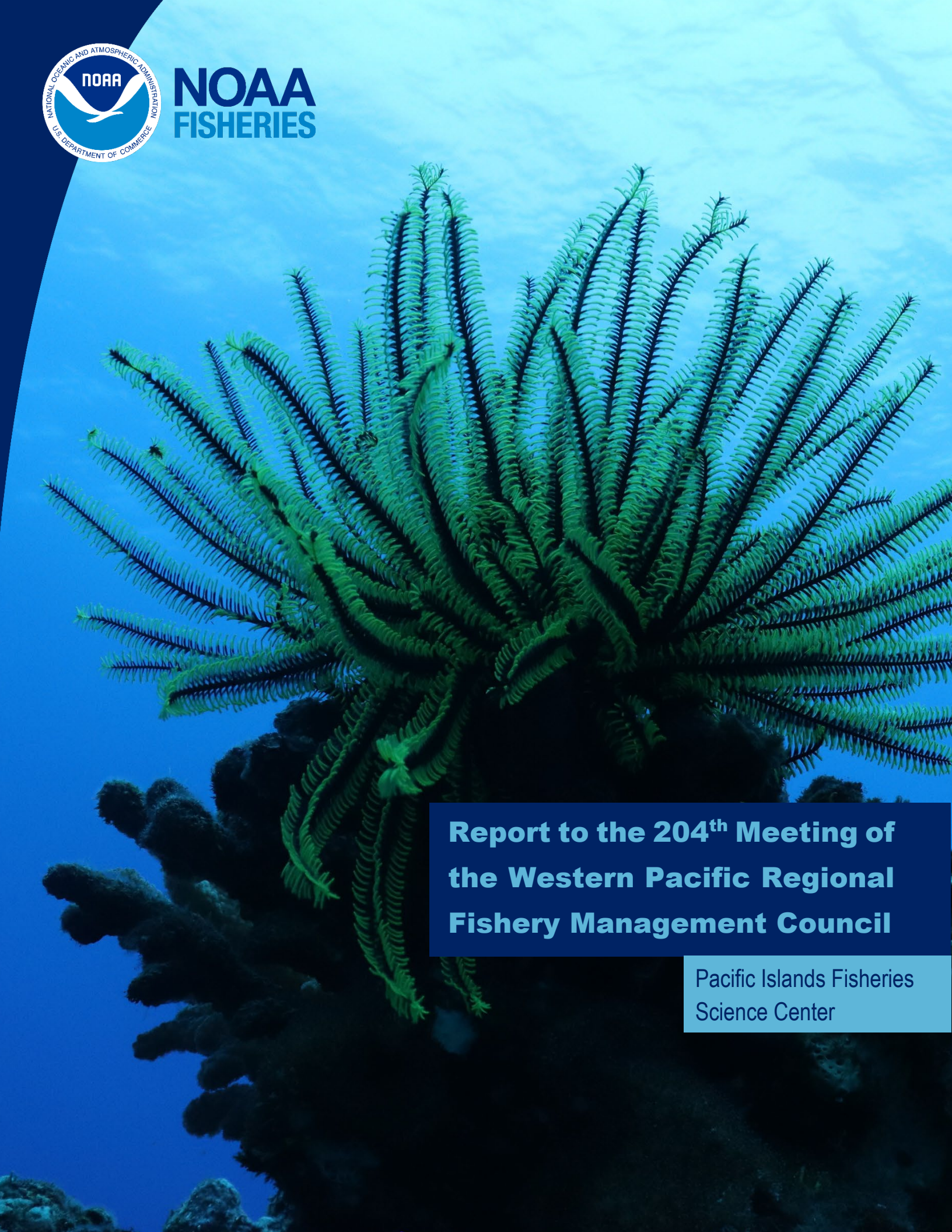

NOAA FISHERIES

Report to the 204th Meeting of the Western Pacific Regional Fishery Management Council

Pacific Islands Fisheries Science Center

Report to the 204th Meeting of the Western Pacific Regional Fishery Management Council

Pacific Islands Fisheries Science Center

Pacific Islands Fisheries Science Center
National Marine Fisheries Service
1845 Wasp Boulevard
Honolulu, HI 96818

PIFSC Special Publication SP-25-03

August 2025

U.S. Department of Commerce
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
Pacific Islands Fisheries Science Center

About this report

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Cover photo: A crinhoid in the open ocean near Pagan. Credit: NOAA Fisheries / Mia Lamirand

Edited by Revere Wood.

Recommended citation

Pacific Islands Fisheries Science Center. 2025. *Report to the 204th Meeting of the Western Pacific Regional Fishery Management Council* (Special Publication Series, SP-25-03). https://doi.org/10.25923/n22t-hj24

