California Fish and Game Commission
Notice of Findings for
Pacific Leatherback Sea Turtle
(*Dermochelys coriacea*)

October 14, 2022

NOTICE IS HEREBY GIVEN that the California Fish and Game Commission (Commission), at a meeting on October 14, 2021, found pursuant to California Fish and Game Code, Section 2075.5, that the information contained in the petition to list Pacific leatherback sea turtle (*Dermochelys coriacea*) (hereinafter "Pacific leatherback") and other information in the record before the Commission, warrants adding Pacific leatherback to the list of endangered species under the California Endangered Species Act (CESA; California Fish and Game Code, Section 2050 et seq.). (See also California Code of Regulations, Title 14, Section 670.1, subsection (i).)

NOTICE IS ALSO GIVEN that, at its October 12-13, 2022 meeting, the Commission adopted the following findings outlining the reasons for its determination.

I. Background and Procedural History

Petition History

On January 23, 2020, the Center for Biological Diversity and Turtle Island Restoration Network submitted to the Commission a petition to list Pacific leatherback sea turtle as endangered (Petition) pursuant to CESA. The Commission referred the Petition to the California Department of Fish and Wildlife (Department) on February 3, 2020 for evaluation, in accordance with Fish and Game Code Section 2073 and published a formal notice of receipt of the Petition on February 14, 2020 (California Regulatory Notice Register (Notice Register) 2020, No. 7-Z, p. 243).

On June 2, 2020, the Department provided the Commission with its evaluation of the Petition to assist the Commission in making a determination as to whether the petitioned action may be warranted based on the sufficiency of scientific information (Fish and Game Code, sections 2073.5 and 2074.2; California Code of Regulations, Title 14, Section 670.1, subdivisions (d) & (e)). The Department recommended that the Commission accept the Petition.

At its August 19, 2020 meeting, the Commission found that sufficient information existed to indicate the petitioned action may be warranted and accepted the Petition for consideration. Upon publication of the Commission's Notice of Findings on September 4, 2020, the Pacific leatherback sea turtle was designated a candidate species (Notice Register 2020, No. 36-Z, p. 1220).

Status Review Overview

The Commission's action designating Pacific leatherback as a candidate species triggered the Department's process for conducting a status review to inform the Commission's decision on whether to list the species.

The Department transmitted its report to the Commission, titled "A Status Review of Pacific Leatherback Sea Turtle (*Dermochelys coriacea*) in California" (Status Review) on July 20,

2021. And on August 18, 2021, the Commission formally received the Department's Status Review. On October 14, 2021, the Commission found that the information contained in the petition to list Pacific leatherback and the other information in the record before the Commission warrants listing Pacific leatherback as an endangered species under the California Endangered Species Act.

Species Description

Leatherback Sea Turtle

Leatherback sea turtle is the largest turtle species in the world and the fourth largest living reptile (McClain et al. 2015). Adults weigh an average of 453 kilograms (1,000 pounds) with the carapace length commonly exceeding 1.5 meters (4.9 feet) (McClain et al. 2015, Davenport et al. 2011). The skin covered carapace is predominantly black with pale spotting. (CDFW 2021; NMFS & USFWS 1998). The carapace is lined with seven longitudinal ridges, notably white in hatchlings, that taper posteriorly to a blunt point (Pritchard 2015). The underside is often mottled with white to pinkish to black coloration, and the degree of pigmentation is variable (NMFS & USFWS 1998). Leatherback hatchlings, in addition to their white longitudinal ridges, have a mottled underside and are covered with small polygonal bead-like scales (CDFW 2021). Unlike other sea turtle species, leatherback sea turtles have clawless flippers, with proportionally longer front flippers that span up to 2.7 meters (8.9 feet) wide in adults (NMFS & USFWS 1998). Leatherback sea turtles also have pointed tooth-like cusps in their upper jaw that, in addition to backward pointing keratinized papillae in the mouth and throat, aid in the capture and ingestion of gelatinous prey (Pritchard 2015).

