

Heat waves and fisheries, practical integration of operational oceanography into the management of tunas.

EuroGOOS, online conference, May 2021

Alvarez-Berastegui et al. (diego.alvarez@ieo.es)

IEO: Alvarez-Berastegui D., Martín-Quetglas M., Balbín R., Ottmann D., Saber S., Ortiz de Urbina J., Alemany F., P.Reglero P.

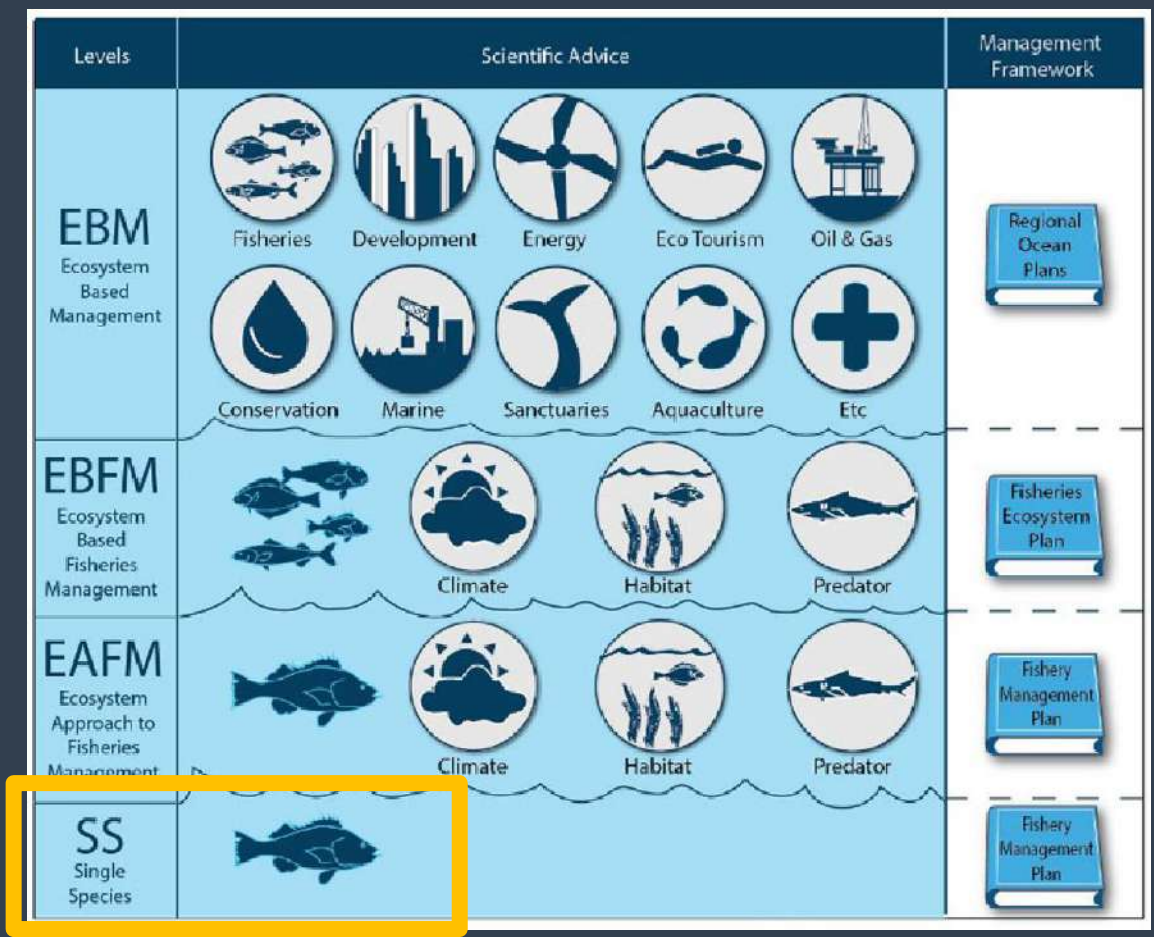
SOCIB: Juza M., Tugores P., Rotllan P., Frontera B., Mourre B., Tintoré J.



