

Hawaii Pelagic False Killer Whales

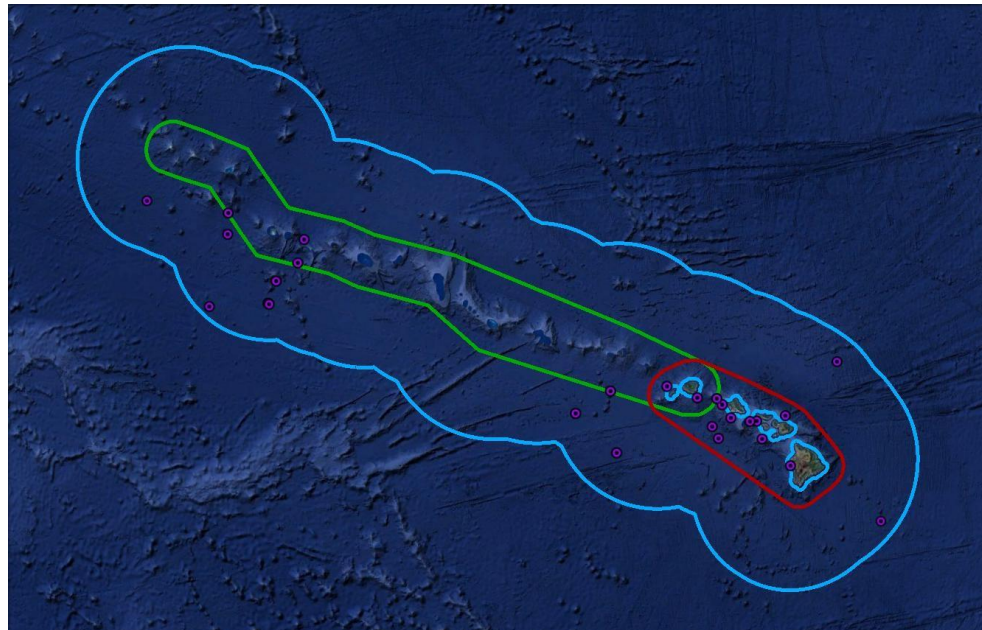
Population biology, status and research to reduce interactions with the Hawaii longline fishery

Erin Oleson

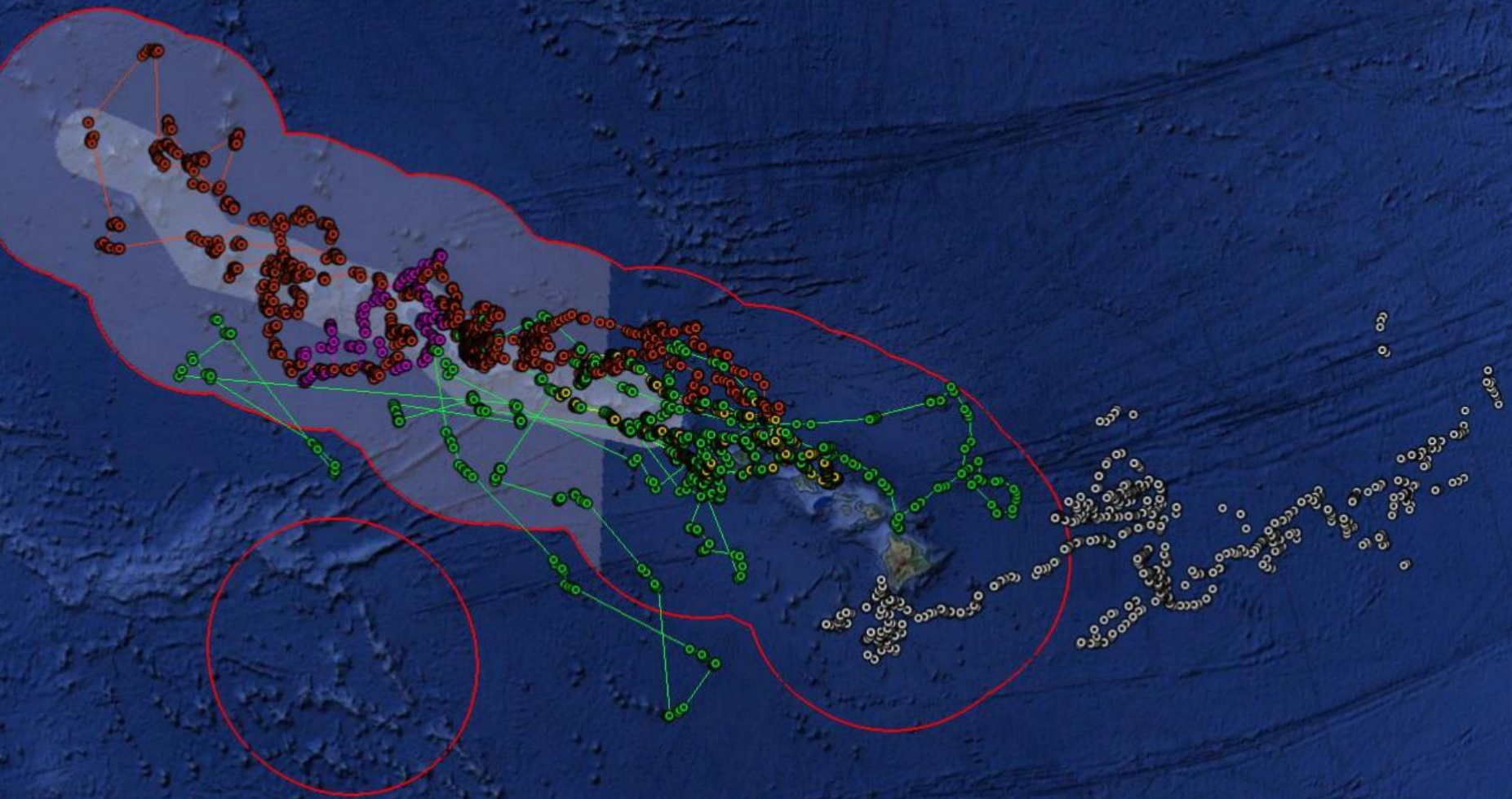
NOAA Fisheries
Pacific Islands Fisheries Science Center

Current HI FKW Stock Status

- Three populations:
 - **MHI Insular**- abundance ~150 animals, range restricted to within ~70km of the MHI, ESA listed
 - **NWHI**- abundance ~550 animals, range within 90km of NWHI and Kaua'i
 - **Pelagic**- EEZ abundance ~1550 animals, range throughout EEZ and beyond, “high” fisheries bycatch



Pelagic False Killer Whale Telemetry Data



GEBCO



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Foraging behavior

- Hunt in dispersed subgroups
- Primarily on large pelagic fish
- Frequently sharing prey



