

A collaborative approach to collecting species-specific manta and devil ray catch data and assessing handling effects on post release survival



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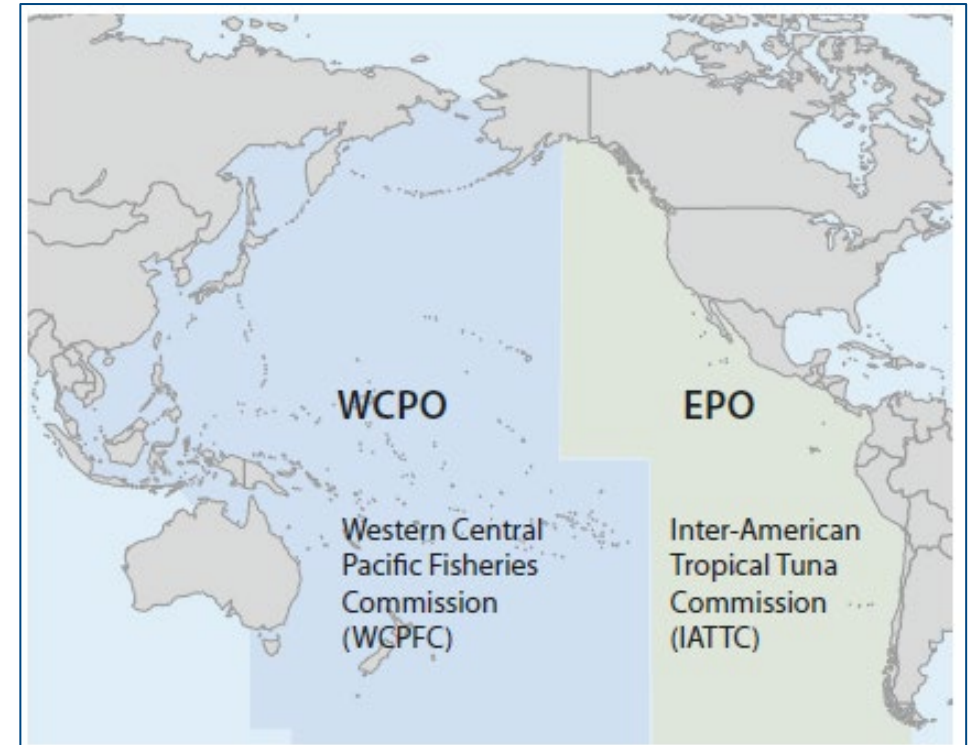
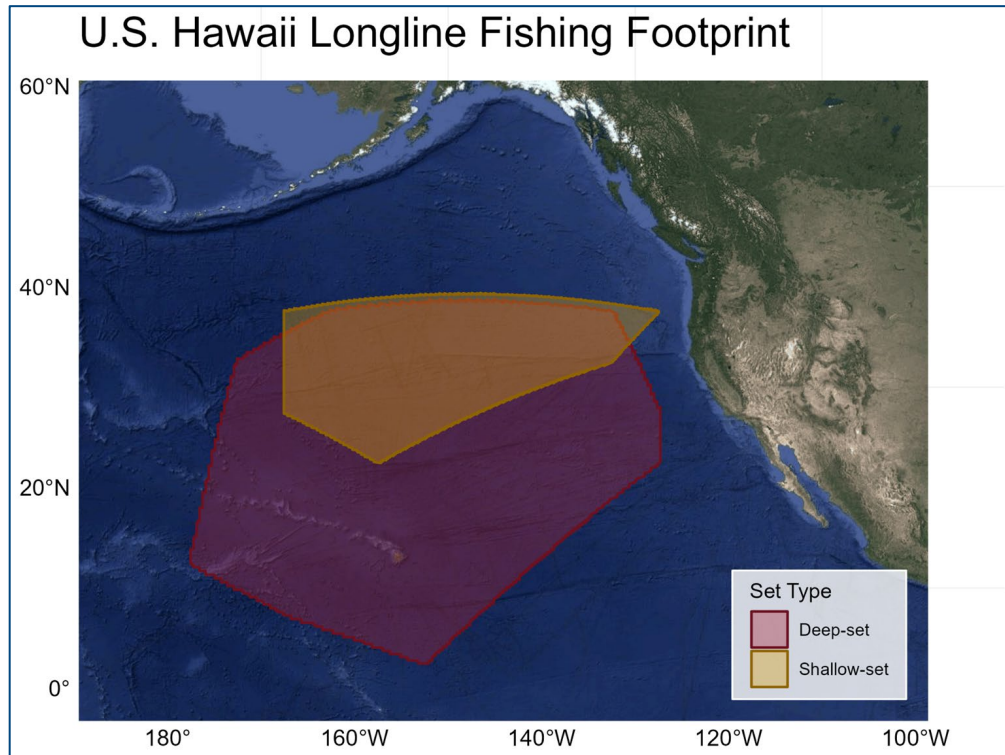
The Problem: Knowledge Gaps in Fishing Mortality