Leatherback sea turtles exhibit a shallow phylogeny as shown through mitochondrial deoxyribonucleic acid (mtDNA) analysis (Dutton et al. 1999). Significant extirpation events during the early Pleistocene glaciation likely reduced the species to a single lineage for the basis of current populations (Dutton et al 1999, Dutton 2004, Dutton et al. 2013). Unlike other sea turtle species which each have multiple mtDNA lineages, the genetic structure of leatherback sea turtles shows an expansion from a single mtDNA lineage approximately 0.17 million years ago (Bowen and Karl 1997, Dutton et al. 1996, Dutton et al. 1999, Duschene et al. 2012). Consequently, shared haplotypes between leatherback populations are most likely a result of common ancient ancestry rather than from gene flow through interbreeding (NMFS & USFWS 2020).

As mentioned in section 1.3 of the Status Review, there are seven federally recognized subpopulations that each meet the discreteness and significance criteria of the "Policy Regarding the Recognition of Distinct Vertebrate Population Segments under the Federal ESA" (i.e., DPS Policy; 61 FR 4722; February 7, 1996). All subpopulations are discrete, exhibit genetic discontinuity representative of marked separation from one another, and are each significant to the global population (Wallace et al. 2010, NMFS and USFWS 2020). As such, each subpopulation can be considered nearly independent from other subpopulations. Any loss of one or more subpopulations would result in a significant gap in the global nesting range and reduce the overall genetic diversity of the species globally (NMFS and USFWS 2020).

Pacific Leatherback Sea Turtle

Two subpopulations of leatherback sea turtle exist in the Pacific Ocean - the West Pacific population and the East Pacific population (CDFW 2021). Pacific leatherback sea turtle subpopulations (east and west) account for two of the seven federally recognized

subpopulations. Analysis of mtDNA showed a significant genetic differentiation between East Pacific population nesting sites (Mexico, Costa Rica) and West Pacific population nesting sites (Solomon Islands, Indonesia, Papua New Guinea), verifying the discreteness between the two populations (Barragan et al. 1998, Dutton et al. 1999, Dutton et al. 2000b, Dutton et al. 2005, Dutton et al. 2006, Dutton et al. 2007). Though the East Pacific and West Pacific populations are genetically different, the two populations overlap in their marine foraging areas.

II. STATUTORY AND LEGAL FRAMEWORK

The Commission, as established by the California State Constitution, has exclusive statutory authority under California law to designate endangered, threatened, and candidate species under CESA. (California Constitution, Article IV, Section 20, Subdivision (b); Fish and Game Code, Section 2070.) The CESA listing process began in the present case with the petitioners' submittal of the Petition to the Commission. The regulatory and legal process that ensued is described in some detail in the preceding section above, along with related references to the Fish and Game Code and controlling regulation. The CESA listing process generally is also described in some detail in published appellate case law in California, including:

- *Mountain Lion Foundation v. California Fish and Game Commission* (1997) 16 Cal.4th 105, 114-116;
- *California Forestry Association v. California Fish and Game Commission* (2007) 156 Cal.App.4th 1535, 1541-1542;
- *Center for Biological Diversity v. California Fish and Game Commission* (2008) 166 Cal.App.4th 597, 600;
- *Natural Resources Defense Council v. California Fish and Game Commission* (1994) 28 Cal.App.4th 1104, 1111-1116;
- *Central Coast Forest Association v. California Fish and Game Commission* (2017), 2 Cal. 5th 594, 597-598; and
- *Central Coast Forest Association v. California Fish and Game Commission* (2018) 18 Cal. App. 5th 1191, 1196-1197.

