

# UNRAVELING THE MIGRATORY MYSTERIES OF NORTH PACIFIC LOGGERHEADS USING EXPERIMENTAL OCEANOGRAPHY

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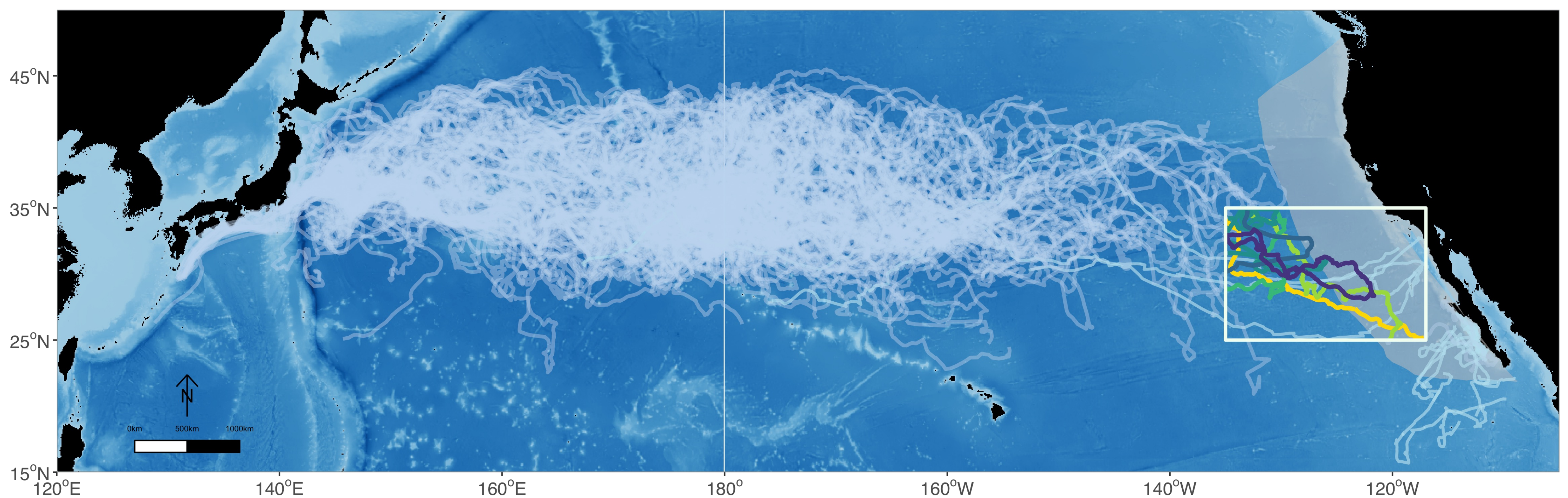


## SEA TURTLE RESEARCH EXPERIMENT ON THE THERMAL CORRIDOR HYPOTHESIS (STRETCH)

### BACKGROUND

Until recently, scientists had no clear understanding of the mechanisms by which loggerhead sea turtles (*Caretta caretta*) leave their nesting beaches in Japan and migrate across the entire North Pacific Ocean to Baja California, Mexico. The Thermal Corridor Hypothesis (TCH, Briscoe et al. 2021) combined over 2 decades of satellite tracked loggerheads (Fig. 1) with independently-derived data, stable isotope and aging techniques (Fig. 2) and remotely sensed oceanography, to propose that juvenile loggerheads access an intermittent migratory corridor from the Central North Pacific (CNP) to the west coast of North America. We hypothesized that this migratory corridor opens under anomalously warm conditions (3-month running mean of sea surface temperature anomalies (SSTa)  $\geq 0.5$  °C). Under cool conditions (SSTa  $\leq -0.5$  °C), the corridor would close, causing turtles to stay in the CNP (Fig. 3).

Fig 1. Satellite tracks of juvenile North Pacific loggerhead sea turtles (1997 – 2013, n = 281). The movements of 6 individuals that migrated east towards North America are shown in color.



### EXPERIMENTAL APPROACH

- We will undertake one of the first experimental oceanography approaches of its kind, providing a novel field test of the Thermal Corridor Hypothesis.
- We will deploy 25 aquarium-reared, satellite tagged loggerheads per year in the eastern edge of the CNP, using Ships of Opportunity.
- Given the variation in ocean conditions across years, we should experience both warm and cold conditions. Ocean forecasts will allow us to predict whether the Thermal Corridor is open or closed in a particular year.

