Sea Grant VIRGINIA BRIDGE ocean science education DATA Series

Whale Sharks: Tracking Elusive Animals

Lesson Time : 45 minutes
Grade Level : 6-12
Vocabulary: distribution, elasmobranch, ovoviviparous, endangered, migration

Summary

These gentle giants can grow to be the size of a school bus! So why don't we know more about where they go?

Objectives

- Recognize the habitat of whale sharks
- Compare whale shark distribution by season.
- Determine what data sets are more helpful in analyzing whale shark movements

Introduction

The whale shark (*Rhincodon typus*) is the largest known extant fish species. While they are typically observed at lengths between 18-32 feet, mature adults can reach more than 60 feet (18.3 m) in length. The sole member of the genus Rhincodon and the only living member of the Rhincodontidae, whale sharks are slow-moving, filter-feeding elasmobranchs that eat plankton and prefer tropical and warm-temperate seas. Rarely found in water temperatures below 70°F (21°C), adults are often found feeding at the surface but may dive as deep as 3200 feet (1000m).

Growth, longevity, and reproduction of the whale shark are poorly understood. Studies looking at growth bands in their vertebrae have estimated whale shark lifespans at 80-130 years. Whale sharks are ovoviviparous and pregnant females can carry as many as 300 fertilized eggs at a time, but it is unknown where they give birth. Because they grow slow and mature later than other species, their populations are particularly vulnerable to losses from bycatch, vessel strikes, and poaching. Because of this, the species was listed as endangered in 2016.

In January of 2021, NOAA shark scientist, Dr. Eric Hoffmayer, and his team released a publication outlining the seasonal occurrence of whale sharks in the northern Gulf of Mexico. The team of researchers looked at more than 800 sharks that were sighted or tagged to try and understand their travel patterns throughout the course of the year.

Data Activity

NOAA researchers compiled sighting and tracking information over 16 seasons and then created figures to illustrate patterns in the data. Study each of the following images and then answer the discussion questions.

Individual Whale Shark Sightings in the Gulf of Mexico by Season (1989-2016)

