MARINE MAMMAL AND TURTLE DIVISION, SWFSC
BIWEEKLY SUMMARY OF FIELDWORK, PUBLICATIONS, RESEARCH RESULTS, AND PROFESSIONAL ACTIVITES

23 October 2026

I. Fieldwork:

Cetacean eDNA Sampling, San Diego, CA 7 October 2026 –Scientists from MMTD (Nick Kellar, Morgane Lauf, Jessica Ruth, Keiko Sherman and Alaina Harmon) aboard the R/V *Alexa K* collected water samples for cetacean environmental DNA (eDNA) off the coast of San Diego on October 7th, 2026. Although no cetaceans were sighted, flying fish, a Sabine's gull, and mobula rays were observed. This study aims to quantify the spatial and temporal patterns of cetacean distribution and genetic variability along the coast in the Southern California Bight using environmental DNA (eDNA). Sampling occurs roughly every month at five stations between Mission Bay and Oceanside. For more information, please contact Brittany Hancock-Hanser.



Morgane Lauf sampling eDNA on on 7 October 2026

Green turtle biological surveys in Southern California, 15 October 2026 – The MMTD marine turtle research team conducted its first of two days of field capture efforts for the Fall 2026 San Diego Bay Green Turtle Survey. The goals of this survey are to 1) collect data on green turtle habitat use and demography to better understand the biology of this population, and 2) develop accurate population size and trend estimates for green turtles in San Diego Bay via capture-mark-recapture analysis. Four turtles were captured, including one turtle first captured in April 2023 and 3 turtles that had not been captured previously. All were in the juvenile size category, ranging from 69.9–83.3 cm in straight carapace length and 52–75 kg in body weight. Three turtles were equipped with Argos-linked GPS satellite transmitters prior to release as part of a long-standing NOAA-US Navy collaboration. As usual, the SWFSC field team was joined by its Navy partners as well as SWFSC interns and community scientist Tracy Tempest. Looking ahead, the next field outing for the 2026 Fall



One of four green turtles (*Chelonia mydas*) captured in San Diego Bay during MMTD's Fall 2026 San Diego Bay Green Turtle Survey. This is one of three turtles equipped with an Argos-linked GPS satellite transmitter, applied to track the turtles movements and habitat use in the Bay (photo by Tracy Tempest).

Survey will be on 22 October, weather permitting. Contact Jeff Seminoff for additional information.

II. Manuscripts accepted for publication:

III. Papers published:

Reeves, I. M., Genty, G., Alexander, A., Aguilar-Gómez, D., Bilgmann, K., Berthelsen, A. L., Brewer, A. M., Carroll, E. L., Day, G. A., Dönmez, E. M., Eichenberger, F., Furni, F., Hoffman, J. I., Holmes, S., **Hernandez, K. M**., **Martien, K. K**., Marfurt, S. M., McCarthy, M. L., **Morin, P. A**., ... Alvarez-Costes, S. (2026). Advancing marine mammal conservation through omics tools and integration of Indigenous Ecological Knowledge. *Molecular Ecology*, *35*(19), e70567. https://doi.org/10.1111/mec.70567

Abstract – Conservation of biodiversity is a global priority as human-driven pressures continue to intensify and alter ecosystems worldwide. Marine mammals are vulnerable species, facing numerous escalating anthropogenic threats. Here, we evaluate how, as omics technologies become more accessible and affordable, established and emerging tools are advancing effective marine mammal research and conservation management. Assessments of genetic diversity, adaptive capacity, demographic history and local adaptation provide vital insights into how marine mammal populations respond to environmental change across contemporary and evolutionary timescales. Whole-genome sequencing, functional genomics, epigenetics and multi-omic integration enable deeper insights into the molecular basis of complex fitness-related traits. Approaches like epigenetics, ancient DNA and environmental DNA offer new opportunities to study cryptic, rare, or historical populations and evolutionary processes. Yet, effective marine mammal conservation management cannot rely exclusively on increased availability of omics tools and data. We emphasize the need and obligation for genuine collaboration and integration of Indigenous perspectives with marine mammal genomics approaches to foster ethical, inclusive and effective conservation, and suggest best practices for this. Additionally, we highlight that translating omics data into practical conservation outcomes remains challenging, requiring clear communication, collaboration and integration into management. Using marine mammal genomics to address conservation challenges in a changing world requires innovation, partnership and the integration of diverse knowledge systems, such as Indigenous Ecological Knowledge.