- Giant/oceanic manta ray (*Mobula birostris*) listed as threatened throughout range under US Endangered Species Act (ESA, 2018).
- Fishing mortality greatest threat to population recovery.
- Major data gaps in U.S. longline pelagic fishery:
 - 1) mobula ray species-level catch rates &
 - 2) survival rates post-interaction and handling impacts on survival.



U.S. Longline Fishery & Mobula Ray Species Spatial Overlap

- 8 mobula species in Pacific Ocean.
- 7 species in WCPO & 5 in EPO.
- U.S. Hawaii based LL fishery overlaps at least 5 species ranges.



WCPO

Mobula birostris
Mobula alfredi
Mobula tarapacana
Mobula mobular
Mobula thurstoni
Mobula eregoodoo
Mobula kuhlii

EPO

Mobula birostris
Mobula tarapacana
Mobula mobular
Mobula thurstoni
Mobula munkiana

Addressing the Problem: Filling Knowledge Gaps in Fishing Mortality

Methods Overview

- Objective 1 - Improve species-level identification:
 - Genetic sampling
 - Development of a field ID Guide
 - Training observers and debriefers to use ID guide
 - Assessing electronic monitoring (EM) video to collect ID using guide
- Objective 2 - Assess post release survival & handling impacts:
 - Telemetry study with fishers applying tags
 - Training observers to collect interaction and handling data
 - Assessing EM for collection of interaction and handling data



Improving Mobula Ray Species ID: Genetics Data

- Genetics samples and video collected by observers in U.S. longline fishery.
- 41 total mobula ray identifications.

Common Name	Genetic Sampling IDs	Count	%
Manta spp.	<i>Mobula alfredi</i> / <i>Mobula birostris</i> *	1	2%
Giant manta ray	<i>Mobula birostris</i>	1	2%
Spinetail devil ray	<i>Mobula mobular</i>	9	22%
Sicklefin devil ray	<i>Mobula tarapacana</i>	9	22%
Bentfin devil ray	<i>Mobula thurstoni</i>	21	51%

Improving Mobula Ray Species ID: Developing a PO Field Guide

- Dichotomous key using physical characteristics observable from a vessel in field or via video.
 - Region
 - Size
 - Coloration

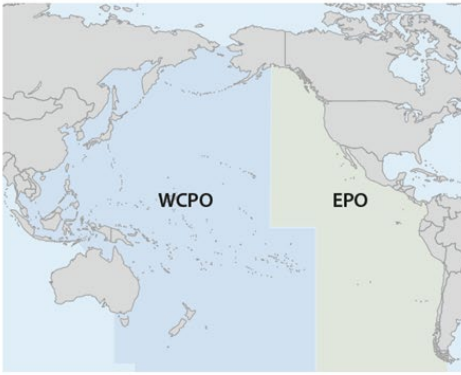
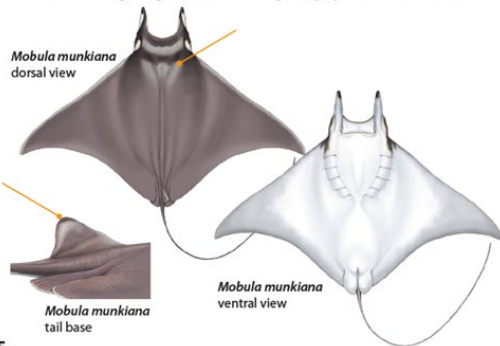


