Science, Service, Stewardship

SEFSC Research Activities

2012 Spring Species Working Groups Meeting
of the Advisory Committee to the U.S. Section to ICCAT
May 1 – 2 2012, Silver Spring, MD

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Pelagic Observer Program
2011 Gulf of Mexico Enhanced Observer Coverage

Results: (NON-Experimental)

- Coverage period was March 28th – June 14th
- 30 observed trips, 218 sets, 13 different vessels, 337 sea days
- Landings: 1075 YFT, 848 SWO, 2 BET
- BFT bycatch: 9 landed, 7 released alive, 11 released dead, 2 lost (29 total)

Results: (Experimental)

- There was no experimental design carried out in 2011.

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Pelagic Observer Program
2011 Gulf of Mexico Enhanced Observer Coverage

Samples made available to researchers in 2011:

Tissue Type	#Samples
Gonads	12
Liver	12
Skin	12
Otolith	7
Dorsal spine	12
Vert	5

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Pelagic Observer Program
2012 Gulf of Mexico Enhanced Observer Coverage

2012 Project Objectives:

- Use available funding to achieve a 50% observer coverage level. This will produce an expected CV for BFT discard estimates of approximately <= 0.2 (***see NOAA Technical Memorandum NMFS-SEFSC-588***)
- Continue collecting data regarding spatial and temporal patterns of BFT bycatch
- Continue collecting biological samples from landed fish or dead discards
- Satellite tagging of yellowfin catch (reimbursed) and bluefin tuna bycatch.

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Pelagic Observer Program

- 50% coverage will fully accommodate research objectives of POP ***AND*** additional funding will allow expanded research programs for BFT, including:
  - Continue required training and equipment purchases to build capacity for production ageing at the SEFSC
  - Augment existing sampling programs to obtain BFT tissues (e.g. otoliths, tissue) for production ageing, natal origin, movement and other purposes
  - Conduct ongoing survival studies using electronic tagging and appropriate release techniques (PLL)
  - Continue research on bycatch mitigation

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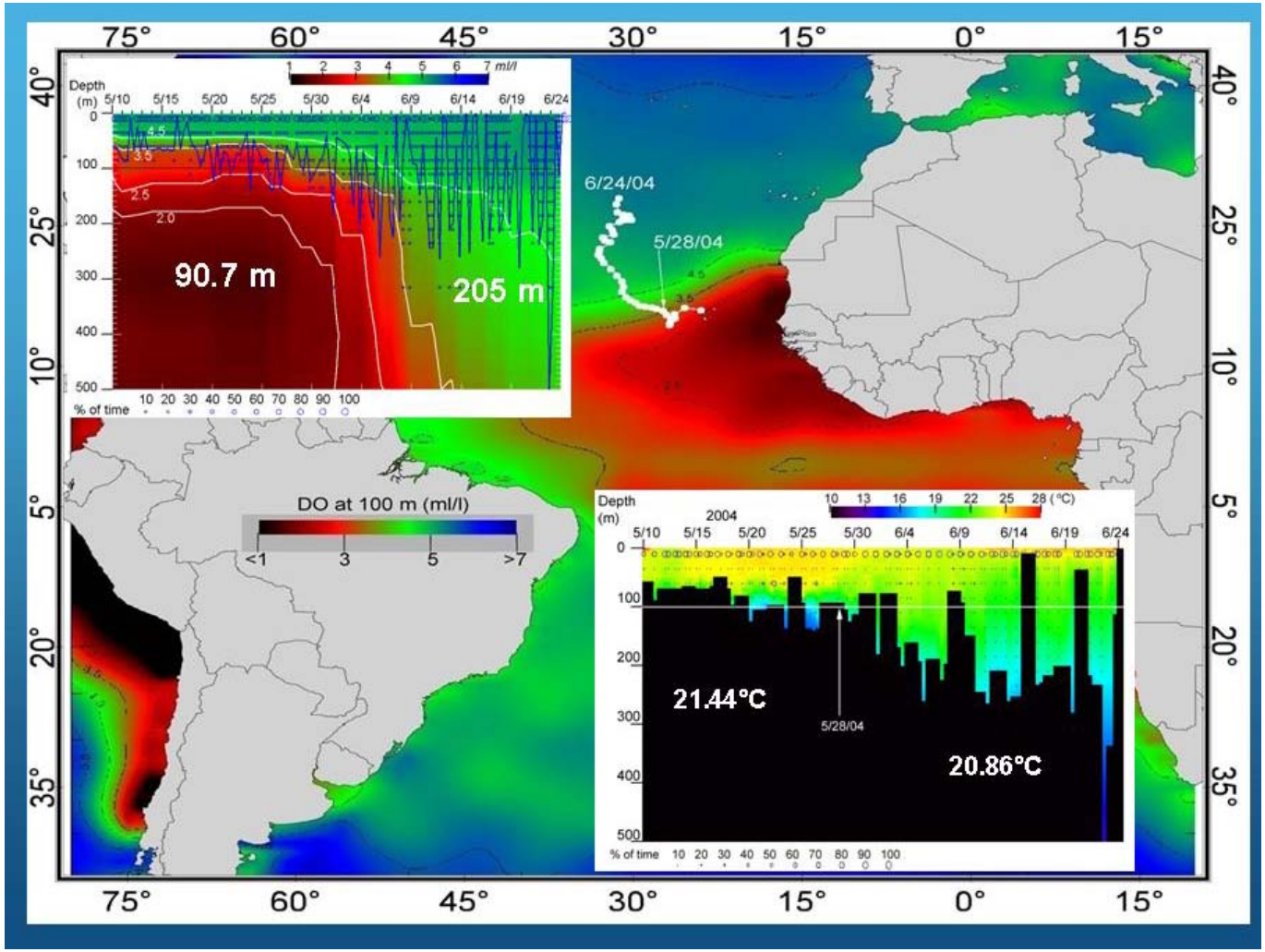
Pelagic Observer Program

