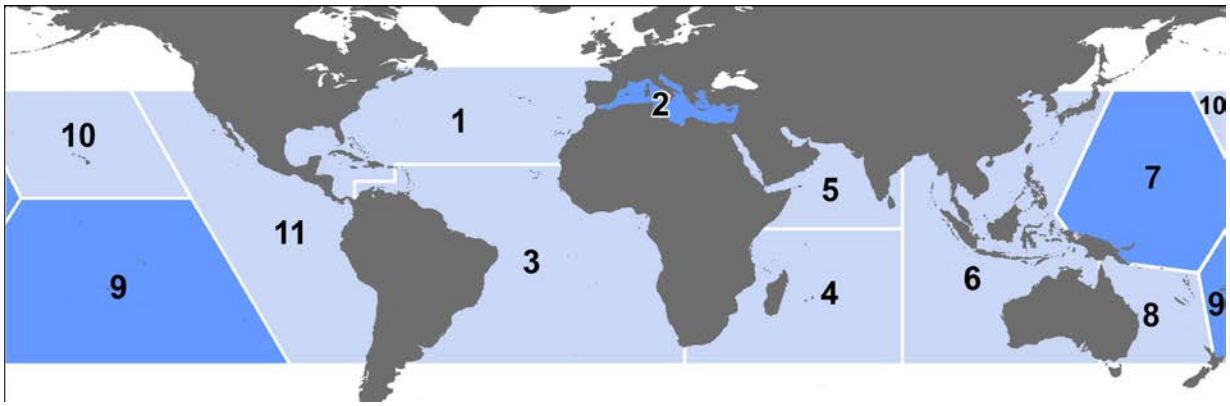

Figure 3. Threatened (■) and endangered (■) green sea turtle distinct population segments: 1. North Atlantic 2. Mediterranean 3. South Atlantic 4. Southwest Indian 5. North Indian 6. East Indian-West Pacific 7. Central West Pacific 8. Southwest Pacific 9. Central South Pacific 10. Central North Pacific, and **11. East Pacific** (NMFS).

Loggerhead sea turtle. The loggerhead sea turtle inhabits temperate, subtropical, and tropical waters of the Atlantic, Pacific, and Indian Oceans, as well as the Mediterranean Sea (Figure 4). In the eastern Pacific, loggerheads have been reported as far north as Alaska, and as far south as Chile. Rare sightings are reported from the coasts of Washington and Oregon (Appendix 1; Dodd 1988, Pitman 1990). Loggerheads in the North Pacific DPS (defined as from the equator to 60°N) originate from nesting sites in the Japanese archipelago and forage in pelagic waters and off the west coast of Mexico, including the Baja Peninsula, which provide important developmental habitats for

juveniles (Witherington 2002, Kamezaki et al. 2003). Within U.S. jurisdiction, individuals from this DPS are frequently found near Southern California and Hawai'i, but no nesting has been documented.

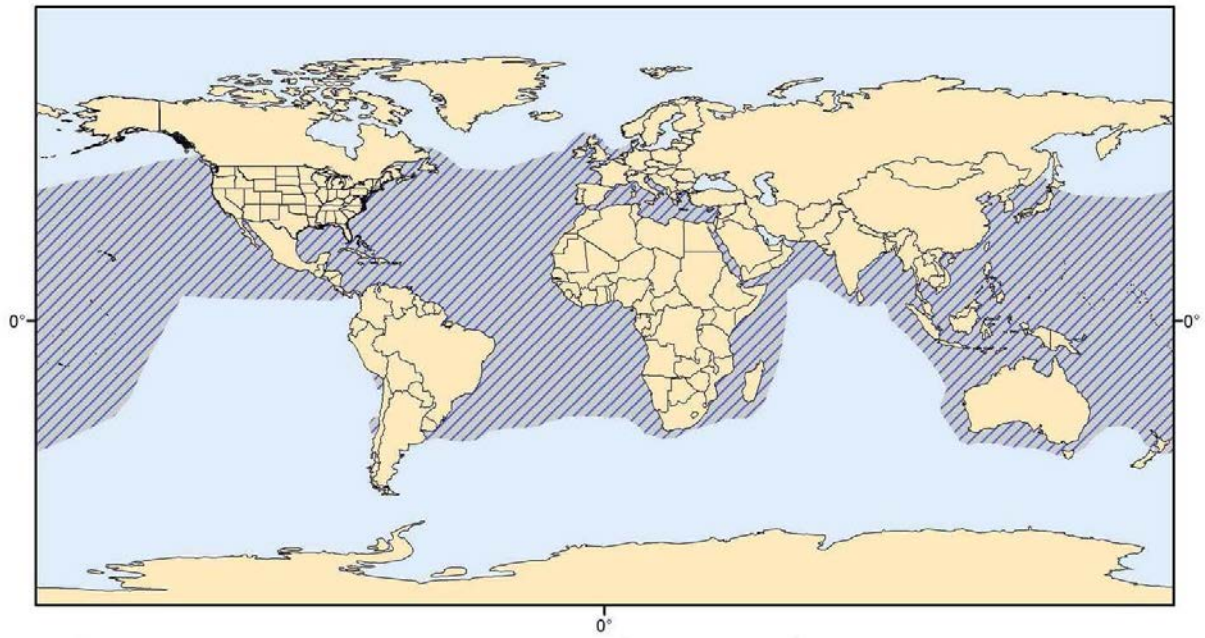

Figure 4. Loggerhead sea turtle global distribution (NMFS).

