VOLUME 01 | ISSUE 01

Photo: Deron Verbeck @iamaquatic

# Hawai'i Community Shark Tagging Program

SEMI-ANNUAL NEWSLETTER

## This Issue



# Introduction

BY DR. MELANIE HUTCHINSON

The Hawai'i Community Tagging Program was born in 2015 when Dr. Melanie Hutchinson and students from the Hawai'i Institute of Marine Biology Shark Research Lab started ika-shibi fishing for bigeye thresher sharks with Geoff Walker and some of his friends during long, over-night trips off the West Hawai'i coast. There was a lot of 'down time' to talk-story, discuss the industry, fisher perspectives, attitudes towards sharks, handling practices, and to exchange knowledge about the biology of the species encountered. All the while only two bigeye threshers were tagged, but other pelagic sharks including oceanic whitetip, blue, mako, and silky sharks were frequently encountered. The exchange of information between the scientists and the fishers during these trips was transformational for both parties, changing the way that some fishers handled sharks as scientists garnered valuable local ecological knowledge, information about interaction rates, and a keen understanding of the need for a stronger relationship between the fishing community, scientists, and managers. Coincidentally, oceanic whitetip sharks were listed as threatened under the U.S. Endangered Species Act (ESA) because populations decreased to the point where they could not replenish themselves under current fishing mortality rates. The species was deemed to be overfished

throughout their range. This determination was made partly due to major gaps in basic biological and ecological information about the species, and almost nothing was known about the population found around Hawai‘i. Are they residents or merely passing through? Is this a mating area or possibly a nursery area? This presented an excellent opportunity for scientists to enlist the assistance of the fishing community that interacts with them regularly to help gather empirical data about interactions, put out electronic tags to gather details on habitat use, and start thinking about strategies to reduce depredation rates and mortality. With this collaborative effort, members of the fishing community have become citizen scientists working together to identify ways to reduce mortality to the population and to get in front of any potential management actions that may result from the listing of the species under the ESA.

Initially the tagging-trained fishers, or ‘Shark Taggers,’ were tagging only oceanic whitetips (and more recently silky sharks) with acoustic and satellite tags (see the Tools of the Trade section for details on tags used in this study). Since learning that shark presence and depredation has become a major issue for fishers with significant economic and ecological impacts, we have expanded the program scope to include a broad ‘interaction’ data gathering effort using identification tags. Any fishers interested in participating in the program can request a tagging packet by sending an email to pacificsharktagger@gmail.com with their contact details and mailing address. The packets include identification tags with postcards requesting details about the fishing interaction. The packets also include a newly developed shark identification guide which was tailored to help fishers targeting tuna and billfish around Hawai‘i to better identify the species that they most frequently encounter in open water. Fishers that successfully tag a shark during a fishing interaction, fill out the tag cards attached to each tag with the requested information, mail in the pre-paid post card, and submit a photo of their tagged animal are given a monetary reward for each shark tagged and released.

The Shark Tagger program was created to facilitate outreach and education to resource users and to bridge the gaps between scientists, fishers and managers. Together we can effectively conserve our marine resources.

# MEET THE TEAM


**Dr. Melanie Hutchinson**
**Fisheries Bycatch Researcher**
**Joint Institute for Marine & Atmospheric Research**
**University of Hawai'i at Mānoa**

Melanie is the principle investigator for the Hawai'i Community Tagging Program and the Shark Tagger organization. She began her career in fisheries as a NMFS observer in the Hawai'i longline fisheries. She now runs several tagging programs in commercial fisheries including the Hawai'i & American Samoa longline fisheries, the tropical tuna purse seine industry and more recently with local small scale fishers around Hawai'i. Most of her projects focus on reducing interaction rates with non-target species (e.g. sharks) and on improving post release survival rates of discarded shark bycatch. Melanie might be hard to reach sometimes because she spends a lot of time at sea on commercial vessels and when she is not out fishing she is hiking, surfing or at a yoga retreat.

**Mia Iwane**
**Graduate Assistant**
**Joint Institute for Marine & Atmospheric Research**
**University of Hawai'i at Mānoa**

Mia Iwane is a Master's student in the Natural Resources and Environmental Management program at UH Mānoa. For her thesis she has taken on some of the human dimensions of this work, interviewing fishers to learn about their experiences with one another, with sharks, and with fisheries managers and scientists. Through these interviews, she hopes to illuminate opportunities for fisher collaboration and understand how social and political relationships shape the way we know and manage local fisheries. Always humbled by her research participants' generosity, knowledge, and experiences, she hopes to continue working with fishing communities after she graduates this year.

**Mark Royer**
**Graduate Research Assistant**
**University of Hawai‘i Mānoa**
**Hawai‘i Institute of Marine Biology**

Mark Royer is a PhD Candidate at the University of Hawai‘i Mānoa. For his dissertation research at the Hawai‘i Institute of Marine Biology, Mark uses a variety of tagging technology and laboratory techniques to investigate the thermoregulation, body activity and behavior of sharks that migrate between drastically different thermal environments on a daily basis. Understanding how sharks respond physiologically and behaviorally to temperature change is important for predicting how they will be impacted in a changing ocean environment. As a research assistant for the Community Shark Tagging Program, Mark is involved in our field work and shark tagging training workshops. For his work and during his free time, Mark enjoys photographing marine life.

