MARINE INSTITUTE
MAUI OCEAN CENTER

Annual Impact Report 2023

MOC Marine Institute
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Paradis, D., Ryon, D., Mayen-St. Louis, Y., Ornelas, K. (2025). MOC Marine Institute, 2023 Annual Impact Report. Wailuku, HI: Marine Institute at Maui Ocean Center.

Figure 1. Hawaiian green sea turtle swimming the reef. 2023 Maui, Hawaii.

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Our Mission

To inspire lifelong environmental stewardship and ensure the survival of sea turtles and coral reefs in Hawai'i through science-based conservation efforts, education, and outreach.

Photo: Don McLeish

Sea Turtle Conservation Team

MOC Marine Institute Staff
(as of December 31, 2023)

Paul McCurdy
Veterinarian

Dustin Paradis
Conservation Program Mngr.

Darby Ryon
Volunteer Coordinator

Ylenia St-Louis
Sea Turtle Technician

Katie Ornelas
Sea Turtle Technician

Volunteer Lead Responders

Alan Espiritu
Don McLeish
Bruce Weyermann

Volunteers

Jonelle Anderson-Metzger, Helen Baillargeon, Ciera Benfield, Mitch Brown, Ty Clark, Meryl Cohen, Rebekah Colletti, Grace Collins, Lydia Cox, Derek DeCrausauz, Kristen DeCrausauz, Adrian Dougherty, Gabriela Echeverry, Ashley Getz, Dana Grad, Theresa Greek, Tim Greek, Greg Helton, Peyton Hoge, Micaela Hogger, Jackie Johnston, Brandon Kagrise, Carolyn Kaya, Regine Lang, John MacNaughton, Jeanette MacNaughton, Travis Matteson, Lucia McKinnon , Bob Melody, Autumn Miller, Ryan Murdock, Rose Nellis, Kayla Nieves, Maria Norman, Mackenzie Perillo, Jordyn Pittsenberger, Izzy Riethbrock, Katrina Rodenberger, Evren Rose Vincent-Crus, Darby Ryon, Jaime Sostsman, Isabella Troxell, Mark Webb, Anita Wintner, Jennifer Wood

*We appreciate all our volunteers and their hard work. This list may not be complete, but our gratitude extends to everyone who contributed this year.

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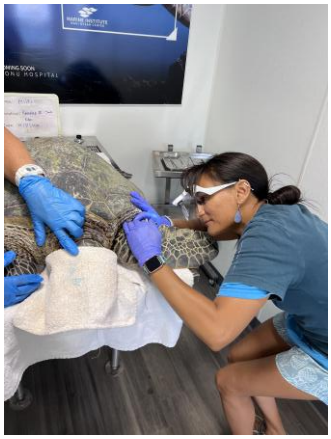
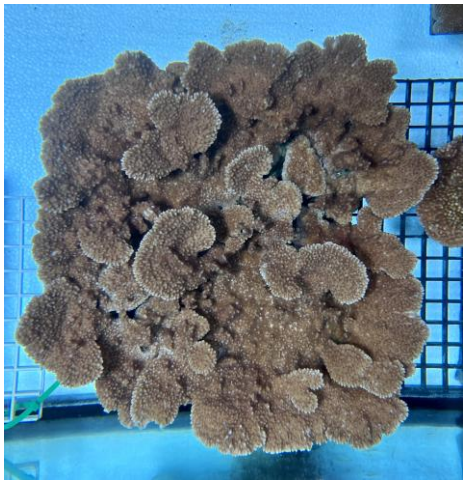
MOCMI PROGRAMS

Sea Turtle Conservation

Coral Reef Conservation



Conservation Through Education




Partnership with NOAA Fisheries

Sea turtle stranding response activities operate under the authority of NOAA National Marine Fisheries Service (NMFS) Pacific Islands Regional Office (PIRO) and the Pacific Islands Fisheries Science Center (PIFSC). MOC Marine Institute is an authorized agent of NMFS for the purposes of responding to stranded sea turtles: 50 CFR 222.310; 50 CFR 223.206; 50 CFR 17.21; and 50 CFR 17.31.

Sea Turtle Stranding Data

This report contains information on documented injured, sick, distressed, or expired sea turtles on the island of Maui, Hawai‘i from 1 January to 31 December 2023. Some of the data presented throughout this report is preliminary and based on field assessment, not necropsy.

Scientific Name	Abbreviation	Common Name
Chelonia mydas	Cm	Green sea turtle
Eretmochelys imbricata	Ei	Hawksbill sea turtle

Table 1. Common name equivalents to scientific names and abbreviations given throughout this report.

Figure 2. Hawaiian Green Sea Turtle off the coast of Maui, Hawaii, 2023. Photo by Don McLeish.

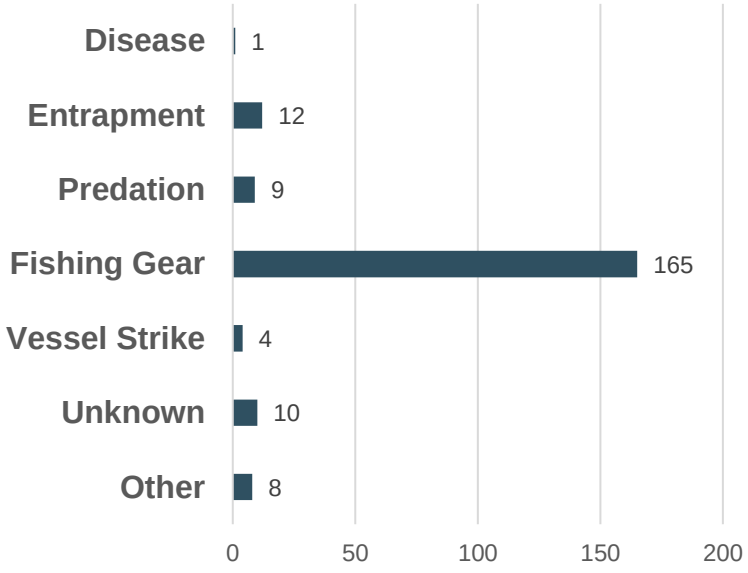
2023 Overview

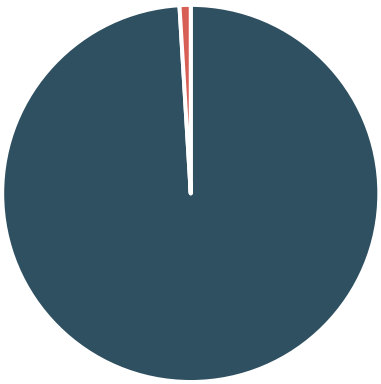
209
Documented stranded sea turtles

79%
Interactions with fishing gear

39
Long-term rehabilitation cases

2023 Cause of Stranding





207
Green sea turtles

2
Hawksbill sea turtles

450+
Students educated in 2023

10,840+
Individual pieces of debris collected through Honu Hero Beach Cleanups

4
Illegal gillnets recovered from nearshore waters

43
Fishing line recycling bins located throughout the island of Maui

209 Documented Strandings in 2023

For the purposes of this report, we define a stranding as any marine turtle found on land or in the water that is deceased, injured, or exhibits any indication of ill health or abnormal behavior.

2023 Overview

Two-hundred and nine(209) sea turtles were documented stranded on the island of Maui by MOC Marine Institute from 1 January – 31 December 2023. One-hundred and ninety-one of the 209 were located alive.

Two-hundred and seven of the documented strandings in 2023 were green sea turtles (Chelonia mydas) and two were hawksbill sea turtles (Eretmochelys imbricata).

Stranding causes included disease (n=1), interactions with fishing gear (n=165), geographical entrapment (n=12), predation (n=9), vessel strike (n=4), other (n=8), and unknown causes (n=10).

