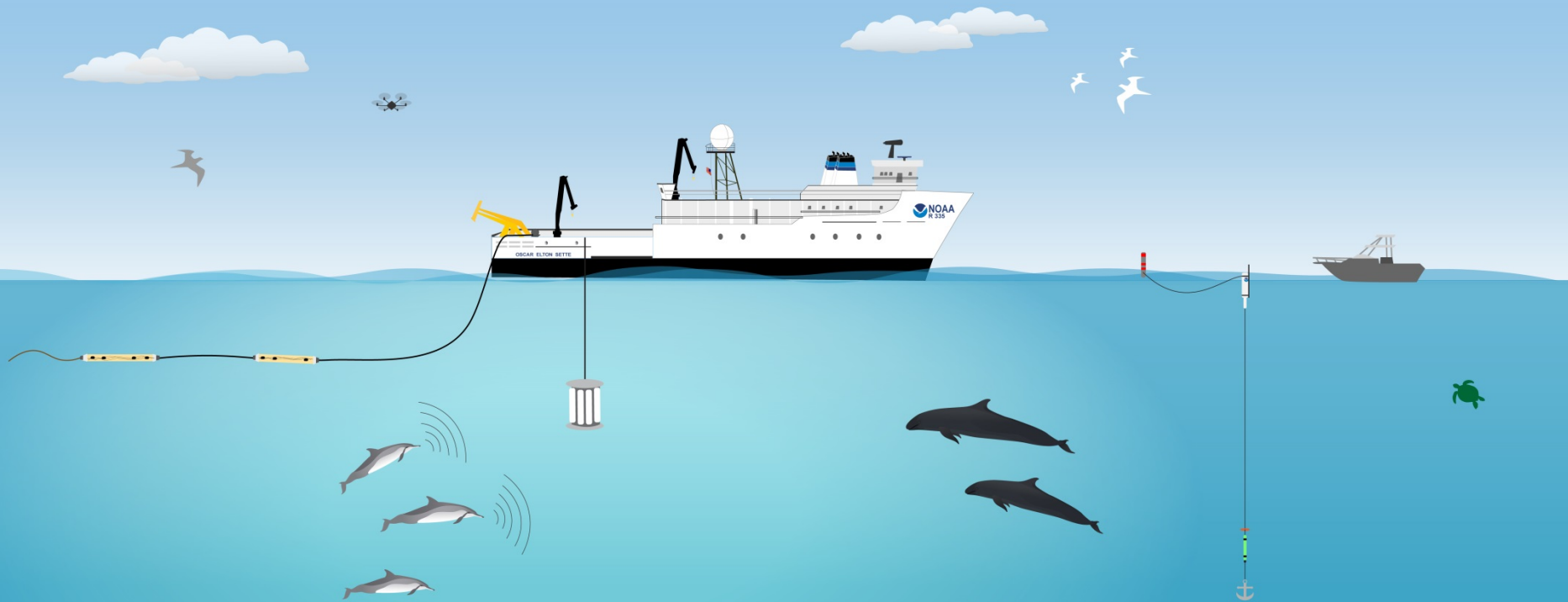


Hawaiian Islands Cetacean & Ecosystem Assessment Survey 2017



Amanda L. Bradford

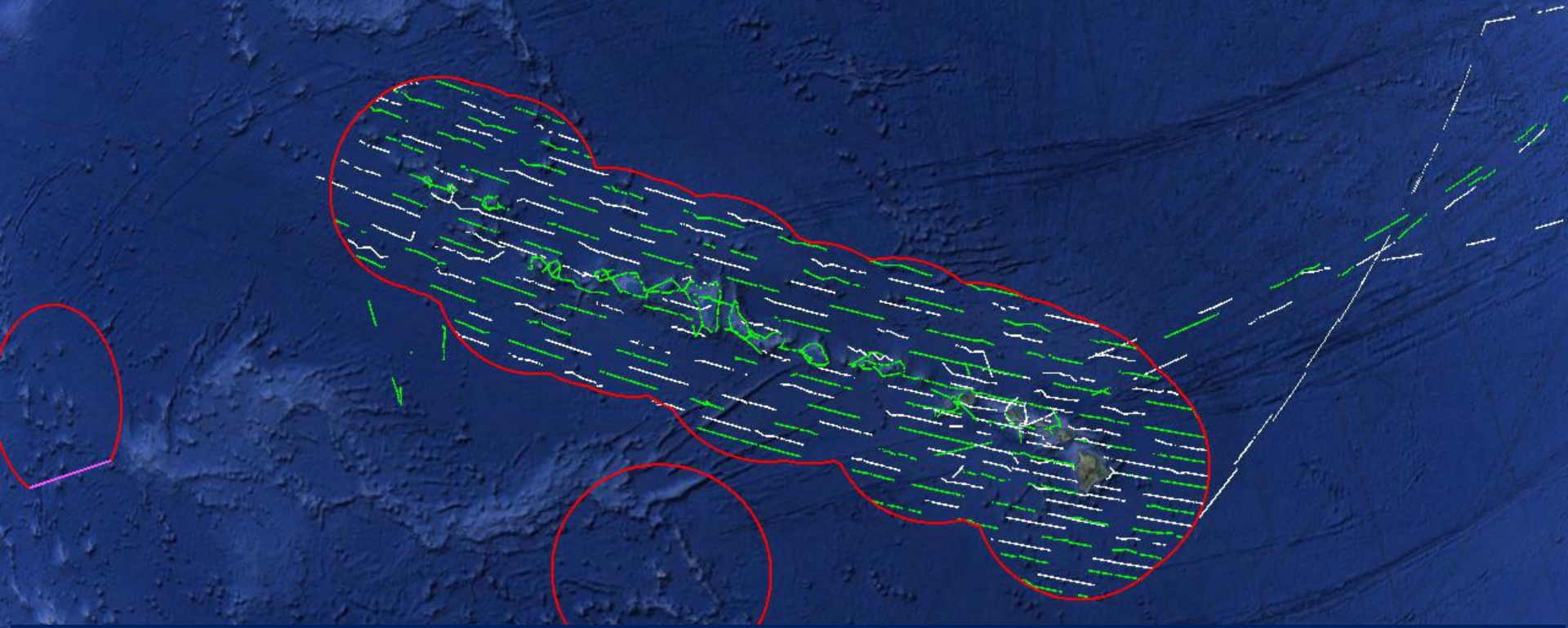
Cetacean Research Program

NOAA Fisheries, Pacific Islands Fisheries Science Center

25 cetacean species in the Hawaiian Archipelago



Hawaiian Islands Cetacean Ecosystem Assessment Survey 2017



HICEAS 2017 is the 3rd survey of the Hawaiian Archipelago
Prior surveys in 2002 and 2010, resulted in abundance
estimates for 19 species

Goals of HICEAS 2017

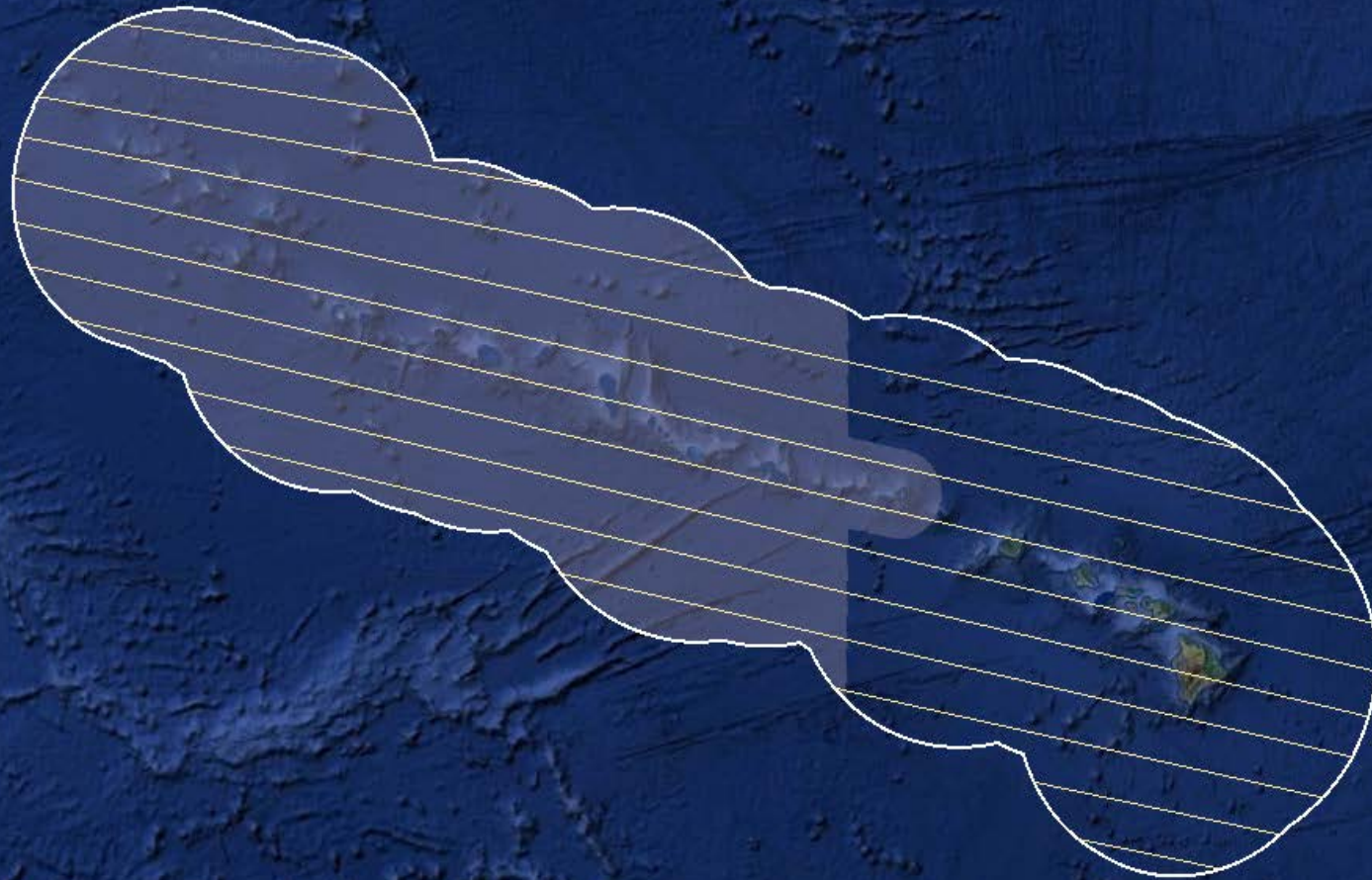
PIFSC & SWFSC collaboration using R/Vs *Sette* & *Lasker* to complete 187 days-at-sea

1. EEZ-wide systematic visual & passive acoustic line-transect survey of cetaceans for updated density & abundance estimates
2. Collection of photos, tissue samples, and deployment of satellite tags for assessment of population structure & movements
3. Ecosystem observations (oceanographic sampling, seabird observations)
4. Ancillary projects for cetacean health assessment, noise monitoring, testing new technologies, sea turtle observations...