NATURAL HISTORY

Green sea turtle. Green sea turtles spend the majority of their lives in coastal foraging grounds that include open coastline and protected bays and lagoons. These zones provide important foraging, internesting, and migratory habitat for adults, and are often highly dynamic and situated in areas with annual fluctuation in sea and air temperatures, which can cause the distribution and abundance of food items to vary substantially between seasons and years (Carballo et al. 2002, Plotkin 2003). Green sea turtles nest on sandy, ocean-facing mainland and island beaches. Optimal nesting beach habitat is characterized by intact dune structures, native vegetation, no artificial lighting, and normal beach temperatures for nesting (Ackerman 1997, Lorne and Salmon 2007). The thermal tolerance range for sea turtle embryo development is estimated to be between 25 to 27°C and 33 to 35°C (Ackerman 1997). Upon leaving the nesting beach, post-hatchling green sea turtles begin a pelagic juvenile phase during which time they are thought to largely inhabit areas where surface waters converge to form local downwellings where vegetation and other prey in the water column are available. After approximately 3 to 5 years in the pelagic zone, juveniles move to coastal waters rich in seagrass and/or marine algae where they forage and grow until maturity (Musick and Limpus 1997).

Pelagic-stage green sea turtle hatchlings and juveniles eat vegetation such as seagrasses and algae, mollusks, jellyfish and crustaceans. Adults were once thought to be unique among sea turtles as strict herbivores, feeding primarily on seagrasses and algae. However, more recent research has shown that in pelagic habitat and occasionally in coastal habitats, adults also consume invertebrates

such as jellyfish, sponges, sea pens, and other prey occupying the water column. Green sea turtles in the East Pacific DPS are more omnivorous than turtles in other regions of the world (Seminoff et al. 2003, Lemons et al. 2011).

Green sea turtles are highly migratory, and undertake complex movements and migrations through a wide variety of habitats throughout their lives (Hirth 1997). Movements are not well understood (Groombridge and Luxmoore 1989). It is not known whether individuals from the Eastern Pacific DPS regularly migrate from breeding grounds in Mexico to specific areas along the North American coast, or whether they are vagrants that occasionally stray into more northern waters, perhaps moving with warmer "El Niño" currents (NMFS and USFWS 1998a). Upon reaching sexual maturity, green sea turtles set out on breeding migrations between foraging areas and nesting beaches, often returning to the same foraging areas following nesting migrations (Godley et al. 2002, Broderick et al. 2006). These migrations are conducted every few years (Hirth 1997). Both males and females migrate, and they may navigate entire ocean basins spanning thousands of kilometers (Carr 1986, Mortimer and Portier 1989). East Pacific DPS adult females migrate from foraging areas to their natal nesting beaches on average every 3 to 4 years (Meylan et al. 1990, Alvarado et al. 2000).

Primary nesting beaches of the green sea turtle East Pacific DPS are located in and around Michoacán, Mexico; however, sporadic nesting also occurs elsewhere along the Mexican and Central American coast. Females nest every 3 to 4 years and lay between one and seven clutches per season at 11-to 13-day intervals. Clutch size averages 65 eggs. Intervals and clutch sizes vary slightly among nesting beaches (Hirth 1997, Alvarado-Diaz et al. 2003). An adult female may deposit 9 to 33 clutches during her lifetime (Hirth 1997). After 42 to 62 days of incubation, hatchlings emerge at night, immediately crawl toward the surf and head for open water (Alvarado et al. 2000). Age to maturity for green sea turtles is estimated at 26 years to 40 years and varies among DPSs (Chaloupka et al. 2004). Reproductive longevity estimates range from 17 to 23 years (Carr et al. 1978, Fitzsimmons et al. 1995). East Pacific green sea turtles are known to mature at smaller sizes than other populations (Seminoff et al. 2002a, Chaloupka et al. 2004). Survival rates tend to be lower for juveniles and subadults than for adults. In the Gulf of California, mean annual survival was estimated at 97 percent for adults and 58 percent for juveniles (Seminoff et al. 2003). Survivorship at any particular site is influenced by the level of human-related impacts (NMFS and USFWS 2007).

Loggerhead sea turtle. Loggerhead sea turtles inhabit pelagic waters, continental shelves, bays, lagoons, and estuaries, foraging in the highly productive coastal waters located on continental shelves (Dodd 1988, Plotkin 2003). They may sometimes be associated with reefs and other natural and artificial substrates (Dodd 1988). Satellite tracking indicates that an ocean current system known as the Kuroshio Extension Bifurcation Region (KEBR) in the northern Pacific Ocean is an important pelagic foraging area for juvenile loggerheads from the North Pacific DPS (Polovina et al. 2006). The KEBR's location varies among years between 38° to 41°N and 147° to 160°E (Sainz-Trapaga et al. 2001). Loggerheads nest on ocean beaches and occasionally on estuarine shorelines. They appear to prefer relatively narrow, steeply sloped, high-energy, coarse-grained beaches, although nearshore contours may play a role in the selection of nesting beaches (Provancha and Ehrhart 1987). Nests are typically laid between the high tide line and the dune front (Hailman and Elowson 1992).