de Benito-Abelló, C., Hounslow, J.L., Gleiss, A.C., **Seminoff, J.A.**, & Fossette, S., (2026). Juvenile green turtles demonstrate developmental plasticity in a dynamic seascape. ICES Journal of Marine Science 83(9):fsag184. https://doi.org/10.1093/icesjms/fsag184

Abstract – Organisms adopt life-history strategies that optimise growth, survival, and reproduction under varying environmental constraints. Understanding how these strategies vary across life stages is critical for ecological insight and ultimately effective conservation. Although the green turtle (*Chelonia mydas*) is one of the most widely studied marine turtle species, substantial gaps remain in our understanding of juvenile ecology within neritic foraging habitats, where environmental conditions—such as habitat quality, resource availability, and seasonal variability—can have lasting effects on growth, survival, and future reproductive potential. Still, no global synthesis has examined how such environmental variability shapes juvenile development. We

conducted a structured global literature review with a thematic content analysis to synthesise current knowledge about juvenile green turtle foraging ecology—encompassing spatial use, diet, and foraging strategies—and associated developmental patterns. Drawing on 172 peer-reviewed studies published from 1979 to 2025; we identify key environmental drivers influencing foraging ecology and development. Our findings reveal substantial variation within and among populations, challenging traditional deterministic models of green turtle ontogeny. Juveniles function as facultative omnivores, with foraging strategies and developmental trajectories shaped by ecological context rather than fixed pathways. This variation reflects how individuals balance energy acquisition, expenditure, and habitat use under different environmental conditions, resulting in context-dependent growth responses rather than discrete or predetermined strategies. Within this context, three broad, non-exclusive growth-motivated strategies emerge: Resident Optimisers, Seasonal Responders, and Competition-Constrained Shifters, each reflecting different responses to environmental conditions and associated energetic constraints. By synthesizing global data, this review advances understanding of juvenile foraging ecology and reveals novel context-dependent, growth-motivated developmental strategies. We provide a foundation for future research and emphasise the need for flexible, regionally tailored conservation approaches that reflect the dynamic nature of juvenile green turtle development.

IV. Research findings:

V. Press:

VI. Local events - meetings or events hosted in-person or virtually:

San Diego Natural History Museum, San Diego, 13 October and 20 October 2026 - For over a decade, MMTD scientists have supported the San Diego Natural History Museum's "Whalers"—a volunteer naturalist corps—by providing expert overviews of marine mammal biology, ecology, and ongoing science. Continuing this partnership, Brittany Hanser gave an in-person presentation titled "*Odontocetes off Southern California*" on 13 October and Dave Weller gave an in-person presentation titled *"Rorquals: A Basic Introduction"* on 20 October. These collaborative outreach efforts advance the Museum's mission to "inspire respect for nature and the environment" and showcase the scientific expertise of MMTD.

VII. Travel - meetings attended in-person or virtually:

2026 Global eDNA Conference, 28-30 October 2026, Seattle, Washington – The theme of this year's conference is "Advancing eDNA: Integrating Science, Practice and People". SWFSC scientists attending the meeting will be Brittany Hancock-Hanser (MMTD), Peter Dutton (MMTD), Aubrie Onoufriou (MMTD/FRD), and Lena Stasiak (MMTD). Brittany will also be attending an all-day pre-conference workshop on October 27th. This workshop aims to show participants how to format, standardize, and publish metabarcoding datasets following the FAIR (Findable, Accessible, Interoperable, Reusable) principles, and become part of global biodiversity data repositories (OBIS/GBIF). More information about the presentations and

conference can be found in Appendix A below and here:
https://mtsociety.memberclicks.net/global-edna-conference

3rd Biennial West Coast Sea Turtle Symposium, Monterey, CA, 2-4 November 2026 – Sea turtle scientists from MMTD will travel to Monterey to attend the 3rd West Coast Sea Turtle Symposium. The theme of this year's conference is "West Coast Sea Turtles: Ambassadors Across the Pacific" and nearly 150 scientists from the U.S., Mexico, and Japan are expected to attend. Co-hosted by Upwell and the West Coast Sea Turtle Society, this year's meeting will feature a Necropsy Workshop on 2 November, co-organized by SWFSC's Erin LaCasella, and more than 50 science presentations on 2-4 November. MMTD attendees include Peter Dutton, Robin LeRoux, Erin LaCasella, Cali Turner Tomaszewicz, Garrett Lemons, and Anna Cahill; all will be giving oral presentations. See Appendix B below for presentation abstracts.

International Whaling Commission Workshop, La Paz, Mexico, 29-30 October – Jeff Moore will participate in an International Whaling Commission workshop on the Conservation and Management Plan for Central America humpback whales. During the event, the workshop committee will develop a report summarizing range-wide threats, current science, and needed research efforts for this population.