Collecting data for cetacean assessment

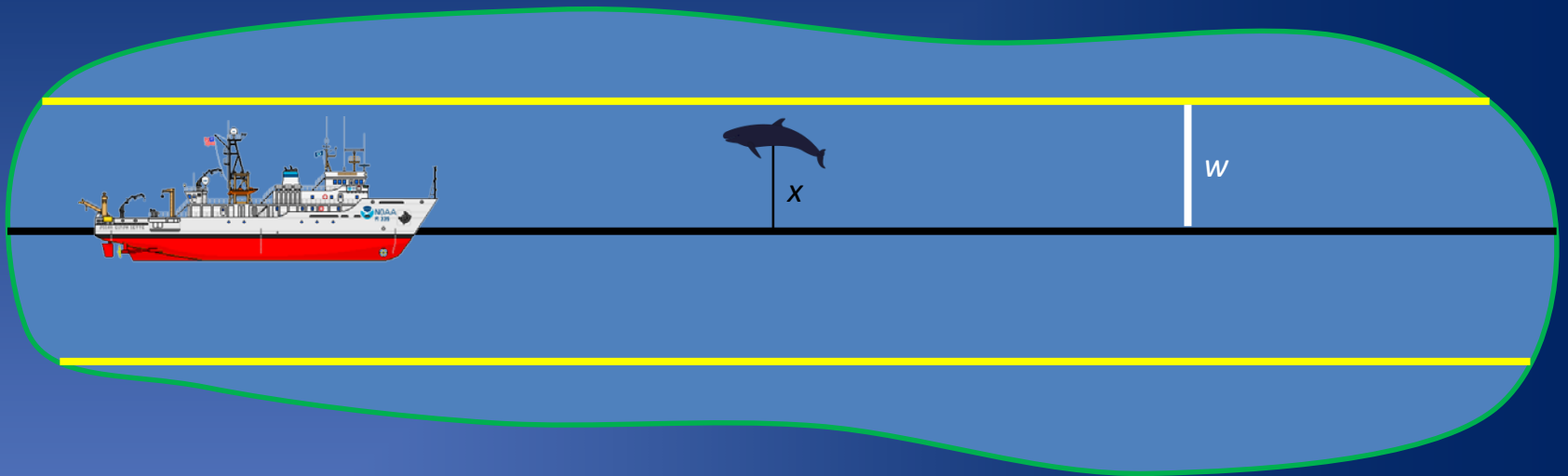


HICEAS 2017 study area & tracklines

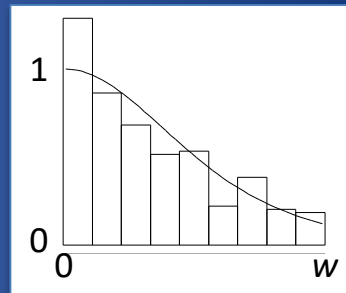


What is line-transect sampling?

- Based on surveying an area on established lines
- Using detection rates of sightings to estimate density
- Multiply density by size of area to get population size



Detection function



ESW

Line-transect abundance estimation

- Effective strip width \Rightarrow ESW
- Number of sightings \Rightarrow n
- Average sighting group size \Rightarrow s
- Length of transect lines \Rightarrow L
- Trackline detection probability \Rightarrow $g(0)$

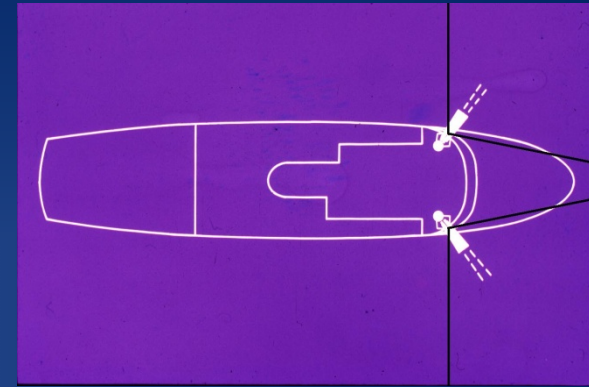
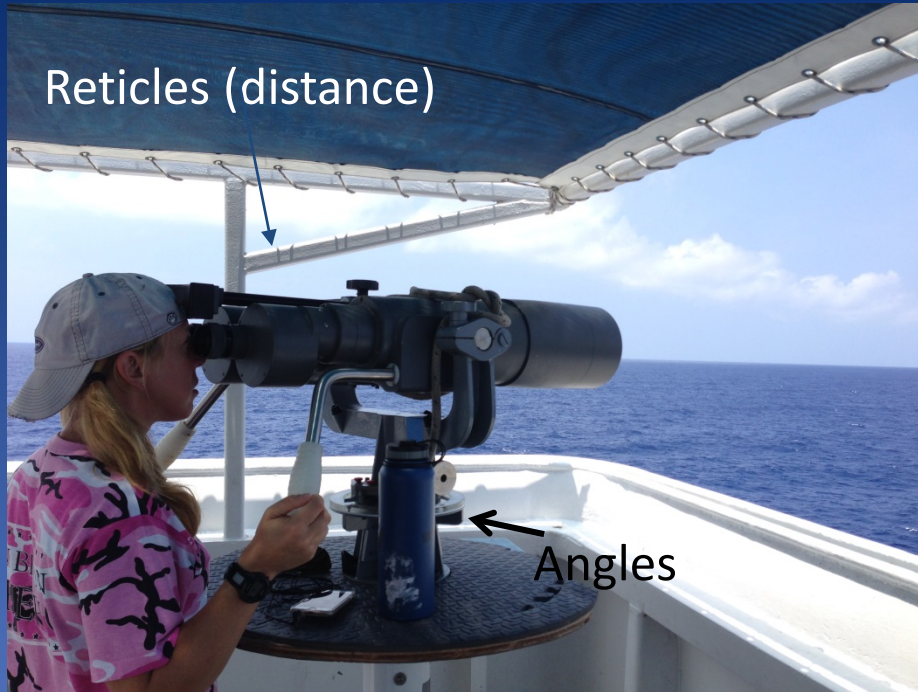
$$D = \frac{n \cdot s}{2 \cdot ESW \cdot L \cdot g(0)}$$



$$N = D \cdot A$$

Cetacean & seabird visual observations

25X “Big Eye” binoculars



Data Recorder / 7X Binos



- 2 big-eye observers for cetaceans
- 1 naked-eye observer for seabirds
- 1 data recorder / trackline observer

