



**MARINE INSTITUTE**  
MAUI OCEAN CENTER

# SEA TURTLE PROGRAM

## 2022 IMPACT REPORT



**MOC Marine Institute**  
192 Mā'alaea Road  
Wailuku, Hawai'i 96793  
[www.mocmarineinstitute.org](http://www.mocmarineinstitute.org)





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**For citation purposes, please use:**

Cutt, T. J., Browne, C. Y. K., Mungai, M.E., & Gardner, M.E. (2023). MOC Marine Institute *Sea Turtle Program, 2022 Impact Report*. Wailuku, HI: Marine Institute at Maui Ocean Center.



Photo: Don McLeish

**Figure 1.** MOCMI rehabilitation patient, MA170, swimming above a nearshore reef in Lāhainā on the west side of Maui.

# Our Mission

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



## Sea Turtle Conservation Team

### MOC Marine Institute Staff (as of December 31, 2022)



**Thomas Cutt**  
*Executive Director*



**Chanel Browne**  
*Conservation Programs Mngr.*



**Paul McCurdy**  
*Veterinarian*



**McKenzie Mungai**  
*Sea Turtle Technician*



**Morgan Gardner**  
*Sea Turtle Technician*

### Seasonal Technicians and Interns

Taylen Bartholomew, *Avon HS*  
 Samantha Bluhm, *Northeastern University*  
 Savannah Browne, *Kamehameha HS*  
 Zachary Bulcao-Moore, *King Kekaulike HS*  
 Avery Dagupion, *Lahainaluna HS*  
 Mackenzie Debets, *Van Hall Larenstein*  
 Annalise Eller, *Kihei Charter School*  
 Lucia McKinnon, *Seabury HS*  
 Hunter Morgan, *Texas A&M University*  
 Gisele Reed, *University of Hawai'i Mānoa*  
 Melody Rock, *Massey University*  
 Jessica Rosado, *Kihei Charter School*  
 Kade Shimada, *Kalama Intermediate*  
 Domenick Symanski, *Kaiser HS*  
 Alexis Vilorio, *Stanford University*

### Volunteer Lead Responders

Alan Espiritu  
 Don McLeish  
 Bruce Weyermann

### Volunteers

Meryl Cohen, Derek DeCrausauz, Kristen DeCrausauz, Mikaela Dibble-Kahn, Adrian Dougherty, Gabriela Echeverry, Greg Helton, Peyton Hoge, Ryan Murdock, Kayla Nieves, Maria Norman, Darby Ryan, Anita Wintner



MOC Marine Institute team members (left to right), Executive Director, Tommy Cutt, Sea Turtle Technician, Morgan Gardner, Sea Turtle Program Coordinator, Chanel Browne, Sea Turtle Technician, McKenzie Mungai, and Intern, Mackenzie Debets.

## 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, 2022. Some of the data presented throughout this report is preliminary and based on field assessment, not necropsy.

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

Scientific Name	Abbreviation	Common Name
<i>Chelonia mydas</i>	Cm	Green sea turtle
<i>Eretmochelys imbricata</i>	Ei	Hawksbill sea turtle