**Ali Bayless**
**Outreach & Education Coordinator**
**Joint Institute of Marine & Atmospheric Research**
**University of Hawai‘i**

Ali Bayless is a Cetacean Biologist and Outreach Coordinator for the Pacific Islands Fisheries Science Center. Her research has been focused on cetacean-fishery interactions in Hawai‘i. She now spends most of her time helping to communicate science to students, fishermen and the general public through education programs, writing, and photography/videography. She loves to spend her free time in the ocean, surfing, kiteboarding and diving.

**Danny Coffey**
**Ph.D. Candidate**
**Hawaii Institute of Marine Biology,**
**University of Hawaii at Manoa**

Danny is a Ph.D. candidate at the Hawaii Institute of Marine Biology Shark Research Group under the supervision of Dr. Kim Holland. His research uses novel tagging technologies to understand the movements of sharks through their three-dimensional environment and identify what drives their behavior. When Danny is not in the field or working on his dissertation, he enjoys hanging at the beach with his dog.

**Paige Wernli**
**Intern**
**Hawai'i Institute of Marine Biology**

Paige's capstone research project for her undergraduate degree focused on Oceanic Whitetip shark movements around Fish Aggregating Devices off the Kona coast of Hawai'i island. The project was completed thanks to Melanie and the fishermen of the Hawaii Community Shark Tagging Program, who provided her with acoustic data from the Kona FAD array. After graduating with honors in the fall, Paige plans to attend graduate school at the University of Hawai'i this year and continue aiding the efforts of the Tagging Program.

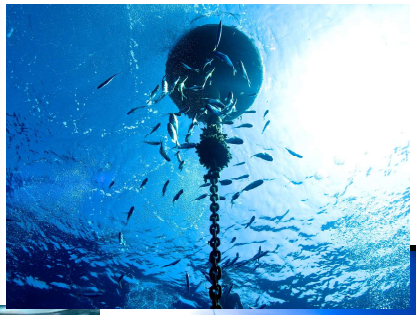
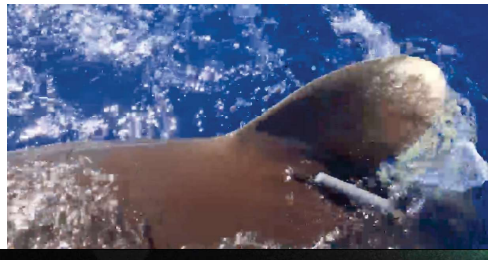
# Tools of the Trade

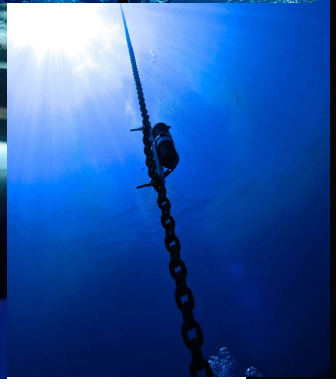
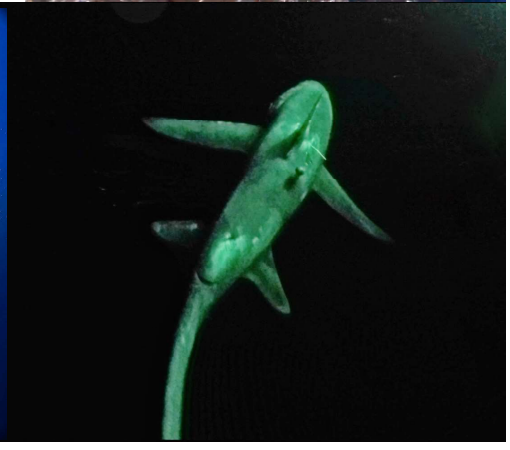
We use a combination of tag types to answer questions related to shark habitat use and movement behaviors that make them vulnerable to fishing. In this study we are placing **satellite linked pop-off archival tags (PAT)** on several key* shark species such as; blue, mako, thresher, silky, oceanic whitetip and hammerheads. The PATs log information such as depth, temperature, and light levels until the tag comes off the animal at a pre-programmed time or deployment period. The logged (archived) data is then transmitted to Argos receivers mounted on several satellites. These data are then transmitted to earth stations for decoding and the data is emailed to the tag owner. These tags give us fine scale information about shark movements through the water and range.

We also use **acoustic or 'pinger' tags** on oceanic whitetip and silky sharks. These tags emit a sonic ping at unique intervals. When the shark swims within the hearing range of an acoustic receiver mounted on a FAD (or the Liquid Robotics Wave Glider), a timestamp is logged for the individual animal at that location. With these tags we are trying to understand FAD associative behavior, residency and are looking for any patterns in arrival or departure times that may help inform fishers on ways to avoid interactions.

Recently, we've started an identification tagging program using **ID or spaghetti tags.** Anyone interested in participating in the Hawaii Community Tagging Program can request a tagging packet, which includes 10 Identification Tags (ID), a shark ID guide, and a stamped post card to fill out and return after each tag event. The data that we gather from these tags will tell us which species are interacting with which fisheries, estimate depredation rates and costs to fishers, and provide details on when sharks are present. It will also help us understand whether certain individuals are responsible for a large proportion of depredation events, or if the whole population has learned the behavior. Additionally, we can acquire valuable biological information from the recapture of tagged sharks such as, growth rates and residency. Contact us at **sharktagger.org** or email: **pacificsharktagger@gmail.com** for more information or to request a tagging packet.

*Key shark species are the species that all nations must report fishery interaction data to regional fishery management organizations.