- ***This additional research is of enormous value to stock assessment and will enable marked improvements in stock assessment data and methodologies.***

Habitat Utilization

- A tagged BUM was released off the Cape Verde Islands and monitored for 43 days.

- Results from this and other tagged fish demonstrate how diving behavior is restricted in areas where DO is reduced at shallower depths.



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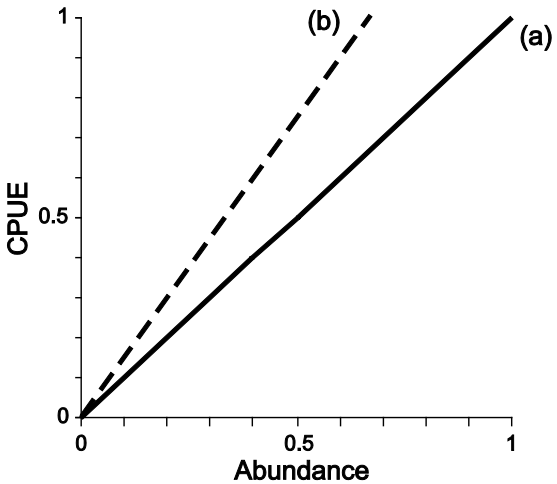
Habitat Utilization

2010 Research:

- At the 2010 BUM data preparatory meeting, SEFSC and SCRS Secretariat staff examined the variability of catchability within and outside the OMZ. A CPUE standardization model was developed to account for this.

- If there is expansion of the OMZ with time, and q varies across the OMZ, it will be necessary to revise CPUE standardization methodologies.



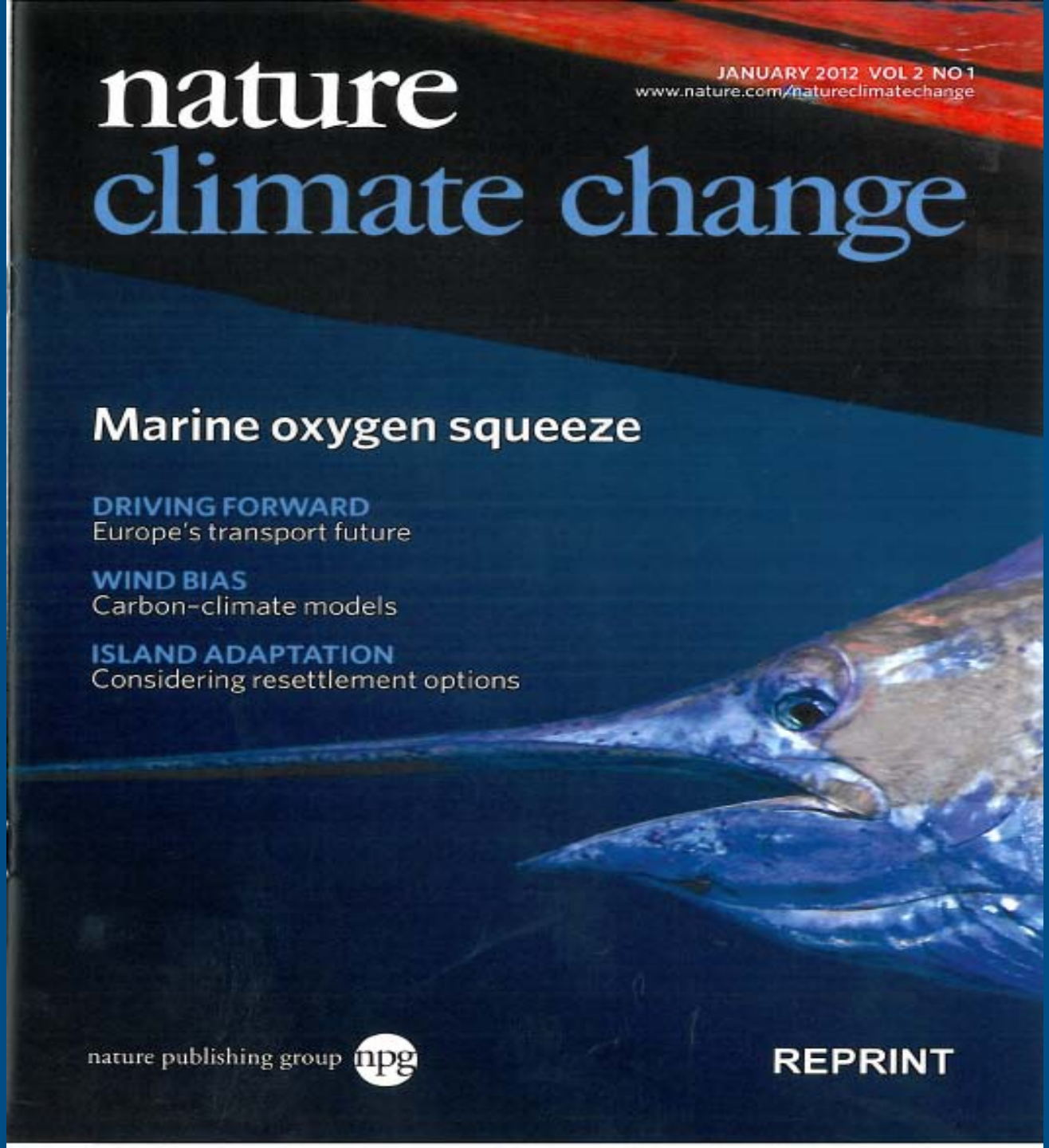
The relationship between CPUE and abundance for tropical pelagic billfish and tuna in uncompressed (a) and (b) compressed environments.