Region-specific Species ID

7a In which region was this specimen caught?
 Western Central Pacific Ocean → 8 (p.16) Eastern Pacific Ocean → 7b

7b Brownish-gray dorsal color that wraps around to above the 1st gill cover on the ventral surface.
YES → *Mobula munkiana* (p.32) **NO** → 6 (p.14)

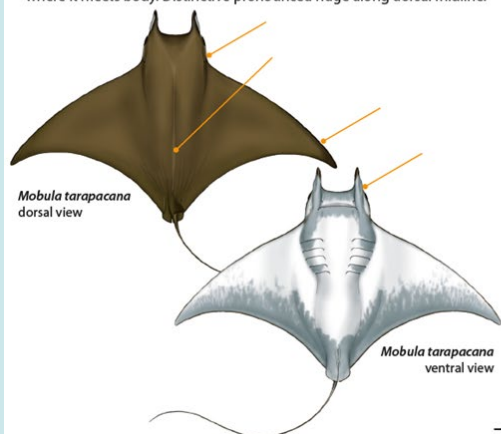
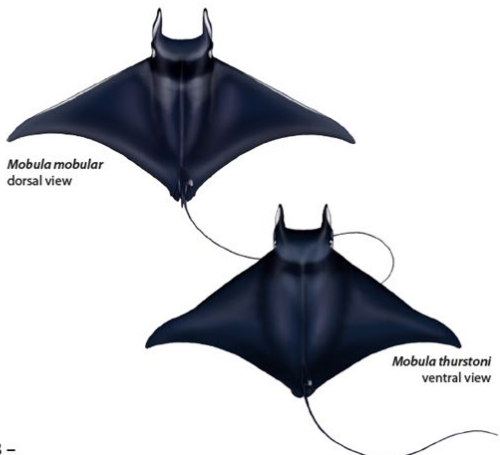
Max. size < 140cm DW. Darker head collar often visible. Dorsal fin with dark rim along margins, often with a lighter gray area in the middle.

- 15 -

5 Uniform brownish, or gray to olive-green dorsal color (no white fin tip). Gray ventral shading on posterior margin of pectoral fins, white anteriorly.
YES → *Mobula tarapacana* (p.26) **NO** → 6 (p.14)

Large: max. size > 380cm DW. Long-necked appearance; trailing edge of pectoral fins distinctly falcate; gray/silvery mouth and underside of head. Tail shorter than DW and covered in scales. Spiracle in an elongated longitudinal slit under a ridge above and behind margin of pectoral fin where it meets body. Distinctive pronounced ridge along dorsal midline.

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Improving Mobula Species ID: Developing a PO Field Guide

Inicio / Recursos / Materiales de referencia

Materiales de referencia

Descargar

- SAC-07-09 Proposed format for the Report of the National Observer Programs for pelagic fisheries in the IATTC Convention Area [EN](#)
- USA - Best practices for safe handling and release of Cetaceans in longline fisheries [EN](#)

Guías

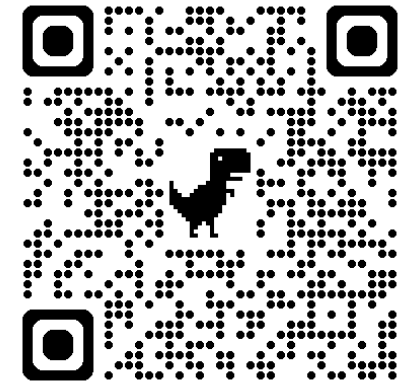
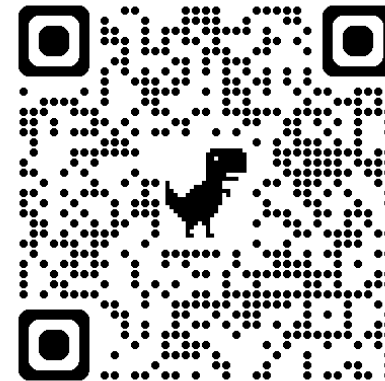
- Guía de campo sobre mantarrayas y mants diablo eb pesquerías del Océano Pacifico - 2024
- Catálogo de anzuelos 2011
- Guía de identificación de peces involucrados en la pesca atunera de cerco en el OPO

