

Residency and inter-island movements of rough-toothed dolphins within the Hawaiian archipelago

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Why this is interesting-

-Rough-toothed dolphins (*Steno bredanensis*) are known to inhabit tropical and warm temperate waters worldwide. However, limited research has been conducted due to the difficulties associated with their typically deep-water distribution.

-Little is known of the movement patterns in rough-toothed dolphins, and to date there have been no published studies on population structure for this species.

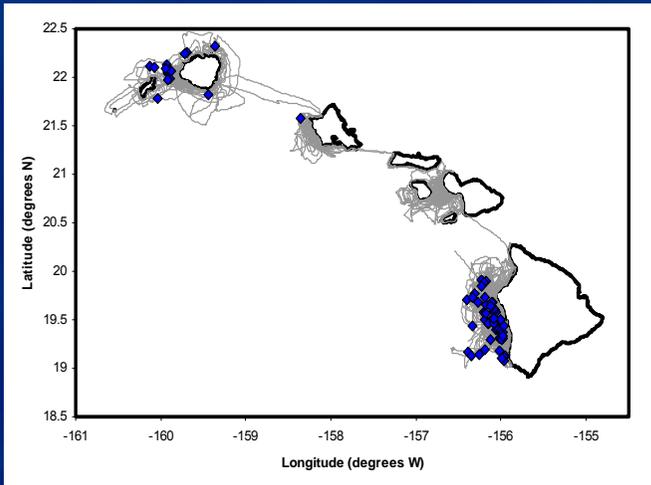
What we did-

We conducted surveys around the main Hawaiian Islands between 2000-2006 as part of a long-term multi-species population assessment. For data analysis, the areas surveyed were divided into four manageable groups:

- 1) Kaua'i/ Ni'i'hau
- 2) O'ahu
- 3) the "4-island area" (including the islands of Maui, Lāna'i, Kaho'olawe and Moloka'i)
- 4) Hawai'i (the big island)

Small vessels (6-18m) were used to survey 38,434km of trackline over 369 days. Our effort was generally restricted to within 40km of shore, and was greatest off of the island areas of Hawai'i and Kaua'i/ Ni'i'hau. During encounters, we biopsied and photographed individuals to assess population structure and movement patterns.

Survey tracklines and rough-toothed dolphin sightings



What we found-

Rough-toothed dolphins were encountered a total of 72 times during our survey effort (out of 851 total odontocete encounters), making them the fifth most frequently encountered species. Sightings were most frequent off the island areas of Hawai'i (55 sightings) and Kaua'i/ Ni'i'hau (16 sightings), with only one sighting off O'ahu and no sightings off the 4-island area. Sighting frequency generally increased with depth, and was greatest at depths >1,500m.

For more information see:

Baird, R.W., D.L. Webster, S.D. Mahaffy, D.J. McSweeney, G.S. Schorr and A.D. Ligon. Accepted for publication. Site fidelity and association patterns in a deep-water dolphin: rough-toothed dolphins (*Steno bredanensis*) in the Hawaiian Archipelago. Marine Mammal Science.

or visit www.cascadiaresearch.org/robin/hawaii.htm

Group size and behavior-

Documented group sizes varied among the island areas studied. Rough-toothed dolphins observed off the islands of Kaua'i and Ni'i'hau had a median group size of 11 individuals while groups observed off the island of Hawai'i were significantly smaller (with a median group size of 6 individuals).

Responses to vessel approaches were also significantly different between the two areas. Individuals encountered off the island of Hawai'i demonstrated avoidance behavior twice as often as Kaua'i/ Ni'i'hau individuals (38.2% and 18.75% respectively). The point in the approach (which is the distance between the vessel and the group) when avoidance was observed was also much higher off Hawai'i (20m) than Kaua'i/ Ni'i'hau (10m). Rough-toothed dolphins have been observed interacting with fishing vessels and increased avoidance off Hawai'i may be due to negative interactions.

Individual identification and movement patterns-

Using photographs from directed research conducted from 2000-2006 as well as opportunistic photographs from 1986-2006, we documented 337 distinctive individuals: 209 off Kaua'i/ Ni'i'hau, 6 off O'ahu, and 122 off the island of Hawai'i. Seventy individuals were seen more than once, for a total of 48 between-year and 52 within-year resightings. The percentage of individuals resighted was significantly different between Hawai'i (75%) and Kaua'i/ Ni'i'hau (8%) suggesting high site fidelity for individuals off the island of Hawai'i.

Two individuals were documented moving from Kaua'i to Hawai'i after a period of 309 days, although these animals were not seen associating with individuals off Hawai'i. This is the first and only documented inter-island movement of rough-toothed dolphins within the Hawaiian archipelago despite reasonable effort off of both island areas. It is not clear whether this movement represents emigration to the small sub-population documented off the island of Hawai'i, or temporary movement among areas.

Mark-recapture estimates-

Peterson mark-recapture estimates for distinctive individuals indicated a population size of 198 (CV=0.12) off Hawai'i and 1,665 (CV=0.33) off Kaua'i/ Ni'i'hau. Differences in mark-recapture estimates may be due to the effect localized oceanographic processes have on prey availability, and thus, fidelity to the area.

Simulations examining the probability of detecting movements among islands, given our sample sizes for different areas/years, indicate our results are consistent with a dispersal rate of 2% per year.

Broader impacts-

- Not much is known about the life history of rough-toothed dolphins. What little that is known comes from stranding events and large vessel surveys.
- Photo-identification and small vessel observations of this species around the main Hawaiian Islands has revealed differences in group size, habitat use, and behavior between island areas, suggesting inter-island movement for this species may be limited.
- Documented inter-island resights have shown that while individuals do move between islands, they have not been observed associating with outside individuals, suggested there may be population structure within each island area.
- Evidence of population structure and site fidelity could affect management of the rough-toothed dolphin in Hawaii, currently recognized as a single stock.

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