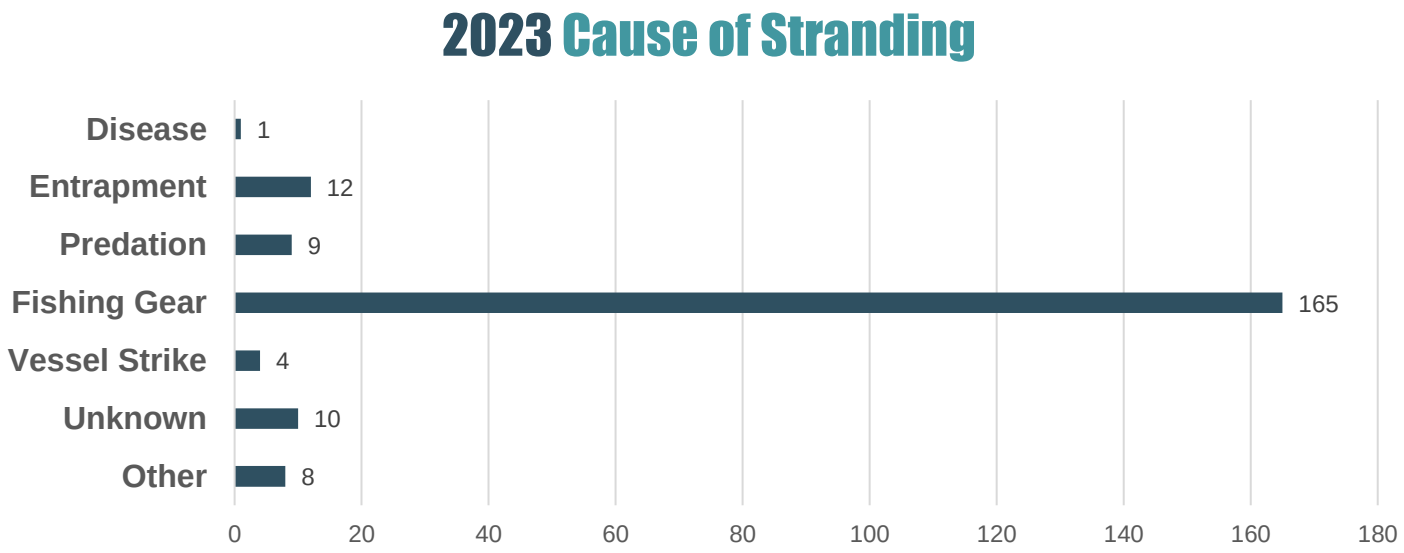


Figure 5. Sea turtle strandings by primary stranding cause in Maui, Hawai'i, 2023.

SEA TURTLE STRANDINGS 2019 - 2023

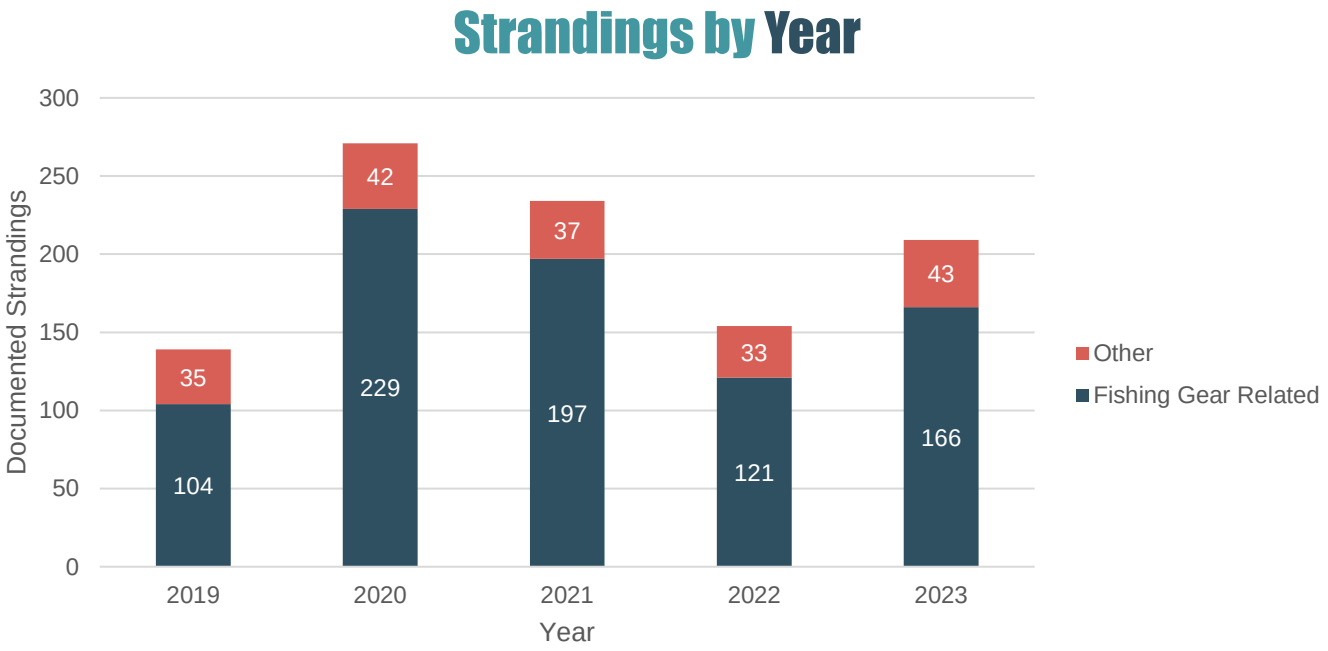


Figure 3. Sea turtle strandings documented by MOC Marine Institute on the island of Maui, Hawai'i, 2019 – 2023.

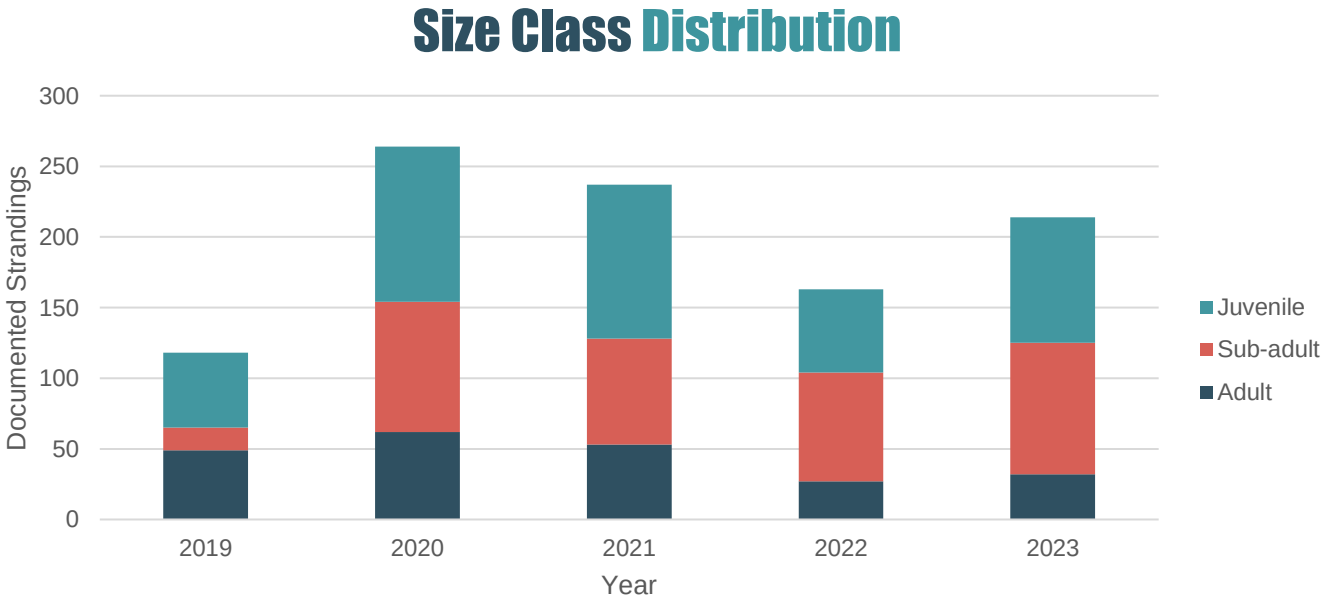


Figure 4. Size class distribution of stranded sea turtles 2019 – 2023.

