

What can whale songs tell us about population connectivity?

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Humpback whales (*Megaptera novaeangliae*) are a migratory species composed of 14 distinct populations distributed in both the northern and southern hemisphere. Traditional migratory route patterns of humpback whales involve movements between feeding and breeding areas. Populations are assigned according to their breeding areas which determines their genetical and acoustical identity.

Humpback whale males display strong acoustic behaviours, producing songs that are culturally transmitted and shared by individuals of the same population. Every population is characterized by their own song. The song can evolve through time within and between seasons, which implies that a learning process is involved between males. Humpback whale songs are traditionally classified into themes, phrases, and units, allowing comparisons of song elements across geographical regions. In Central America, two humpback whale populations from both hemispheres breed in the same area at different times of the year. Potential temporal overlap exists between both populations based on field observations and raises the question on potential acoustical exchange and therefore population connectivity.

The objective of this research is to understand population connectivity by analysing the song structure and assess correspondences and differences between song elements (including units, phrases and themes). Data were collected during boat-based surveys between January and April in San Juan del Sur, Nicaragua between 2021 and 2023. Signal-to-Noise Ratio (SNR) was estimated by measuring NIST Quick Signal-to-Noise ratio for each labelled unit in every recording using RAVEN 1.5 program. Songs were visually inspected in RAVEN by generating spectrograms with a Fast Fourier Transform of 1024 points resolution.

Preliminary results showed the presence of a similar theme in 2021, song analysis of 2022 and 2023 are still in progress. This investigation holds significant implications to assess migratory routes and for the conservation of humpback whales in identifying key reproductive areas based on song connectivity.