

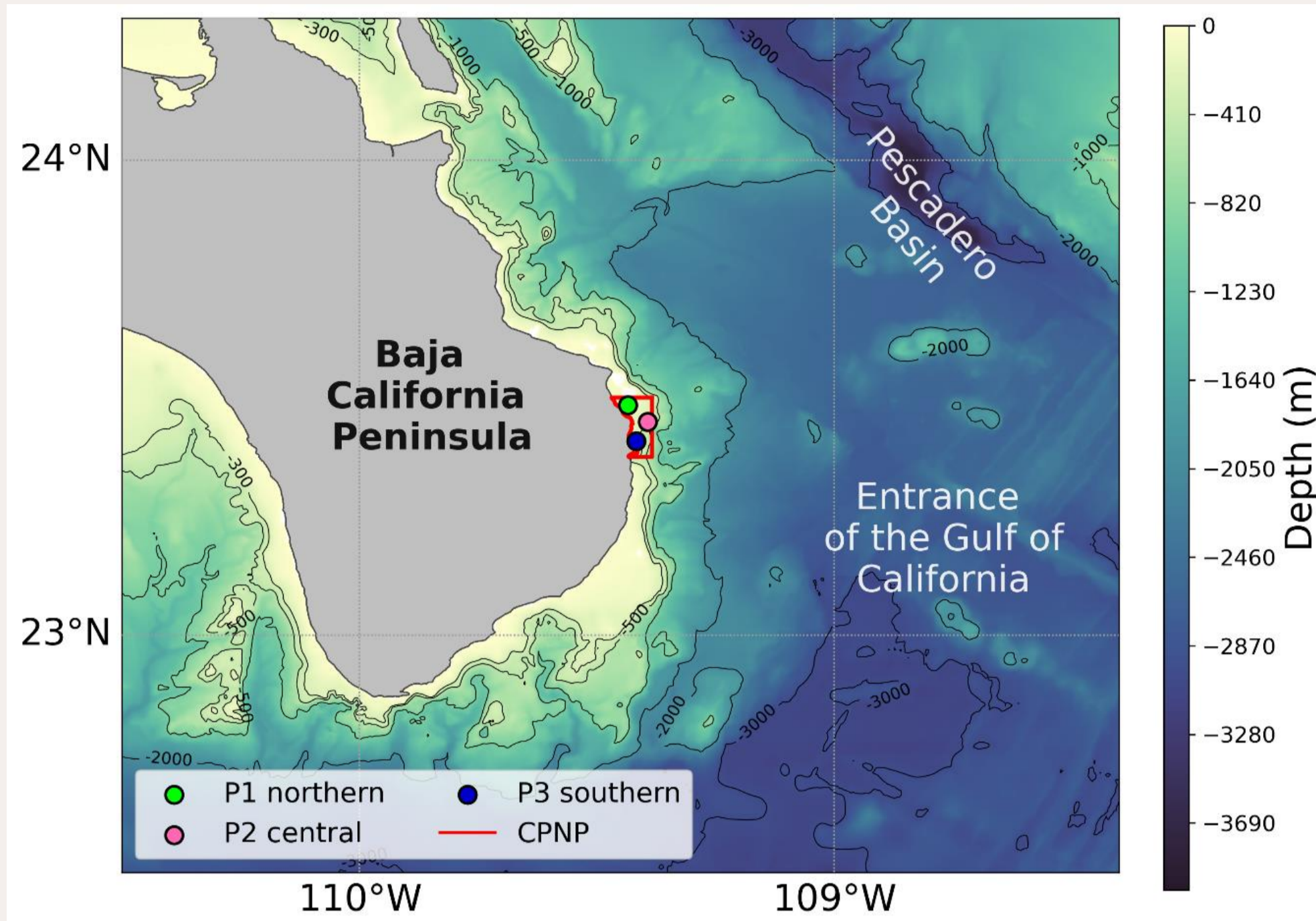
# ENSO modulation on larval fish connectivity in a Tropical Marine Reserve: trophic implications around Cabo Pulmo National Park