STRANDINGS BY MONTH

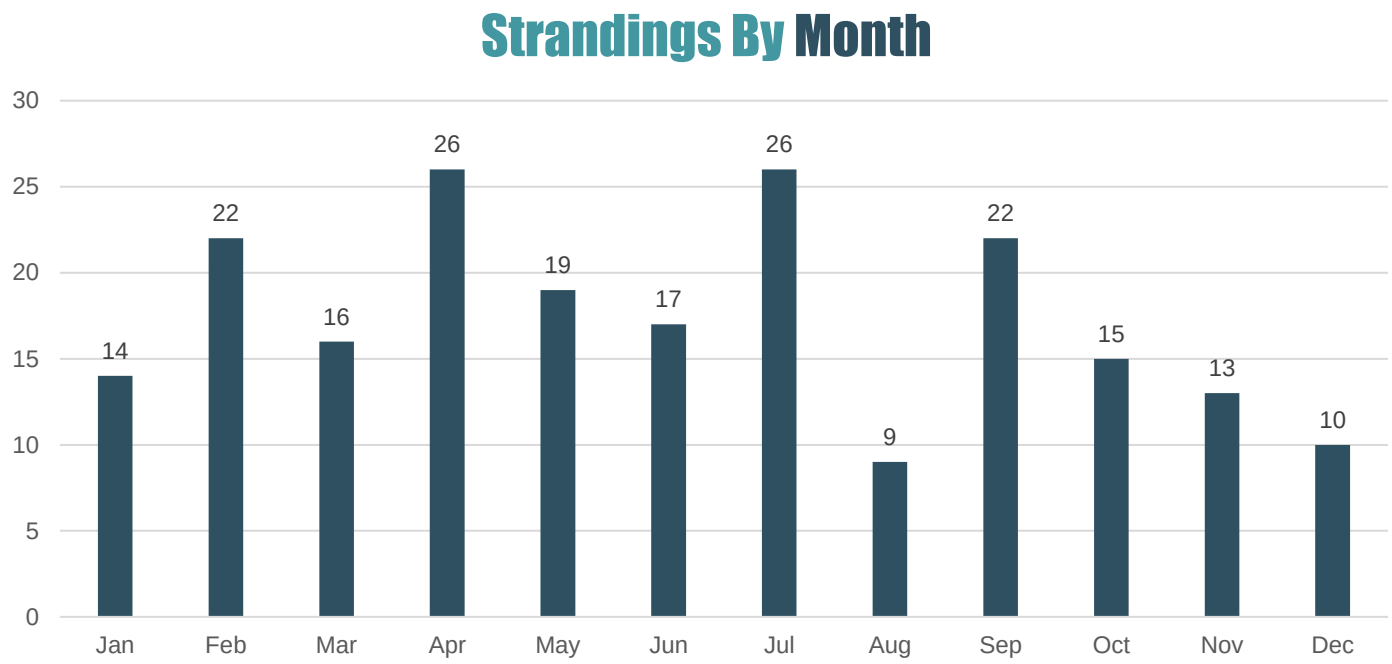
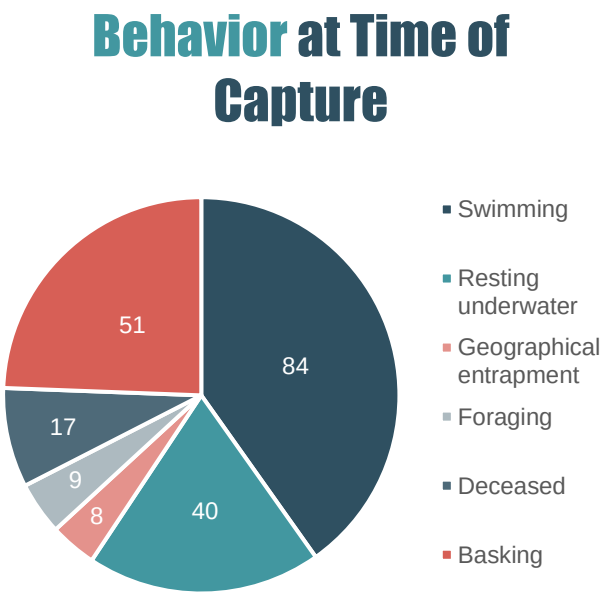
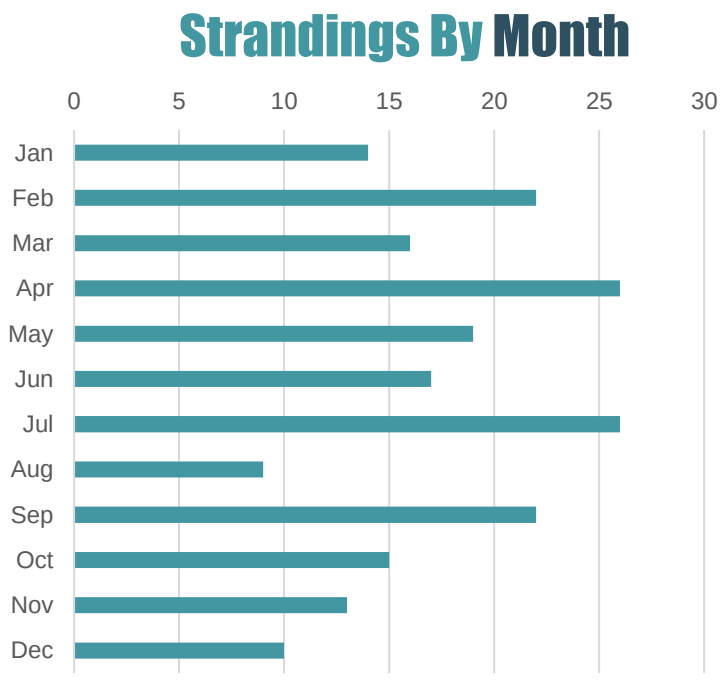


Figure 7. Documented sea turtle strandings by month, 2023, Maui, Hawai'i.

Figure 8. Sea Turtle with bi-lateral fishing line entanglement, Maui, 2023. Photo by Don McLeish.

Figure 5. MOCMI field responders with a stranded turtle, Maui, 2023.





Sea Turtle Assessment & Intake Procedure

MOC Marine Institute staff collects the below data points on all stranded sea turtles that are
transported to MOCMI's Honu Rescue lab for assessment:

- Photo-documentation of the sea turtle, its injuries, and any other abnormalities
- Weight (kg)
- Measurements (curved and straight)
  - CCL and CCW (curved carapace length and width) are measured using a soft measuring tape
  - SCL and SCW (straight carapace length and width) are measured using calipers
- Visual assessment
  - All abnormalities and injuries are documented
- Blood Test (Hematocrit and Total Protein)
- If a sea turtle patient is admitted into the rehabilitation facility, a full blood chemistry is ran and additional tests are completed as needed
- Check for previously inserted passive integrated transponder (PIT) tags in rear flippers by using a PIT tag scanner
  - If no tags are detected, PIT tags are inserted safely into each hind flipper

Figure 6. Basking Sea Turtle on Maui's South shore, 2023.

SEA TURTLE PROGRAM MEASUREMENTS

Curved Carapace Length (CCL)
Using a soft tape measure, the Curved Carapace Length (CCL) is measured from the nuchal notch to the posterior tip of the carapace (top shell). Measurements of the curved carapace width (CCW) is also collected.

MOCMI collected CCL measurements from 181 stranded green sea turtles in 2023. The mean CCL was 69.1 cm (range 37.2 to 102.0 cm).

Figure 9. Measuring the CCW of a patient.