Expansion of oxygen minimum zones may reduce available habitat for tropical pelagic fishes

L. Stramma[1], E.D. Prince[1], S. Schmidtko[1], J. Luo, J.P. Hoolihan, M. Visbeck, D.W.R. Wallace, P. Brandt, and A. Kortzinger

[1] **Equally contributing first authors**

Entities: Leibniz Institute of Marine Science, Southeast Fisheries Science Center, Univ. Miami RSMAS & CIMAS, Univ. East Anglia.


nature
climate change
JANUARY 2012 VOL 2 NO 1
www.nature.com/natureclimatechange
Marine oxygen squeeze
DRIVING FORWARD
Europe's transport future
WIND BIAS
Carbon-climate models
ISLAND ADAPTATION
Considering resettlement options
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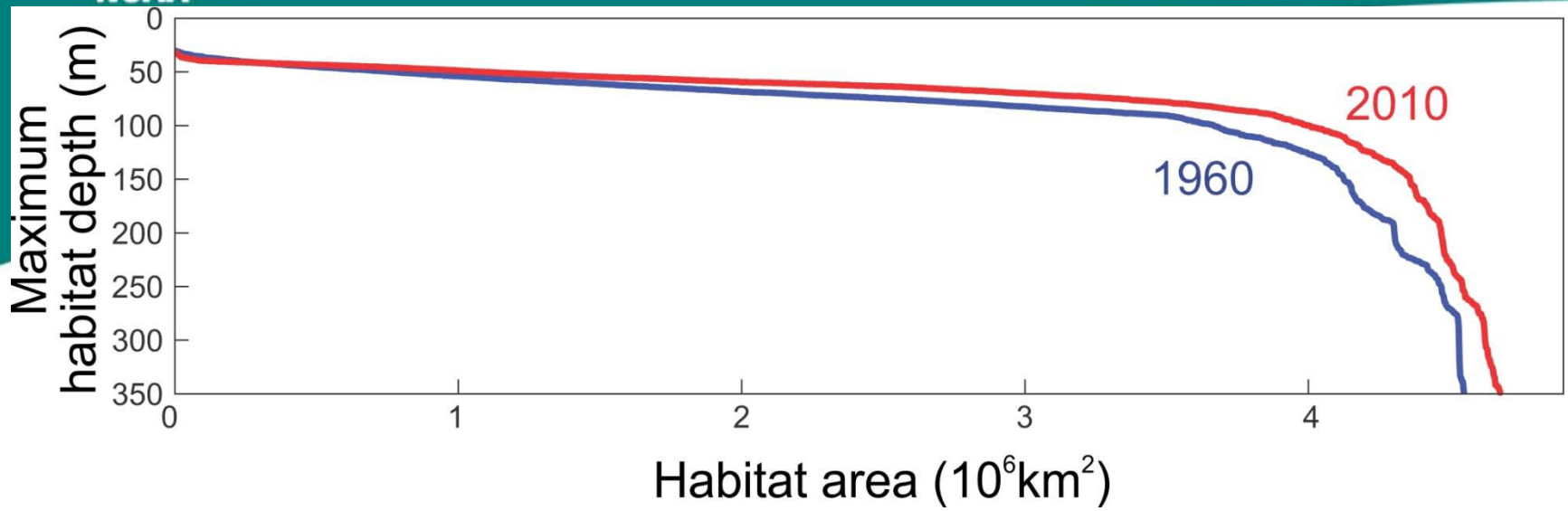
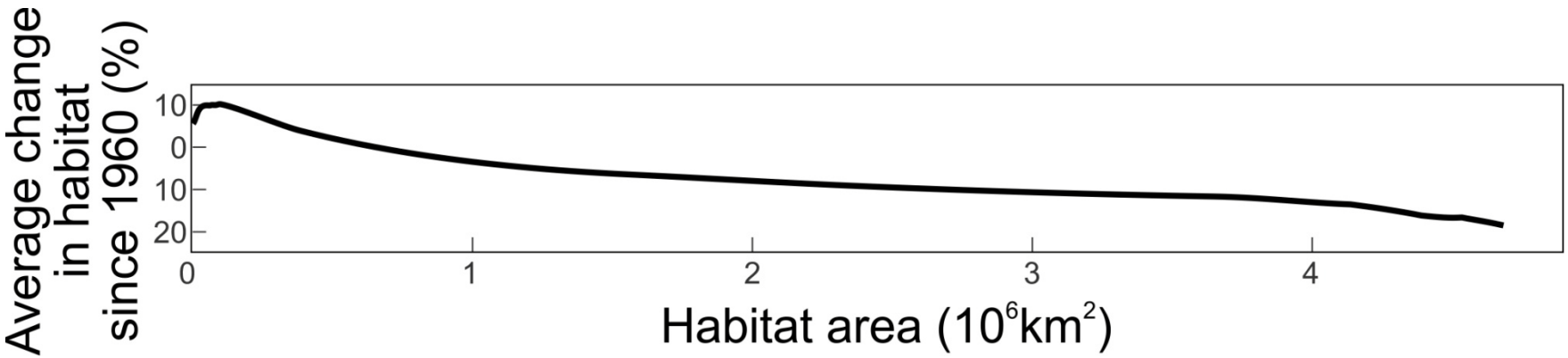

