Habitat suitability index of Pacific sardine (Sardinops sagax) in the Mexican Pacific under climate change scenarios.

PICES - Changes in Transitional Areas of Pacific
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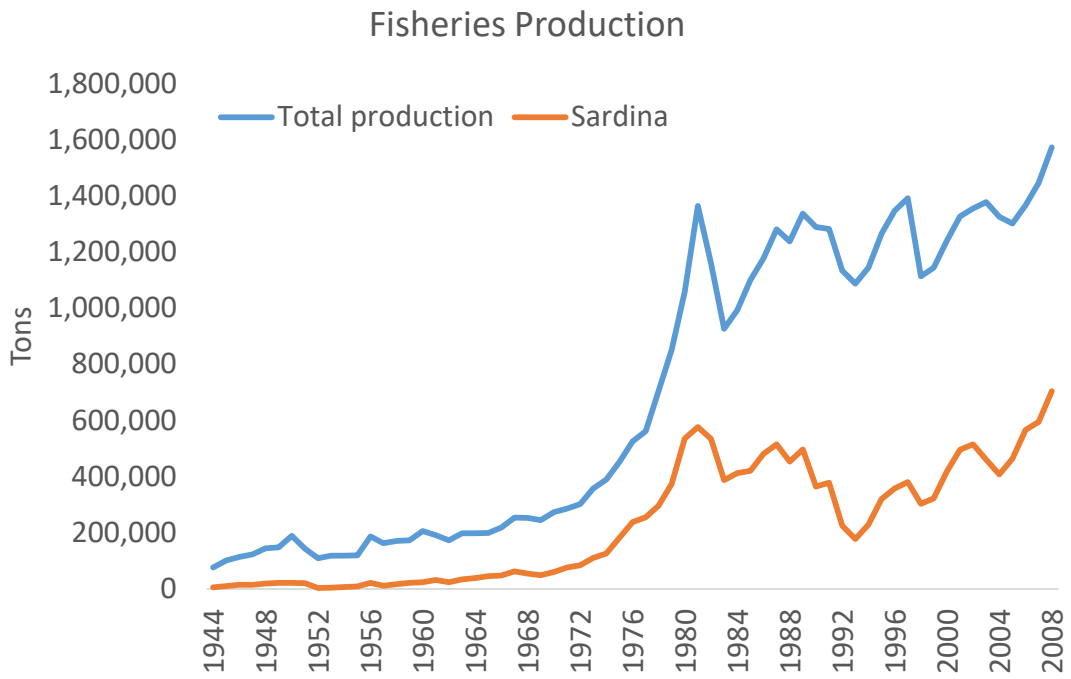
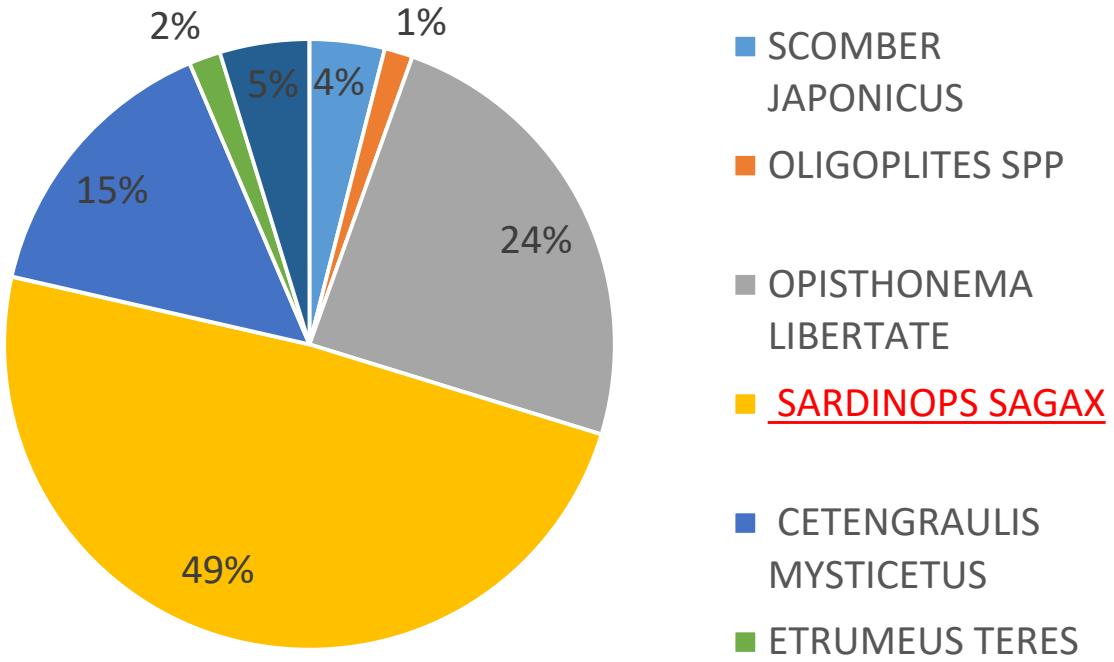
The importance of Pacific Sardine