Opah



Mahi mahi



Yellowfin tuna



Skipjack tuna



Monchong



Ono/wahoo



Threadfin jack

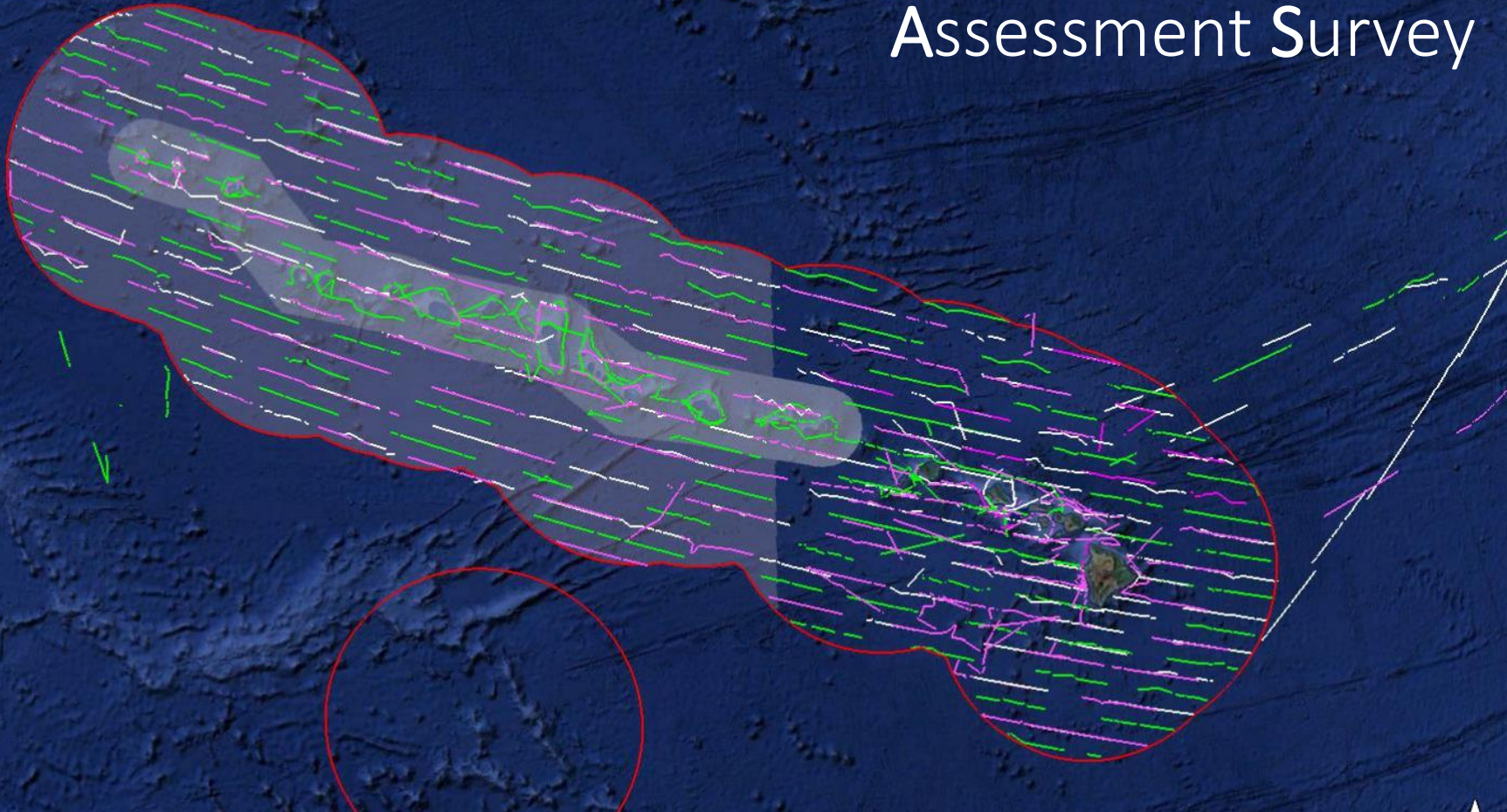


Swordfish

Swordfish

Photos by D.J.
McSweeney, R.W.
Baird, D. Perrine, C.
Babbitt

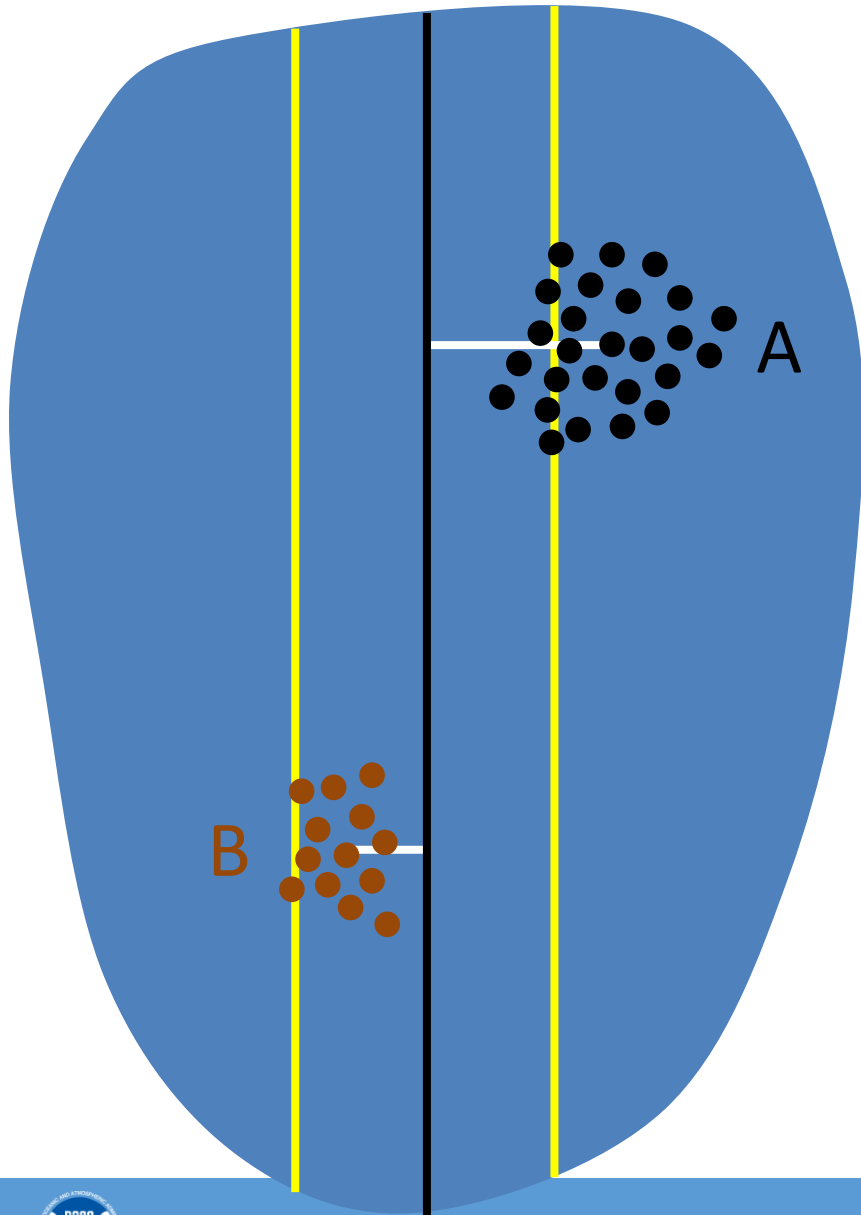
Hawaiian Islands Cetacean Ecosystem Assessment Survey