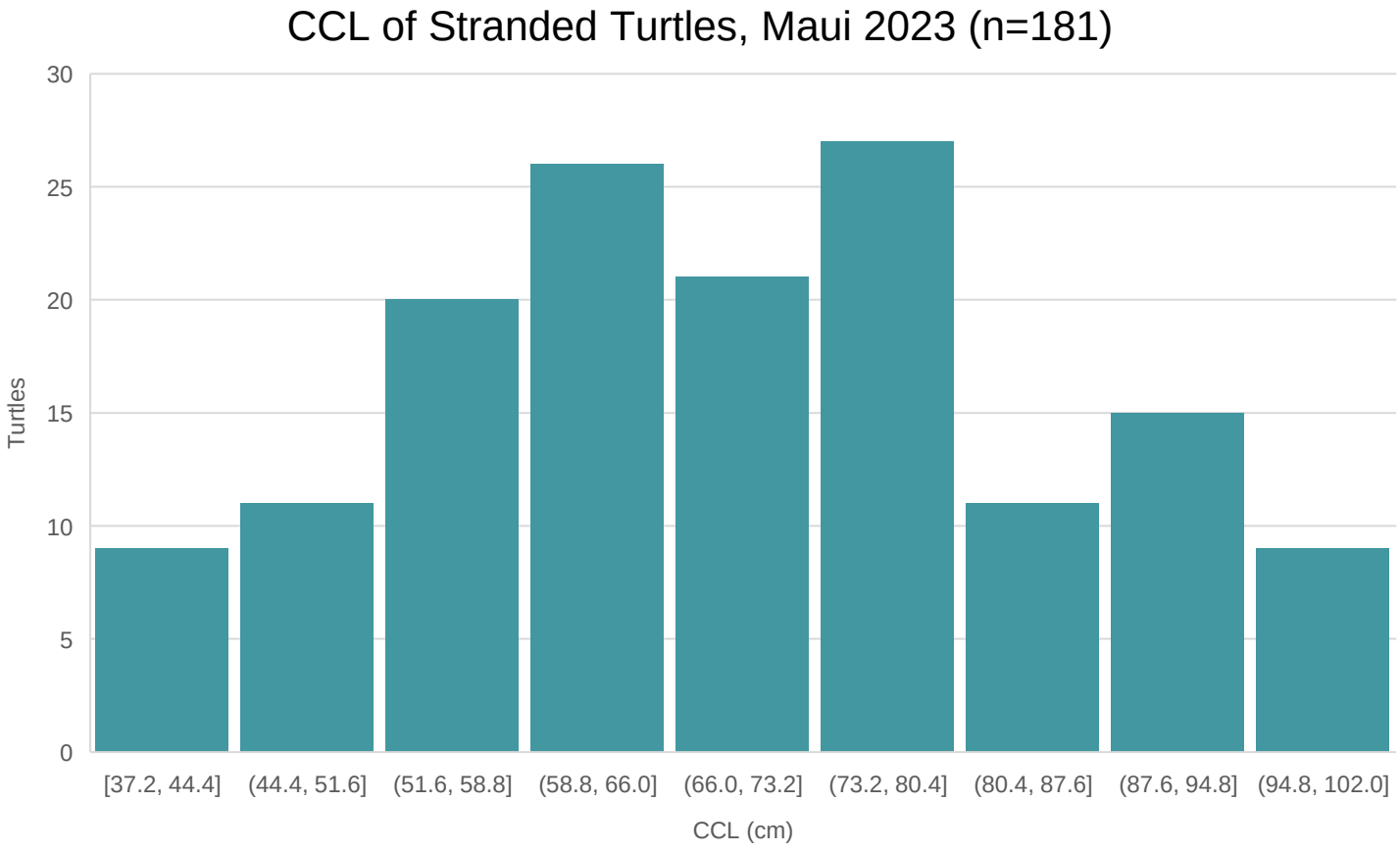


Figure 10. MOCMI collected Curved Carapace Length (CCL) measurements from 181 stranded green sea turtles in 2023. The mean CCL was 67.1 cm (range 37.2 to 102.0 cm)

SEA TURTLE PROGRAM MEASUREMENTS

Straight Carapace Length
Using calipers, the Straight Carapace Length (SCL) is measured from the nuchal notch to the posterior tip of the carapace (top shell).

MOCMI collected SCL measurements from 137 stranded green sea turtles in 2023. The mean SCL was 65.7 cm (range 33.9 to 96.3 cm).

Figure 11. Measuring the SCL of a patient.

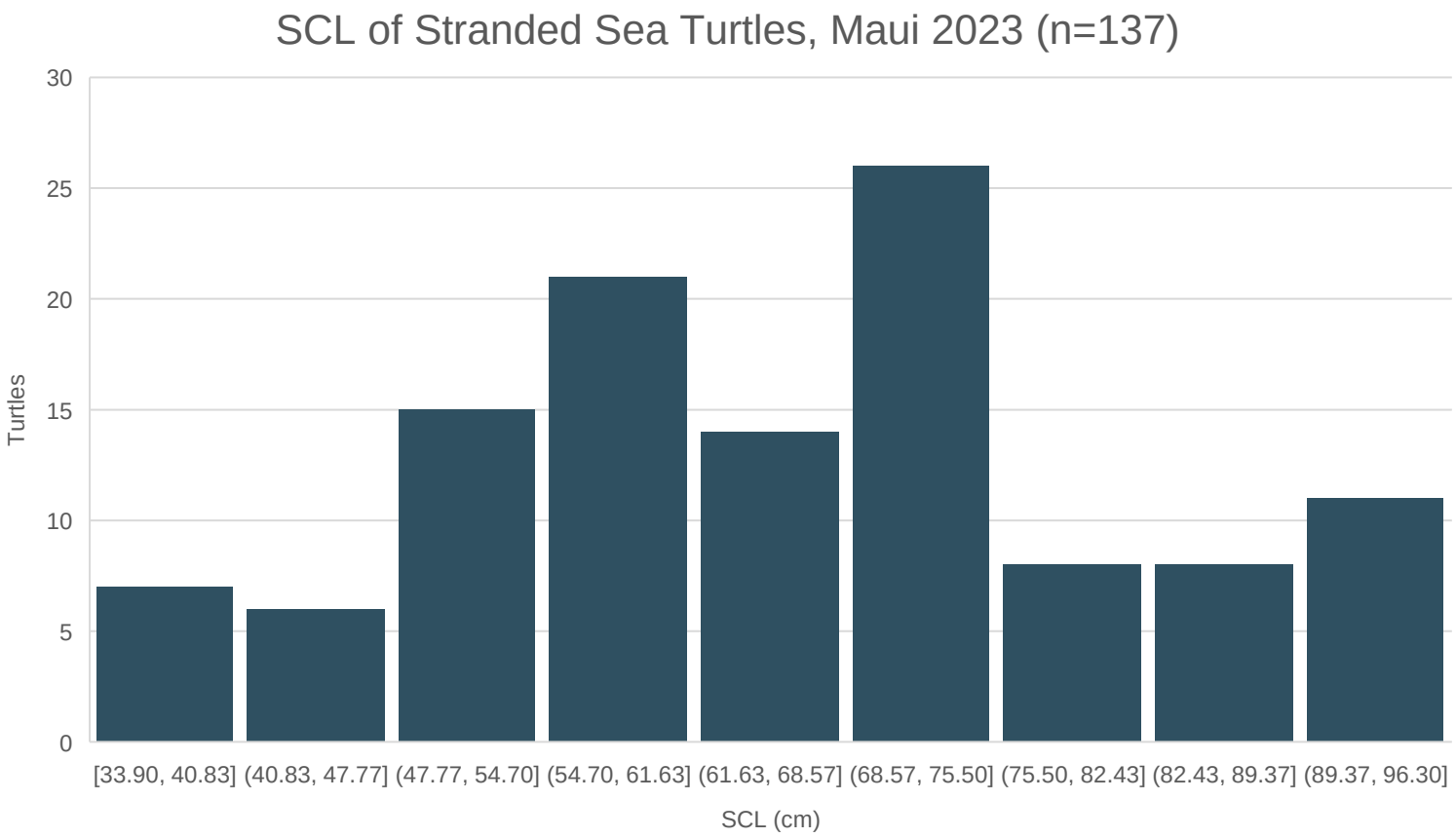


Figure 12. MOCMI collected Straight Carapace Length (SCL) measurements from 137 stranded green sea turtles in 2023. The mean SCL was 65.7 (range 37.8 to 94.5).