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NOAA FISHERIES

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Executive Summary

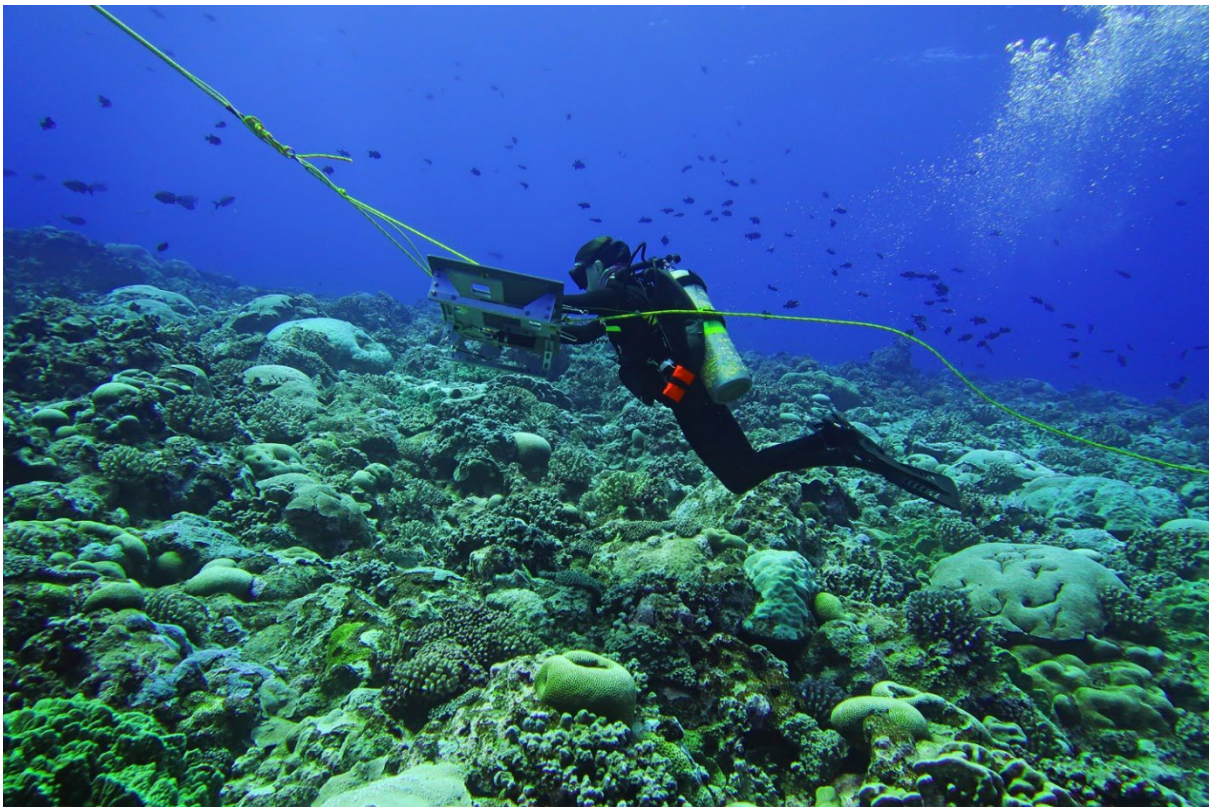
The Pacific Islands Fisheries Science Center (PIFSC or Center) administers and conducts scientific research and monitoring programs that produce science to support the conservation and management of fisheries and living marine resources. This is achieved by conducting research on fisheries and ocean ecosystems and the communities that depend on them throughout the Pacific Islands region and by dedicating efforts to the recovery and conservation of protected species. The Center is organized into four major divisions: Ecosystem Sciences Division, Fisheries Research and Monitoring Division, Protected Species Division.

PIFSC continues to improve its science and operations through collaboration and integration across divisions, and increased communication, cooperation, and coordination with partners and stakeholders. This report highlights research, projects, activities, and other events that are of direct interest to the Western Pacific Regional Fishery Management Council (Council), including bottomfish and National Coral Reef Monitoring Program surveys in the Mariana Archipelago, Hawai‘i longline fisheries research, and sea turtle research.

Mariana Archipelago National Coral Reef Monitoring Program Surveys

From March through June, PIFSC scientists conducted underwater coral reef health and ocean condition surveys as part of the National Coral Reef Monitoring Program (NCRMP) throughout the Mariana Archipelago. NOAA Ship *Oscar Elton Sette* departed Honolulu in late March and arrived in Guam after conducting surveys around Wake Atoll. This long-running monitoring effort generates long-term publicly available fisheries, coral, and ocean water quality data for the region. As part of a joint project with the U.S. Air Force, NOAA also conducted towed diver surveys around Wake Atoll to determine the presence and abundance of humphead wrasse *Cheilinus undulatus* and bumphead parrotfish *Bolbometopon muricatum*, and completed targeted surveys to detect Endangered Species Act-listed corals at specific locations around the atoll. The reefs in this remote protected area are home to diverse and extensive coral colonies, teeming with schools of fish.

This school of parrotfish thriving with high coral cover offers a glimpse into a balanced reef ecosystem around Wake Atoll. Credit: NOAA Fisheries / Andy Shantz



A diver is towed by boat over a reef collecting data on humphead wrasse and bumphead parrotfish as part of a U.S. Air Force funded effort to monitor the populations of these important fish. (Credit: NOAA Fisheries / Jan Staman)

After six days of surveys around Wake Atoll, the ship traveled another six days to reach Guam. From there, scientists spent the next two and half months traveling up and down the Mariana Archipelago collecting vital data on coral reef ecosystems.

Islands visited in the Mariana Archipelago:

- Uracas
- Maug
- Agrihan
- Pagan
- Alamagan
- Guguan
- Sarigan
- Saipan
- Tinian
- Aguijan
- Rota
- Guam