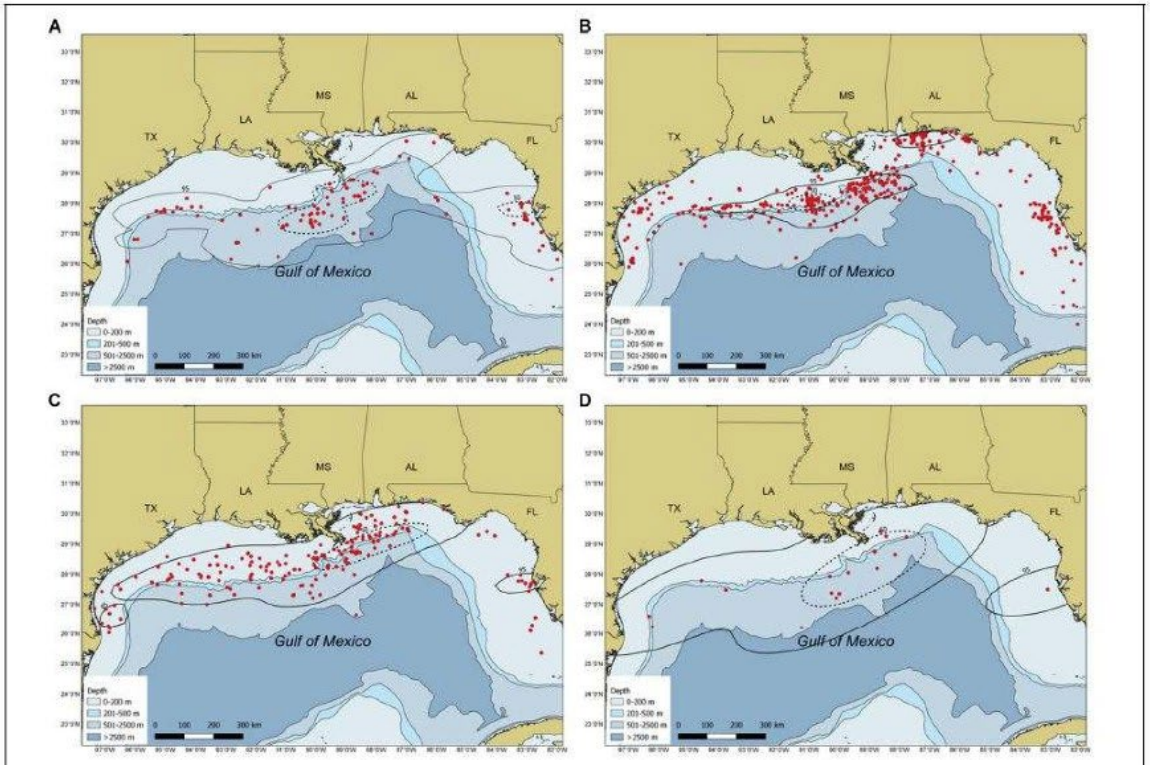

FIGURE 3 | Maps depicting sighting locations (red circles) and weighed kernel utilization distributions of whale sharks, *Rhincodon typus*, in the Gulf of Mexico by season: **(A)** spring, **(B)** summer, **(C)** fall, and **(D)** winter from 1989 to 2016. The 95% (solid black line) and 50% (dashed black line) contours are presented. Circles represent both individual and aggregation sightings.

Hoffmayer ER, McKinney JA, Franks JS, Hendon JM, Driggers WB III, Falterman BJ, Galuardi B and Byrne ME. (2021). Seasonal Occurrence, Horizontal Movements, and Habitat Use Patterns of Whale Sharks (*Rhincodontypus*) in the Gulf of Mexico. Frontiers in Marine Science. 7:598515. doi: 10.3389/fmars.2020.598515

Whale Shark Distribution in the Gulf of Mexico by Season (2008-2014)

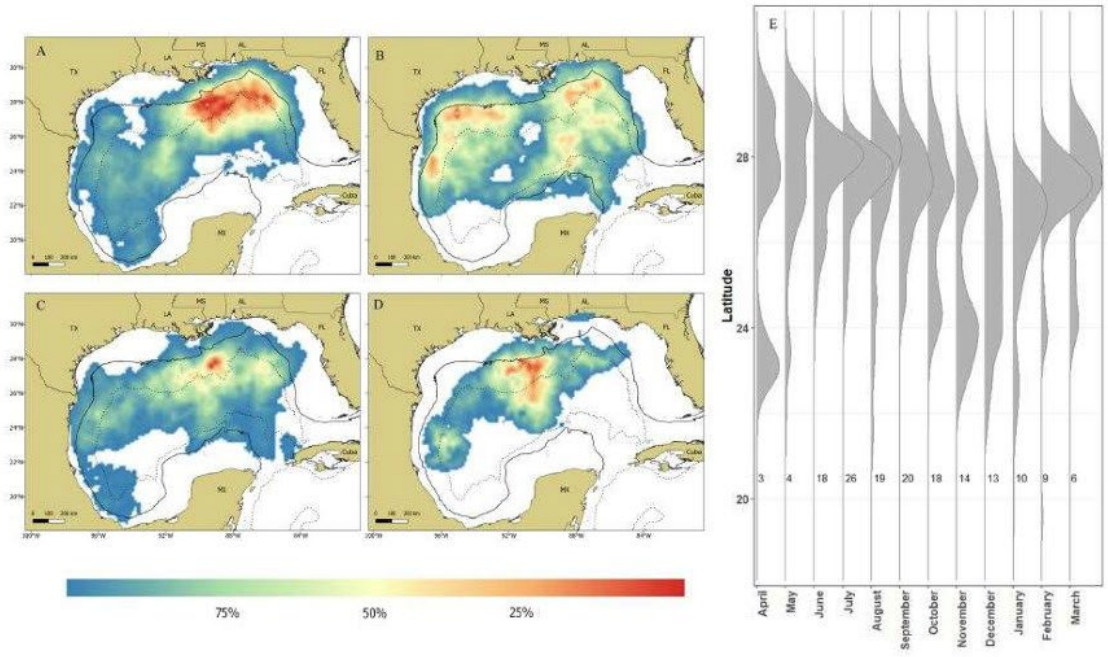

FIGURE 5 | Maps depicting residency distributions of whale sharks, *Rhincodon typus*, based on most probable track locations in the Gulf of Mexico by season; **(A)** summer, **(B)** fall, **(C)** winter, and **(D)** spring. The black solid line represents the 200m isobaths and the black dashed line represents the 2,500 isobath, separating the continental shelf, slope, and open ocean water of the Gulf of Mexico. The latitudinal density plot **(E)** shows the latitudinal distribution of PSAT tagged whale sharks in the northern Gulf of Mexico from 2008–2014. Each vertical line represents a month of the year and the numbers to the right of each line indicate the number of individuals tracked during that month.