The "is warranted" determination at issue here stems from Commission obligations established by Fish and Game Code Section 2075.5. Under this provision, the Commission is required to make one of two findings for a candidate species at the end of the CESA listing process; namely, whether listing a species is warranted or is not warranted. Here, with respect to the Pacific leatherback, the Commission made the finding under Section 2075.5(e)(2) that listing the Pacific leatherback as endangered is warranted.

The Commission was guided in making these determinations by statutory provisions and other controlling law. The Fish and Game Code, for example, defines an endangered species under CESA as "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, over exploitation, predation, competition, or disease." (Fish and Game Code, Section 2062.) Similarly, the Fish and Game Code defines a threatened species under CESA as "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." (*Id*., Section 2067.)

The Commission also considered Title 14, Section 670.1, subsection (i)(1)(A), of the California Code of Regulations in making its determination regarding Pacific leatherback. This provision provides, in pertinent part, that Pacific leatherback shall be listed as endangered or threatened under CESA if the Commission determines that its continued existence is in serious danger or is threatened by any one or any combination of the following factors:

1. Present or threatened modification or destruction of its habitat,
2. overexploitation,
3. predation,
4. competition,
5. disease, or
6. other natural occurrences or human-related activities.

Fish and Game Code Section 2070 provides similar guidance. This section provides that the Commission shall add or remove species from the list of endangered and threatened species under CESA only upon receipt of sufficient scientific information that the action is warranted. Similarly, CESA provides policy direction not specific to the Commission per se, indicating that all state agencies, boards, and commissions shall seek to conserve endangered and threatened species and shall utilize their authority in furtherance of the purposes of CESA (Fish and Game Code, Section 2055). This policy direction does not compel a particular determination by the Commission in the CESA listing context. Nevertheless, "'[l]aws providing for the conservation of natural resources' such as the CESA 'are of great remedial and public importance and thus should be construed liberally." (*California Forestry Association v. California Fish and Game Commission*, supra, 156 Cal. App.4th at pp. 1545-1546, citing *San Bernardino Valley Audubon Society v. City of Moreno Valley* (1996) 44 Cal.App.4th 593, 601; Fish and Game Code, sections 2051 and 2052.)

Finally, in considering these factors, CESA and controlling regulations require the Commission to actively seek and consider related input from the public and any interested party (see, e.g., Id., sections 2071, 2074.4, 2078; California Code of Regulations, Title 14, Section 670.1, subsection (h)). The related notice obligations and public hearing opportunities before the Commission are also considerable (Fish and Game Code, sections 2073.3, 2074, 2074.2, 2075, 2075.5, 2078; California Code of Regulations, Title 14, Section 670.1, subsections (c), (e), (g), (i); see also Government Code, Section 11120 et seq.). All of these obligations are in addition to the requirements prescribed for the Department in the CESA listing process, including an initial evaluation of the petition and a related recommendation regarding candidacy, and a review of the candidate species' status culminating with a report and recommendation to the Commission as to whether listing is warranted based on the best available science (Fish and Game Code, sections 2073.4, 2073.5, 2074.4, 2074.6; California Code of Regulations, Title 14, Section 670.1, subsections (d), (f), (h)).

III. Factual and Scientific Bases for the Commission's Final Determination

The factual and scientific bases for the Commission's determination that designating the Pacific leatherback as an endangered species under CESA is warranted are set forth in detail in the Commission's record of proceedings including the Petition; the Department's petition evaluation report; the Department's status review report; written and oral comments received

from members of the public, the regulated community, tribal entities, and the scientific community; and other evidence included in the Commission's record of proceedings.

The Commission determines that the continued existence of Pacific leatherback in the state of California is in serious danger or threatened by one or a combination of the following factors as required by the California Code of Regulations Title 14, Section 670.1, subsection (i)(1)(A):

1. Present or threatened modification or destruction of its habitat,
2. overexploitation,
3. predation,
4. competition,
5. disease, or
6. other natural occurrences or human-related activities.