Field Guide to Manta & Devil Rays in Pacific Ocean Fisheries



SPANISH

ENGLISH



Assessing Post Release Survival & Handling: Collecting Telemetry Data

- Trained fishers to successfully tag mobula.
- Data recorded, including size, handling, and trailing gear.
- Video collected to confirm ID & condition.



Data required for each tag deployed

The below data fields are requested for each interaction with a mobulid ray. (See identification instructions next page). Successful tag events with good data and footage will be reimbursed at a rate of \$800 USD.

Please take a photo of the data on this sheet and email or text us as soon as you return to port 😊
 Email: pacificsharktagger@gmail.com and/or Text Forest O'Neil: 808.321.9188

Tag serial #: _____, Tag PTT #: _____, Tag location: Left wing, Right wing
 MM DD YY

Trip No. _____, Set No. _____, Date ____/____/____

Time _____, Latitude _____ N / S, Longitude _____ W / E

Sex: Claspers present (male), Claspers absent (female), Undetermined

Hook/entanglement location: Mouth, Cephalic fin, Wing, Body,

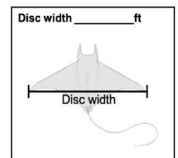
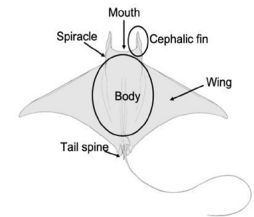
Other _____

Capture condition: Good, Injured, Lethargic, Dead (Please don't tag dead animals)

Release condition: Good, Injured, Lethargic, Dead

Handling/release method: Line cut, Dehooker, Escaped, Other _____

Trailing gear? _____ ft, Comments: _____



Condition Definitions:

Good - Animal active and energetic, no visible signs of trauma or injury, no bleeding from the vent or gills, fights against the gear, swims away well.

Injured - Clear evidence of injury to any part of the body; bleeding may be seen from the hook, gills or vent.

Lethargic - Animal exhibits signs of life but does not appear very active; still makes efforts to swim.

Dead - Animal does not exhibit signs of life, sinks or sinks upside down.

Assessing Post Release Survival & Handling: Telemetry Results

N = 15 tags: 11 survivors, 1 mortality, 1 non-reporter, 1 lost, & 1 bad deploy

Species	Hook Location	Release Condition	Trailing Gear	Post-release Fate	Days
<i>M. birostris</i>	<ul style="list-style-type: none"> N=2 Entangled 	<ul style="list-style-type: none"> N=1 Good N=1 Injured 	0, NR	<ul style="list-style-type: none"> N=1 survivor N=1 bad deploy 	60
<i>M. tarapacana</i>	<ul style="list-style-type: none"> N=3 Foul hooked 	<ul style="list-style-type: none"> N=2 Good N=1 Injured 	0.6 - 1.2 m	<ul style="list-style-type: none"> N=3 survivor 	58-60
<i>M. mobular</i>	<ul style="list-style-type: none"> N=1 Entangled N=3 Foul hooked 	<ul style="list-style-type: none"> N=1 Good N=2 Injured* N=1 Lethargic 	0 - 0.6 m	<ul style="list-style-type: none"> N=2 survivor N=1 mortality* N=1 non reporter 	10*-60
<i>M. thurstoni</i>	<ul style="list-style-type: none"> N=4 Foul hooked N=2 Mouth hooked 	<ul style="list-style-type: none"> N=4 Good N=1 Alive N=1 Injured 	0.2 - 1.2 m	<ul style="list-style-type: none"> N=6 survivor 	60



Assessing Electronic Monitoring (EM) Video Data Collection: Species Level ID & Interaction/Handling Data

- 24 mobula interactions reviewed from EM video (flagged by observers or tag events).
- Fishers generally removed trailing gear, disentangled animals & left large mobula in water.

