

WHERE'S MY DINNER?

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THE PROBLEM

The Iberian orca are critically endangered¹ due to overfishing of their main prey, bluefin tuna, in the early 2000s^{2,3}. The tuna population have since recovered⁴, however, reintroduced fishing has added increasing pressure to the unrecovered orca.



Protecting key foraging areas could support orca recovery. However, these locations are poorly known. Spatial models can be used to identify likely foraging areas^{5,6,7}.

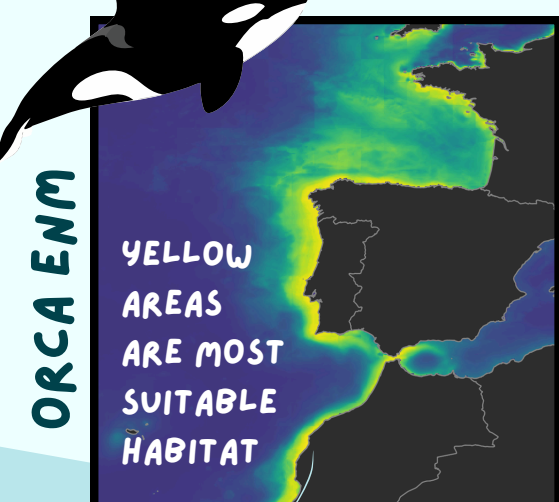
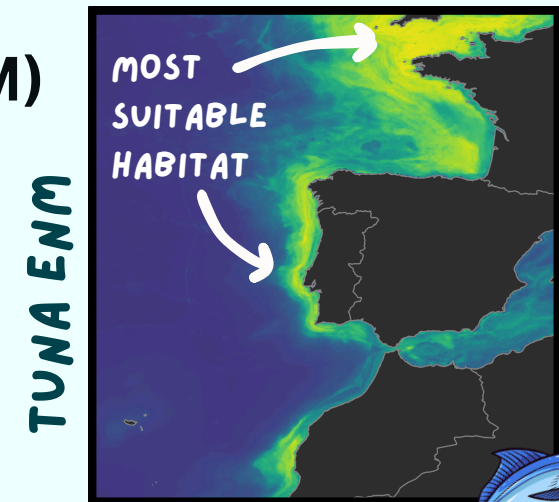
AIMS

- Predict orca feeding hotspots
- Map overlap with fisheries
- Design targeted no-fish zones

Ecological Niche Models (ENM)

use sighting data and environmental conditions to identify the habitats a species prefers⁸.

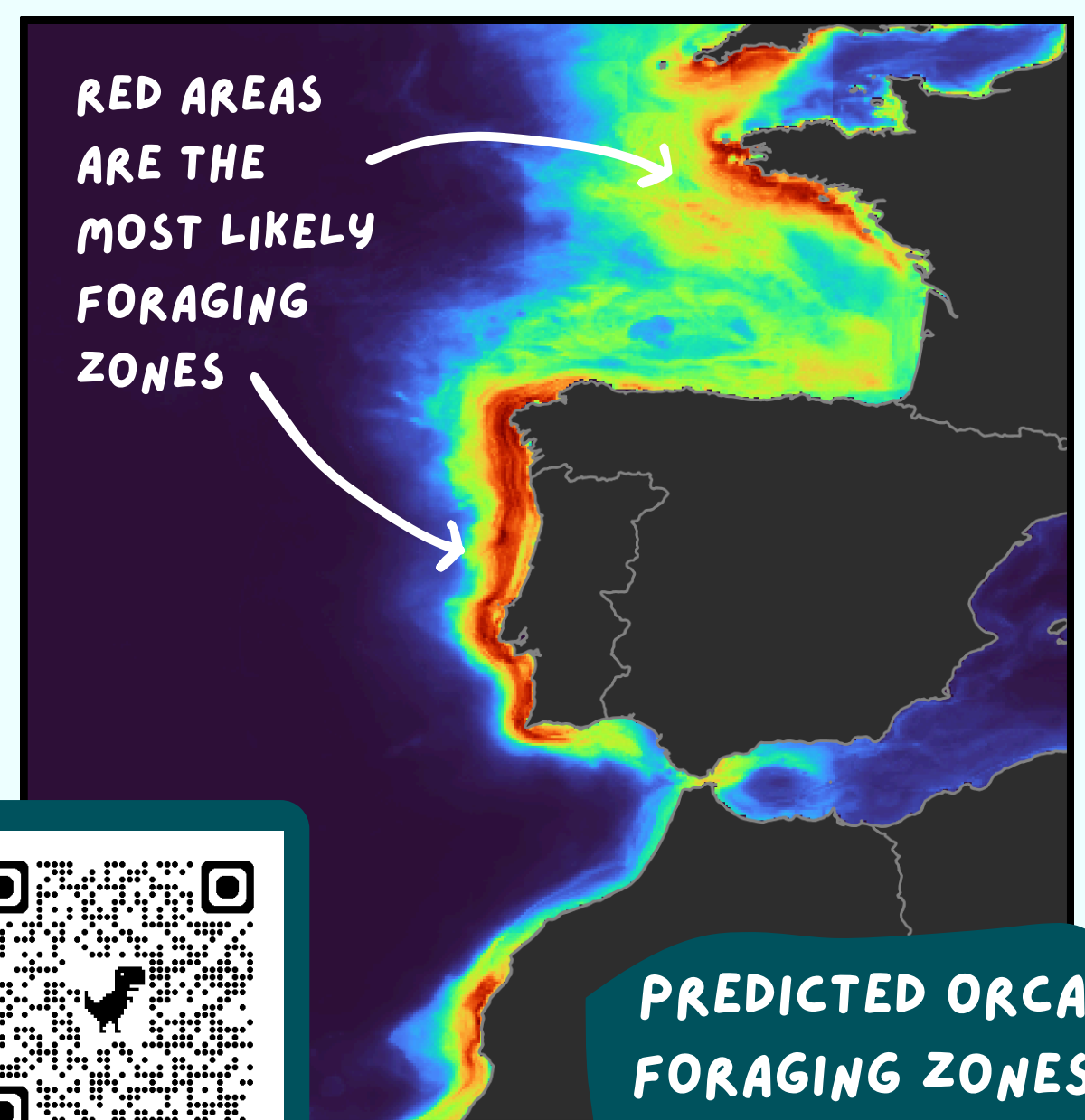
They then map other areas with similar conditions, highlighting where the species is most likely to occur.



