Joint FRA-CLIOTOP Workshop on Advancing Comparative Ecological Studies of Early Life History and Recruitment Strategy of Bluefin Tunas and Related Species, and Effects of Environmental Changes on Fluctuations of Oceanic Top Predators

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National Research Institute of Far Seas Fisheries, Shizuoka

Background

The early life history dynamics of oceanic top predators are tightly linked to environmental processes that are influenced by global climate. Biological processes, such as distribution, movement, growth and survival in relation to environmental factors, all contribute toward the observed variations in the recruitment of oceanic top predators. Consequently, increasing our knowledge of aspects such as the early life histories of top predators, adult spawning activities, seasonal and/or annual changes in reproductive parameters with environmental factors, prey availability and predation intensity during larval periods, are all considered important. In order to better understand these issues, a comparative approach for studying the early life histories of oceanic top predators in different regions and oceans will be useful for understanding the impacts of climate variability on ocean ecosystem dynamics.

The membership of CLIOTOP-WG1 consists of approximately 20 scientists, mainly from Japan, Spain and USA. Since 2004, the WG1 has convened two workshops - the 2005 Malaga Workshop and 2007 Shimizu Joint FRA-CLIOTOP Workshop. Through these meetings, our knowledge of the early life dynamics of top predators has progressed considerably and our understanding of ocean ecosystems has also increased.

To extend these findings and further examine the possible scenarios for oceanic ecosystems in the 21st century, CLIOTOP, which is in its second five-year phase (2010-2014), convened the 2010 Paris Mid-Term workshop.

Based on the results that have emerged from these meetings, the Second FRA-CLIOTOP Joint Workshop was held at the NRIFSF in Shimizu in September 2011.

Objectives of the workshop

The primary aim of the Joint FRA-CLIOTOP workshop on "Advancing comparative ecological studies of early life history and recruitment strategy of bluefin tunas and related species, and effects of environmental changes on fluctuations of oceanic top predators" was to collate new information on the early life histories and recruitment strategies employed by tuna and related species in different regions in collaboration with CLIOTOP WG1. CLIOTOP WG1 is currently focusing on the early life histories and recruitment dynamics of oceanic top predators in an attempt to resolve the following key scientific questions:

- What environmental characteristics define the timing and intensity of reproduction and spawning areas?
- What environmental and biological characteristics most influence larval survival?

The joint FRA-CLIOTOP workshop also highlighted the effects of environmental changes on fluctuations in the populations of oceanic top predators, such as bluefin tuna and related

species, through examining their foraging activities. These findings were presented in collaboration with CLIOTOP WG3, which focuses on the trophic pathways in open ocean ecosystems in order to address the following key scientific questions:

- What are the main trophic pathways and how do they differ among and within oceans?
- Is there evidence of change in trophic pathways over time and space consistent with climate variability? Can seasonal and spatial variability be used to explore the impacts of climate variability?
- What is the relative importance of mesopelagic versus epipelagic prey resources in oceanic top predators, and how does this vary within and among oceans. How does climate variability affect the distribution and availability of mesopelagic and epipelagic prey?
- Is it possible to identify indicators, such as prey species or size spectra, that would highlight significant changes in trophic pathways?

In addition, the workshop reviewed recent scientific findings and developed research programs focusing on the early life history and recruitment strategies of oceanic top predators, such as bluefin tuna, other tuna species, tuna-like species, and ecologically similar species, and also to assess the effects of environmental change on marine ecosystems and the population dynamics of these oceanic top predators.

Finally, the workshop examined future plans to analyze the early life histories and recruitment strategies of oceanic top predators within the context of the ultimate objective of these studies, i.e. the development of a robust, predictive methods for assessing the dynamics of top predator populations and oceanic ecosystems in ways that consider the impacts of both fishing and the environment, in conjunction with CLIOTOP workgroups.