



Hawai'i's *other*

the volcanic Hawaiian Islands are the most isolated archipelago in the world. They sit on the middle of the Pacific plate, and rise from depths of over 5,000 metres to elevations of over 4,000 metres above the ocean's surface. Over the last 30 years there has been a tremendous amount of attention focused on whales and dolphins in Hawaiian waters, but despite being home to more than 15 species of cetaceans, most of the attention has been

directed towards just two species.

Each winter thousands of humpback whales return to the waters of Hawai'i to mate and give birth. The large number of humpbacks close to shore, combined with the clear and warm waters, has resulted both in a large whalewatching industry and a wide diversity of research on humpback whale behaviour and population dynamics. Another species of cetacean, the spinner dolphin, lives in Hawai'i's near-shore waters year-round. They are

famous for their behaviour of resting in shallow bays during the daytime, where they can easily be seen from shore or by boat. The accessibility of these dolphins has resulted in a tremendous amount of research being undertaken on them, making spinner dolphins in the main Hawaiian Islands one of the more well-studied populations of dolphins anywhere. However, the focus on these accessible and abundant species has diverted attention away from the many other species of whales and



Forget spinner dolphins and humpback whales, **ROBIN W. BAIRD** spends his days with less familiar cetaceans in Hawaiian waters



Above, the long and bulbous dorsal fin of an adult male short-finned pilot whale, sporting a white scar, probably from a cookie-cutter shark © Robin W. Baird

Main picture left, false killer whale leaping with mahi mahi in mouth © Dan J. McSweeney

Below, a mystery from the deep – an adult male Blainville's beaked whale in Hawai'i, body covered in white scars from fighting with other males, white oval scars from the bites of cookie-cutter sharks, a thin layer of brown diatoms behind the head and clusters of stalked barnacles attached to the erupted teeth © Alice MacKay

Photographs taken under authority of NMFS Scientific Research Permit No. 731



cetaceans

dolphins that are found in Hawaiian waters, many of which may have important conservation concerns. Until recently, less was known about the status of odontocete (toothed whale) populations in Hawai'i than for any other region of the United States.

BACKGROUND

Research on Hawai'i's other species of whales and dolphins began in 1982 when Dan McSweeney began photographing

odontocetes off the west coast of Hawai'i – 'the big island'. Within just a few kilometres of shore the bottom drops to depths of several thousand metres, where both pelagic and deep-water/slope species can be found. In general the waters around Hawai'i are relatively unproductive, so density of cetaceans is low, but species diversity is high.

I first moved to the island of Maui in December 1998. Not knowing how long I would spend in Hawai'i, I wanted to work with

some of the poorly-known species and simultaneously avoid overlapping with the many other cetacean researchers working there. I first began projects with bottlenose dolphins, false killer whales and pantropical spotted dolphins off Maui, then in 2002 began working with Dan McSweeney. Conditions for working with deep-water cetaceans were much better off the big island due to the protected lee provided by mountains. Using Boston Whalers provided by the Wild Whale

RESEARCH

Research Foundation as research vessels, my work expanded to include many other species.

TECHNIQUES

Our work involves photo-identification, some tagging work with suction-cup attached radio tags and collecting skin biopsies for genetic studies. The skin biopsies are collected using either a crossbow or a pole spear, with a stainless steel tip that takes a small plug of skin and blubber from individuals. Reactions to this technique are typically mild – a flinch and a fast dive – and individuals that have been biopsied are usually quite approachable afterwards, often returning to bow-ride. Since encounters are few and far between, we try to make the most of them. And rather than focusing on the most regularly encountered species, our strategy has always been the opposite – the only way to learn about some of the less common species is to take every opportunity as it comes, and recognize that a long term approach will be needed. This does make for long days on the water, but as we finish our sixth year of work, the payoffs in terms of research results are very clear.

POPULATION STUDIES

Pygmy killer whales are one of the best examples showing the value of this approach. In 281 days of search effort we've encountered this species only six times. In Dan McSweeney's year-round efforts this species has typically been encountered only a couple of times each year. Yet combining our photos with those taken by Dan over the last 24 years, we were surprised to find that, rather than indicating that pygmy killer whales are part of a larger oceanic population that occasionally passes

by the islands, the photographs showed repeated re-sightings of individuals over the years. This suggests the presence of a small population, probably less than 150 individuals, with a high degree of residency to the big island.

