

Sperm Whale (*Physeter macrocephalus*) Residency Across Temporal Scales Off The Galápagos From 2013-2023

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Introduction

The sperm whale, *Physeter macrocephalus*, is a species for which understanding their movement patterns and residency is crucial for understanding their population structure. Residence time, how long an animal spends in a region, is affected by immigration, emigration, and mortality (Figure 1).

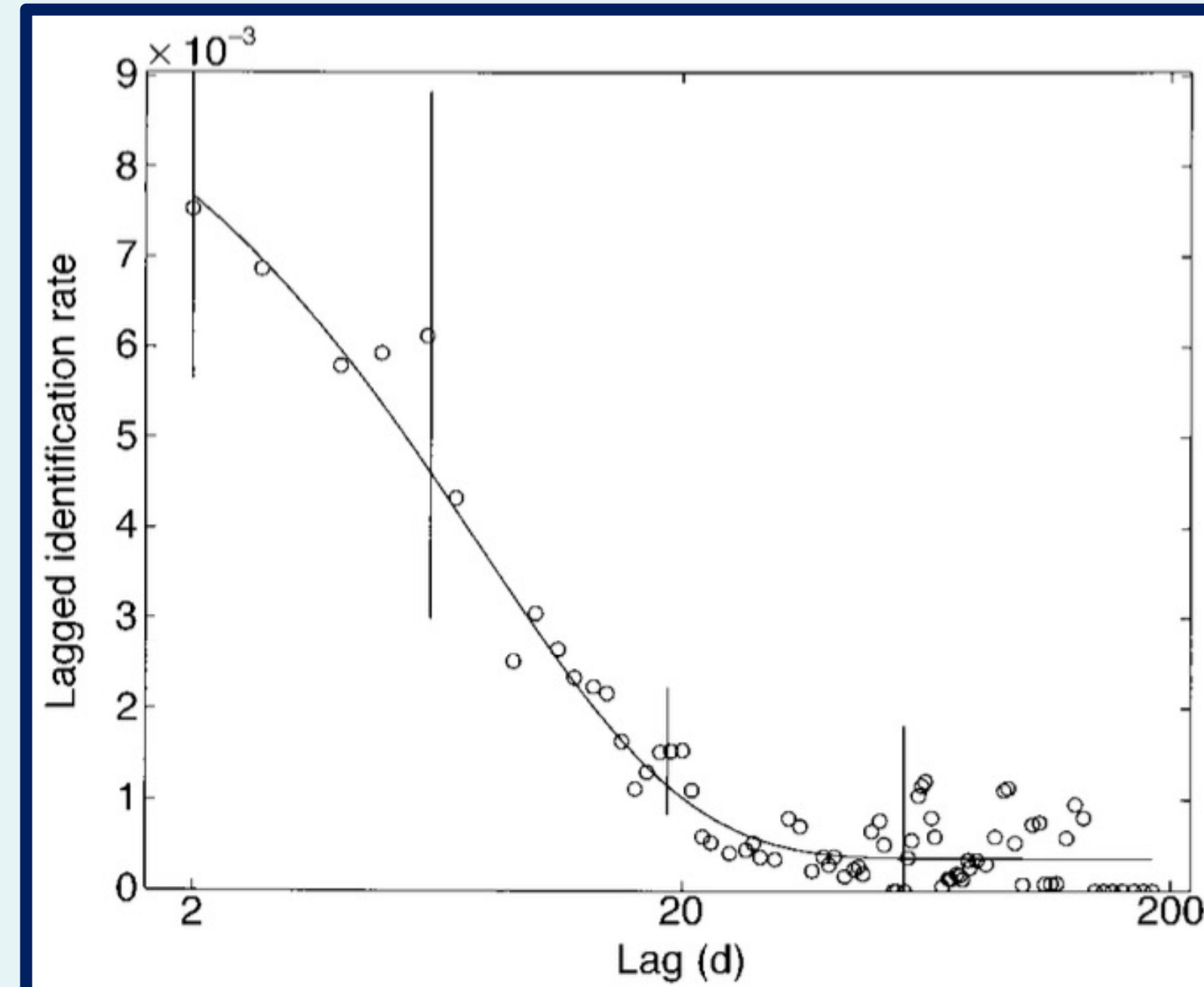


Figure 1 Lagged identification rate for female and immature sperm whales off the Galápagos from 1985-1997. Figure from Whitehead (2001).