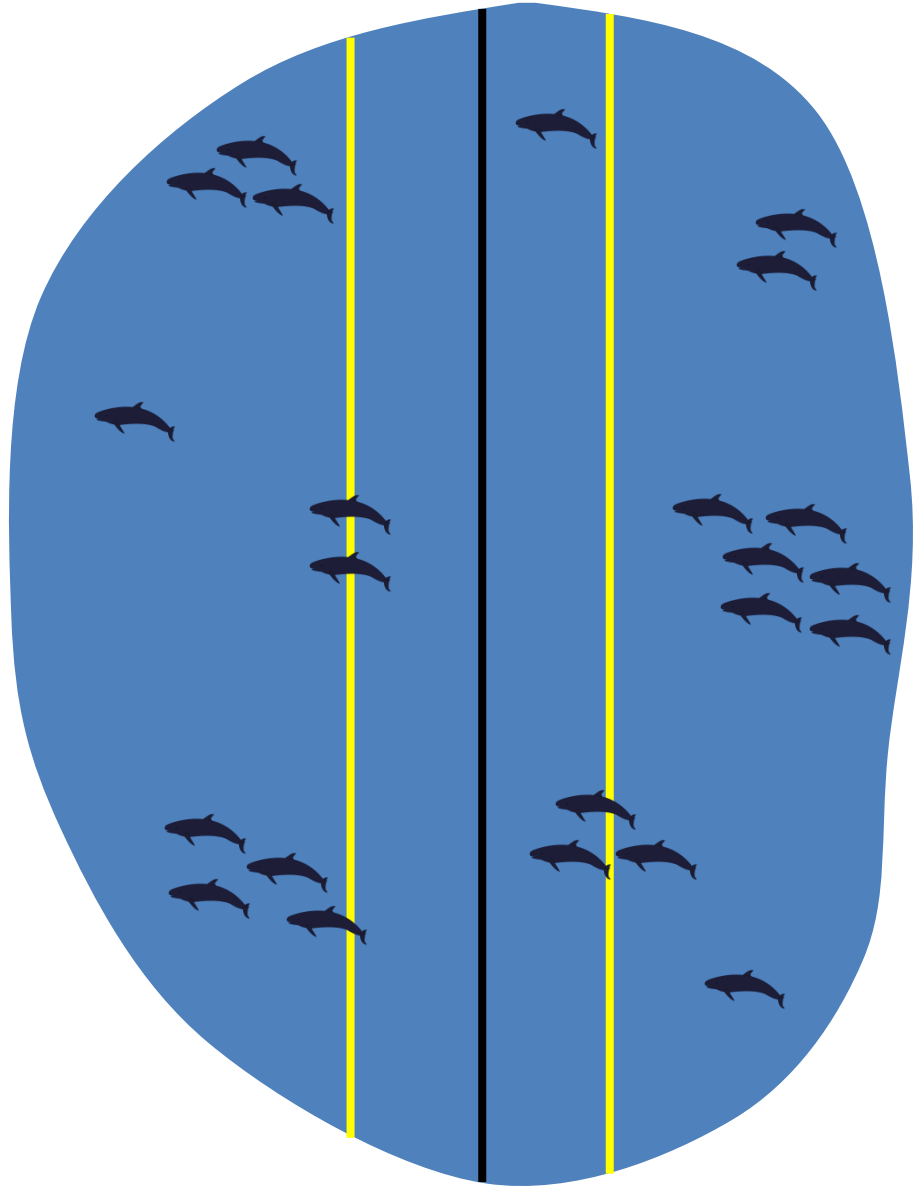
- Three surveys to date: 2002, 2010, 2017
- Provide primary abundance data for pelagic false killer whales
- Group size estimation approach has changed with each survey



In theory...

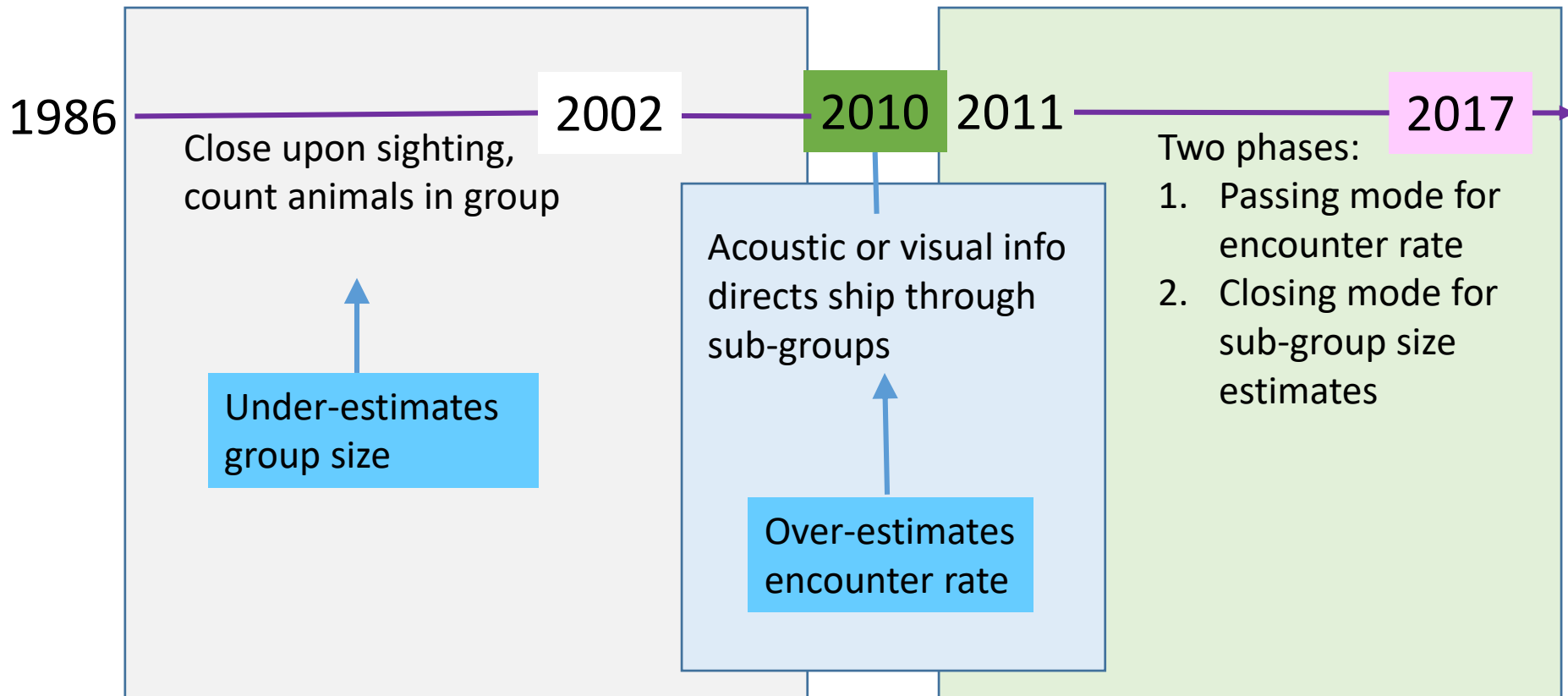


In reality...