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Whale Shark Migration Tracks in the Gulf of Mexico (2014-2015)

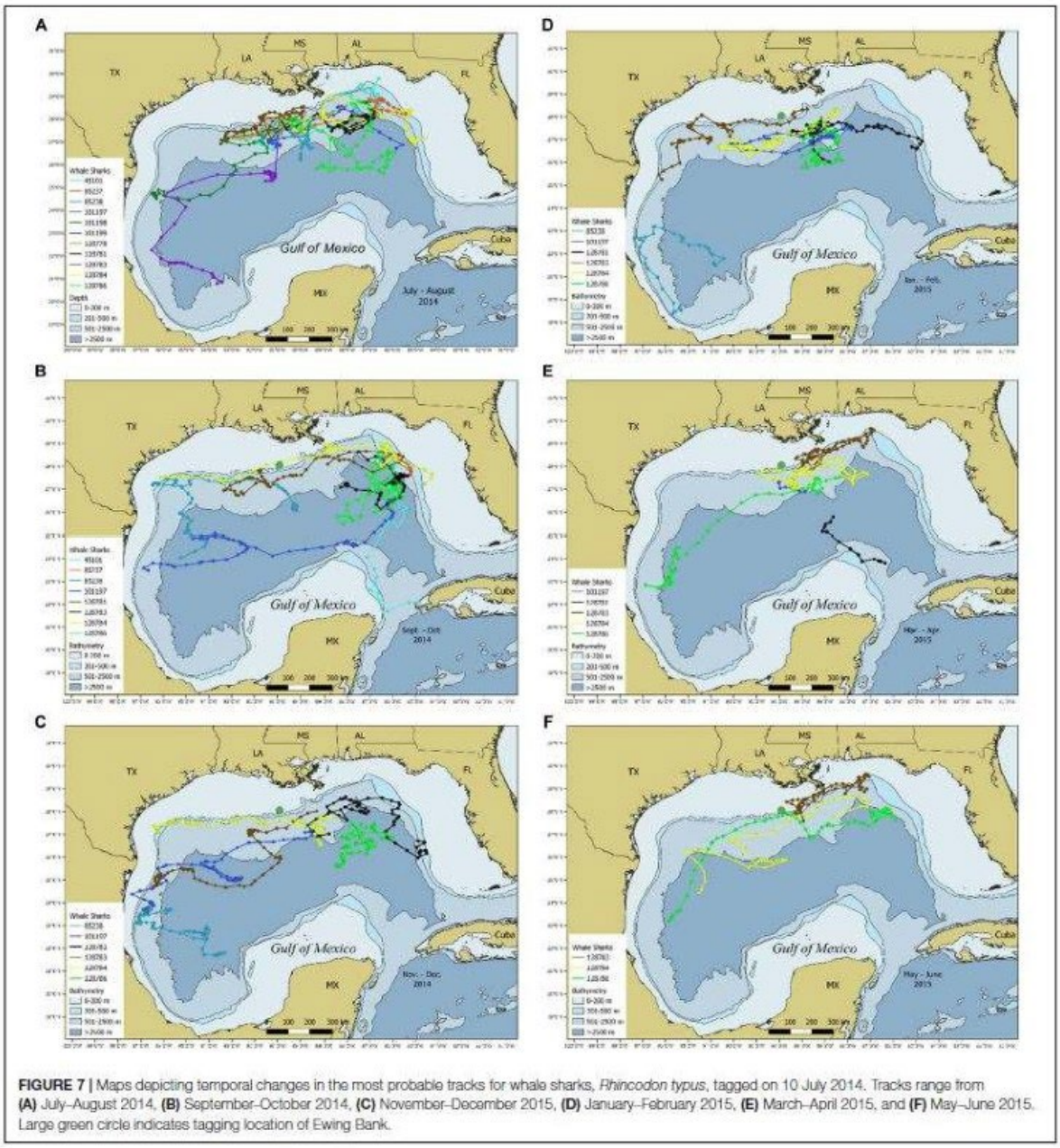

FIGURE 7 | Maps depicting temporal changes in the most probable tracks for whale sharks, *Rhincodon typus*, tagged on 10 July 2014. Tracks range from **(A)** July–August 2014, **(B)** September–October 2014, **(C)** November–December 2015, **(D)** January–February 2015, **(E)** March–April 2015, and **(F)** May–June 2015. Large green circle indicates tagging location of Ewing Bank.