Genetic studies have also produced interesting results. All of the species of odontocetes found around the main Hawaiian Islands are also found in the open ocean waters of the Pacific. There is increased productivity around the islands, and the timing and location of potential prey resources is more predictable than in the surrounding waters of the open ocean. Genetic evidence for the species so far studied – false killer whales and short-finned pilot whales – both suggest the existence of populations specific to the islands, presumably taking advantage of the higher productivity and predictable resources. Despite the lack of barriers in the open ocean, and the existence of offshore populations for both species, false killer whales and short-finned pilot whales around the main Hawaiian Islands appear to be reproductively isolated from populations in the eastern tropical Pacific. Where the boundaries to these populations are is unknown – more research is needed in offshore areas around the islands.

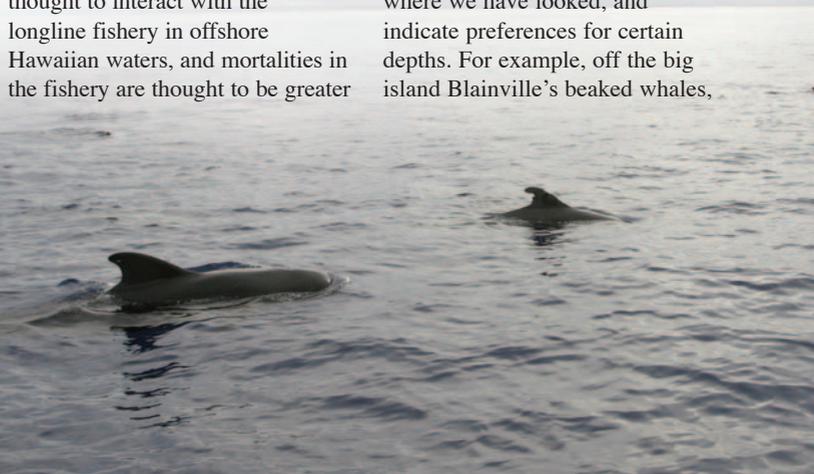
Our findings have important implications for conservation. The small and genetically isolated population of false killer whales is thought to interact with the longline fishery in offshore Hawaiian waters, and mortalities in the fishery are thought to be greater

than the population can sustain. We have documented a high frequency of dorsal fin injuries in false killer whales consistent with fishery interactions, suggesting that the animals around the main islands are interacting with the longline fishery. The small population sizes and genetic isolation put many populations at risk from human impacts [see p36].

The high species diversity for odontocetes in Hawai'i reflects the diversity of niches available. Not only is there a variety of habitats (shallow, deep, and slope waters), and prey sizes (from small fish and squid to large game fish), but also in prey depths. Some prey migrate upwards at dusk so are present in surface waters at night, some are available only at great depths day and night, and others are available in surface or mid-water depths. Combining prey depth, prey size, and location results in niches that allow the co-existence of populations of several species of sperm whales, two species of beaked whales, and more than half a dozen dolphin species.