Loggerhead sea turtles are omnivores with a variety of feeding behaviors. The diet of all life stages is mostly invertebrates and occasionally jellyfish (NMFS and USFWS 1998b). North Pacific DPS

loggerheads foraging in the Eastern Pacific Ocean prefer the pelagic red crab (*Pleuroncodes planipes*), which occurs year round off Baja California (Aurioles-Gamboa and Perez-Flores 1997). Necropsies performed on loggerheads killed by North Pacific driftnets have found additional prey items, including other pelagic invertebrates such as gooseneck barnacles. Oceanic immature turtles in the Pacific forage on pelagic sea snails, gooseneck barnacles, and tunicates (Parker et al. 2005). Adults in coastal water habitats of Japan and China forage on a variety of jellyfish, cephalopods, anemones, conchs, crustaceans, and echinoderms (Hatase et al. 2002).

Currents transport North Pacific DPS hatchlings from Japanese nesting grounds eastward to feeding areas off Baja California (Bowen et al. 1995, Bowen 2003). Juveniles do not just use the currents as passive transport, but will actively swim to maintain a position in currents that provide favorable transport away from coastal areas and cold waters where survival is lower (Putman et al. 2012). Young turtles spend at least 10 years as pelagic juveniles as they travel to their foraging grounds in Baja and California (NMFS and USFWS 1998b). This trans-Pacific migration has been confirmed through DNA analysis and satellite tagging studies (Resendiz et al. 1998, Bowen 2003, Kobayashi 2008). Nesting female loggerheads show a strong site fidelity to their natal beaches, returning to the same area in successive reproductive migrations (Bjorndal et al., 1983). Remigration intervals typically average from 2.5 to 3.7 years (Richardson et al. 1978, Bjorndal et al. 1983).

Loggerhead sea turtles in the North Pacific DPS nest almost entirely in Japan from Honshu Island (37 ºN) south to the Yaeyama Islands (24ºN) (Kamezaki et al. 2003), although low levels of nesting may occur in other countries surrounding the South China Sea (Chan et al. 2007). The nesting season occurs from late May through August (NMFS and USFWS 1998b). Loggerheads typically lay 3 to 6 nests per season (Frazer and Richardson 1985, Hawkes et al. 2005, Tucker 2010) at intervals of approximately 12 to 15 days. Mean clutch size varies from about 100 to 126 eggs (Dodd 1988). Incubation to hatching lasts for variable periods of time depending on time of year and latitude, but typically range from about 42 to 75 days (Dodd and Mackinnon 2010). The warmer the sand surrounding the egg chamber, the faster the embryos develop (Mrosovsky and Yntema 1980). Immediately after hatchlings emerge from the nest, they make their way to the surf and are swept through the surf zone. They continue swimming away from land for 20 to 30 hours, presumably an adaptation to evade nearshore predators (Carr 1982, Wyneken and Salmon 1992). Loggerheads attain maturity at roughly 45 years (Scott et al. 2012). Tagging studies have documented reproductive longevity from 18 to 37 years in different regions of the species' range (Casale and Tucker 2015).

POPULATION AND HABITAT STATUS

Population abundance estimates are based on nesting beaches, either as counts of nests or counts of nesting females, or a combination of both. Information on abundance and trends away from nesting beaches is often unknown, so nesting data is the primary source for population estimates.

Green sea turtle. The East Pacific DPS is estimated at 20,112 females at 39 nesting sites along the western coast of Mexico, and nesting data for this DPS indicate an increasing trend in recent decades (NMFS and USFWS 2016). Reported nesting abundance among the 11 DPSs ranges between a high of 167,424 females in the North Atlantic DPS to a low of 992 females in the Mediterranean DPS. Trends at 32 nesting areas around the world indicated an overall decline of 48

to 67 percent in the number of females nesting over the past 100 to 150 years, with the degree of change being variable among sites and regions (Seminoff 2004, NMFS and USFWS 2016).

Washington is located north of the East Pacific DPS's normal range. Most of the turtles found along the state's outer coast appeared to have succumbed to hypothermia or related conditions (Appendix 1). It is theorized that the turtles found along the coasts of Oregon, Washington, British Columbia and Alaska were swept northward from southern California by ocean currents. There are 28 records of green sea turtles, mostly strandings, occurring on the outer coast of Washington dating from 1950 to the present, with the most recent in November 2010 (Appendix 1). Records peaked between 1990 and 2010, but this may be related to increased efforts to find and report stranded individuals compared to previous decades.