Maximum habitat depth (m)
0
50
100
150
200
250
300
350
2010
1960
0
1
2
3
4
Habitat area ($10^6 km^2$)


Average change in habitat since 1960 (%)
10
0
10
20
0
1
2
3
4
Habitat area ($10^6 km^2$)

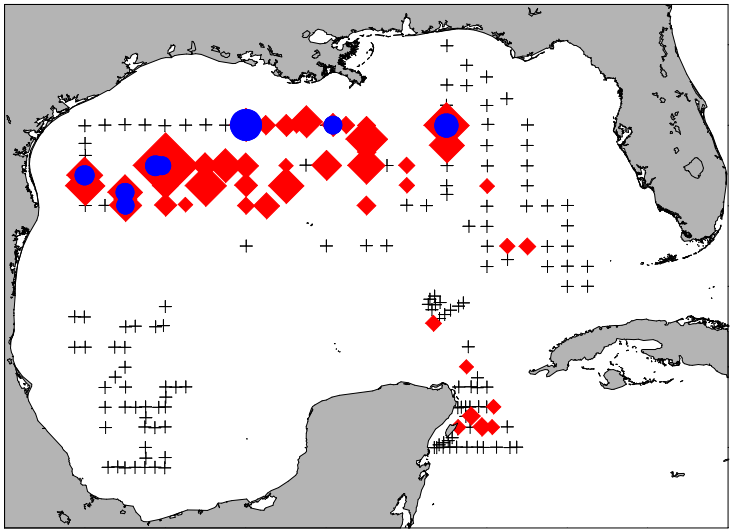
Larval bluefin tuna gear selectivity and habitat modeling

A new plankton sampling method trialed in 2009 has been more widely applied during 2010 – 2012

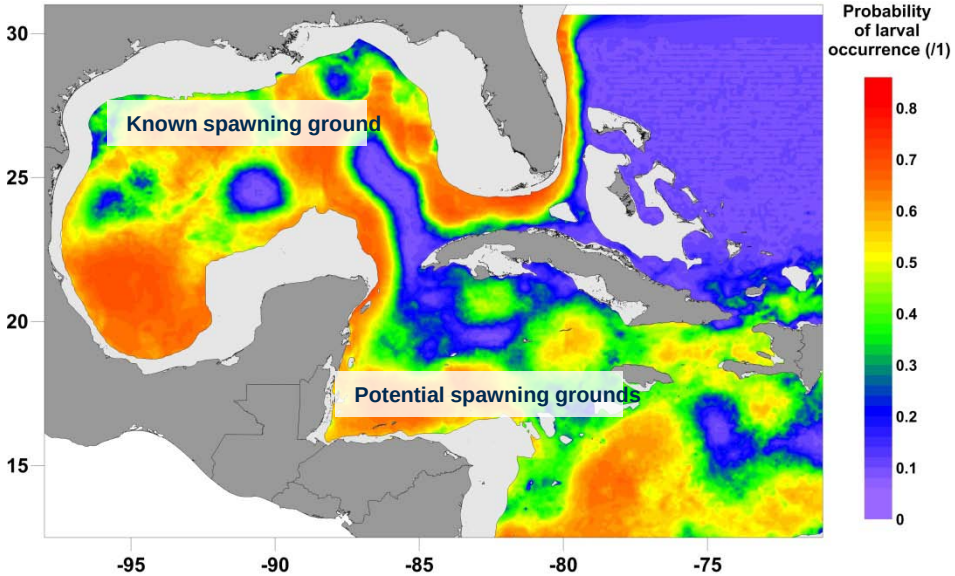
- This gear has a larger mouth, coarser mesh and fishes shallower depths (0→ 10m) than traditional bongo nets
- Larval occurrences and abundances are significantly higher with this new gear
- This has allowed us to develop more accurate models of potential spawning grounds, and may lead to the development of an improved larval index
- An improved index would allow the more accurate assessment of adult spawning stock biomass in the Gulf of Mexico