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Discussion

What do the data show about whale shark populations in the northern Gulf of Mexico?

How does the number of whale sharks in the Gulf compare from season to season? Is this what you expected to see? Why or why not?

Compare the three data figures, which do you think is the best one for determining how whale sharks migrate in the Gulf of Mexico?

Whale sharks face threats from changing climate, entanglement in fishing gear, vessel strikes, illegal fin harvest, and decline in plankton populations. If you were a legislator, how would you work with scientists to develop a plan to help protect whale sharks from one or more of these threats?

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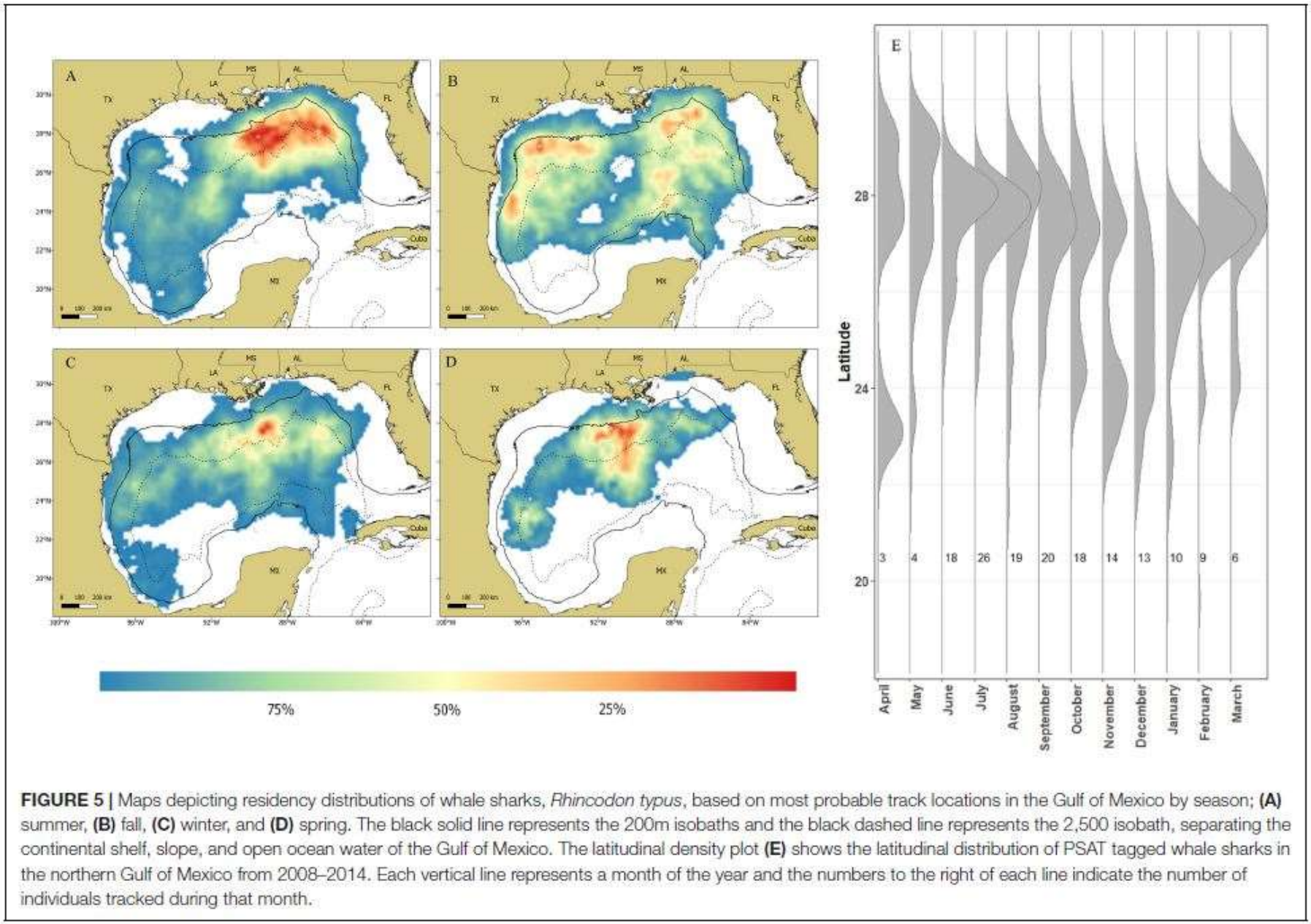

