

# Mobulid rays in the Eastern Pacific:

Post-release mortality and fishery-facilitated research



Monterey Bay  
Aquarium®



UNIVERSITY OF CALIFORNIA  
SANTA CRUZ



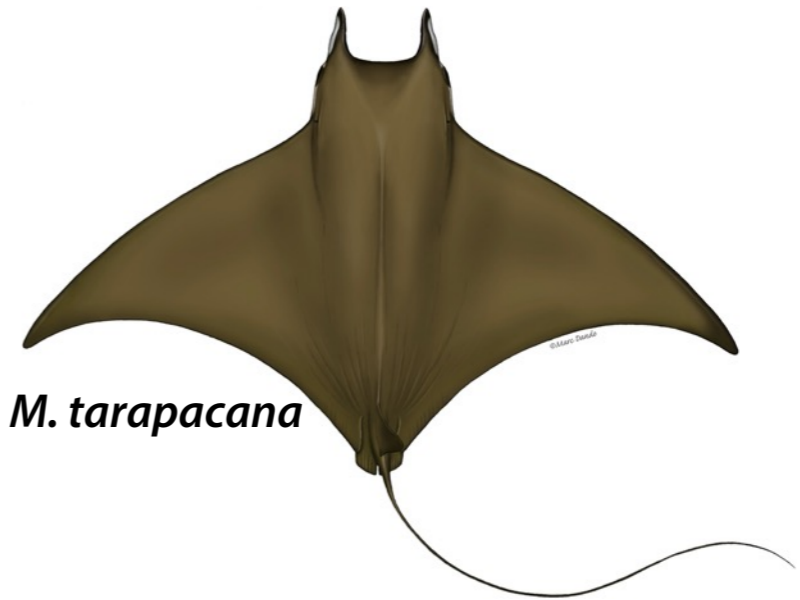
IATTC Bycatch Working Group  
June 4, 2020

**Joshua Stewart, Ph.D.**  
The Manta Trust  
**Melissa Cronin**  
UC Santa Cruz

# Mantas and Devil Rays



*M. birostris*



*M. tarapacana*



*M. munkiana*



*M. thurstoni*



*M. japanica*

# Mobulid life history

- Long lived
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  - 15-20+ for mobulas



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- Late maturity
  - ~8 years for mantas
  - ~6 years for mobulas



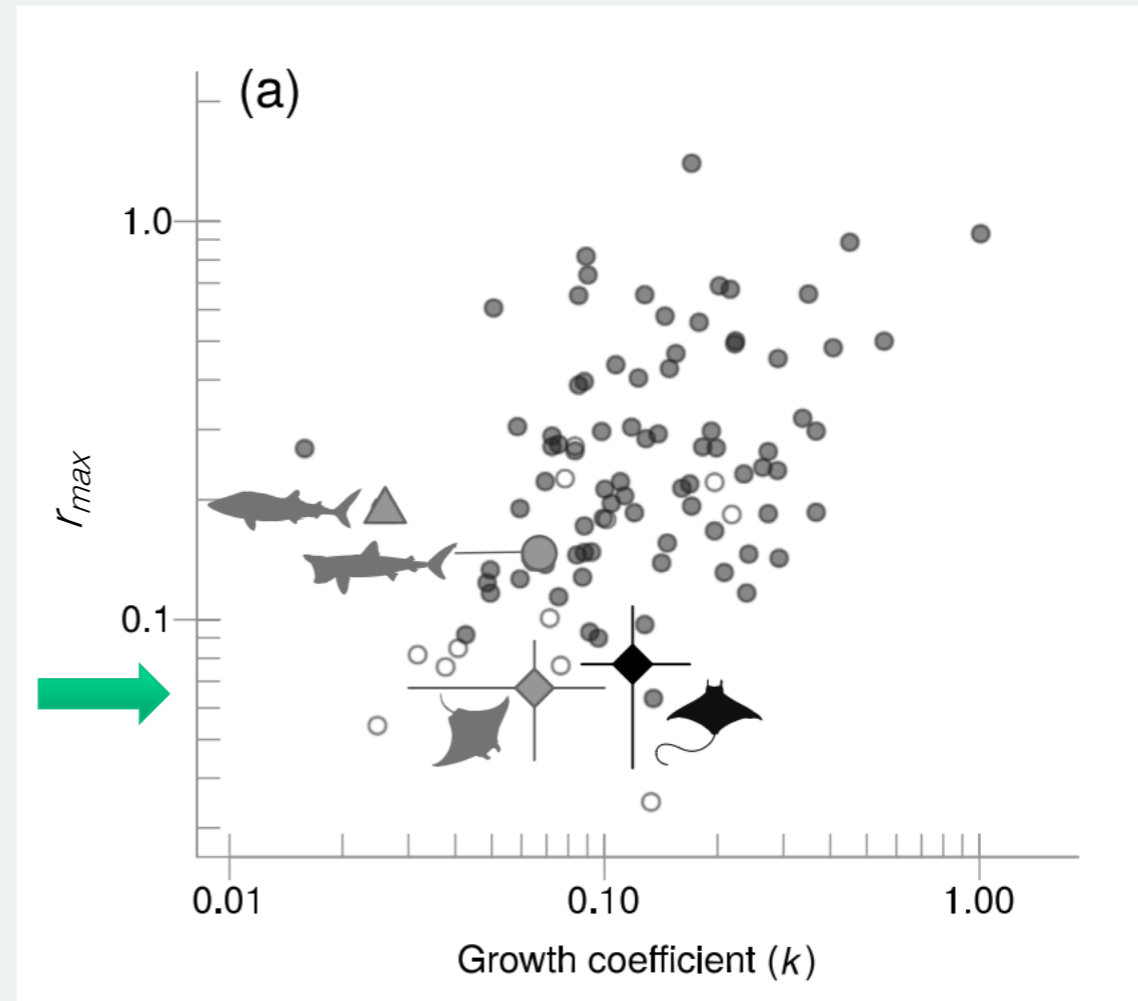
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- One of the lowest population growth rates among elasmobranchs