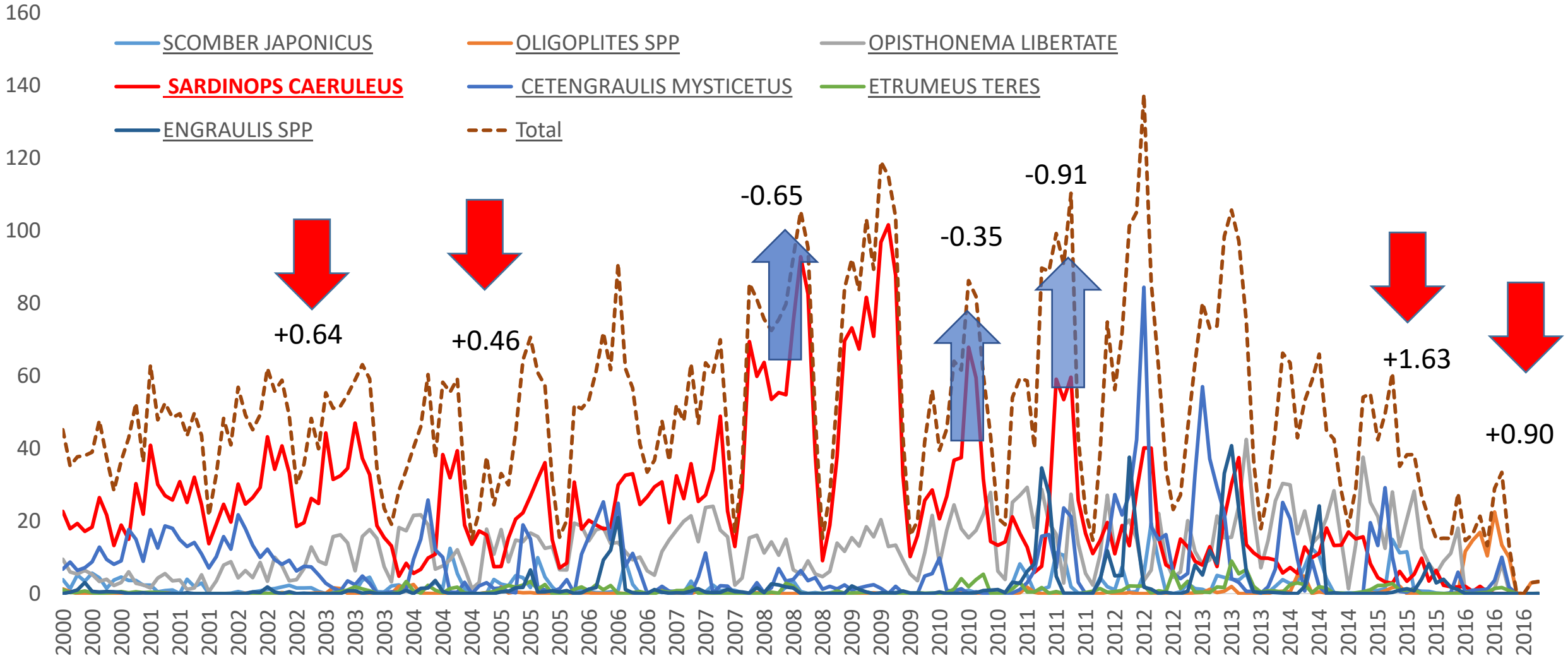




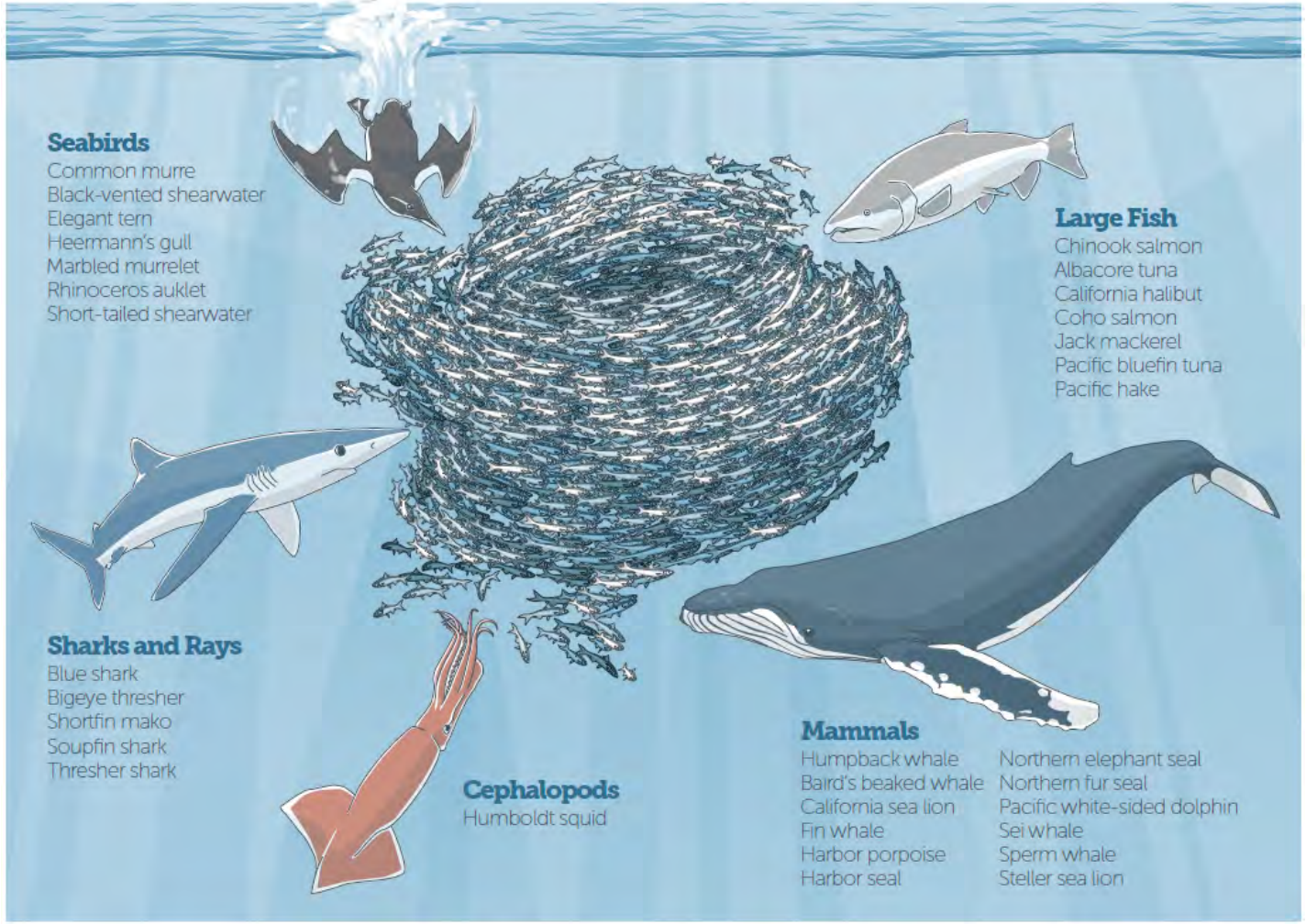
Sardine represents 34% of total catches in Mexico

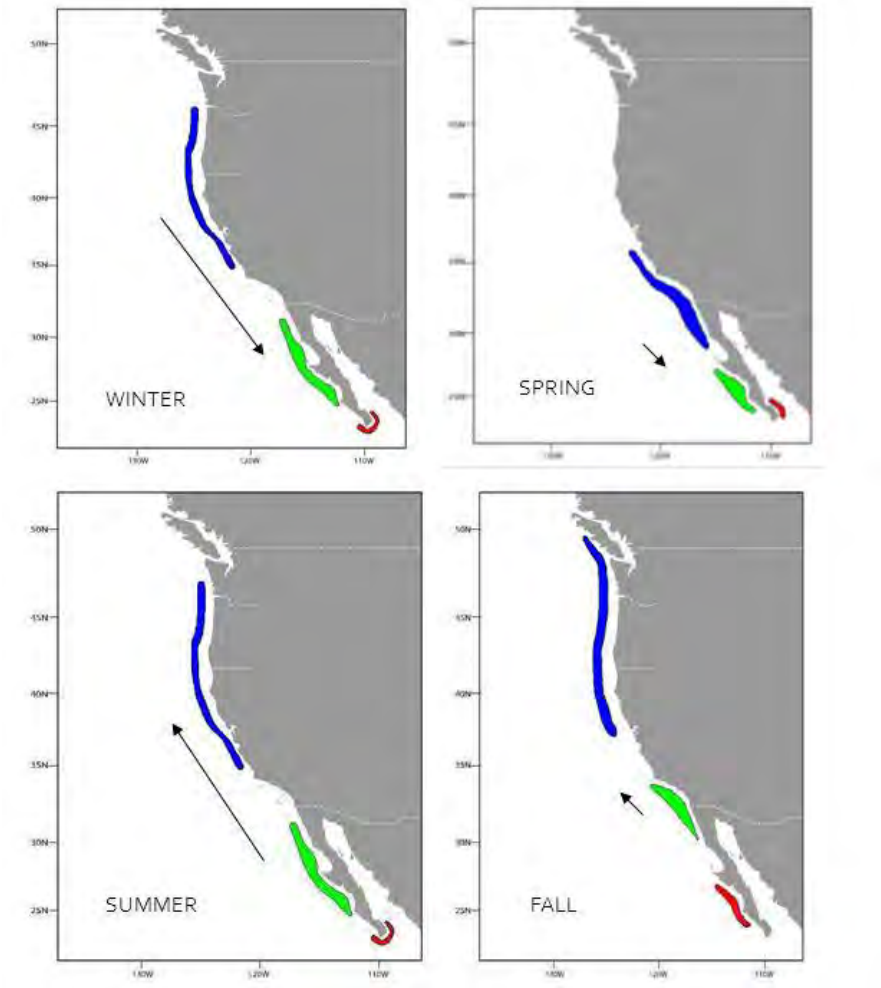
- +69% of the national fishing in México.
- +57% of the economic value.
- The sardine it's the most important fishery in Mexico. +600,000 ton/year
- fourth place by economic importance ($50 millions)