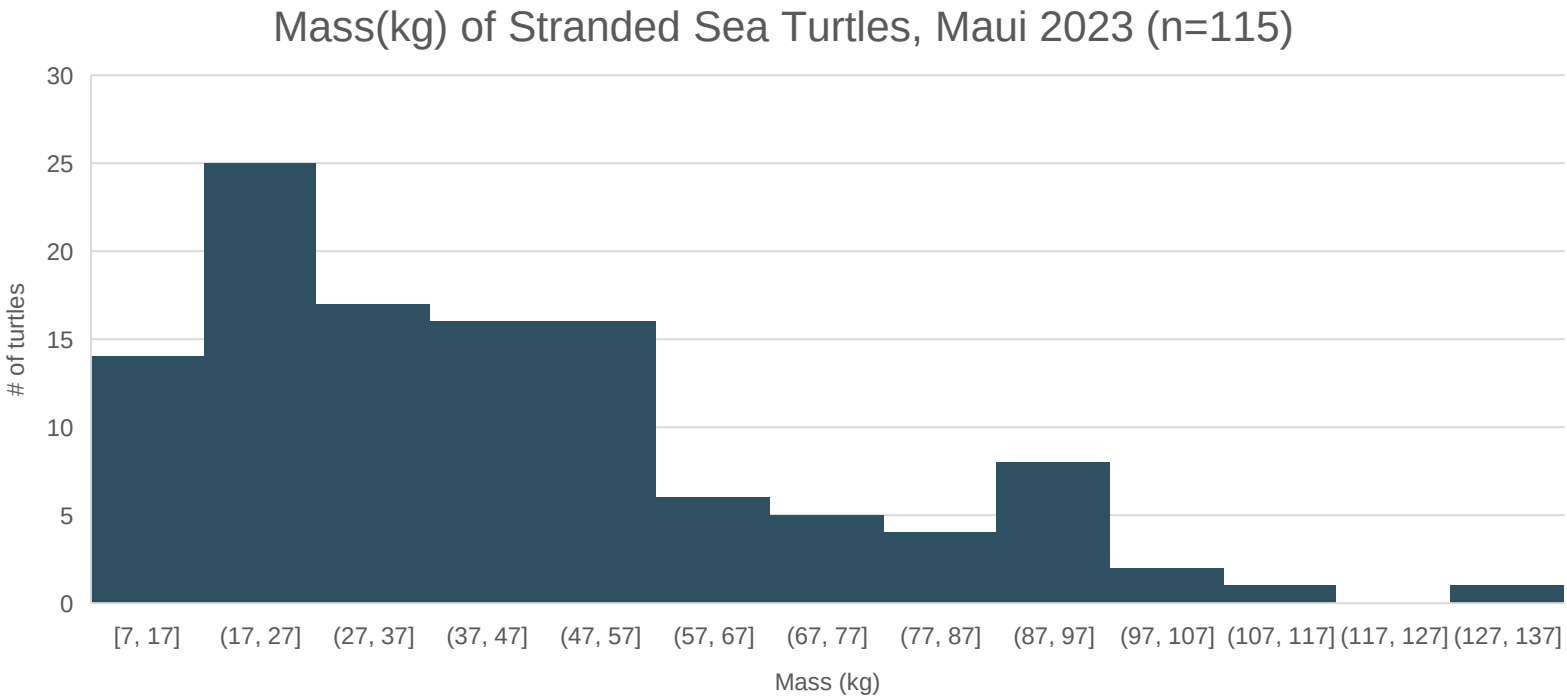


Figure 13. MOCMI staff collected weights on 115 stranded green sea turtles in 2023. The mean was 43.75 kg (range 7.3 to 133.1 kg).

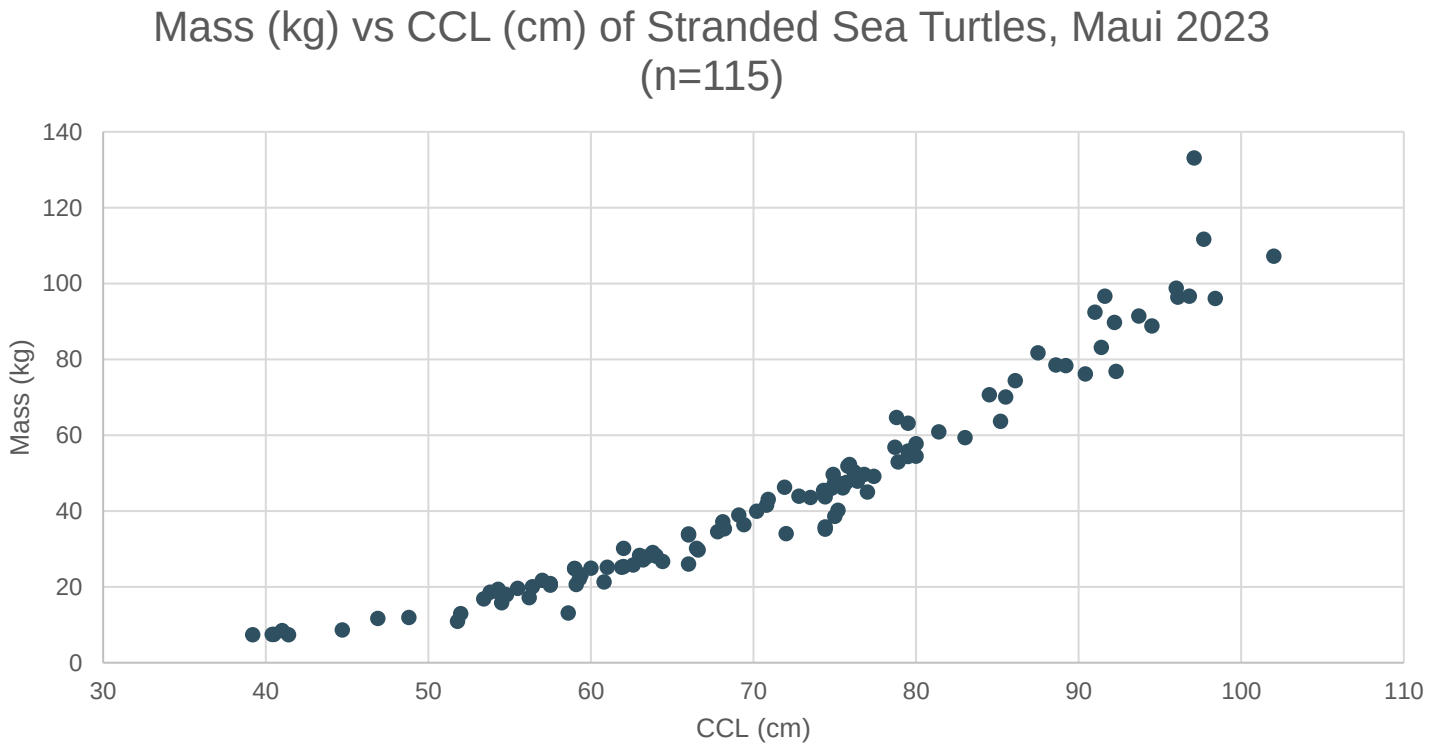


Figure 14. Of the 115 green turtles weighed in 2023, for every increase in 10 cm in CCL, the turtle's weight increased by 17.5 kg.

SEA TURTLE PROGRAM BLOOD TESTING

MOCMI staff collects a blood sample from all sea turtles examined; routine testing includes hematocrit and total protein. If a sea turtle patient is admitted into MOCMI's rehabilitation facility, we perform blood chemistry tests and other labs as needed.

Hematocrit
A hematocrit test measures the proportion of red blood cells in your blood. The hematocrit test is also known as a packed-cell volume (PCV) test. In 2023, MOCMI collected a blood sample and ran a PCV test on 114 sea turtle patients upon intake.

Total Protein (TP)
A total protein test measures the sum of all types of proteins (albumin and globulin) in the blood. In 2023, MOCMI collect a blood sample and ran a total protein test on 113 sea turtle patients upon intake.

Figure 15. A green sea turtle patient awaits treatment, Maui, 2023.

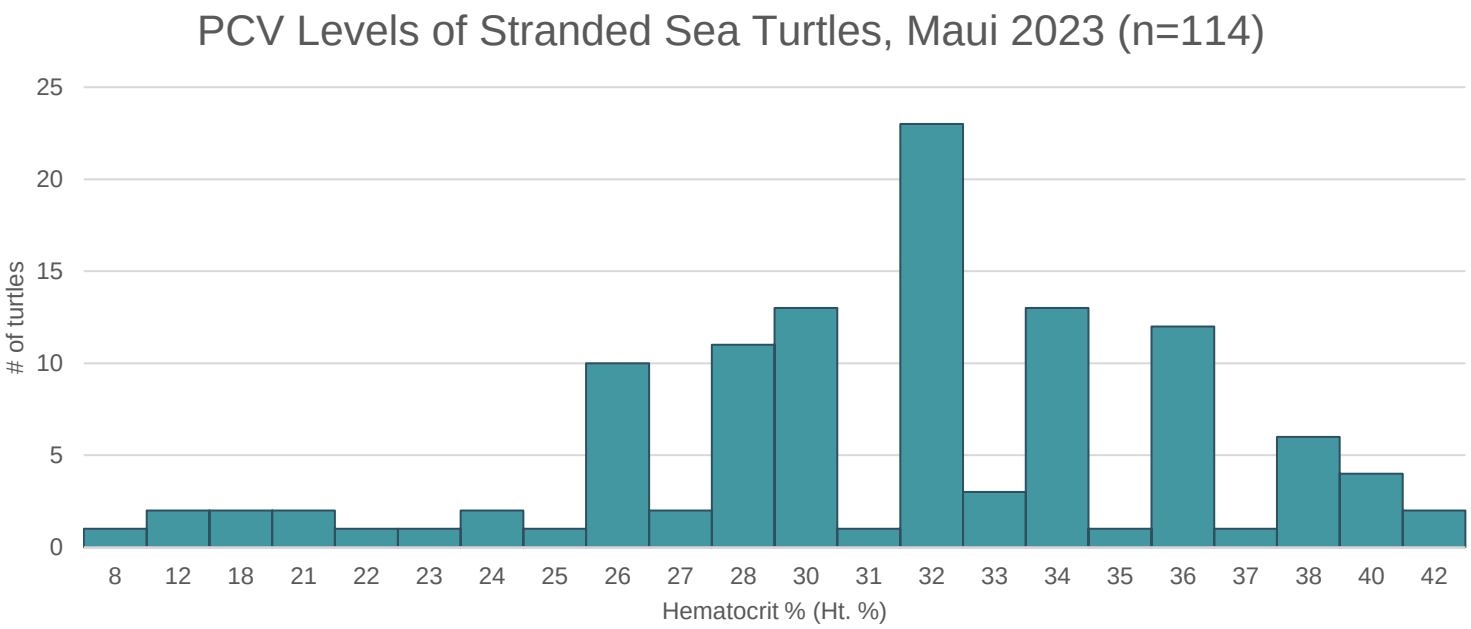


Figure 16. MOCMI staff tested 114 blood samples from green sea turtle patients for hematocrit (PCV) in 2023. The mean PCV is 30.91% (range 8 to 42%).

