Environmental factors driving short-beaked common dolphin coastal distribution and habitat suitability in NW Spain

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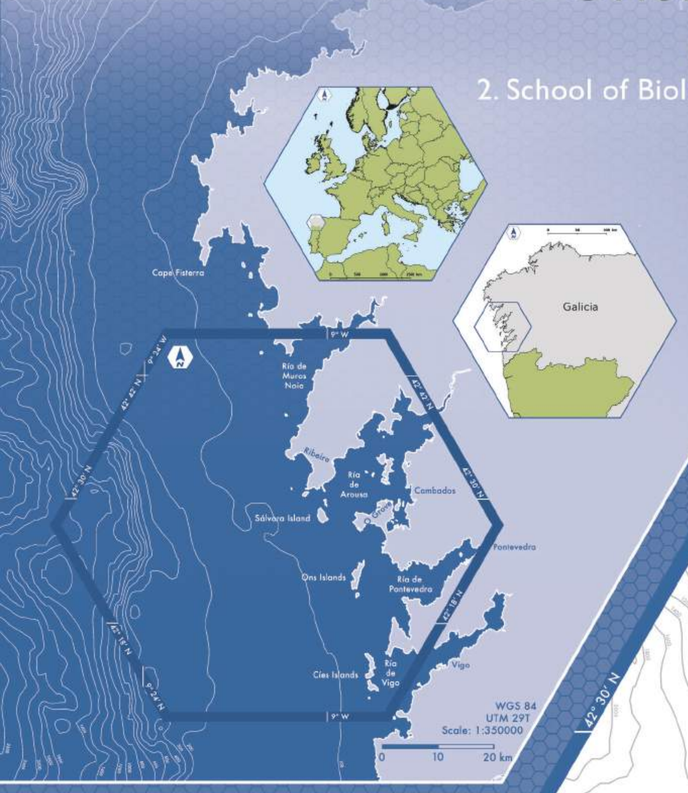

AIMS

- Provide information on the environmental variables that influence common dolphin's distribution & habitat suitability.
- Assess the best measures to promote common dolphin conservation & evaluate the areas in which this conservation would be more effective.

INTRO

Environmental Niche Factor Analysis (ENFA), uses environmental information to assess the **distribution of species** & is a robust technique to study highly mobile species (Reutter et al., 2003).

The **short-beaked common dolphin** (*Delphinus delphis*) is the **most abundant cetacean** in coastal Galician waters, NW Spain (Saavedra et al., 2018).

METHODS

Biomapper 4.0 (Hirzel et al., 2002;) was used to study common dolphins distribution & habitat suitability.

QGIS 2.18 used to create the biogeographical maps (Fig 2).

9 Ecogeographical variables (EGVs) were considered initially. Only non-highly correlated variables were retained in the model.

A **Habitat Suitability Index (HSI)** (Fig 3) was used to assess the more suitable areas.