After the 2000s, clans that were common in the Galápagos were replaced by two different clans that had previously been absent from the Galápagos.

Research Question

What is the average residency time of sperm whales off the Galápagos from 2013-2023, and how does it compare to that observed between 1985-1997? (Figure 2).

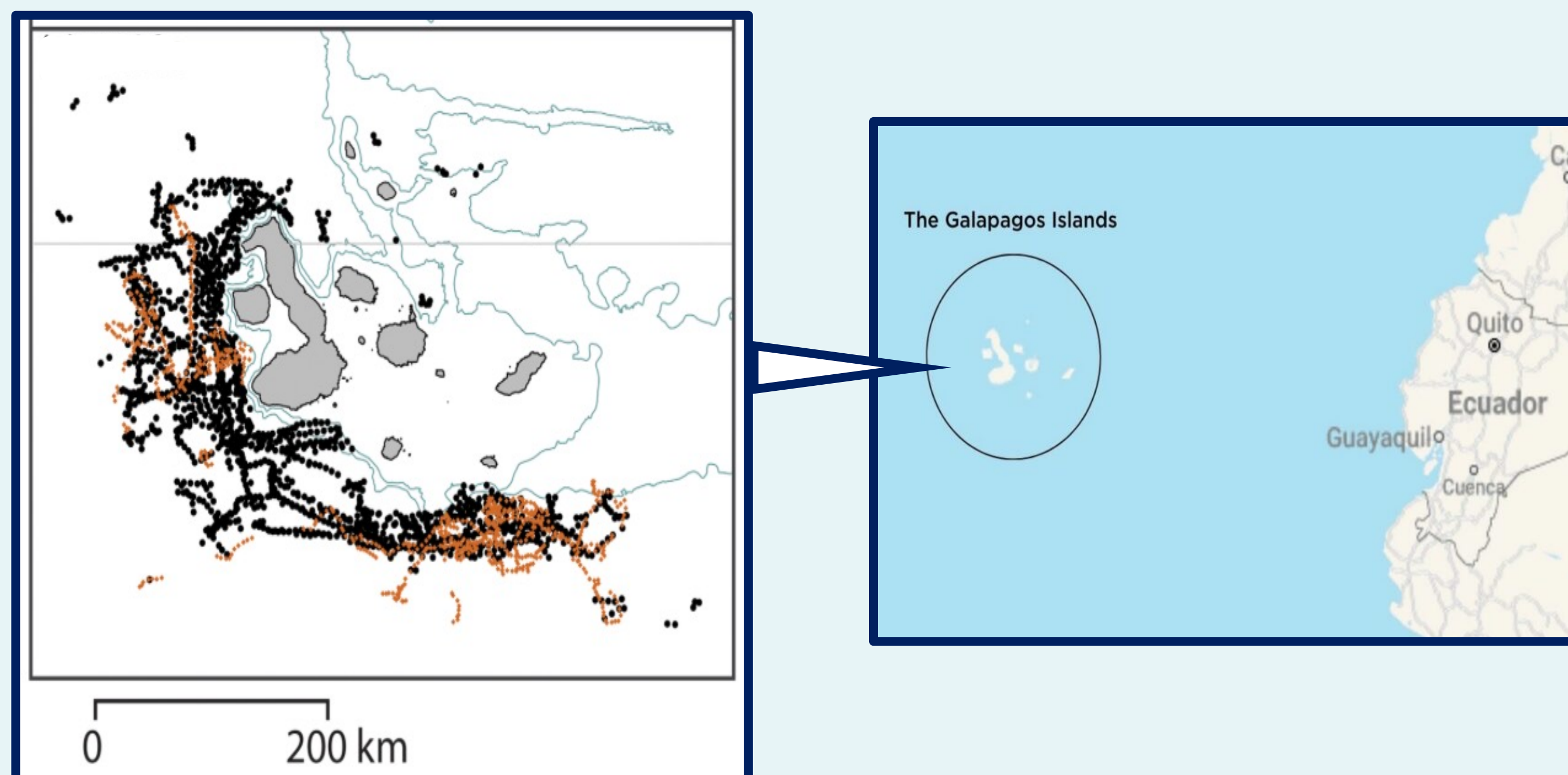


Figure 2 A map of the Galápagos Islands with a zoomed in view of presence (orange diamond) and absence (black circle) positions of sperm whales off the Galápagos in the 2010s. Zoomed in figure extracted from Eguiguren et al. (2020).