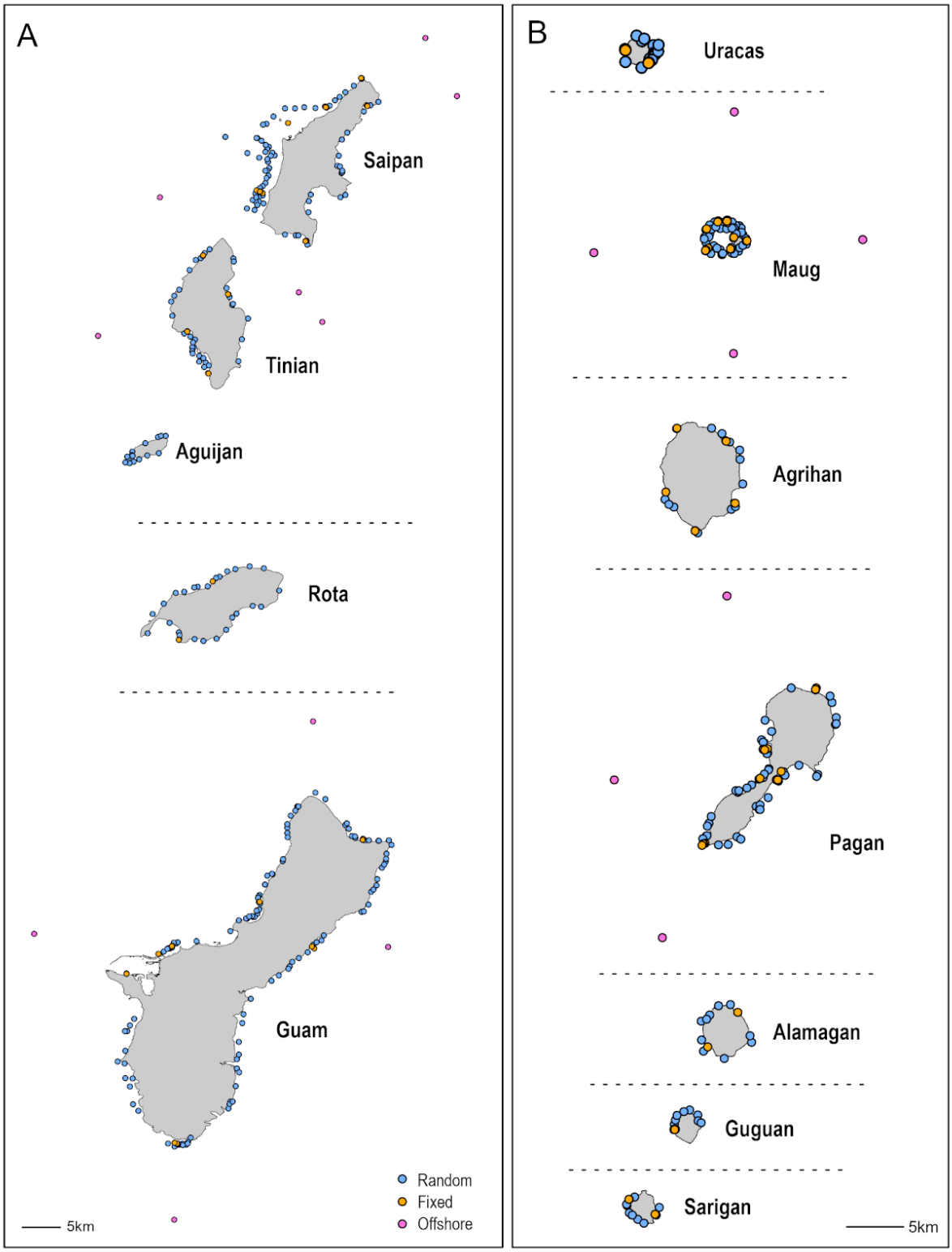


Figure 1. Map of NCRMP fixed, random, and offshore survey sites in the A) southern (Guam to Saipan) and B) northern (Sarigan to Uracas) Mariana Archipelago during SE-25-03 legs 2-4.

To build a comprehensive picture of coral reef health, NCRMP utilizes both random stratified and fixed sites to monitor and assess trends in coral reef health over time and across the archipelago with the goal of surveying across a large spatial and environmental gradient.

PIFSC random stratified site surveys monitor species composition, abundance, size, and spatial distribution of reef fishes, corals, other invertebrates, and algae using stationary point count (SPC) fish surveys, structure-from-motion (SfM) belt surveys, and photoquadrat benthic surveys.

NCRMP-MA 2025 accomplishments:

- 422 SPC fish surveys
- 313 SfM belt surveys
- 428 photoquadrat benthic surveys
- 107 CTD casts and carbonate chemistry samples collected at random sites

Random stratified surveys allow us to assess reef fish populations by identifying, counting, and estimating the size of fish at the 422 survey sites. Benthic imagery was also collected from 313 sites to generate three-dimensional reef models. These models will be used to calculate a set of summary benthic metrics. NCRMP surveys are a critical source of coral reef fisheries, habitat, and climate data available to the governments of Guam and the Commonwealth of the Northern Mariana Islands (CNMI) as they work to develop sustainable coral reef fisheries management plans.

PIFSC fixed site surveys assess reef environmental conditions and biological responses by returning to the exact same location every three years and recovering and redeploying oceanographic and ecological instrumentation, including subsurface temperature recorders (STRs), calcification accretion units (CAUs) and bioerosion monitoring units (BMUs). Scientists also conducted carbonate budget assessments at a selection of fixed sites to determine if the reef structure is growing or shrinking over time. SfM spiral surveys were completed at 19 fixed sites, including images collected over the same footprint of SfM surveys from previous survey years. Data extracted from these consecutive images are used to track coral colony growth, mortality, and reproduction, while also contributing to carbonate budget assessments. Water samples for carbonate chemistry and conductivity, temperature, and depth (CTD) casts were also conducted at fixed, random, and off-shore survey sites.