**Figure 2.** Adult green sea turtle resting on the beach on the north shore of Maui, Hawai'i.



### 2022 Overview



**154**

documented stranded sea turtles



**81%**

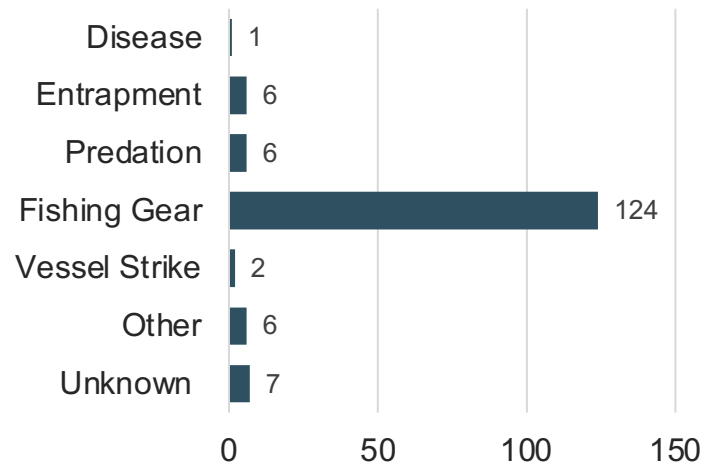
interactions with fishing gear



**49**

long-term rehabilitation cases

### 2022 Cause of Stranding



**153**

green sea turtles

**1**

hawksbill sea turtle

**500+**

students educated in 2022

**21,903**

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

**5**

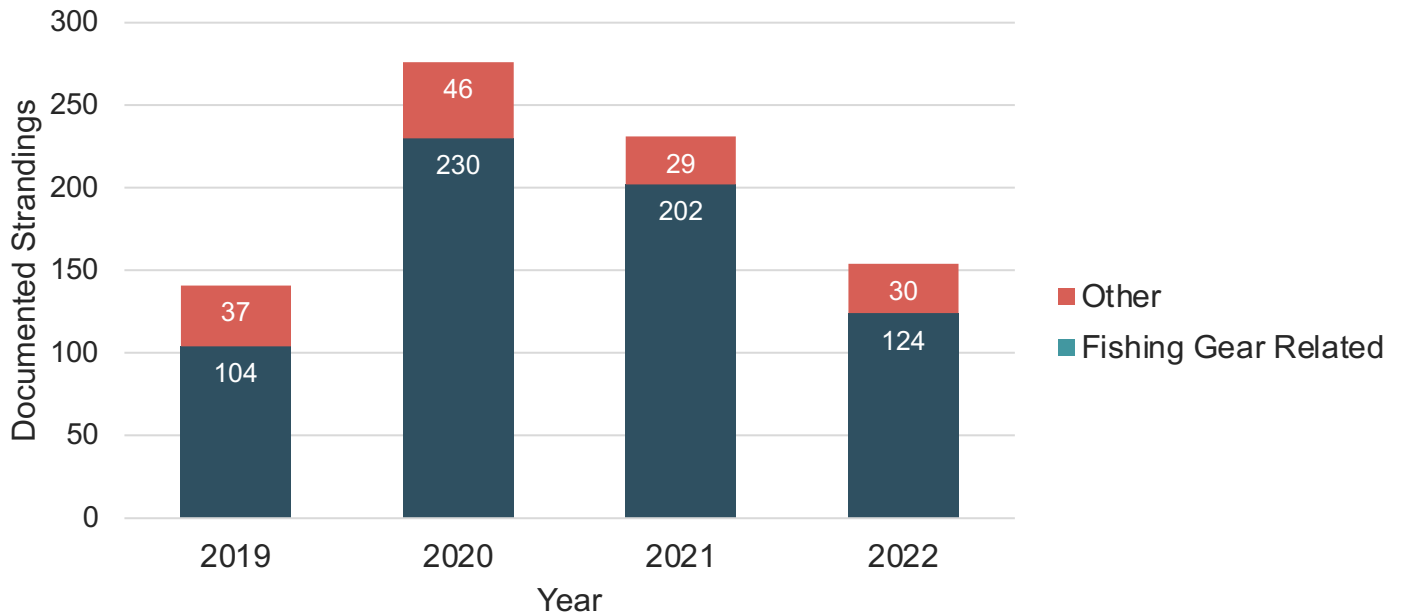
staff members

**31**

interns & volunteers



**Sea Turtle Strandings on Maui, 2019 - 2022**



**Figure 3.** Sea turtle strandings documented by MOC Marine Institute on the island of Maui, Hawai'i, 2019 - 2022.



**Figure 4.** Juvenile green turtle swimming in the nearshore environment off Maui's west side.

## 154 Documented Strandings in 2022

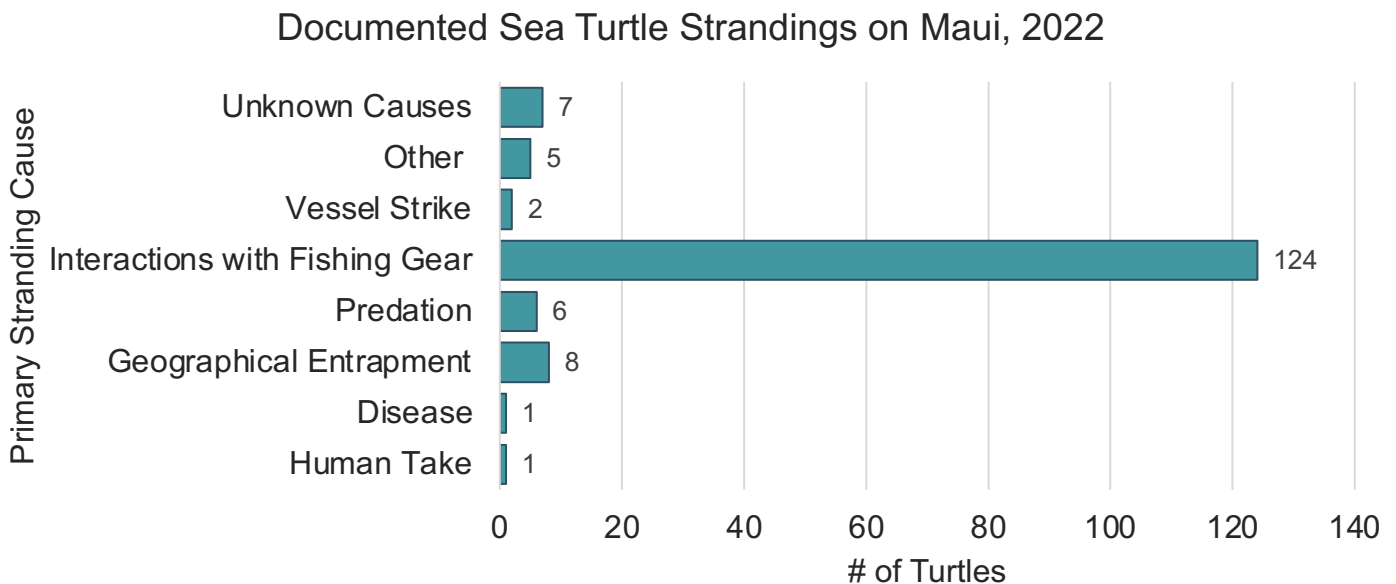
For the purposes of this report, we define a stranding as any marine turtle found on land or in the water that is deceased, injured, or exhibits any indication of ill health or abnormal behavior.

### 2022 Overview

One-hundred fifty-four (154) sea turtles were documented stranded on the island of Maui by MOC Marine Institute from 1 January – 31 December 2022. One-hundred forty of the 154 were located alive. One-hundred thirty-six were released back into the ocean, three were humanely euthanized, and one expired within 24 hours of receiving treatment.

One-hundred fifty-three of the documented strandings in 2022 were green sea turtles (*Chelonia mydas*), and one was a hawksbill sea turtle (*Eretmochelys imbricata*).

Stranding causes included disease (n=1), interactions with fishing gear (n=124), human take (n=1), geographical entrapment (n=8), predation (n=6), vessel strike (n=2), other (n=5), and unknown causes (n=7).



**Figure 5.** Sea turtle strandings by primary stranding cause in Maui, Hawai'i, 2022.

## 64% of sea turtle responses occurred in the water

99 of the 154 documented strandings in 2022 occurred in the water



**154** documented stranded sea turtles  
**140** located alive



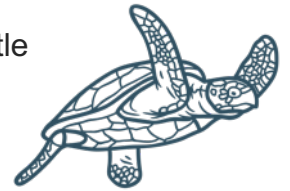
**110** transported to MOCMI for assessment