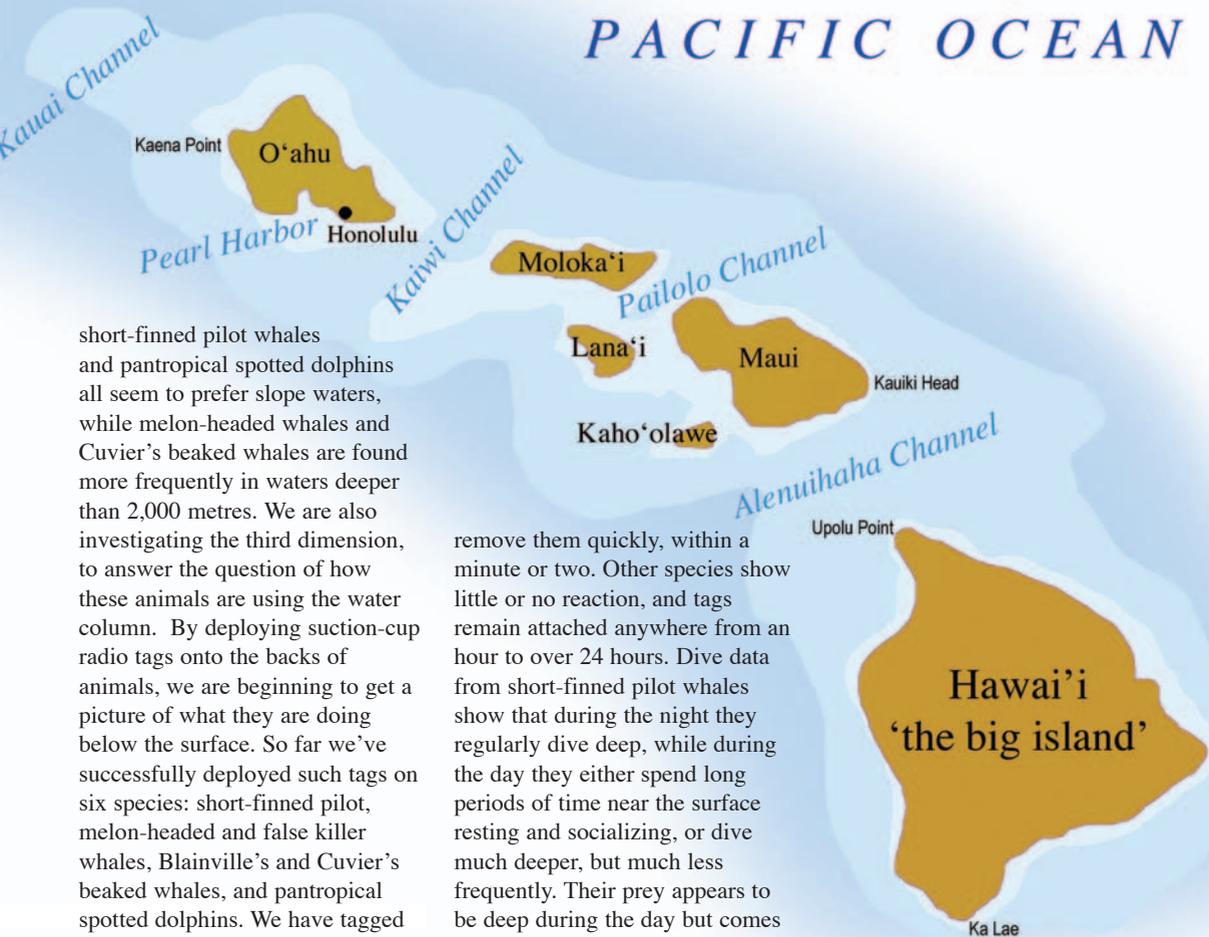
THE THIRD DIMENSION

Understanding how species partition the habitat requires studying them in all three dimensions. Our surveys show where they are found relative to where we have looked, and indicate preferences for certain depths. For example, off the big island Blainville's beaked whales,



Preparing to deploy the suction-cup tag on pilot whales © Doug Perrine

The Hawaiian Islands of the PACIFIC OCEAN



short-finned pilot whales and pantropical spotted dolphins all seem to prefer slope waters, while melon-headed whales and Cuvier's beaked whales are found more frequently in waters deeper than 2,000 metres. We are also investigating the third dimension, to answer the question of how these animals are using the water column. By deploying suction-cup radio tags onto the backs of animals, we are beginning to get a picture of what they are doing below the surface. So far we've successfully deployed such tags on six species: short-finned pilot, melon-headed and false killer whales, Blainville's and Cuvier's beaked whales, and pantropical spotted dolphins. We have tagged two other species in Hawai'i, bottlenose dolphins and spinner dolphins, but both show strong reactions to the tags and are able to

remove them quickly, within a minute or two. Other species show little or no reaction, and tags remain attached anywhere from an hour to over 24 hours. Dive data from short-finned pilot whales show that during the night they regularly dive deep, while during the day they either spend long periods of time near the surface resting and socializing, or dive much deeper, but much less frequently. Their prey appears to be deep during the day but comes up closer to the surface at night, where they are much easier to get to. Not surprisingly we haven't been able to tag very many beaked whales – not only are they hard to spot in the first place, but they are often difficult to approach. But we have tagged four Blainville's beaked whales and two Cuvier's beaked whales, and both species dive for incredibly long periods (up to or over an hour) and go very deep (greater than 1,400 metres) both during the day and at night – presumably their prey remain in deep water day and night. Their time spent in such deep water is reflected in the large number of white oval scars and wounds they have from cookie-cutter sharks, a deep-water species.

For species encountered an average of only once every 20 or

46 days on the water (false killer whales or pygmy killer whales, respectively), assessing their population size and trends, understanding their movements and how they utilize their habitat, will require considerable expenditure of time, energy, and resources. Only by persistence and taking advantage of the opportunities as they arise will we begin to understand more fully the biology of many of these lesser-known tropical oceanic species. ■

This research has been primarily supported by the Southwest Fisheries Science Center of the National Marine Fisheries Service and the Wild Whale Research Foundation

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