

Hawaii False Killer Whale Abundance, the Final 2012 SAR, & Assessment Update

PACIFIC ISLANDS FISHERIES SCIENCE CENTER



Line-transect Abundance Estimates of
False Killer Whales (*Pseudorca crassidens*)
in the Pelagic Region of the Hawaiian Exclusive
Economic Zone and in the Insular Waters of
the Northwestern Hawaiian Islands

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Administrative Report H-12-02

2010 False Killer Whale Group Size Estimation Protocol

- When groups visually or acoustically detected, acoustics directed the ship through subgroups
- Details:
 - Acoustics did not alert visuals to encounter until first subgroup was past the beam
 - Once protocol began, acoustics alerted visuals to individual subgroups and attempted to match visual and acoustic detections to ensure size estimation for each subgroup
- Problems:
 - Cannot explicitly measure detection probability for each subgroup
 - Diversion of the ship resulted in counting groups outside of analysis strip width
 - Fundamental change to how group size is treated relative to all older data
 - Protocol not always followed

Analysis Approach

- Use subgroups as the detection unit
- Decouple the components of the density equation
 - uncertainty in each component is appropriately accounted for & estimated through simulation

$$D = \frac{1}{2w} * E(s) * \frac{n}{L} * \frac{1}{g(0)}$$

Subgroup protocol estimates, 2010 & 2011 only

ESW

Encounter rate

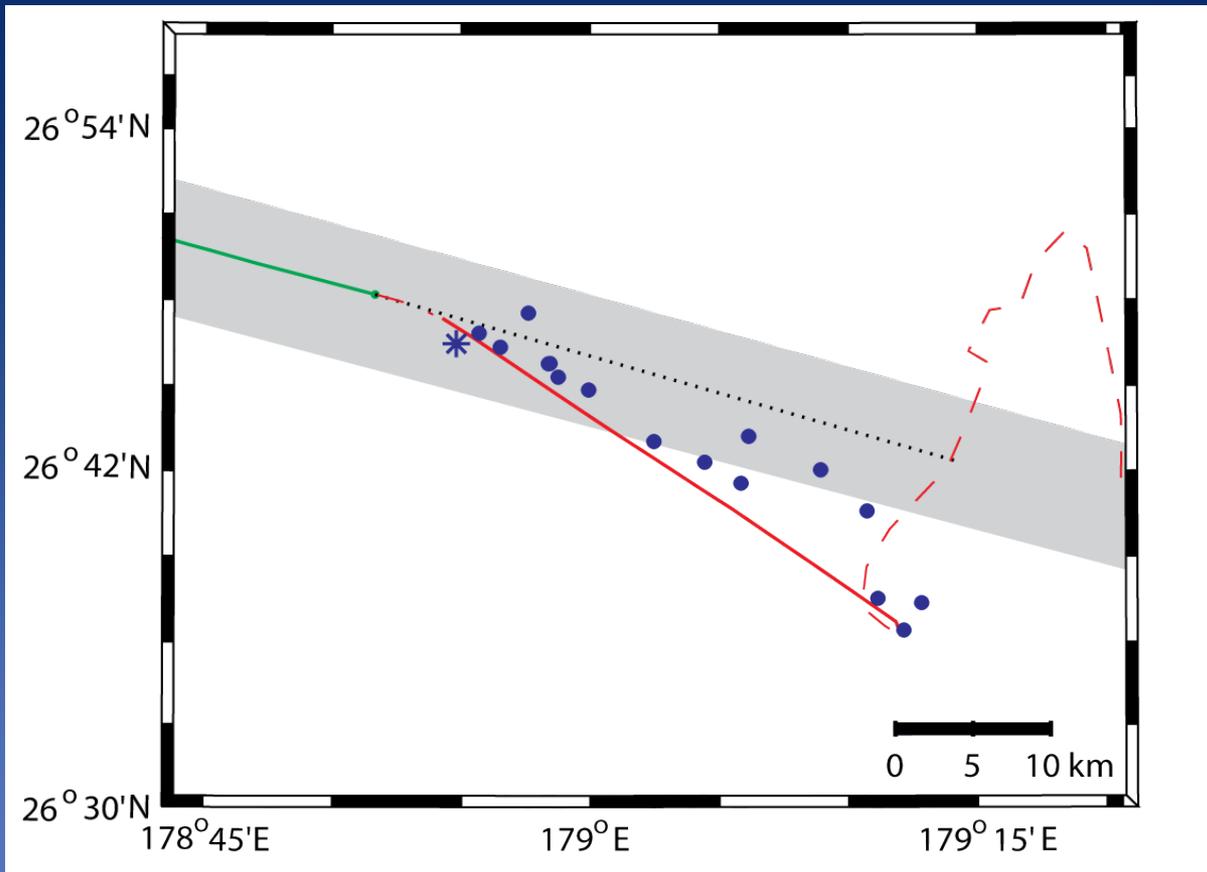
Barlow 1995

ENP + CNP sightings in Beaufort 3-6

Encounter rate

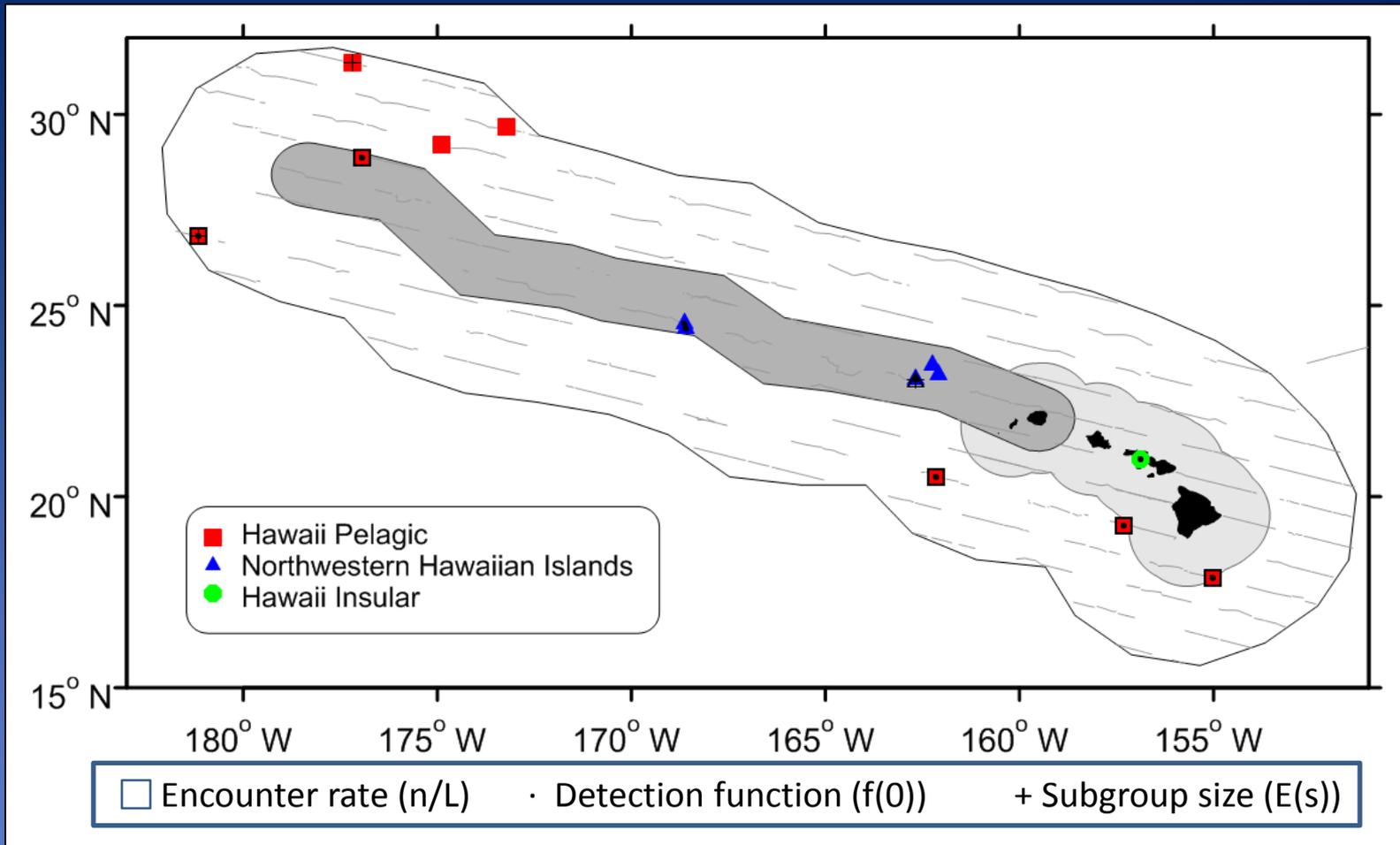
- Total trackline subdivided into ~1 day (150km) increments, representing independent effort segments
- When subgroup estimation protocol sighting included within a chosen effort segment, include each subgroup:
 - Within 4.5 km of projected trackline, and
 - probabilistically treated according to distance from projected trackline & probability of detection at that distance