VIII. Awards, grants, and recognition:

IX. Other of note:

Stranding summary for the weeks of 6 - 19 October 2026
Cetaceans: 1

- 13 October - Keiko Sherman and Alaina Harmon responded to a skeletal/mummified headless dolphin carcass on Silver Strand State Beach. A genetics sample was taken to attempt to identify sex and species.

Pinnipeds: 5 (no response)
Turtles: 0

X. Where-about of Division Director:

La Jolla

****Appendix A**

2026 Global eDNA Conference
28-30 October 2026, Seattle, WA

(**Bolded** authors are from SWFSC, Presenter is *Italicized*)

Optimizing eDNA Methodologies for Marine Mammal Monitoring: Evaluating Extraction Efficiency and Filtration Delay in a Controlled Setting

***Brittany L. Hancock-Hanser*, Alexandria J. Mena, Frederick I. Archer and Karen K. Martien**

Robust fieldwork and laboratory protocols are essential for the effective collection and interpretation of environmental DNA (eDNA) from wild marine mammal populations. We conducted a set of experiments aimed at optimizing eDNA methodologies for collection and processing of samples from wild environments. Utilizing samples collected from the beluga whale (*Delphinapterus leucas*) enclosure at SeaWorld San Diego, a pilot study was implemented to address two critical variables: the efficacy of two common DNA extraction methods, and the effect of the time between water collection and filtration on DNA integrity. The Extraction Method experiment compared a traditional phenol-chloroform technique to a modified version of the Qiagen DNeasy Tissue kit. The DNeasy kit yielded more extracts that were ultimately successfully Sanger sequenced than phenol-chloroform. While phenol-chloroform extractions showed potential, they suffered from PCR artifacts like double-banding and lower Sanger sequencing success. Additionally, the kit-based extraction yielded a higher number of clean, full-length Sanger sequences than the phenol-chloroform method. The Time to Filtration experiment examined the degradation of eDNA over 24 hours, 48 hours, 72 hours, and seven days before the collected water was filtered. By quantifying the relationship between filtration delay and DNA efficacy, this research seeks to extend the utility of eDNA sampling to remote field sites where immediate 24-hour filtration is logistically improbable. Using the QX200 ddPCR system from BioRad, we confirmed that beluga whale DNA could be successfully detected across all time points, and all replicates from each time point had at least 100 copies/ul of beluga DNA in the sample. These results provide a framework for maximizing eDNA yield, reliability, and provide guidance for field collection where immediate filtration may not be feasible. Future steps include refining PCR annealing temperatures to eliminate artifacts and validating these protocols in complex open-ocean environments where multiple species are present. Ultimately, these optimized protocols will enhance the capacity to monitor cetacean biodiversity and augment tissue-based data sets in marine mammals.

Detecting Pacific Leatherback Turtle Presence on the U.S. West Coast Using eDNA

Lena Stasiak, Aubrie Onoufrio, Garrett Lemons, Scott Benson and *Peter H. Dutton*

To support survey and recovery efforts for the "Species in the Spotlight" Pacific leatherback turtle (*Dermochelys coriacea*), whose populations have declined by up to 97%, we developed a non-invasive environmental DNA (eDNA) tool to supplement traditional aerial and boat surveys across 40,000 square miles of critical habitat off the US West Coast. We designed a targeted 111bp mitochondrial D-loop assay optimized for Droplet Digital PCR (ddPCR), a technology chosen for its high sensitivity and ability to provide absolute quantification of ultra-low DNA concentrations. After lab validation confirmed species specificity and established precise limits of detection, field testing in California and Florida provided a successful proof-of-concept by detecting strong DNA signals directly adjacent to turtles in the water. Furthermore, time-series sampling demonstrated that leatherback DNA can persist for up to 72 hours post-release, offering an expanded sampling window to identify high-use genetic hotspots even after individuals have

departed. This functional tool moves beyond scientific advancement into a scalable monitoring practice that increases the efficiency of traditional conservation resources and is highly transferable to other marine vertebrate species. We discuss progress and challenges of incorporating our eDNA tools into routine traditional aerial and ship-based population surveys.