The new shallow subsurface net

Catches from bongo (blue) and subsurface (red) tows, 2010



Experimental model of larval occurrence from new shallow subsurface gear



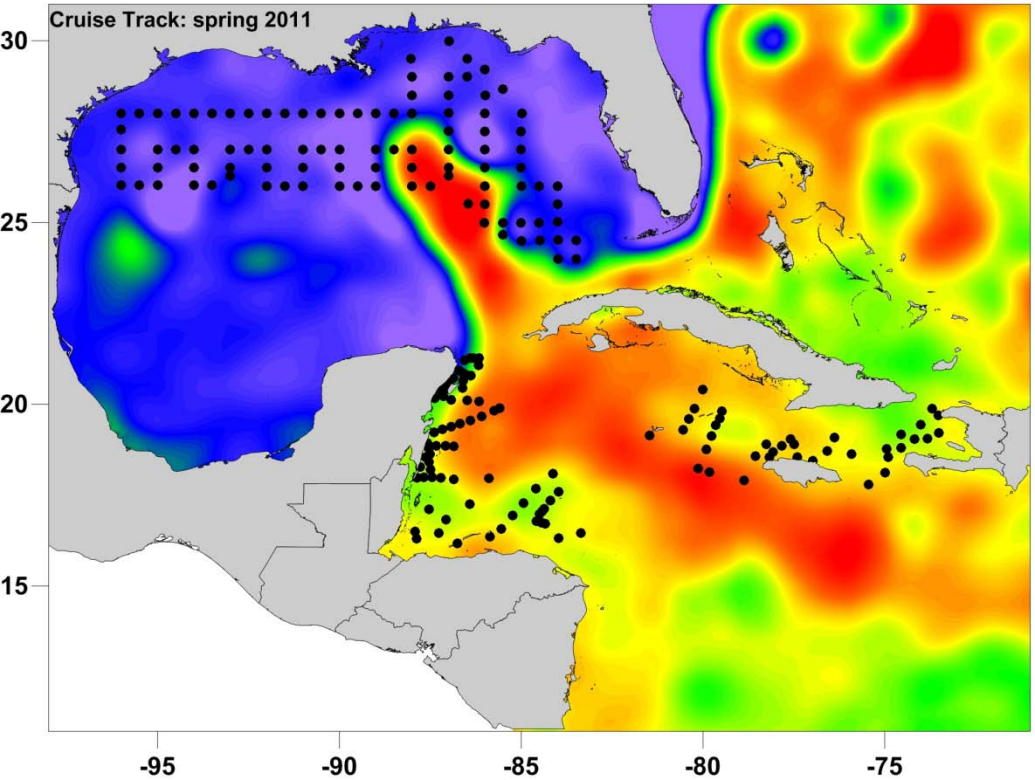
2012 spring larval bluefin tuna cruise

Our 2012 spring cruise in the western Caribbean and Gulf of Mexico is currently underway

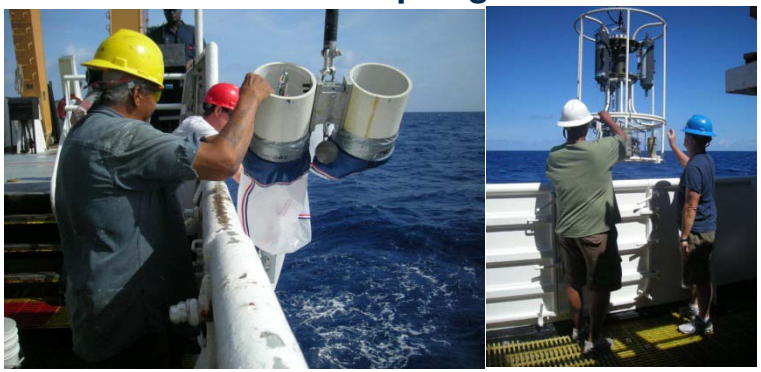
We have completed stations between the Cayman Islands and Belize, utilizing plankton sampling gear and CTD casts, along with predictions from ocean models and satellites