Small pelagics catches



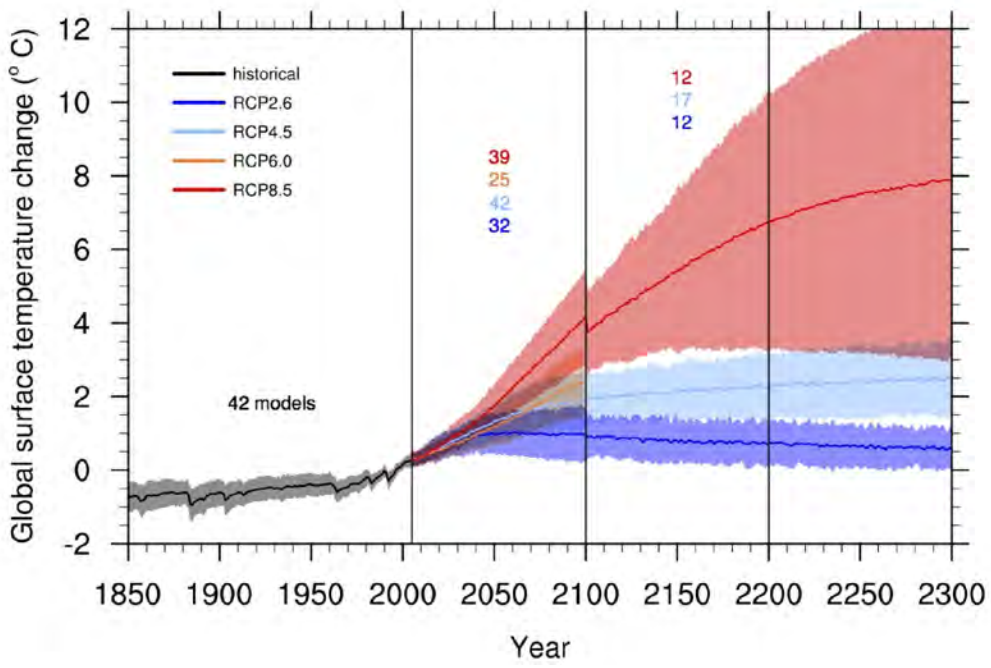
Spatial distribution of pacific sardine



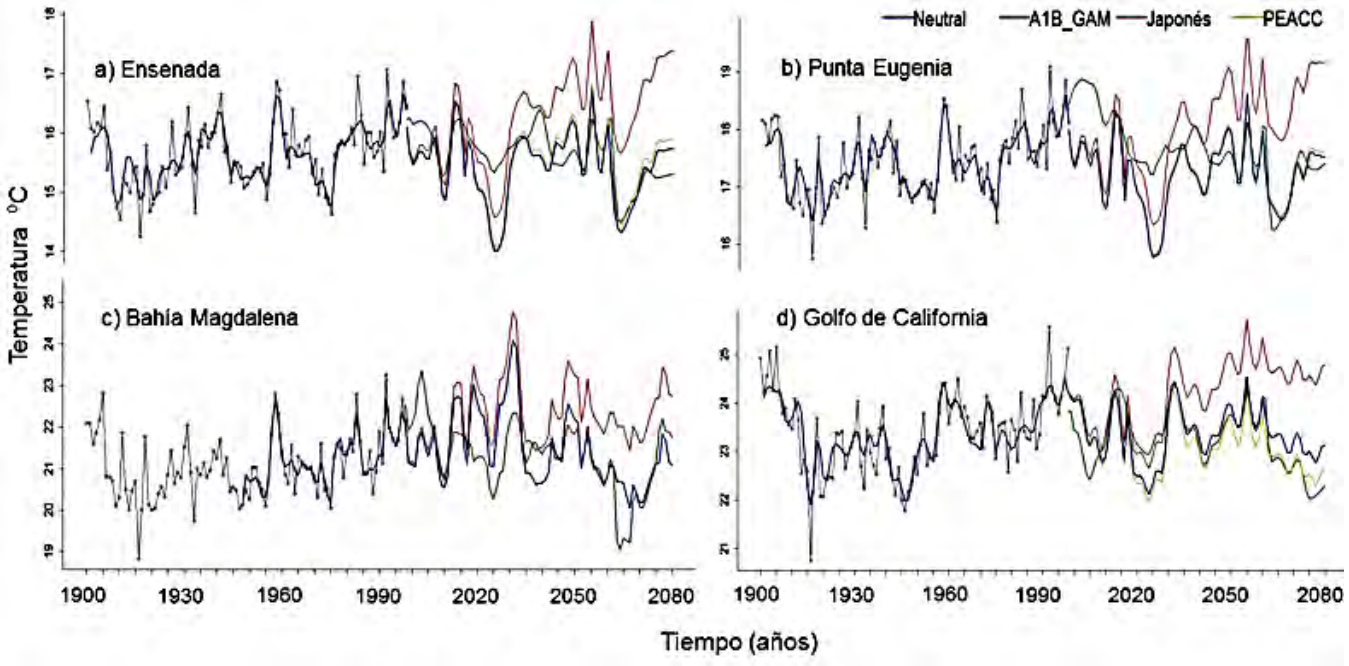


(Félix-Uraga et al. **2005)**

Climate Change scenarios



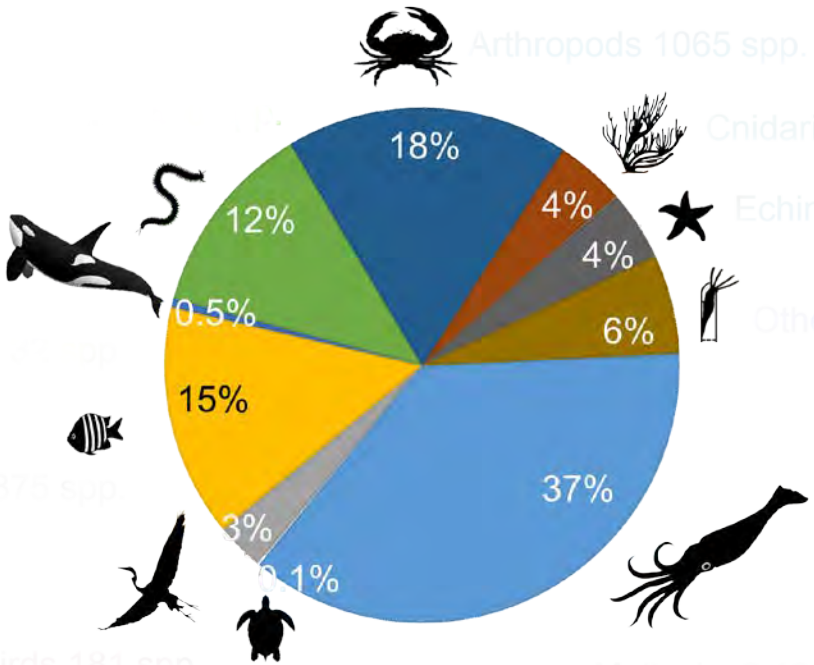
IPCC RCP scenarios



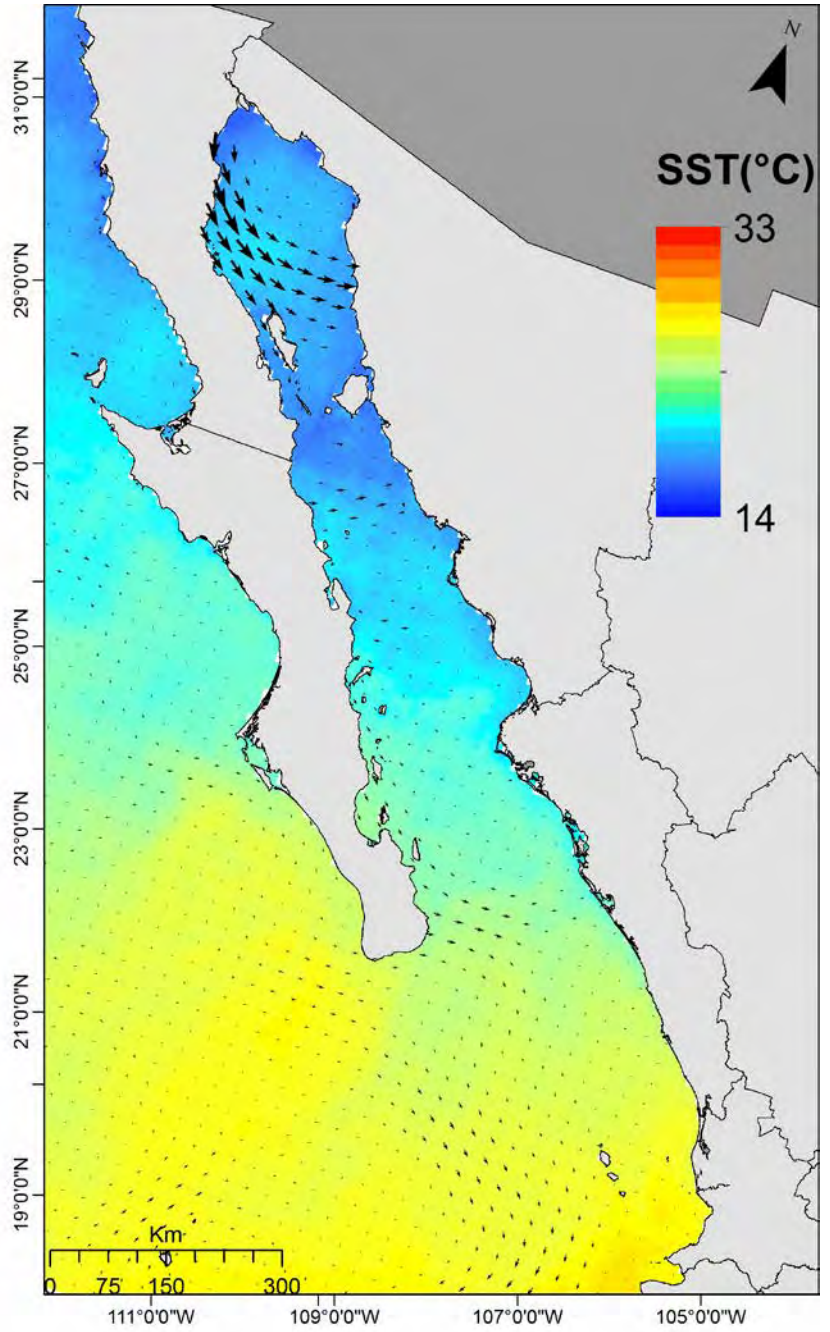
Saldívar-Lucio et al_2015

Northwestern Mexico

- Recognized for its unique oceanographic features
- Over half a million metric tons of seafood.
- It has a highest priority for conservation.
- Abundance and diversity of species it became one of the most biologically productive regions of the world.



Gulf of california biodiversity



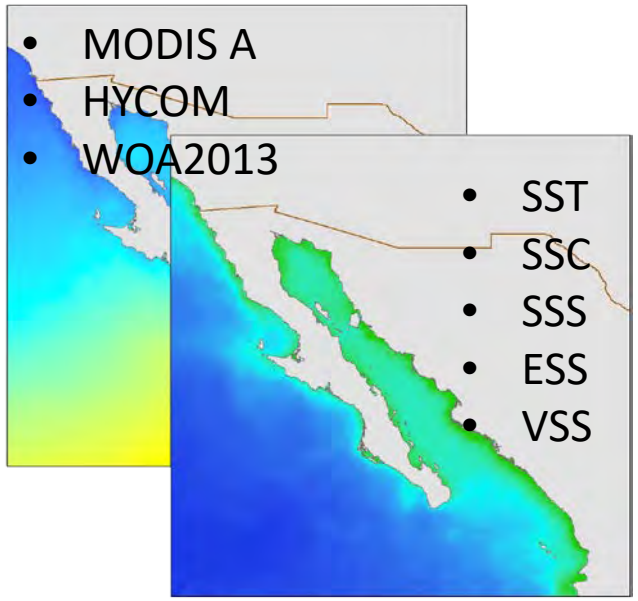
Targets

Modeling the spatial distribution of the Pacific sardine in Mexico and establish the relationship catches & environment patterns.

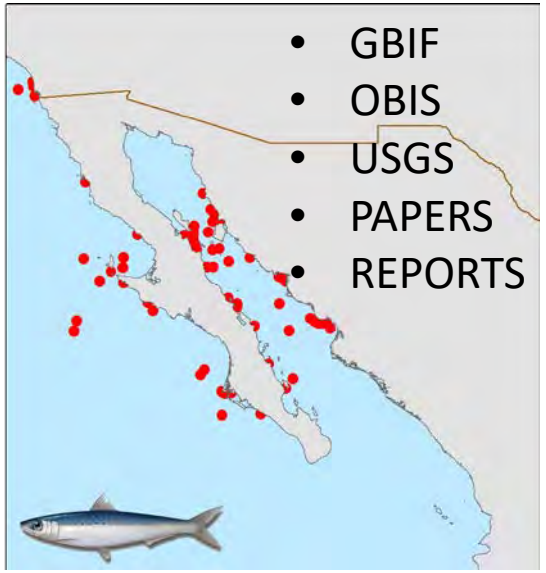
Create projections of spatial distribution using RCP scenarios in 2050 and 2100.

Species Distribution Model

For spatial modeling, the MaxEnt (Maximum Entropy Algorithm) tool was used, which uses georeferenced points and environmental variables as predictors of potential geographic distribution.