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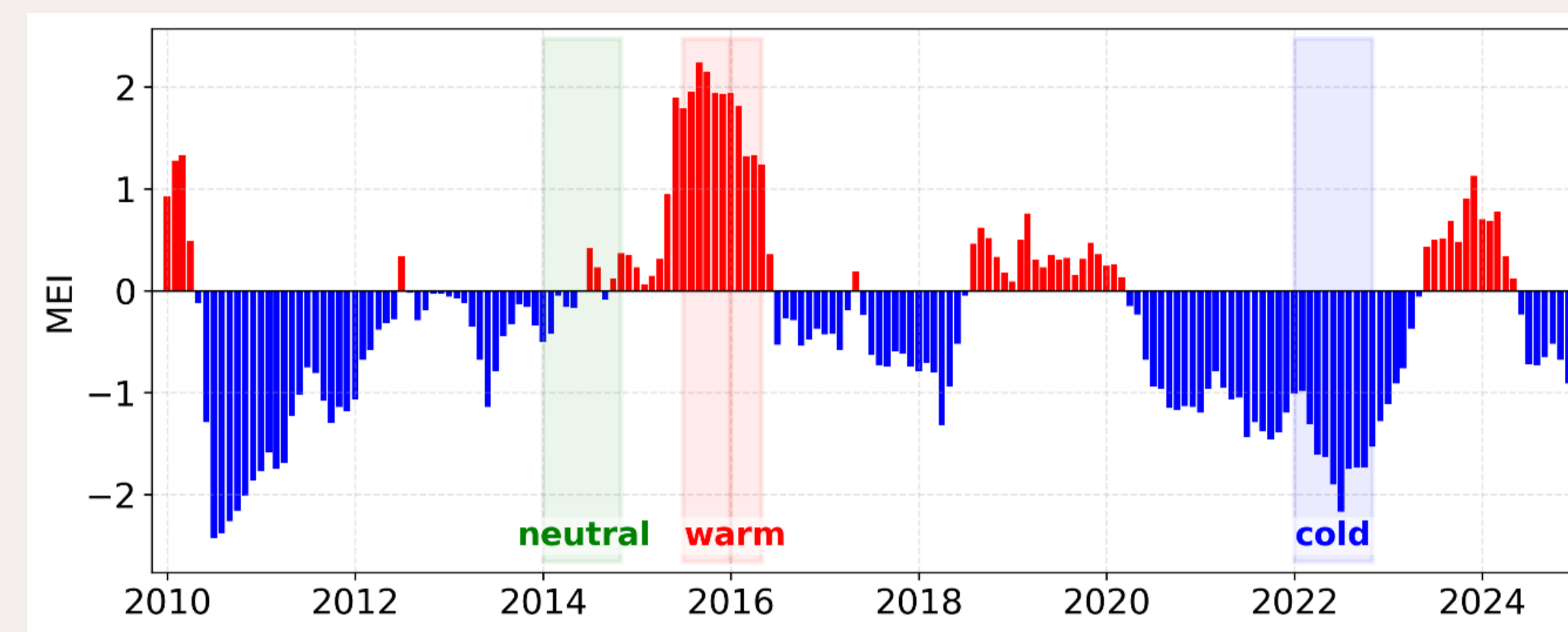
## BACKGROUND & OBJECTIVE

### WHERE?



- Cabo Pulmo National Park (CPNP), located at the southern entrance of the Gulf of California, Mexico.