### SIGNIFICANCE

- Distributional shifts due to changing ocean conditions will allow us to dynamically manage & protect this species.
- Hypothesis validation is a critical step. If a corridor were to open more frequently, it could result in increased abundances for all migratory animals that utilize these habitats.
- STRETCH will create a unique educational opportunity to engage interested individuals around the world, allow them to learn about how sea turtles across all ocean basins respond to climate variation.
- To learn more, follow STRETCH at [www.loggerheadstretch.org](http://www.loggerheadstretch.org)

Fig 2. Relative number of annual juvenile loggerhead sea turtle recruits (1997–2012) using skeletochronology (Turner Tomaszewicz 2017).

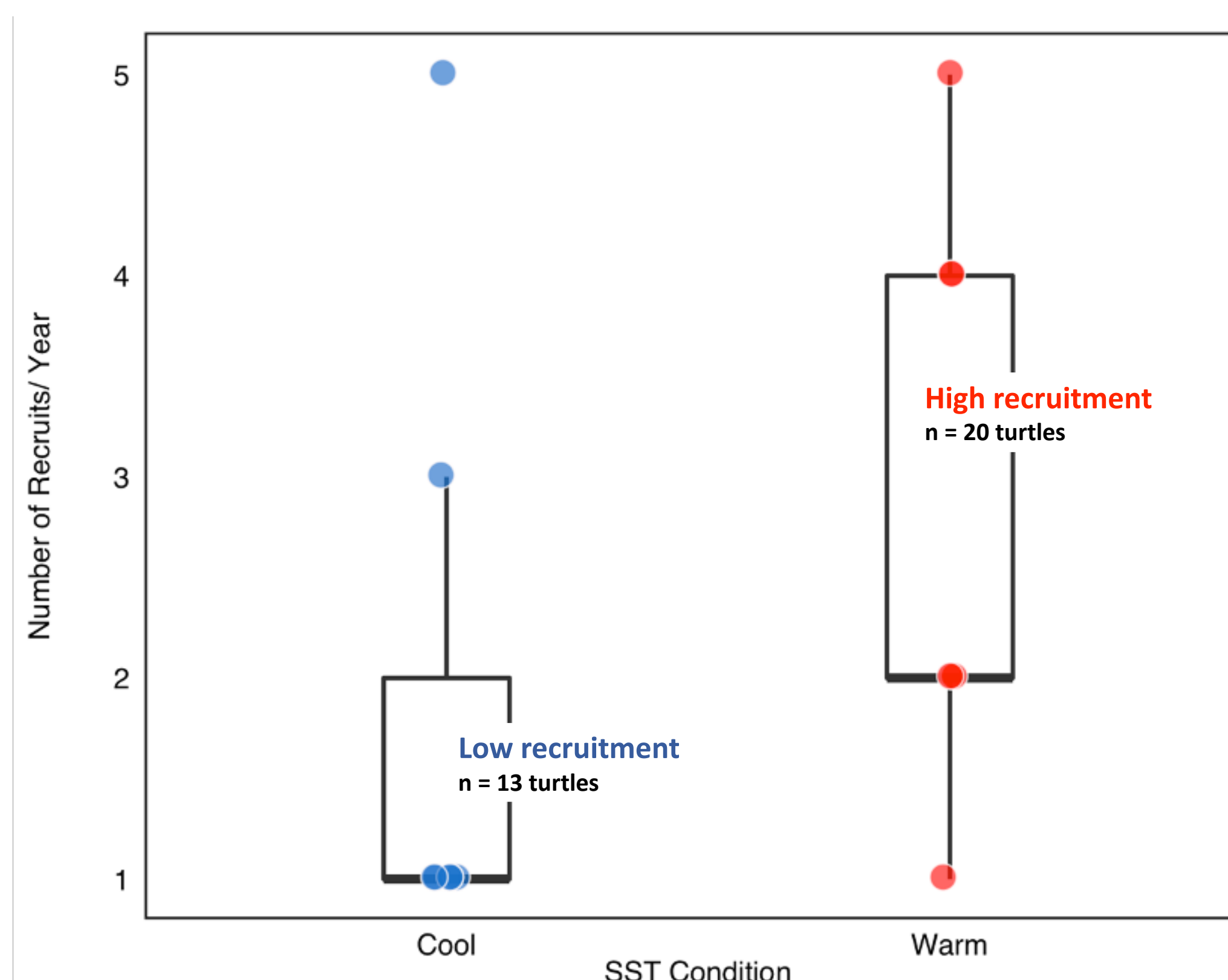
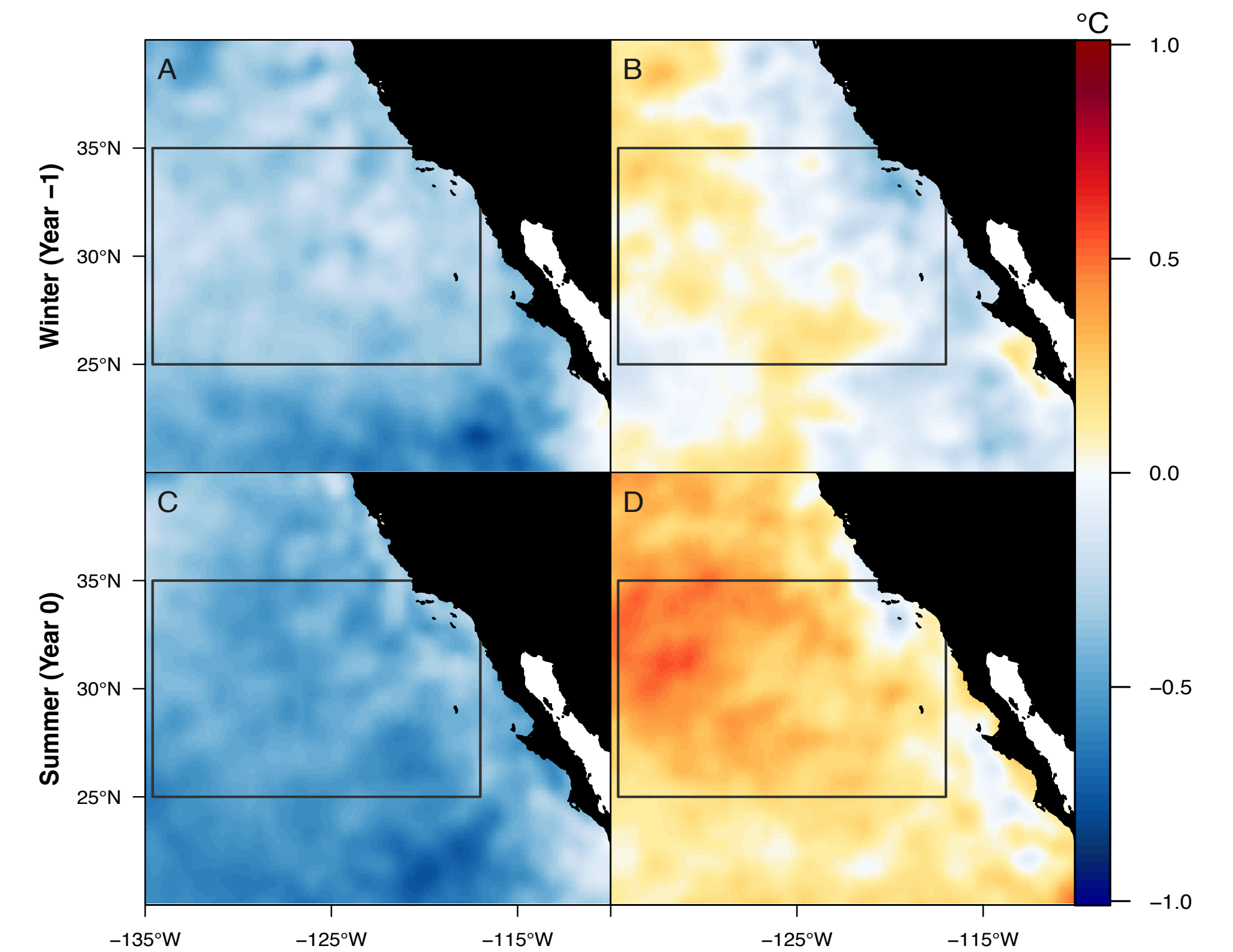


Fig 3. SST anomalies for cool (A, C) and warm (B, D) ocean conditions during recruitment years. Thermal corridor area outlined in gray.



Citations: Figures from Briscoe et al. 2021 *Frontiers in Marine Science*. Turner Tomaszewicz et al. 2017, *Journal of Animal Ecology*. Photo credit: Ralph Pace.

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