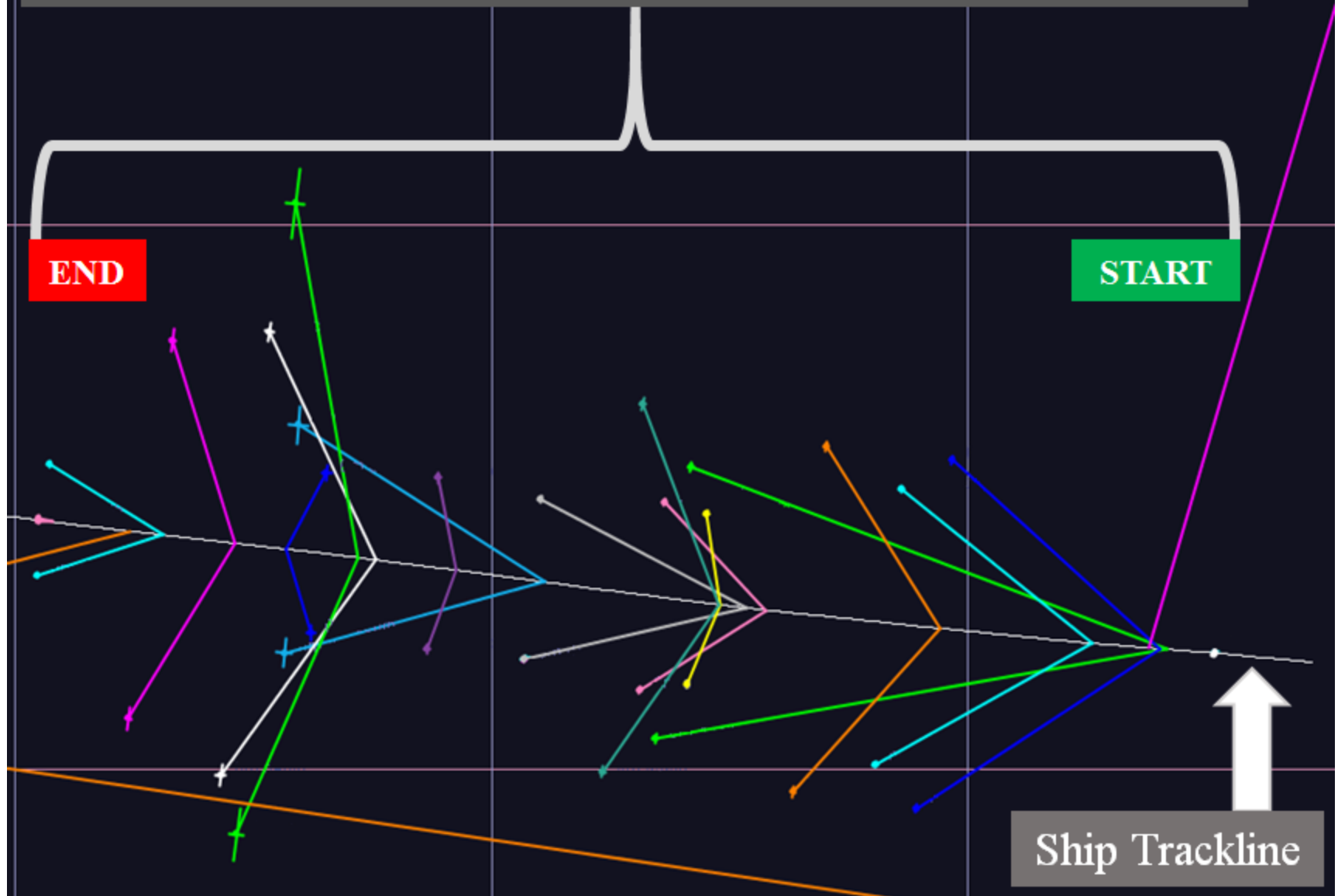
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Evolving Data Collection for False Killer Whales



PHASE 1:

Acoustics 19 subgroups & Visuals 18 subgroups over 19.3 nmi



Comparing Pelagic FKW Abundance Estimates

Parameter	2002	2010	2017
n	# groups (=1)	# subgroups, probabilistically (=11.6)	# Phase 1 subgroups
\bar{s}	group size (=10.3)	subgroup size (=3.14)	subgroup size
ESW	pooled FKW sightings in CenPac/ETP 1986-2005	pooled FKW sightings in CenPac 1986-2010	pooled FKW sightings in CenPac 1986-2017
L	standard effort distance	standard effort distance	standard and fine-scale effort distance
$g(0)$	0.76 (CV=0.14)	0.76 (CV=0.14)	Beaufort-specific
role of acoustics	none	integrated, group size estimation protocol	independent, Phase 1; integrated, Phase 2
A	all Hawaii EEZ	Hawaii EEZ – 40 km around MHI	Hawaii EEZ – 11 km around MHI
N (CV, 95% CI)	484 (0.93, 103-2.274)	1540 (0.67, 470-5,047)	??

$$D = \frac{n \cdot \bar{s}}{2 \cdot ESW \cdot L \cdot g(0)}$$



What about these 3 estimates?

- Variation in data collection and analysis methods means that estimates are not directly comparable
- Each represent adaptation to *improve* EEZ abundance estimate
- Limitations across estimates:

Low encounter rates

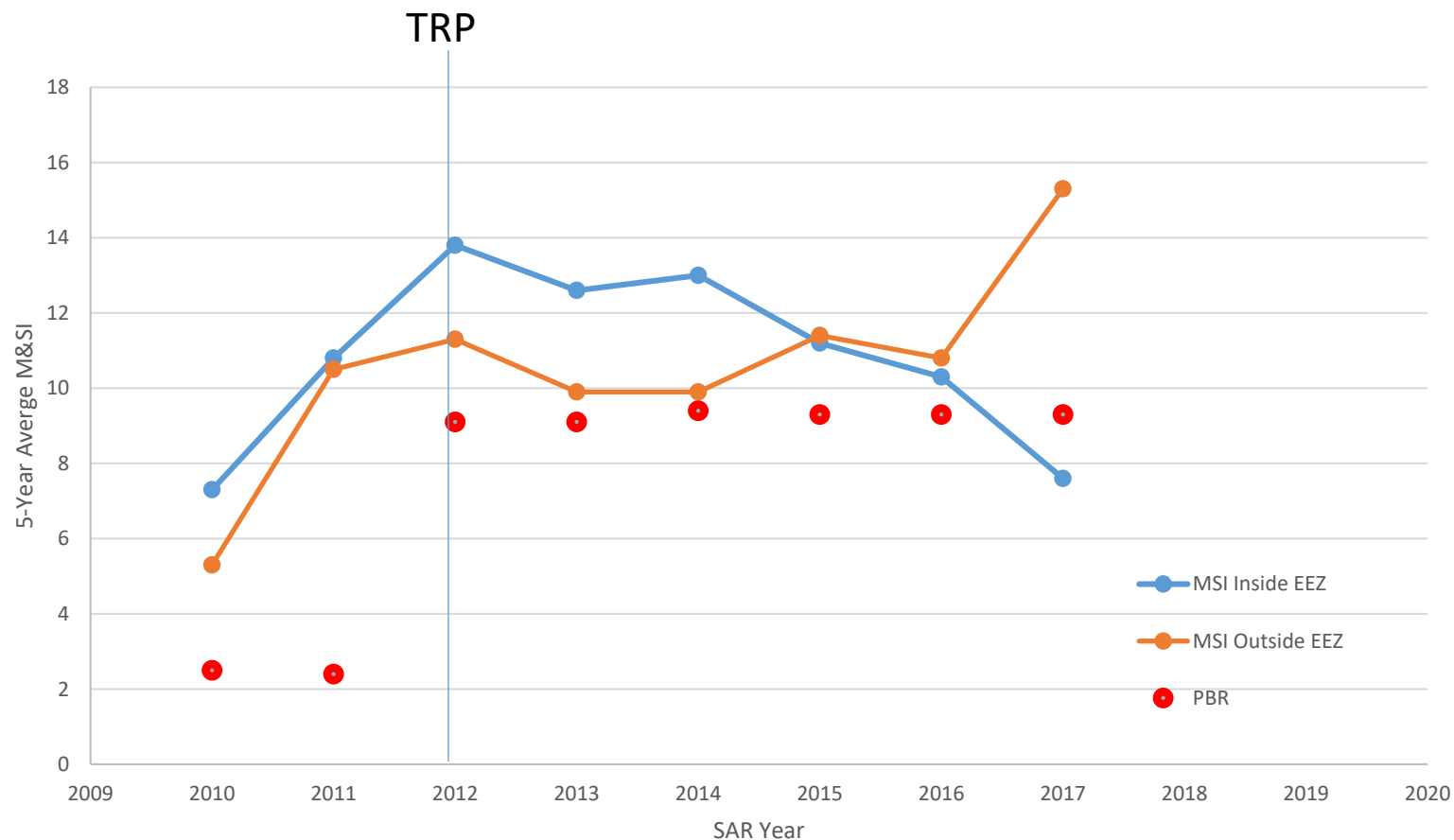
- Leads to high variance
- Estimates likely to remain imprecise and overlapping

