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Transnational mapping of cetacean bycatch risk in the Bay of Biscay and the Atlantic Iberian coast



Project CETAMBICION (DG ENV/MSFD 2020)

Fernando TEMPERA, Chloé MERRIEN, Nolwenn COZANNET, Vincent TOISON, Stéphanie TACHOIRES & Benjamin GUICHARD

What's going on?

- Mass mortality events linked to fisheries bycatch have intensified in the Bay of Biscay and Iberian coast over the last decade
- The phenomenon calls for urgent investigation and fisheries impact mitigation

Why it matters?

- EU member states are committed to protect marine mammals under the Habitats and the Marine Strategy Framework Directives
- Common Fisheries Policy sets bycatch reduction goals (Technical Measures Regulation)
- Strong societal demand for protected species bycatch reduction



See you at ECS 2023

What's in CETAMBICION WP2 task 3.2?

- A spatially-explicit risk analysis identifying geographical sectors where professional fishing activities have a higher probability of inducing cetacean by-catch.

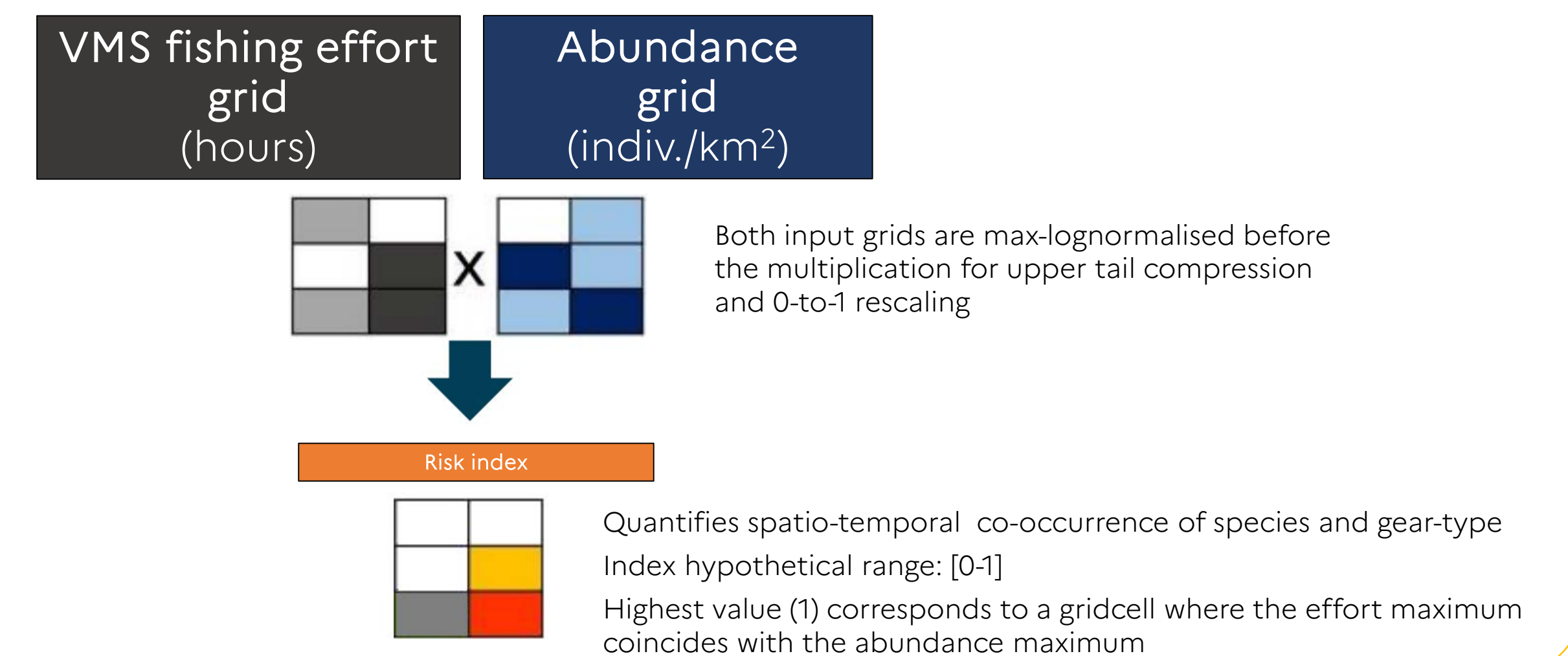
What species have been prioritised?

- A literature review highlighted the gears that are likely to generate by-catch for each species and those that do not present a risk.

