



Crab your attention!

Spatial overview of invasive crab species and native European shore crab in the North Sea

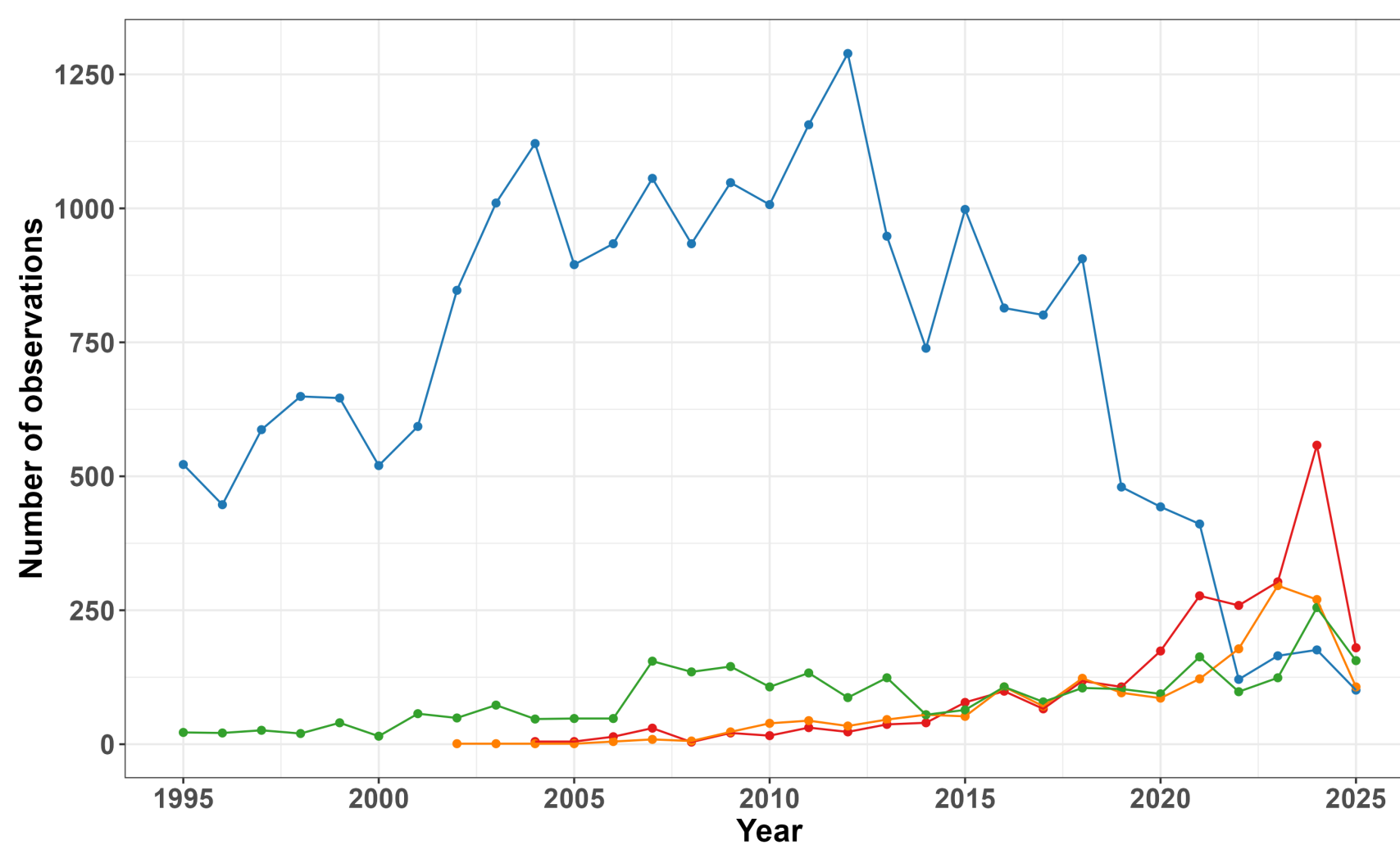
Research question:

How do invasive crab species in the North Sea spatially overlap with the native European shore crab (*Carcinus maenas*), and what are the temporal trends in their distribution shift?