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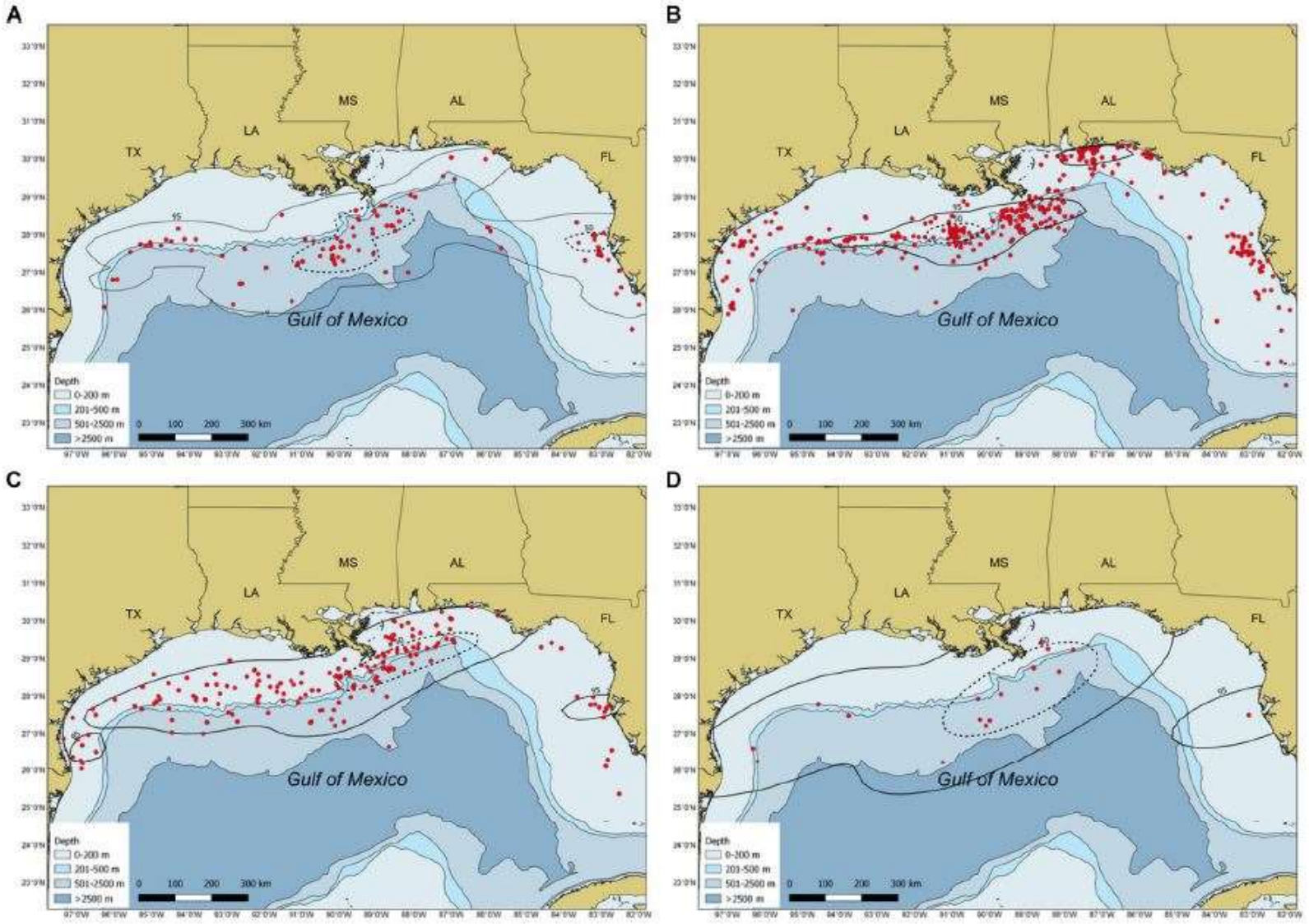