Loggerhead sea turtle. For the North Pacific DPS, the total estimated number of nests laid annually averaged 9,050 from 2009 to 2013 (Casale and Matsuzawa 2015). While nesting numbers have gradually increased in recent years and the number for 2009 was similar to that in 1990, historical evidence from Kamouda Beach (one nesting beach for the North Pacific DPS where census data dates back to the 1950s) indicates that there has been a substantial decline over the last half of the 20th century (Kamezaki et al. 2003) and that current nesting represents a fraction of historical nesting levels (NMFS and USFWS 2011). Global population size is unknown, because information is not available for four of the 10 subpopulations. Information available for six subpopulations indicates a decrease of 47% over the past 100 to 150 years (Casale and Tucker 2015). An estimated total of about 200,000 nests are produced annually. Considering a range of 3 to 5.5 nests per female, the above value would correspond to approximately 36,000 to 67,000 nesting females annually. (Casale and Tucker 2015).

There are 8 records of loggerhead sea turtles occurring on the outer coast of Washington dating from 1980 to the present, with the most recent being in January 2000. These records represent seven strandings and one bycatch incident (Appendix 1).

FACTORS AFFECTING GREEN AND LOGGERHEAD SEA TURTLES

Adequacy of existing regulatory mechanisms. In 2016, NMFS and USFWS issued a final rule to list 11 DPSs of the green sea turtle under the ESA, with the East Pacific DPS being designated as threatened (NMFS and USFWS 2016). In 2011, NMFS and USFWS issued a final rule to list nine DPSs of the loggerhead sea turtle under the ESA, with the North Pacific DPS classified as endangered (NMFS and USFWS 2011). The ESA protects endangered and threatened species and their habitats by prohibiting take (defined as harassing, hunting, capturing, killing or attempting to harass, hunt, capture or kill) and importation of these animals and products derived from them. Section 7 of the ESA requires federal agencies to consult with USFWS to ensure that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of either species in U.S. waters. Examples of federal actions include dredging and channelization, beach nourishment and nearshore construction, pile-driving, water quality standards, oil and gas exploration and extraction, power plant operations, vessel activities, military activities, and fisheries management practices. The federal Magnuson-Stevens Fishery Management and Conservation Act influences international conservation efforts by mandating responsible fishing practices and bycatch mitigation within fleets that sell fisheries products to the U.S.

Internationally, all sea turtles benefit from a number of protective regulations. The U.S. is a part of the Inter-American Convention (IAC) for the Protection and Conservation of Sea Turtles, which is the only international treaty dedicated exclusively to marine turtles. All sea turtle species are listed in Appendix I of the Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES), which lists species threatened with extinction and prohibits international trade. The Convention on Migratory Species (CMS) is an international and intergovernmental treaty backed by the United Nations Environmental Programme that lists marine turtles under Appendices I and II (species threatened with extinction and species that need international cooperative conservation efforts). Marine turtles are also protected under Annex II of the Specially Protected Areas and Wildlife (SPAW) Protocol of the Cartagena Convention (a comprehensive, umbrella agreement for protection and development of the marine environment).

As threatened species under Washington state law, green and loggerhead sea turtles are protected from hunting, intentional and malicious taking, harassment, and possession (RCW 77.15.130). Both species also receive protection under WAC 220-450-030, which prohibits the capture, importation, possession, transfer, and holding in captivity of most wildlife in the state. NMFS and the Washington Department of Fish and Wildlife (WDFW) have a Section 6 Cooperative Agreement that includes the green sea turtle and the North Pacific DPS of the loggerhead sea turtle. The agreement requires WDFW to maintain an adequate and active program for the conservation of endangered species and threatened species.

Harvest. The principal cause of historical population decline for green sea turtles is harvest of eggs, hatchlings and adults on nesting beaches and juveniles and adults on feeding grounds (NMFS and USFWS 1998a, 2007). These harvests continue to inhibit recovery in some areas. Decades of egg harvest have impacted many nesting subpopulations in the East Pacific DPS of green sea turtle. Eggs are taken for subsistence by local people and others who scour the beach for eggs to sell. In some countries and localities, egg harvest is legal, while in others it is illegal but continues due to lack of enforcement. Laws were enacted in Japan in 1973 and 1988 that prohibit egg collection of North Pacific loggerheads (Matsuzawa 2006).

The hunting of adult and juvenile turtles of both DPSs continues to be an important problem in a number of countries (e.g., Mexico) despite legal protections (Nichols et al. 2002, Seminoff et al. 2003, Koch et al. 2006). Harvest along the West Coast of the U.S. is prohibited and not known to be an issue. A man was successfully prosecuted under the federal ESA for capturing and killing a green sea turtle on the beach at Ocean Park, Washington in 2001 (Department of Justice 2004).

Incidental capture. Incidental capture and drowning in fishing gear is a significant ongoing threat to sea turtles throughout the Pacific Ocean. There are two green sea turtle bycatch records for Washington, one in 1958 and one in 1963, and one bycatch record for loggerhead in 1992 (Appendix 1). The primary gear types involved in these interactions include gillnets, longlines, drift nets, set nets, and trawl fisheries. These are employed by artisanal and commercial fleets targeting a wide variety of fish and invertebrate species (NMFS and USFWS 1998a, 1998b, 2007). The main foraging grounds of East Pacific green sea turtles are most likely along the coast of Baja California, Mexico and southern California, where the main concern is capture by shrimp trawlers in Mexico (Seminoff et al. 2002b). The federally required use of Turtle Excluder Devices (TEDs) by shrimpers and other commercial fishermen and other conservation measures have reduced the occurrences of sea turtle deaths (Finkbeiner et al. 2011), but some mortality continues.