# GEOFF WALKER

FEATURED FISHERMAN

**ARMED WITH A LIFETIME OF EXPERIENCE AND PASSION FOR UNDERSTANDING THE ANIMALS HE ENCOUNTERS, GEOFF WALKER HAS AIDED SCIENTIFIC EFFORTS FOR YEARS. HE IS OUR FIRST FEATURED FISHERMAN.**

For this issue's "Featured Fisherman," I got to sit down with commercial fisher and long-time Kona resident Geoff Walker. We talked about everything from local canned tuna and the fossil belt to shark encounters and frustration with fishery management. At 15 years old, Geoff read a book about the life of a salmon after it had been tagged. It followed the salmon's journey to the ocean, where it faced many trials and tribulations, and its eventual return to the river. This is where Geoff's tagging interest began. He and his friends started making notches between the fin rays of the bluegills they caught to see how many times they would catch the same fish. At present, Geoff has been a commercial fisherman for nearly 50 years. He has worked everywhere from San Francisco to Alaska to American Samoa, multiple sites in the South Pacific, and throughout the Hawaiian Islands. His fascination with fish movement and behavior has grown throughout his commercial fishing career.

# GEOFF WALKER

FEATURED FISHERMAN

After days, weeks, years of cumulative water time in Hawai'i, Geoff's knowledge and passion for research, and willingness to work with scientists, has made him an asset to several different research programs. In the early '80s he began working with David Itano and the Hawai'i Tuna Tagging Study. Since then he's gained tagging experience through bottomfish tagging studies, the Ulua tagging project, archival tagging of albacore for the Southwest Fishery Science Center, marlin tagging for the Billfish Tagging Program, and more recently our Community Shark Tagging Project. Geoff and I talked about the large gap in knowledge between local fishers and resource users with scientists and managers. One thing we both admire about this project is that it is a collaborative effort to bridge the gap in knowledge and communication by directly engaging the fishing community in tagging efforts. Geoff Walker has become a central cog in the workings of this project. He is an important voice in the fishing community and has helped shape this program from inception to today. He is also the contact for any successful tag deployments and is the contact for all reimbursements.

Geoff is one of the founders of the former Big Island Fisherman's Association and a former member of the Pelagic Advisory Committee. He holds hope for a future where fishery management is based on science and common sense. He is eager to work with the Shark Tagger team to develop safe and efficient shark deterrent methods that mitigate losses to predation. Geoff, and many other fishermen, are excited to learn where the sharks in Kona go and what clues the tags can give us about about their day to day lives.

Article by: Paige Wernli

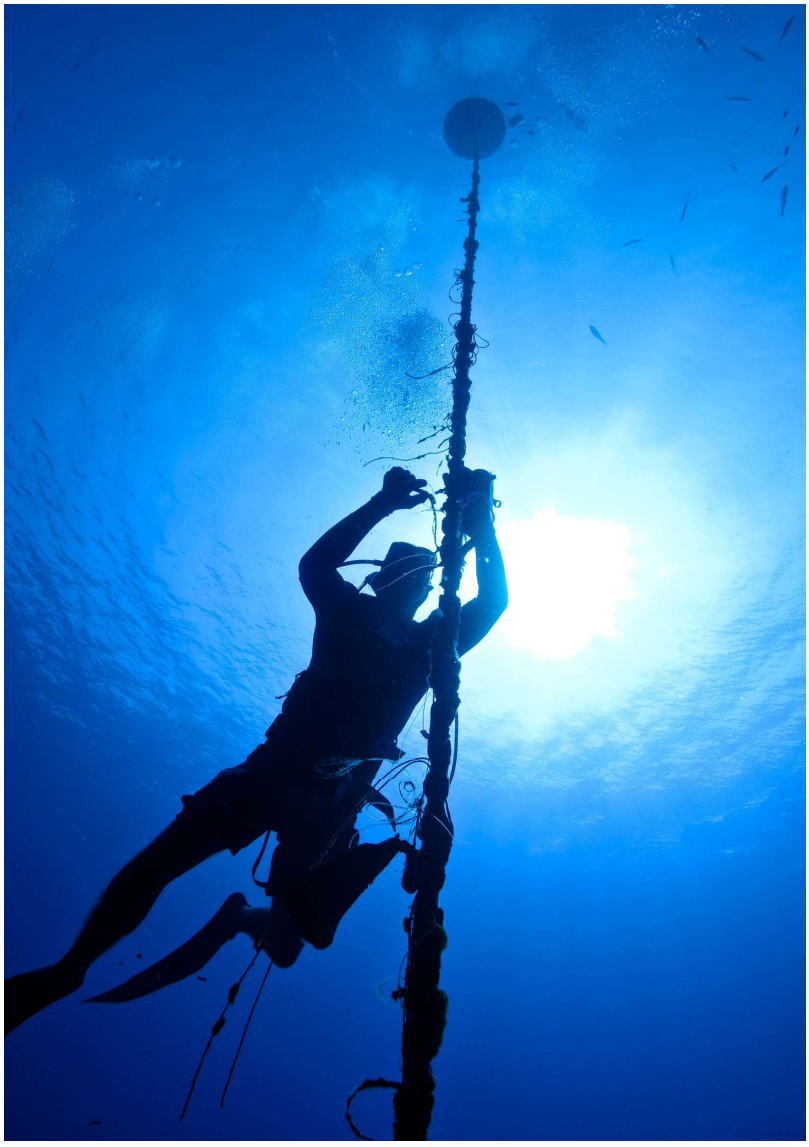
# SHARKS AND THE KONA FISH AGGREGATING DEVICES (FADS)