The Commission also determines that the information in the Commission's record constitutes the best scientific information available and establishes that designating Pacific leatherback as an endangered species under CESA is warranted. Similarly, the Commission determines that Pacific leatherback 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.

The items highlighted here and detailed in the following section represent only a portion of the complex issues aired and considered by the Commission during the CESA listing process for Pacific leatherback. Similarly, the issues addressed in these findings represent some, but not all of the evidence, issues, and considerations affecting the Commission's final determination. Other issues aired before and considered by the Commission are addressed in detail in the record before the Commission, which record is incorporated herein by reference.

Background

The Commission bases its "is warranted" finding for Pacific leatherback on the significant threats posed by four of the six listing factors (all except competition and disease).

Qualification for listing

The Petition requests that the Commission list Pacific leatherback. Pacific leatherback sea turtles are comprised of two subpopulations (CDFW 2021). The two subpopulations are reproductively isolated as mating occurs off nesting beaches and not at foraging sites (CDFW 2021). Both subpopulations may occur within the California Current Ecosystem. (Dutton et al. 2007).

The Department ultimately concluded that the petitioned action to list Pacific leatherback was warranted and recommended that the Commission do so (CDFW 2021). Pacific leatherback constitutes two subpopulations, which, while they can be genetically differentiated, have substantial geographic overlap within foraging habitat (Dutton et al. 2007; CDFW 2021). Based on the foregoing factors, the Commission finds Pacific leatherback qualifies for listing under CESA.

Threats

Pacific leatherback is threatened due to:

1. Present or threatened modification of its habitat,
2. overexploitation,
3. predation, and
4. other natural events or human related activities.

Present or Threatened Modification or Destruction of Habitat

Based on review of the best available science, the destruction or modification of nesting habitats is a threat to Pacific leatherback.

In Indonesia, the monsoon season beginning in September has been documented to remove entire beaches at Jamursba-Medi, making the beach unsuitable for nesting (Hitipeuw et al. 2007). In the 2003-2004 nesting season, 80% of marked nests at Jamursba-Medi were washed away before hatching (Hitipeuw et al. 2007). A similar threat occurs at Wermon, with 23% and 26% of nests lost due to beach inundation during the 2003-2004 and 2008-2009 nesting seasons, respectively (NMFS and USFWS 2020). Beach erosion at less consistently monitored beaches in Papua New Guinea and Vanuatu has also been documented, with low hatching success in years with turbulent water activity caused by storms, floods, and high tides (Petro et al. 2007, Pilcher 2008, WSB 2016 referenced in NMFS and USFWS 2020).

Despite recent research showing California's leatherback foraging habitat is not contributing to the declining abundance and population trends, climate change has the potential to reduce prey availability by altering ocean productivity (CDFW 2021). This change in prey availability can alter foraging behavior and would have unknown consequences on Pacific leatherback survival and reproduction (Benson et al. 2020; CDFW 2021).

The Commission finds habitat modification and destruction to be a significant threat to the continued existence of Pacific leatherback.

Overexploitation

The harvest of leatherback sea turtles and eggs occurs in all four countries where the West Pacific population nests and is well documented (Bellagio Sea Turtle Conservation Initiative 2008, Jino et al. 2018, Kinch et al. 2009, Petro et al. 2007, Suarez and Starbird 1996, Tiwari et al. 2013a, NMFS and USFWS 2013, Tapilatu et al. 2017, NMFS and USFWS 2020). In Indonesia, leatherback turtle and egg take at Jamursba-Medi and Wermon has been eliminated since the enactment of the monitoring program in 1993 (Hitipeuw et al. 2007). However, recent surveys show leatherback turtle eggs are harvested from other Indonesian beaches and sold in local markets. Between 2016 and 2017 at Buru Island, Indonesia, it is estimated three to five nesting females were killed and approximately 114 of 203 leatherback nests were harvested (CDFW 2021). It is estimated that three to five females are killed annually at Buru Island (USFW and NMFS 2020). The killing of leatherback turtles (juveniles and adults) in the Kei Islands foraging habitat is also an ongoing threat to the population (NMFS and USFWS 2020). Prior information on the local tradition of hunting Pacific leatherback turtles in the Kei Islands suggested up to 100 adult leatherbacks are killed annually (Kinan 2005). Similarly, in Papua New Guinea, leatherback sea turtles have been