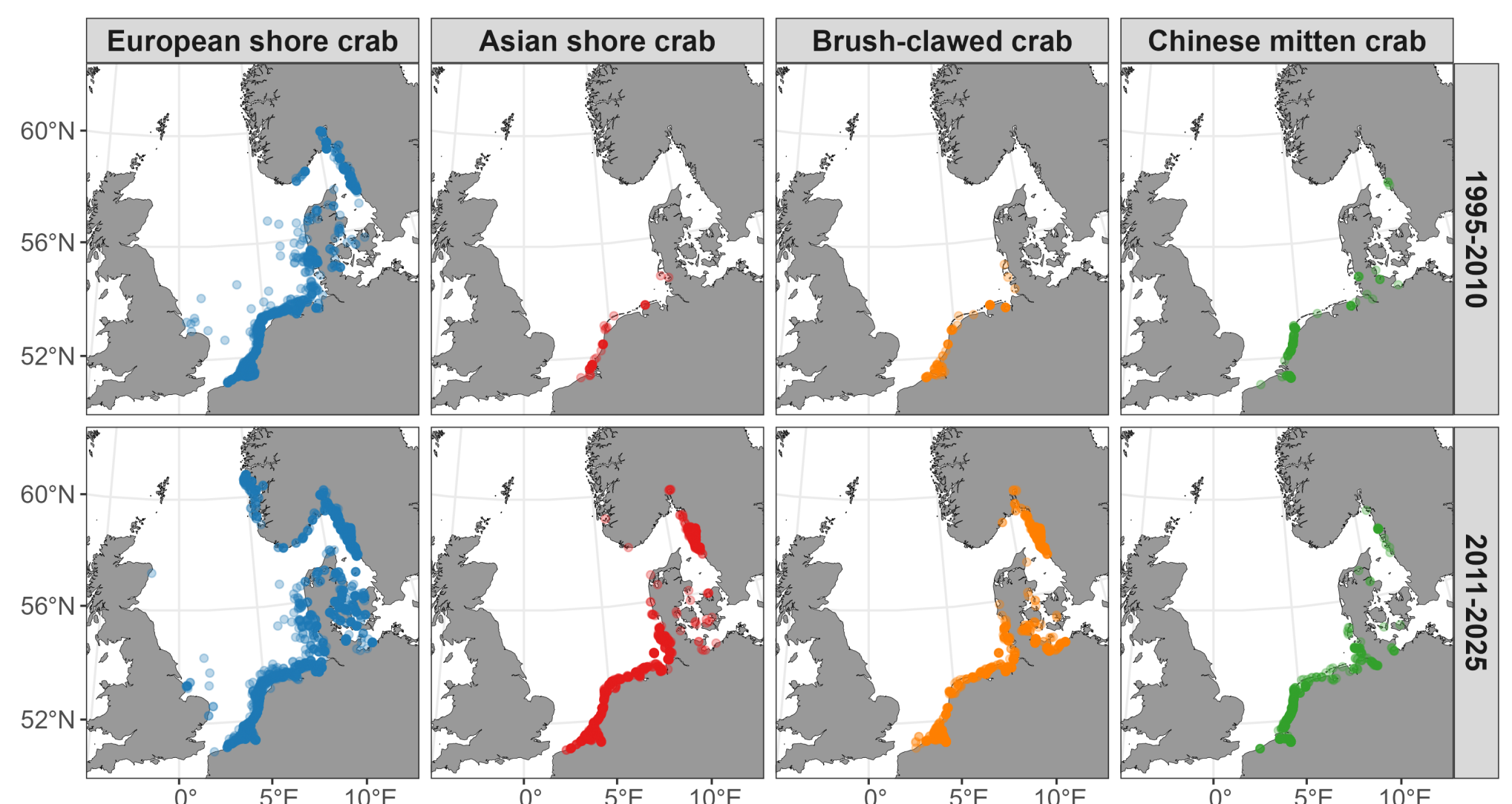
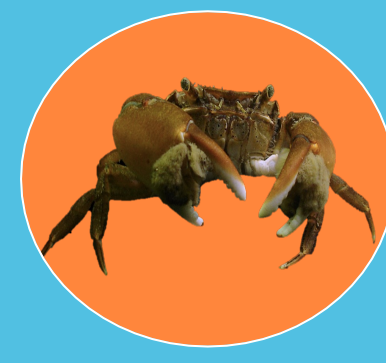
What did we do?

- Species & data source: Occurrence records for European shore crab (*Carcinus maenas*), Asian shore crab (*Hemigrapsus sanguineus*), Brush-clawed crab (*Hemigrapsus takanoi*), Chinese mitten crab (*Eriocheir sinensis*)
- Spatial scope: North sea, 1995-2025; observations >500m from shore excluded using *naturalearth*.
- Temporal division: Two periods: 1995-2010 and 2011-2025
- Mapping & Trends: Species occurrences mapped for both periods; observation counts plotted over time.
- Analysis: Occupancy-grid approach ($0.5^\circ \times 0.5^\circ$ cells); per-species observations aggregated; Pearson correlation matrix.



Why is it important?

- Invasive species can introduce shifts in local communities; potential cascade effects on ecosystems, including trophic interactions and predation pressure.
- Invasive crab species are rapidly expanding in the North Sea.
- Identifying spatial overlap helps reveal potential competition and areas with high pressure.
- Introducing an overview of the North Sea to highlight the need for study on area restricted competition between native and invasive species.



What we found:

- Increase in observation of all invasive crab species from first to second period; decrease for European shore crab in the study area.
- Range expansion for Asian shore crab and the brush-clawed crab in the North Sea; northward shift in species distribution.
- European shore crab shows apparent range increase, likely due to greater sampling effort in northern areas during second period.
- Observation plot reveal public data bias, including COVID-19 effect.
- Correlation matrix: low correlation between European shore crab and invasive species; Chinese mitten crab also weakly correlated.
- High correlation between Asian shore crab and brush-clawed crab, suggesting shared habitats and niches, supporting joint management strategies.



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