# Mobulids & Fisheries



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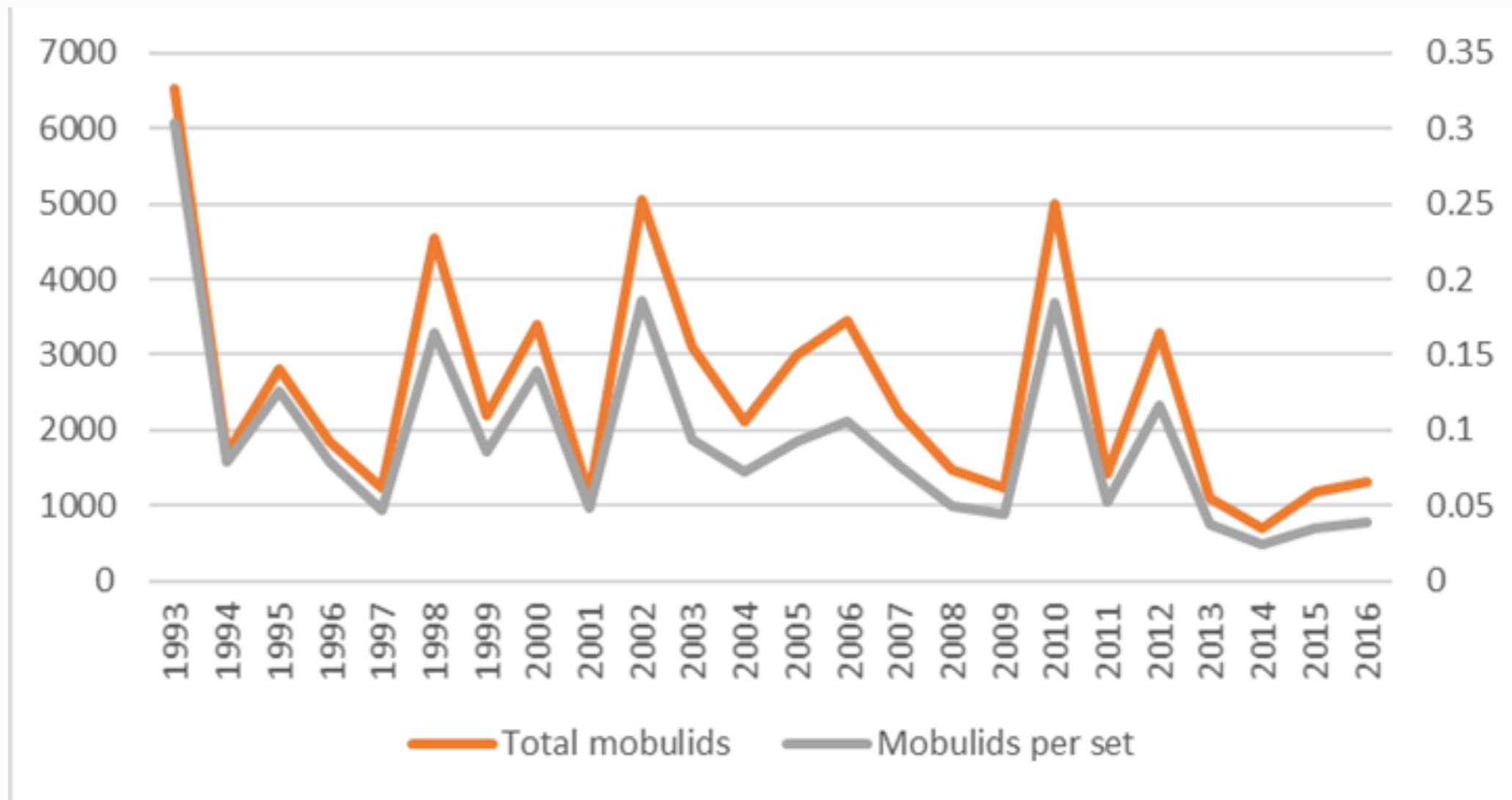


# Mobulids & Fisheries

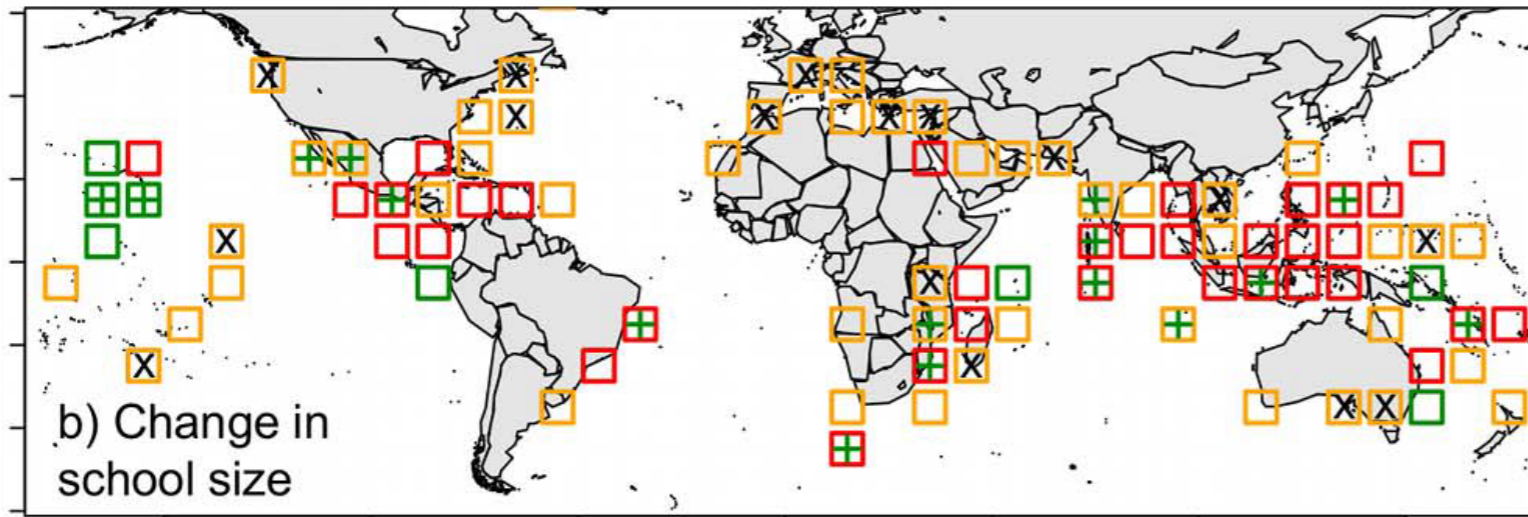
## IATTC Purse Seine Fleet:

2,545 mobulids captured / year (mean)

Range: 705 (2014) – 6,531 (1993)

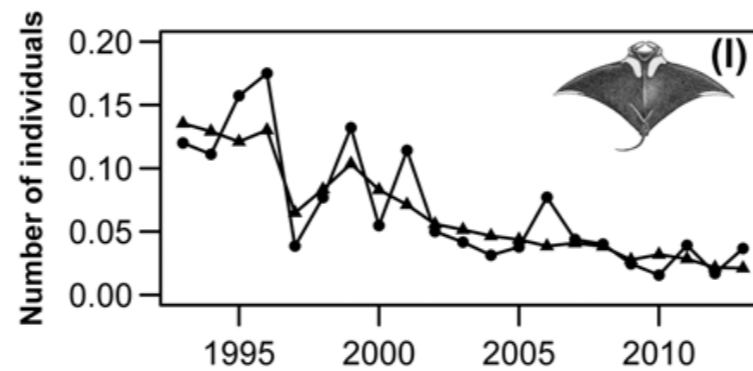
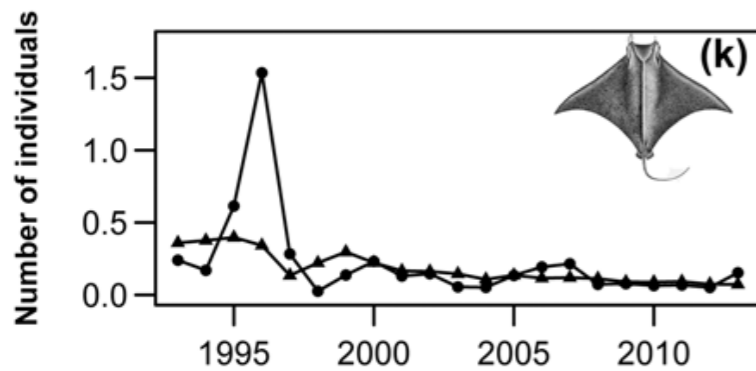


# Population Trends



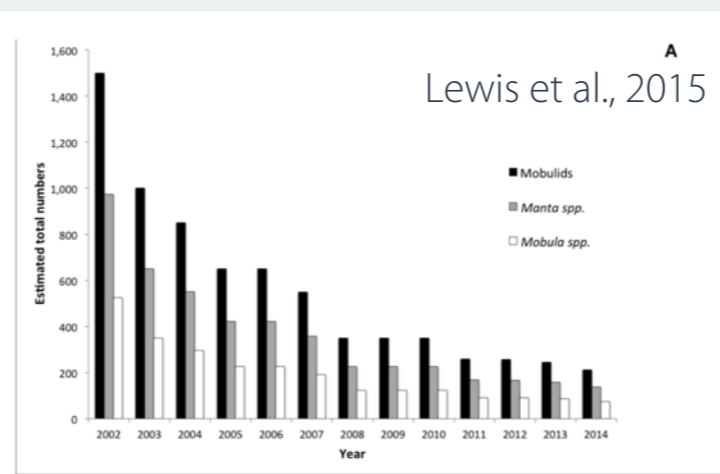
Ward-Paige et al., 2013

Global decline in school size and sighting frequency



White et al., 2015

Declines in manta and mobula sighting frequency (Cocos Isl.)