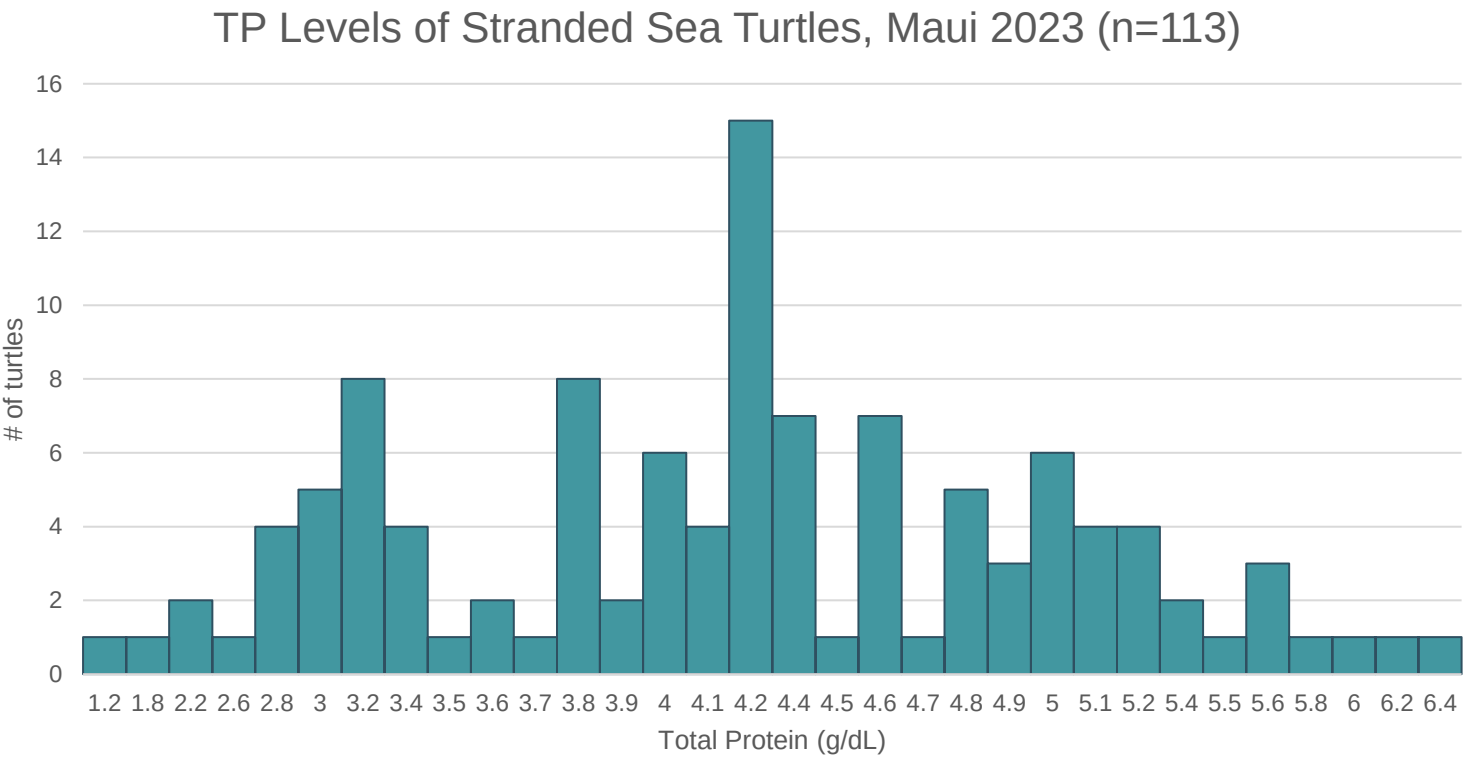


Figure 17. MOCMI staff tested 113 blood samples from green sea turtle patients for total protein in 2023. The mean total protein is 4.17 (range 1.2 to 6.4 g/dL)

FISHERIES INTERACTIONS OVERVIEW

80% of strandings due to interactions with fishing gear

The entanglement of sea turtles in fishing gear is a global problem. In Hawai'i, nearshore recreational hook-and-line fisheries are considered the primary threat to threatened green sea turtles (Chelonia mydas) and endangered hawksbill sea turtles (Eretmochelys imbricate).

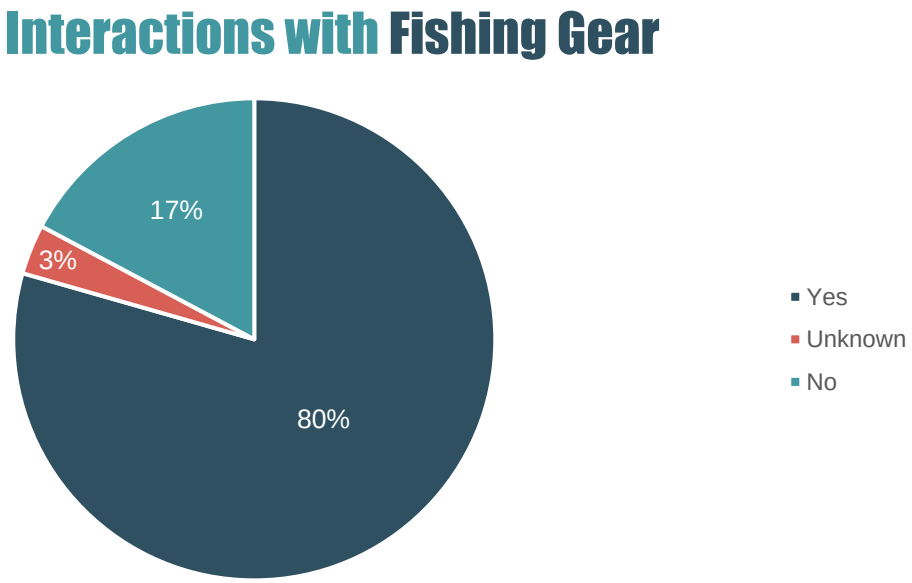


Figure 18. 80% of documented sea turtle strandings in 2023 on Maui were due to interactions with fishing gear (nearshore hook and line fisheries).

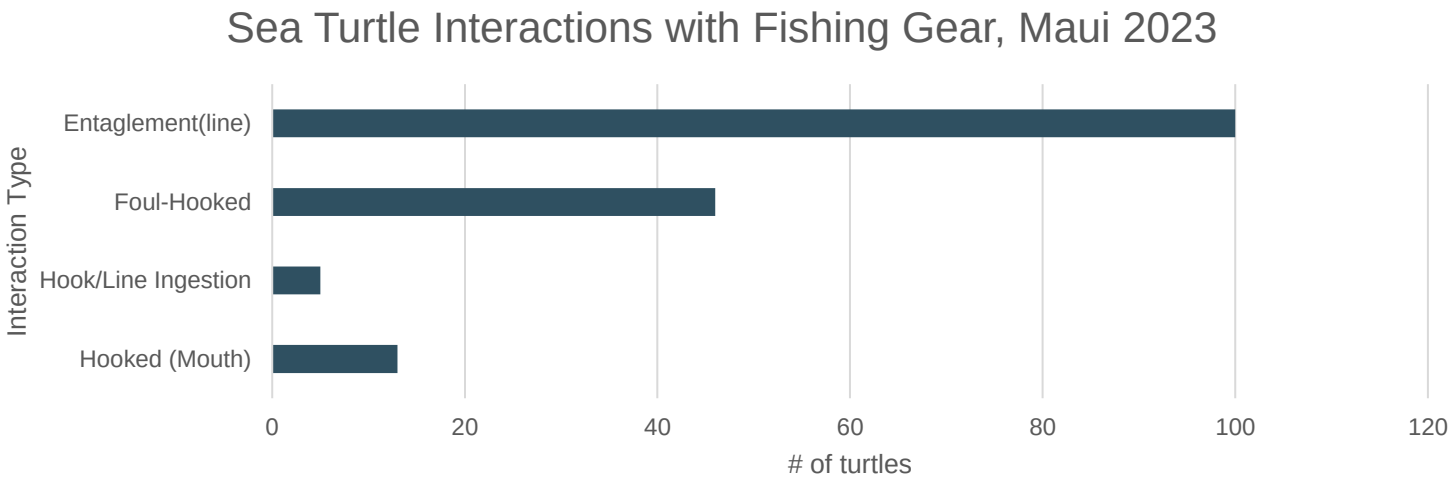


Figure 19. Sea turtle interactions with fishing gear by type of interaction, Maui, Hawaii, 2023.