Beyond Detection: Characterizing Intraspecific Diversity of Endangered Cetaceans Using Novel eDNA Metabarcoding Primer Sets

***Aubrie B. Onoufriou*, Brittany Hancock-Hanser, Karen Martien, Flora Coden, Victoria Pease, Alaina Harmon, Alexandria Mena, Kathryn Sherman, Morgane Lauf, Suzanne E. Roden, Tomo Eguchi, Jesse Pierce,** Jonathan Whitney, Amanda Bradford, Marie Hill, **Jeff Moore,** John Calambokidis **and Frederick I. Archer**

Traditional cetacean monitoring is often constrained by financial limitations and the difficulty of species and population identification during brief surface encounters. Environmental DNA (eDNA) metabarcoding offers a non-invasive alternative, although most published primers lack the resolution to distinguish between intraspecific cetacean populations. We present the development and validation of four taxon-specific primer sets targeting the hyper-variable mitochondrial control region (d-loop) to resolve both inter- and intraspecific diversity in cetaceans from eDNA samples. To design these primers, we aligned haplotypes to identify variable regions and conserved sequences for primer binding sites, incorporating degenerate bases where necessary. We used a nested PCR approach that paired amplicon-specific primers designed to capture diagnostic polymorphic sites with region-specific primers for pre-amplification to boost the low-concentration eDNA templates. Primer sets were adapted from the literature or were designed in Geneious. Taxonomic specificity was validated using *in silico* PCR and NCBI's BLAST, with *in vivo* testing using validated tissue samples.
The utility of these primer sets to detect haplotype-level diversity was validated across three cetacean species with endangered populations. We matched eDNA from captive Beluga whale (*Delphinapterus leucas*) enclosures to inferred individual haplotypes, paired Humpback whale (*Megaptera novaeangliae*) "flukeprint" eDNA with biopsy data, and identified diversity in false killer whale (*Pseudorca crassidens*) eDNA from samples with positive detections using other published primers. Finally, the primers were implemented on samples collected during two large-scale surveys: a monthly time series across five stations in the Southern California Bight (SCB) and a California Current line-transect survey. Genetic diversity of abundant delphinid assemblages (*Tursiops truncatus*, *Delphinus delphis* ssp., and *Grampus griseus*) and large whales (*Megaptera novaeangliae*, *Balaenoptera musculus*, *B. physalus* and *Eschrichtius robustus*) was characterized with the new primers. This framework provides a standardized bioinformatic pipeline that enhances long-term monitoring and management of protected cetacean species.

Rapid eDNA-based assessment of green turtle abundance in Southern California

***Lena Stasiak*, Aubrie Onoufriou, Erin LaCasella, Alexandria Mena, Victoria Pease, Amy Frey, Suzanne Roden, Alaina Harmon, Peter H. Dutton**

Environmental DNA (eDNA) offers a promising, non-invasive tool to supplement traditional methods for species detection and quantification. In the Southern California Bight, green sea turtles (*Chelonia mydas*) are observed year-round and there is a growing need for rapid, scalable

methods to assess the presence and relative abundance of these protected species to inform management decisions. We have developed and validated a species-specific droplet digital PCR (ddPCR) assay targeting the mitochondrial control region of eastern Pacific green turtles. This assay will allow for precise quantification of turtle eDNA from water samples, enabling more consistent and efficient population monitoring.

Using paired eDNA water samples with visual observations of turtles in a well-studied foraging site, San Diego Bay, we aim to correlate ddPCR-based detection of turtle eDNA with turtle presence. We further hope to use the abundance of turtle DNA copies in the water to correlate with visual counts, supporting future integration into abundance-based rapid assessments. This approach directly supports abundance and distribution modeling by providing scalable, minimally invasive data collection across habitats and seasons, while also opening avenues for rapid response surveys and broad-scale assessments in hard-to-monitor areas.

****Appendix B**

2026 West Coast Sea Turtle Symposium
2-4 November 2026, Monterey, CA

(**Bolded** authors are from SWFSC, Presenter is *Italicized*)

Oral Presentations:

A day in the life of a green turtle: Foraging, social, and dive behavior recorded by an animal-borne camera

Anna Cahill, Cameron Mullaney, **Garrett E. Lemons**, **Andrew S. Maurer**, **Jeffrey A. Seminoff**

For cryptic species such as sea turtles, developing a comprehensive understanding of fine-scale daily activities presents a challenge that traditional telemetry devices often cannot address. Utilizing an animal-borne camera and biologging system manufactured by Customized Animal Tracking Solutions (CATS), we have gained extensive insight into the day-to-day behavior and habitat use of green sea turtles (*Chelonia mydas*) in the urban foraging area of San Diego Bay. Since May 2022, the suction-cup-attached CATS tag has been deployed on 24 turtles (mean straight carapace length = 89.2 ± 11.5 cm). Successful deployments yielded between 1 and 17 hours of video and associated dive and accelerometry data, with 159 total hours of video collected and annotated for behavior. Detailed observations of foraging activity, social interactions with other turtles, resting behavior, and surfacing patterns have increased our understanding of how individuals of this thriving green sea turtle population regularly acts within their urban environment. The extensive video will also help inform ongoing research and conservation efforts in this seagrass-dominated foraging area, and shows the utility of advanced camera-biologging technology to monitor coastal marine megafauna.