### WHEN?

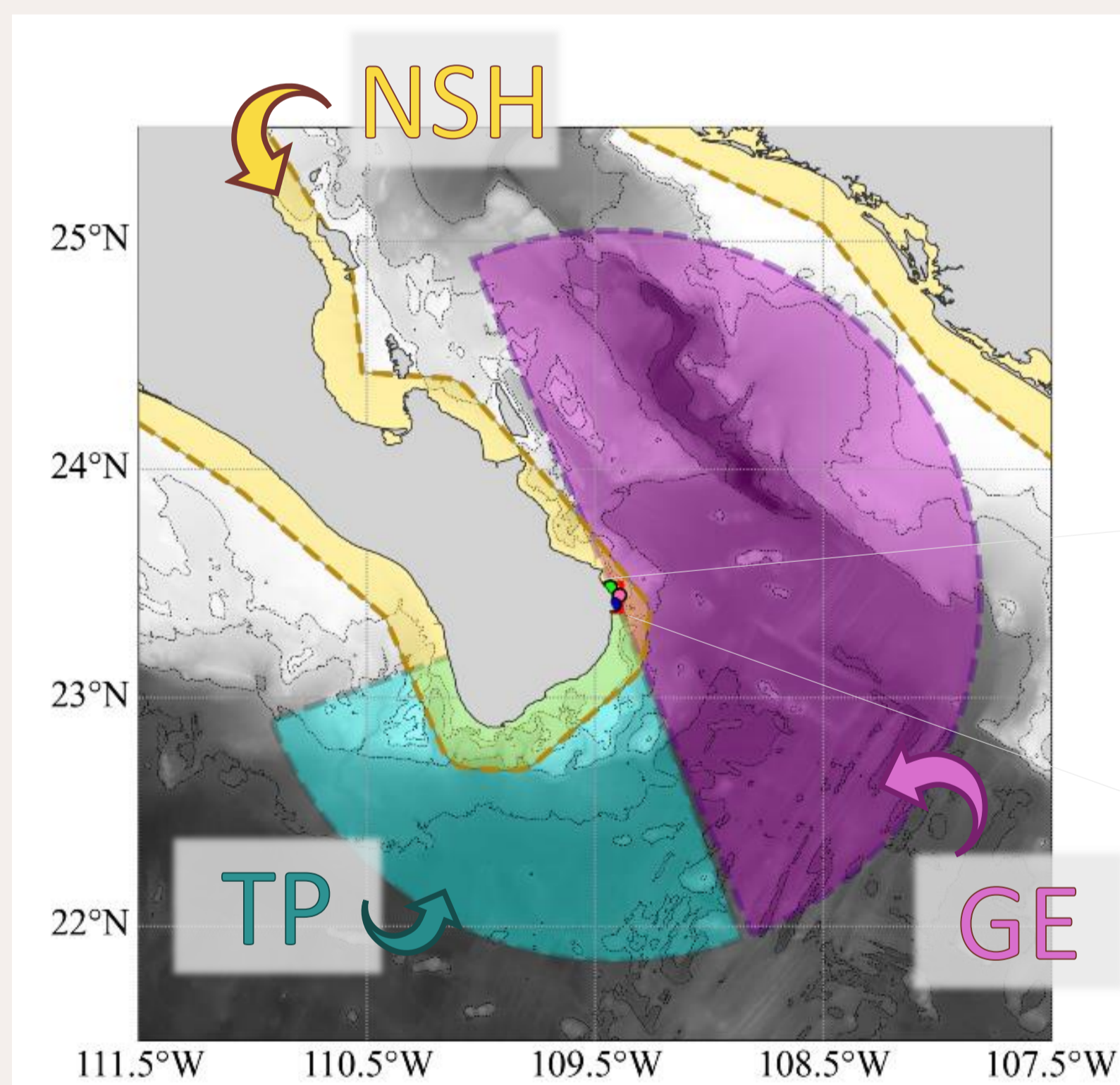


- Simulations were conducted during representative ENSO phases: Neutral (2014), Warm (2015–2016), and Cold (2022).
- Seasonal releases were performed in January, April, July, and October.

## SIMULATIONS

### HOW?

- Lagrangian simulations were performed using OpenDrift, forced by GLORYS ocean currents and ERA5 wind stress.
- Particles were released at three locations within CPNP and tracked for 10 days.
- Connectivity was evaluated based on final particle destinations: Retained, Nearshore, Gulf Entrance, and Tropical Pacific.