Introduction

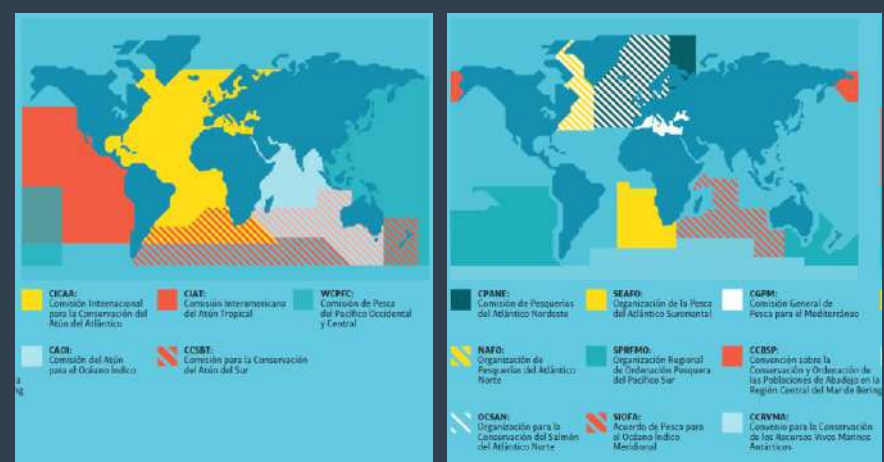
Levels of the ecosystem integration into management

COMPLEXITY



EBFM= Ecosystem Based Fisheries Management

Dolan et al. FR 2016



ALL fisheries Management Organizations include the EBFM in their strategic planning



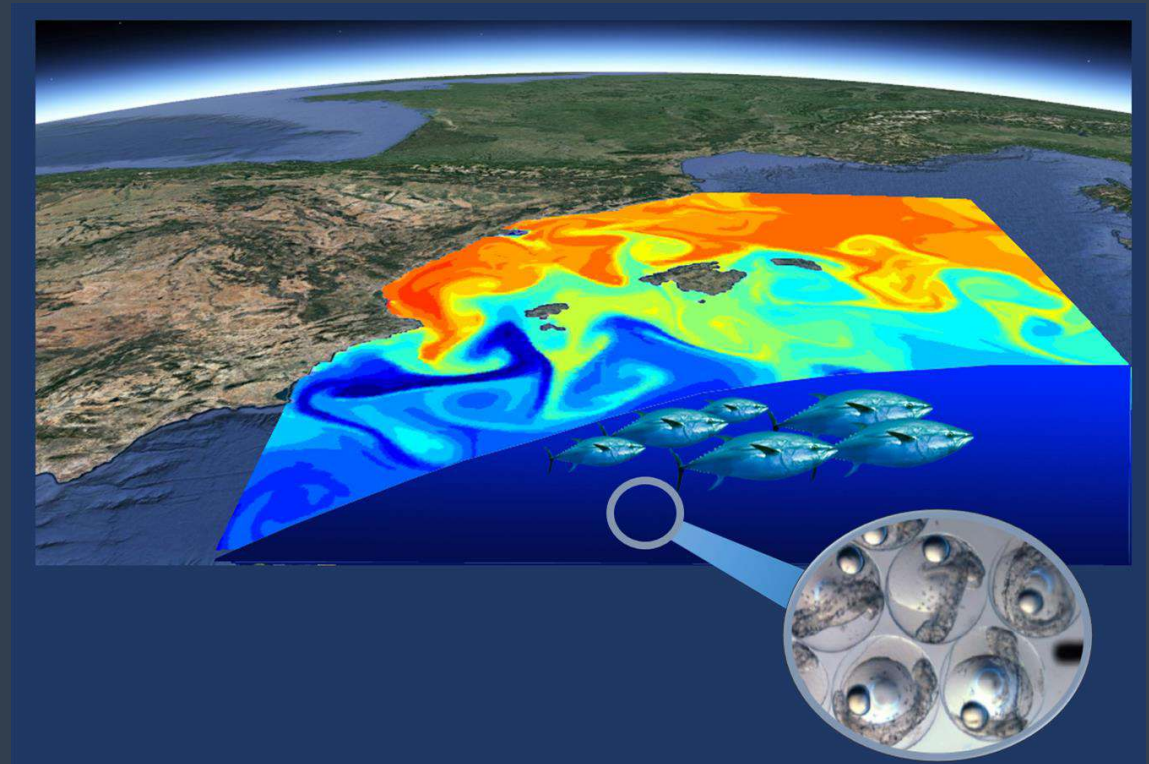
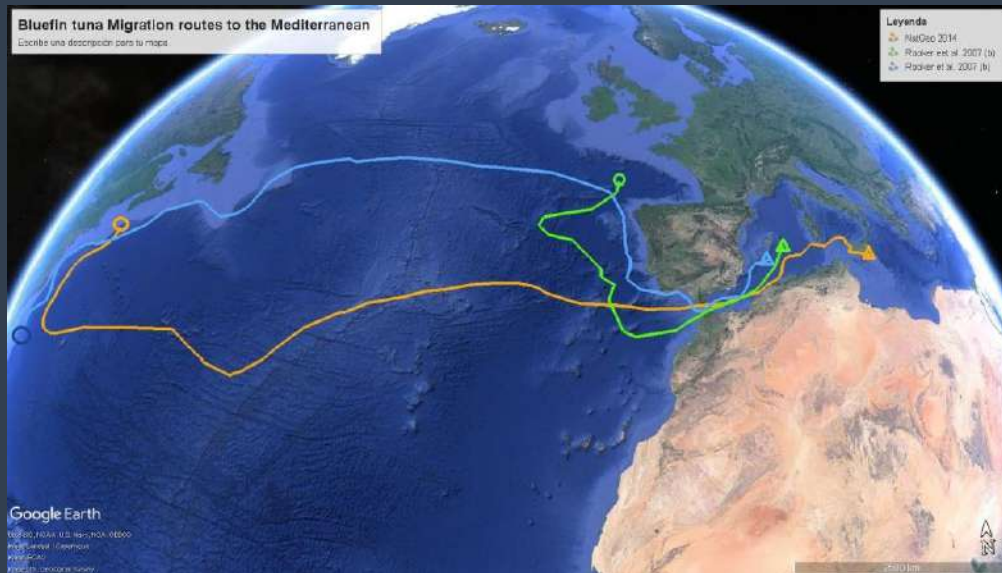
From 1250 fisheries assessment reports analysed **only 2% included** quantitative ecosystem information