Passive acoustic survey for cetaceans

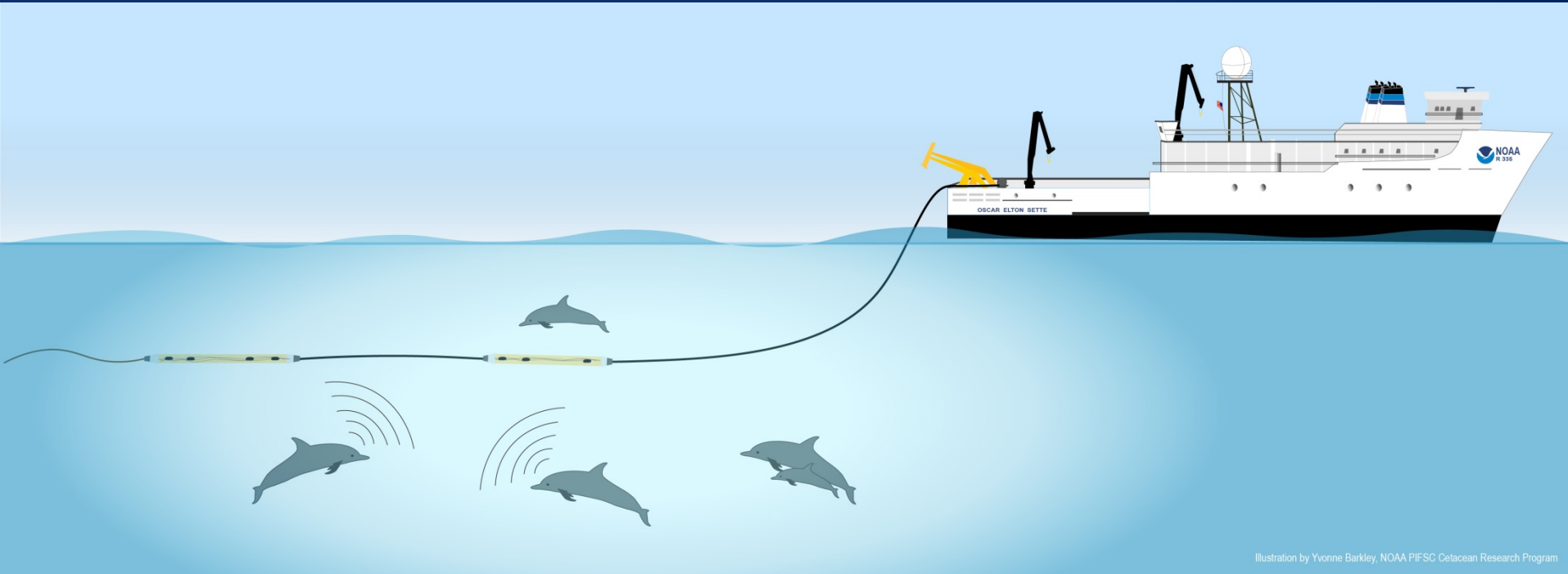
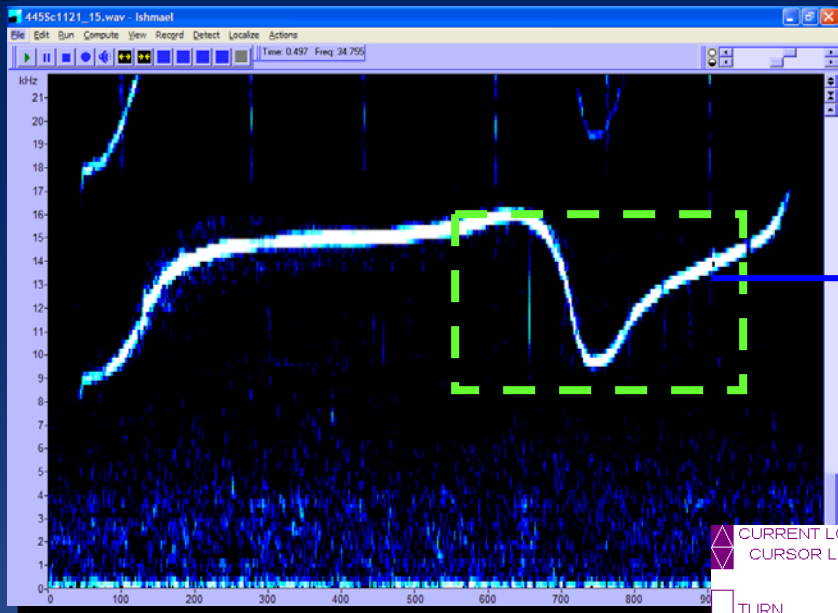
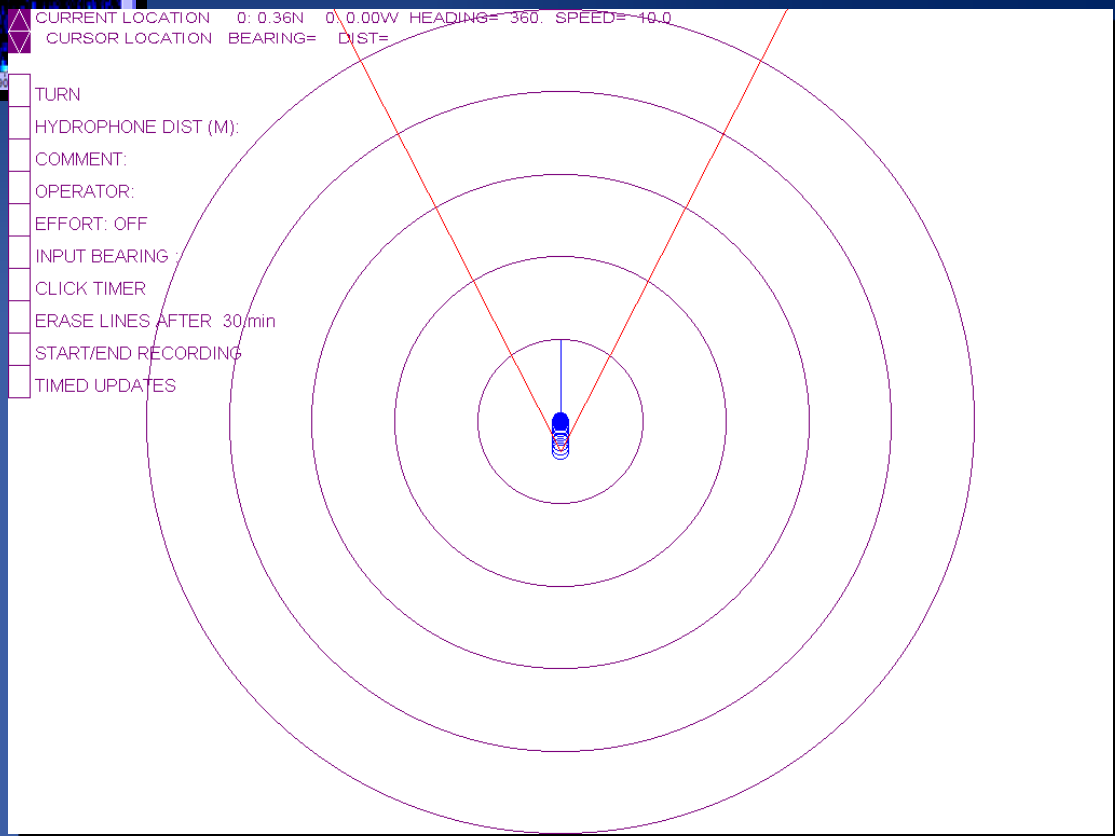


