

Science, Service, Stewardship



Response to Species Working Group Recommendations for Research

**2014 Fall Meeting of the
Advisory Committee to the U.S. Section to the
International Commission for the Conservation of Atlantic Tunas
October 9th–10th, 2014 Silver Spring, MD**

**NOAA
FISHERIES
SERVICE**



Bluefin Tuna Working Group





Bluefin Tuna Working Group

As the highest bluefin tuna priority, NMFS scientists should continue to participate in the SCRS work to develop new stock assessment methodologies, which take into account stock mixing, for Atlantic bluefin tuna, upon which management advice would be based. As part of this process, a management strategy evaluation framework for science-based management of bluefin tuna fisheries should be developed for consideration by the Commission in 2017.

NMFS scientists have been fully participating in this work, and there has been progress, including on MSE. But this progress has been substantially slowed due to the Commission request for an assessment in 2014.



Bluefin Tuna Working Group

In advance of the 2015 stock assessment, NMFS should host a domestic BFT workshop/webinar/teleconference for the sharing of best available science, and for prioritizing future research.

It should be noted that the SCRS is recommending that the next assessment of BFT take place in 2016. We are supportive of the concept. However, the Sustainable Fisheries Division (the SEFSC Division that is responsible for SCRS work) does not have the resources support or travel to a face-to-face workshop/meeting.



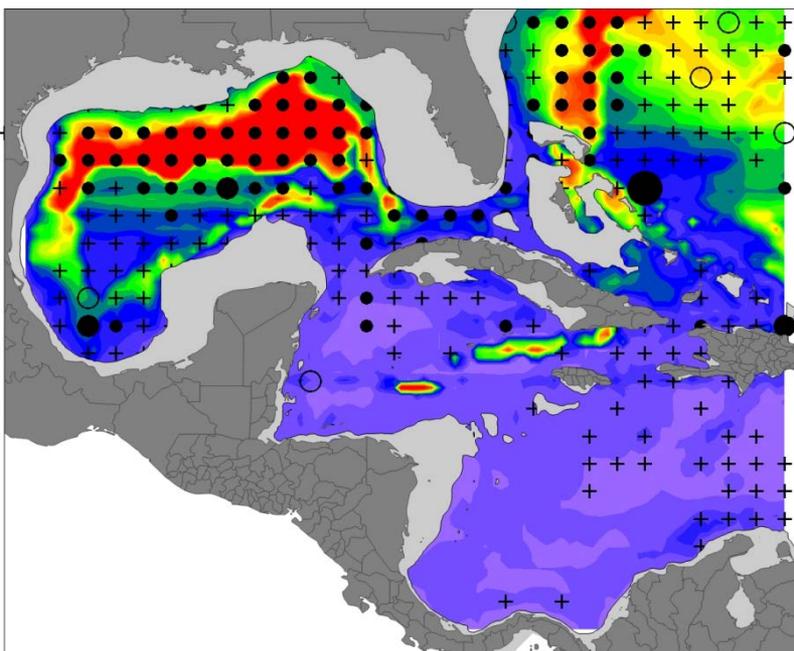
Bluefin Tuna Working Group

- **The United States should continue scientific research to obtain a greater understanding of the following:**
 - **a. Changes in coastal fisheries (e.g., examine hypotheses regarding shifts in bluefin distribution, abundance, and other factors such as prey availability and environment**
 - **b. stock structure and mixing**
 - **c. early life history, reproductive and maturity schedules, and recruitment processes**
 - **d. further investigation of spawning grounds**
 - **e. post-release mortality in recreational and commercial fisheries**
- *(a-d) Results from a number of studies were presented during the bluefin stock assessment meeting, including studies involving otoliths, electronic tagging, size structure, potential responses to climate change*
- *(e) studies ongoing or completed*