**136** released back into the ocean  
**97** released within 24 hours

## Species

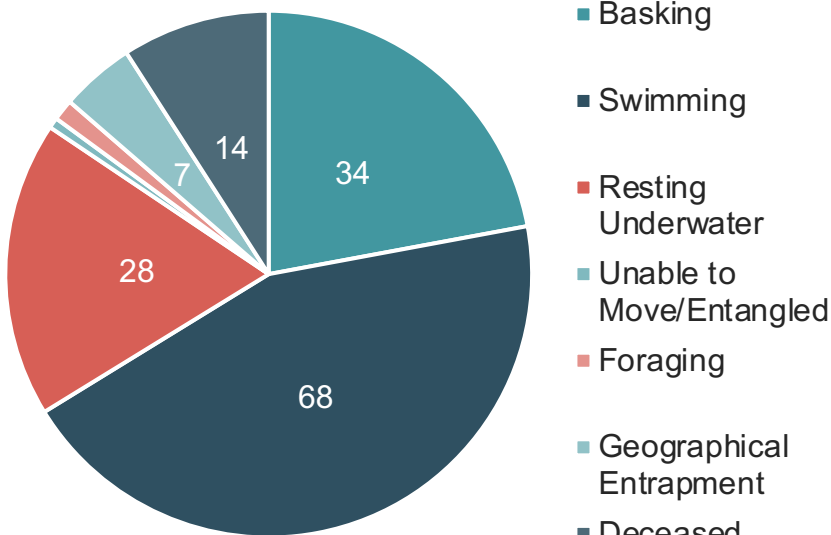
**1** hawksbill sea turtle



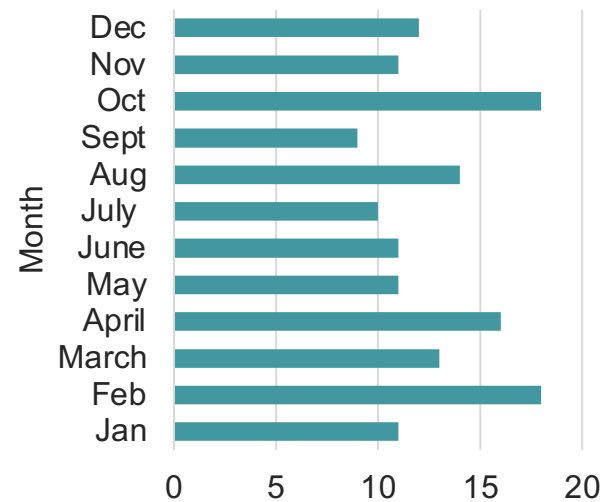
**153** green sea turtles



## Behavior at Time of Capture



## Strandings by Month



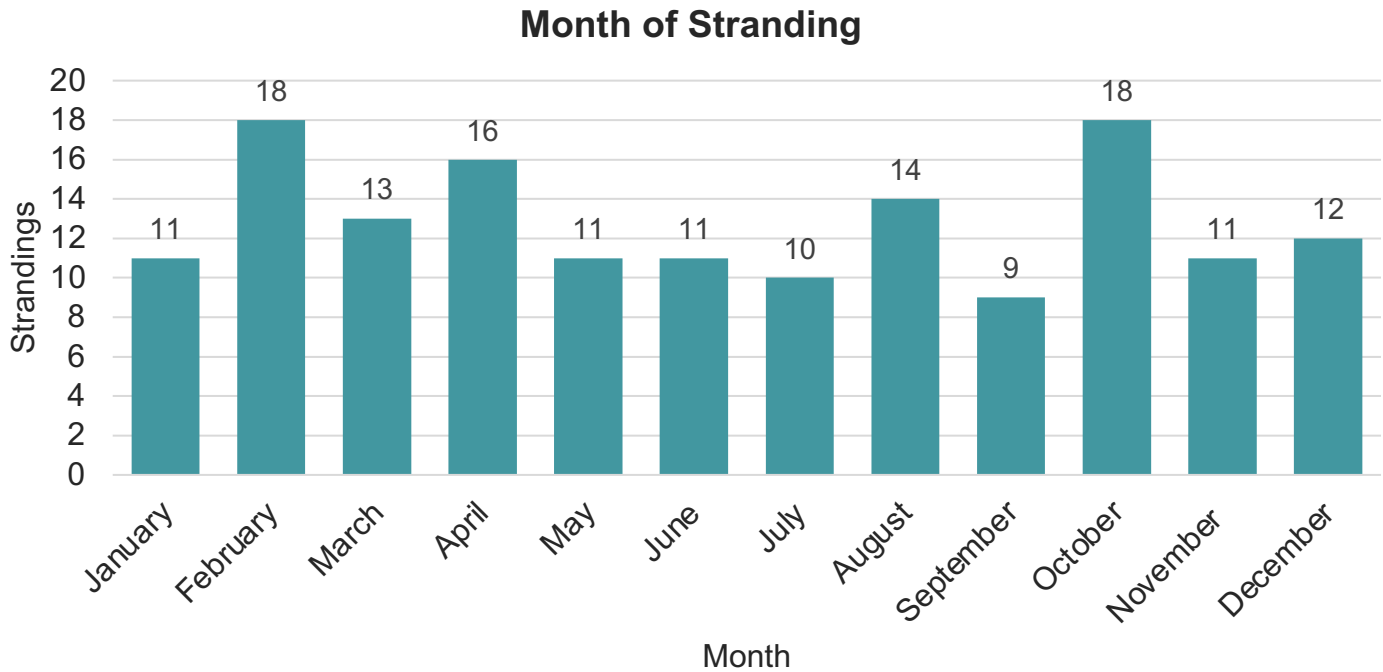
## Sea Turtle Assessment & Intake Procedure

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.** MOCMI team members, Chanel Browne and Alan Espiritu, complete intake procedures on a stranded green sea turtle.



**Figure 7.** Documented sea turtle strandings by month, 2022, Maui, Hawai'i.



**Figure 8.** Mature green sea turtle swimming in the nearshore waters of Maui, Hawai'i.

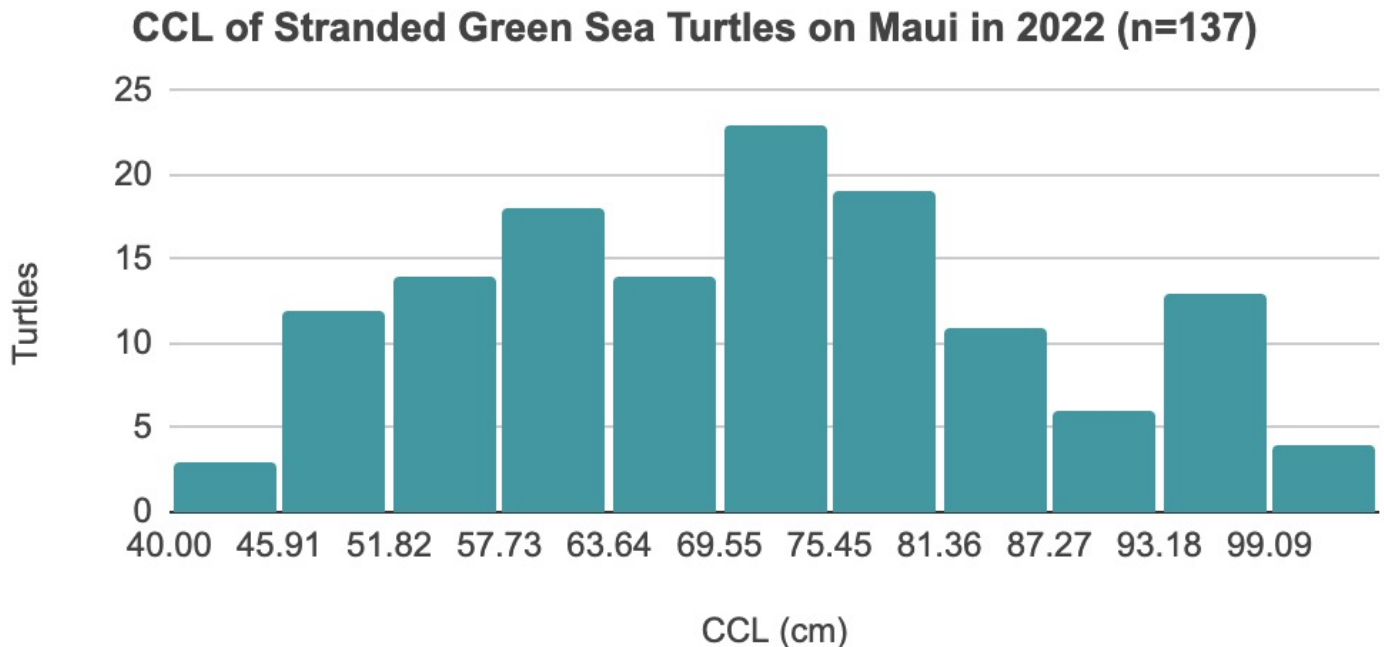
### Curved Carapace Length (CCL)

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).