Encounter Rate Example



— On-effort On-effort projected — Off-effort passing mode - - - Off-effort chase * Sighting location • Sub-group location

False Killer Whale Sightings during HICEAS



Density Components

Analysis component	Observations used	Point estimate	Bootstrap CV	Notes
ESW (km) [1/f(0)]	62	2.31	0.11	Half-normal, truncated at 4.5km
E(s)	44	3.11	0.12	Subgroup size estimates only
n/L	5 pelagic 1 NWHI	0.07 0.15	0.60 1.04	
g(0)	--	0.76	0.14	Barlow 1995

To compute density:

- Combine point estimates
- Variance estimated using random combination of bootstrap values of ESW, E(s), n/L, and g(0)

Abundance estimated based on total surveyed area

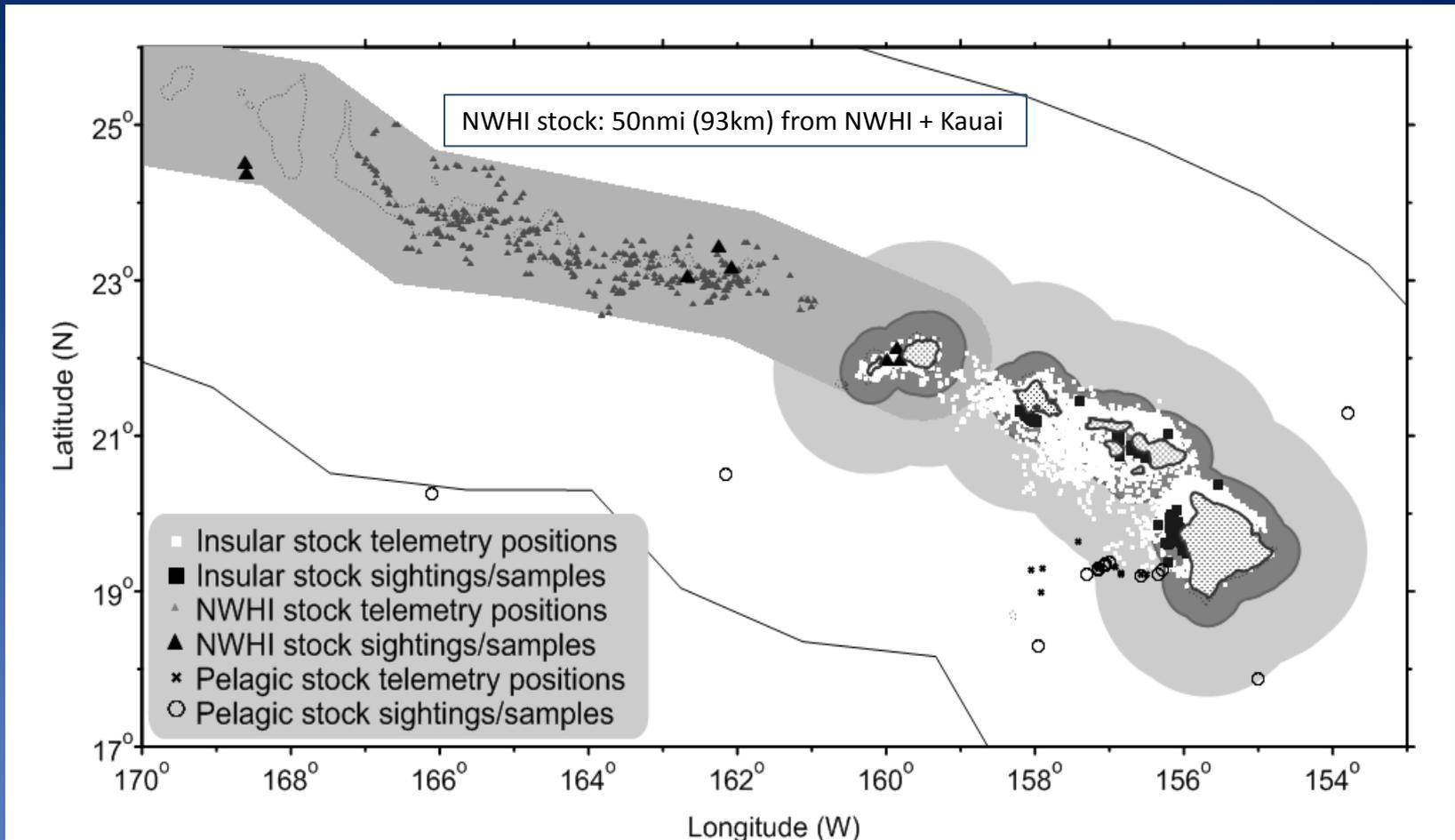
Density and Abundance

Stock	Density (100km ⁻²)	Abundance	CV	95% Confidence Limits	95% BCa Confidence Limits
Pelagic	0.06	1,503	0.66	464-4,866	246-4,637
NWHI	0.13	552	1.09	97-3,129	0-2,677
Pelagic (2002)	0.02	484	0.97	103-2,274	N/A

Final 2012 False Killer Whale SAR

- Major changes:
 - Overview of new genetic, photo-ID, and movement data
 - Addition of NWHI stock
 - Updated abundance estimates for Hawaii pelagic stock
 - Palmyra stock to its own SAR

Stock Boundaries



Stock Status

Stock	Nmin	PBR	M&SI (CV)	Status
Hawaii Insular	129	0.3	0.5 (1.7)	Strategic*
NWHI	262	2.6	0 (-)	Not strategic
Hawaii Pelagic	906	9.1	13.8 (0.3)	Strategic
<i>Pelagic (High-seas)</i>	539	(5.1)	11.2 (0.3)	
Palmyra	806	6.4	0.3 (1.7)	Not strategic

* Strategic status based on ESA-listing, 9% decline, & fishery M&SI

New Assessment Research

1. Completed abundance analysis for all other species from HICEAS 2010 dataset
2. Papahānaumokuākea Associated Cetacean Ecology Survey (PACES)- May 7 to June 5
 - Goal: understand abundance in NWHI and connectivity of populations to MHI and pelagic waters
 - Over 60 sightings so far, including 4 of FKWs
 - Several biopsy samples and ID photos collected & 2 satellite tags deployed