protected since 1976, but illegal take of turtles and eggs continues throughout the country due to lack of enforcement and long-standing community-based traditions (Bellagio Sea Turtle Conservation Initiative 2008). Kinch (2009) documented the taking of 21 nesting females in Bougainville Island, Papua New Guinea. From 2008 to 2013, a conservation measure providing financial rewards to locals for non-harvest of eggs and turtles increased hatchling emergence success by 60% (Pilcher 2013 referenced in NMFS and USFWS 2020). However, egg and turtle harvest resumed when the program ended in 2013 (NMFS and USFWS 2020). Egg and turtle harvest have also been well documented in Vanuatu and the Solomon Islands despite similar conservation efforts (NMFS and USFWS 2020). In 2011 at Isabel Island, Solomon Islands, nearly all the eggs in 315 leatherback nests were taken (USFWS and NMFS 2020). On Vangunu Island, Solomon Islands, Jino et al. (2018) found that approximately 10-20 nesting females are taken annually.

Harvest of West Pacific leatherback eggs and turtles remains a major threat to the population. Though regulatory mechanisms exist in all four nations where the population nests, the laws are rarely enforced. Lack of community buy-in and conservation funding combined with the continued practice of traditional customs has made mitigation from the threat of harvest difficult (Kinch 2006, Gjersten and Pakiding 2012, Von Essen et al. 2014). Though the exact number of West Pacific leatherback turtles removed from the population via harvest is unquantified, the removal of West Pacific leatherback turtles and eggs reduces both abundance and productivity (NMFS and USFWS 2020). The taking of female turtles directly removes reproductive individuals from the population, reducing the overall reproductive potential of the population. Similarly, egg harvest reduces future population recruitment. The continued harvest of leatherback turtles and eggs in the West Pacific adversely impacts the population.

The Commission finds that overexploitation is a significant threat to the continued existence Pacific leatherback.

Predation

Predation of leatherback sea turtle eggs is a well-documented threat to the West Pacific population. Nest predation by feral pigs, feral dogs, and monitor lizards (*Varanus salvator*) occurs at many beaches in Indonesia, Papua New Guinea, and Solomon Islands (Bellagio Sea Turtle Conservation Initiative, 2008; NMFS and USFWS 2020). For example, between June and July of 2005, 29.3% of nests were destroyed by pigs at Jamursba-Medi (Tapilatu and Tiwari 2007). At Wermon, 21% of nests were lost to predation during the 2004-2005 nesting season (Wurlianty and Hitipeuw 2005). In Papua New Guinea, predation by village dogs is a significant threat to nests. All nests laid during the 2003-2004 and 2004-2005 nesting season were lost to predation by dogs (NMFS and USFWS 2020).

The Commission finds that predation is a significant threat to the continued existence of Pacific leatherback.

Other Natural Occurrences or Human-Related Activities

Fishery Bycatch

The West Pacific population's foraging range and migratory routes expose the population to coastal and pelagic fisheries in many nations and international waters. Information on bycatch and Pacific leatherback mortality in international pelagic and coastal fisheries suggests these fisheries negatively impact the population, though few studies accurately quantify mortality in

international fishery interactions due to inconsistent reporting and lack of information on small-scale coastal fisheries (CDFW 2021). Annual fisheries interaction and mortality rates of leatherback sea turtles are only reliably available for U.S. fisheries. U.S.-managed fisheries operate under strict regulatory management regimes designed to mitigate sea turtle bycatch and mortality that have significantly reduced Pacific leatherback sea turtle interactions. NMFS currently estimates approximately 13.3 leatherback sea turtle interactions have occurred between 2001 and 2018 in the drift gill net fishery, with approximately 7.7 mortality/serious injury occurrences (Carretta 2020).

