Hooked on Honu: Documenting the Harmful Effects of Nearshore Fishery Interactions with Hawaiian Sea Turtles Around the Island of Maui (2004-2016)

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Introduction

The Hawaiian archipelago, one of the most isolated island chains in the world, consists of eight populated "Main Hawaiian Islands" (MHIs) and the uninhabited Northwestern Hawaiian Islands (NWHIs). Critically endangered Hawaiian hawksbill turtles (*Eretmochelys imbricata*), or *honu'ea* in Hawaiian, inhabit nearshore habitats but are rarely seen compared to the threatened Hawaiian green sea turtle (*Chelonia mydas*), known as *honu*. The general term for sea turtles in Hawai'i is *honu*.

Approximately 96% of Hawaiian greens nest in the NWHIs and the remainder nest in the MHIs. Hawaiian hawksbills utilize the MHIs for both nesting and foraging. Hawksbills predominantly nest on Hawai'i Island, with considerably lower numbers that nest on the islands of Maui, Moloka'i, O'ahu, and Kaua'i. Hawai'i and Maui Islands are the only two that have long-term nest monitoring programs, but the best statewide estimate is at ~100 reproductive females with typically fewer than 20 nesting each season. These are extremely low numbers, making this one of the most critically endangered sea turtle populations in the world.

Since sea turtles only spend a small fraction of their lives nesting, their in-water life stages need to be monitored and threats assessed in order to understand the population and to make effective management decisions. Immediate threats include boat strikes, marine debris entanglement and ingestion, harassment from ocean goers, pollution, coral reef habitat decline from numerous factors, and interactions with fishing gear.

Information Sources of Entanglement and Hooking Events (n= 184):

- Network of Personal Contacts (n= 98)
- Authors' Field Observations (n= 65)
- Volunteering with the NOAA Sea Turtle Stranding Program (n= 16)
- Online (n= 5)

Data Collection

In-water observations are made of Hawaiian sea turtles that inhabit accessible, nearshore habitats since snorkeling and SCUBA diving are very popular activities. The increase of basking turtles allows for more observations of their health conditions and land-based disentanglement efforts. A total of 184 sea turtles directly affected by fishing gear were documented around the island of Maui from 2004-2016 through the authors' field observations (n=65), a network of personal contacts (n=98), volunteering with the National Oceanic and Atmospheric Administration (NOAA) Sea Turtle Stranding Program (n=16), and online (n=5). The map above shows the distribution of the sightings, which represent where snorkeling/diving most often occur (these activities aren't as frequently done around most of the north, south and east-facing shores). Fishing occurs around the rest of the island as well, so hookings/entanglements likely occur but go unreported without as many in-water assessments. The increase in cases is proportional to heightened monitoring efforts.

Results

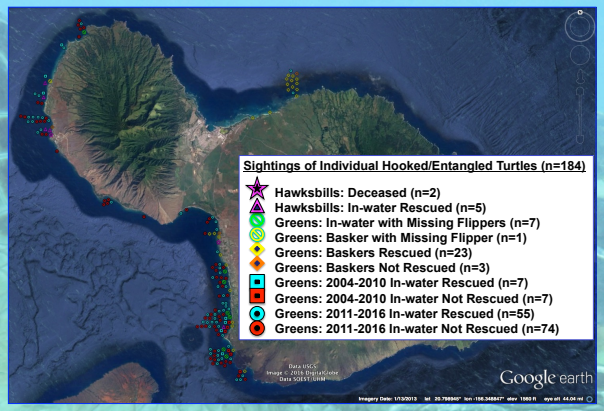
Seven cases, two of which were fatal (one pictured to the left), involved endangered hawksbills. The remaining 177 cases involved live, threatened green turtles. Like the one pictured to the right, 19 of the greens had fibropapillomatosis (a tumor-forming disease that was first documented on O'ahu in 1957).