NCRMP-MA 2025 accomplishments:

- 98 STRs deployed / 82 retrieved
- 140 CAUs deployed / 136 retrieved
- 50 BMUs deployed / 129 retrieved
- 83 CTD casts and carbonate chemistry samples collected at fixed sites
- 22 CTD casts and carbonate chemistry samples collected at offshore sites
- 17 carbonate budget assessments
- 19 SfM spiral surveys
- 3 diel suite deployments in Maug caldera (low, mid, and high pH sites)

Scientists at Maug caldera use lift bags filled with air to help move heavy instruments carefully down to the seafloor. Credit: NOAA Fisheries / Zach Taylor

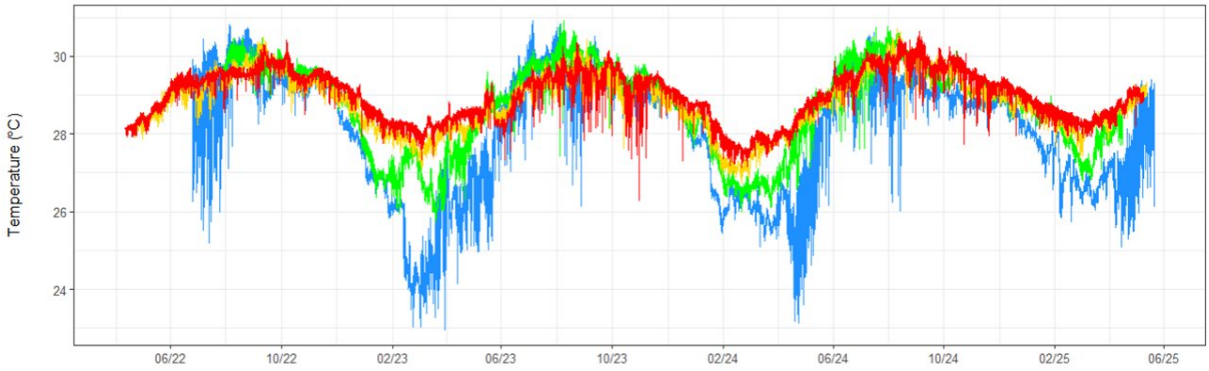
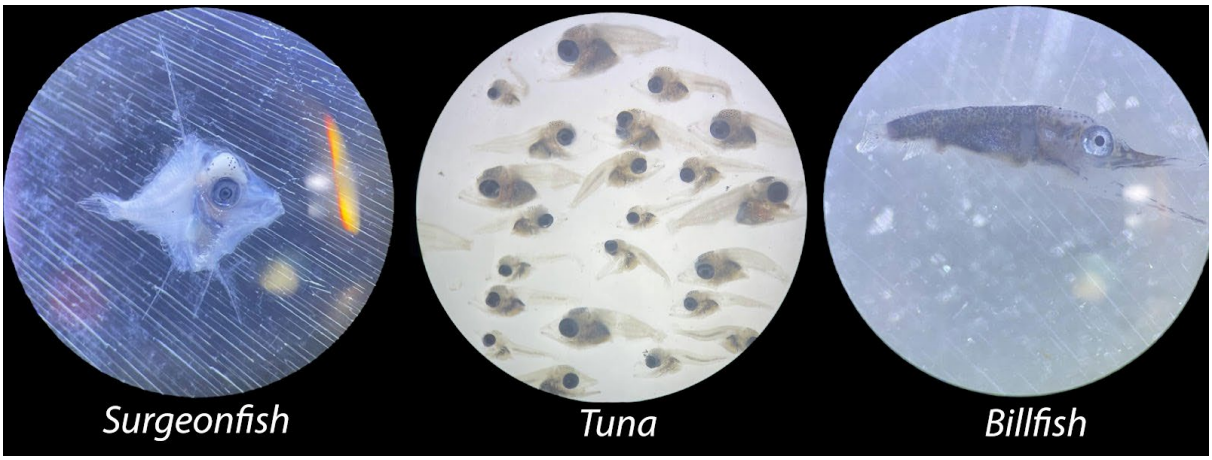


Figure 2. Subsurface temperature recorder data from representative 15 m sites at Guam (red), Saipan (yellow), Pagan (green), and Maug caldera (blue).

Plankton and Larval Fish Sampling

Oscar Elton Sette headed offshore each evening to collect plankton and larval fish samples overnight, completing a total of 60 Isaacs-Kidd midwater trawl deployments over the course of the NCRMP mission. Studying fish at this early life stage provides scientists with important insight into where and when fish are spawning, and the overall health of fish populations in the region. Each small sample provides a microscopic glimpse into the early lives of marine species in the Mariana Archipelago.



Surgeonfish (hugupao asut in Chamorro), tuna (makuro'), and swordfish (saoåra') larvae that were found in offshore plankton samples conducted around Guam and the CNMI. Credit: NOAA Fisheries/Lori Luers

HARP Deployment / Recovery

High-frequency acoustic recording packages (HARPs) were retrieved and redeployed offshore at both Wake Atoll and Saipan. These devices are part of the larger Pacific Island passive acoustic network that collects cetacean acoustic signals to assess the occurrence, seasonality, and long-term changes in distribution of species, and any changes in vocal behavior or distribution in response to increasing human sound sources or changing environmental conditions, as mandated under the Marine Mammal Protection Act (16 USC 1383/1386, 1392) and the Endangered Species Act (16 USC 1533/1536).