Declines in manta and mobula catch rates (Indonesia)

# Bycatch Impacts

## Small Scale Fishery / Gill Net Bycatch

Likely to have 100% Mortality

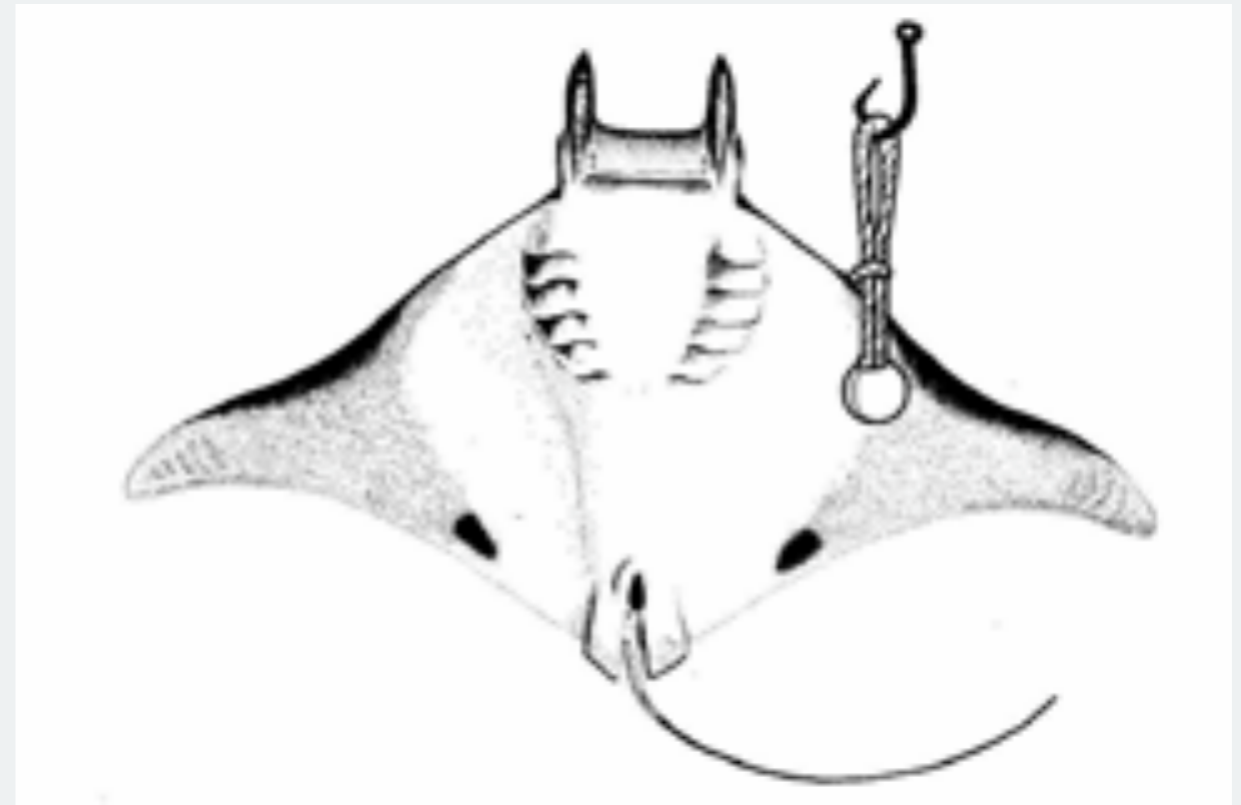


## Purse Seine Fishery Bycatch

Has potential to be lower impact



# Manta & Devil Ray Bycatch

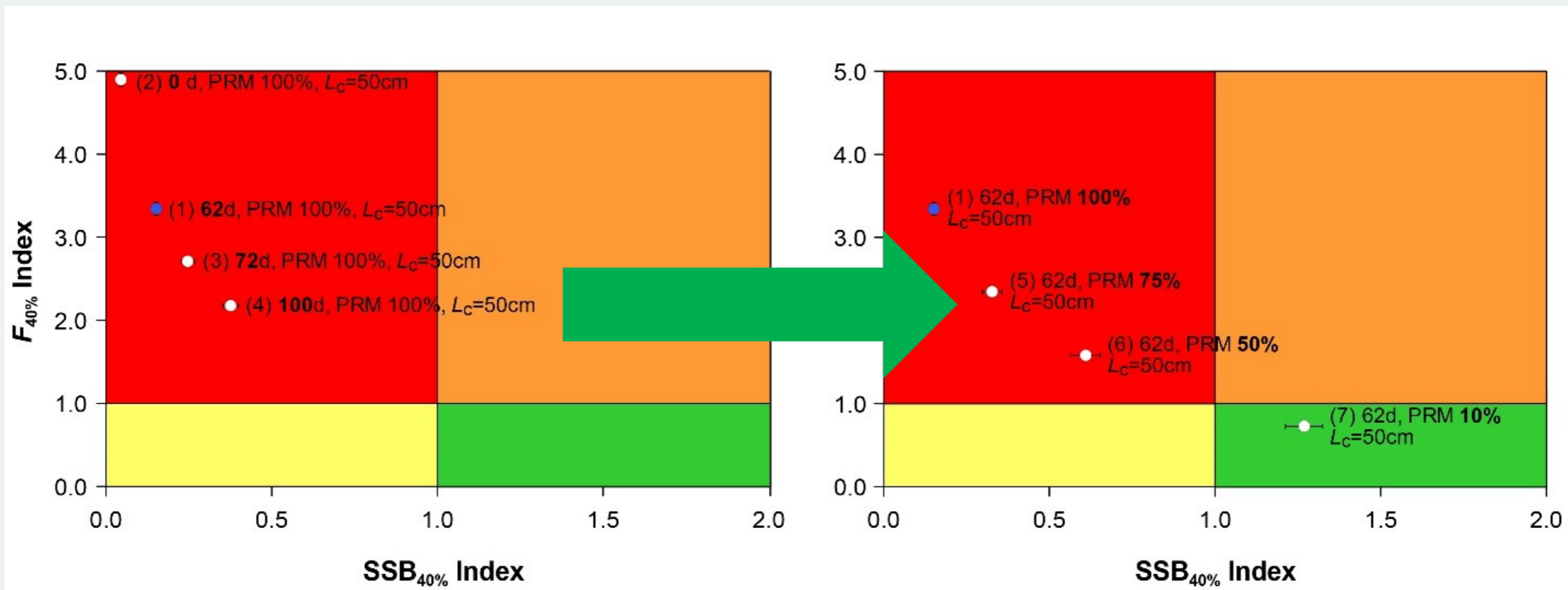


IATTC previously assumed **100% mortality** for mobulids, based on harmful handling & release practices

These practices are now **banned** (as of 2015: Resolution C-15-04)

# Recovering Mobulid Populations in the ETP

- IATTC risk assessment determined that reducing post-release mortality was one of the most effective ways of improving the status of mobulid populations in the ETP



# Project Overview

- Estimate the post-release mortality of mobulid rays released from purse seine vessels.
- Identify handling and release methods that minimize mobulid post-release mortality
- Work with vessel captains and crews to develop new, low-impact release methods and technology
- Use genetic methods & tag data to examine population structure of mobulids within the ETP and improve species identification

# Collaborating Partners

## Research

- The Manta Trust
- Monterey Bay Aquarium
- UC Santa Cruz
- IATTC

## Fishery / Management

- TUNACONS
- PROBECUADOR

## Funding / Support

- Monterey Bay Aquarium
- Save Our Seas Foundation
- International Seafood Sustainability Foundation