## WHAT WE'VE LEARNED FROM FADS

BY PAIGE WERNLI

Fish Aggregating Devices (FADs) are anchored buoys maintained by the Hawaii State FAD program (http://www.himb.hawaii.edu/FADS/) to enhance local fisheries. These floating objects attract dozens of fish species and their predators (sharks). The array of FADs off the Kona coast can be very productive for fishers, but several shark species have found that taking bait or even the catch itself from fishers' lines is a pretty good way to make a living. These are called depredation events. These interactions can be a significant financial burden for the fishers and often result in fishers killing the sharks that pose the highest depredation threat (or other barrier) to their catch. One of the goals of the Hawai'i Community Tagging Program is to get some basic information about these interactions such as: species involved, time, date, location, fishing modality, bait type,

# SHARKS AND THE KONA FISH AGGREGATING DEVICES



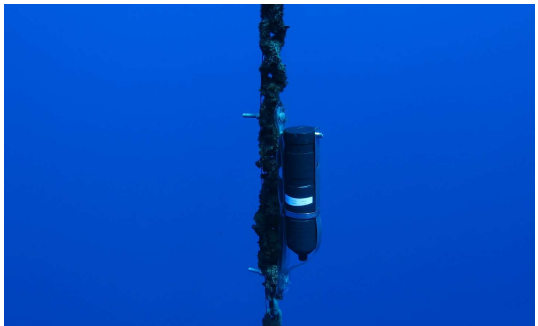
and fisher behavior. These data will provide us with a basis to understand some of the underlying drivers of depredation events so that we can collaboratively devise better strategies to mitigate these interactions.

Additionally, the project aims to understand the behavior of sharks around FADs, as this associative behavior makes sharks more vulnerable to capture in other fisheries that use FADs as well (e.g. purse seine). We have mounted acoustic receivers on all of the West Hawai'i FADs: XX, OTEC, VV, F, C, UU, B, and TT and around the East side of Oahu; X, LL, U, MM, T. Participating fishermen that have been trained to tag oceanic whitetip (and now silky) sharks, tag incidental sharks with acoustic tags and release them. The data from these tags will help to determine the extent to which these species utilize the FADs. To help fishermen better avoid encounters with these sharks, we will be analyzing the sharks' movement patterns around the FADs, searching for a time of day, season, or specific FAD where their presence is more common.

Thanks to our fishermen who have tagged 23 oceanic whitetips and one silky shark with acoustic tags we have detected 11 of these individuals at the FADs and two different sharks on the Liquid Robotics wave glider.

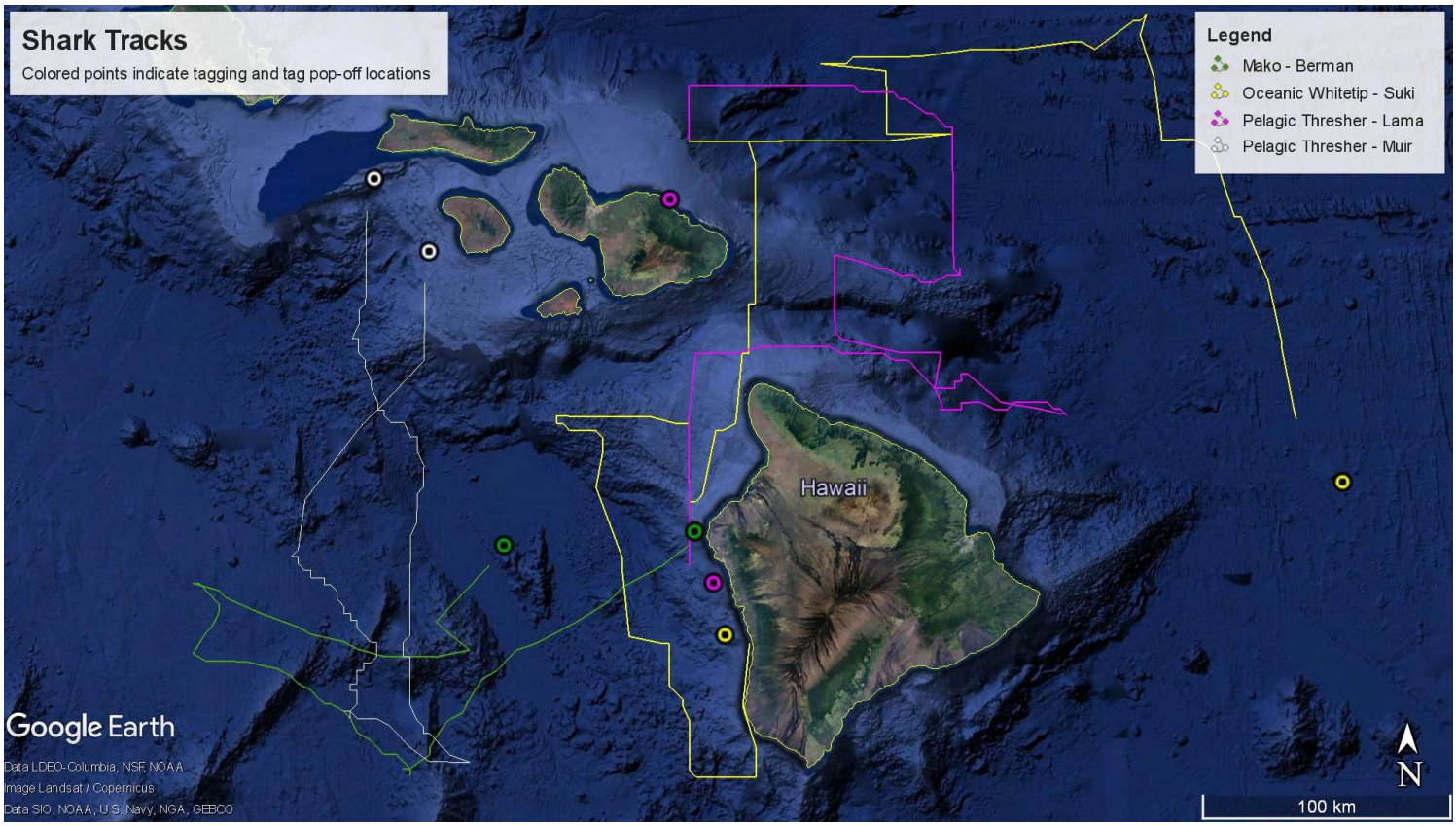
We look forward to gathering more information about the relationship between pelagic sharks and the Kona FADs. We hope the data from these tags will help inform fishers on ways to avoid shark interactions and keep their fish intact. Happy tagging in the new year!

