

# Population Structure of Island-Associated Pantropical Spotted Dolphins

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## Abstract

Genetic and photo-identification studies of bottlenose and spinner dolphins have suggested they show site fidelity to individual Hawaiian islands, while photo-identification suggests other dolphins regularly move among islands. Coastal dolphin studies have found genetic differentiation driven by female philopatry in many locations. Our study explores genetic relationships among pantropical spotted dolphins around the main Hawaiian Islands. Low  $F_{st}$  supports gene flow, but low allele and genotype sharing suggests differentiation. Analyses are ongoing.



Left: Boat used for sample collection. The crossbow (held by the researcher on the bowsprit) was used to shoot biopsy darts. Right: Close up photo of spotted dolphin. Note the spotting and cape coloration, which can be used to distinguish individuals.

## Introduction

Initial studies suggest that for some dolphin species, females show site fidelity to individual Hawaiian islands. Studies of spotted dolphins in the Eastern Tropical Pacific and near Taiwan have also found evidence of gene flow mediated by female site fidelity. Our research will address questions of dispersal patterns and gene flow among spotted dolphins near the Hawaiian Islands.

## Methods

- Biopsies & photos collected 2002-2007 near the main Hawaiian islands.
- Mitochondrial and nuclear DNA will be analyzed.
- Data will be compared among and within putative populations and between sexes to investigate gene flow and philopatry.
- Discovery curves and mark-recapture will be applied to photos to estimate population size, inter-island movement patterns, and individual associations.



Left: Biopsy dart hitting spotted dolphin. The yellow float that keeps the dart at the surface is visible.

Right: Biopsy dart with sample visible flying backward from dolphin after sampling.

## Results

Samples: 172 genetic samples, ~3,200 photos

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## Analyses To Date:

- Seven microsatellite loci
- 27 samples from Maui/Lana'i
- 30 samples from the island of Hawai'i
- 28 samples from O'ahu
- 8 samples from Kaua'i

	Allelic Diversity	Genotypic Diversity
Hawaii	0.25	0.76
Maui/Lanai	0.27	0.72
Kauai	0.64	0.96
Oahu	0.22	0.67

## % Shared Alleles, % Shared Genotypes

	Hawaii	Maui/Lanai	Kauai
Hawaii			
Maui/Lanai	49.51, 12.00		
Kauai	44.33, 4.97	42.11, 4.29	
Oahu	57.14, 17.33	56.84, 15.85	45.65, 8.33

$F_{st}$	Hawaii	Kauai	Maui/Lanai
Hawaii			
Kauai	0.01608		
Maui/Lanai	0.04700	0.04094	
Oahu	0.03032	0.02398	0.03702

Diversity is high for all loci; 18% of alleles across all loci are rare alleles (only one in sample), and 54% of genotypes are rare.



Left: Note the difference in shape in the dolphin dorsal fins. Such differences can be used to identify individuals. Right: Note the distinctive fin useful for identification.

## Conclusion

**Low  $F_{st}$  suggests high levels of gene flow; however, low levels of allele and genotype sharing support differentiation. The number of rare alleles indicate the system may be more complex than expected. Further analyses of these data are ongoing, including mtDNA.**

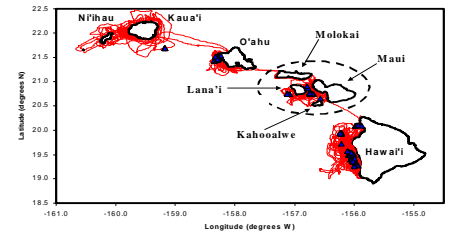
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Survey effort and sample collection locations through 2006