The primary threat to North Pacific loggerheads is drowning from entanglement in longline and gillnet fishing gear. Thousands of adult and juvenile North Pacific loggerheads are caught each year in pelagic longline fisheries operated by the U.S., Japan, China, and other nations (Lewison et al. 2004). A recent NMFS analysis indicates that fisheries have likely caused multiple mortalities or serious injuries to loggerhead turtles after 2003 (Carretta et al. 2017). Numerous loggerheads also are caught and killed in coastal fishing gear off Baja California.

Nesting habitat destruction and modification. Nesting habitat destruction and modification poses a major threat to North Pacific loggerheads. On Japanese nesting beaches, tourism threatens loggerhead nests on the island of Yakushima. Unrestricted access to beaches and poor management put nesting loggerheads at risk. Nighttime beach use by people disturbs nesting females, and artificial lighting disorients adults and hatchlings. Heavy utilization of nesting beaches by humans may also compact the sand, resulting in lowered hatching success. Beach nourishment impacts turtles by increasing and compacting the sand over nests and disturbing nesting turtles. Repeated mechanical raking of nesting beaches by heavy machinery can result in compacted sand and tire ruts that may hinder or trap hatchlings. The placement of physical obstacles on a beach can hamper or deter nesting attempts as well as interfere with incubating eggs and the hatchlings ability to find the sea (Suganuma 2002, Kamezaki et al. 2003, Kudo et al. 2003).

East Pacific green sea turtle nesting beaches in Costa Rica, Revillagigedos Islands, and the Galapagos Islands are less affected by coastal development than green sea turtles in other regions around the Pacific, but several of the secondary green sea turtle nesting beaches in Mexico suffer from coastal development (Seminoff 1994).

Boat collisions. Along the West Coast of the U.S., boat collisions are a potential threat to sea turtles, which can be killed or injured when struck by a boat hull or an engaged propeller (NMFS and USFWS 1998a). Eighty percent of the East Pacific green sea turtle deaths reported in San Diego Bay and Mission Bay, California from 1990 through 1992 were associated with boat collisions (McDonald and Dutton 1992). No additional boat collision data are available for the West Coast of the U.S. or Hawai'i for green sea turtles or loggerhead sea turtles (NMFS 1998a,1998b; J. Seminoff pers. comm. 2016). However, three Washington green sea turtle occurrence records indicate boat strikes (Appendix 1).

Marine debris. Ingestion and entanglement in human-related marine debris is another threat to marine turtles both at sea and in coastal waters. The Pacific Ocean contains large volumes of plastics, monofilaments, and other debris. Much of this is discarded waste from the fishing industry following decades of disposal practices. Turtles can become entangled in abandoned fishing nets, lines, ropes, and nets and cannot surface to breathe or submerge to feed. Even small amounts of ingested debris can result in gut obstruction and mortality (Balazs 1985, Carr 1987, Bjorndal et al. 1994, McCauley and Bjorndal 1999). One Washington green sea turtle record indicates injury from entanglement (Appendix 1).

Climate change. The potential impacts of climate change include (1) inundation of nests, or erosion or submergence of nesting beaches due to rising sea levels, (2) skewed hatchling sex ratios from rising incubation temperatures, (3) rapid disturbance of ocean currents used for natural dispersal during the green and loggerhead sea turtles' life cycles, and (4) alteration of marine food

webs (Fish et al. 2005, Hawkes et al. 2009, Poloczanska et al. 2009). Even minor irregularities in sea surface temperatures could cause mounting effects on food, habitat use, and overall range of both species, particularly loggerheads (J. Seminoff pers. comm. 2016). It is not clear what effect warming currents might have on sea turtle dispersal along the Washington coast, but these could result in both species becoming increasingly common in the future, but these could result in both species becoming increasingly common in the future.

MANAGEMENT ACTIVITIES

In the U.S., NMFS and USFWS have joint federal jurisdiction for sea turtles, with NMFS taking the lead in the marine environment and USFWS maintaining jurisdiction when in the terrestrial environment. Both agencies, along with many state agencies and international partners, have issued regulations to eliminate or reduce threats to sea turtles, while working together to recover them. To reduce the incidental capture of sea turtles in commercial fisheries, NMFS has enacted regulations to reduce bycatch in certain U.S. commercial fishing gear (gillnets, longlines, pound nets, and trawls). In 2003, NMFS established a 25,000-square-mile Pacific Loggerhead Conservation Area (PLCA) off southern California, where drift gillnet fishing is closed from June to August whenever an El Niño event is occurring or forecasted. The seasonal closure associated with the U.S. Pacific Leatherback Conservation Area, which restricts gillnet fishing off the coast of California during the fall, also potentially benefits green and loggerhead sea turtles. The NOAA Marine Debris Program was established in 2005 to investigate and reduce marine debris to protect living marine resources. The program supports numerous projects that remove debris and derelict fishing gear in areas where sea turtles are present. In the early 1980s, NOAA established the West Coast Marine Mammal Stranding Network under the Marine Mammal Protection Act. The network also records sea turtle strandings. The Sea Turtle Stranding and Salvage Network, formally established in 1980 and the Sea Turtle Disentanglement Network established in 2002 collect information on entanglement and ingestion of marine debris. The federal Marine Turtle Conservation Act is a key element of sea turtle protection in the U.S. and internationally. It authorizes a dedicated fund, administered by the USFWS, to support marine turtle conservation projects in foreign countries, with emphasis on protecting nesting populations and nesting habitat.

