

# Group dynamics of the endangered insular population of false killer whales in Hawai'i

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## Why is this interesting?

- ❖ False killer whales are highly social, known for cooperative hunting and maintaining strong, long-term bonds.
- ❖ An endangered main Hawaiian Islands insular population includes three recognized social clusters: C1, C2, C3.
- ❖ Although they appear longitudinally stable, all three clusters are interconnected and some individuals are regularly associated with multiple clusters, making their social affiliation unclear.

## How do socially ambiguous clusters affect the population?

- ❖ Links among established clusters were extensive but weak: almost half of all association links within the network disappeared when restricted to  $\geq 0.3$ , leaving one individual linking C1-C2 and three individuals linking C2-C3.
- ❖ Links between C1 and C3 either disappeared entirely, with the two clusters linked instead through two remaining peripheral clusters (gray nodes), or were joined by a small number of individuals that clustered with either C1 or C3.

## What did we do?

- ❖ To understand their influence on fine-scale social structure, we examined sighting histories (2000-2016) and associations of socially ambiguous individuals using photo ID and social network analysis.
- ❖ We then simulated targeted removals of ambiguous individuals, imposed restrictions on association strength and recorded the impact on the social network.

## What did we find?

- ❖ We identified 4-6 peripheral clusters using eigenvector-based modularity, 2 or 3 of which were mostly younger individuals, seen 1-2 times or in 1-2 years and were considered sample size artifacts (purple and gray nodes).
- ❖ One of the remaining peripheral clusters was robust to change: at association strengths  $\geq 0.3$ , all links between it and other clusters dissolved, warranting designation of a new cluster (C4).

## Why is this important?

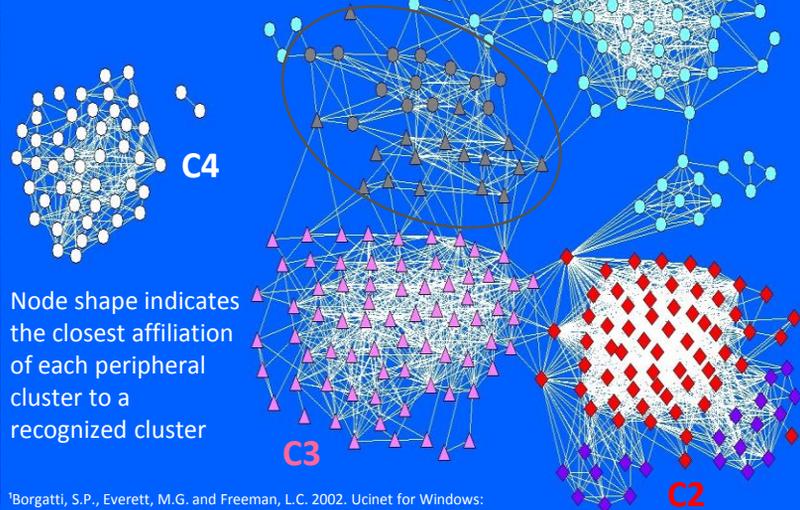
- ❖ Culturally-mediated behaviors such as prey-sharing and a tendency to mass strand make false killer whales vulnerable to anthropogenic impacts. Previous studies indicate social clusters in Hawai'i play an important role in where individuals spend their time and how frequently they interact with fisheries, which can be used to help mitigate harmful and sometimes fatal interactions.
- ❖ Socially ambiguous individuals may have a strong impact on the health of the population by disseminating information between clusters or acting as a vector for diseases. These individuals may provide valuable lines of communication among clusters and help minimize inbreeding, although additional encounters may be required to elucidate their cluster affiliation.

For more information and a complete list of publications see: <http://www.cascadiaresearch.org/projects/hawaii>

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60% of individuals from the two ambiguous clusters (both shown in gray) linking C1 and C3 at associations  $\geq 0.3$  were younger or rarely seen, but suggest a possible intermediate group that may be a nexus between established clusters



<sup>1</sup>Borgatti, S.P., Everett, M.G. and Freeman, L.C. 2002. Ucinet for Windows: Software for Social Network Analysis. Harvard, MA: Analytic Technologies.

Social network diagram<sup>1</sup> of the Hawai'i insular population of false killer whales (n=322) from 2000-2016, restricted to Association Indices  $\geq 0.3$  (Socprog 2.7). Social clusters C1-C3 are labeled as well as the newly identified C4.