Data collectable with EM:

- Species level ID - 79%
- Hook/entanglement location
- Condition
- Handling/release methods
- Trailing gear



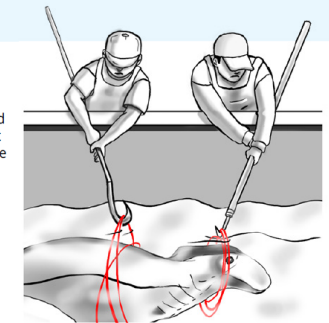
NOAA
FISHERIES

National Marine Fisheries Service
Pacific Islands Regional Office

HANDLING & RELEASE GUIDELINES

Giant Manta Rays

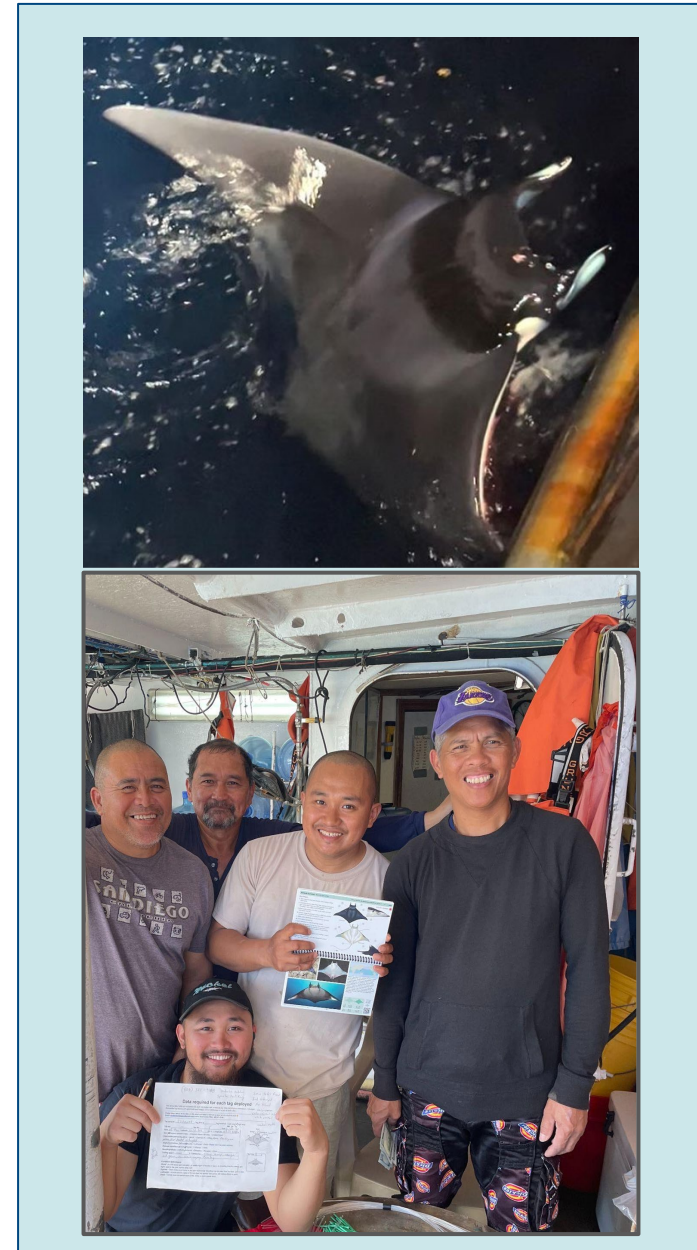
3c. If the giant manta ray is entangled, secure any excess tangled line with the long-handled gaff, while another crew member uses a long-handled line cutter to remove as much tangled monofilament line as possible. Make sure that you don't accidentally poke the animal with the long-handled tools.