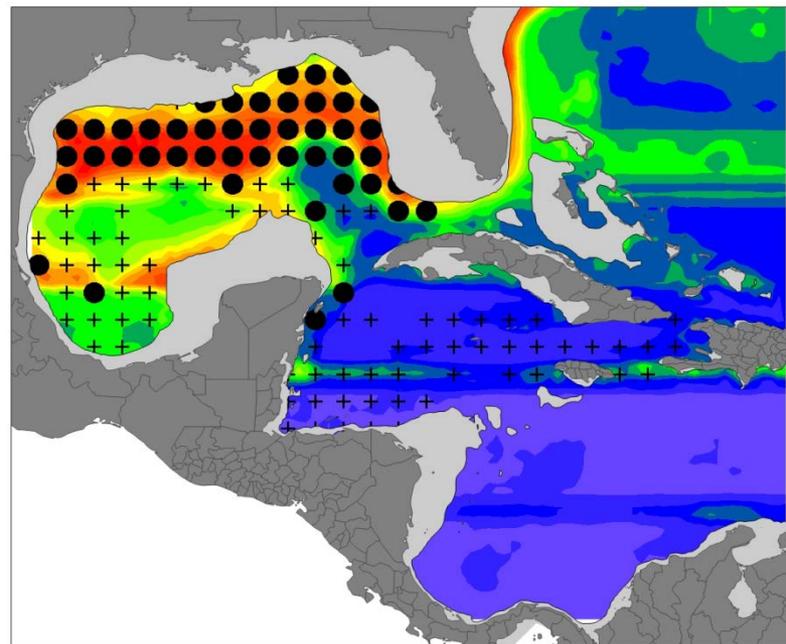
Habitat Models

- Habitat models have been built for adult and larval stages of tunas, swordfish and marlin
- Distributions of most species can be well predicted by environmental conditions
- Temperature is frequently important
- Spawning and feeding habitats are usually distinct

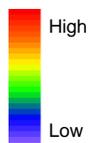
Adult bluefin tuna: Spring



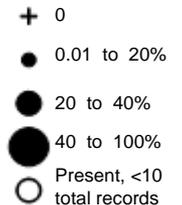
Larval bluefin tuna: Spring



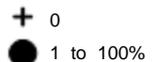
Predicted Probability of Occurrence



Observed Probability of Occurrence: Adults

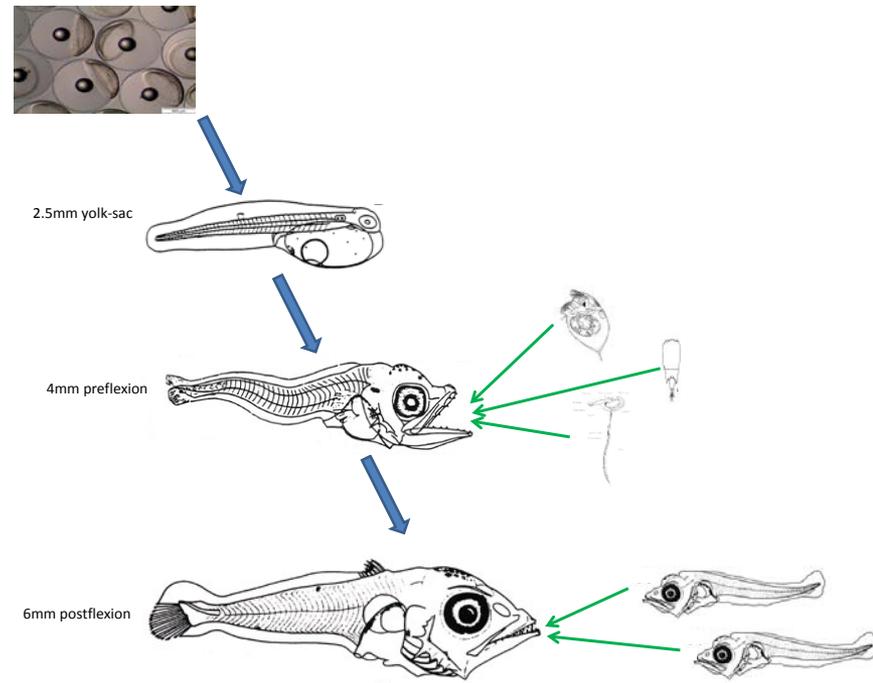
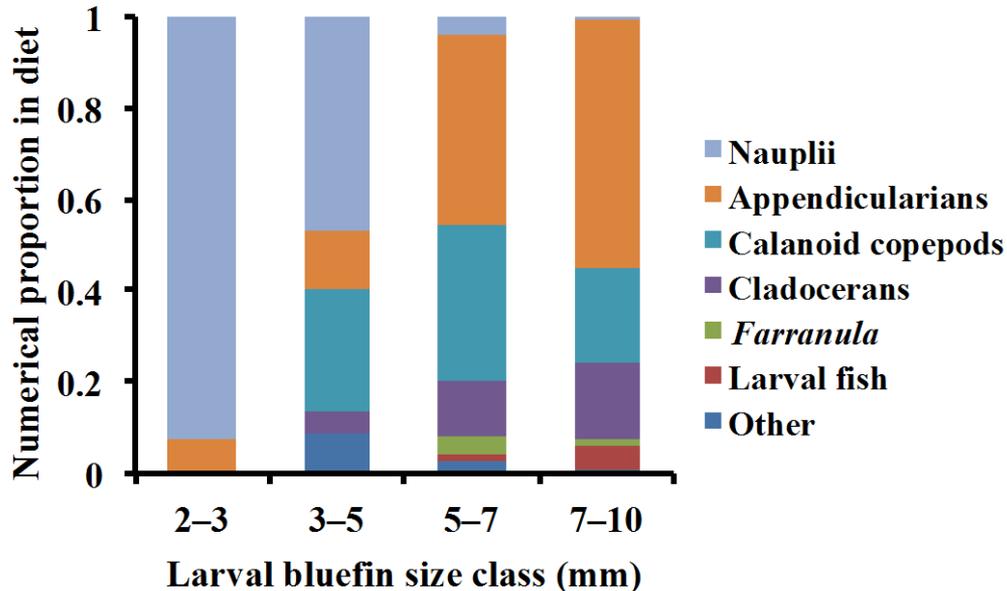