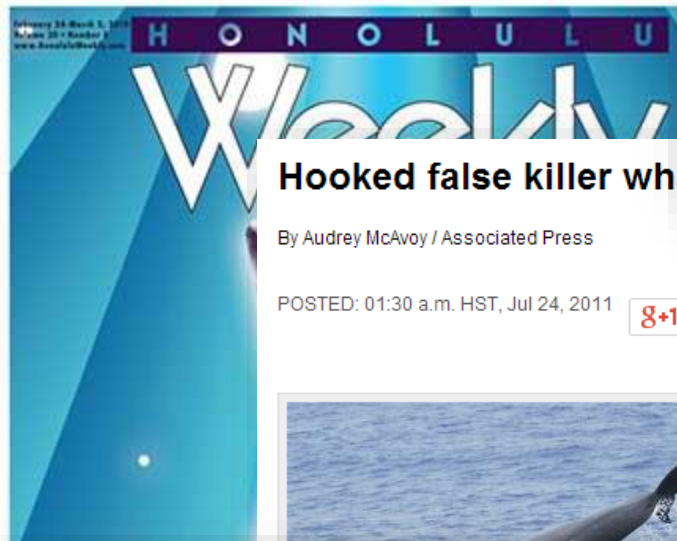
EEZ as a boundary

- Jurisdictional, not biological
- Changes in abundance may not reflect population status



Pelagic False Killer Whale Assessment





Fisheries service sued over false killer whale deaths

By Star-Advertiser staff

Hooked false killer wh

By Audrey McAvoy / Associated Press

POSTED: 01:30 a.m. HST, Jul 24, 2011

g+1 0

Recommend

Be the first of your friends to recommend this.



The federal government is moving to protect a rare dolphin species from getting accidentally snagged off Hawaii's shores.

New rules propo



False Killer Whales to receive protection

Submitted by Editor on Sat, 20/10/2012 - 22:08

Hawaiian islands Dolphins

US Fisheries Service which is charged with protecting marine mammals has to finalize and implement protections for false killer whales by November 30, 2012, court rules.



False killer whale hookings threaten longline tuna fishing

A second false killer whale hooking will close 112K sq. nautical miles south of main Hawaiian islands

UPDATED 10:45 AM HST Mar 07, 2013

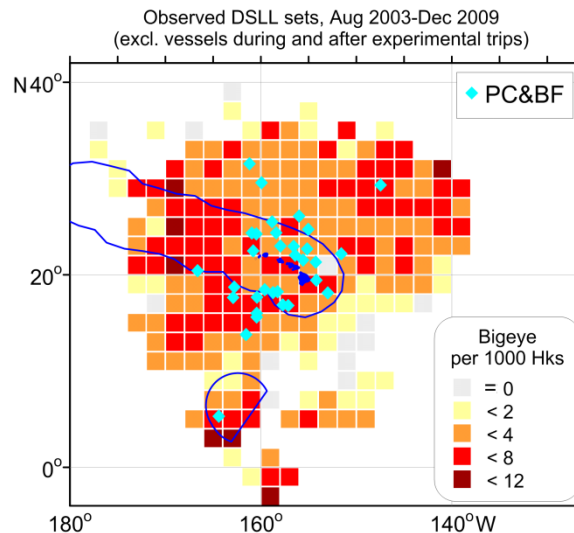
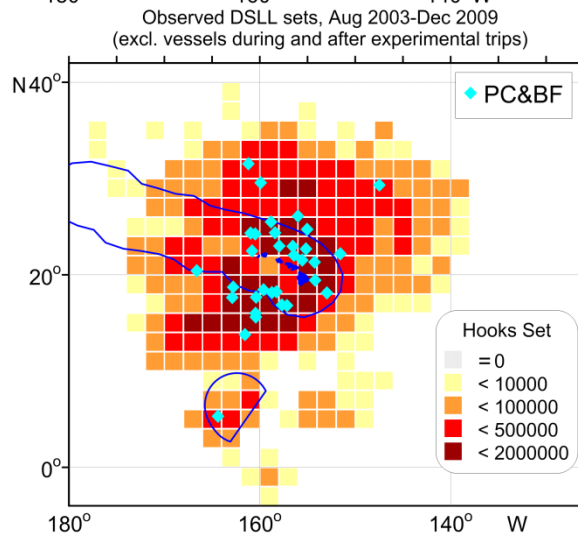
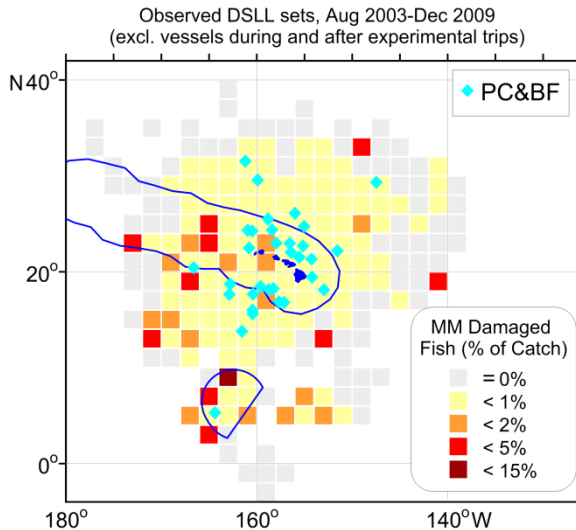
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Spatial patterns of depredation

Major patterns:

1. Few hotspots of depredation
2. Depredation & bycatch are linked, but not linearly
3. The more hooks set, the higher likelihood of bycatch