RESULTS

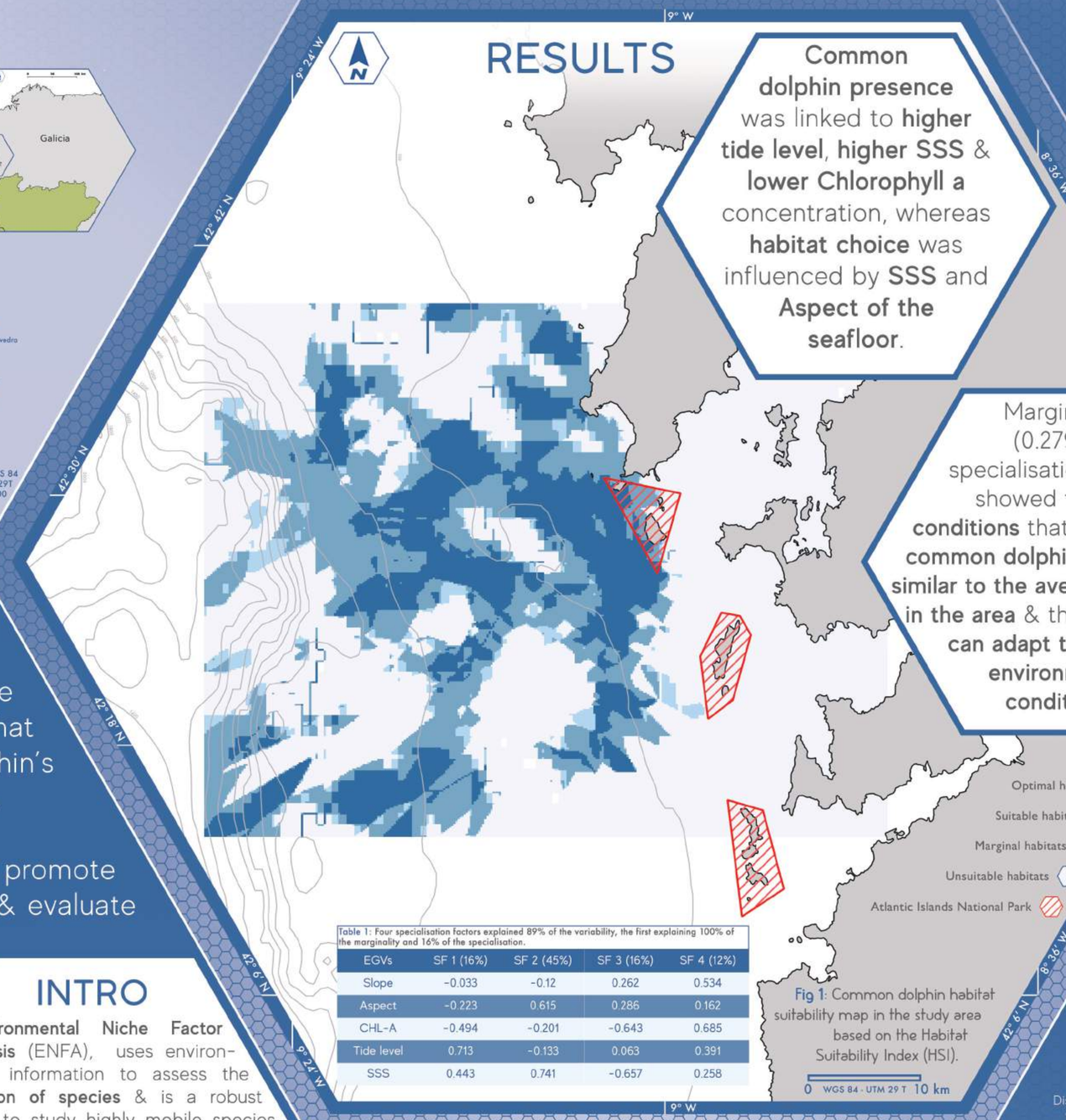

Fig 1: Common dolphin habitat suitability map in the study area based on the Habitat Suitability Index (HSI).

Table 1: Four specialisation factors explained 89% of the variability, the first explaining 100% of the marginality and 16% of the specialisation.

EGVs	SF 1 (16%)	SF 2 (45%)	SF 3 (16%)	SF 4 (12%)
Slope	-0.033	-0.12	0.262	0.534
Aspect	-0.223	0.615	0.286	0.162
CHL-A	-0.494	-0.201	-0.643	0.685
Tide level	0.713	-0.133	0.063	0.391
SSS	0.443	0.741	-0.657	0.258

Common dolphin presence was linked to **higher tide level**, **higher SSS** & **lower Chlorophyll a** concentration, whereas **habitat choice** was influenced by **SSS** and **Aspect of the seafloor**.

Marginality (0.279) & specialisation (1.268), showed that the **conditions** that best defined **common dolphin habitat were similar to the average conditions in the area** & that the **species can adapt to different environmental conditions**.