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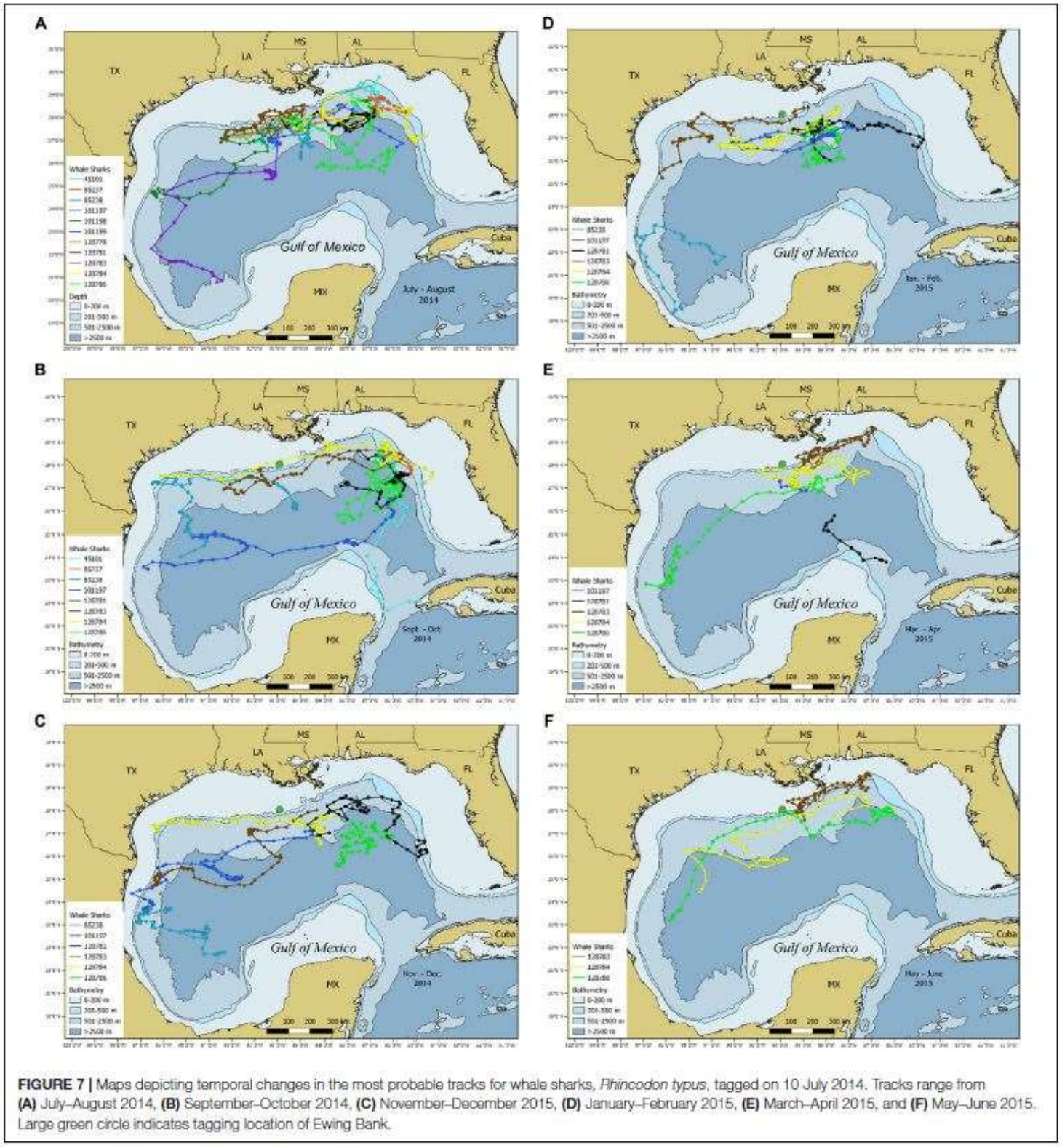

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