STRANDING REGIONAL MAPS

Figure 20. Documented strandings due to interactions with fishing gear (nearshore coastal fisheries) on the island of Maui, 2023.

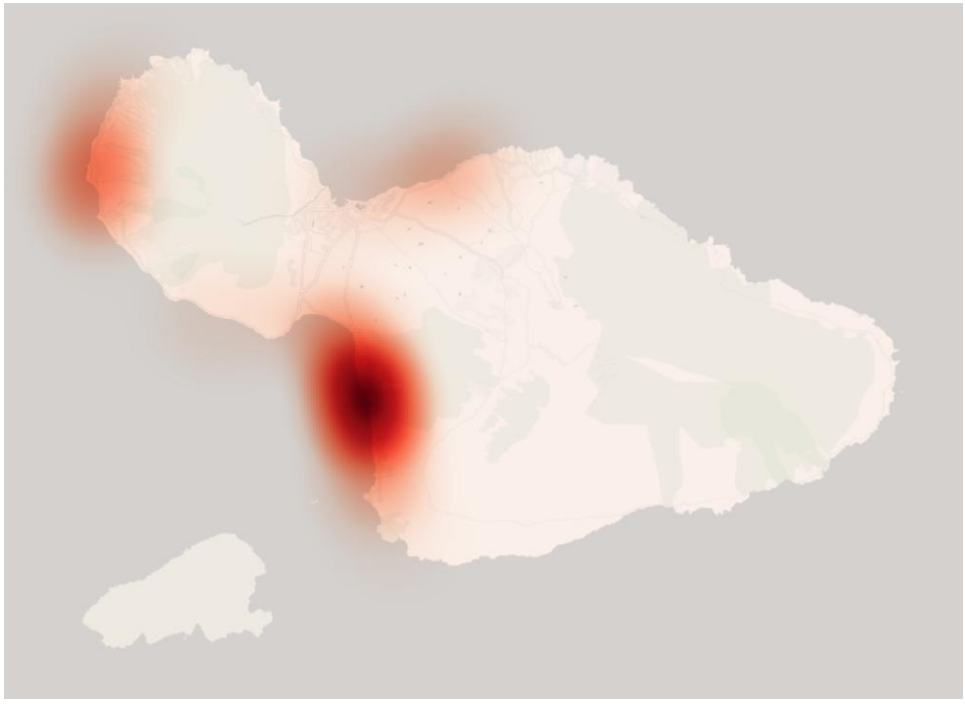


Figure 21. Hot spot analysis of sea turtle and fishing gear interactions on the island of Maui, 2023.

Sea Turtle Rehabilitation Committee

MOC Marine Institute provides critical medical care and rehabilitates sick and injured sea turtles from all of the main Hawaiian Islands.

Sea Turtle Rehabilitation Committee

Name	Affiliation	Name	Affiliation
Dr. Paul McCurdy	MOC Marine Institute	Dr. Michelle Barbieri	NOAA Fisheries
Dustin Paradis	MOC Marine Institute	Dr. Gregg Levine	NOAA Fisheries
Chanel Browne	MOC Marine Institute	Dr. Summer Martin	NOAA Fisheries

Figure 19. Entangled turtle on south shore reef, Maui, 2023.

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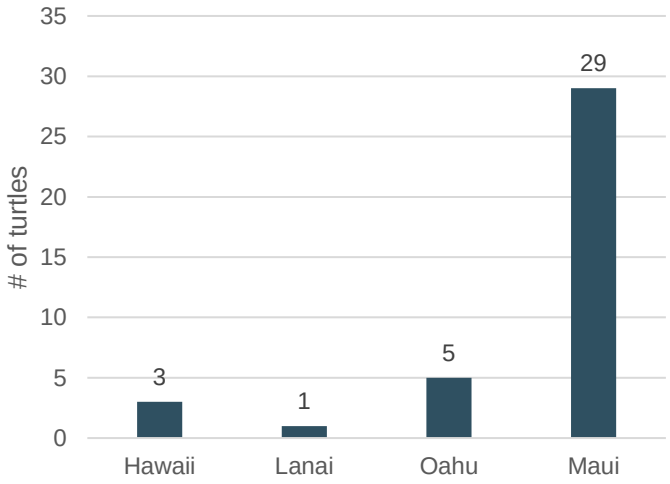
SEA TURTLE REHABILITATION 2023 SUMMARY

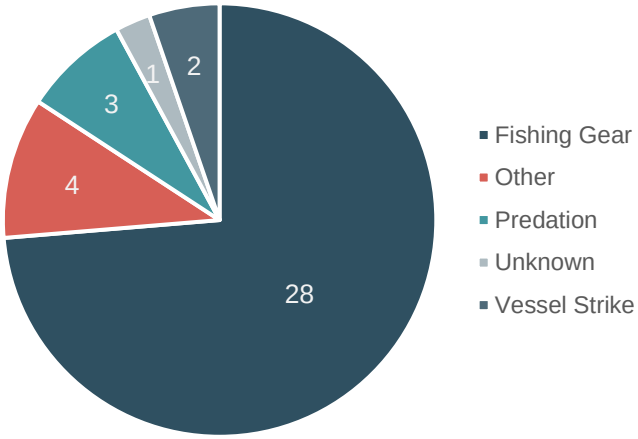
38 Long-Term Rehabilitation Cases in 2023

For the purposes of this report, long-term rehabilitation is defined as any sea turtle that received medical care at MOC Marine Institute's sea turtle hospital for more than 48 hours.

Stranding Location of Rehabilitation Patients



Stranding Cause



Average Number of Days of Rehabilitation

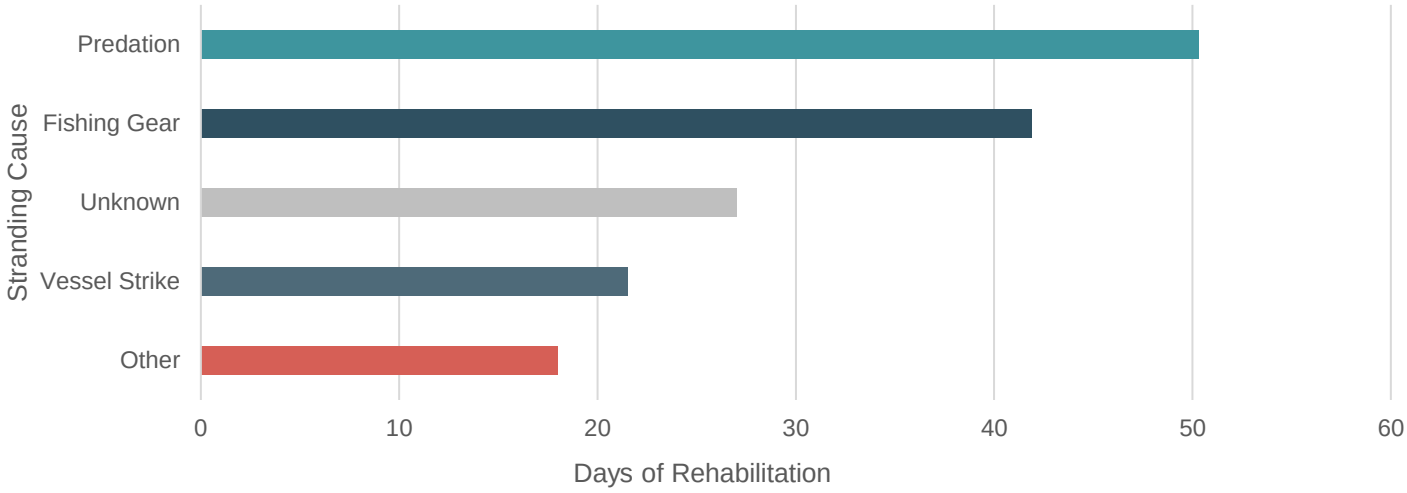


Figure 1. Average number of days of rehabilitation by primary stranding cause, 2023.