DATA COLLECTION

Data collected on board Tyba III
12 m long boat with flybridge

273 days at sea (9417 km)
03-2014 - 10-2017
Only Douglas < 3
No rain, no fog

At least 3 experienced observers on board

GPS coordinates & environmental data every 20 minutes

Díaz López et al., 2019

ADDITIONAL INFO

A grid with hexagonal cells (radius = 1 nm) was used to show common dolphins presence. Ecogeographical variables were divided into persistent and non-persistent depending on their temporal variability. Highly correlated EGVs (|r|>0.7) were discarded (in grey in Fig. 2).

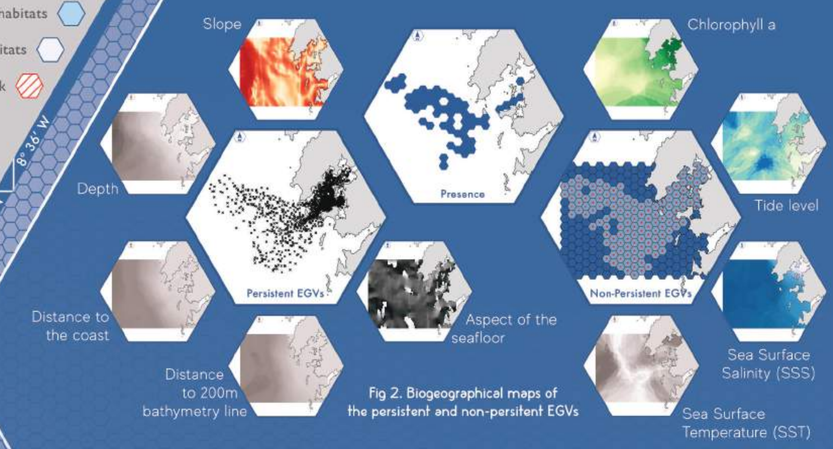

Fig 2. Biogeographical maps of the persistent and non-persitent EGVs

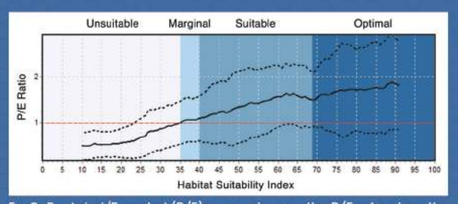

Fig 3. Predicted/Expected (P/E) curves showing the P/E ratio along the HSI and the different categories. The P/E curves and the cross-validation (Boyce Index = 0.552 ± 0.2121) showed that the model had a good predictive power.

CONCLUSIONS

- ENFA can be used as a **comprehensive tool** to understand the distribution & habitat use of common dolphins & **to develop better management & conservation strategies**.
- The **optimal habitats** were found in areas of intense fishing pressure (Díaz López et al., 2019).
- Conservation measures should involve a **reassessment of the dimensions & the protection level** of the Atlantic Island National Park.

Acknowledgements: We would like to thank all BDRI interns & volunteers that participated in the data collection.

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This work has been published as Giralt Paradell, O., Díaz López, B., Methion, S. 2019. Modelling common dolphin (*Delphinus delphis*) coastal distribution and habitat use Insights for conservation Ocean and Coastal Management. 179. Scan QR code to access the publication.

REFERENCES

Díaz López, B., Methion, S., Giralt Paradell, O., 2019. Living on the edge: overlap between a marine predator's habitat use and fisheries in the Northeast Atlantic waters (NW Spain). Progress in Oceanography 175, 115–123.

Hirzel, A.H., Hausser, J., Chessel, D., Perrin, N., 2002. Ecological-Niche Factor Analysis: How to Compute Habitat-Suitability Maps without Absence Data? Ecology 83, 2027–2036.

Reutter, B.A., Helfer, V., Hirzel, A.H., Vogel, P., 2003. Modelling habitat-suitability using museum collections: an example with three sympatric Apodemus species from the Alps. Journal of Biogeography 30, 581–590.

Saavedra, C., Gerrodette, T., Louzao, M., Valeiras, J., García, S., Cerviño, S., Pierce, G.J., Santos, M.B., 2018. Assessing the environmental status of the short-beaked common dolphin (*Delphinus delphis*) in North-western Spanish waters using abundance trends and safe removal limits. Progress in Oceanography 166, 66–75.