# Observer Programs

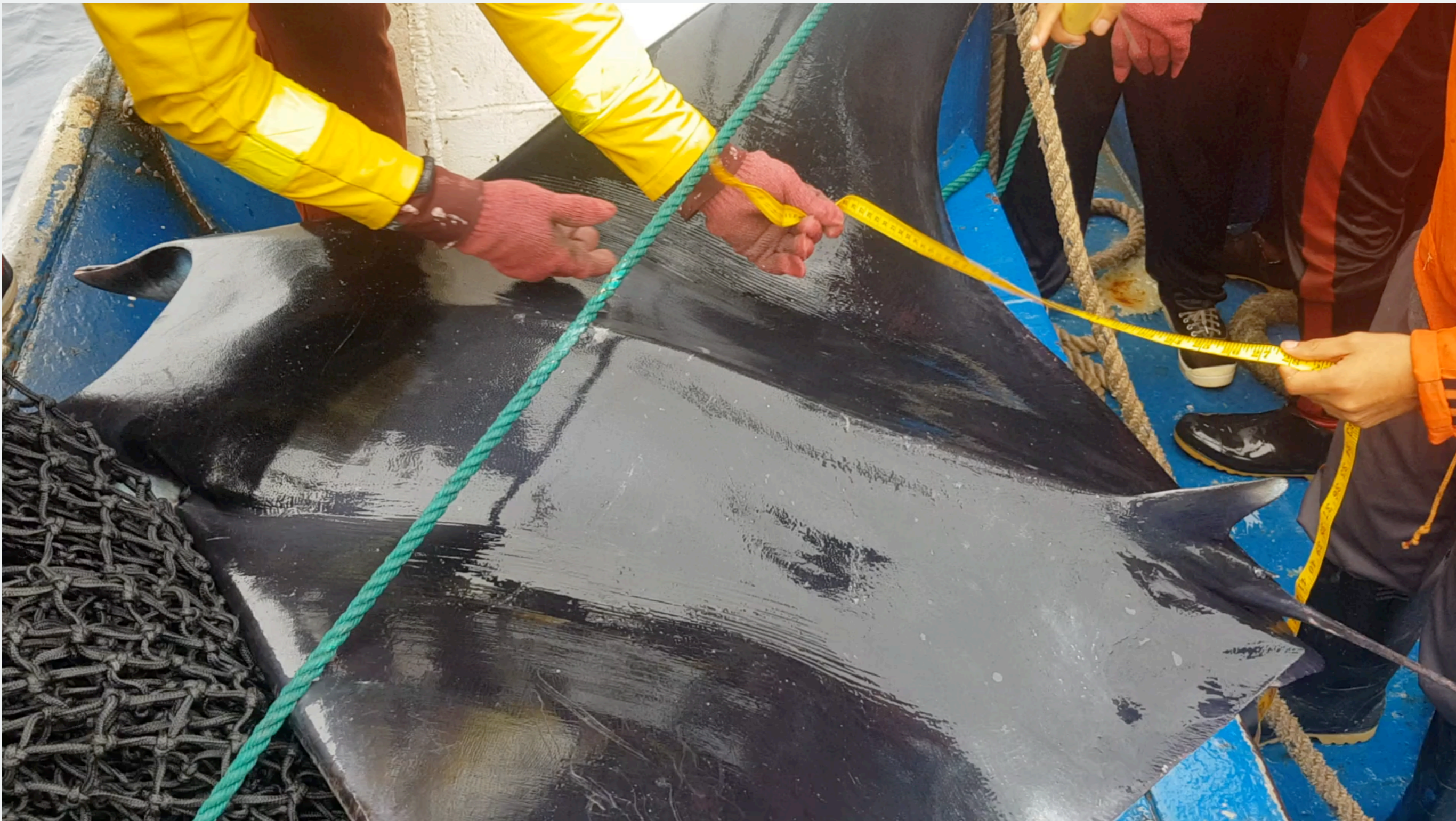




# Observer Programs



# Data Collection



TUNACONS, used with permission

# Handling & Release



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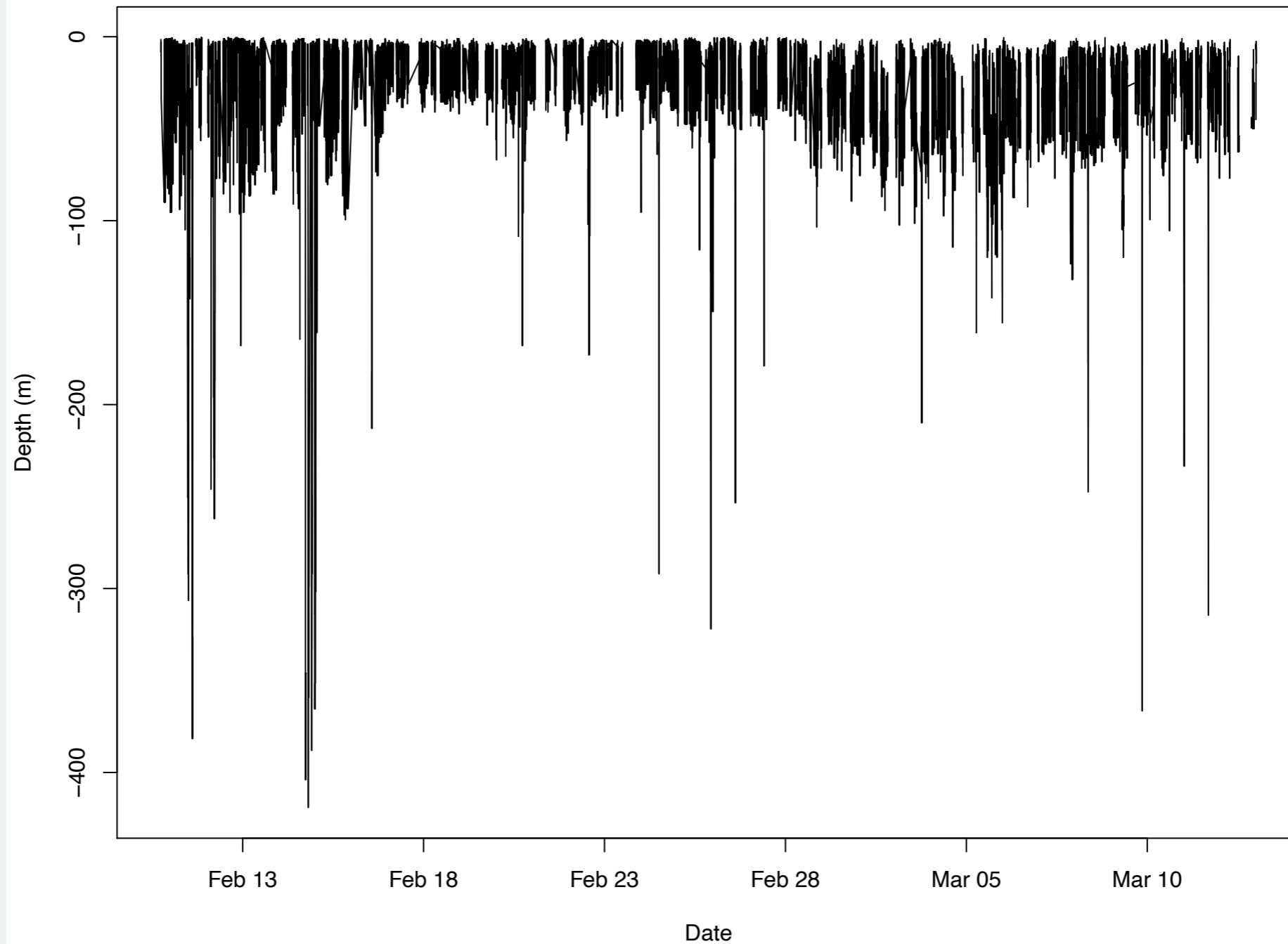
TUNACONS, used with permission