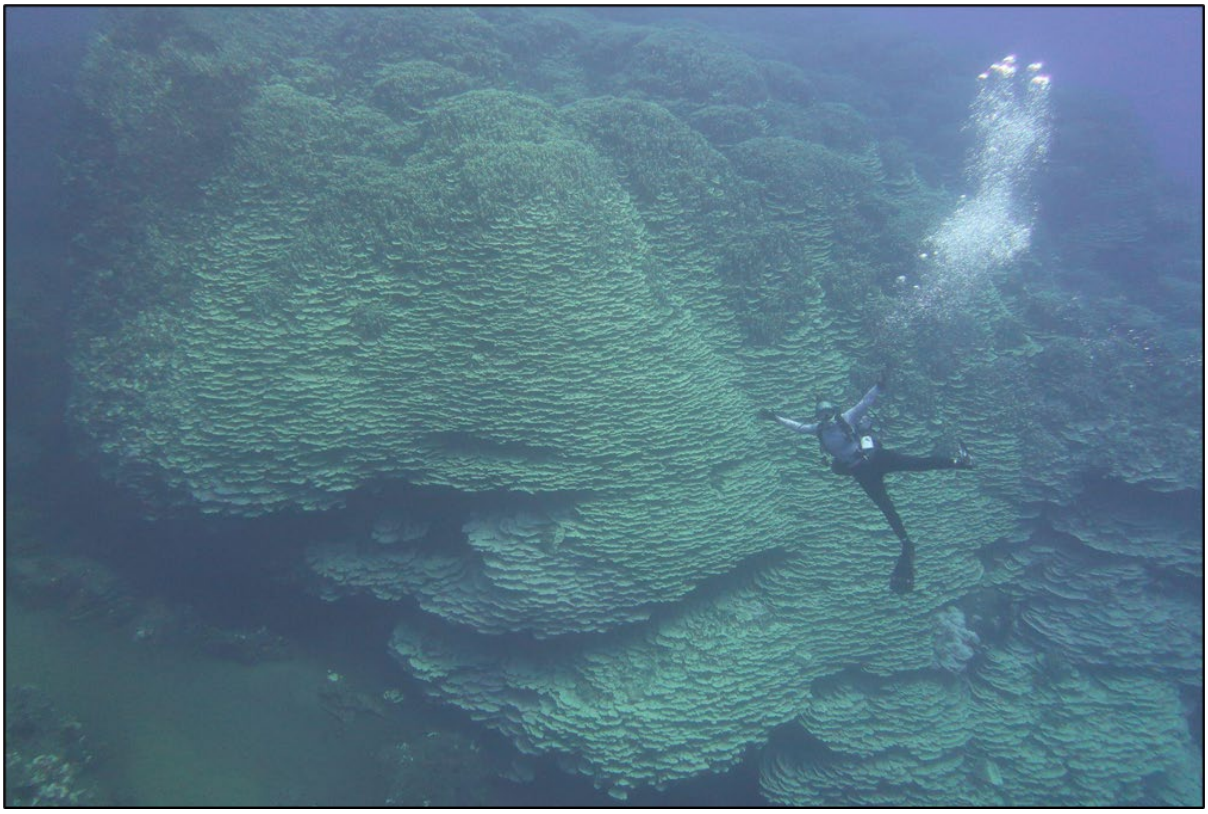
Maug caldera studies

Maug caldera was surveyed as part of the 2025 NCRMP Mission. This special place is recognized as a ”natural laboratory” due to its underwater volcanic vents, which release carbon dioxide (CO_2) through the seafloor. The CO_2 lowers the pH of the surrounding

seawater, creating an ideal environment for studying the effects of ocean acidification on coral reefs. By combining physical and chemical data with coral condition data, we are gaining insight into how the adjacent coral reefs are responding to the more acidic conditions at Maug caldera. This year, the team successfully continued a long-term study initiated in 2003, enabling us to observe changes and responses of these communities to ocean acidification over the past 22 years.

CO_2 *bubbling up from vents in the sea floor at Maug caldera makes for a perfect natural laboratory to study ocean acidification. Credit: NOAA Fisheries*

Maug caldera is also home to what might just be the largest coral reef colony on record, with an estimated size of this massive *Porites rus* colony (aptly nicknamed “Porites Zeus”) of 14,500 square feet and greater than 200 feet maximum diameter. By comparison, this ancient coral colony is substantially larger than the current record holder discovered last year in the Solomon Islands by National Geographic, which measured approximately 11,500 square feet.



A PIFSC scientist swims near the top of the massive Porites rus *colony at Maug caldera. Credit: NOAA Fisheries/Samantha Darin*

Surveying remote locations such as Wake Atoll, Maug Island, and the other uninhabited islands of the Mariana Archipelago allows us to better understand the environmental drivers and ecosystem conditions that support such high diversity and unique coral colonies, while providing critical information to guide conservation and management in more populated locations.

Within the next year, the data from this 2025 mission will be integrated with existing NCRMP data, which has been collected since the early 2000s. Summaries of recent data are currently available on the NCRMP's Data Visualization Tool and all data can be found on Data.gov by searching for "National Coral Reef Monitoring Program" and specifying the location.

Mariana Archipelago Bottomfish Survey

The 2025 Marianas Bottomfish Survey marked a milestone for fisheries science and community collaboration in the Commonwealth of the Northern Mariana Islands. Conducted aboard NOAA Ship *Oscar Elton Sette*, the survey covered 1,900 nautical miles across the Northern Islands, achieving 72% of its planned sampling despite challenging weather conditions. Using standardized hook-and-line fishing and nighttime larval tows, the team collected over 600 bottomfish specimens—and many more yet to be identified in the 21 larval tows—generating vital data on species abundance, distribution, and life history traits, such as age, growth, and reproduction. These data form the foundation for improved stock assessments and sustainable management of bottomfish species critical to the region's fisheries.

What truly set this survey apart was the unprecedented collaboration between NOAA scientists from multiple PIFSC programs and the local fishing community. Fishers from the community (Lino Tenorio, James Roberto, and Audrey Toves) worked side-by-side with NOAA scientists to design, test, and deploy standardized survey gear, ensuring that the methods were both scientifically rigorous and operationally practical. This partnership enabled the team to capture accurate measures of catch per unit effort (CPUE), while also collecting life history samples that would have been nearly impossible to obtain without local knowledge and expertise.