### WHY?

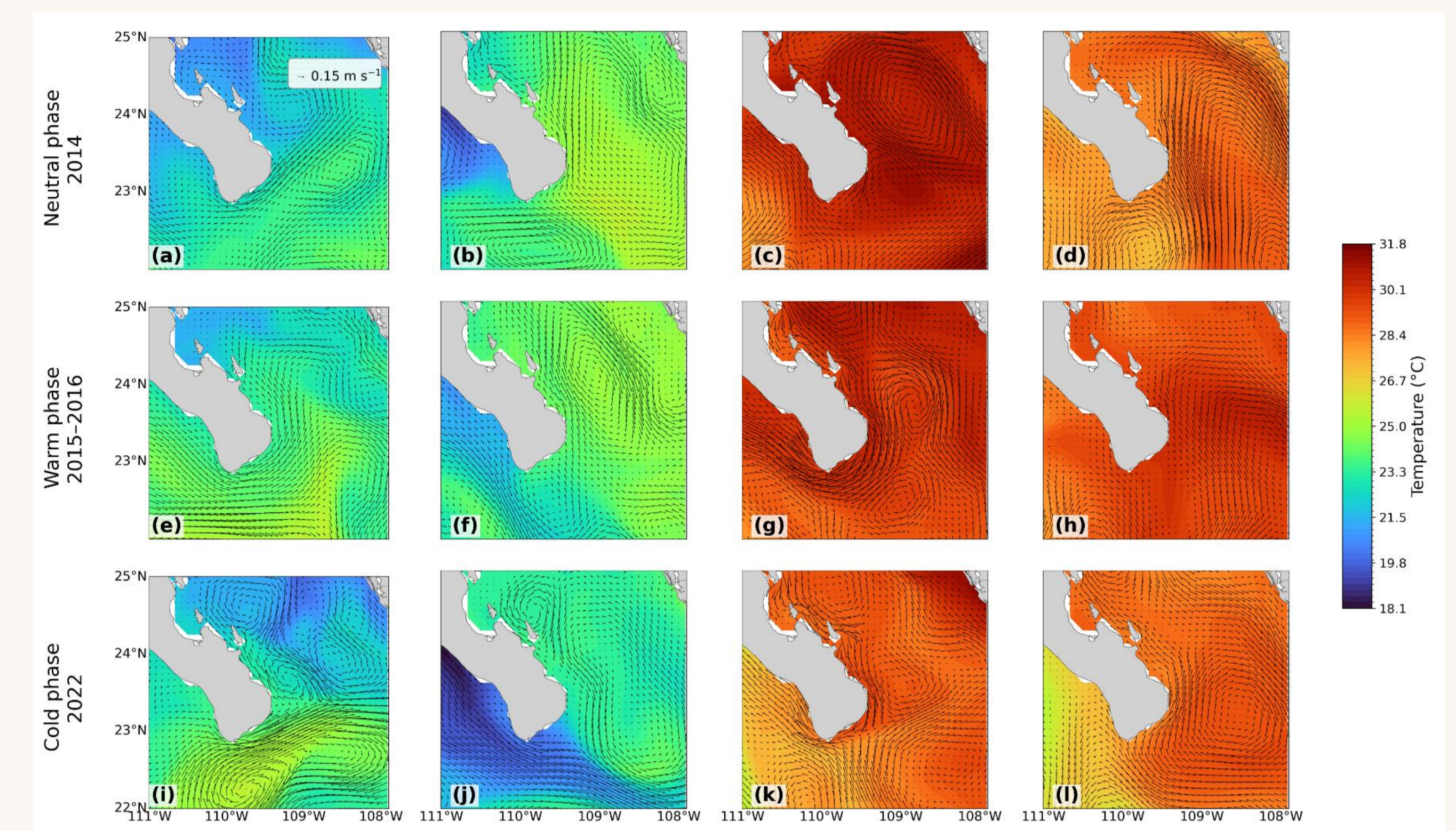
- To understand how climate-driven variability influences larval dispersal and connectivity patterns.
- To assess potential impacts on trophic dynamics and recruitment within a marine protected area.