REHAB APPROACH

Integrated Multimodal Therapeutic Approach

Fishing line entanglement causes deep lacerations and strangulation of the affected flipper, leading to distal swelling, necrosis, bone fracture, and self-amputation. To avoid surgical amputation and preserve functionality, MOC Marine Institute and NOAA Fisheries developed an alternative therapeutic approach to treat flipper entanglement injuries. The approach includes the integration of:

1. Topical Wound Therapy
2. Laser Therapy
3. Massage Therapy

MONITORING & COMMUNITY ENGAGEMENT

MOC Marine Institute staff biologists insert PIT tags into sea turtle patient's hind flippers and etch an alphanumeric mototool tag onto the patient's carapace before release.

PIT Tags

Passive Integrative Transporter (PIT) tags, similar to the microchips used in dogs or cats, are inserted under the skin of the turtle's hind flippers. PIT tags are about the size of a grain of rice and can be detected by a scanner. The main benefit of PIT tags is that they are nearly permanent; however, one must have the appropriate scanner to read them.

Alphanumeric Tags

A Dremel is used to safely etch the shell with the initials of the island and the number of the stranding case (for example, MA for Maui and 05 for the fifth turtle stranding case). The groove is then filled with white paint that is harmless to the turtle but makes it easier for future observers to
view the turtle's number without disturbing it. These numbers will typically last up to a year, depending on the turtle's growth rate.

Reporting

Community members and visitors assist with data collection of sea turtle patients by reporting sightings of tagged turtles on Maui. Their sightings help us to see how the patient is doing post-release and gain an understanding of green turtle foraging habitats, migration, and distribution.

Figure 24. Sea turtle with line ingestion, Maui, 2023.

2023 Overview

97 stranded turtles tagged with PIT tags

133 mototool marks applied to stranded sea turtles

34 recaptured (stranded) turtles with mototool marks

1,336 marked turtles reported, 2019 - 2023

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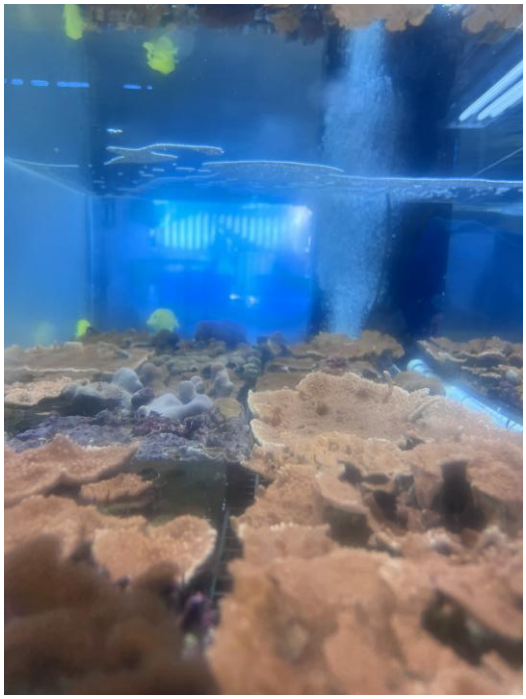
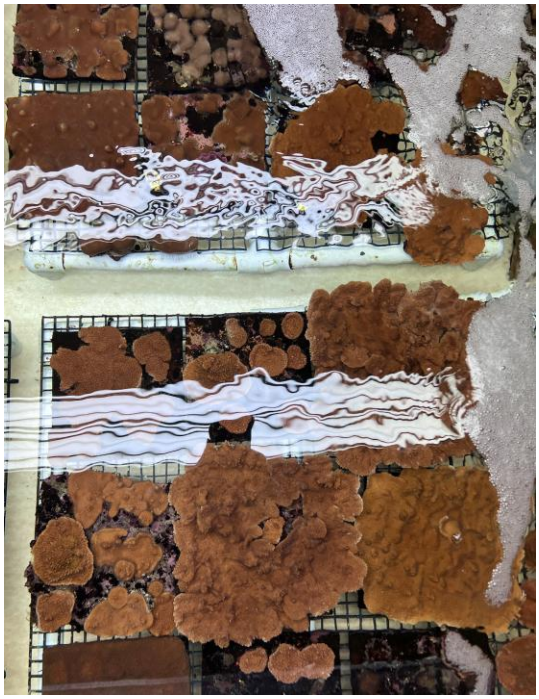
CORAL PROGRAM OVERVIEW

MOCMI operates the only land based nursery dedicated to coral restoration in Maui Nui. It is here where we are working to streamline and scale our efforts in alignment with the most up to date scientific practices found by our regional and national colleagues. We use a holistic approach by utilizing aqua-cultured native Hawaii collector urchins and yellow tangs to aid in algae mitigation, inclusive community engagement through volunteer-ship to further aid in colony care, and meaningful partnership with research institutions to further refine our techniques.

We work in close collaboration with the State of Hawaii Department of Land and Natural Resources (DLNR) Division of Aquatic Resources (DAR) and have served as an organization DLNR DAR can turn to in times of need with coral mitigation projects.

Our primary non-governmental partners, Maui Ocean Center & The Coral Resilience Lab, have greatly aided in the development of our infrastructure by providing expert guidance in coral husbandry and advanced techniques identifying thermally tolerant corals.





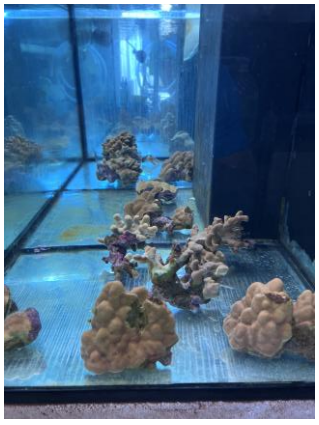
Nakoa Yatch Grounding at Honolua Bay

In early 2023, the Nakoa, a 97ft luxury yacht, grounded in Honolua Bay, just outside the Honolua-Mokuleʻia Marine Life Conservation District causing significant damage to the benthic reef habitat. MOCMI collected the corals of opportunity left behind after the vessel was salvaged, brining them to our land-based nursery for care and propagation. This effort resulted in 280 coral fragments of four different species being produced for outplanting at the original site of damage



Restore with Resilience

MOCMI is partnered on the Statewide project Restore with Resilience, led by the Coral Resilience Lab. MOCMI is the place based partner for Maui and has served as the central hub for all activities on Maui. This project seeks to engage the community of Maui in coral restoration while selectively propagating corals that are identified as thermally tolerant. This project will continue into 2024 where the corals will be outplanted and in 2025 where we will duplicate the efforts.



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EDUCATIONAL PROGRAMS OVERVIEW

MOCMI provides education to the community through various avenues including community based volunteers, high school and university level internships, attending educational outreach events, and hosting educational programming at our facility.

Through these avenues, we educate individuals on the life history of sea turtles, global and local threats to both turtles and coral reefs, connect the dots between land-based stressors and marine consequences, ways to reduce your impact on the natural environment, our approach to reducing threats, and how to get involved with marine conservation and protected species management as a career path.

Participants are taught information in short lectures and then apply what they learned through hands-on activities both in the field and at our facility.

THREAT REDUCTION

MOCMI works with partners and community members on Maui to mitigate threats to Hawai‘i’s marine life.

Fishing Net Collection Program
MOC Marine Institute (MOCMI) is dedicated to reducing entanglement threats to all marine animals.
MOCMI also runs an island-wide hotline (1-800-4-Da-Nets) where visitors and residents can report derelict fishing nets for retrieval.

MOCMI’s Honu Hero program aims to remove pollutants from both the land and ocean by organizing individual, group, and community cleanup efforts.
10,840 items collected in 2023

MOCMI’s Fishing Line Recycling Program (FLRP) allows beachgoers to recycle used and derelict fishing gear.
43 recycling bins located on Maui

PARTNERS

MOCMI Sea Turtle Stranding Response Hotline (Maui)
808-286-2549

NOAA Statewide Response Hotline (all marine animals)
1-888-256-9840

Photo: Don McLeish