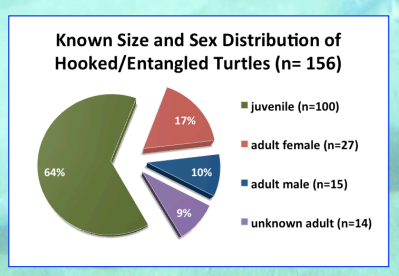
The majority of these 184 observations were of turtles in their marine environment (n=157), with an increasing number of basking greens (n=27).

When size classes could be determined (n=156), 64.1% of the cases involved juveniles and 35.9% were adults (64.3% were females and 35.7% were males).

Fishing line affected 151 of the 184 turtles, many of which had multiple entangled appendages. The total of 231 instances are classified on the line graph on the right side of this poster. The most common entanglement locations were the shoulders (50.2%), mouth (23.8%), neck (19.5%), front flippers (2.6%), rear flippers (2.2%), and then face (1.7%).

The severity of fishing line entanglements was recorded when possible: 66 cases had tight wraps and 22 of these exhibited swollen/necrotic tissue. Eight green turtles were missing front flippers due to the self-amputation effects from losing blood circulation from wrapped line. Line types included various colors (clear, green, red, and orange) of monofilament and strong braided nylon. Weights were recorded 6 times.



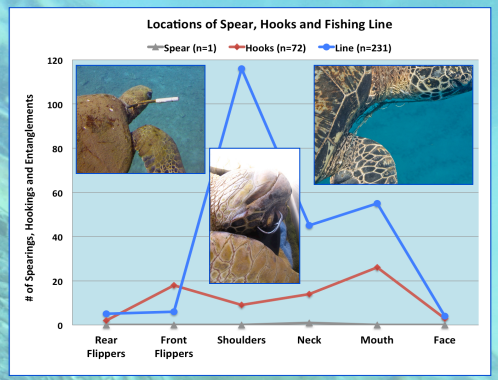


Evaluating the 72 cases involving visible hooks, 25.0% of the turtles were hooked in the front flippers and 2.8% were hooked in the rear flippers, indicating these were the most purely accidental interactions. The turtles' shoulders were hooked in 12.5% of the cases, and 19.4% were hooked in the neck, also indicating that these may have been accidental snags. The majority (36.1%) was hooked in the mouth and 4.2% was hooked in the face region, demonstrating that these turtles were likely intentionally foraging on the baited hooks.

Taking these 29 turtles that were hooked in the mouth and face region and adding an additional 38 cases in which turtles were observed having line going into their mouths, but no hook was visible, leads to the presumption that, at a minimum, 67 (36.4%) out of the total 184 hooked/entangled cases were likely bait-driven and not accidental.

Thirty-seven of these hooks were identified as being used when pole fishing for large jacks, or "ulua".

These steel hooks are extremely difficult to remove or cut and they likely won't rust very fast.



Rescues

A total of 89 "Good Samaritan" rescues were made: 49.4% were completely successful (no gear remained on the turtle). The remaining 50.6% were not as successful for numerous reasons. Hooks were typically the gear that remained on the turtle. We use photo-ID to track the turtles, but more research needs to be done to monitor their short and long-term survival with these hooks and injuries from necrotic tissue loss (pictured to the right).

Discussion

It is known that these interactions represent a significant threat to sea turtle survival, and these observations are merely a fraction of the total cases that actually occur. Due to the physical resilience of sea turtles, no further medical attention was necessary for most of the turtles, but many conditions would've likely worsened if not helped. At least 75 (40.8%) of the cases would have benefited from further medical treatment: 38 with ingested line/hooks, 22 with necrotic appendages and 15 with embedded gear directly affecting their survival. These numbers do not include the eight greens whose flippers had already self-amputated, which emphasizes the need for an official specialized in-water response team (similar to other protected species teams in Hawai'i) that is permitted to make these rescues. A sea turtle rehabilitation facility is necessary to treat these turtles in need of further care. More more community awareness is always needed as well.

Mahalo nui loa to all of the photographers, snorkelers and divers who have contributed to this project to save sea turtles!