4. Distribution of target fish catch not a strong predictor for depredation or bycatch

Acoustic Monitoring of the Fishery

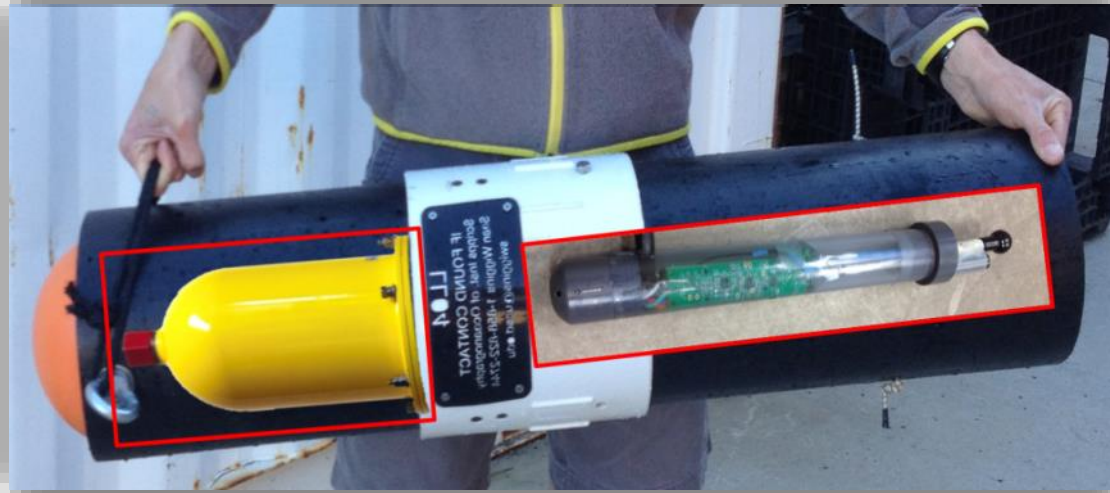
Deploy acoustic recorders on
longline gear to assess:

1. Vessel and gear sounds
2. False killer whale occurrence
3. False killer whale behavior around the gear
4. Identify potential acoustic cues

In partnership with the Hawaii
Longline Association & the
PIRO Observer Program



Acoustic Monitoring of the Longline Fishery

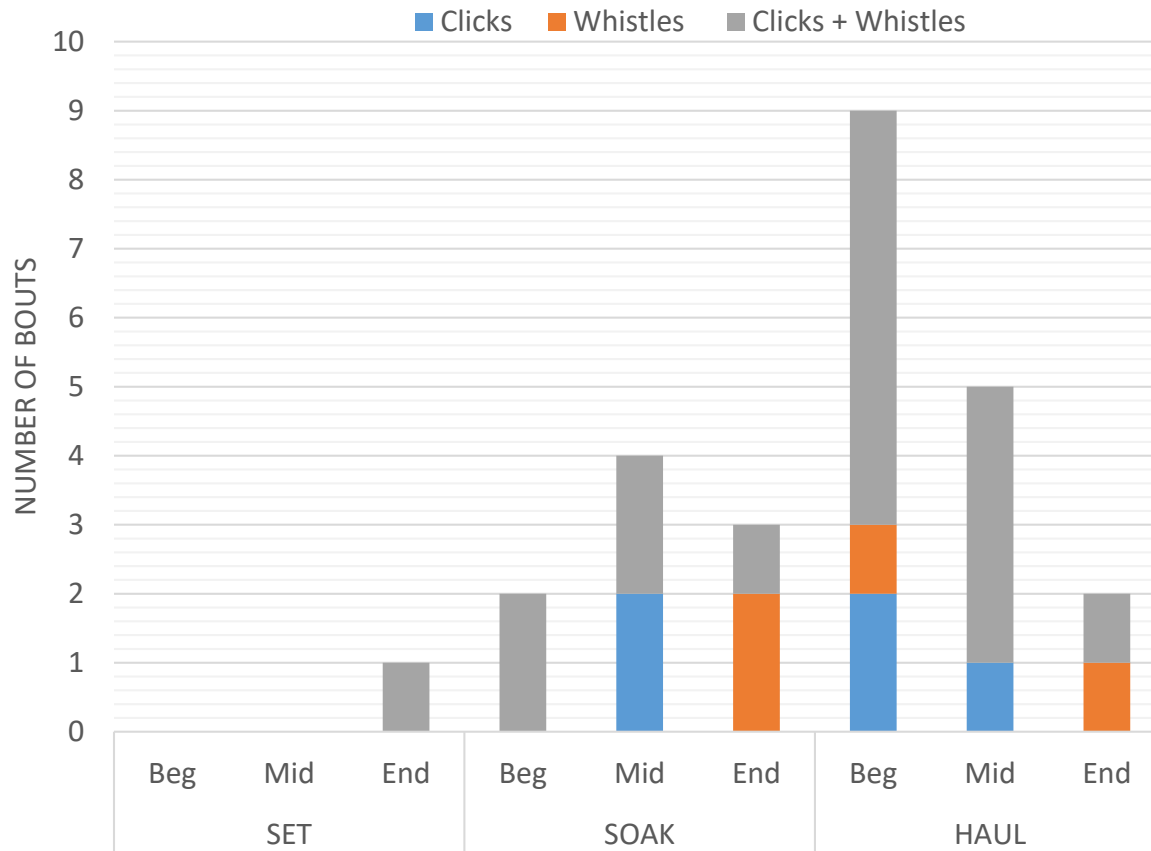


Specific design considerations:

- Continuous broadband ($>100\text{kHz}$) sampling
- Storage for > 15 days @ 15 hours/day
- Small & robust
- Saltwater switch, no at-sea programming
- Vibration isolation
- Flexible deployment orientation

