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CERES storyline - bluefin tuna in the Mediterranean

What do we expect under climate change?

Atlantic bluefin tuna is a large migratory apex predator that migrates in May–June to the Mediterranean Sea to reproduce, and then return to their foraging grounds in the North Atlantic during July–August. The confined spawning window and the specific location of their spawning grounds make this species very sensitive to climate change. We expect climate-driven consequences in the offspring fitness and the selection of reproductive habitats.

How vulnerable is the bluefin tuna to climate change?

Atlantic bluefin tuna is categorized as an endangered species according to the IUCN Red List Criteria (IUCN 2016) though in 2009 there was even a proposal to list bluefin tuna under Appendix I of CITES (Convention on International Trade in Endangered Species of Wild Fauna and Flora). It is considered one of the most vulnerable species to climate change and harvesting among tuna and billfish species.

Atlantic bluefin tuna is managed in two stock units, the western and eastern Atlantic stocks, by the International Commission for the Conservation of Atlantic Tuna (ICCAT). The eastern stock reproduces in the Mediterranean Sea. The western stock reproduces in the Gulf of Mexico and the Slope Sea. It has been demonstrated that their reproductive habitats are sensitive to climate change, particularly warming, in the western stock. No studies have yet addressed the plausible effects of climate change on the reproductive habitats in the eastern stock.

What is the economic value of this species??

The two stocks are subjected to important restrictions and harvesting controls. A recommendation by International Commission for the Conservation of Atlantic Tuna established a 15 year recovery plan for the eastern

Atlantic and Mediterranean bluefin tuna stock starting in 2007 to ensure the sustainability of the fishery by 2022. The TAC was reduced to 13,500 tonnes in 2010 in agreement with the scientific advice. There are closed fishing seasons for pelagic longline vessels, purse seiners, baitboats and pelagic trawlers. There is prohibition to use airplanes and helicopters to search bluefin tuna and there is a 30 kg minimum size catch except in the Adriatic Sea where the minimum size is established at 8 kg. TACs for 2015, 2016, and 2017 were established at 16,142 t, 19,296 t, and 23,155 t, respectively. A new assessment will be conducted in 2017 for the next years.

What are the challenges?

Since bluefin tuna is an environmental driven spawners, that is, selects spawning grounds based on specific environmental characteristics, we expect an important impact of environmental changes in the reproductive traits of the species. The biggest gaps are to estimate possible changes in reproductive timing and habitat use induced by global change based on a solid ecological knowledge and forecast economical consequences in the future.



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What is the working program in CERES?

1. The experiments planned include egg and larvae sensitivity measured, as growth, developmental time and survival, to different ranges of temperature, salinity and pH
2. Long-time series of field data of different life stages (egg, larvae, juvenile, adults) from fisheries and fisheries-independent data, data from annual ichthyoplankton surveys, oceanographic data, operational oceanographic models, data from satellite, knowledge of the fleets, economical data.
3. Statistical models, bio-physics models (coupled circulation and individual based models parameterized for the species), bio-economic models (Flbeia). The different models will be combined with the aim of making environment-tuna relationships useful for population projection models and bio-economical models in different scenarios of climate change.

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