First Recording of Two Olive Ridleys Nesting in Southern California

Justin Greenman, Katy Kughen, Justin Viezbicke, **Cali Turner Tomaszewicz**, **Jeff Seminoff**, **Erin LaCasella**, Lance Adams

Olive ridleys (*Lepidochelys olivacea*) are the most widespread and abundant of the world's sea turtles. This species is found primarily in the tropical regions of the Pacific, Indian, and Atlantic oceans. In the Pacific, large nesting populations occur in Mexico, Nicaragua, Costa Rica, and Panama. Olive ridleys have two nesting strategies, solitary or mass nesting (arribada). An arribada refers to the phenomenon of synchronized mass nesting of thousands of turtles. Olive ridleys have become internationally famous for their breathtaking arribada nesting strategy, but in 2026 it was a different kind of nesting event that made the news!

On September 16, 2026, a female olive ridley sea turtle was observed digging a nest and depositing eggs on a beach in Orange County, California. This was the first witnessed and confirmed nesting event from any sea turtle species recorded on the West Coast of the United States.

A response team was established by the U.S. Fish & Wildlife Service (USFWS) and NOAA's National Marine Fisheries Service, and included multiple local and state partners. The team acted quickly and constructed a barrier to protect the nesting site from human or predator disturbances and began meeting to discuss the situation and management of the site. Three days later, a second olive ridley sea turtle was observed nesting in Orange County, approximately 7 miles south of the first turtle nest. The response team again acted quickly to construct a protective barrier. While there was concern about potential nest disturbance or vandalism of the protective fencing, the consensus was to leave both of the nests in place and undisturbed. However, after receiving predictions for higher than normal tides, storm surge and beach flooding from an oncoming hurricane, the decision was made to remove the eggs from both nests for ex situ incubation. The nest was excavated by hand, and eggs were moved into a polystyrene cooler and transported to the Aquarium of the Pacific for incubation. A multi-agency proactive public communications plan using social media, web postings, and a press event offered clear and rapid transparency of these activities. This talk will provide the latest updates.

High-density Social Interactions of Green Sea Turtles in the Upper San Gabriel River

Jessica Hughes, Dylynn Abbey, Cheryl DeMatteis, **Cali Turner Tomaszewicz**

The northernmost foraging population of eastern Pacific green sea turtles (*Chelonia mydas*) is found in the San Gabriel River, Long Beach, California. The San Gabriel River provides a unique urban habitat for green sea turtles: the water is heated by the warm-water effluent of 2 power plants and a system of over 30 miles of concrete flood control channel that terminates at the confluence of the San Gabriel River and Coyote Creek; algal growth is abundant in the flood control channel; and no predators have been observed in the river. The large aggregation of turtles in the confluence, combined with the riprap riverbank and an adjacent elevated service road, creates an ideal and unique opportunity to study the behavior of these foraging green turtles in-situ at close range.

Observations since 2023 show that the turtles aggregate at the mouth of the concrete channel as the tide rises; preparing to enter where they forage on abundant algae. As the tide reaches a height between 3 to 4 feet, the turtles begin to enter the channel. When the tide recedes, the turtles remain at the mouth of the channel to forage on the algae as it flows out with the tide. The tide appears to function as an environmental cue, resulting in a high density of turtles

aggregating in a small area which then increases the frequency of social interactions. Few existing studies of sea turtle social behavior exist, and even fewer focus on social behavior in high-density foraging aggregations. Establishing a behavioral baseline through visual observations can inform long-term management and conservation strategies for an ecologically important species that faces multiple anthropogenic impacts.

Using all-occurrence behavior sampling during visual observation surveys, the social behaviors and interactions between turtles were recorded. The ethogram used for this study included foraging, travel, contact, and assessment. Contact and foraging were most prevalent; however, rare more aggressive behaviors, such as biting and chase, were also observed. These social behaviors were observed most frequently during rising and receding tides at peak aggregation density, which suggests that a denser aggregation may lead to increased social behavior.