In California, the Department's Risk and Mitigation Program and its Lost and Abandoned Dungeness Crab Trap Gear Retrieval Program are designed to reduce the entanglement risks of Pacific leatherback sea turtles in the commercial Dungeness crab fishery, and the state's Drift Gill Net Transition Program is designed to reduce potential bycatch in the large-mesh drift gill net fishery. Nonetheless, any mortality of females (including those in California) reduces the population's productivity (CDFW 2021).

Although this threat is mitigated by existing regulations in California and the United States, its severity is significantly greater in certain international fisheries

Therefore, fishery bycatch is a threat to the persistence of the Pacific leatherback.

Climate Change

The Earth's climate is warming, and the primary causes are greenhouse gas emissions and deforestation (IPCC 2007; USGCRP 2009; USGCRP 2017). Since 1900 global average temperature has increased 0.7° C (NRC 2006) due to carbon dioxide emissions. Ice core data indicates that atmospheric carbon dioxide is currently 30% greater than its peak in the last 800,000 years. If current conditions remain unchanged, studies project that global climate will change drastically. Projections include an increase of 1.1 – 6.4° C in average global surface temperature (USGCRP 2009), sea level rise of 1 – 3 m (IPCC 2007; USGCRP 2009; USGCRP 2017).

Increased frequency of abnormal environmental conditions as a result of climate change can impact the survivability of Pacific leatherback turtles. Rising sea levels adversely change nesting habitat and increase the risk of beach erosion (Benson et al. 2015). Warmer temperatures at nesting sites have the potential to increase the occurrence of lethal incubation temperatures, alter incubation times, and change hatchling sex ratios (Benson et al. 2015). In 2007, Tapilatu and Tiwari attributed low hatching success and a female skewed sex ratio to high average sand temperatures (Tapilatu and Tiwari 2007). In Papua New Guinea, incubation duration was observed to decrease as beach temperatures warmed (Steckenreuter et al. 2010).

For Pacific leatherback sea turtles foraging off the California Coast, an additional impact of climate change is the effect on prey availability. Benson et al. (2007a) found a correlation between annual abundance of West Pacific leatherback sea turtles foraging off California between 1990 and 2003 and the strength of upwelling each year, indicating the West Pacific cohort that forages off California may be impacted by ocean productivity. Weak upwelling and lower ocean productivity, particularly if exacerbated by climate change, has the potential to reduce prey availability and alter West Pacific leatherback foraging behavior.

Therefore, climate change is a threat to the persistence of Pacific leatherback.

The Commission finds the natural or human-related activities discussed above to be a significant threat to the continued existence of Pacific leatherback.

IV. FINAL DETERMINATION BY THE COMMISSION

The Commission has weighed and evaluated the information for and against designating Pacific leatherback as an endangered species under CESA. This information includes scientific and other general evidence in the Petition; the Department's petition evaluation report; the Department's status review; the Department's related recommendations; written and oral comments received from members of the public, the regulated community, various public agencies, and the scientific community; and other evidence included in the Commission's record of proceedings.

Based upon the evidence in the record, the Commission has determined that the best scientific information available indicates that the continued existence of Pacific leatherback is in serious danger or threatened by present or threatened modification or destruction of the species' habitat, overexploitation, predation, or other natural events or human-related activities, where such factors are considered individually or in combination (see generally California Code of Regulations, Title 14, Section 670.1, subsection (i)(1)(A); Fish and Game Code, sections 2062 and 2067). The Commission determines there is sufficient scientific information to indicate that designating Pacific leatherback as an endangered species under CESA is warranted at this time and that, with adoption and publication of these findings, Pacific leatherback, for purposes of its legal status under CESA, shall be listed as endangered.

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