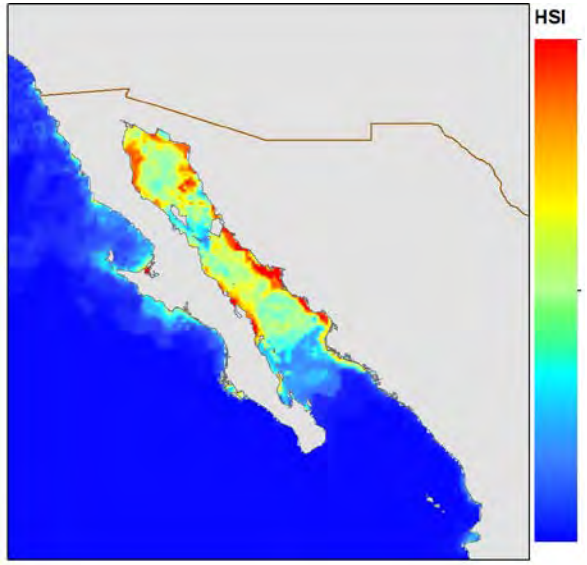


Enviromental database



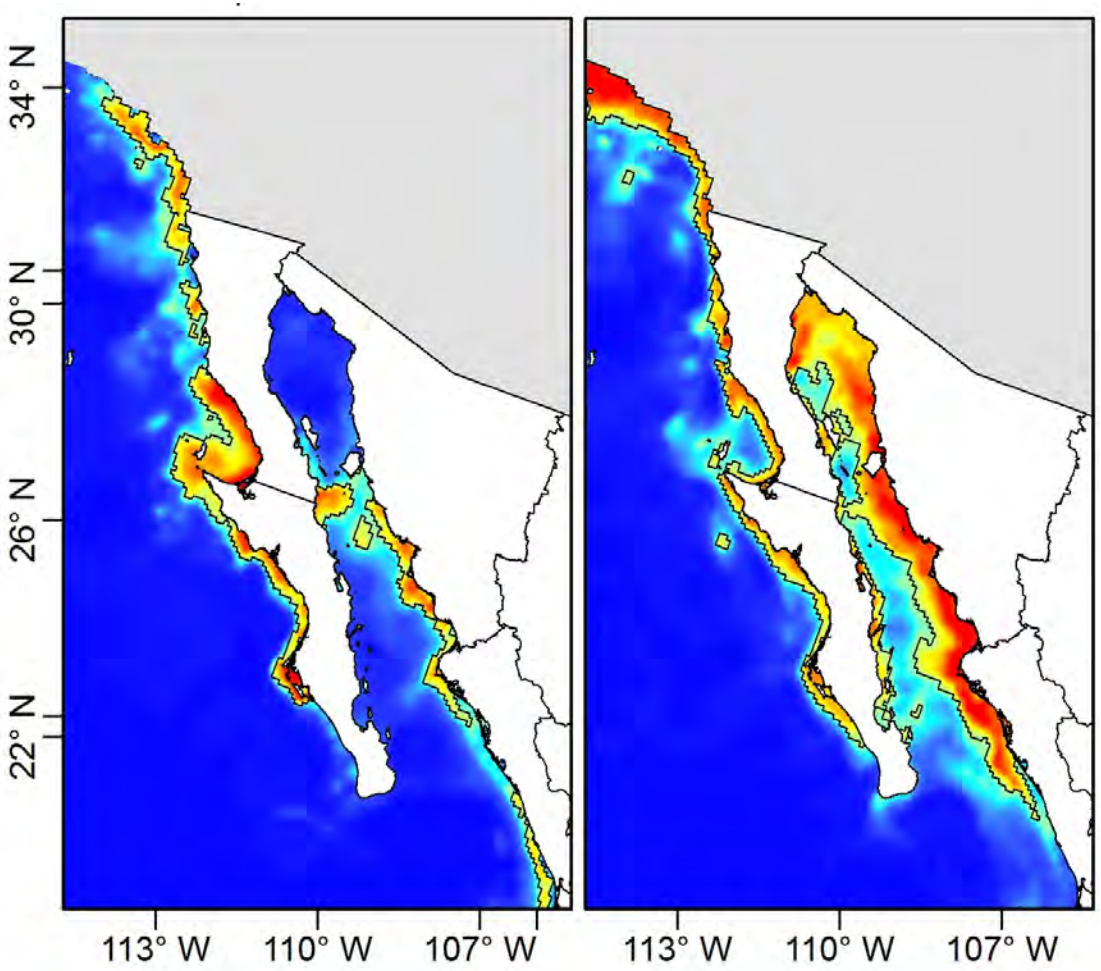
Ocurrence records

MaxEnt



- Niche model
- Specie distribution

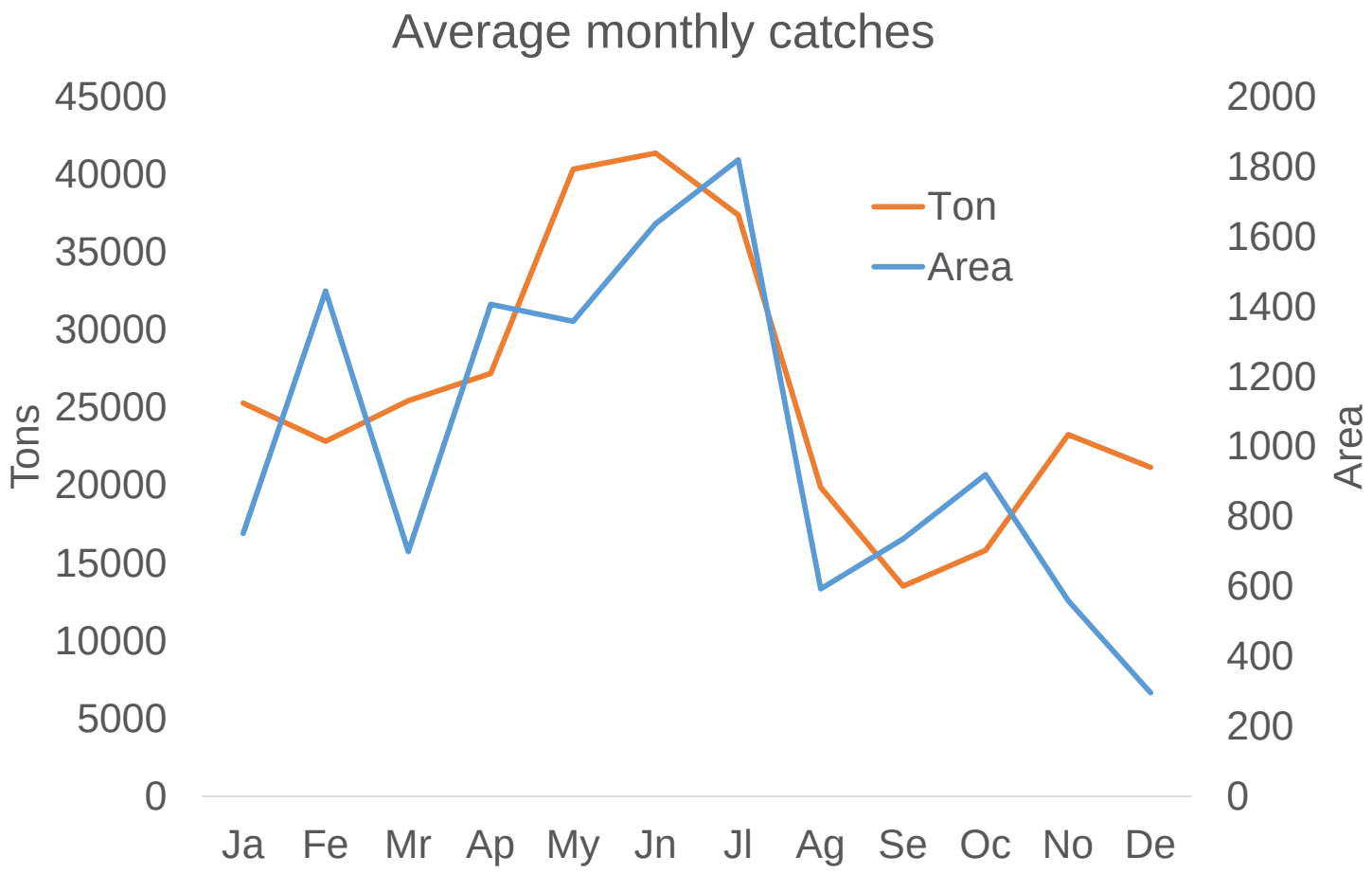
SDM & Catches

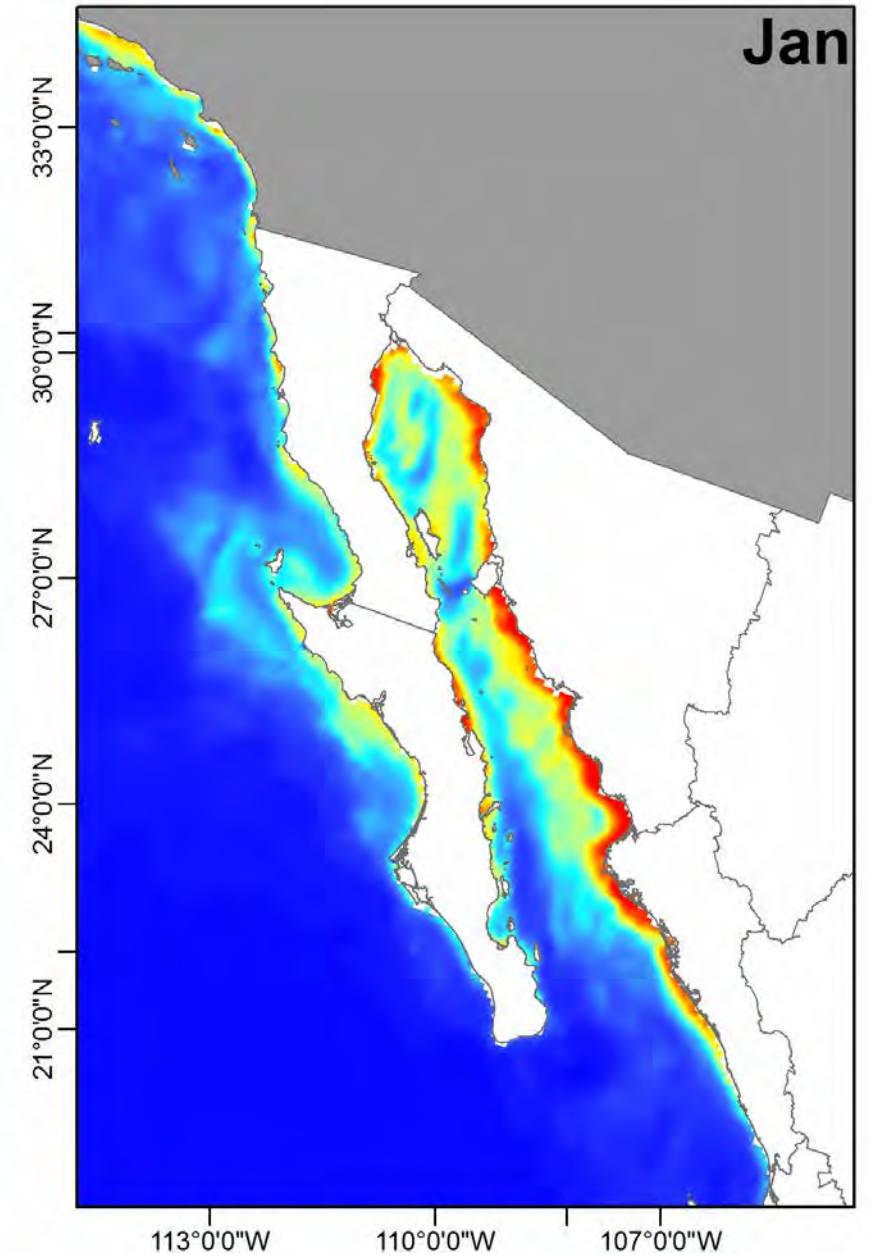


Using the SDM we extract the number of pixels with index values upper that 0.5.