Sea turtles found alive on Washington's coast are generally taken to the nearest aquarium, including Seaside Aquarium or Oregon Coast Aquarium in Oregon, or the Point Defiance Zoo or Seattle Aquarium in Washington, where they receive emergency care. Turtles stabilized at the Oregon aquariums and Point Defiance Zoo are later transferred to the Seattle Aquarium for rehabilitation and, if successfully rehabilitated, they may be sent to Sea World in San Diego, California for release into the wild, where warmer waters exist. The Seattle Aquarium is Washington's only recognized turtle rehabilitation facility.

Countries within the ranges of the East Pacific green sea turtle DPS and North Pacific loggerhead sea turtle DPS each have some type of sea turtle protection as part of their national legislation. There are also numerous conservation networks and several international groups working along with NMFS and USFWS to increase sea turtle protection via enforcing protection of nesting beaches, raising conservation awareness, assessing bycatch mortality, reducing interactions and mortalities in coastal and offshore fisheries, and providing information through hands-on activities, events and outreach.

CONCLUSIONS AND RECOMMENDATION

Despite the rarity of green sea turtles and loggerhead sea turtles in Washington, both are part of federally listed DPSs that face continuing conservation threats. Even the loss of a few individuals, especially adults, holds potential consequences when combined with other impacts. Both populations are wide-ranging and migratory, and threats are widespread across the nesting and marine portions of their ranges. Members of both populations spend the majority of their lives in areas outside of U.S. jurisdiction, so international cooperation is essential for addressing conservation challenges.

For the reasons presented in this periodic status review, it is recommended that the green sea turtle remain listed as a state threatened species in Washington. It is also recommended that the loggerhead sea turtle be uplisted to a state endangered species in Washington due to the threats outlined, the documented decline of the North Pacific DPS, and to reflect the recent federal uplisting of this DPS as endangered.

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Individual papers cited cover a number of topics discussed in the report, including information on: 1) the species' description, taxonomy, distribution, and biology; 2) habitat requirements; 3) population status and trends; 4) conservation status and protections; 5) research, monitoring, and restoration activities; and 6) factors affecting the continued existence of the species.

Table A. Key to 34.05.271 RCW Categories:

34.05.271(1)(c) RCW	Category Code
(i) Independent peer review: review is overseen by an independent third party.	i
(ii) Internal peer review: review by staff internal to the department of fish and wildlife.	ii
(iii) External peer review: review by persons that are external to and selected by the department of fish and wildlife.	iii
(iv) Open review: documented open public review process that is not limited to invited organizations or individuals.	iv
(v) Legal and policy document: documents related to the legal framework for the significant agency action including but not limited to: (A) federal and state statutes; (B) court and hearings board decisions; (C) federal and state administrative rules and regulations; and (D) policy and regulatory documents adopted by local governments.	v
(vi) Data from primary research, monitoring activities, or other sources, but that has not been incorporated as part of documents reviewed under the processes described in (c)(i), (ii), (iii), and (iv) of this subsection.	vi
(vii) Records of the best professional judgment of department of fish and wildlife employees or other individuals.	vii
(viii) Other: Sources of information that do not fit into one of the categories identified in this subsection (1)(c).	viii

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PERSONAL COMMUNICATIONS

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Appendix A. Records of green sea turtles and loggerhead sea turtles in Washington, 1950 to 2010. Official records for Washington post-2010 are not currently available.