U.S. West Coast Sea Turtle Strandings: Trends, Anomalies, and Threats

Erin L. LaCasella, Heather Harris, **Garrett Lemons**, **Alexandria Mena**, **Calandra Turner Tomaszewicz**, **Robin LeRoux**, Justin Greenman, Justin Viezbicke, Kristin Wilkinson, Brian Stacy, **Jeffrey Seminoff**

Sea turtle strandings along the United States West Coast provide critical ecological indicators of species distribution, population health, and marine threat exposure in the eastern North Pacific. This synthesis examines stranding records cataloged from the earliest reports to present day across California, Oregon, Washington, and Alaska to evaluate baseline spatial patterns and primary mortality drivers affecting protected sea turtle populations. Stranding data cataloged by a collaborative, multi-agency network provides systematic records of species identification, life stage, physical condition, and pathological evidence of environmental or human impacts.

Five sea turtle species inhabit the waters off of the U.S. West Coast including: green (*Chelonia mydas*), loggerhead (*Caretta caretta*), olive ridley (*Lepidochelys olivacea*), leatherback (*Dermochelys coriacea*), and on rare occasion the hawksbill (*Eretmochelys imbricata*), all of which are listed as threatened or endangered under the Endangered Species Act. Records reveal distinct spatial patterns along the coast with more green turtles stranding near established foraging habitats in urbanized southern California embayments, and leatherbacks clustering closer to their central California foraging grounds. Notable stranding encounters include olive ridleys stranding in Pacific Northwest waters, well north of their typical habitat, likely owing to cold-stunning after exposure to critically low water temperatures, as well as loggerheads stranding during warm-water conditions such as El Niño.

Primary anthropogenic threats for green turtles include fishing gear entanglements and vessel collisions, which represent leading causes of acute mortality, particularly within high-density urbanized coastal corridors. Ultimately, West coast stranding monitoring and examination demonstrate that sea turtles face ongoing environmental and anthropogenic risks, underscoring that sustained response networks and post-mortem diagnostics remain vital to guide marine conservation policies and mitigate human-caused injuries.

Urban foragers: A synopsis of eastern Pacific green turtle research in the Seal Beach National Wildlife Refuge, CA from 2012–2026

Robin A. LeRoux, **Garrett Lemons**, **Calandra N. Turner Tomaszewicz**, **Erin LaCasella**, **Anna Cahill**, Justin Greenman, Megan Hanna, Jessica Curran, Brendan Saunders, Erica Dollinger, Dan Lawson, **Jeffrey A. Seminoff**

East Pacific green turtles (*Chelonia mydas*) inhabit several highly urbanized coastal foraging areas in southern California, including the Seal Beach National Wildlife Refuge (SBNWR). The SBNWR is a thriving ~1,000-acre salt marsh wetland located within the Seal Beach Naval Weapons Station that protects a remnant of a historical wetland complex in northern Orange County. As one of the northernmost foraging areas, SBNWR offers a unique foraging habitat to study green turtles embedded within a dense urban setting.

Over the past decade, green turtle presence throughout southern California has increased due to the significant recovery of the Mexican breeding population, which has resulted in range expansion of green turtles into Southern California waters. Green turtles were first documented in the SBNWR in 2007. In collaboration with the U.S. Navy and U.S. Fish & Wildlife Service, NOAA's Marine Turtle Ecology & Assessment Program at the Southwest Fisheries Science Center initiated regular monitoring in 2012. Capture efforts have been concentrated in the channel that extends from Anaheim Bay into the 7th Street Basin. Upon capture, each animal was tagged for identification, with life history data and tissue samples taken to understand demographic profiles, population structure and foraging behavior. In some instances, satellite or ultrasonic transmitters were deployed to understand habitat use and seasonal movement patterns.

Sea turtles have been documented in the SBNWR year-round. During in-water monitoring efforts from 2012 to 2026, we captured 67 unique individual turtles during 93 capture events. Straight carapace length ranged from 42.4 cm to 95.0 cm, with a majority classified as juveniles. Eighteen turtles were recaptured on 1 to 5 occasions, with an overall recapture rate of 26.5%, indicating long term site fidelity to the foraging area. Satellite tracking and ultrasonic tagging has provided valuable insight into coastal preferences and indicate movement from the refuge to nearby highly urbanized areas. Genetic analyses indicate that the primary nesting beaches of origin for this population include the Revillagigedo Islands and Michoacán, Mexico.

Our research provides information that is relevant to the current conservation and management issues relating to east Pacific green turtles in this highly urbanized Southern California region.

