

INTER-ISLAND DIFFERENCES IN CETACEAN SPECIES COMPOSITION IN THE MAIN HAWAIIAN ISLANDS

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Background

The Hawaiian Islands are the most isolated archipelago in the world. The main islands are a series of eight volcanic pinnacles rising from the ocean floor to elevations of up to 4,000 m. Four islands (Maui, Lana'i, Moloka'i, Kaho'olawe) form a broad plateau with extensive habitat (>3000 km²) less than 200 m, but the other main islands all have relatively little shallow habitat and drop quickly to depths of 1,000-2,000 m. In 2000-2002 we studied odontocetes off the 4-island area, O'ahu, and the island of Hawai'i, and found similar cetacean species composition among islands.

Methods & Results

Two vessels were used: a 7 m gasoline (outboard) powered Boston Whaler and an 18 m diesel (inboard) powered Striker. We spent 521 hours on 37 days, surveying 8,461 km of trackline. Approximately 1,700 km were covered off each of Hawai'i, the 4-island area, and O'ahu (the eastern-most islands), with 3,200 km off Kaua'i and Ni'ihau, in both shallow and deep water. We observed 14 species (140 groups) of odontocetes, with 137 groups identified to species/genus. The five most frequently observed species (bottlenose, pantropical spotted, spinner & rough-toothed dolphins & short-finned pilot whales) accounted for ~84% of sightings. For these five, differences in species composition (measured as # sightings/100 km) between islands were documented (see Table). Pantropical spotted dolphins and short-finned pilot whales were regularly observed off all of the eastern-most study sites. Rough-toothed dolphins were found frequently off Kaua'i/Ni'ihau, but almost absent elsewhere. Bottlenose dolphins were abundant off Kaua'i/Ni'ihau, O'ahu, and Maui/Lana'i, but were rare off Hawai'i.

Purpose of the project

In May and June 2003 we surveyed all the main Hawaiian Islands. Our goals were:

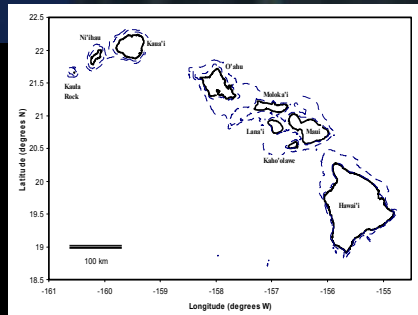
- 1) to collect genetic samples to be used for examination of inter- and intra-Hawaiian population structure
- 2) to collect photo-identification data to examine movements of individuals between islands and as a basis for population assessment
- 3) to examine habitat use in relation to potential deep-water barriers to movement

Possible reasons for inter-island differences

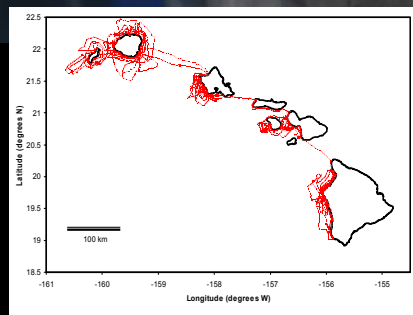
• **Habitats** vary between islands, with the greatest shallow-water habitat available in the 4-island area. However, Kaua'i and Hawai'i are most similar in bathymetry/depth, yet differ the most in species composition/density.

• **Prey populations** may vary between islands due to differences in island-size (the "island-mass effect") or depth/bathymetry. Unfortunately virtually nothing is known of the diet of Hawaiian odontocetes or differences in potential prey species abundances.

• **Anthropogenic influences** such as shooting of rough-toothed and bottlenose dolphins off the island of Hawai'i (due to their tendency to steal fish from fishermen), may have resulted in a reduction in their population sizes in that area.



The main Hawaiian islands, showing the 100 m and 1,000 m depth contours



Distribution of search effort in May and June 2003

Species	Number of sightings	Group size (mean)	Sightings per unit effort (#/100 km)				
			Hawai'i	Maui & Lana'i	O'ahu	Kaua'i & Ni'ihau	Overall
Bottlenose dolphin	41	5.2	0.06	0.42	0.56	0.71	0.48
Pantropical spotted dolphin	25	77.1	0.34	0.54	0.34	0.12	0.30
Spinner dolphin	19	47.4	0.28	0.12	0.17	0.28	0.22
Short-finned pilot whale	17	15.6	0.22	0.42	0.22	0.06	0.20
Rough-toothed dolphin	13	13.1	0.06	0.00	0.06	0.34	0.15
Dwarf sperm whale	8	2.0	0.00	0.06	0.00	0.22	0.09
Dense-headed whale	5	4.0	0.06	0.00	0.00	0.12	0.06
Melan-headed whale	3	146.7	0.06	0.00	0.06	0.03	0.04
False killer whale	1	35	0.00	0.00	0.06	0.00	0.01
Killer whale	1	4	0.06	0.00	0.00	0.00	0.01
Sperm whale	1	1	0.00	0.00	0.00	0.03	0.01
Pygmy killer whale	1	13	0.00	0.00	0.00	0.03	0.01
Striped dolphin	1	45	0.00	0.00	0.00	0.03	0.01
Pygmy sperm whale	1	2	0.00	0.00	0.00	0.03	0.01
Overall	-	-	1.12	1.57	1.45	2.02	1.62
Number of species	-	-	8	5	7	12	14

Species seen and differences in species composition between islands

For more information on our Hawai'i odontocete research see:

- Poster by Gorgone et al. on a lack of inter-island movements of bottlenose dolphins in Hawai'i (spot XXXX)
- Talk by Baird et al. on pilot whale diving behavior in Hawai'i (Friday at 2 PM, Imperial Room)

• Report by Baird et al. 2003. Studies of odontocete population structure in Hawaiian waters: results of a survey through the main Hawaiian Islands in May and June 2003. Report prepared for the National Oceanic and Atmospheric Administration, Seattle, WA. Available from: <http://ts.dal.ca/~whitelab/rwb/Hawaii.htm>

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