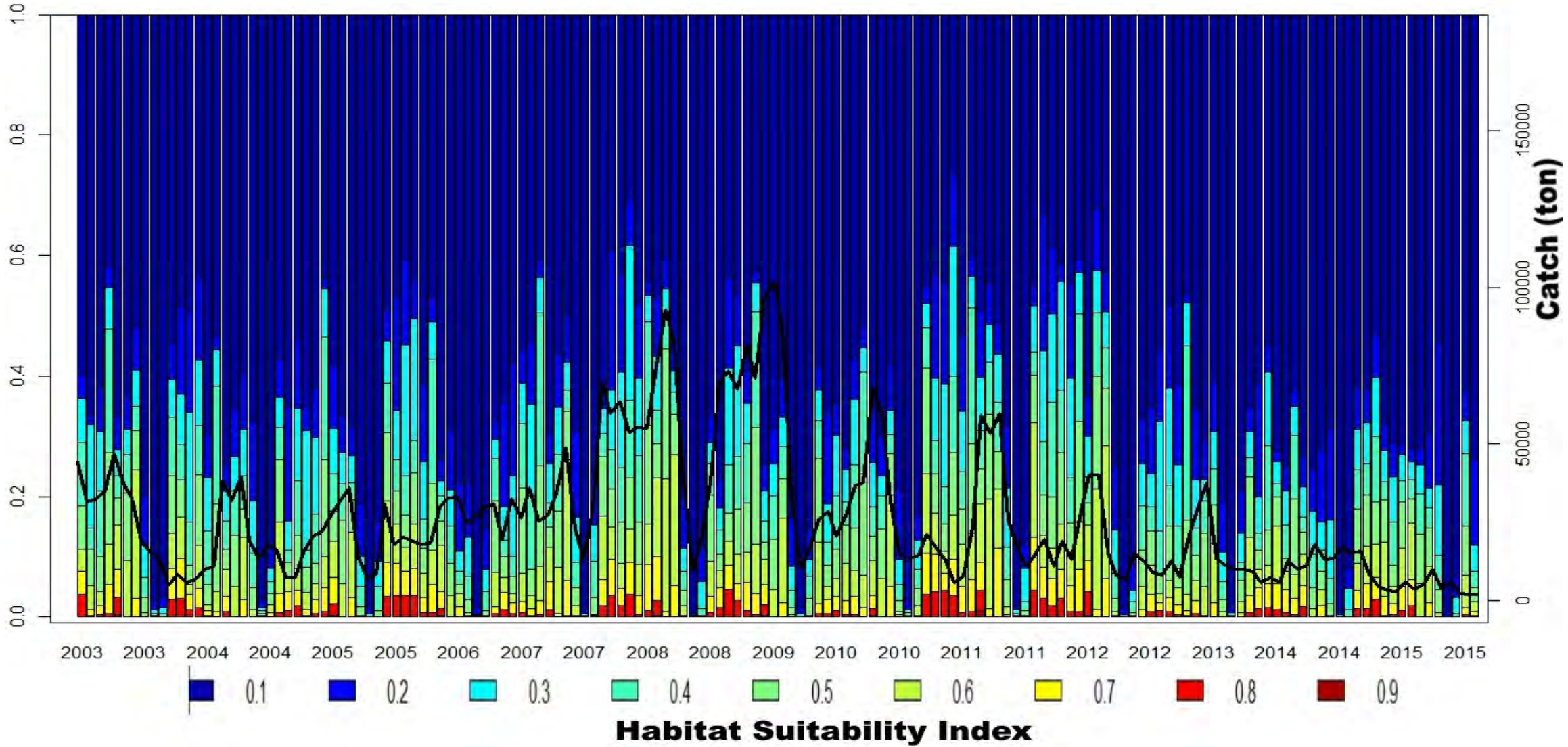
Using oficial fisheries statistics we get the correlation between pixels and catches reported to CONAPESCA from january 2000 to november 2016.

Spatial changes (monthly)