SPATIAL OVERLAP

By overlapping the orca and tuna models, we identify areas where BOTH are likely to occur - potential orca foraging areas.

SUMMER showed the largest predicted foraging areas, which aligned with field observation of orcas hunting tuna^{9,10}.



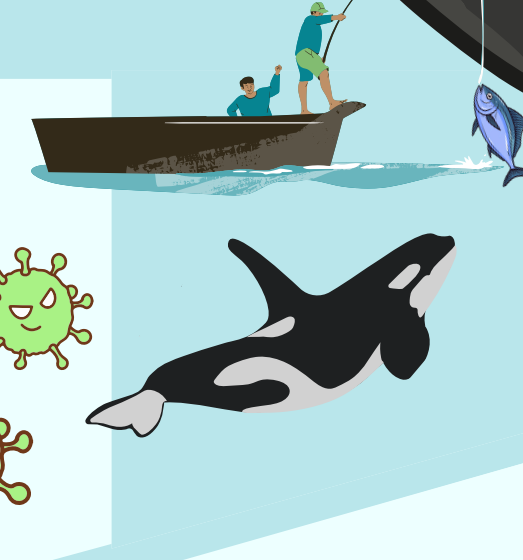
SCAN TO SEE ALL SEASONS



FISHING OVERLAP

Fishing effort was overlapped with the predicted orca foraging zones to identify areas of potential highest competition. The strongest overlap - and therefore highest potential competition - occurred in the Bay of Biscay.

Food shortage has hidden risks. When orcas don't get enough food, they burn stored fat for energy¹¹. That fat holds pollutants like PCBs¹¹ - toxic chemicals found at very high levels in Iberian orcas^{12,13,14,15}. As fat is used up, these toxins are released into the bloodstream¹¹. Mothers can pass them to calves through milk¹⁶, which is linked to poor calf survival.