Beyond the scientific accomplishments, this survey showcased how collaborative research builds trust and shared purpose. By involving local fishers in the research process—from gear development to community presentations—the project strengthened the connection between science and the communities that depend on these fisheries. The success of the Mariana Archipelago Bottomfish Survey lays the groundwork for a long-term data series that will guide sustainable fisheries management for years to come.

(Left) CNMI Fisher (Lino Tenorio), CNMI stock assessment lead (Erin Bohaboy), and survey lead (Ben Richards) head out for another day of standardized research fishing. Credit: NOAA Fisheries/Erin Bohaboy. (Right) Local CNMI fishers, Lino Tenorio and James Roberto, and Guam fisher, Audrey Toves, show off the poster that they generated to show the median sizes of bottomfish in the Northern Mariana Islands compared to median sizes around Saipan at a community engagement event on Saipan, July 20, 2025. Credit: NOAA Fisheries/Eva Schemmel.

Hawai‘i's longline fishery demonstrates the need to consider multispecies impacts in pelagic time-area closures

PIFSC staff recently published an article in the ICES Journal of Marine Science (Van Wert et al., 2025) evaluating the multispecies consequences of cap-based spatial closures in the Hawai‘i deep-set longline fishery, focusing on the Southern Exclusion Zone (SEZ)—a large, time-area closure designed to reduce bycatch of false killer whales. The study leverages over 17 years of observer and logbook data and uses an ensemble random forest modeling framework to estimate spatial interaction risk for eight protected species, including sharks, sea turtles, and marine mammals.

Results show that while the SEZ closure reduced direct fishing effort within its boundaries, it led to effort displacement along the SEZ border and beyond the EEZ, particularly to the south and east. This redistribution of fishing activity altered the spatial risk fields for multiple species. Oceanic whitetip sharks *Carcharhinus longimanus*, giant manta rays *Mobula birostris*, and olive ridley sea turtles *Lepidochelys olivacea* experienced increased interaction risk in areas of concentrated displaced effort, while false killer whales and loggerhead turtles exhibited more diffuse spatial risk. The findings highlight that while the SEZ may reduce risk for the target species in the closed area, it can unintentionally increase bycatch risk for co-occurring protected species outside the closure.

The authors argue that spatial closures focused on single-species management can create unintended ecological and regulatory tradeoffs, potentially undermining broader conservation goals. Despite the SEZ's intent to reduce false killer whale bycatch, interaction risk may not decrease at the population scale due to increased fishing in areas with high densities of pelagic stocks. The study underscores the need to move toward ecosystem-based fisheries management that accounts for the spatial and ecological dynamics of multiple species. It also raises caution for the design of future marine protected areas and time-area closures in dynamic pelagic systems.