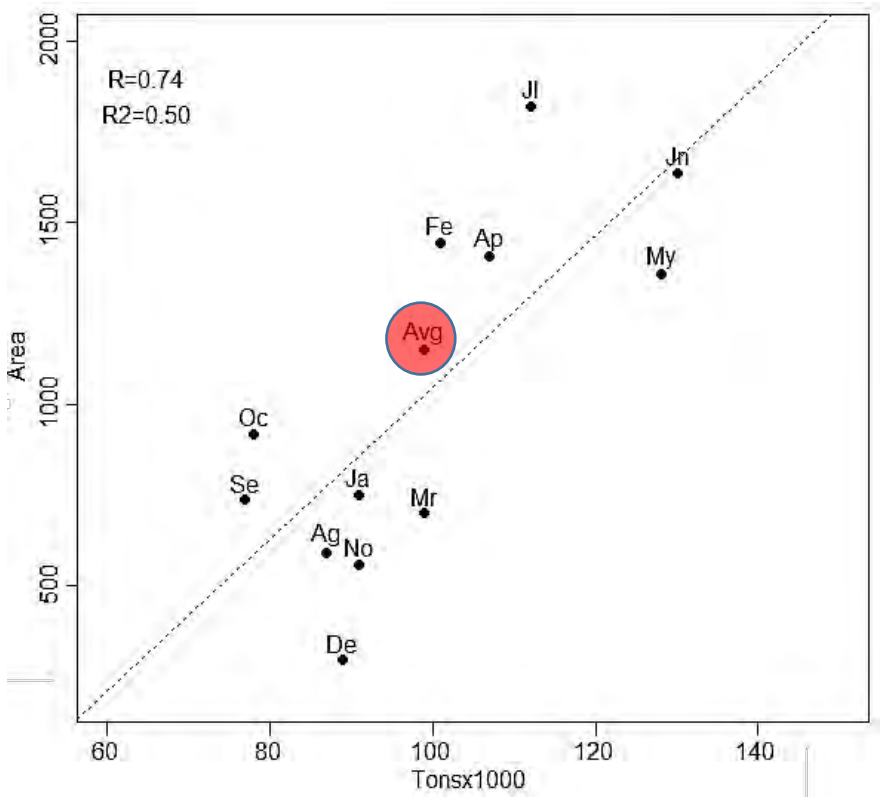


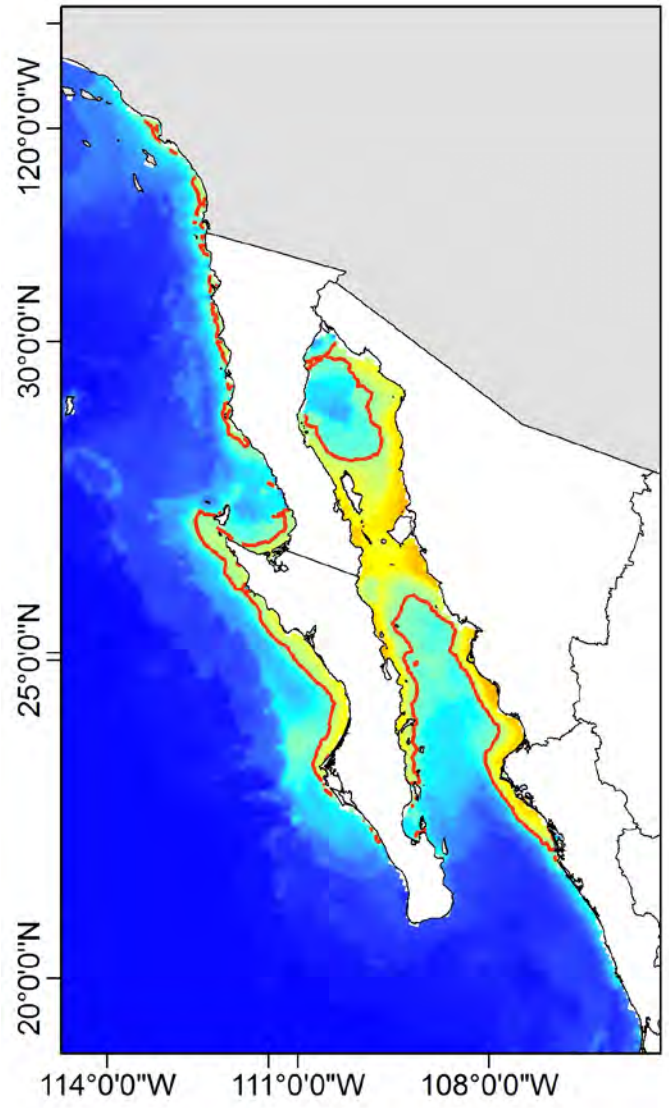


Time series 2000-2015

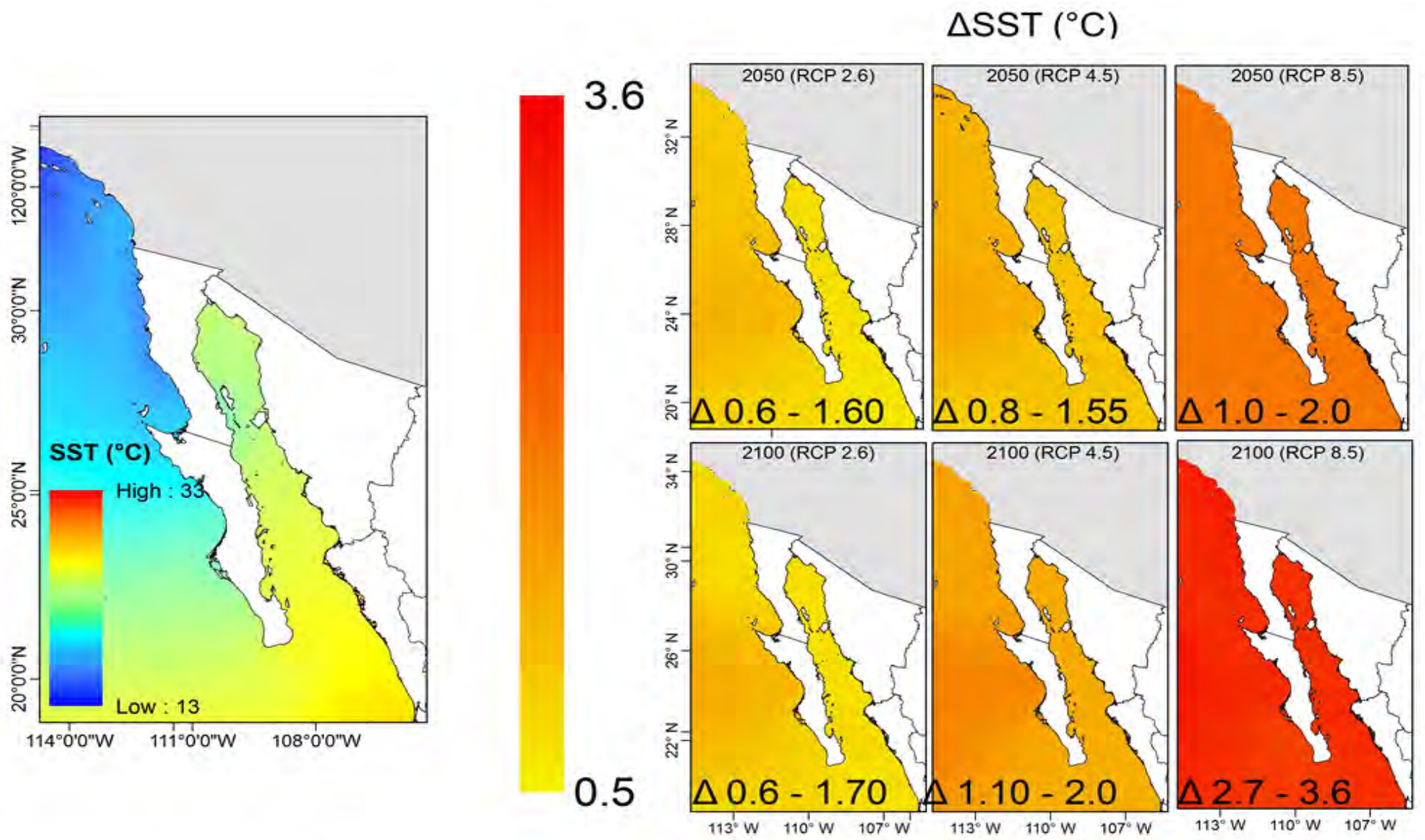


Annual distribution and catches





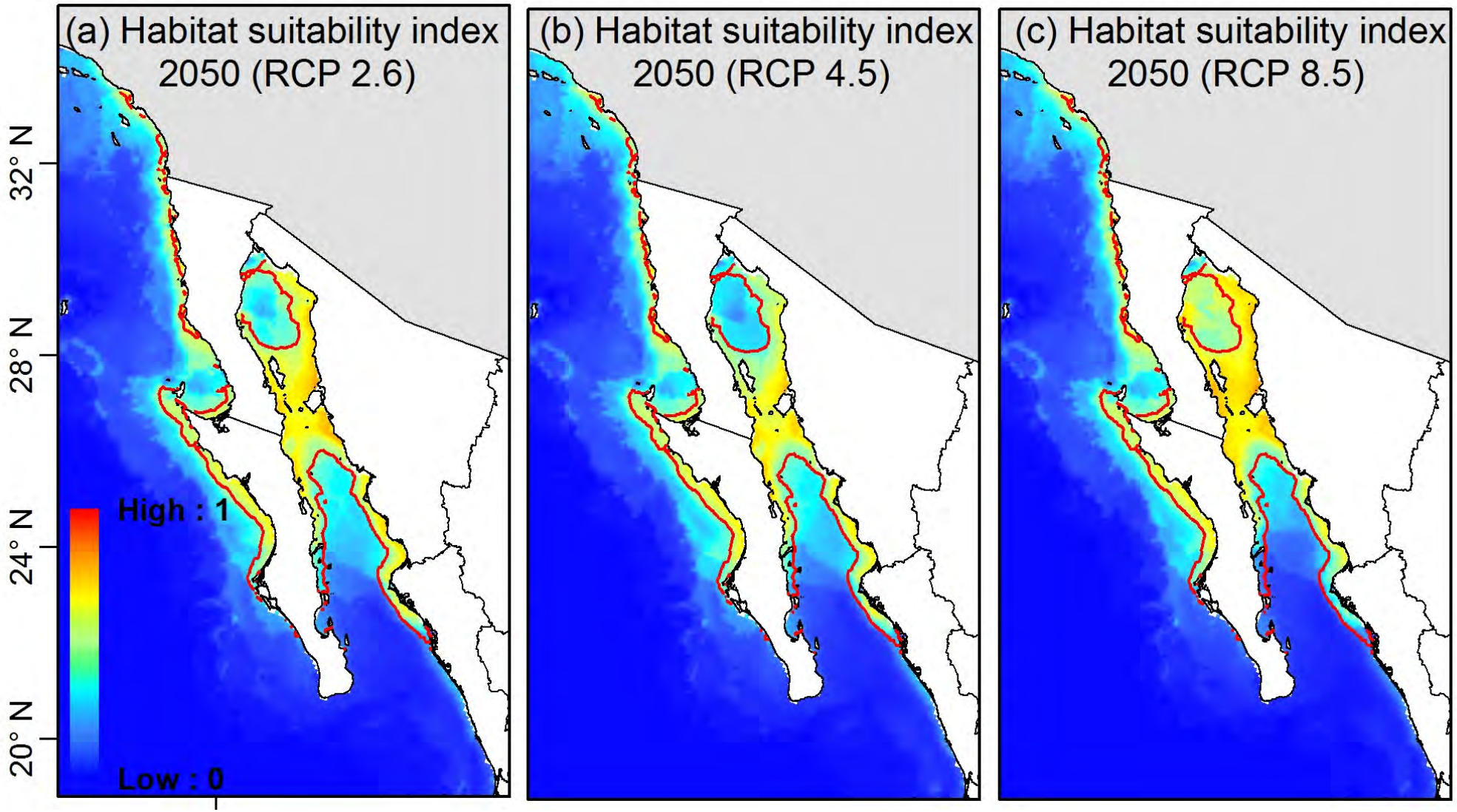
Results: Changes in SST temperatura in 2050 & 2100