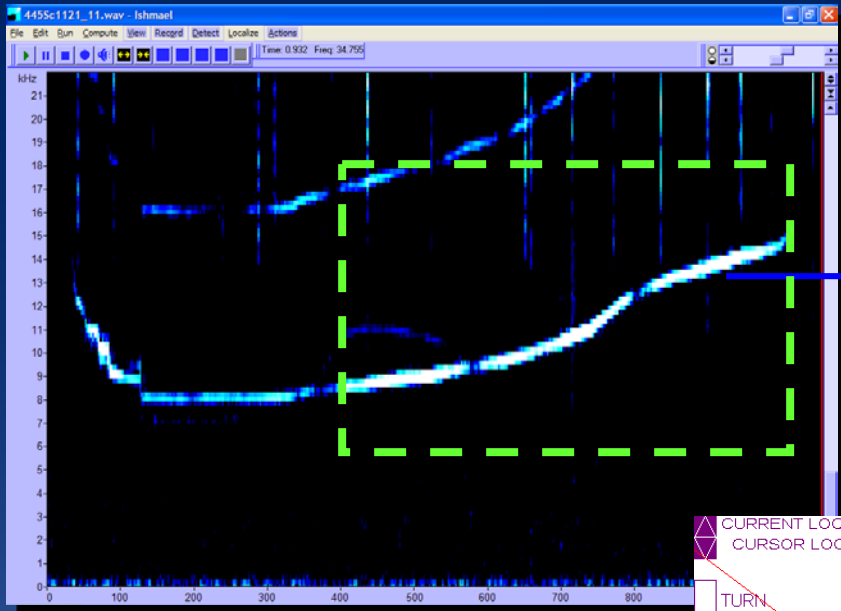
Illustration by Yvonne Barkley, NOAA PIFSC Cetacean Research Program

Listening with a towed hydrophone array augments the visual surveys by increasing our encounter rate and encounter distance