MOCMI collected CCL measurements from 137 stranded green sea turtles in 2022. The mean CCL was 71.6 cm (range 42.3 to 100.8 cm).



**Figure 9.** MOCMI staff member, Tommy Cutt, measures the CCL of a green sea turtle patient.



**Figure 10.** MOCMI collected Curved Carapace Length (CCL) measurements from 137 stranded green sea turtles in 2022. The mean CCL was 71.6 cm (range 42.3 to 100.8 cm).

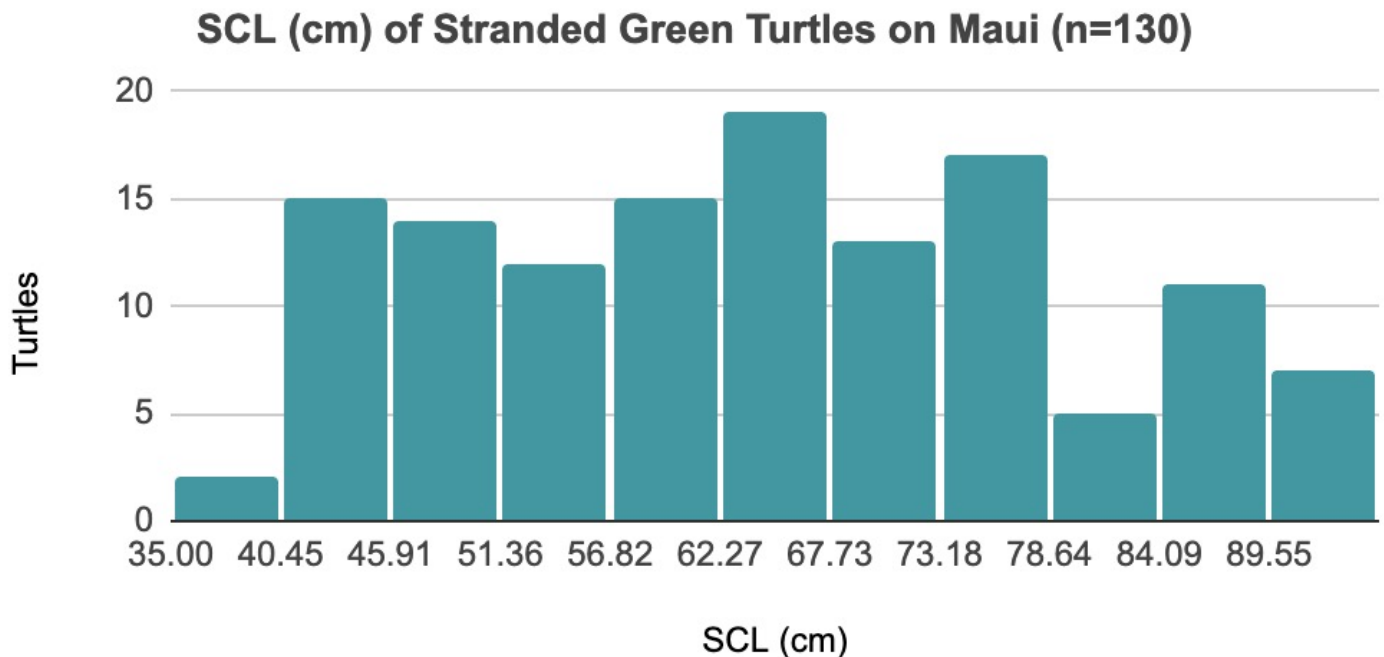
### Straight Carapace Length

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 130 stranded green sea turtles in 2022. The mean SCL was 64.49 cm (range 37.8 to 94.5 cm).