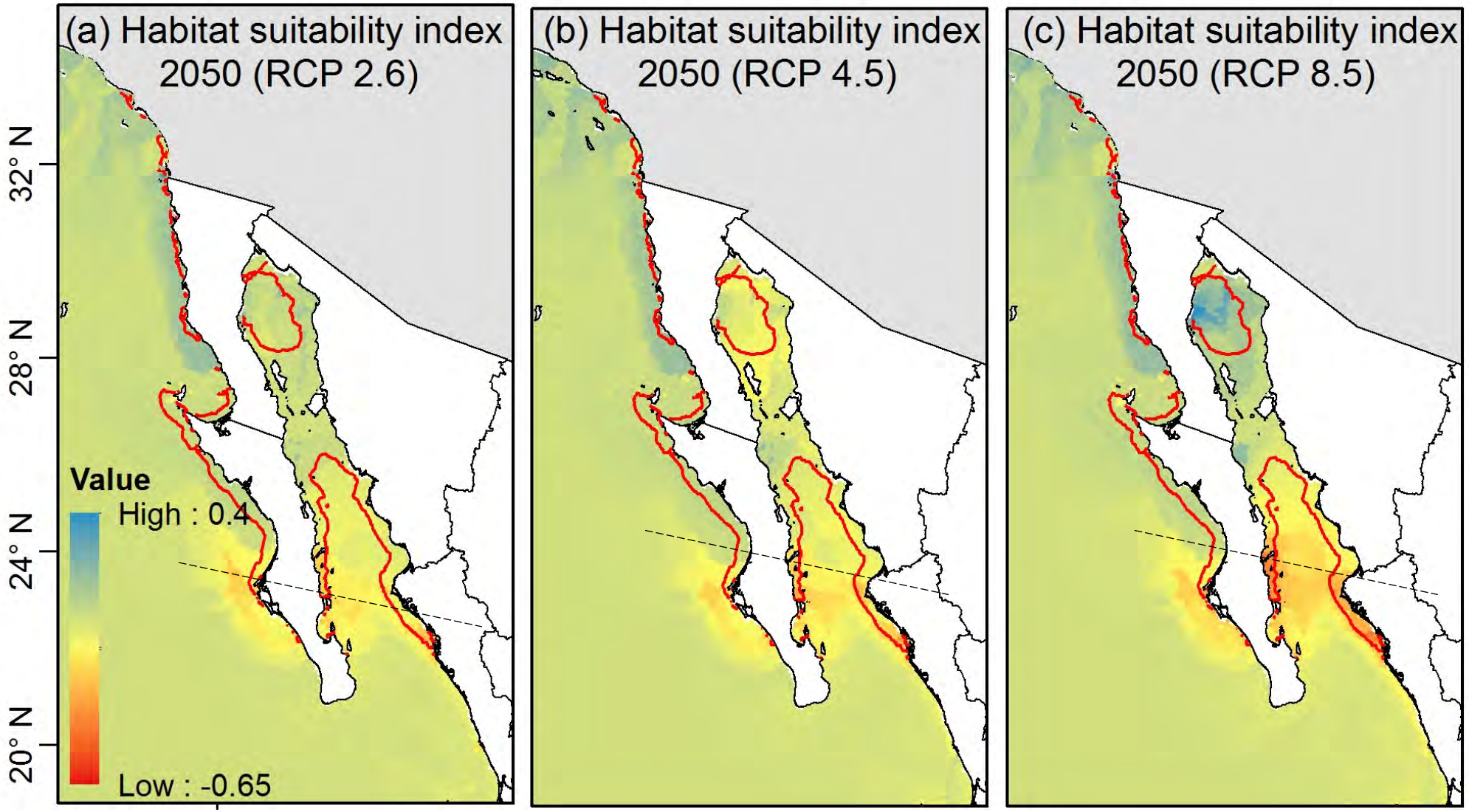
Present temperature

RPC Scenarios 2050 & 2100

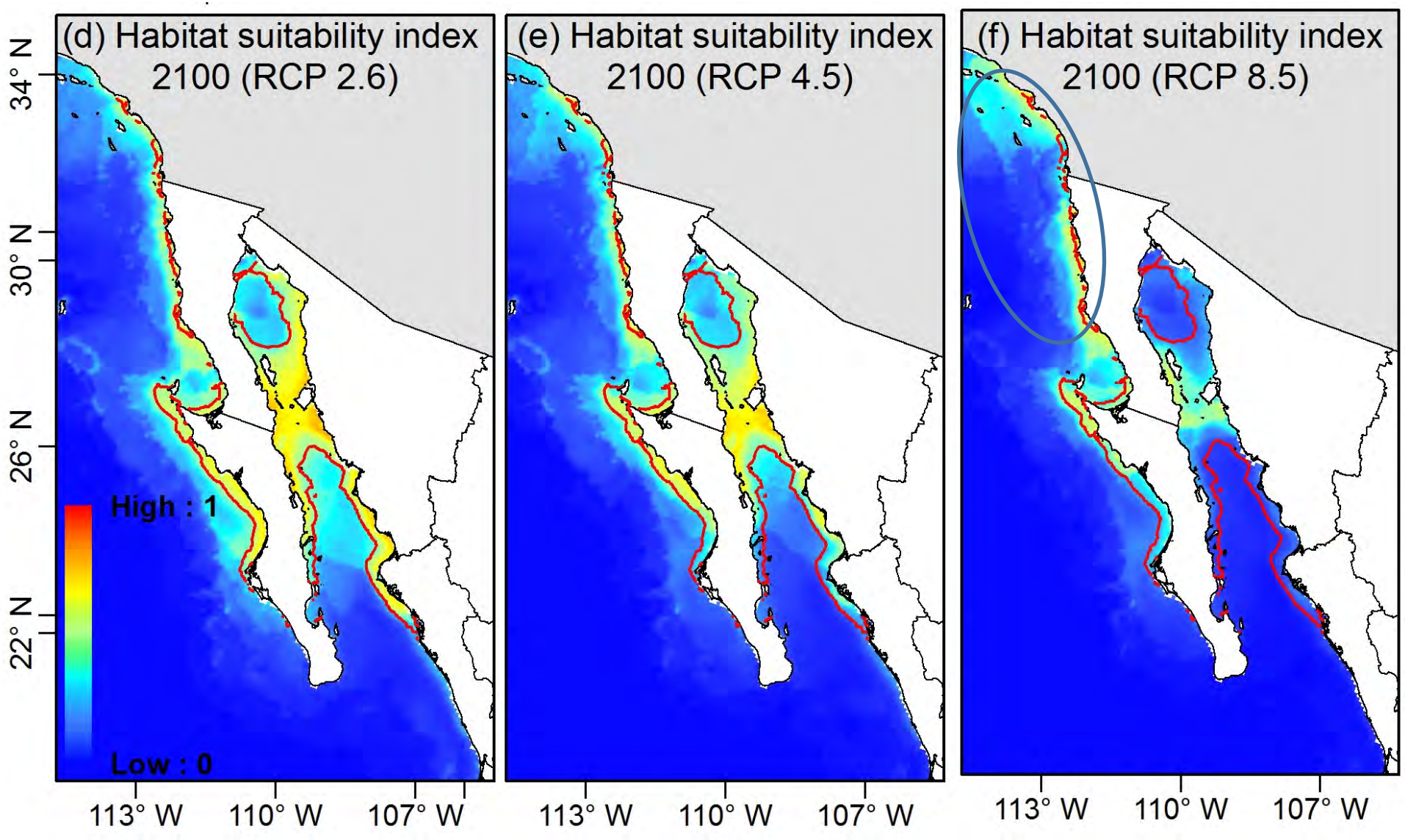
Projections to 2050 using RCP models



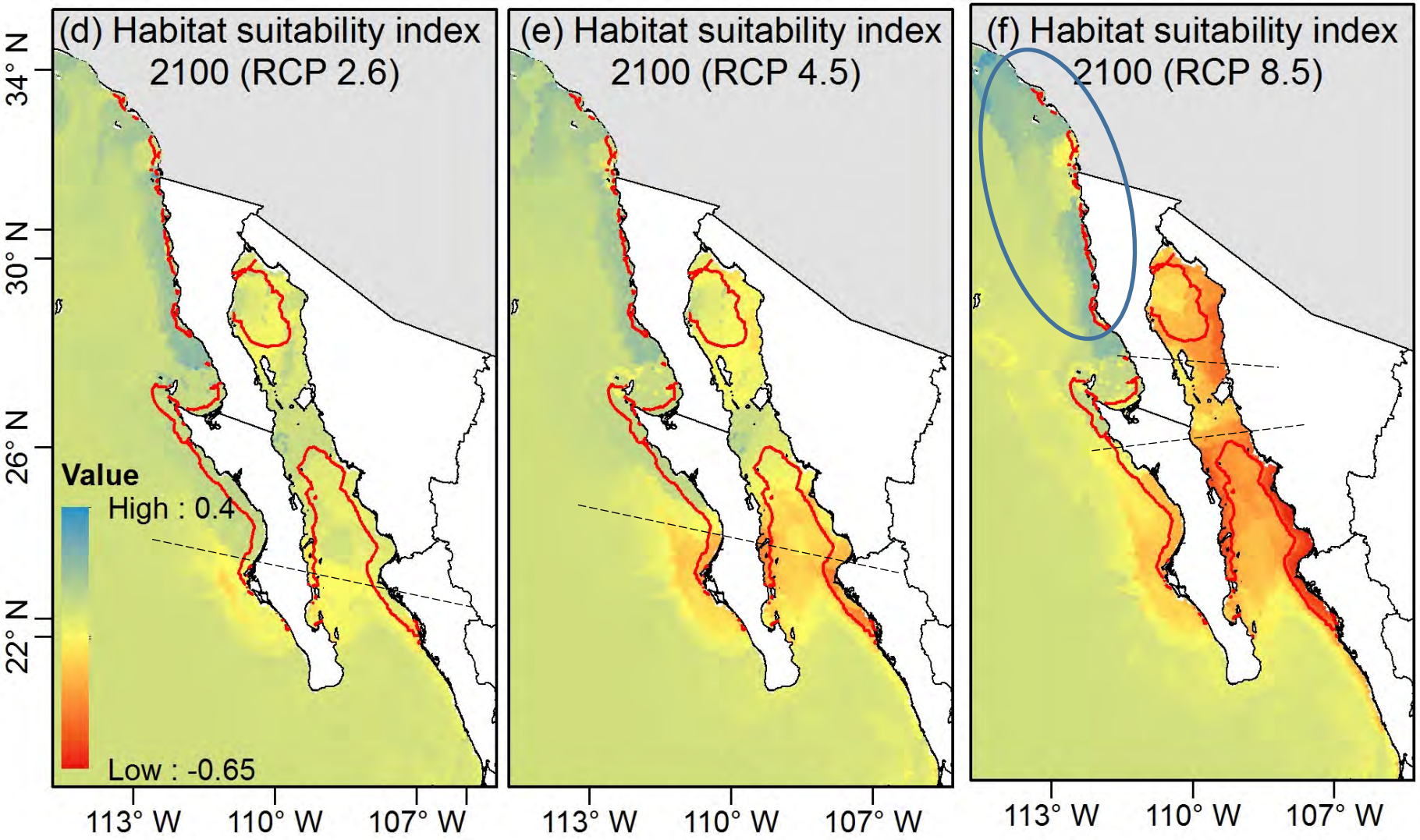
Differences between present & projections 2050