Observed Probability of Occurrence: Larvae

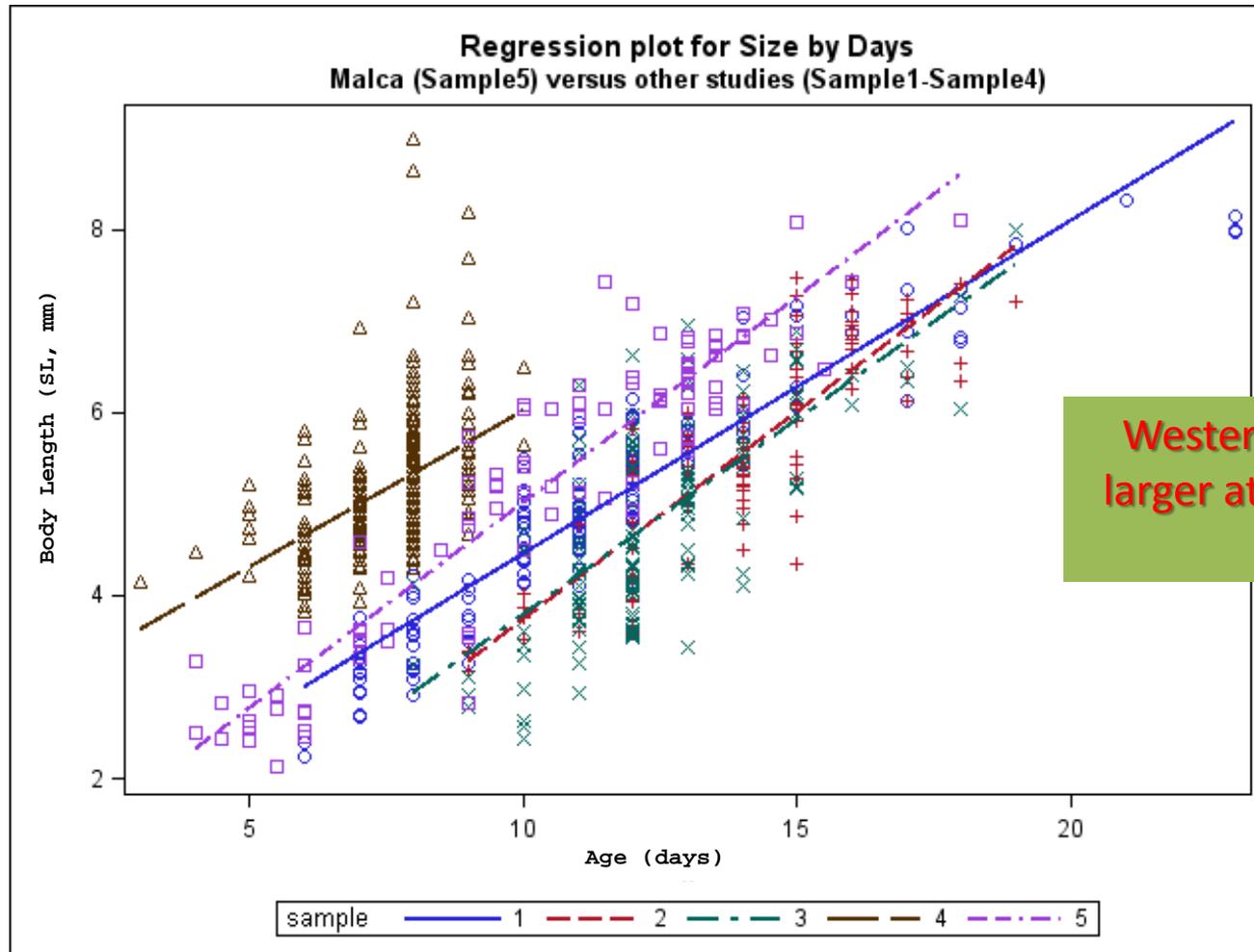


Diet composition

- Preliminary results show high feeding success
 - **100%** in all larvae >4mm in length
- Small larvae rely on copepod nauplii, appendicularians important for larger larvae
- Piscivory recorded from ~6mm
- Adaptation to oligotrophic environment
 - Tuna are not herring
 - Ambient phyto/zooplankton concentrations not good indicators of feeding conditions



