JRC
EUROPEAN COMMISSION

NEWSRELEASE

21 November 2011

Satellite data can help protect bluefin tuna

A new model developed by scientists of the European Commission's Joint Research Centre (JRC) allows the potential presence of bluefin tuna to be tracked through daily updated maps, helping to protect endangered stocks and fight illegal fishing. The model, based on satellite remote sensing data, provides for the first time an overall view of the preferred bluefin tuna habitats in the Mediterranean Sea, as well as their changes over time. Satellite-based habitat mapping can help identify more precisely areas to be inspected or to be closed for fisheries and it can also help refine estimates of fish stocks, thus contributing to a more effective fisheries management.

European Commissioner for Research and Innovation, Máire Geoghegan-Quinn, said: "*This model will help to ensure sustainable management of bluefin tuna, actively contributing to two of the most pressing challenges for the future: food security and protection of the environment. Another good example of how science and research provide support to European Union policies."*

European Commissioner for Maritime Affairs and Fisheries, Maria Damanaki, said *"Responsible fisheries management decisions that ensure the sustainable exploitation of fisheries resources and the availability of fish for future generations worldwide rely on good science. New findings, like the JRC's new model, will help us greatly in our efforts to protect bluefin tuna and fight illegal fishing practices."*

The JRC habitat model allows the creation of near real-time maps of feeding and spawning potential bluefin habitats in the Mediterranean Sea, as well as habitat maps over a decade. The novelty of this model is the use of satellite data on the concentration of chlorophyll on the sea surface, as well as temperature, to track specific oceanographic features, which play a key role on the fish distribution.

The results achieved through the model clearly highlighted that bluefin tuna feeding and spawning is concentrated in some recurrent locations. Areas most frequently chosen for nutrition are on the northern side of the Mediterranean. Reproduction starts in May in the eastern part of the Mediterranean and ends in July in the western part.

However, the results also displayed a strong seasonality in habitat size and locations, as well as high year-to-year variations for the potential spawning habitat depending on regional weather conditions. This variability is key to evaluating the pertinence of Marine Protected Areas (or sensitive areas) for this species.

Bluefin tuna is a commercial fish of high market value which has been strongly overexploited for 15 years, especially in the Mediterranean Sea. The largest stock of adults which reproduce in the Mediterranean Sea is now at its lowest on record, around 40% of late 1950s' level.

In the past years the International Commission for the Conservation of Atlantic Tunas (ICCAT) has set lower quotas, established a restricted fishing period and recommended measures to enforce fisheries control. However, there is a need to increase the knowledge about spawning grounds for exploring additional management measures.

The implementation of a habitat-guided management could help identify spawning areas to be partially closed to fishing, thus protecting the spawners and ensuring adequate repopulation. Moreover, by restricting authorised fishing areas, control operations can be better targeted to fight illegal fishing, which is estimated to account for more than one-third of total catches in recent years.

The JRC habitat model can be adapted to other species of commercial interest. Potential habitat maps of fish at basin scale could help to produce more reliable assessments of fish stocks and can contribute to the planning of more efficient and sustainable use of limited maritime space.

Background

About the JRC

The Joint Research Centre (JRC) is the European Commission's in-house science service. Its mission is to provide customer-driven scientific and technical support for the conception, development, implementation and monitoring of European Union policies. The JRC serves the common interest of the Member States, while being independent of special interests, whether private or national.

The JRC provides tools, services and advice in support of the EU's Common Fisheries Policy (CFP). Activities include scientific advice to the Commission's Scientific, Technical and Economic Committee for Fisheries (STECF), the collection of fisheries data reported by EU Member States and the development of tools to support fisheries enforcement, such as the Vessel Detection System (VDS) and forensic genetics methods to detect the origin of captured or farmed fish and fish products.

The JRC habitat model for bluefin tuna

Two main behaviours are recognised in most fish: feeding and spawning. The corresponding habitats are generally separated for bluefin tuna as they correspond to distinct biological requirements and it avoids that the top predator’s prey feeds on the top predator’s larvae. The JRC bluefin tuna habitat model uses satellite data of Sea Surface Temperature (SST) and surface chlorophyll content (CHL) from MODIS-Aqua sensor (NASA) to compute daily habitats since July 2002.