Projections to 2100 using RCP models



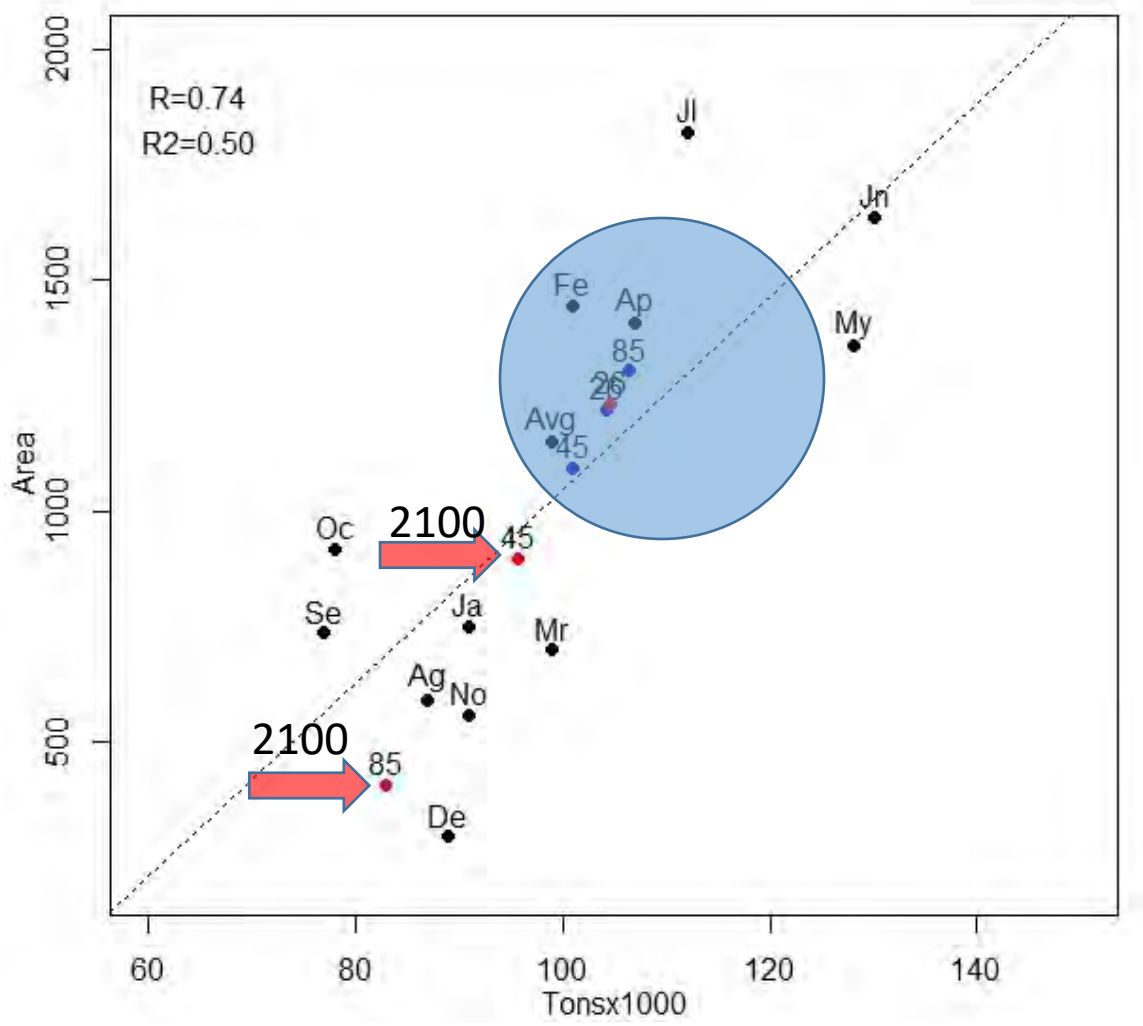
Differences between present & projections 2100



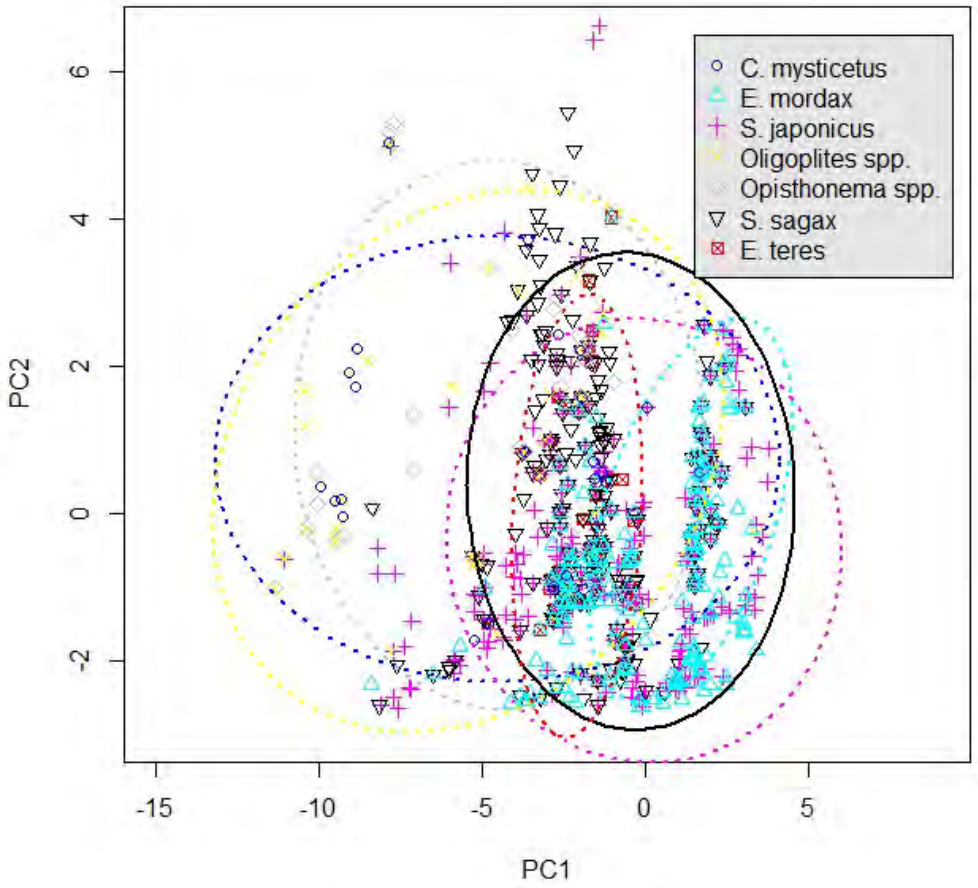
Differences projections and present catches

The catches in average could increase in 2050 for all scenarios.

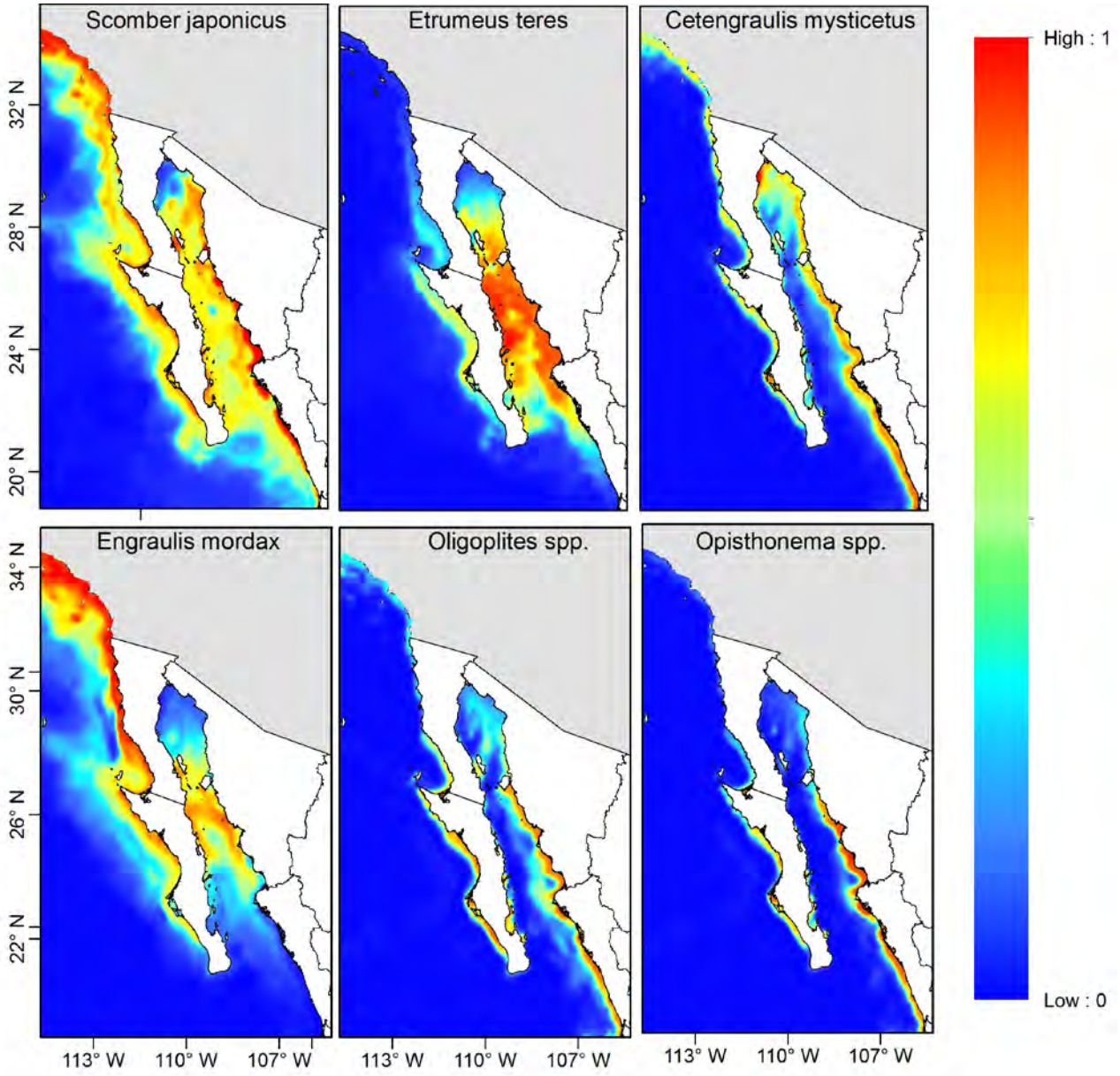
To 2100 catches could get down mainly in Mexico but increase in California.



Next steps…



Niche overlapping



SDM for spring season

conclusions

SMD is a good tool for modelling the changes in migratory species.

Its possible to model the expantions and contractions of sardine population and the changes with the catches.

The stocks of S. sagax could changes in the future but it will be repleaced by another species (small pelagic group)

Acknowledgements