Larval Bluefin tuna growth curves – Comparisons GOM vs MED



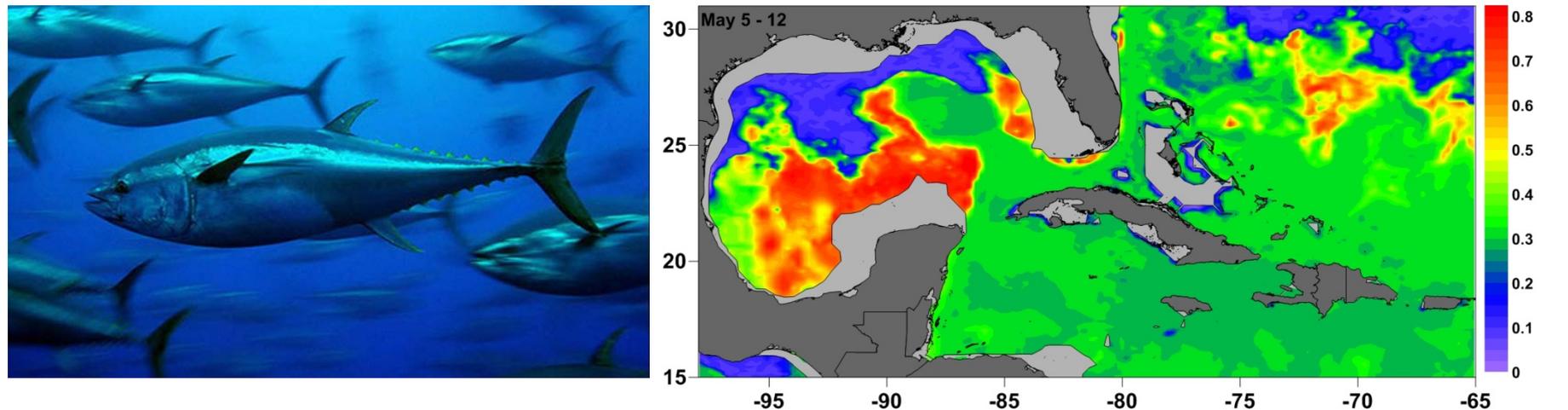
1. Garcia et al 2013, *T. Thynnus* from Mediterranean 2003*
2. Garcia et al 2013, *T. Thynnus* from Mediterranean 2004*
3. Garcia et al 2013, *T. Thynnus* from Mediterranean 2005*
4. Brothers et al 1933, *T. Thynnus* from Florida Straits 1981*
5. Malca et al (current study), *T. Thynnus* from Gulf of Mexico 2012*