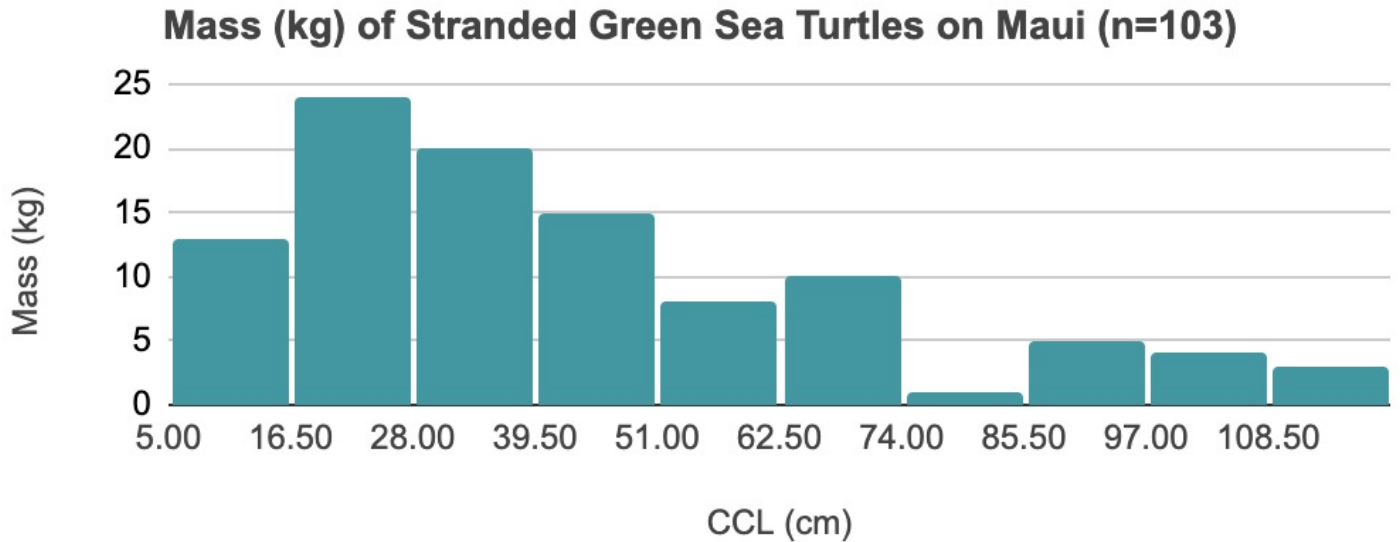


**Figure 9.** MOCMI team members, Chanel Browne and Nanea Youn, measure the SCL of a green sea turtle patient.

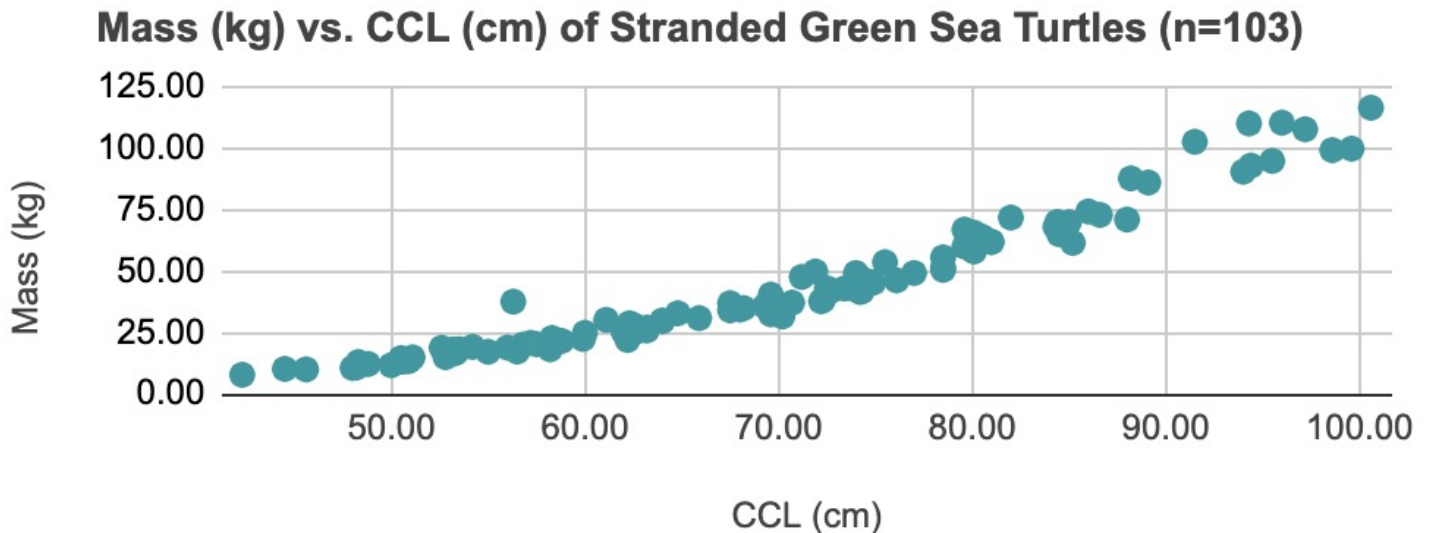


**Figure 10.** MOCMI collected Straight Carapace Length (SCL) measurements from 130 stranded green sea turtles in 2022. The mean CCL was 64.49 cm (range 37.8 to 94.5 cm).





**Figure 11.** MOCMI staff collected weights on 103 stranded green sea turtles in 2022. The mean weight was 56.4 kg (range 7.8 to 116.7 kg).



**Figure 12.** Of the 103 green turtles weighed in 2022, for every increase in 10 cm in CCL, the turtle's weight increased by 18.3 kg.

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

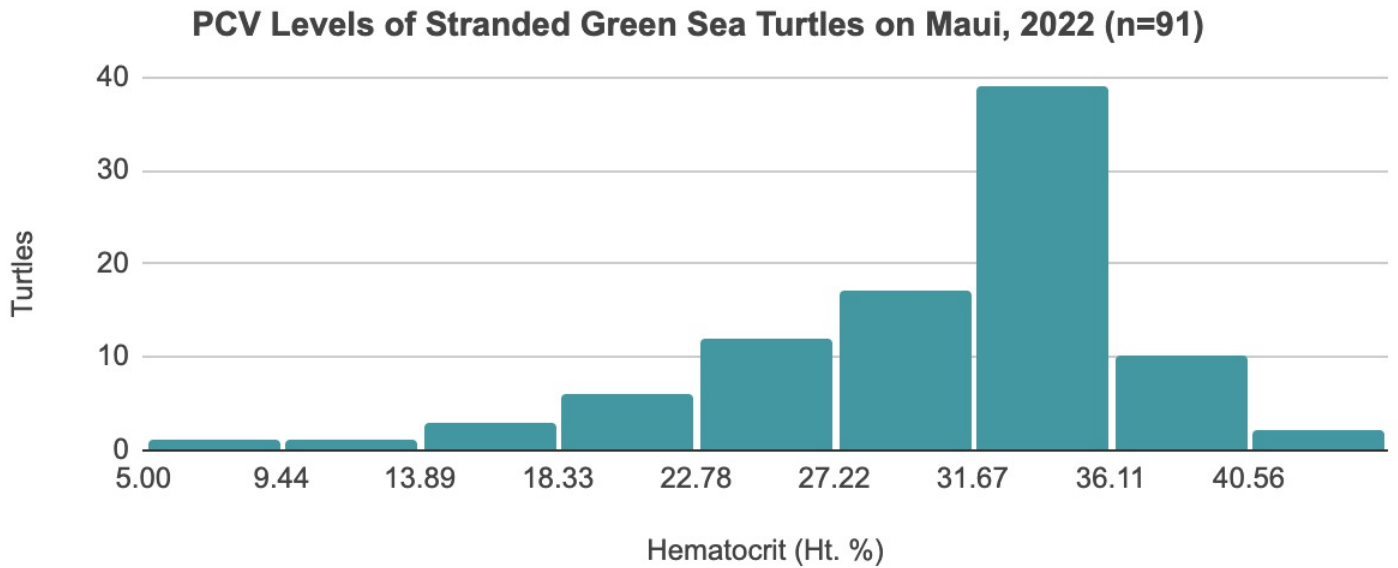
A hematocrit test measures the proportion of red blood cells in your blood. The hematocrit test is also known as a packed-cell volume (PCV) test. In 2022, MOCMI collected a blood sample and ran a PCV test on 91 sea turtle patients upon intake.