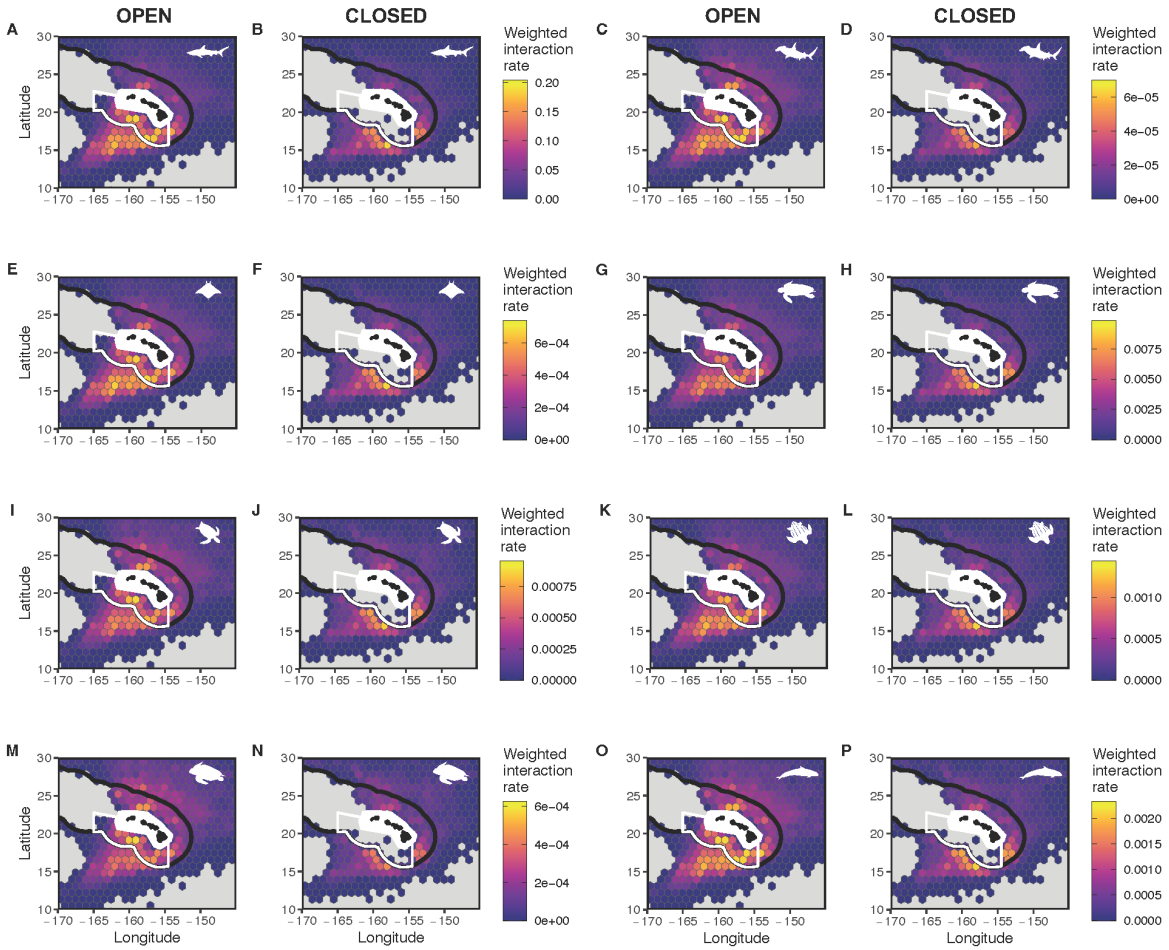


Figure 3. Weighted interaction rates for (a–b) oceanic whitetip sharks, (c–d) scalloped hammerhead sharks, (e–f) giant manta rays, (g–h) olive ridley sea turtles, (i–j) green sea turtles, (k–l) leatherback sea turtles, (m–n) loggerhead sea turtles, and (o–p) false killer whales when the SEZ is open (dates outside of closure between August 26, 2016 and December 12, 2022; columns 1, 3) and closed (July 24–December 31, 2018 and February 22, 2019–August 25, 2020; columns 2, 4). The Hawaiian EEZ is outlined in black, SEZ is outlined in white, and the longline prohibited area is the solid white filled polygon.

Leatherback anchor tag field trials and deployment results

In May 2025, NOAA researchers from various line offices conducted field trials of the newly developed leatherback anchor system (LAS) in North Carolina to evaluate tag retention and performance. A total of 13 leatherback turtles were captured, with 7 tagged using the LAS method and 6 using traditional pygal attachments. LAS tag retention ranged from 34.7 to 56.5 days (mean = 46.5, SD = 9.2), exceeding the 30-day benchmark identified as critical for evaluating post-release mortality.

Additional trials are scheduled for September 2025 in and around Cape Cod, Massachusetts, during which researchers will test the next-generation leatherback anchor deployment device (LADD) in a controlled research setting. These trials are designed to ensure the new LADD system performs reliably as this is the version that will be used for longline deck-based attachments. The next phase will involve researcher-led tests aboard actual longline fishing vessels to assess the practicality of using the system in a fishery context. Such trials would likely take place in regions where leatherbacks are more common, such as the U.S. East Coast or New Zealand. The ultimate goal is to develop a turnkey system that can be deployed safely and effectively by trained observers or fishers in the Hawai‘i longline fishery, enabling real-time data collection on post-release survival and informing fisheries management decision making.

Leatherback turtle tagged with the LAS device off North Carolina. From left to right, Dr. Chris Sasso, Dr. Brian Stacy, and Dr. John Wang. Credit: NOAA Fisheries

Evaluation of loggerhead turtle habitat use and implications for management

PIFSC staff reviewed recent satellite telemetry data from loggerhead turtles (*n*=60) incidentally captured in the Hawai‘i shallow-set longline (SSLL) fishery (Figure 6). These data are being compared with movement data from previous years to assess habitat use and evaluate recent claims of a northward range shift driven by climate change (Briscoe et al., 2025). The team’s preliminary findings indicate that loggerheads captured in the SSLL fishery continue to utilize lower-latitude subtropical habitats in the central North Pacific. This challenges earlier findings that were based primarily on captive-reared loggerheads released in the North Pacific Transition Zone. These results highlight the importance of using wild-caught, fishery-interacting individuals when generating movement data to inform species distribution models and fisheries management strategies.

To support further evaluation, the team is compiling a comprehensive telemetry dataset that integrates both historic and newly collected movement data. These efforts will feed directly into improving the protected species ensemble random forest model used to inform dynamic ocean management tools.

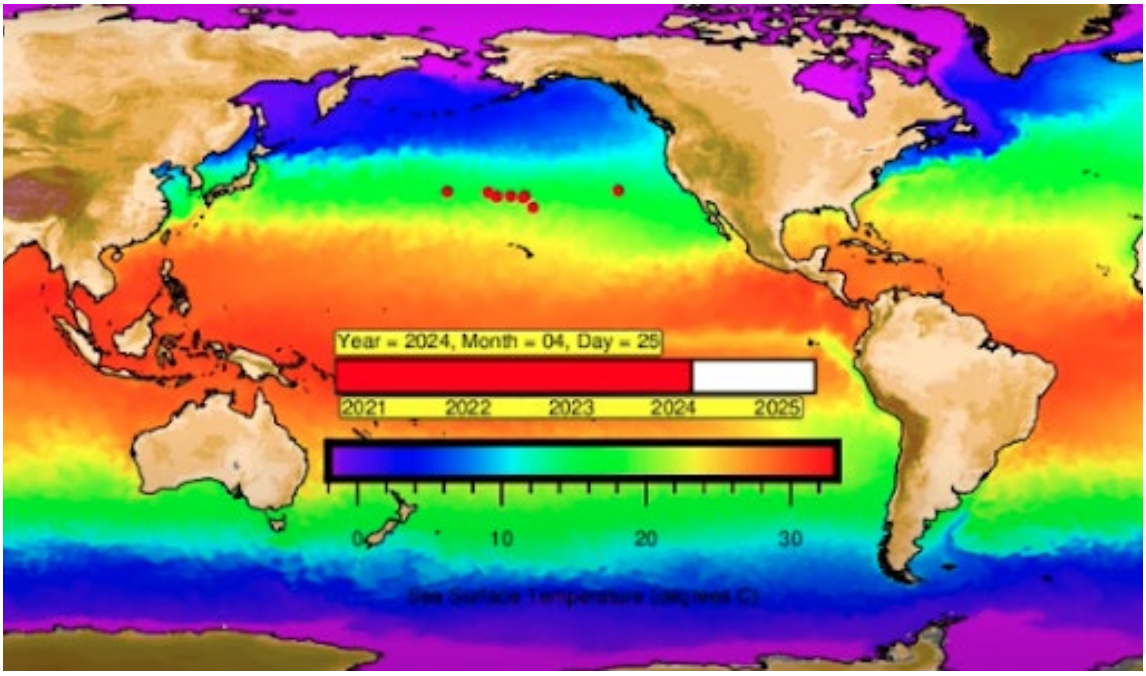


Figure 4. Satellite-derived, sea surface temperature (SST) map showing locations of satellite-tagged loggerhead turtles (red dots) in 2024. Preliminary results indicate continued use of central North Pacific subtropical waters, counter to recent hypotheses of a northward habitat shift.