*Curves significantly different ($p < .001$)

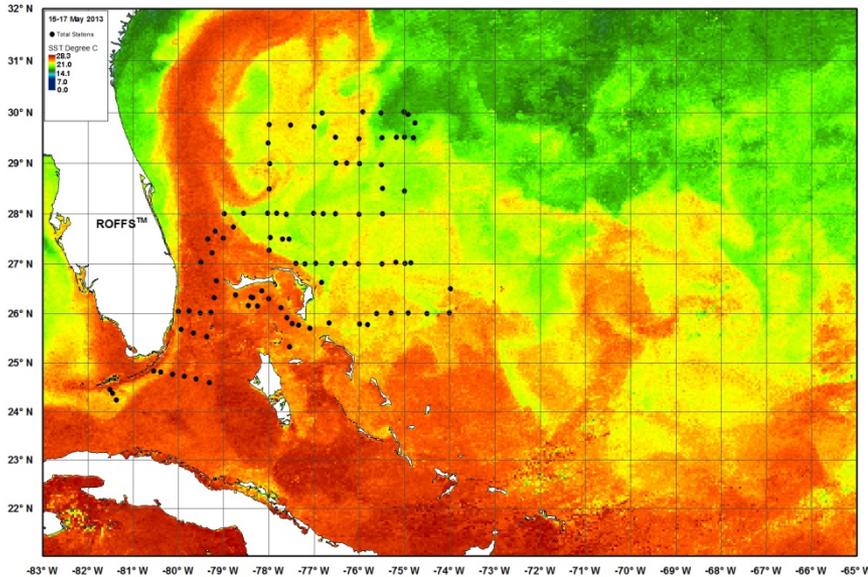
Larval sampling around the Bahamas

- Larval bluefin tuna surveys completed in the northern Gulf of Mexico since 1977 provide good information on larval distributions
- Larval occurrences have been combined with environmental data to formulate predictive models of occurrence
- Applying these models to regions outside of the Gulf shows potentially suitable spawning habitat east of the Bahamas
- We sampled in and around this region during spring 2013

Probability of occurrence (/1)

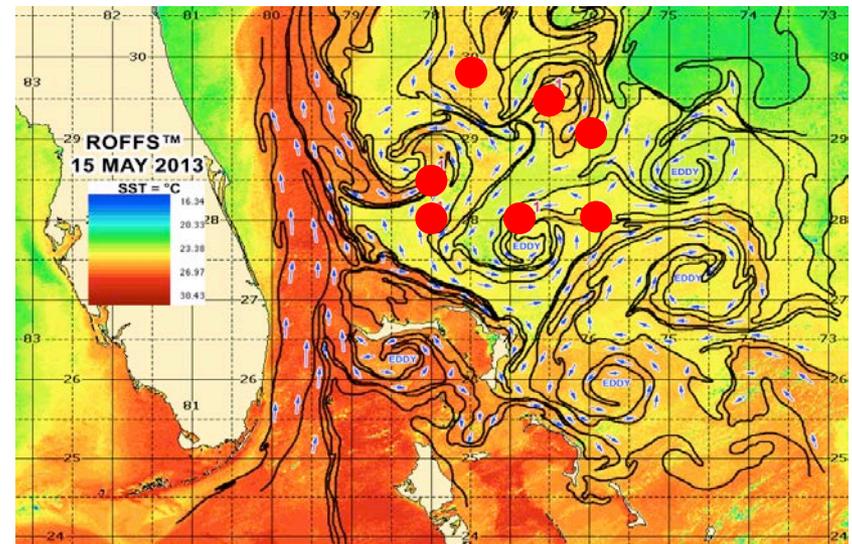


Cruise track and positive stations



- Bluefin larvae were found in low numbers to the north and east of the Bahamas, near cyclonic and anticyclonic surface features
- Fourteen larvae were collected in total, at 7 stations