NOAA FISHERIES

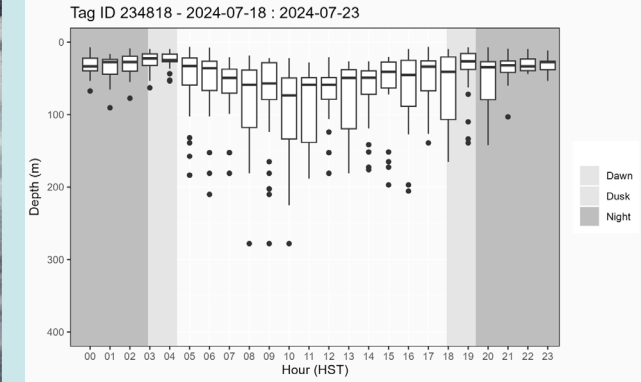
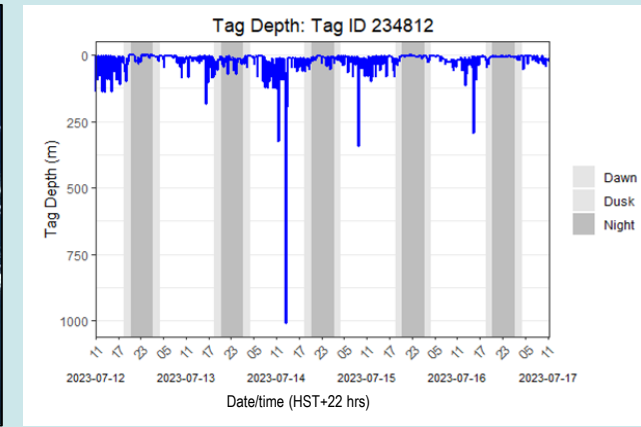
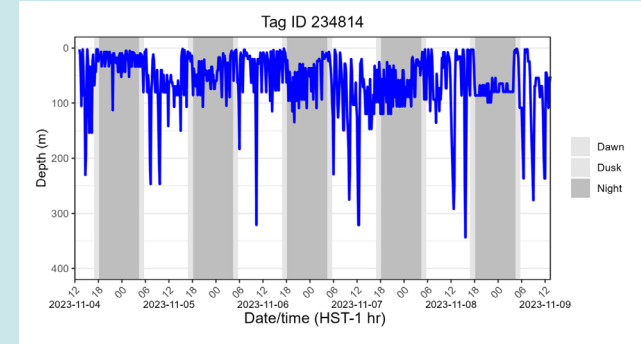
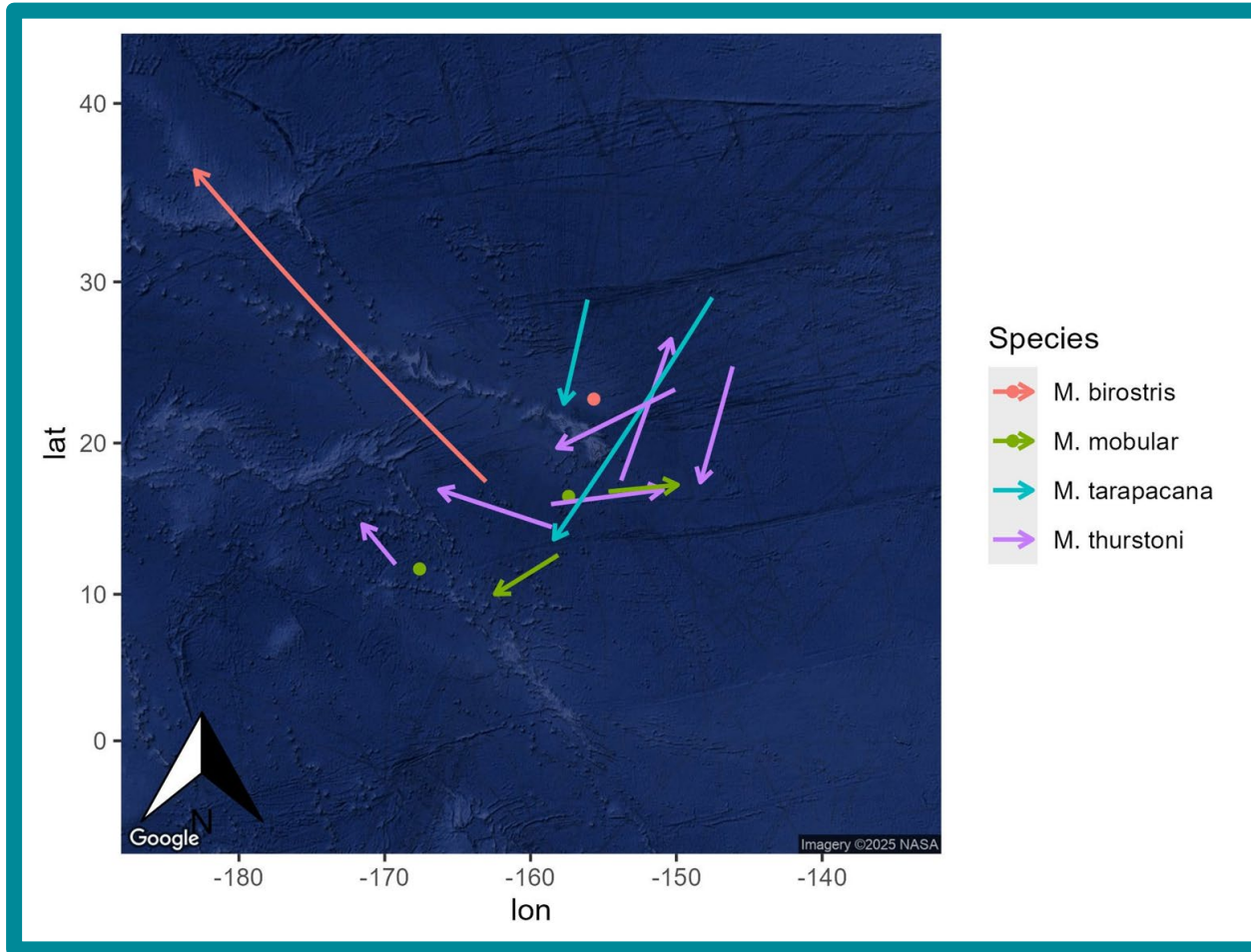
Conclusions & Recommendations