Introduction

Objectives, Propel and implement EFBM through the integration of environmental variability in the monitoring and assessment process for the sustainability of tunas, TARGET EOv= SST and associated heat waves

Western Mediterranean,

- ➔ A main Tuna spawning ground,
- ➔ Biodiversity hot spot
- ➔ One of most sensitive areas to heat waves at global scale



Methods

Monitoring
tools

Ecosystem
Report
Cards

Indices of
abundance

Fisheries
assessment
models

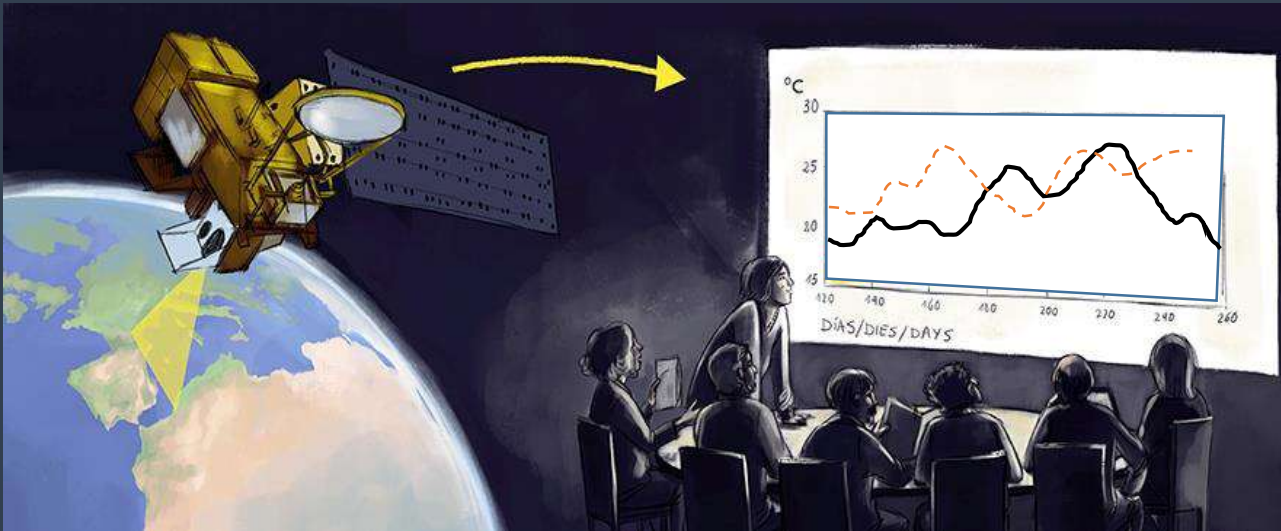


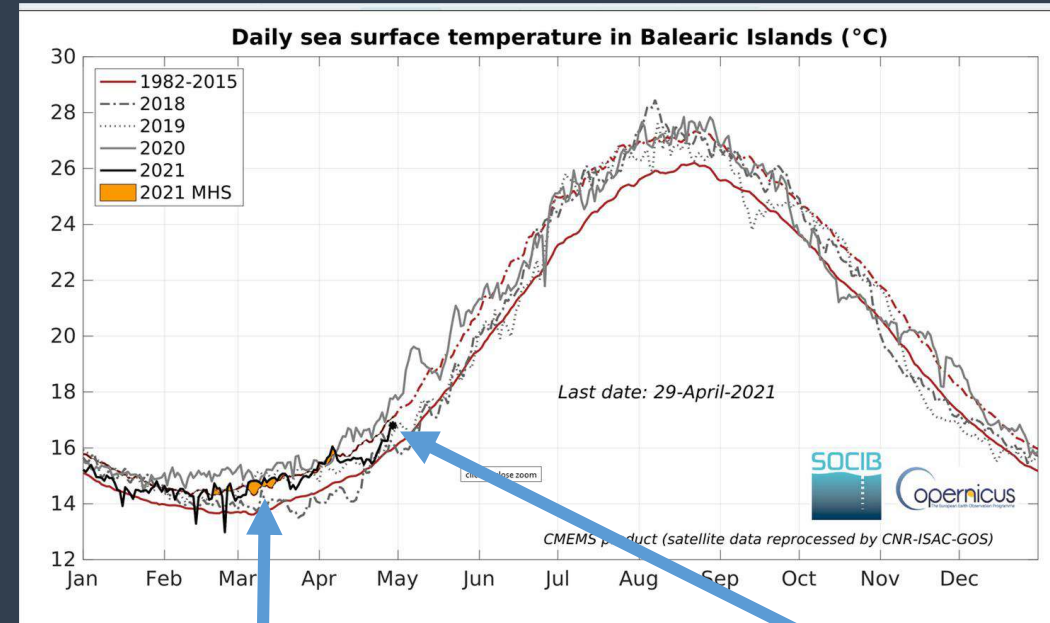
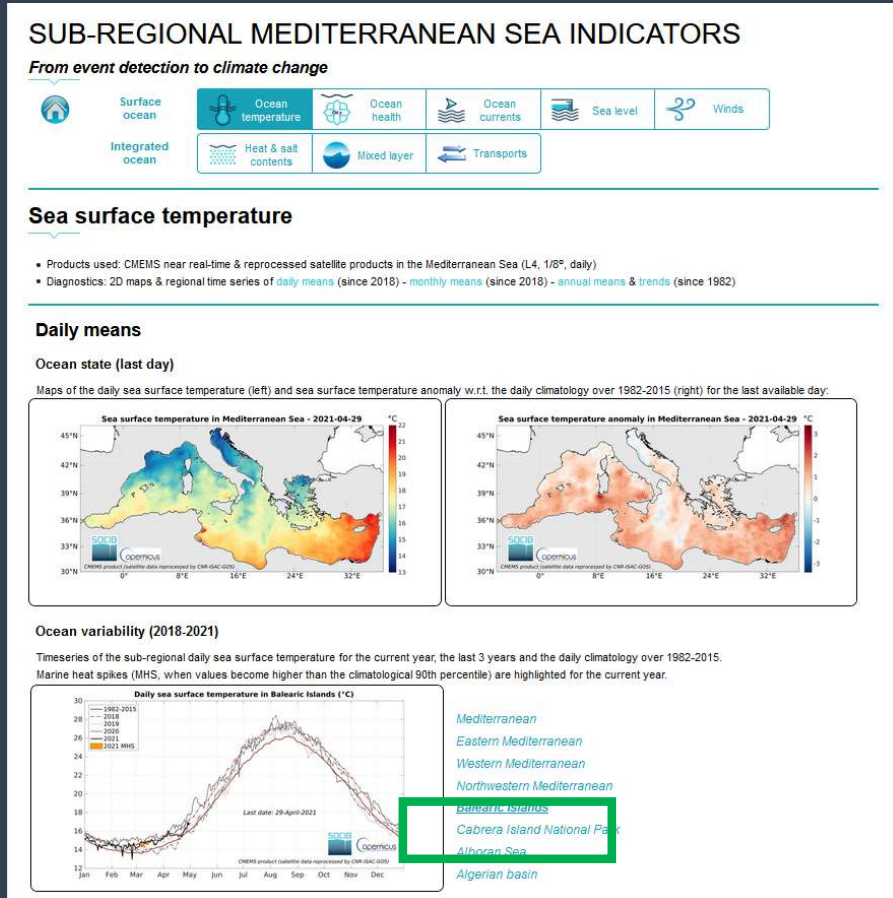
Image <http://planetttuna.com>