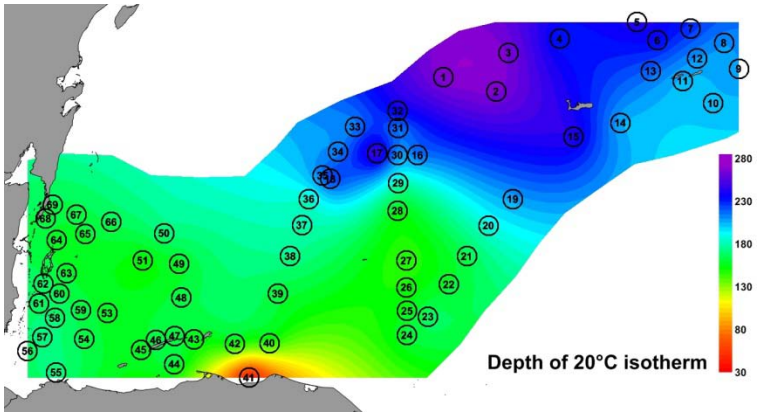
In addition to traditional sampling methods, we plan to collect bluefin tuna larvae for stable isotope analysis and aging studies. In addition, we will collect depth-stratified samples in the western Gulf of Mexico, during the late May peak in spawning, to investigate larval ecology and dispersal

Stations sampled during 2011 spring cruise, with sea surface height also shown



Sampling methods and oceanographic conditions from spring 2012 cruise





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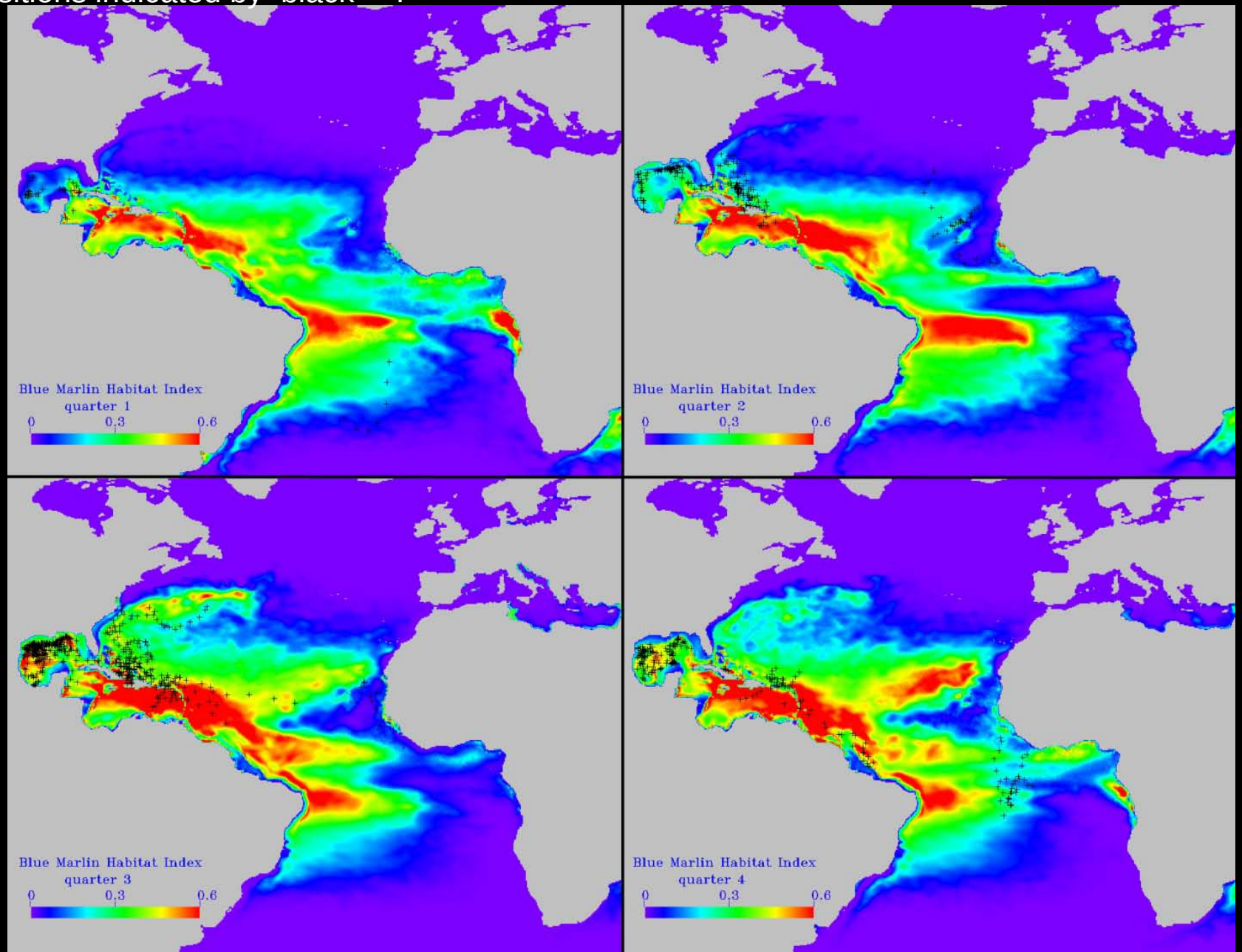
Habitat Assessment Improvement Plan