Halting the decline of the leatherback nesting population in Papua Barat-Indonesia: 35 years of monitoring and conservation

Deasy Lontoh, Yairus Swabra, Petrus P. Batubara, Johni Mau, Abraham Leleran, Arfiandra A. Wanaputra, Tonny W. Duwiri, Muhamad Faisal, **Tomo Eguchi**, ***Peter H. Dutton***, Fitryanti Pakiding, Manjula Tiwari

The northwest coast of the Bird's Head region in West Papua, Indonesia, provides a critical nesting habitat for several species of sea turtles, most notably the last remaining sizeable leatherback population in the western Pacific, which declined dramatically since the 1970's, becoming a focal point for international conservation. Nesting is concentrated at Jeen Yessa and Jeen Syuab Beaches at Jeen Womom Coastal Park, a marine protected area established in 2017 to protect these important marine turtle nesting areas in response to continued population declines. The State University of Papua's (UNIPA's) Abun Leatherback Project leads a holistic leatherback conservation effort in the Coastal Park, partnering with the local community and

beach owners to protect nesting leatherbacks and maximizing hatchling production by implementing effective nest protection methods that have been scaled up in recent years.

The decades-long UNIPA program has resulted in consistent monitoring and protection that serves as a model for leatherback conservation in the region and has provided a robust long-term dataset to evaluate population trends. Although the Bird's Head leatherback nesting population has undergone a major decline over the past 35 years, it appears to have stabilized over the last decade and the recent uptick in nest numbers provides encouragement for the future of leatherbacks in the Western Pacific.

Detecting Pacific leatherback turtle presence on the U.S. West Coast using eDNA

Lena Stasiak, **Aubrie Onoufriou**, **Scott Benson**, **Suzanne Roden**, **Lexi Mena**, **Erin LaCasella**, **Garrett Lemons**, ***Peter H. Dutton***

To support survey and recovery efforts for the "Species in the Spotlight" Pacific leatherback turtle (*Dermochelys coriacea*), whose populations have declined by up to 97%, we developed a non-invasive environmental DNA (eDNA) tool to supplement traditional aerial and boat surveys across 40,000 square miles of critical habitat off the US West Coast. We designed a targeted 111bp mitochondrial D-loop assay optimized for Droplet Digital PCR (ddPCR), a technology chosen for its high sensitivity and ability to provide absolute quantification of ultra-low DNA concentrations. After lab validation confirmed species specificity and established precise limits of detection, field testing in California and Florida provided a successful proof-of-concept by detecting strong DNA signals directly adjacent to turtles in the water. Furthermore, time-series sampling demonstrated that leatherback DNA can persist for up to 72 hours post-release, offering an expanded sampling window to identify high-use genetic hotspots even after individuals have departed. This functional tool moves beyond scientific advancement into a scalable monitoring practice that increases the efficiency of traditional conservation resources and is highly transferable to other marine vertebrate species. We discuss progress and challenges of incorporating our eDNA tools into routine traditional aerial and ship-based population surveys.

Emerging Sea Turtle Survey Methods Along the West Coast: Integrating AI-Powered Photo Identification and Community Sightings with Traditional NOAA Research

Cali Turner Tomaszewicz, **Erin LaCasella**, **Garrett Lemons**, **Anna Cahill**, **Robin LeRoux**, Ryan Bender, Alson Wurster, Tracy Tempest, Jericho Guerra, **Jeffrey Seminoff**

Evaluating sea turtle population dynamics (e.g., survival rates, demographic trends, health) along the U.S. West Coast requires comprehensive spatial and temporal monitoring across diverse urban coastal habitats. To expand beyond traditional in-water research, NOAA's Marine Turtle Ecology & Assessment Program (MTEAP) at the Southwest Fisheries Science Center (SWFSC) is integrating two digital survey tools: the community-driven U.S. West Coast Sea Turtle Sightings Survey and AI-powered Photo Identification hosted on Wildbook's Internet of Turtles (IoT) platform. By pairing opportunistic community-based sighting reports and photographic submissions along the West Coast, MTEAP creates a unified, non-invasive monitoring framework. Focused on key California habitats—including San Diego Bay, Seal Beach National Wildlife Refuge, La Jolla Shores, the San Gabriel River, Bolsa Chica, Mission Bay/Famosa Slough, the Channel Islands and even Pt. Mugu Naval Base—green turtles (*Chelonia mydas*) are the primary species monitored, but other species include loggerhead (*Caretta caretta*), olive ridley (*Lepidochelys olivacea*), and leatherback (*Dermochelys coriacea*). This integrated

approach directly advances three core population ecology objectives: (1) mapping localized habitat use and foraging hotspots across coastal, estuarine, and riverine environments; (2) quantifying residency time and multi-year site fidelity through long-term re-encounter histories; and (3) tracking individual movement and habitat connectivity between regional foraging grounds. Ultimately, fusing community sightings and computer vision algorithms with NOAA's long-standing biological hands-on monitoring efforts provide a scalable model to evaluate population recovery, demographic trends, and health status for sea turtles along the U.S. West Coast.