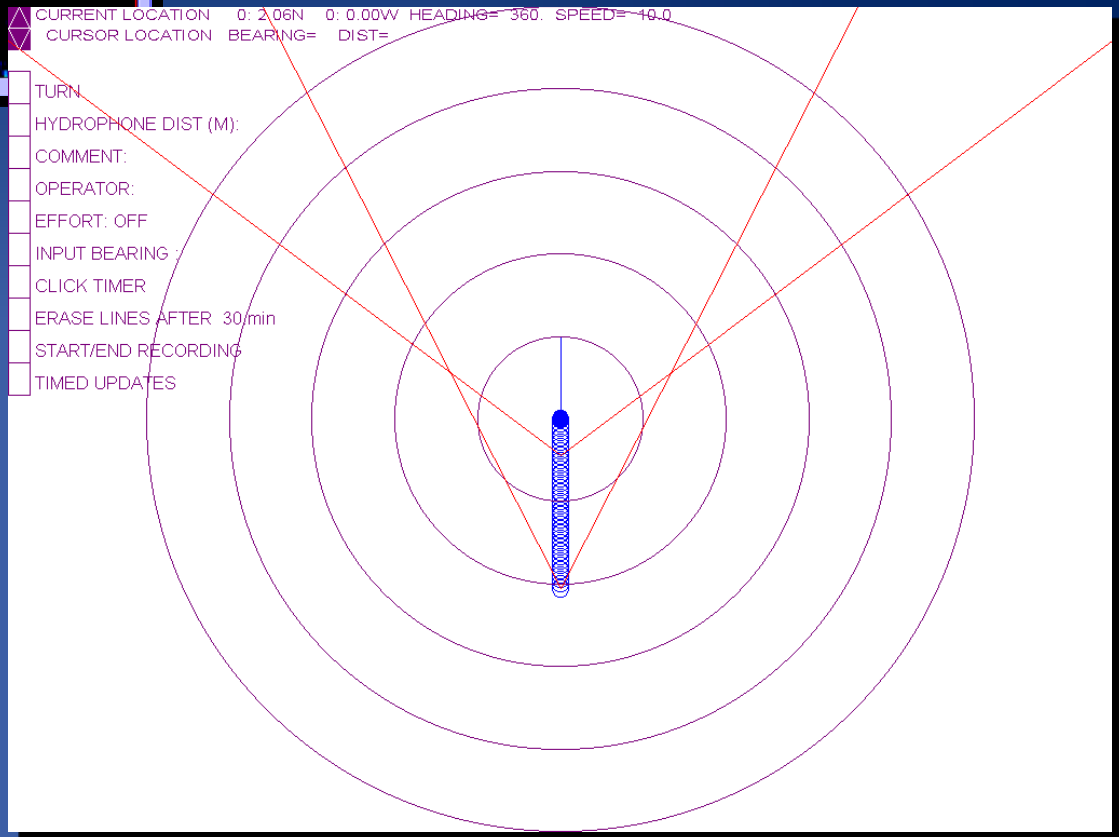


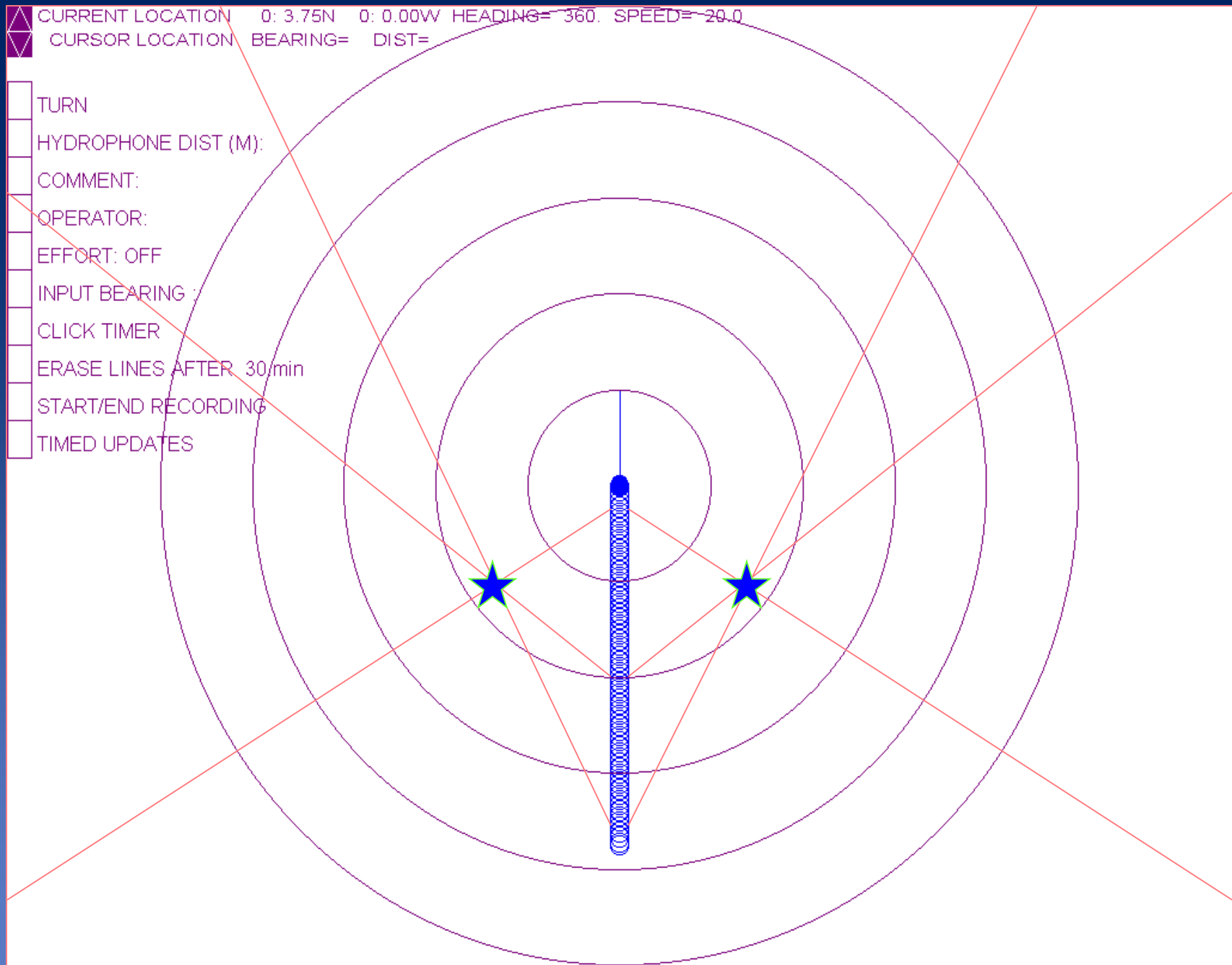
27°





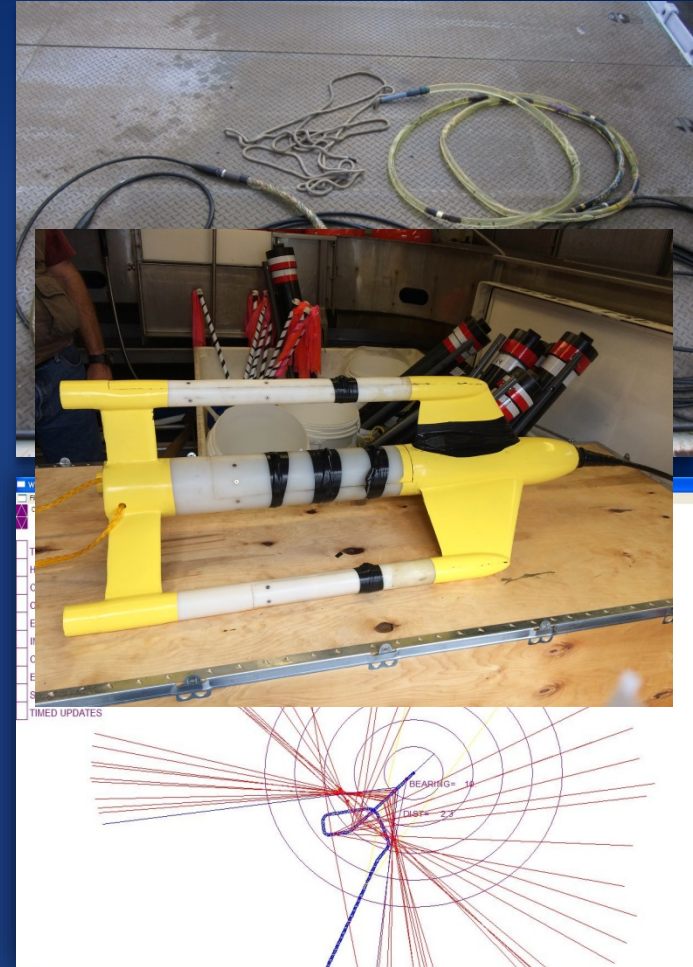
53°





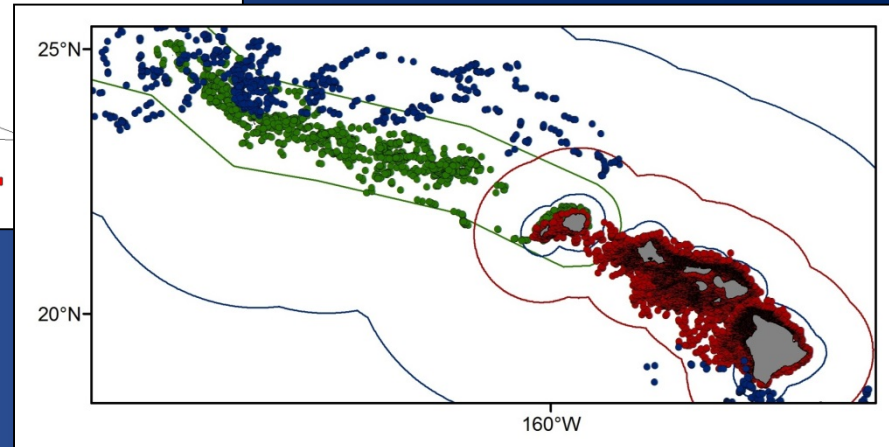
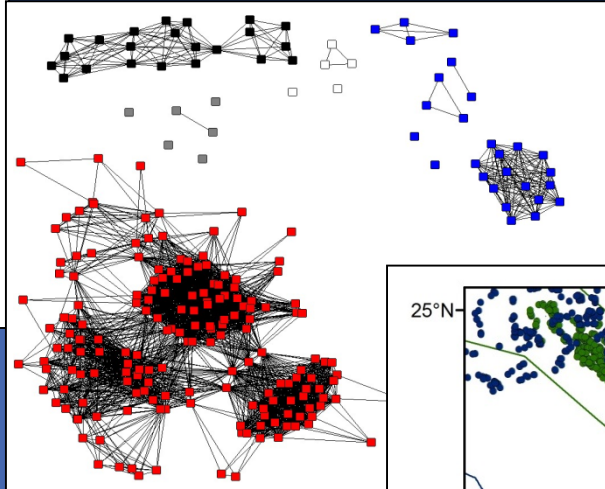
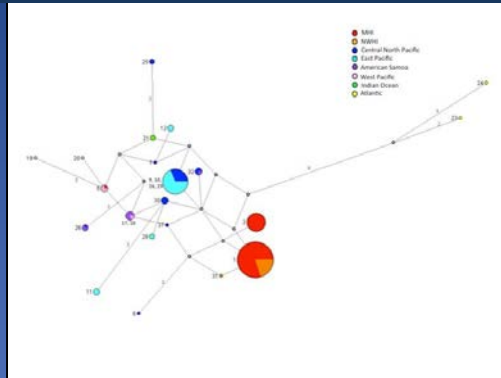
Towed hydrophone arrays augment standard visual surveys

- Acoustic detection rates are often 2-3x higher than visual sighting rates
- There are limitations though...
 - We can't identify all species based on their sounds
 - A line array results in left-right ambiguity in location
- On HICEAS we'll test new technology hoping to overcome these limitations