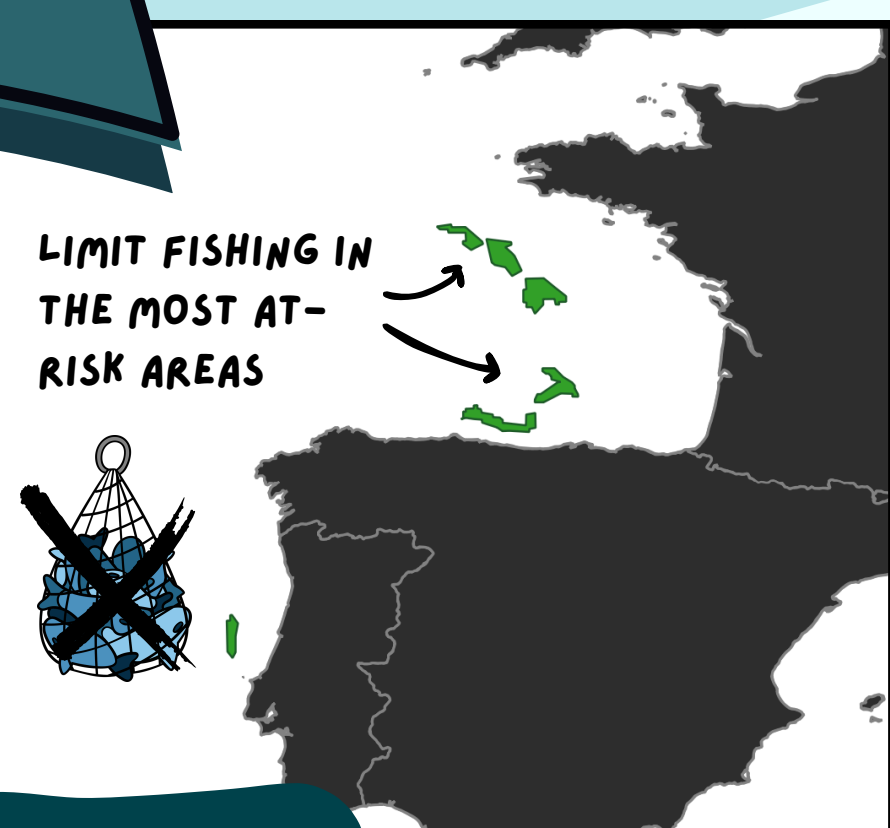
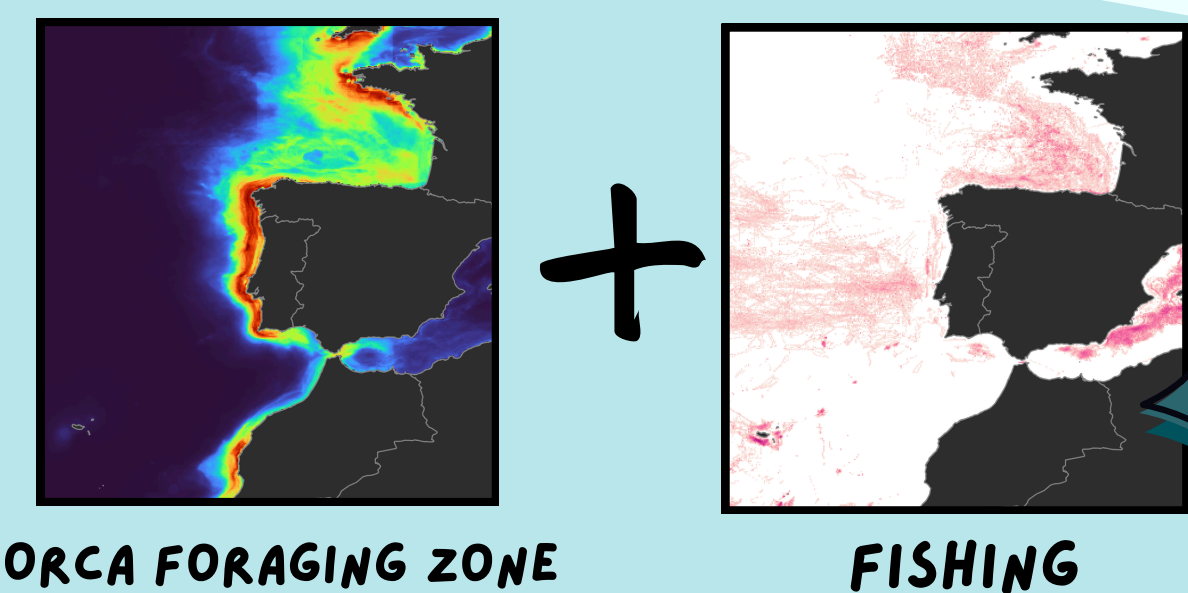
FISHING MANAGEMENT

Using these maps, management zones were designed to reduce fishing pressure in the most at-risk areas. These zones could be incorporated into existing fisheries policy to support ecosystem-based management.

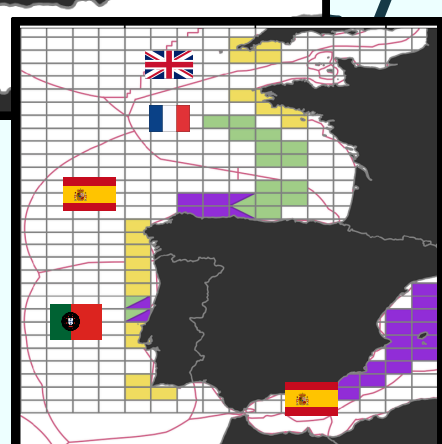
Ecosystem-based management protects the whole ecosystem, not just the target species¹⁷. In this case, tuna management would also consider the needs of orcas as part of the wider marine system.

CONCLUSION

This project identifies where to reduce fishing pressures to give Iberian orcas better access to bluefin tuna. It also highlights the role of spatial modelling in ecosystem-based management - particularly for data-limited species.



MANAGEMENT ZONES



1) Esteban *et al.*, 2016 2) Fromentin & Powers, 2005 3) García-Tiscar, 2009 4) EU Parliament, 2023 5) Quiroga and Souto, 2022 6) Soliani *et al.*, 2024 7) Bischoff *et al.*, 2025 8) Franklin, 2011 9) Srouf, 1994 10) De la Serna *et al.*, 2004 11) Aguilar, Borrell and Pastor, 1999 12) Jepson *et al.*, 2016 13) Helle *et al.*, 1976 14) Jepson *et al.*, 2005 15) Kannan *et al.*, 2000 16) Haraguchi, Hisamichi and Endo, 2009 17) Pikitch *et al.*, 2004