Poster Presentations:

Rapid eDNA-Based Assessment for Green Turtle Monitoring in Southern California

Lena Stasiak, **Aubrie Onoufriou**, **Erin LaCasella**, **Alexandria Mena**, **Victoria Pease**, **Amy Frey**, **Suzanne Roden**, **Alaina Harmon**, ***Peter Dutton***

San Diego Bay hosts a key foraging population of East Pacific green sea turtles (*Chelonia mydas*) that has been monitored by MMTD for over three decades. Different traditional survey methods have included capture-mark-recapture, tagging, satellite telemetry tracking, drone surveys, etc. For this project, we aimed to leverage this information and design, optimize, and validate a highly specific and sensitive droplet digital PCR (ddPCR) eDNA assay capable of detecting low-abundance sea turtle eDNA in coastal marine waters of Southern California

Nuclear DNA markers provide further insight into Pacific green turtle population structure

Suzanne E. Roden, **John B. Horne**, Michael P. Jensen, Nancy N. FitzSimmons, **Amy Frey**, Lisa M. Komoroske, Maike Heidemeyer, George H. Balazs, Cristian M. Cayanan, I-JiunnCheng, Richard Farman, Jessy R. Hapdei, Jennifer Cruce Horeg, Brian Peck, Rotney Piedra, Tammy M. Summers, Miri Tatarata, Shawn Wusstig, T. Todd Jones, Summer L. Martin, Shawn Murakawa, Elizabeth Vélez, Patricia M. Zárate, Adriana Laura Sarti-Matinez, and ***Peter H. Dutton***

This study builds upon the current understanding of green turtle population structure based on mtDNA in order to more holistically characterize rookeries, examine regional connectivity, and expand our knowledge of green turtle population structure in the Pacific. A total of 1,111 nesting green turtle samples were analyzed with 10 nDNA microsatellite markers from rookeries throughout the Pacific Ocean. Spatial genetic patterns were assessed with discriminant analysis of principal components (DAPC) and isolation by distance was evaluated with estimated effective migration surfaces (EEMS). The data indicated defined structure throughout the Pacific largely in agreement with stock structure and natal homing signals defined by mtDNA studies, except for some areas including the Central American and Australian continental shelf rookeries, providing evidence of potential male-mediated gene flow.
The broad scale pattern for the DAPC analysis showed Hawaii as a distinct central Pacific cluster distinguishing from the eastern and western Pacific rookeries, and revealed the connectivity of rookeries along continental shelves in the eastern Pacific and southwestern Pacific. EEMS results suggested that rookeries from the same continental shelf are more genetically similar to each other than to those on nearby oceanic islands. For example, along the coast of Central America, the genetic dissimilarity between rookeries increased at a rate expected, or less than expected,

given the distance between them, while many of the models tested indicated a weak genetic barrier between the Central American continental shelf and the Galapagos and Revillagigedo Islands.

In summary, the results of our study provide an ocean-wide rookery baseline dataset for green turtles in the Pacific and prompt reconsideration of how some population units for conservation have been characterized for green turtles by incorporating nDNA variation with previous mtDNA assessments.

Genetic stock identification of fisheries bycatch provides insights into differences in broad-scale distribution patterns of leatherbacks in the North and Southeast Pacific

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Leatherback turtles use waters throughout the Pacific as foraging grounds that often overlap with fishing activity, resulting in incidental catch in commercial and artisanal longline and gillnet fisheries. This bycatch is of concern due to severely depleted Pacific nesting populations, prompting leatherback conservation as an international priority. This study uses molecular genetic analysis to build on previous satellite telemetry research in order to advance the overall understanding of connectivity and migration patterns of Pacific leatherbacks. Analysis of a comprehensive set of samples collected by observers from US-based fisheries in the North Pacific as well as artisanal and commercial fisheries in the southeast Pacific (Peru and Chile) between 1995 and 2022 reveals that while almost all leatherbacks bycaught in the North Pacific originated from the western Pacific nesting population, a portion of the Chile and Peru leatherback bycatch originated from both western and eastern Pacific nesting stocks. The connectivity between the western Pacific nesting populations and the fisheries in the eastern Pacific is notable, and is something that satellite telemetry studies, largely based on tracking nesting females, has not detected. We present details of these results and discuss conservation implications and future research directions that leverage new genomics resources for improving genetic stock identification (GSI) of Pacific leatherbacks.