Above: Jeff Muir attaches a receiver used for detecting tagged sharks onto a FAD mooring chain off Kona.
Below: An oceanic whitetip shark with an acoustic tag.
Right: Acoustic receiver attached to a FAD mooring chain off Kona.
Photos by Mark Royer & Lama Gaspar



# RESULTS TO DATE

This map shows tracks from four sharks tagged with satellite tags by participating fishermen. The white line reflects an 83-day track from a pelagic thresher tagged on Penguin Banks. In pink is another pelagic thresher that was tagged in Kona. The yellow track is from a 150-day deployment on an oceanic whitetip shark. The green track is from a mako tagged near the Kona airport. Colored points indicate approximate tagging and tag pop-off locations.




## Electronic Tag Results

*Dr. Melanie Hutchinson*

The waters west of the big island attract several highly migratory species to the area. With this study we want to reveal whether or not these species are resident, seasonal visitors or just passing through. Many of the pelagic sharks that move through Hawaiian waters interact with local fishers seasonally (e.g. bigeye threshers). These species are managed by the international tuna Regional Fishery Management Organizations (RFMO). One of the biggest data gaps to effective management of these species is understanding the drivers of these migrations - when and why are these species moving to specific spots? Are these areas important for reproduction or mating? Is it to follow prey or avoid predation? We hope to fill some of these data gaps through our collaborative tagging efforts.

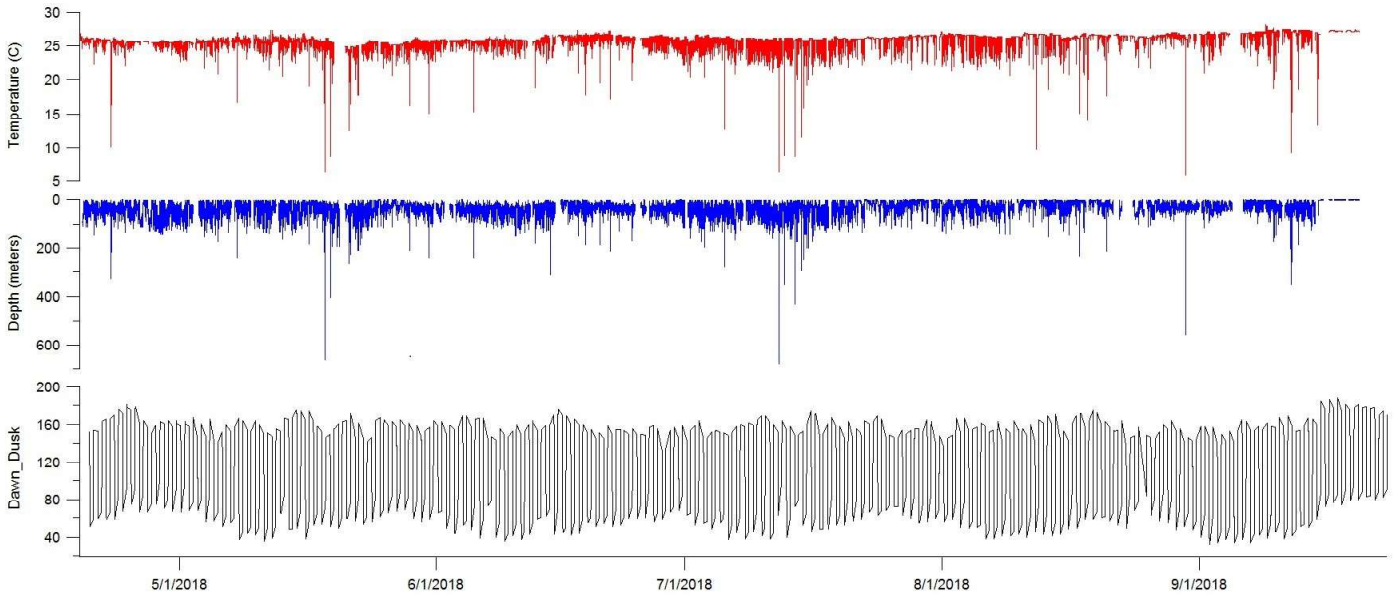
Below Melanie & Mark tag a blue shark that was captured during an ika-shibi fishing charter. Blue sharks are regular visitors to Hawai'i. Sampling of this species includes; measurements, DNA, ID and satellite tags.