The feeding habitat was mainly traced by horizontal changes of surface chlorophyll content created by currents, while the spawning habitat was mostly inferred from the heating of surface waters. Generally, higher CHL contents were found to be preferred for the feeding habitat (0.11-0.34 vs 0.08-0.15 mg/m3) and a minimum SST value of 19 degrees was found to be preferred for the spawning habitat. Both habitats were defined by the presence of relevant oceanographic features and are therefore potential and functionally-linked habitats, as opposite to effective habitats which are always difficult to produce for marine animals, especially highly migratory ones such as tunas.

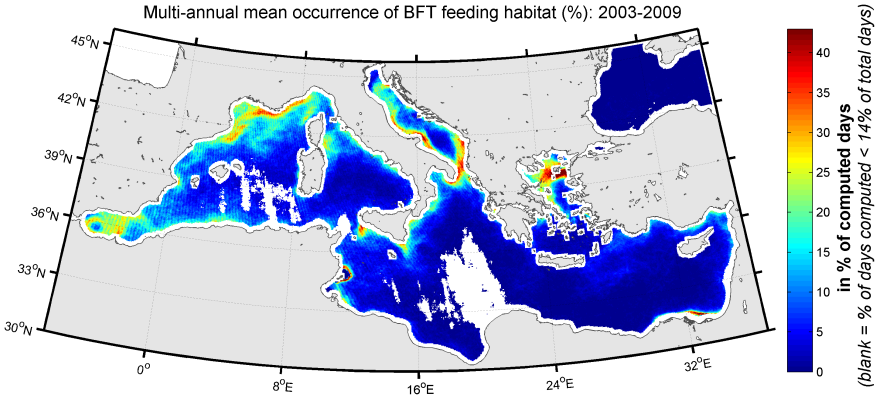
The daily maps of bluefin tuna potential habitats were calibrated and validated with geo-located observations from scientific surveys or fisheries operations. Monthly, seasonal and annual maps of potential feeding and spawning habitat of bluefin tuna were then computed from daily maps since July 2002.

The JRC habitat model is described in details in the following scientific publications:

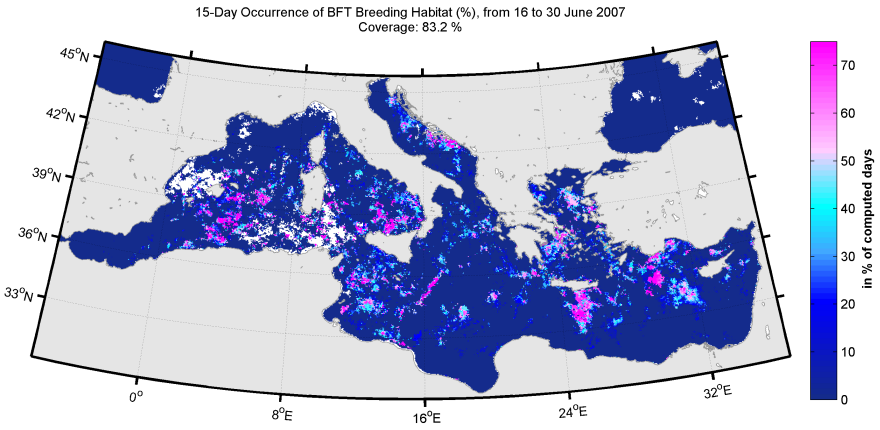
Druon J-N, Fromentin J-M, Aulanier F, Heikkonen J (Vol. 439: 223/240, 2011, doi: 10.3354/meps09321). *Potential feeding and spawning habitats of Atlantic bluefin tuna in the Mediterranean Sea*. Marine Ecology Progress Series.
Open access at: http://www.int-res.com/articles/meps_oa/m439p223.pdf

The implementation of a habitat-guided management is explored here:
Druon J-N (2010) *Habitat Mapping of the Atlantic Bluefin Tuna Derived from Satellite Data: Its Potential as a Tool for the Sustainable Management of Fisheries*. Marine Policy; 34(2):293-297.

For further information: http://ipsc.jrc.ec.europa.eu/index.php/Fishreg/288/0/



Potential feeding habitat in the Mediterranean Sea: orange/red areas in this map represent on average the areas most frequently chosen by bluefin tunas for nutrition for the years 2003-2009.



Potential spawning habitat in the Mediterranean Sea: pink areas in this map represent the areas most frequently chosen by bluefin tunas for reproduction over the fortnight June 16-30 2007.