- Stations were selected to cover multiple oceanographic features and temperature regimes





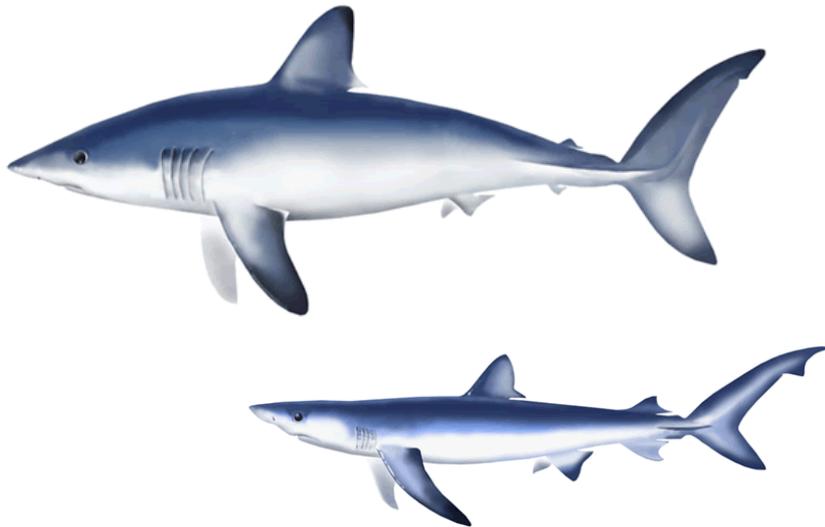
Bluefin Tuna Working Group

In response to the Commission's call for proposals of new indices of abundance, the United States (NMFS/SEFSC) should explore the development of fishery-independent estimates of abundance such as aerial and sonar surveys and physical and genetic tagging.

- *NMFS scientists submitted a number of proposals at the -
Western Atlantic Bluefin Tuna Commission Intersessional and
during the WBFT stock assessment meeting*
 - *Close-kin genetic pilot project is underway*
 - *Some aspects of the proposed larval work is being done*
 - *A pilot study on the feasibility of a YOY index is planned for 2015*
 - *Additional work by non-governmental researchers is being funded.*



Shark Working Group





Shark Working Group

- Noting with satisfaction the scheduling of the SCRS blue shark stock assessment in 2015. The United States should seek clear management advice as part of its participation.
- *This is always our goal, but is often difficult to achieve as a result of the degree and nature of various uncertainties, and the corresponding difficulties in reaching scientific consensus.*



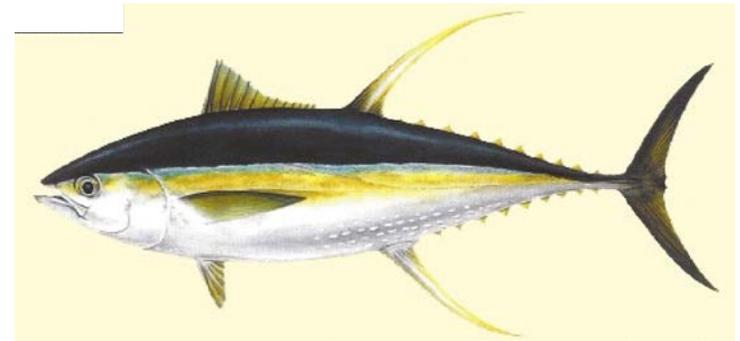
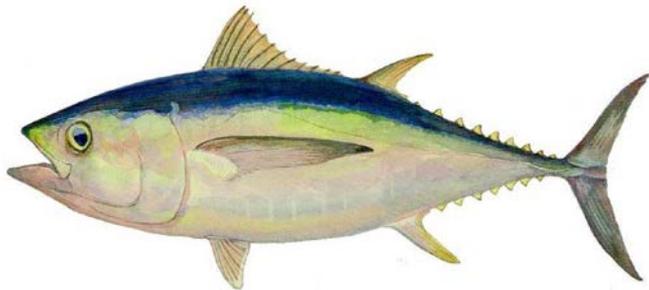
Shark Working Group

For shark species lacking an assessment, request that the SCRS continue to develop objective criteria for proxies and benchmarks that would detect relative trends in abundance and signal a need for management action (or a change to existing management measures). For example, these tools could be used to evaluate the status of currently prohibited species.