### Total Protein (TP)

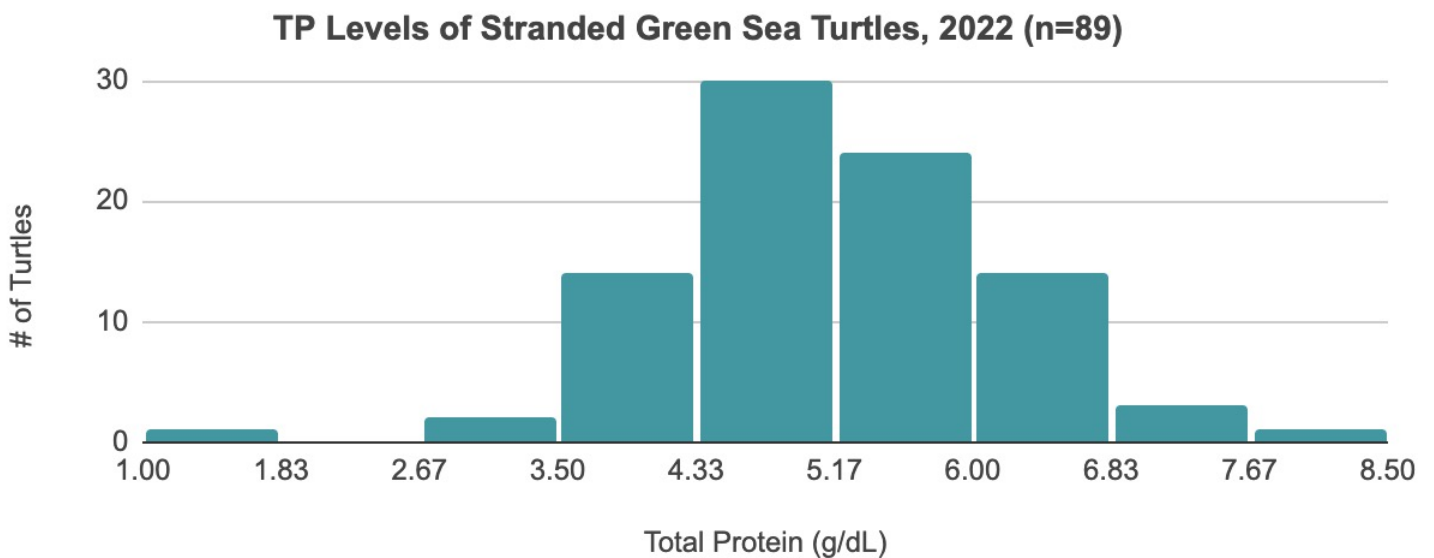
A total protein test measures the sum of all types of proteins (albumin and globulin) in the blood. In 2022, MOCMI collect a blood sample and ran a total protein test on 89 sea turtle patients upon intake.



**Figure 13.** (left) MOCMI staff member, Tommy Cutt, collects a blood sample from an immature green sea turtle patient; (right) MOCMI Seasonal Technician, Savannah Browne, prepares a blood sample for testing.



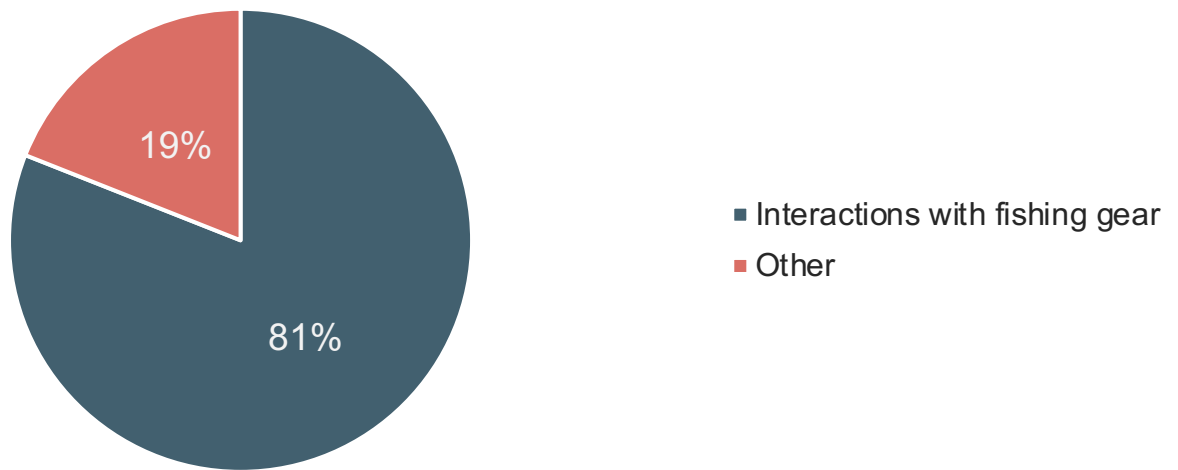
**Figure 14.** MOCMI staff tested 91 blood samples from green sea turtle patients for hematocrit (PCV) in 2022. The mean PCV is 30.3% (range 6 to 44%).



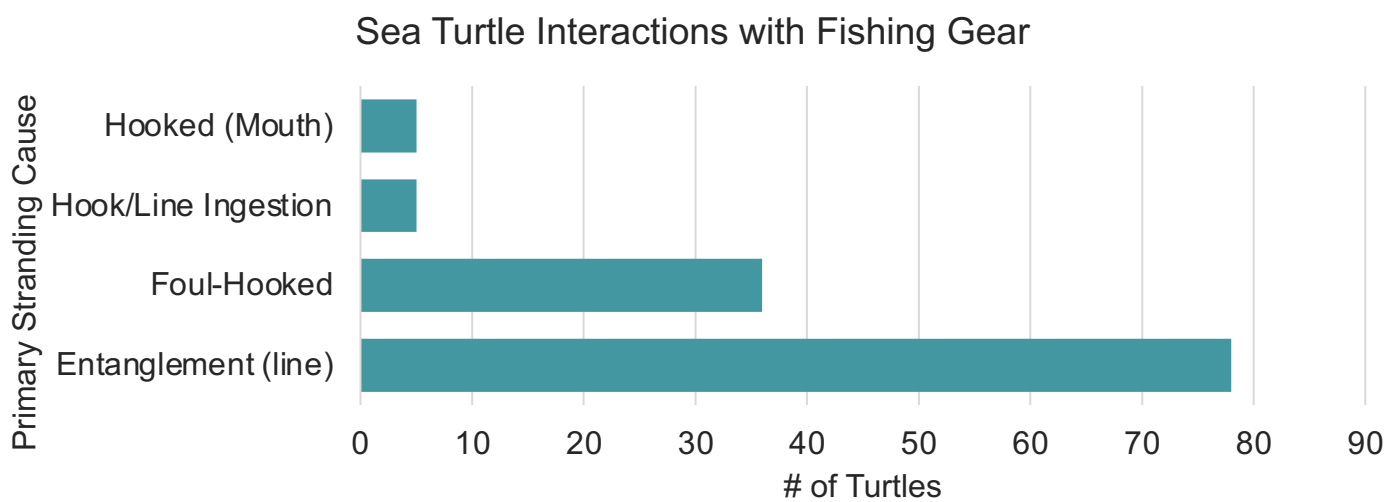
**Figure 15.** MOCMI staff tested 89 blood samples from green sea turtle patients for total protein in 2022. The mean total protein is 5.2 (range 1.2 to 8 g/dL).