# Handling & Release



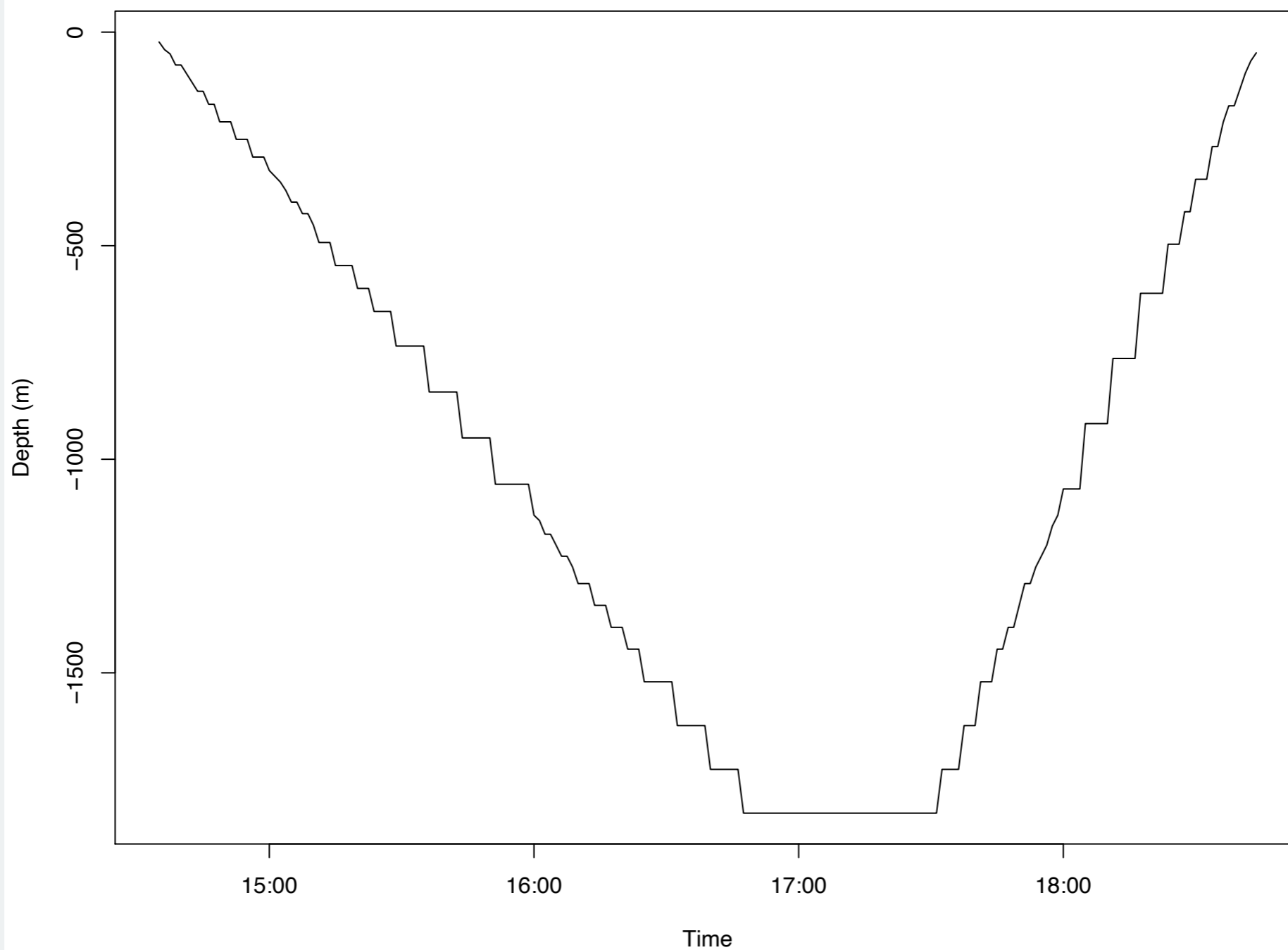
# Post release mortality

## *M. mobular* 30-day post release survival



# Post release mortality

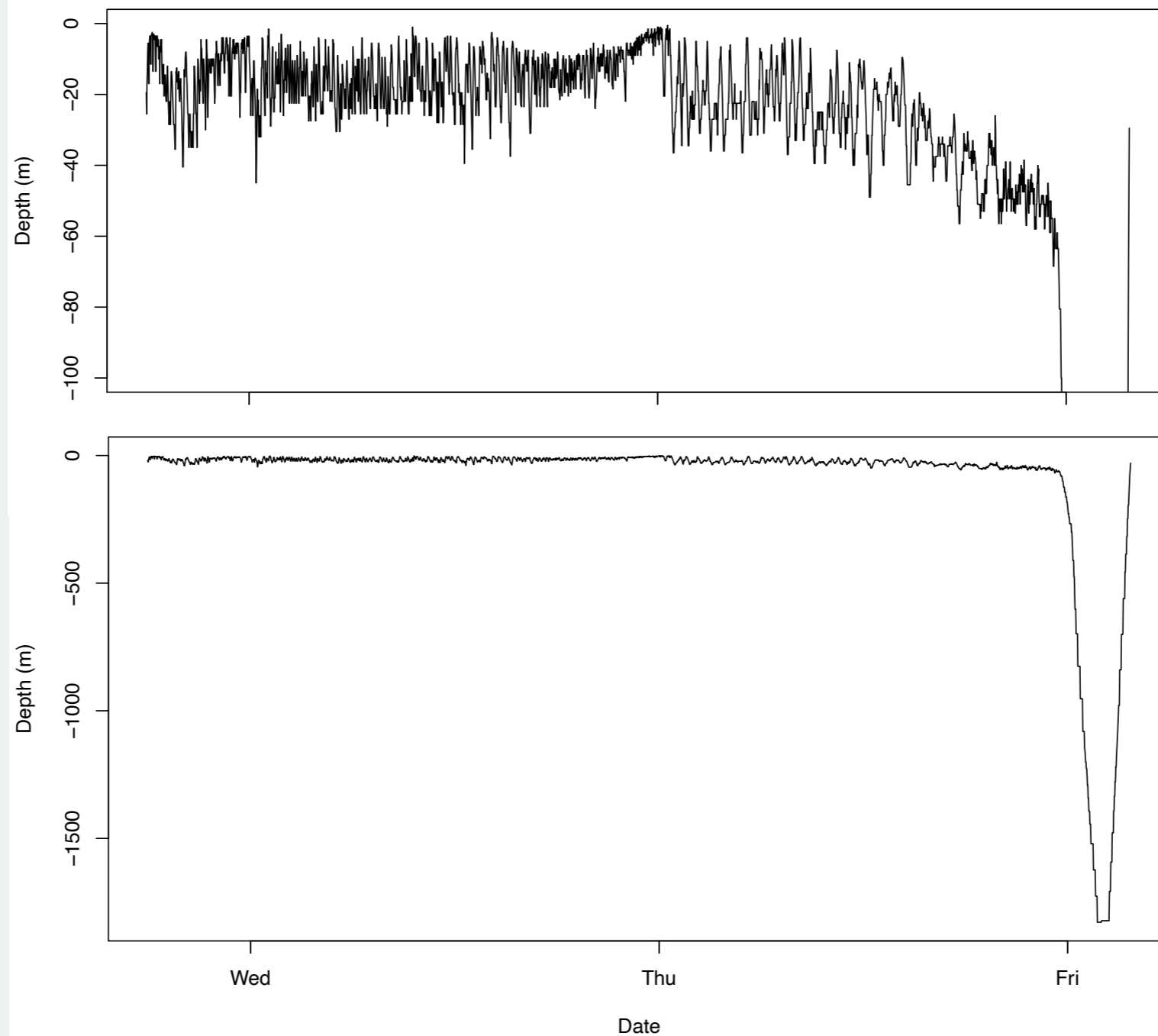
## *M. birostris* at-vessel mortality





# Post release mortality

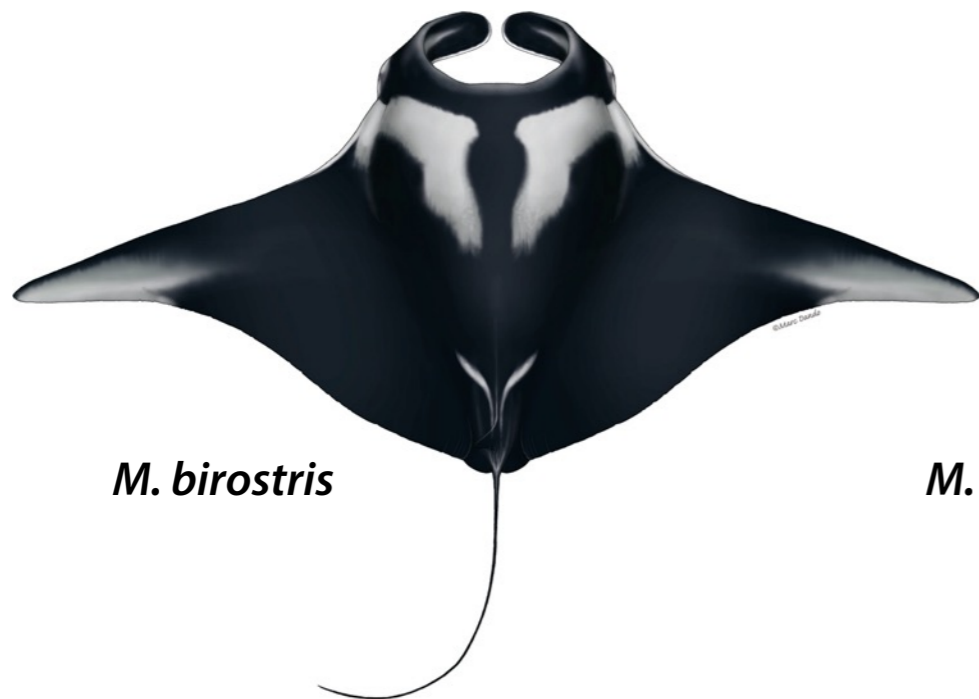
## *M. thurstoni* delayed mortality



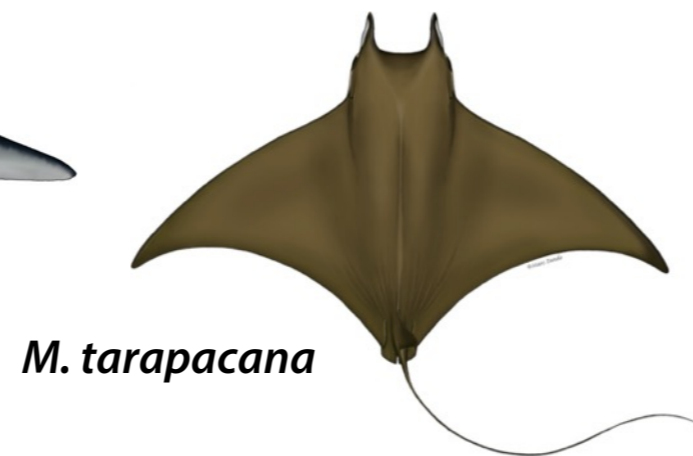
# Preliminary Results

- 31 tags deployed since 2018
  - **16** *M. mobular*
  - **8** *M. thurstoni*
  - **5** *M. tarapacana*
  - **2** *M. birostris*