Country/Map	Small toothed cetaceans			Large toothed cetaceans			Harbour porpoise			Baleen whales & sperm whale		
	FR	SP	PT	FR	SP	PT	FR	SP	PT	FR	SP	PT
Towed Dredges [DRB]	1-2	-	-	1-2	-	-	1-2	-	-	1-2	-	-
Single boat bottom otter trawl [OTB]	3	4	1-2	1-2	1-2	-	1-2	1-2	-	1-2	-	-
Bottom pair trawls [PTB]	3	4	-	1-2	3	-	1-2	-	-	1-2	-	-
Twin bottom otter trawls [OTT]	1-2	-	-	1-2	-	-	1-2	-	-	1-2	-	-
Beam trawls [TBB]	1-2	-	-	1-2	-	-	1-2	-	-	1-2	-	-
Single boat midwater otter trawls [OTM]	4	-	-	4	-	-	1-2	-	-	1-2	-	-
Midwater paired trawls [PTM]	4	-	-	4	-	-	1-2	-	-	1-2	-	-
Hand lines and hand-operated pole-and-lines [LHP]	-	-	-	1-2	-	-	1-2	-	-	1-2	-	-
Mechanised lines and pole-and-lines [LHM]	-	-	-	1-2	-	-	1-2	-	-	1-2	-	-
Trolling lines [LTL]	-	-	-	1-2	-	-	1-2	-	-	1-2	-	-
Drifting longlines [LLD]	-	-	-	3	-	-	1-2	-	-	1-2	-	-
Set longlines [LLS]	-	-	-	3	-	-	1-2	-	-	1-2	-	-
Pots [FPD]	-	-	-	1-2	-	-	1-2	-	-	3	-	-
Fyke nets [FYK]	-	-	1-2	-	-	-	1-2	-	1-2	-	-	1-2
Stationary uncovered pound nets [FPN]	-	-	1-2	-	-	-	1-2	-	1-2	-	-	1-2
Trammel nets [GTR]	4	-	-	4	-	-	4	-	-	3	-	-
Set gillnets (anchored) [GNS]	4	-	-	4	-	-	4	-	-	3	-	-
Drift gillnets [GND]	4	1-2	-	1-2	-	-	1-2	-	-	1-2	-	-
Purse seines [PS]	4	3	4	4	-	1-2	-	-	-	-	-	-
Surrounding nets without purse lines, lampara nets [LA]	3	-	-	1-2	-	-	-	-	3	-	-	-
Scottish seine [SV]	3	-	-	1-2	-	-	-	-	3	-	-	-
Danish seine [SV]	3	-	-	1-2	-	-	-	-	3	-	-	-
Pair seine [SV]	1-2	-	-	1-2	-	-	-	-	1-2	-	-	-
Beach seines and boat seines [SB] [SV]	-	-	4	-	-	1-2	-	-	4	-	-	1-2