## 81% 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*).



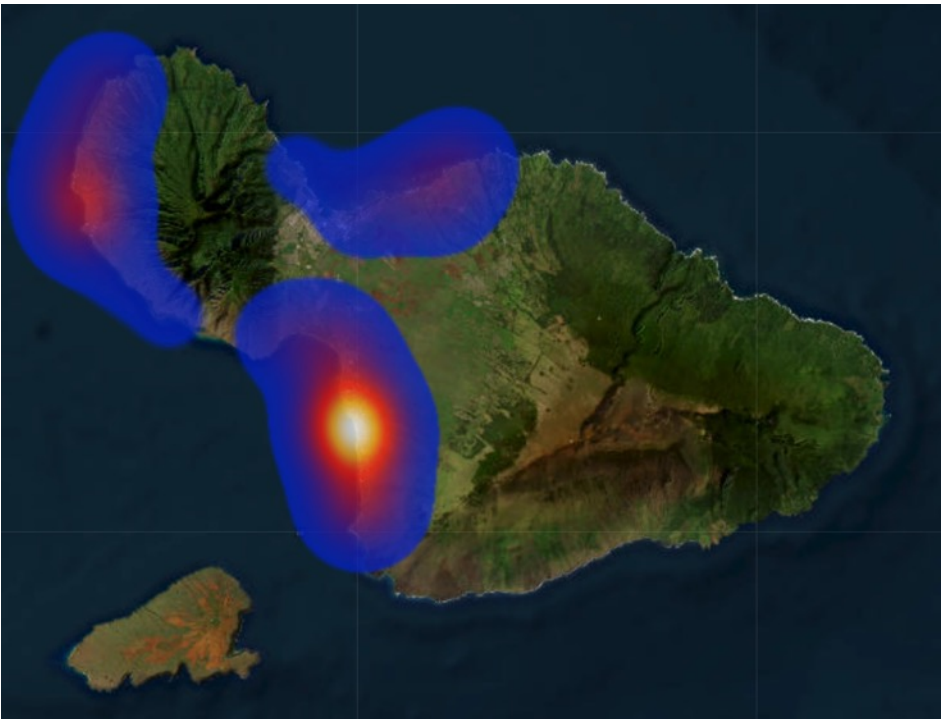
**Figure 16.** 81% of documented sea turtle strandings in 2022 on Maui were due to interactions with fishing gear (nearshore hook and line fisheries).



**Figure 17.** Sea turtle interactions with fishing gear by type of interaction, Maui, Hawai'i, 2022.



**Figure 18.** Documented strandings due to interactions with fishing gear (nearshore coastal fisheries) on the island of Maui, 2022.



**Figure 19.** Hot spot analysis of sea turtle and fishing gear interactions on the island of Maui, 2022.

## 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

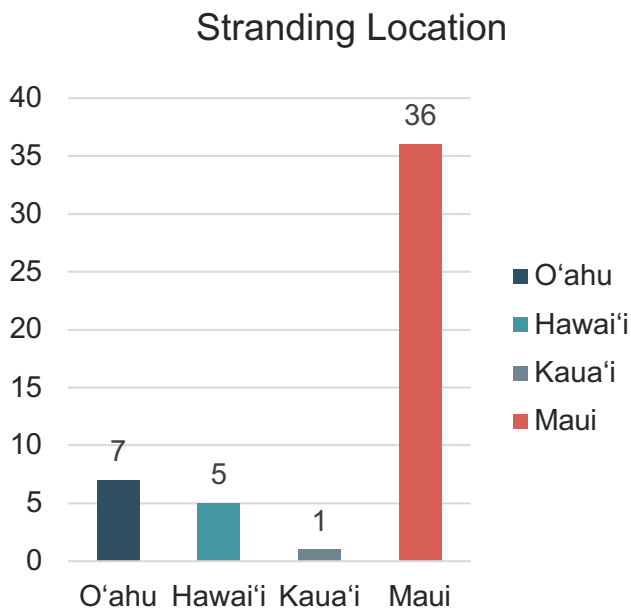
Name	Affiliation	Name	Affiliation
Dr. Paul McCurdy	MOC Marine Institute	Dr. Michelle Barbieri	NOAA Fisheries
Thomas Cutt	MOC Marine Institute	Dr. Gregg Levine	NOAA Fisheries
Chanel Browne	MOC Marine Institute	Dr. Summer Martin	NOAA Fisheries



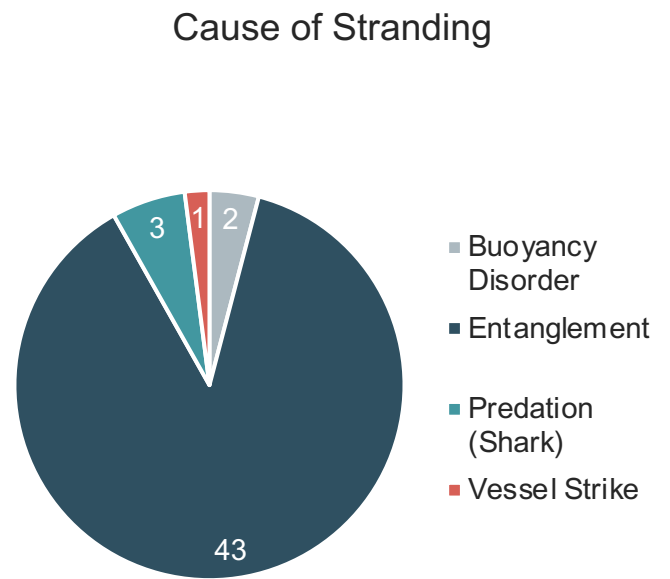
**Figure 20.** (left) MOCMI staff member, Chanel Browne, applies a wound VAC bandage to an adult green sea turtle; (right) MOCMI team members discuss current sea turtle patients.