# RESULTS TO DATE

**Table 1.** Results of the tagging effort to date. In parenthesis are numbers of tags that have reported. *Indicates that some tags have not yet reached their pre-programmed deployment period.

| Species | Acoustic Tag | Satellite Tag | ID Tag |
|---|---|---|---|
| Bigeye Thresher | 0 | 4 (2*) | 0 |
| Bignose | 0 | 2 (0) | 1 |
| Blue | 0 | 4 (3*) | 3 |
| Mako | 1 (1) | 3 (3) | 2 |
| Oceanic Whitetip | 23 (12) | 9 (5*) | 6 |
| Pelagic Thresher | 0 | 2 (2) | 0 |
| Sandbar | 0 | 0 | 1 |
| Silky | 0 | 1 (0) | 2 |

Tagging of pelagic sharks for this project began in 2015. In three years we have put out 24 acoustic, 25 satellite and 15 identification tags on 8 different species of shark that interact with local small-scale commercial fishers around Hawaii. We are still gathering data from the acoustic tags and have expanded the scope of the electronic tagging study to include silky sharks. We look forward to working with fishers on these deployments in the future.




In the figure above the transmitted time series data from a PAT that was placed on an oceanic whitetip at C buoy by one of our participating fishermen is shown. The traces represent the vertical movement of the animal during a 150 day deployment. In red is the temperature time series, in blue is the depth that the animal was swimming at and on the bottom in black are the daily light curves. Light curves are used to recreate where the animal was in horizontal space. The geo-located approximate track for this animal is outlined in the map above in yellow. The combination of depth, temperature and light information help us understand how different species are moving through their environments. what their foraging behaviors may look like and with this we can begin to understand habitat use and habitat requirements of different marine species. We can also begin to devise interaction mitigation strategies based on where the animals are in time and space. If you were to zoom in on the daily movements of this sharks we would see that it spends almost all of its time in the warmest uppermost layers of the water column. There are also no changes in their vertical movements between day and night indicating that they are not foraging on vertically migrating species. This information is hard to acquire but absolutely critical to devising effective management measures and fishery interaction mitigation strategies.

# SOCIO-ECONOMICS

WITH MIA IWANE

## SUMMARY

How can we create opportunities for collaboration to improve fisheries management? How do social and political relations shape how environmental knowledge and fisheries management is created and shared? With your help, UHM Master's student Mia Iwane is pursuing the answers to these questions. Since the fall of 2017, more than 30 fishermen have sat down with Mia to contribute guidance and full-length interviews to the project. Interviews explored these questions in the context of shark interactions and local fisheries management. Preliminary results were presented at the last Shark Tagging Workshop in October of 2018, and we were happy to receive additional research insights from our attendees. Highlights from presented results and audience comments from the October workshop are available in our Highlights document, which was shared via email with attendees and research participants last year.

Before she graduates this summer, Mia looks forward to sharing her complete analysis with you on Saturday, February 9th, 2019 from 4-6pm at the West Hawai'i Civic Center's Community Hale! This will be a great opportunity to again hear from research participants' and Shark Taggers' reflections on the work. See you there!

BLOG POST

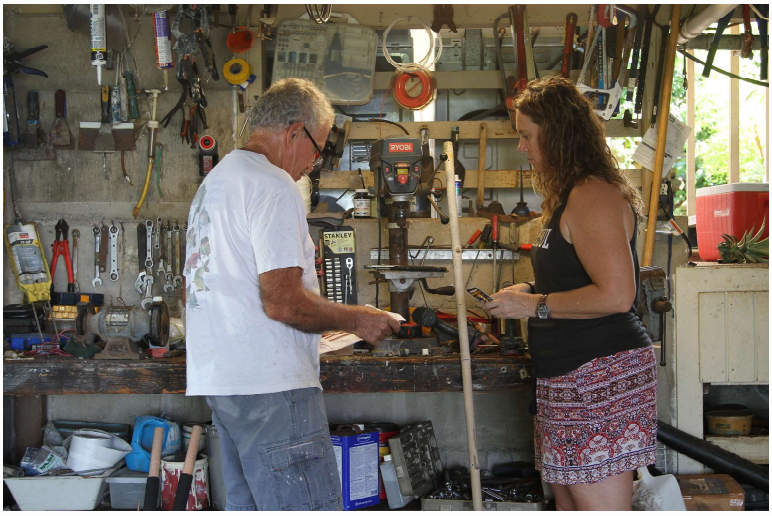
# *Fishermen and Scientists Work Together to Reduce Shark Bycatch in Hawai‘i*

**By Ali Bayless**

See full blog post at

https://www.fisheries.noaa.gov/science-blog/fishermen-and-scientists-work-together-reduce-shark-bycatch-hawaii

# BLOG HIGHLIGHTS

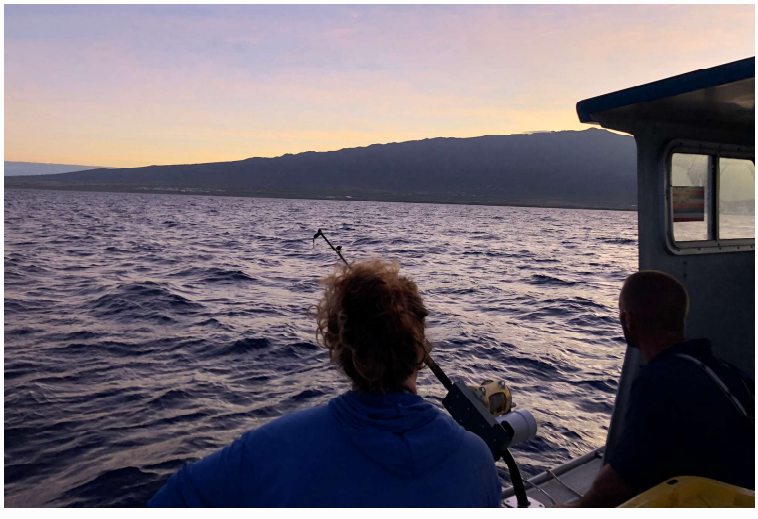


## COLLABORATION

Dr. Melanie Hutchinson working with fisherman Geoff Walker to build shark tagging poles for the workshop.