International Commission
for the Conservation of
Atlantic Tunas

Results

Monitoring tools



Identification of Marine Heat Spikes (MHS) at daily scale

Current Date

<https://apps.socib.es/subregmed-indicators/index.htm>

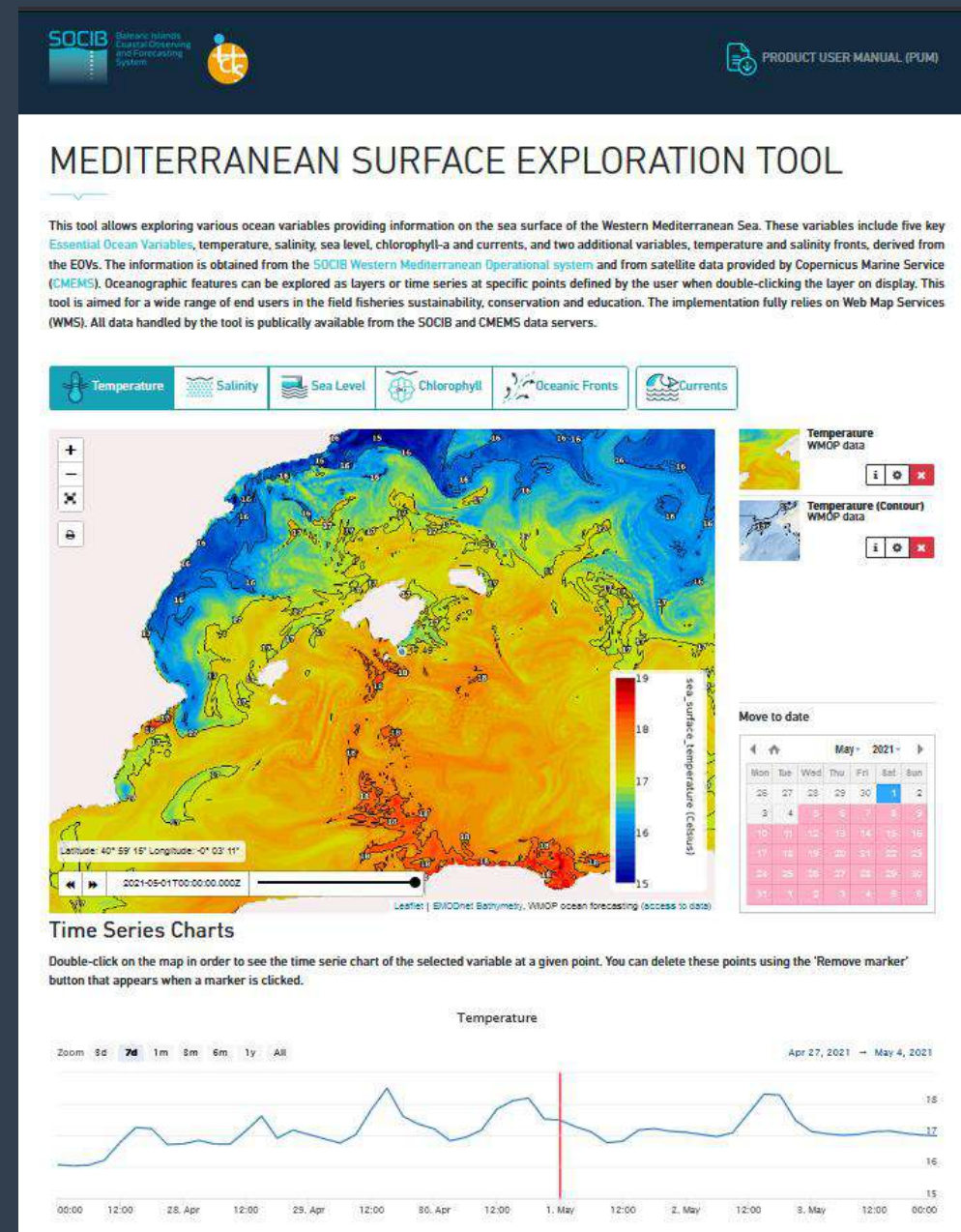
Juza & Tintoré (FMS 2020)