## 49 Long-Term Rehabilitation Cases in 2022

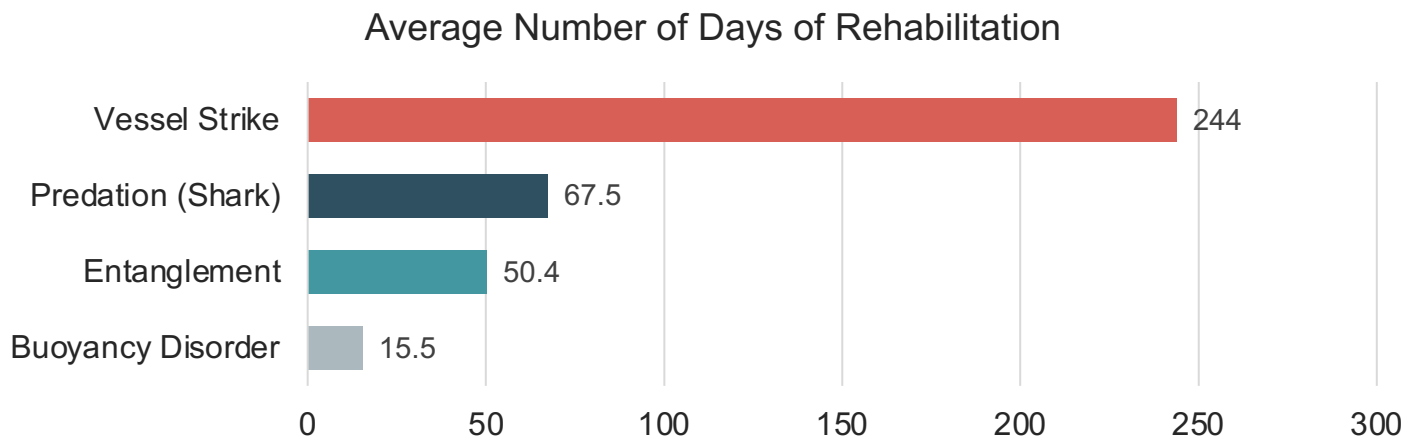
For the purposes of this report, long-term rehabilitation is defined as any sea turtle that received medical care at MOC Marine Institute’s sea turtle hospital for more than 48 hours.



**Figure 21.** Stranding location for long-term rehab cases, 2022.



**Figure 22.** Cause of stranding for long-term rehab cases, 2022.



**Figure 23.** Average number of days of rehab by primary stranding cause, 2022.



MOC Marine Institute Seasonal Technician, Alexis Vilorio helps remove fishing line from an entangled green sea turtle patient.



## Determining Severity of Entanglement Injuries

In collaboration with NOAA Fisheries, MOCMI developed a six-part severity classification system for entanglement injuries. These classifications assist with patient assessment, veterinary communications, and determine the course of therapy. This system can also aid in the determination of the type of gear posing the most significant threat to the nearshore sea turtle populations.

**Table 2.** Six-Part Severity Classification System

Ranking	Criteria
One	Superficial strangulation injury, does not break the skin
Two	Strangulation wound with open shallow laceration, but not completely encircling, no distal swelling
Three	Deep laceration, no bone exposure, or shallow laceration, completely encircling, mild distal limb swelling, mild distal tip necrosis
Four	Deep laceration with bone exposure, and moderate to severe distal limb swelling, moderate to severe distal tip necrosis
Five	Broken bone
Six	Self-amputation

**Table 3.** Sea turtle rehab cases by severity ranking and days in rehabilitation

Ranking	Number of Cases	Days in Rehab (mean)	Notes
Two	6	18	
Three	20	49	
Four	6	72	Two cases resulted in amputation surgery
Five	8	53	Six cases resulted in amputation surgery
Six	3	60	



**Figure 1.** 87.8% of long-term rehabilitation cases treated at MOC Marine Institute in 2022 were due to fishing line entanglement injuries.

## 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
4. Targeted Pulse Electromagnetic Field Therapy



FREE Webinar

Laser Therapy to the  
Rescue for Hawaiian  
Green Sea Turtles





MOC Marine Institute Sea Turtle Technician, Morgan Gardner, treats a juvenile sea turtle rehab patient with laser therapy.

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 their 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.** MOCMI staff member applies a mototool mark to a green sea turtle patient.

## 2022 Overview

- 83** stranded turtles tagged with PIT tags
- 239** basking turtles tagged with PIT tags
- 96** mototool marks applied to stranded turtles
- 23** recaptured (stranded) turtles with mototool marks
- 1,229** marked turtles reported, 2019 - 2022

# Research Projects

## Understanding Sea Turtle Basking Behavior



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MOCMI conducts bi-weekly surveys at different locations throughout the island of Maui. Basking surveys provide our team with the opportunity to PIT tag new sea turtles in the field and collect data on previously tagged individuals. This information can aid in future population studies of green sea turtles in Hawai'i.

MOCMI worked in collaboration with partners at Florida Atlantic University (FAU) and NOAA Fisheries in 2022 on various research projects throughout the year. These collaborations allow us to gain a better understanding of green and hawksbill sea turtle populations in Hawai'i.



MOCMI's Sea Turtle Education Program encompasses various topics, including sea turtle biology, anatomy, species identification, life history, ecology, and threats in Hawai'i.

Students apply their knowledge of sea turtles through hands-on, interactive activities, including in-water sea turtle surveys, sea turtle husbandry, and patient care at our Honu Hospital.

By participating in beach cleanup efforts and actively working with MOCMI staff and interns on community-based threat reduction projects, students better understand how our actions affect marine life and what we can do to lessen our impact a society.

**500+** students educated in 2022





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 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.



## Honu Hero Beach Cleanup Program

MOCMI's Honu Hero program aims to remove pollutants from both the land and ocean by organizing individual, group, and community cleanup efforts.

**21,903** items collected in 2022



## Fishing Line Recycling Program

MOCMI's Fishing Line Recycling Program (FLRP) allows beachgoers to recycle used and derelict fishing gear.

**43** recycling bins located on Maui

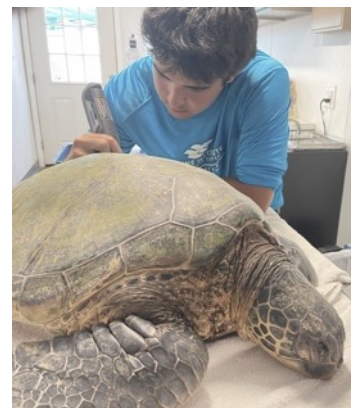
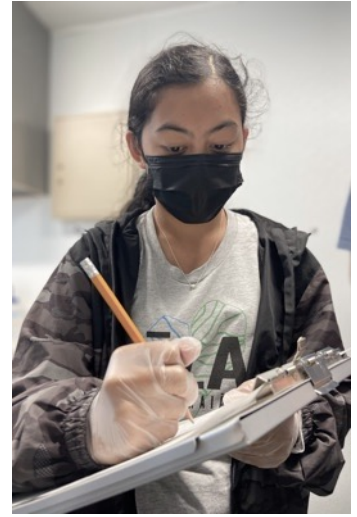
## 2022 Volunteer of the Year

### Alan Espiritu

Alan has dedicated his life to the well-being of animals, especially Hawai'i's sea turtles. Whether it be an in-water rescue or a day filled with treatments at our rehabilitation facility, Alan is a leader in all he does. Alan brings joy and laughter to all activities and has a personality that inspires those around him to work hard and pour their passion into all they do. He has been a lead volunteer with MOC Marine Institute for several years and continues to thrive in all aspects of the job, which includes sea turtle rescue and response, husbandry and medical care, and various threat mitigation projects.









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

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



**Figure 25.** Green sea turtle patient entangled in monofilament fishing line.