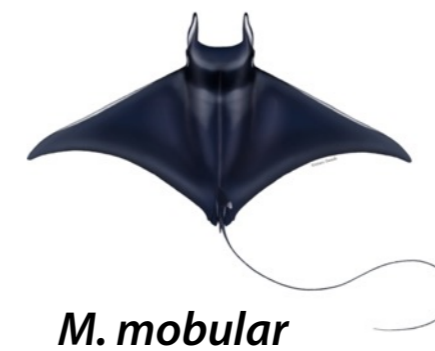
50% Mortality



60% Mortality



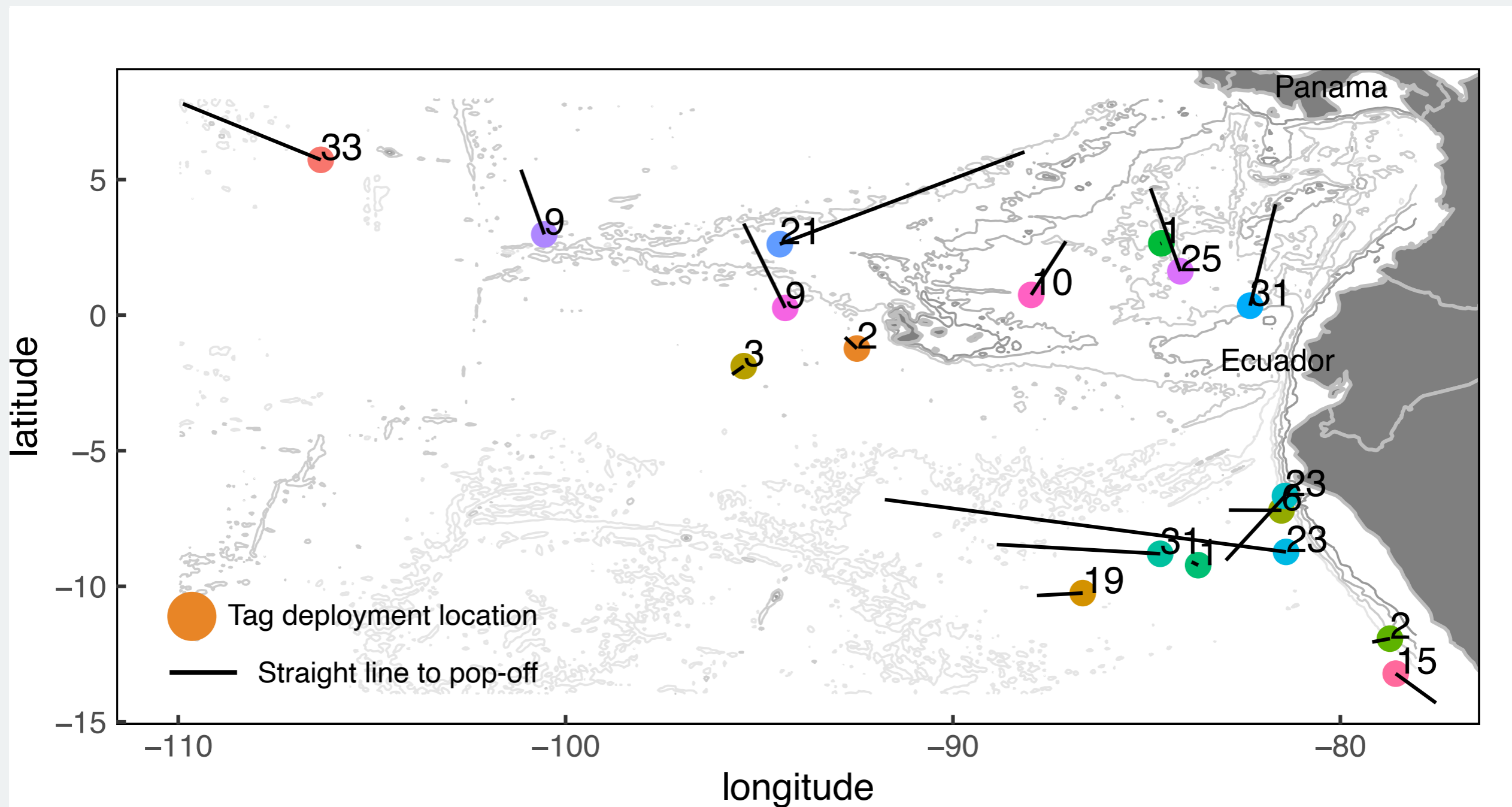
8% Mortality



80% Mortality



# Preliminary Results



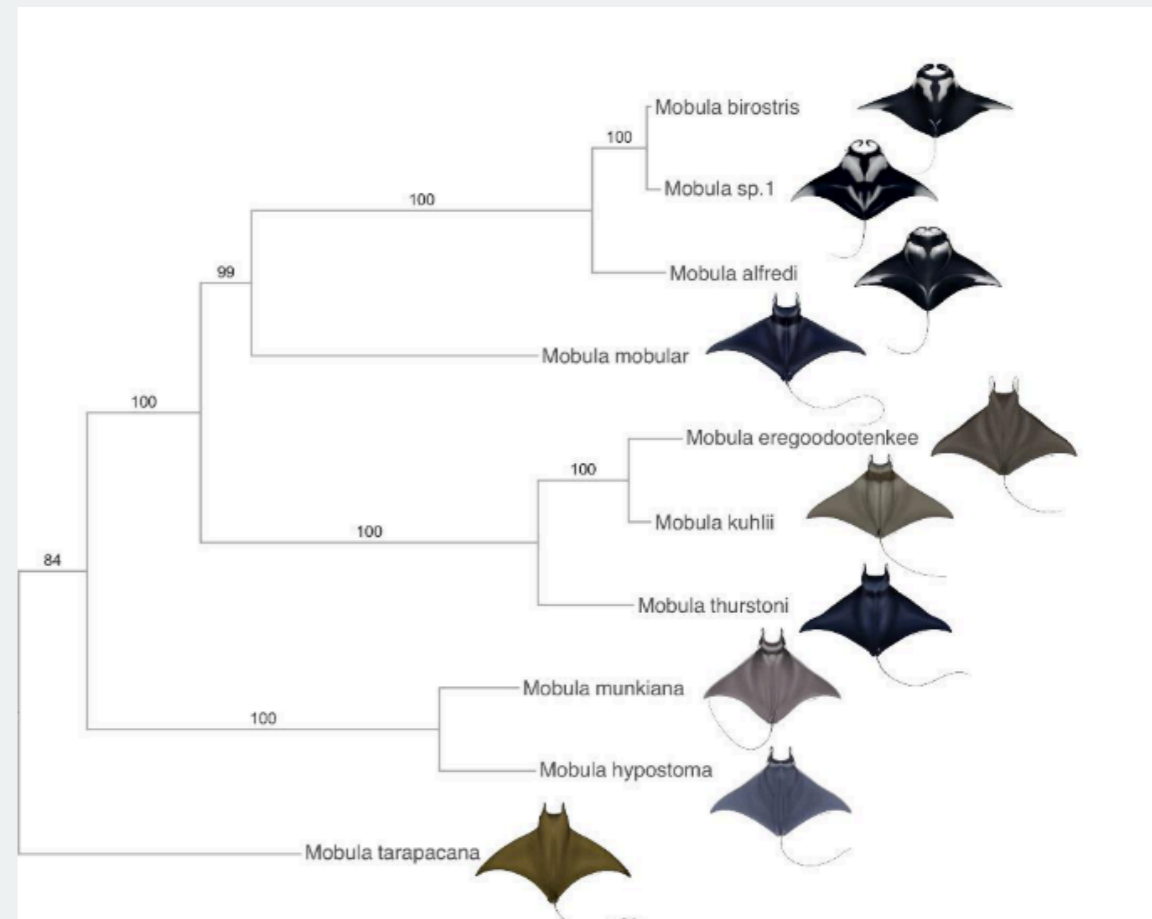
# Skipper workshops supported by ISSF

- Developed mobula bycatch survey for skippers, crew, and observers
- Funding to host 2-3 skipper workshops in Manta, Ecuador, 2021
- Skippers collaborate to develop ideas for gear/handling modification, or improve existing one
- ‘Winning’ design to be developed, tested with PAT tags