Results

Monitoring tools



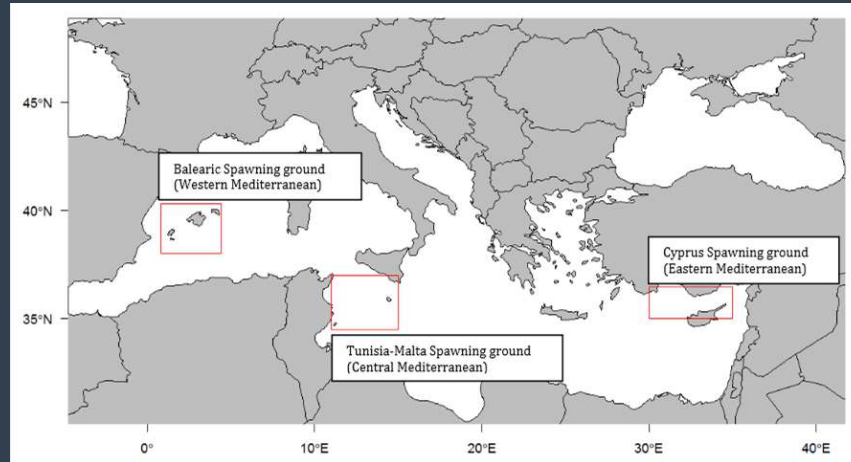
End user oriented design through groups of experts