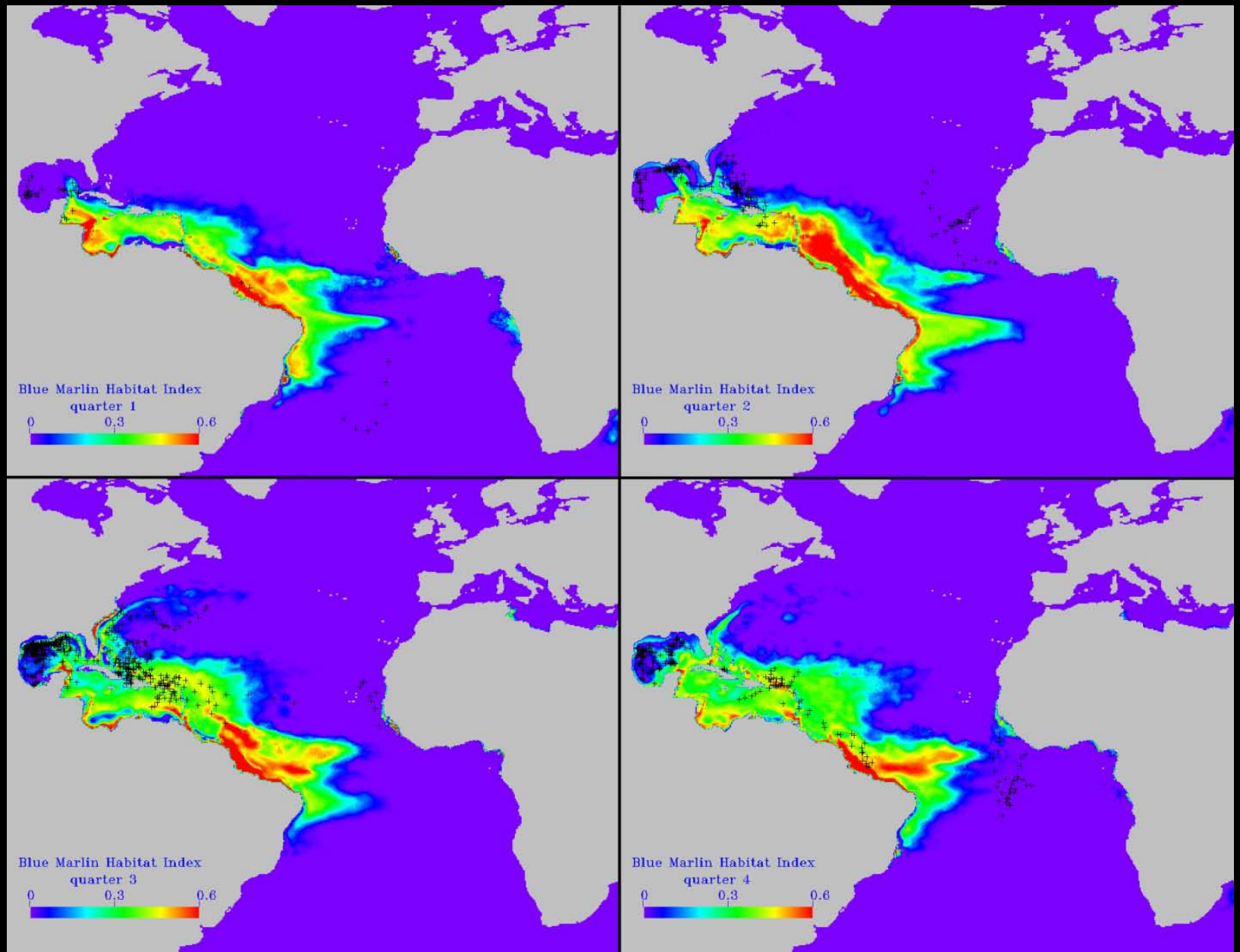
- ***Primary Investigators:*** Michael J. Schirripa (SEFSC), Patrick Lehodey (CLS, France), Eric Prince (SEFSC) and Jiangang Luo (UM-RSMAS)

- ***Objectives:*** Model the habitat of Atlantic blue marlin using an approach developed for a Spatial Ecosystem And Populations Dynamics Model (SEAPODYM). The model is calibrated and evaluated using fishing data and electronic tagging data. The results will be useful for CPUE standardization.

Seasonal avg. distribution of blue marlin feeding habitats from SEAPODYM model simulation of optimal feeding temperature and DO threshold T_a= 27.5 ^{o}C and DO threshold Ô=3.0 ml/L. Tag positions indicated by black '+'.