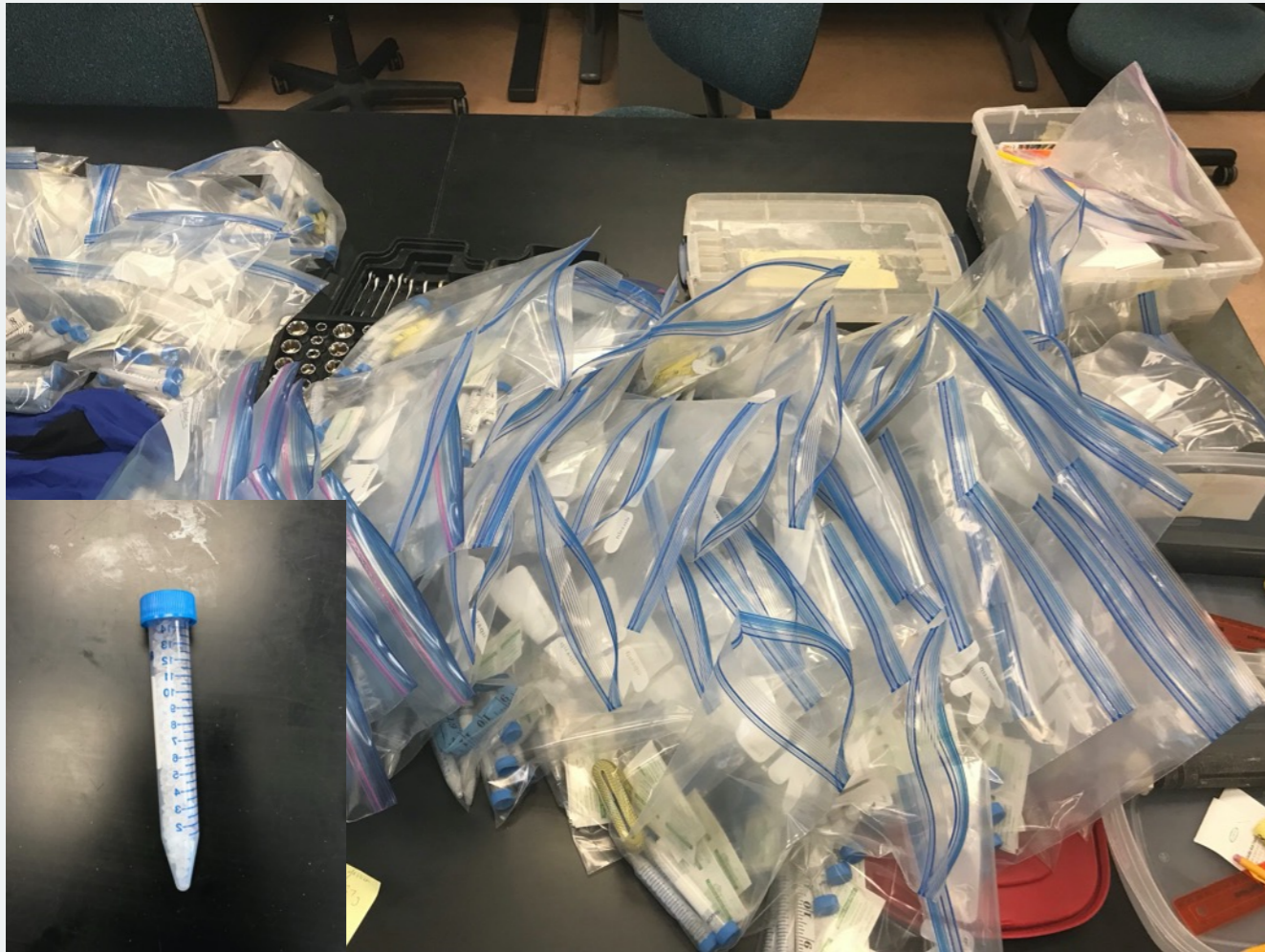


# Mobula population genetics

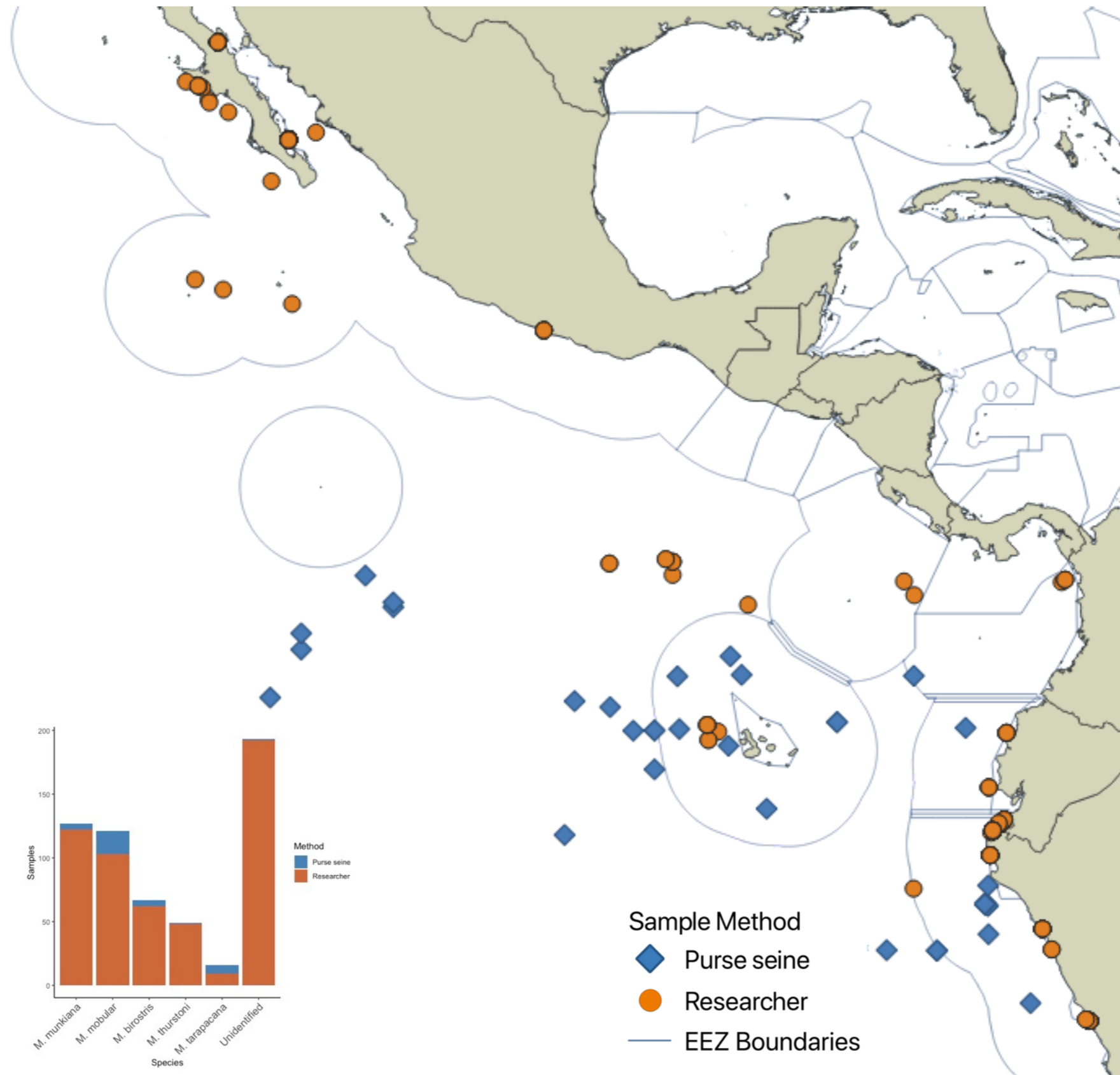
- How accurate are observers' species IDs?
- Is there population structure, or are all populations panmictic?
- Can unique stocks be identified for management?
- What is effective population size?