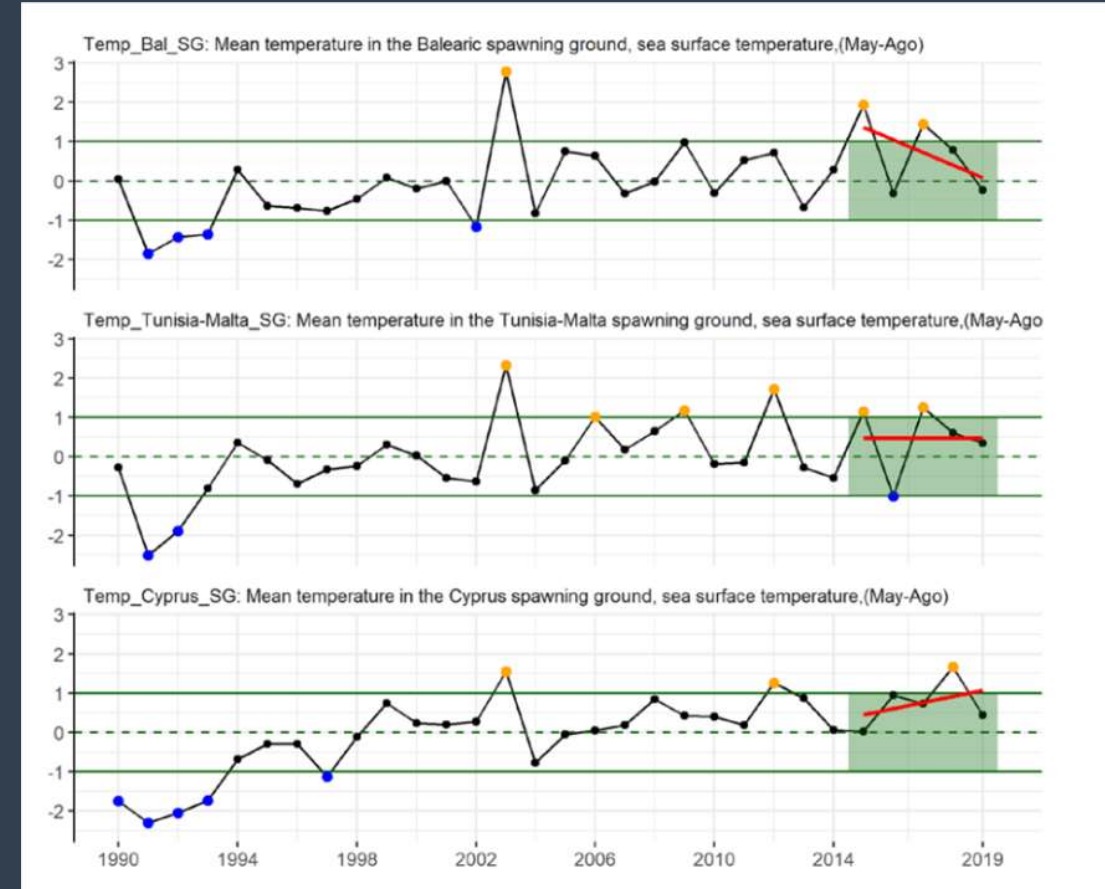
<http://apps.socib.es/MSET/>

Results

Ecosystem Report Cards



Main Bluefin tuna spawning grounds in the Mediterranean



Alvarez-Berastegui et al, 2020a

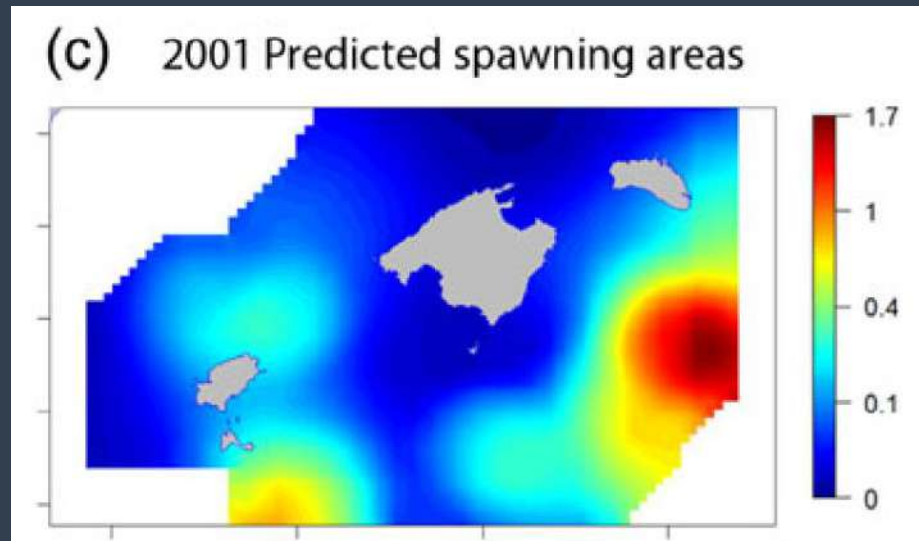
Results

Indices of abundance

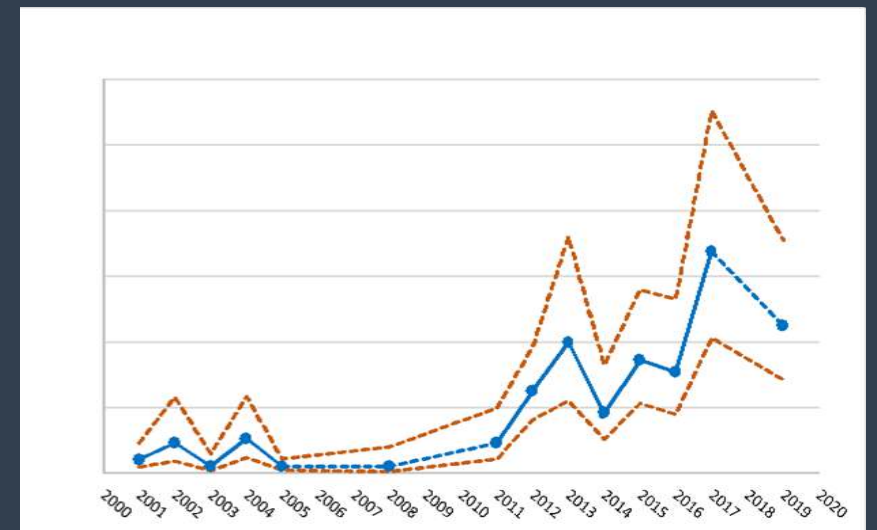


Investigate how SST and anomalies drive Bluefin tuna habitats in the Western Mediterranean Sea

Integrate habitat variability in the standardization of the catches
For improved indices of abundance