In 2014, the SCRS Shark Working Group took a preliminary look at this and other potential data inputs available for pelagic sharks (not just prohibited species) to evaluate the feasibility of conducting stock assessments in the future for species other than blue, shortfin mako and porbeagle. The Group recommended that CPC scientists develop indices of abundance for species other than those main three.



Bigeye, Albacore, Yellowfin and Skipjack (BAYS) Tunas Working Group

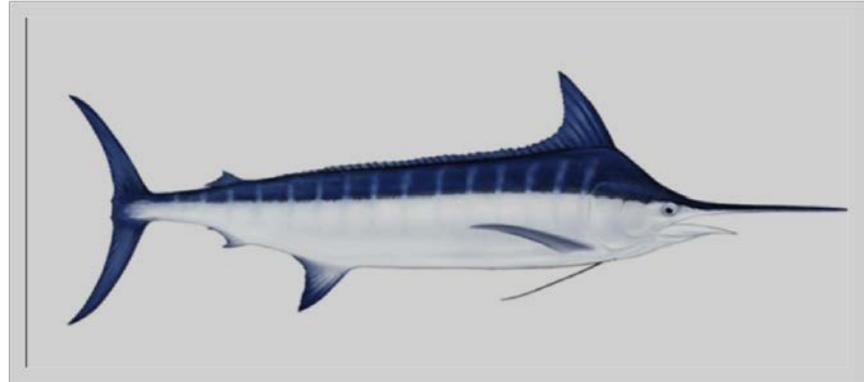




BAYS Tunas Working Group

Atlantic-wide tagging program: The Working Group continues to recommend that the United States support an enhanced, Atlantic-wide tagging program for tropical tuna species, using both conventional and archival tags, as proposed in recent SCRS reports. The Working Group also recommends that the United States continue to fund the Atlantic tropical tuna tagging program and encourages the development of infrastructure to more regularly collect biological samples.

The U.S. provided \$62,500 toward this program in 2012. These funds supported the participation of experts from the Indian Ocean Tropical tuna Tagging Program in initial SCRS planning of the AOTTP , and provided part of the funding (with the EU) of the feasibility study that was an essential first step.



Billfish Working Group





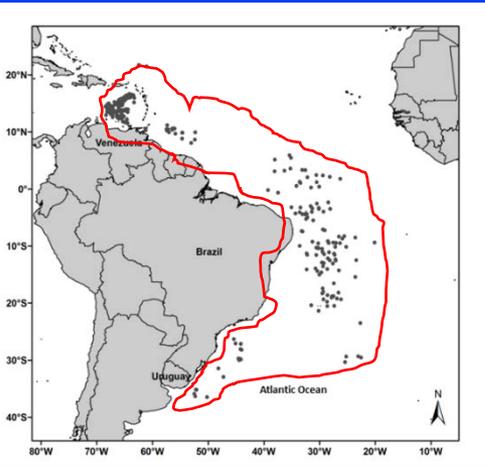
Billfish Working Group

Increase the emphasis on collection and analysis of life-history data for billfish. Noting that many of the basic life-history parameters of billfish are still poorly understood for all species, the BSWG encourages continuing basic billfish research in age, growth, natural mortality, spawning areas, and population structure.

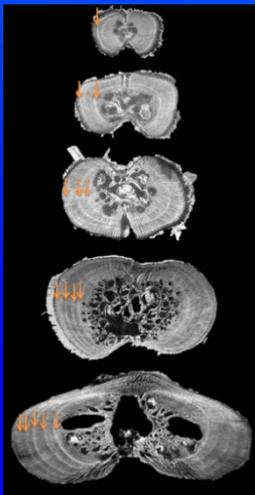
In 2014, the SCRS Billfish working group reviewed the results of new life history studies.