## WORKSHOP

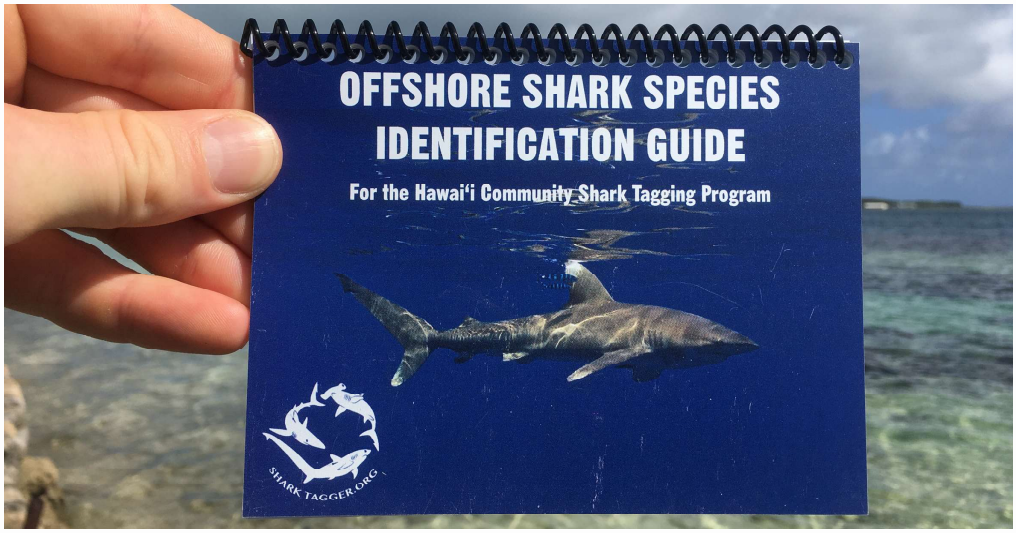
Mark Royer greets fishers as they arrive at the shark tagging workshop that was held at the West Hawai'i Civic Center in October.



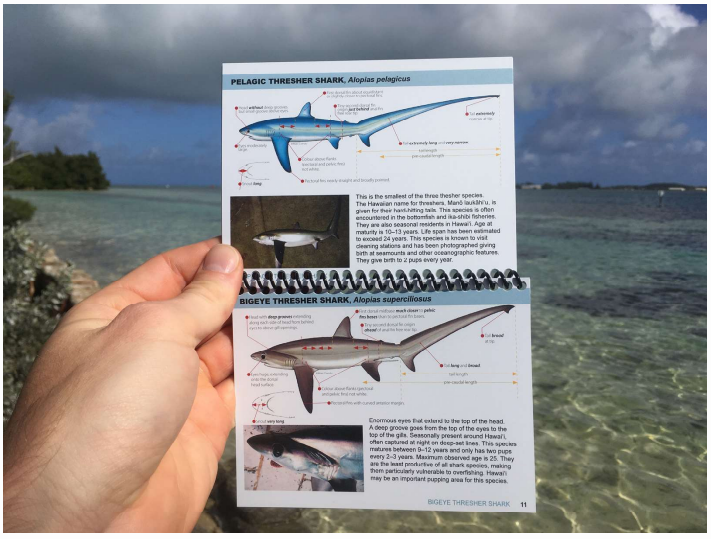
## FISHING

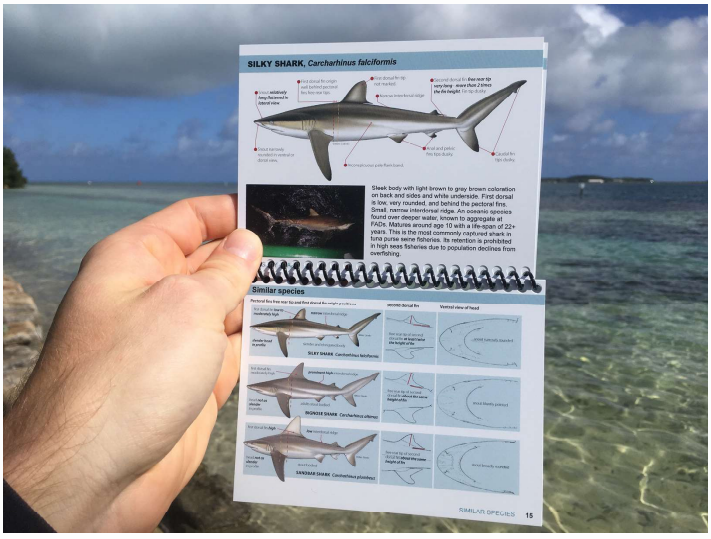
Melanie Hutchinson and fisher Rick Reger watch the sun come up over Kailua-Kona after a long night of fishing. "One of the things I am most happy about with this project is the education that Melanie is offering," Reger says. "It has definitely changed my perspective over 20 years of fishing...and has made me want to be more of a steward of the environment."