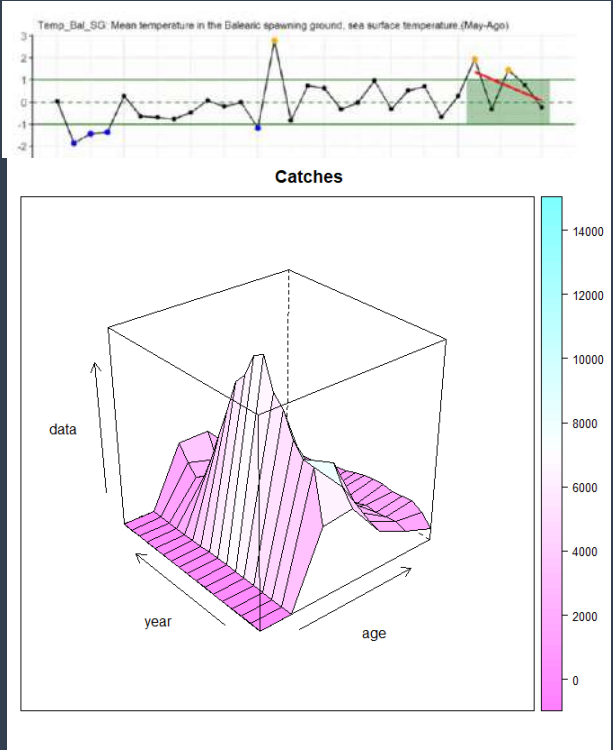
Alvarez-Berastegui et al. 2016



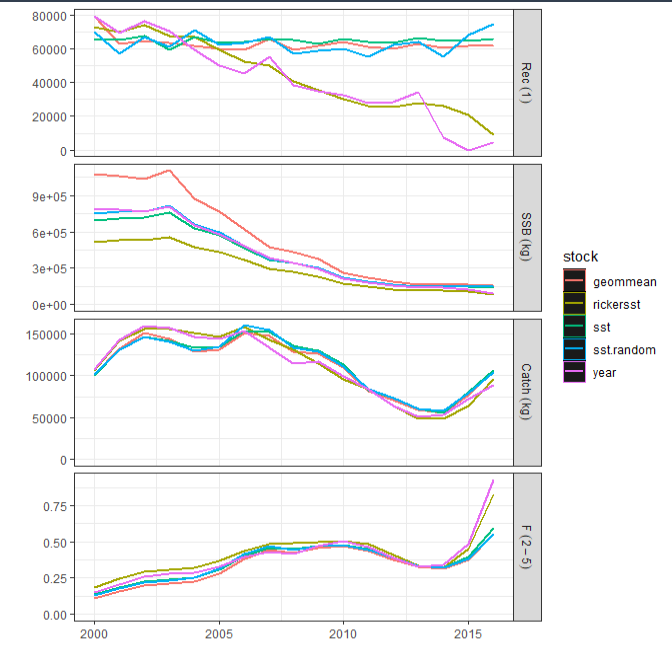
Alvarez-Berastegui et al. 2020b

Results

Fisheries
assessment
models



Alvarez-Berastegui et al 2020c



Maximum Sustainable Yield

Total Allowable catches (TACs)

Take Home Messages

- Implementing EBFM is an objective of all RFMOs responsables for the sustainability of fisheries at global scale, but most fisheries stocks at global scale are still managed under the framework of single species approach, far from a effective EBFM
- Novel tools on ocean observation, web services and end-user engagement allow developing tools for effective transference of science to society
- Linking environmental variability and ecology of tunas in the western Mediterranean demonstrated the potential for improving scientific advice for fisheries and for advancing towards the practical implementation of EBFM

Acknowledgements

This work has been developed in the framework of the BLUEFIN TUNA PROJECT, a joint research initiative from the Spanish Oceanographical Institute and the Balearic Islands Coastal Observing and Forecasting System. The work has received funds from the project PANDORA a European Union's Horizon 2020 research and innovation programme (Grant Agreement No 773713) and from the project EuroSea H2020 *The Future of Seas and Oceans Flagship Initiative* (grant agreement 862626)



References

- Alvarez-Berastegui et al. (2016). Pelagic seascape ecology for operational fisheries oceanography: modelling and predicting spawning distribution of Atlantic bluefin tuna in Western Mediterranean. *ICES Journal of Marine Science*, 73(7), 1851-1862.
- Alvarez-Berastegui et al. (2020 a) Environmental variability in three major mediterranean tuna spawning grounds: updating sst indicators for the ecosystem report card. SCRS 2020/044, Collect. Vol. Sci. Pap. ICCAT, 77(4): 137-143 (2020)
- Alvarez-Berastegui et al. (2020b) Bluefin tuna larval indices in the Western Mediterranean, ecological and analytical sources of uncertainty, SCRS/2020/067, Collect. Vol. Sci. Pap. ICCAT, 77(2): 289-311 (2020),
- Alvarez-Berastegui D et al. (2020c), Assessing the applicability of environmental indicators for improving the fisheries assessment of the albacore (*Thunnus alalunga*) under the A4A approach, SCRS/2020/106 , Collect. Vol. Sci. Pap. ICCAT, 77(7): 377-390(2020), 377-390
- Juza, M. and Tintoré, J. (2021). Multivariate sub-regional ocean indicators in the Mediterranean Sea: from event detection to climate change estimations, *Frontiers in Marine Science*, 8:610589, <https://doi.org/10.3389/fmars.2021.610589>.