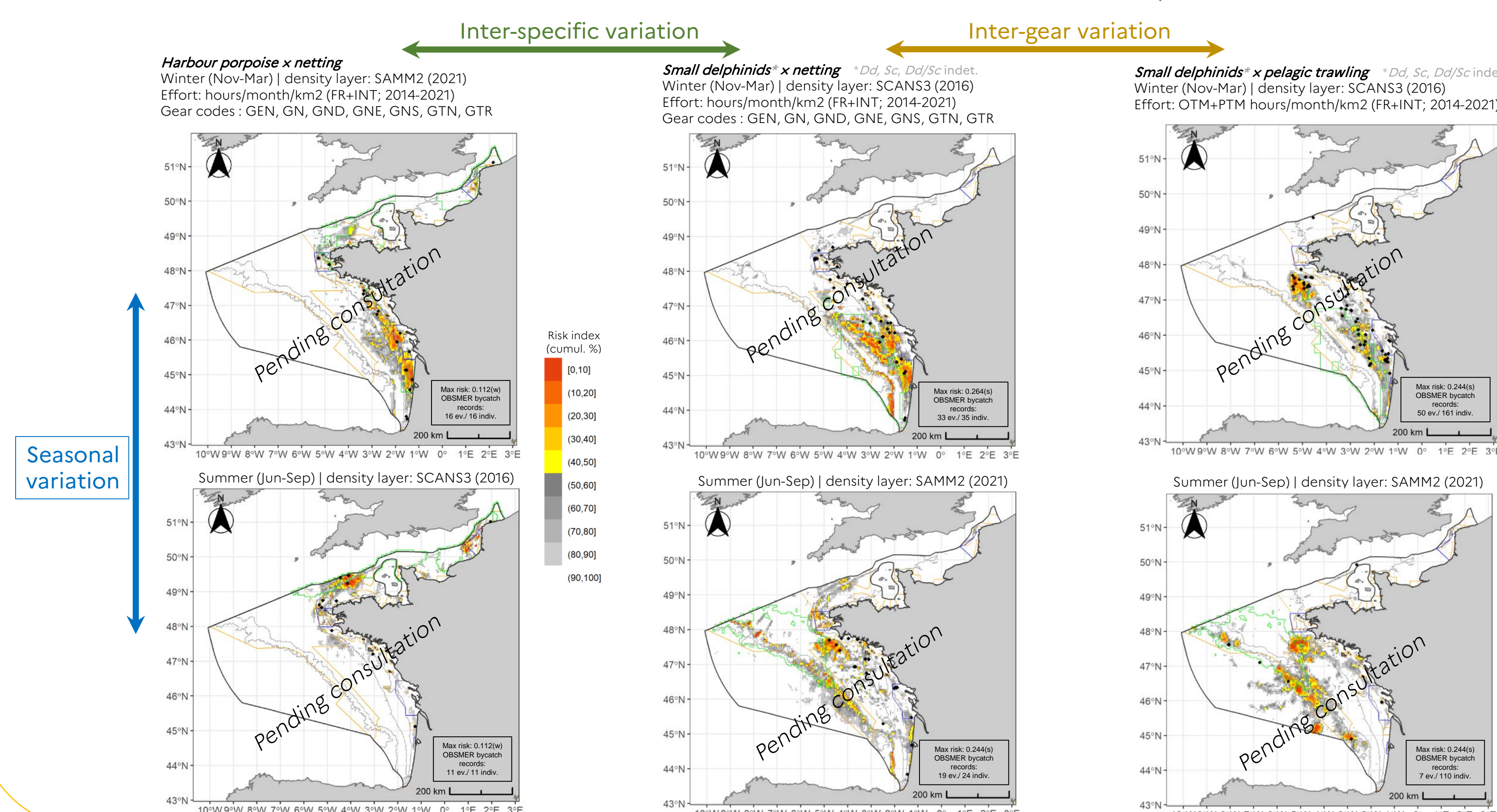
The bycatch risk analysis method

- Spatial resolution: harmonised 3 by 3 min grids
- Cetambicion species x gear type *interaction matrix*
- Species distributions: Predictive density surface layers
- VMS effort data: seasonally-averaged number of hours of fishing activity per month per pixel per gear type per vessel nationality



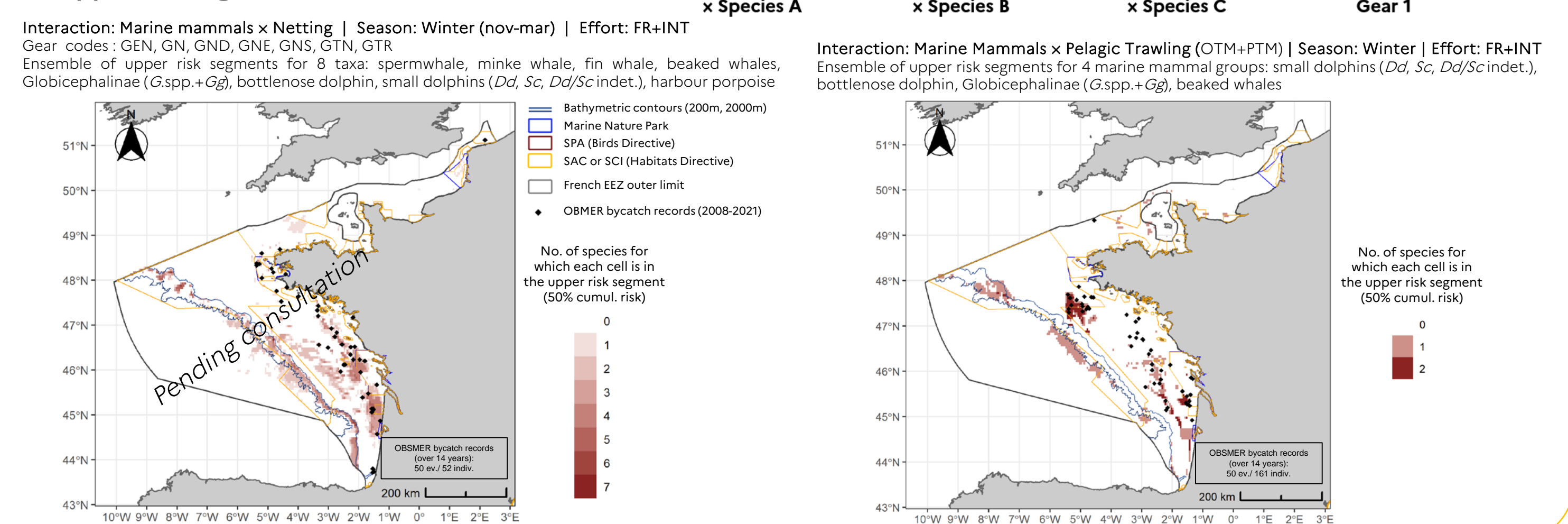
What we found

- Areas of high bycatch risk that vary between 'species x gear type' couples
- Good match between high risk areas and bycatch observations collected at sea under the French Fisheries Observers Programme (OBSMER, EU DCF)
- Joint risk maps that highlight coherent geographical sectors that gear-specific observation programmes might target
- Cetambicion risk analyses focus on marine mammals; in France the approach has been extended to all recognised 'protected species x gear type' interactions (incl. marine mammals, sea birds, sea turtles and anadromous fish)



Joint (multispecific) risk

- Number of species for which each cell is in the upper risk segment (50% of cumulative risk)



The code...

- R scripts developed to estimate and map bycatch risk for all recognized interactions 'marine protected species x gear type'
- Scripts automate, speed up and ensure repeatability of geomatic analyses
- In the event of data updates, scripts permit re-running the analyses and producing revised risk maps

What's next?

- Fisheries observers programmes at sea to groundtruth risk areas
- Bycatch reduction trials and regulatory measures

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