# Sample collection by observers

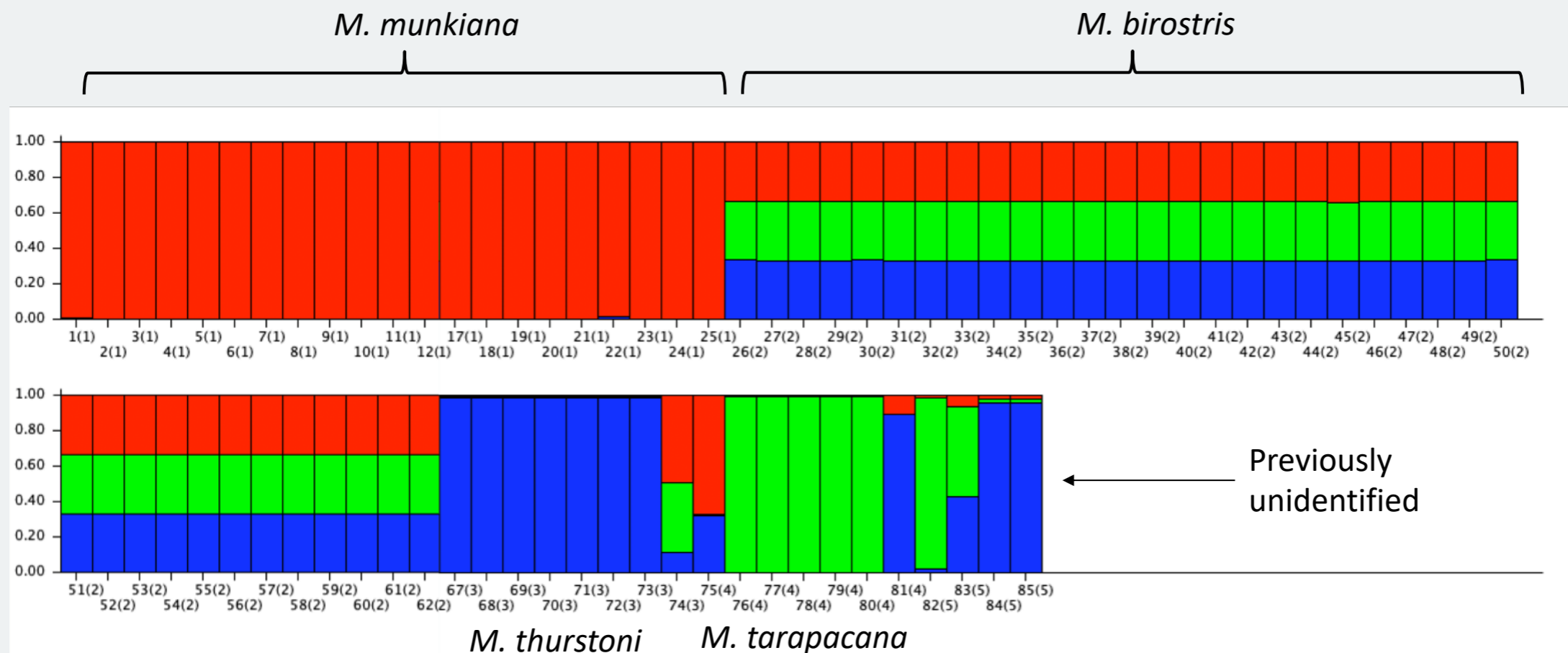


# Mobulid samples collected in the ETP



# RAD-Sequencing fractional genome method

- High-coverage sampling across fragments of genome
- Effective for species without good genomic “infrastructure”





# Thank you

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