Seasonal average distribution of blue marlin spawning habitats from SEAPODYM model simulation of optimal spawning temperature T_0= 27.25 ^{o}C. Tag positions indicated by black '+'.



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Habitat Assessment Improvement Plan FY2012 Proposal

- ***Problem:***

  The SEAPODYM model did not do a very good job of capturing the OMZ effect because of the way it deals with fish distribution at depth.

- ***Objectives:***

  This project would use an individual based model (IBM) to more explicitly model fish distribution at depth. Unlike SEAPOSYM, the IBM should be more able to capture to crowding of fish at the surface of the OMZ.

NOAA Sponsored BFT Research

Direct contribution to GBYP:

- 2011 $175,000
- 2012 TBD (~$225,000)

External funding- Bluefin Research Program Grants

- 2011 $510,000 Bluefin Research Grants
- 2011 $506,000 Juvenile BFT tagging contract UMASS
- 2012 $730,000 Bluefin Research Grants

Internal funding (Southeast Fisheries Science Center)

- Expanded observer coverage (GOM bluefin spawning season)
- Weak-hook study
- GOM LL release mortality study (on going)
- Pilot biological sampling program (on going)
- Adaptive larval sampling

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Additional Details on FY11 Funding

- Roughly $510K was made available to fund extramural research (e.g. genetic studies, tagging etc.)
- While a number of proposals were highly ranked by the reviewers, the available funds permitted supporting only the top 4 ranked proposals which included:
  - ‘Biological Sampling Atlantic Bluefin Tunas' - Lutcavage
  - 'Application of otolith chemical tracers to assign population of origin in US and Eastern Atlantic bluefin tuna fisheries' – Secor and Rooker
  - ‘Evaluating Population Effects and Management Implications of Mixing between Eastern and Western Atlantic Bluefin Tuna Stocks' - Cadrin and Kerr
  - ‘Genetic Population Structure of Atlantic Bluefin Tuna: Examining Evidence for Subdivision within the Gulf of Mexico’ - Reeb

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Additional Details on FY12 Funding

- Roughly $730K was made available through NOAA grants to fund extramural research (e.g. genetic studies, tagging etc.)

- The response to the Fiscal Year 2012 opportunity includes 8 proposals from 6 research facilities. While a high proportion of these were highly ranked by the reviewers, the available funds permitted supporting only the top 5 ranked proposals. Applicants have been notified.

- **Funding levels for FY13 are not currently known**

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Expanded Experiments in the Gulf of Mexico to Evaluate Bluefin Tuna Bycatch Mitigation Measures in the Yellowfin Tuna Fishery

and

Conduct Tuna Electronic Archival Tagging

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Objectives:

- Improve estimates of precision for weak hook effect on indices of abundance (needed larger sample sizes)
- Evaluate time/effort for BFT to straighten weak hooks (using TDRs)
- Continue ongoing post-release mortality study of BFT (PSATs)
- Facilitate broad deployment of PSATs on YFT for ongoing study

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So far. . .

- 69 of 94 scheduled sets have been completed (~450 hooks/set)
- 73 BFT have been caught
- PSATs have been deployed on 17 BFT
- PSATs have been deployed on 25 YFT

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Biological Sampling Program: Commercial and Recreational fisheries

- Primary Objective – Collect BFT otoliths representative of the fisheries, to permit assignment of stock origin and direct ageing

- Secondary Objectives –
  - collect additional hard parts (spines, vertebrae) from BFT
  - collect reproductive and muscle tissues from BFT/evaluate reproductive status
  - collect biological samples from other tunas

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Biological Sampling Program: Commercial and Recreational fisheries

- The program achieved improved sampling levels in 2011. Reasons for this included:
  - Earlier start
  - Observers were now trained
  - Improved coordination of sampling effort
  - Opportunistic sampling initiated for recreational component (samplers could respond to info on BFT landings)
  - Retention of the most available recreational size category had not been permitted for much of the previous year
  - Large coolers placed at key sites where anglers could leave fish after cleaning
- Improvements could be gained by increased outreach, involvement of dealers/fisherman, collaborations with researchers, etc.

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2010 & 2011 Sampling Results

NMFS-NER Port Biological Sampling Program / REMSA Inc.

Year	No. Fish	OTOs	Spines	Vertebra
2010	160	26	149	18
2011	262	75	196	65
Grand Total	422	101	345	83

Sampled fish landed primarily in Gloucester MA
(North Atlantic Traders)

Small number from other ports

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2010 & 2011 Sampling Results

NMFS Large Pelagics Biological Survey

Year	No. Fish	OTOs	Spines	Vertebra	Gonad
2010	32	13	29	27	13
2011	236	220	219	214	58
Grand Total	268	233	248	241	71

2010: 7 school, 25 large school
2011: 1 young school, 146 school, 70 large school, 18 small med., 1 lrg. med.

Sampled fish landed in Maryland (48%), Massachusetts (31%), Virginia (12%), New Jersey (5%), New York (3%), and Delaware (1%)