- US Hawaii-based LL fisheries interacts with at least 4 spp.: *M. birostris*, *M. tarapacana*, *M. mobular*, *M. thurstoni*
- Good tools available for high-confidence species-level field ID: genetics & PO field guide
- EM and video collected by fishers and observers allows species-level ID and other interaction data collection.
- Observers, EM video reviewers, and fishers benefit from training for ID and other interaction data collection.
- Species-level ID codes needed for observer, EM, and logbook data collection.
- Post release survival may be relatively high for mobulids released using BHRP: additional tagging needed for post release survival rates.
- Fishers are excellent partners for tagging studies.



Next Steps – Mobula Ray Habitat Use

- Distance travelled: 384 - 2872 km
- Vertical migrations: 287 - 1426 m



Acknowledgements

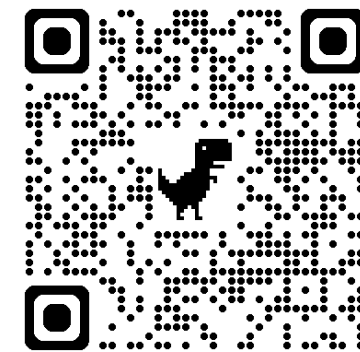
- Hawaii longline fishers!!!
- Funding from NOAA fisheries (NMFS) Office of Protected Species.
- Genetics sample coordination: Jamie Marchetti (NMFS Pacific Islands Regional Office).



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