Charter Trips: Results

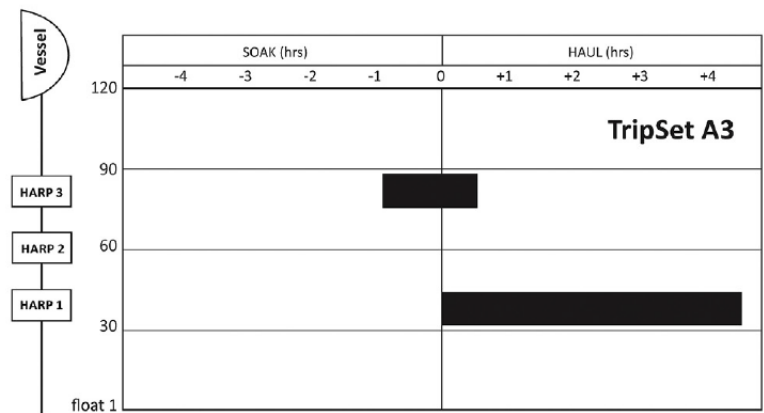
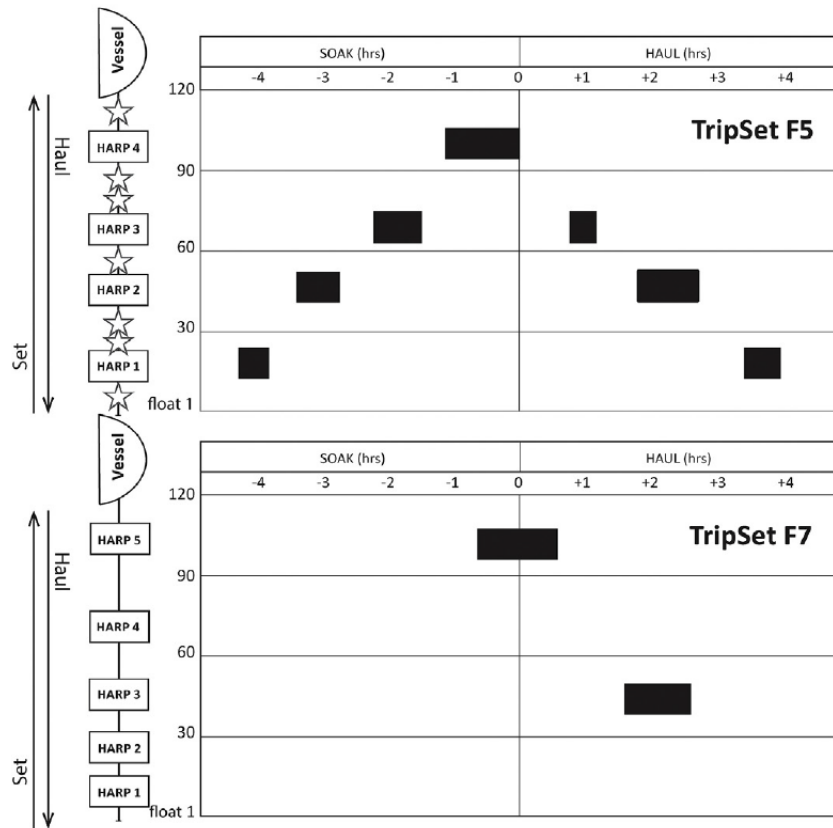
FKW Detections in Relation to Fishing Activities