## CONCLUSIONS

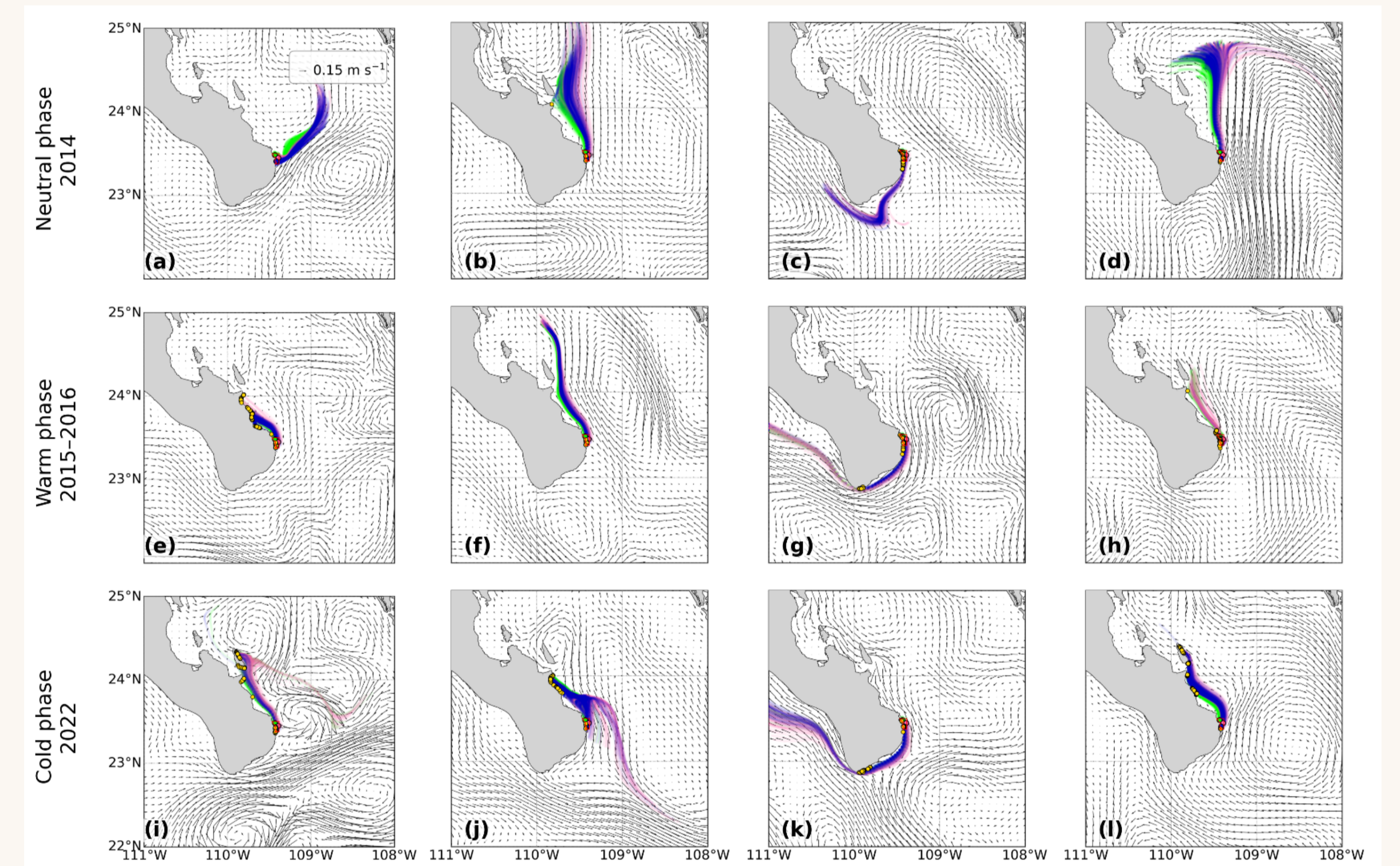
- ENSO modulates larval connectivity patterns in Cabo Pulmo.
- Warm conditions enhance offshore transport and dispersion.
- Cold conditions favor nearshore retention and local connectivity.
- Mesoscale circulation is a key driver of dispersal pathways.
- Connectivity shifts may influence trophic dynamics and recruitment.

## RESULTS

- SST and near-surface geostrophic currents under ENSO phases (Neutral, Warm, Cold). Shading: SST (°C); vectors currents (reference of 0.15 m s<sup>-1</sup>).



- Particle trajectories illustrate phase-dependent dispersal and retention patterns.



- ENSO-driven changes in surface currents modulate potential dispersal routes.
- ENSO alters connectivity structure, modifying retention and export proportions.