Effort Date	Effort Type	Occurrence Notes	Quantity	County Name
Green Sea Turtle				
1950	Unknown	Observation date unknown. Lat. 46.42, long. -123.88. [1]	1	Pacific
9/30/1958	Bycatch	Naselle bridge: Juvenile caught in gillnet, provided alive to Portland Zoo, lived for 3 days. Gillnet set in Naselle estuary near Naselle bridge. Washington Department of Fisheries reported warm currents and many tropical fish landed off Washington during 1958 Lat. 46.25, long. -123.54. [1,2,3]	1	Pacific
2/20/1961	Unknown	Westport: 3 miles south. Lat. 46.84, long. -124.10. [1,3]	1	Grays Harbor
8/1/1963	Bycatch	Westport: 3 miles south, hooked by charter boat. Carapace 3ft long. Treated at Point Defiance Zoo, no information on whether it survived. Lat. 46.51, long. -124.09. [2]	1	Grays Harbor
9/5/1981	At sea	Cape Flattery: 100 miles west. Lat. 49.07, long. -127.08. Two turtles within 50 miles of each other. Recorded separately. [2]	1	Clallam
9/5/1981	At sea	Cape Flattery: 100 miles west. Lat. 49.07, long. -127.08. Two turtles within 50 miles of each other. Recorded separately. [2]	1	Clallam
11/13/1989	Stranding	Ocean Shores: Recovered live green sea turtle. Rehabilitated at Seattle Aquarium. Weight 24.4 lb., 20in long. [1]	1	Grays Harbor
11/17/1989	Stranding	Ocean Shores: Collected alive, cold stunned, transported to Seattle Aquarium for stabilization and rehabilitation. Weight 11.1 kg. Later died. Lat. 47.0, long. -124.17. [1,3]	1	Grays Harbor
1/29/1990	Stranding	Copalis Beach: Collected alive cold stunned, transported to Seattle Aquarium for stabilization and rehabilitation. Said to be hypothermic but not dehydrated. 15.8 lb., 16.25in length, 15.75in width. Lat. 47.1, long. -124.18. [1,3]	1	Grays Harbor
1/30/1990	Stranding	Klipsan Beach 0.2 mi. south. Found dead on beach. Weight 7.3 lb., 12.6in length and 12.2in width. Transferred to Burke Museum. [1,3]	1	Pacific
2/3/1990	Stranding	Grayland: 2.5 miles south of Twin Harbors State Park. Small turtle. Washed up dead. 14in width. [1,3]	1	Grays Harbor
2/5/1990	Stranding	Grayland: Dead turtle recovered. Specimen sent to Burke Museum. Weight 14.3 lb., 15.2ft length, 15.2in width. [1]	1	Grays Harbor

Effort Date	Effort Type	Occurrence Notes	Quantity	County Name
3/4/1999	Stranding	Taholah: Collected dead by Tribal members at mouth of Quinault River. Weight 35 kg. Carcass given to Burke Museum. Genetic samples sent to Peter Dutton at UCSD. [3]	1	Grays Harbor
10/31/1999	Stranding	Long Beach: Collected alive cold stunned north of Fort Canby. Superficial injuries. Transported to Seaside Aquarium, then Seattle Aquarium. Weight 47 kg. Died during treatment on 11/3. Necropsy revealed pneumonia, ulcerated stomach, some necrosis inside and outside of lung. Lat. 46.35, long. -124.06. [1,3]	1	Pacific
11/22/1999	Stranding	Long Beach: Collected alive in poor condition and transported to NW Wildlife Alliance where it died. Carapace straight length 72 cm, width 58 cm. Tissues collected for Peter Dutton. Transferred to WSU Dept. of Anthropology. [3]	1	Pacific
12/13/1999	Stranding	Long Beach: Collected alive, cold stunned with some bleeding abrasions. Transported to Seaside Aquarium then to Seattle Aquarium for treatments. Estimated 65 cm long, weight 32 kg. Lat. 46.35, long. -124.06. [3]	1	Pacific
12/16/1999	Stranding	Copalis: Collected dead. Delivered to NMFS Sand Point on 1/14/2000 and necropsied. Identified as adult female, weight 34 kg. [3]	1	Grays Harbor
12/16/1999	Stranding	Ocean Shores: Collected dead. Carapace had several rake marks. Delivered to NMFS Sand Point and necropsied. Identified as adult male weight 32.5 kg. [1,3]	1	Grays Harbor
12/16/1999	Stranding	Taholah: Collected status undetermined by Tribal members and later confirmed dead by veterinarian in Aberdeen. Carapace measurement 28in long, weight 76 lb. Tissues collected for Peter Dutton (SWFSC). Lat. 47.34, long. -124.29. [1,3]	1	Grays Harbor
12/30/1999	Stranding	Ocean Shores: Collected alive. Transported to Seattle Aquarium for treatment. Estimated weight 80 lb., length 21in. Lat. 47.0, long. -124.17. [1,3]	1	Grays Harbor
1/6/2000	Stranding	Outer Coast: Collected dead by tourist and delivered to WDFW Montesano. Carcass frozen and delivered to NMFS Sand Point. [3]	1	
1/26/2000	Stranding	Ocean Shores: Collected dead by stranding network volunteer. Carapace straight length 72 cm, width 61 cm. Tissues collected for Peter Dutton. Transferred to WSU Dept. of Anthropology. [3]	1	Grays Harbor
2/2/2001	Stranding	Ocean Park: Stranded turtle observed by Wildlife Center volunteer. Turtle later caught and killed for its shell. Killer convicted and sentenced in May 2004. [3]	1	Grays Harbor
1/27/2004	Stranding	Westport: Live turtle collected from North Cove. Transported to Seattle Aquarium for treatment. Carapace length 56 cm, width 46 cm, weight 25.5 kg. [3]	1	Grays Harbor