Satellite tagging and genetic sampling of green turtles in the main Hawaiian Islands

To better understand the population dynamics of Hawaiian green turtles *Chelonia mydas*, PIFSC researchers recently conducted fieldwork in the main Hawaiian Islands, including the deployment of satellite tags and collection of skin samples from nesting green turtles encountered on beaches at Marine Corps Base Hawai‘i (Kāne‘ohe). The primary objectives of this work are to:

- Determine the degree of demographic connectivity between the main Hawaiian Islands green turtles and the primary nesting population in the Northwestern Hawaiian Islands.
- Assess whether turtles nesting in the main Hawaiian Islands represent a genetically distinct population or a shifting subset of the larger Northwestern Hawaiian Islands stock.

All turtles tagged to date have remained in the vicinity of Kāne‘ohe following nesting (Figure 7), suggesting the possibility of a local, resident population. However, whether these turtles are genetically distinct remains unknown and will take time to evaluate through genetic analyses. Satellite telemetry will continue to provide insights into their spatial ecology, post-nesting behavior, and if the turtles remain local. These findings are directly relevant to the potential need for localized management strategies should a distinct main Hawaiian Islands nesting population be confirmed.

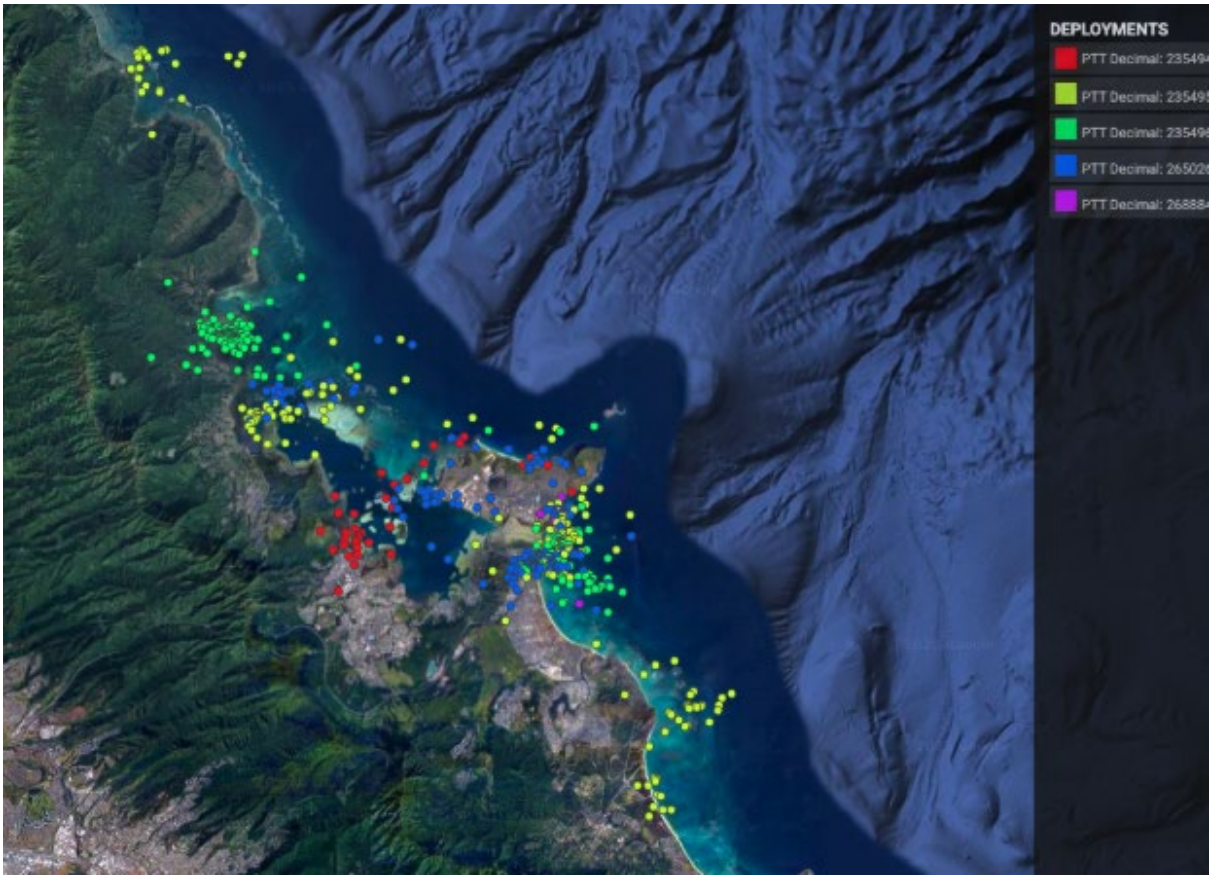


Figure 5. Locations of 5 female green turtle tagged while nesting at Kāneʻohe Bay, Oʻahu.

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