→ False killer whale detections peak during the haul

Bayless *et al.* 2017 Fisheries Research

False killer whales may remain among the gear for hours and follow the haul

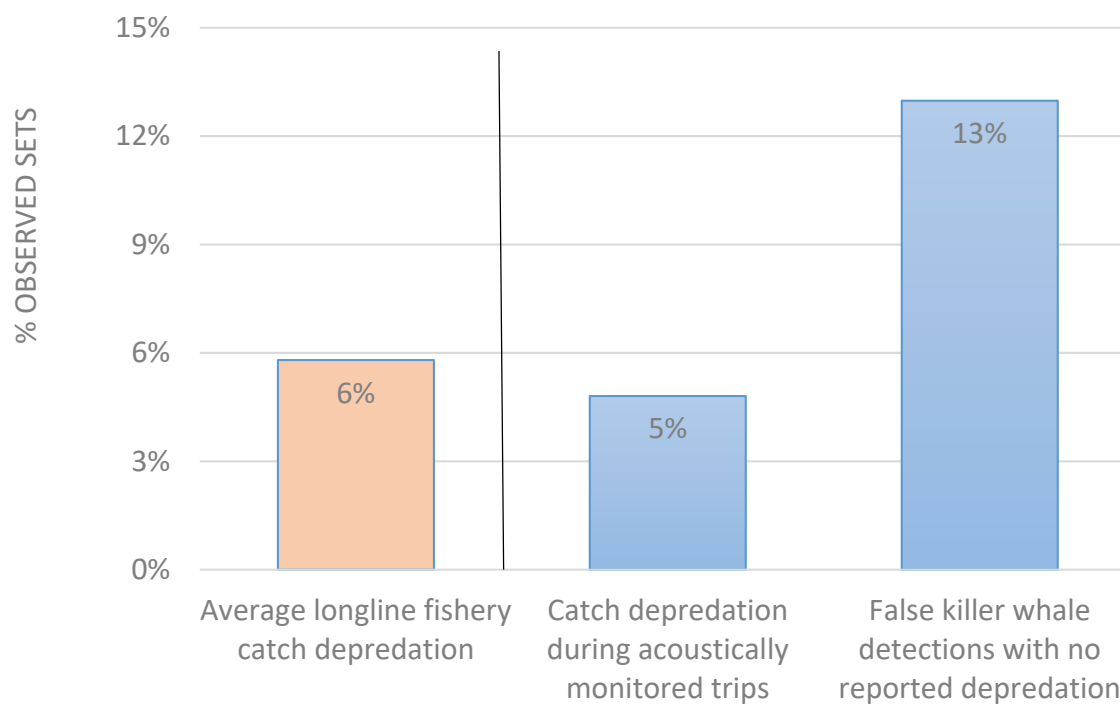


☆ Depredation Occurred

Bayless *et al.* 2017 Fisheries Research

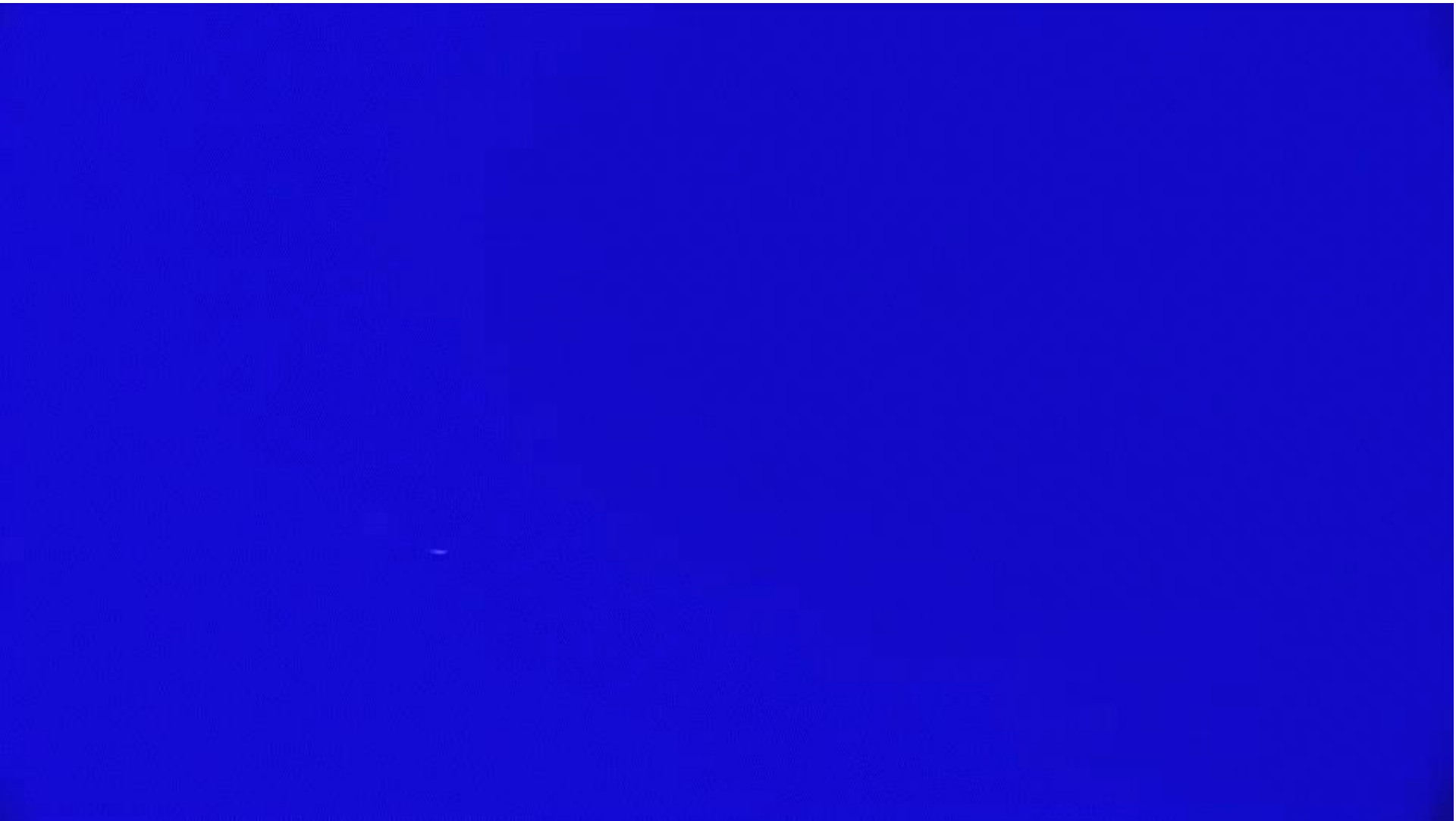
Charter Trips: Results

Acoustic Detections in Relation to Depredation



- False killer whale occurrence near gear is much higher than suggested based on depredation rates alone.

Bayless *et al.* 2017 Fisheries Research

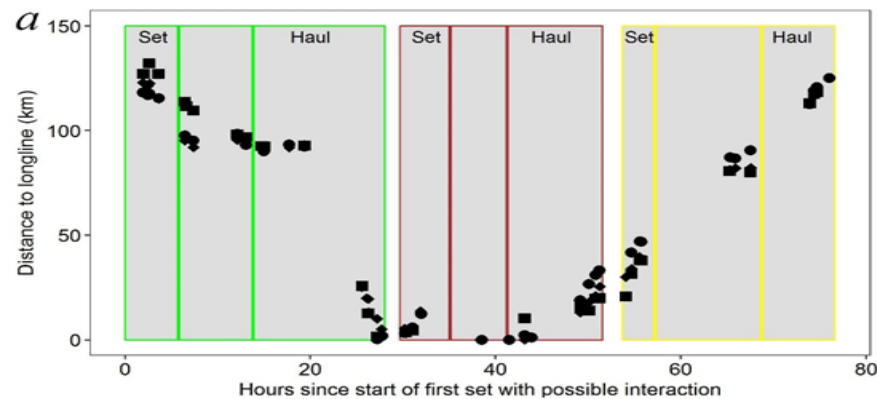


Thode *et al.* 2016 JASA



Insights from tagged false killer whales

- 10% of tagged animal locations within 100 km of a set
- 26 sets (0.6%) with three or more whale positions within 100 km
- (October 2013 group = 21 sets)
- Of these, only six sets (two events) had evidence of interactions

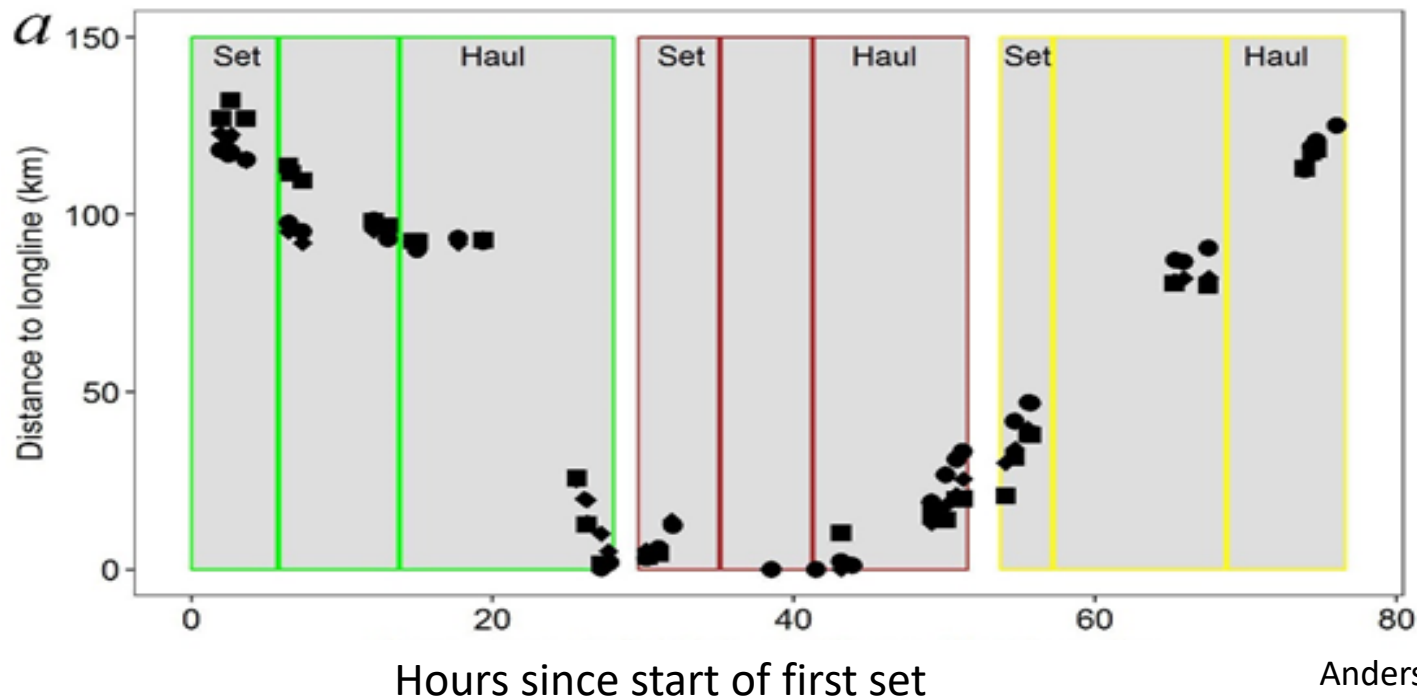


Anderson *et al.* In prep.



Interaction with three consecutive sets

- No observer on board
- Rapid approach from ~100 km away during hauling
- Remained close to gear during second set
- Catch on set 1 and 2 (12 bigeye per set) greater than preceding sets (2, 3, 10) and subsequent sets (4, 0, 6, 5)
- Sets overlapped spatially (i.e., captain did not move vessel in response to FKWs)



Anderson *et al.* In prep.



Interaction with three consecutive sets

- No observer on board
- Appeared to follow vessel during first two sets and approached closer during haul
- Crossed over gear on third set
- Catch on set 1 and 2 (25, 20 bigeye) greater than 3rd set (0)
- Vessel moved ~50 km between set 1 and 2, set 3 started where set 2 ended



Anderson *et al.* In prep.

False killer whales are smarter than us

- Depredation and bycatch continue to be a problem
 - In 2018 and 2019 the Southern Exclusion Zone was closed due to 2 takes inside the EEZ
- We are developing new analytical and processing approaches for examining HICEAS visual and passive acoustic data
- Currently working on habitat-based density estimates for the fishery area



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