Methods & Materials

Data Collection

- From 2013-2023, sperm whale surveys were conducted off the Galápagos.
- During encounters, photographs were taken of their flukes (Figure 3).



Figure 3 An individual taking a picture of a sperm whale fluke during the 2023 field season in the Galápagos. CC Mauricio Cantor.

Photoidentification

- Fluke markings were used for individual identification.
- A quality rating was assigned to each photograph (Figure 4).
- High quality photographs were compared and matched using FlukeBook (Figure 5).

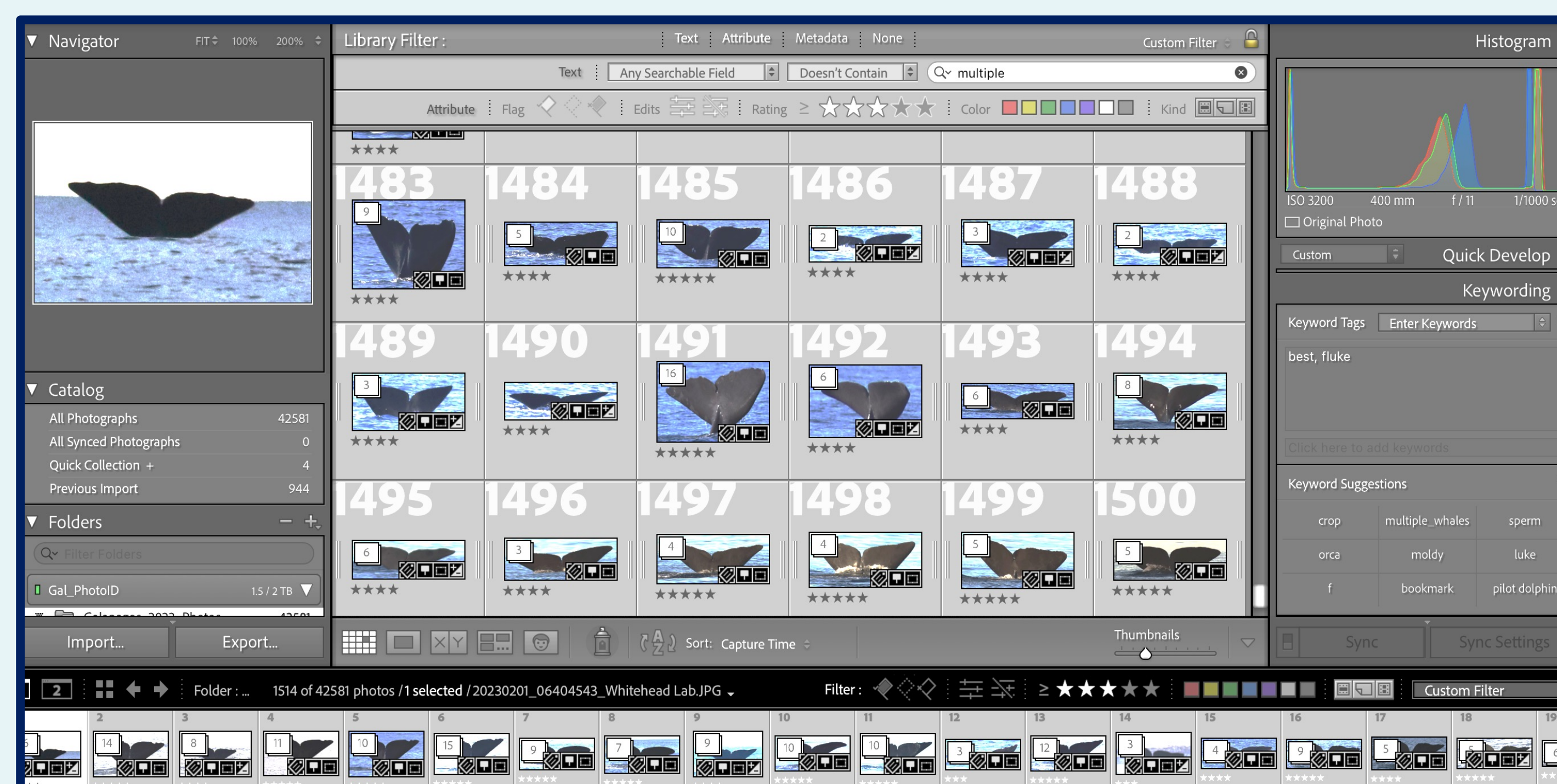


Figure 4 Using Adobe Lightroom Classic to filter, quality rate, and choose the best photos for sperm whale photographs taken during Galápagos field seasons.