Effort Date	Effort Type	Occurrence Notes	Quantity	County Name
3/2/2008	Stranding	South Sand Point Beach: Observed by COASST volunteer while doing a dead seabird survey. Carapace 78 cm long and 76 cm wide. 100 cm from head to back of carapace, 20 cm tail. Carcass left at site and reported to NOAA Fisheries in May 2009. [3]	1	Clallam
2/6/2009	Stranding	Ocean Shores: Dead turtle brought in by unknown person to Ocean Shores Interpretive Center. Ed Mitchell picked up and transported to WDFW MMI. Transferred to NOAA Fisheries in Seattle and necropsied. Identified as male, weight 24.5 kg. [3]	1	Grays Harbor
11/28/2009	Stranding	Long Beach: Stranded and later transported to Oregon Coast Aquarium. Considered fairly robust, active, with injured pectoral flipper which appeared to be an entanglement wound. 89 lb., length 28in, width 22in. [3]	1	Pacific
11/18/2010	Stranding	Long Beach: Collected cold stunned male sea turtle. Transported to Seattle Aquarium. Warmup protocol initiated, but animal died overnight on 11/22/2010. Necropsy noted old propeller scars on carapace. Weight 30 kg. [3]	1	Pacific
Loggerhead Sea Turtle				
9/15/1980	Stranding	Ocean Shores: Juvenile found dead but fresh condition. Carapace 18in length, 16in width. Lat. 47.00, long. -124.10. [1,2]	1	Grays Harbor
2/1981	Stranding	Fort Canby State Park: Benson Beach. Found alive suffering from puncture wound. Treated at Seattle Aquarium and released. Weight 150 lb. [3]	1	Pacific
2/1981	Stranding	North Beach: Washed up and found dead after February storm. Had yellow underbelly with barnacles attached. Reported by North Beach Beacon newspaper on 3/11/1981. [3]	1	Grays Harbor
2/18/1981	Stranding	Fort Canby State Park: Benson Beach. Came ashore alive during a four-day storm. Weight 130 to 160 lb. Treated at Seattle Aquarium, sent to Sea World for release. [2]	1	Pacific
12/1/1990	Stranding	Ocean Shores: Collected alive, cold stunned, transported to Point Defiance Zoo and then Seattle Aquarium for stabilization and rehabilitation. Weight 14 kg. Carapace about 2ft long. Lat. 47.0, long. -124.17. [1,3]	1	Grays Harbor
8/14/1992	Stranding	Westport: Found alive on beach, died shortly thereafter. Lat. 46.9, long. -124.13. [1]	1	Grays Harbor
8/14/1992	Bycatch	Westport: Collected alive at sea and brought to Westport Aquarium by unknown vessel operator, who indicated it had been collected far offshore 20 days earlier. Estimated length 30 cm. Transported to Seattle Aquarium for check-up and tagging. [3]	1	Grays Harbor

Effort Date	Effort Type	Occurrence Notes	Quantity	County Name
1/9/2000	Stranding	Ocean Shores: Found dead on beach. Transported to WDFW Montesano. [3]	1	Grays Harbor

Records were obtained from the following sources: [1]Washington Department of Fish and Wildlife (WDFW) wildlife observation card files and Washington Survey Data Management (WSDM); [2]M. Stinson 1984; and [3]K. Wilkinson, NOAA West Coast Region, Seattle, Washington.

Appendix B. WDFW responses to public comments received during the 90-day public review period for the draft Periodic Status Report for the Green and Loggerhead Sea Turtles in Washington conducted from November 15, 2016 to February 13, 2017. The comments presented here are summaries of the remarks provided by one or more people.

Report Section	Comment and Response
General comments	1. I support the wildlife managers' recommendations to keep the green sea turtle listed as a state threatened species, and to elevate the loggerhead sea turtle from state threatened status to state endangered status.
	WDFW believes that green sea turtles sea turtles should remain on the state list of threatened species and loggerhead sea turtles should be elevated to the state list of endangered species for the reasons given in the periodic status review.
	2. All sea turtles should have endangered status. These majestic animals are seriously at risk.
	WDFW believes that green sea turtles sea turtles should remain on the state list of threatened species and loggerhead sea turtles should be elevated to the state list of endangered species for the reasons given in the periodic status review.
Population status	3. There have been significant declines of the loggerhead sea turtle global and North Pacific Distinct Population Segment populations.
	WDFW agrees with this comment and discusses this topic in the report on pages 5 and 6.
Factors affecting continued existence	4. One of the primary threats to the loggerhead and green sea turtles is the incidental take of the turtles by marine fisheries.
	WDFW agrees with this comment and discusses this topic in the report on pages 7 and 8.
	5. Sea turtles are threatened by human-generated sources of marine noise, such as military sonar.
	WDFW is not aware of any impacts to sea turtles from underwater noise pollution.
	6. We request that Washington encourage the Pacific Fisheries Management Council (PFMC) to address continued bycatch of endangered sea turtles by advocating for the complete phase-out of the drift gillnet fishery as soon as possible. 7. We encourage Washington to adopt practices to avoid sea turtle entanglements in its pot and trap fisheries.
	This periodic status review is not intended to discuss management recommendations. However, WDFW is interested in these recommendations and will examine them in the future for all marine wildlife.