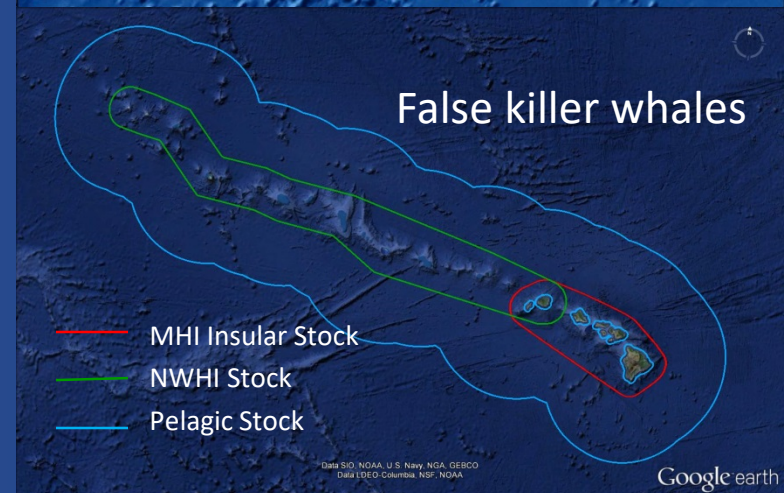
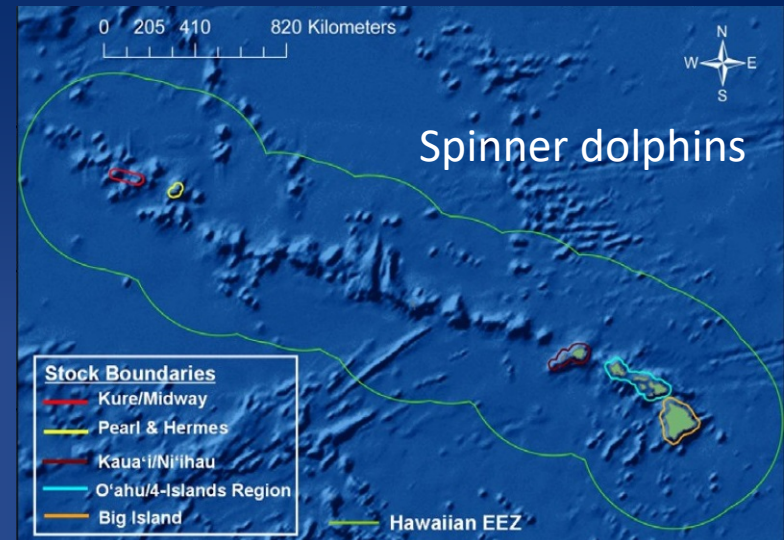
HICEAS 2017 – Beyond abundance & density

Animal photographs, biopsy samples, and satellite tags will provide data to assess population range, movements, & structure

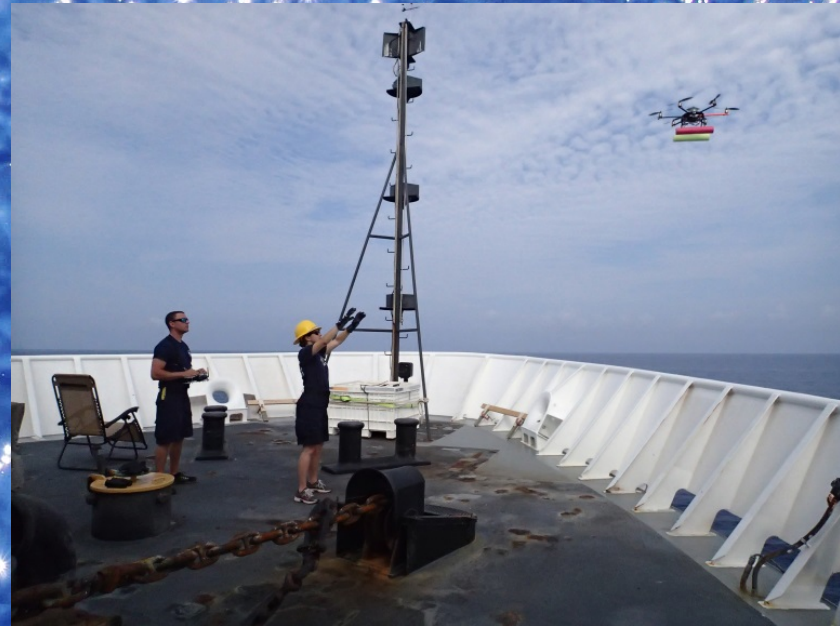


Island-association in Hawaiian Cetaceans

- Several species known to maintain separate island-associated populations in the Hawaiian Islands
 - Spinner dolphin and false killer whale populations are recognized within the NWHI
 - There are likely many others, including beaked whales and bottlenose dolphins



UAS imagery for health assessment and demographics



How are the HICEAS data used?

- MMPA & ESA population assessments
- False Killer Whale Take-Reduction Team
- PMNM ecosystem & resources assessments
- Regulatory actions of other agencies:
 - Wind farm lease sales off Oahu (BOEM)
 - Naval testing & training impact assessments

Abundance estimates from 2010:

<https://pifscblog.wordpress.com/2017/02/23/counting-whales-and-dolphins-in-hawaiian-waters/>

A photograph of three dolphins swimming in the ocean. The dolphins are dark grey and sleek, with their dorsal fins visible above the water. The water is a deep blue with some white foam from the dolphins' movement. The background shows a hazy horizon.

What observations/measurements are you interested in that we can incorporate?

THANK YOU!

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