2014



2022

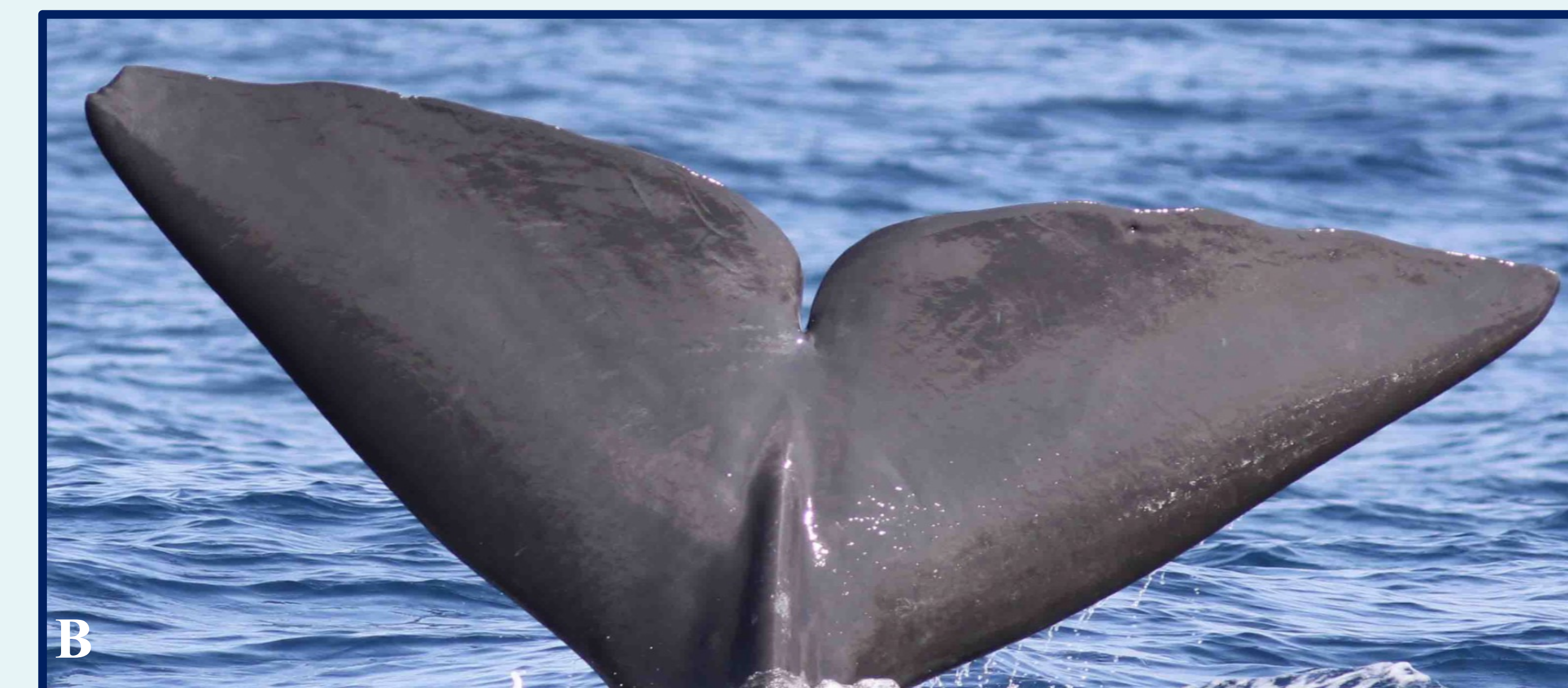


Figure 5 An individual photoidentified off the Galápagos from 2014 (A) and an individual photoidentified off the Galápagos from 2022 (B). These two photographs have been compared and matched as the same individual via FlukeBook.

Data Analysis

- Lagged identification rate (the probability that an individual identified in an area at one time is identified in the area at another time)

Conclusion

By analyzing a new dataset (2022-2023), this study aims to:

- Create a better understanding of whether Galápagos sperm whales photoidentified during the cultural turnover are still present in the same region from 2022-2023.
- Build the sperm whale catalogue on FlukeBook to help detect long-range movements across regions.

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