# Our Pocket Guide for Identifying Offshore Shark Species Around Hawai‘i




Teaming up with wildlife illustrator Marc Dando, we have created a waterproof ID guide for offshore sharks around Hawai‘i. Marc's detailed illustrations and diagrams show key features that can be used to distinguish between similar shark species. All of the fishers who participate in the community tagging program receive one.

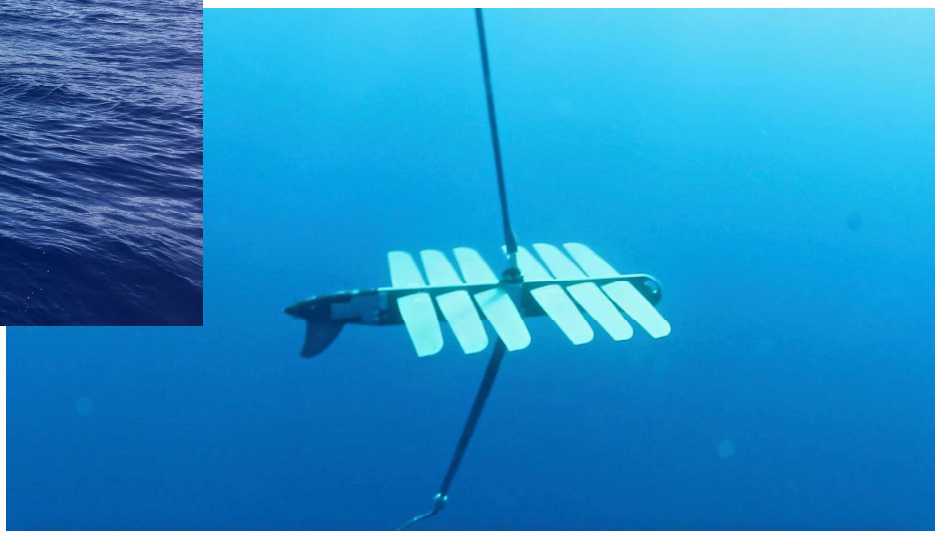



You can see a web version of the ID Guide on our website www.sharktagger.org/taggers

# Other Cool Stuff


**https://www.youtube.com/watch?v=4TW1KaaEQ3U**

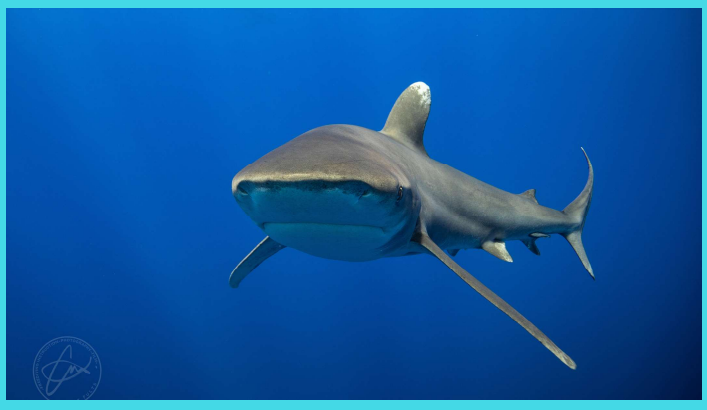


During the most recent trip to Kona, Melanie Hutchinson and Mark Royer checked one of Liquid Robotics wave gliders that is carrying an acoustic receiver. This glider has picked up two of our tagged oceanic whitetip sharks!

NEXT STEPS

# WANTED: OCEANIC WHITETIP PHOTOS

*Teaming up with Hawaii Uncharted & citizen scientists to understand the population dynamics of oceanic whitetip sharks around Hawaii*



## PHOTO IDENTIFICATION

For this component of the program we have partnered with the Hawaii Uncharted Research Collective (www.hawaiiuncharted.org) to extend our outreach and engagement efforts beyond the fishing community to anyone that interacts with this species in or on the water. If you have footage of oceanic whitetips you can submit them through the website above. If your individual can be identified by the color pattern on the tip of the dorsal fin it will be added to our catalog. If it is a new ID you might be able to name it.

## POTENTIAL OUTCOMES

A photo library of individual oceanic whitetip sharks can help us understand population dynamics, and to track individual movements, presence and absence over time. Photos will help estimate population size, growth rates, home ranges and get better data on reproductive cycles. Photo libraries have been very effective at estimating population sizes of marine mammals, great white sharks and whale sharks in several regions of the world. Plus you might get to name your shark!!

NEXT STEPS

# WHO AM I?

*If you can accurately identify this shark species we need your help getting tags out! Come learn about the project and pick up a tag packet during the next fisher workshop* ***Saturday Feb. 9 at 4 pm at the West Hawaii Civic Center in Kona****. Hope to see you there!*

## WANTED

This shark species is often encountered at offshore FADs, near coastal ledges but over deeper water, and is attracted to floating objects. It has been implicated as a major contributor to high depredation rates and may prevent fish from biting if present at a FAD. This species is often commonly captured in offshore tuna fisheries. As such, population trajectories are declining due to over fishing in several areas. We need to understand the habitat use and movement behavior of this species around Hawai'i.

## IDENTIFYING CHARACTERISTICS

Commonly called a brown shark or mistakenly referred to as a 'bronze whaler' (bronze whalers are not found in Hawai'i). This shark has a small, rounded first dorsal fin that begins well behind the pectoral fins. An inter-dorsal ridge is present. The second dorsal fin has a long trailing edge. See the identification guide for additional identification features of silky sharks (*Carcharhinus falciformis*). Help us tag this shark!