2. Review of Biology.....cont.

Document SCRS/2014/068 reported estimates of age and growth for longbill spearfish *Tetrapturus pfluegeri* in the western Atlantic Ocean. Potential bias were acknowledged due to vascularization and asymmetry in spines of older fish.



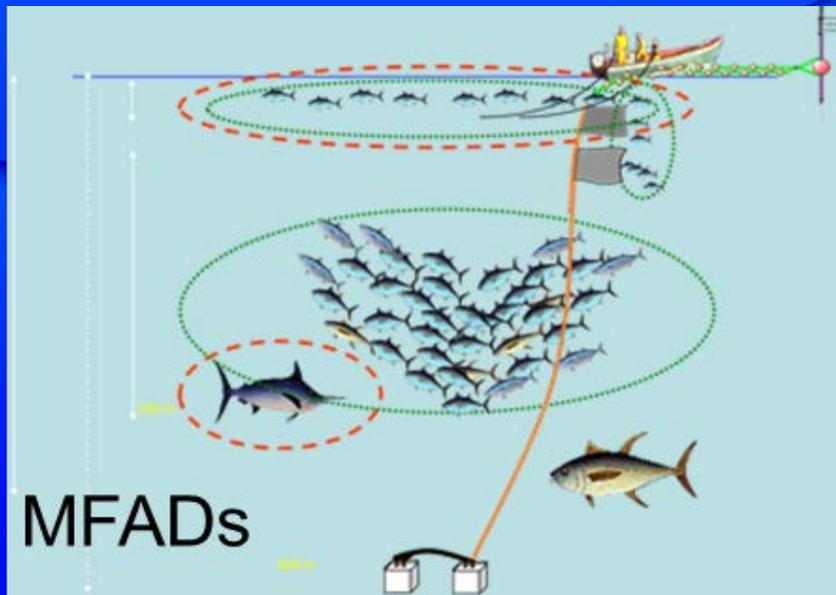
	L_{∞}	SE	t_n	SE	k	SE
Total						
Observed						
Age 1-7	175	1.14	-0.99	0.25	0.74	0.08
Back-calculated						
Age 1-7	175	2.48	-1.26	0.20	0.52	0.05
Males						
Observed						
Age 1-6	174	1.16	-0.66	0.32	0.92	0.14
Back-calculated						
Age 1-6	173	2.90	-1.12	0.20	0.58	0.08
Females						
Observed						
Age 1-7	181	3.68	-2.23	0.70	0.44	0.10
Back-calculated						
Age 1-7	179	5.20	-1.67	0.40	0.42	0.08



4.3. Anchored FADs.

A study in the French Caribbean on anchored FADs (SCRS/2014/071) compared different gears and selectivity techniques. Comparisons were made on species composition and size of the catch around anchored FADs. **Results** showed that jigging around FADs was most favorable for catching adult BLF tuna, and most catches of BLF and YFT occurred late in morning. Flying fish as bait was most efficient in catches, except for BUM.

Diurnal operation



Further off-shore = higher catches

Adult fish caught by mid-morning



Billfish Working Group

- **Encourage the SCRS to promote cooperative research programs with CPCs and enhance current information regarding potential differences in the catchability of non-target finfish species on pelagic longline gear when deploying circle hooks versus J-hooks.**

SEFSC scientists proposed US-Mexico cooperative research, under the auspices of MexUS, comparing circle hooks vs J-hooks. Mexican scientists were open to the idea, if their own already completed studies were insufficient to accomplish this. But still in early stages of consideration.



Swordfish Working Group





Swordfish Working Group

Continue cooperative fisheries research programs with CPCs.

- *The SCRS Swordfish Working Group plans a collaborative analysis of electronic archival tagging data to investigate North Atlantic habitat preferences and response to major oceanographic features, such as the NAO.*
- *SEFSC scientists have begun a collaboration with Portuguese scientists, initially involving deployment of PSATs on swordfish from Portuguese longliners (in the southern North Atlantic)*
- *Ongoing research collaboration with Canadian scientists to develop joint US-Canadian longline indices for swordfish*