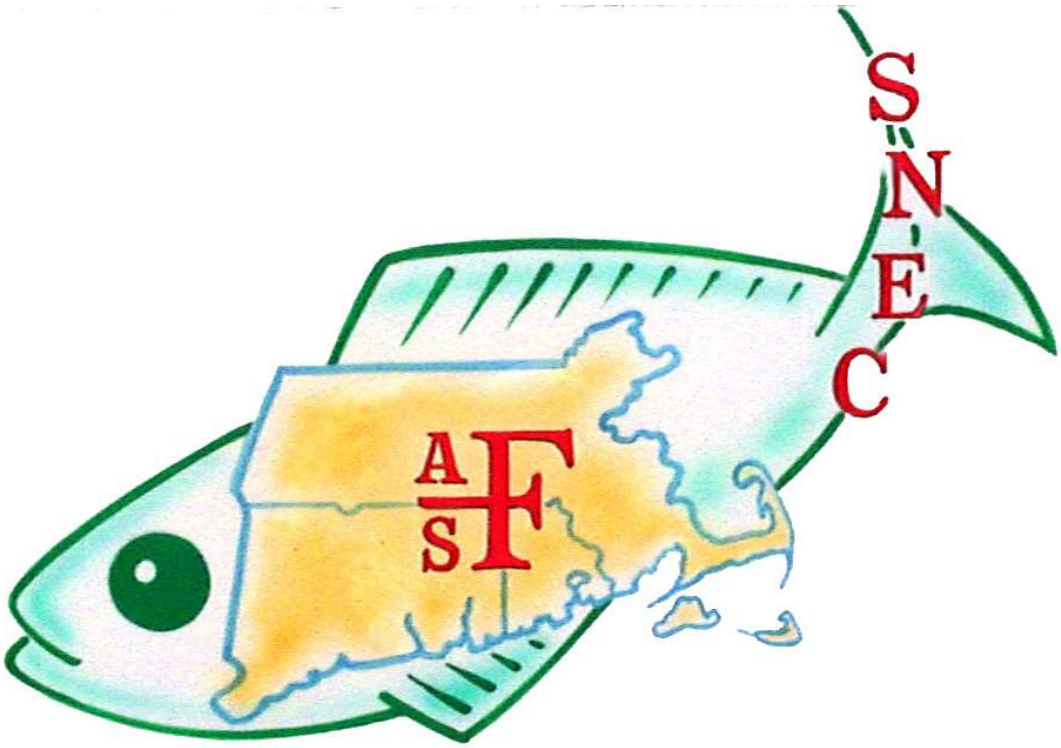
2018 Summer Science Meeting



Southern New England Chapter

American Fisheries Society

June 28, 2018

University of RI, Graduate School of Oceanography Bay Campus
Narragansett, RI

Program

AGENDA FOR THE SNEC AFS 2018 SUMMER SCIENCE MEETING
Thursday June 28, 2018

8:00 – 8:30	***Registration and Coffee***
8:30 – 8:40	**Opening Comments.** Sara Turner, SNEC President
8:40 – 9:00	**Determining Eyeshine in Scallops to Improve Optical Survey Methods.*** Whitman, Sarah V., Kevin D.E. Stokesbury, *School for Marine Science and Technology, University of Massachusetts Dartmouth, New Bedford, MA 02744*
9:00 – 9:20	**Resiliency of Marine Benthic Communities in Sea Scallop Roational Management Areas on Georges Bank.*** Goulet, Melissa, Kevin D.E. Stokesbury, *School for Marine Science and Technology, University of Massachusetts Dartmouth, New Bedford, MA 02744*
9:20 – 9:40	**Conservation, Management, and Trade of Porbeagle (*Lamna nasus*).*** Haugen, Janne[1], Tobey Curtis[2], Gregory Skomal[3], Steven Cadrin[1], [1] *School for Marine Science and Technology, University of Massachusetts Dartmouth, New Bedford, MA 02744*, [2]*NOAA National Marine Fisheries Service, Silver Springs, MD,* [3]*MA Division of Marine Fisheries, New Bedford, MA 02744*
9:40 – 10:00	**Too Many Haddock Spoil the Tow.** Chosid, David, Michael Pol, *MA Division of Marine Fisheries, New Bedford, MA 02744*
10:00 – 10:20	***Break***

10:20 – 10:40 **Identification of Migration Status and Spawning Phase of Blueback Herring.*** Mouchlianitis, Foivos Alexandros[1], Justin Davis[2], Ganias Konstantinos[1], Eric Schultz[3], [1]*School of Biology, Aristotle University of Thessaloniki, Thessaloniki, Greece*, [2]*CT Department of Energy and Environmental Protection, Old Lyme, CT 06371*, [3]*Department of Ecology and Evolutionary Biology, University of Connecticut, Storrs, CT 06269*

10:40 – 11:00 **Age Structure and Recruitment of Atlantic Sturgeon (*Acipenser oxyrinchus*) and Shortnose Sturgeon (*Acipenser brevirostrum*) in the Cooper River, South Carolina.*** Ruddle, Victoria[1,2], Walter Bubley[3], Chad Holbrook[3], Gorka Sancho[1], Virginia Shervette[4], [1]*College of Charleston, Charleston, SC*, [2]*US Fish and Wildlife Service, Hadley, MA 01035,* [3]*South Carolina Department of Natural Resources, Charleston, SC,* [4]*University of South Carolina, Aiken, SC*

11:00 – 11:20 **Striped Bass Movement Ecology and Management in Massachusetts.** Gahagan, Benjamin[1], William Hoffman[1], Micah Dean[1], Adrian Jordaan[2], Andrew Whiteley[3], [1]*MA Division of Marine Fisheries, Gloucester, MA 01930,* [2]*University of Massachusetts Amherst, Amherst MA 01003,* [3]*University of Montana, Missoula, MT 59812*

11:20 – 11:40 **Multifactorial Analysis of Early-Stage American Shad Feeding Ecology in the Hudson River Estuary.** Schultz, Eric T.[1], Michael G. Smircich[1], David L. Strayer[2], [1]*Unversity of Connecticut, Storrs, CT 06269*, [2]*Cary Institute of Ecosystem Studies, Millbrook, NY 12545*

11:40 – 12:20 ***Awards and Business Meeting***

12:20 – 13:10 ***Lunch***

13:10 – 14:10 **Keynote Presentation: Bridging the Salt Gap – Finding Common Ground in Fisheries from Land to Sea.** Limburg, Karin E., *State University of New York College of Environmental Science and Forestry, Syracuse, NY 13210*

14:10 – 14:30 **Spawning Displacement Predicts Fine-Scale Genetic Differentiation.** Golden, Heidi[1], Cameron MacKenzie[2], Linda Deegan[2], Mark Urban[1], [1]*University of Connecticut, Storrs, CT 06269*, [2]*Woods Hole Research Center, Falmouth, MA 02540*

14:30 – 14:50 **Atlantic Tuna Spawning off the Northeast United States.** Richardson, David[1], Katey Marancik[1], Christina Hernandez[2], Elisabeth Broughton[3], Harvey Walsh[1], [1]*NOAA Northeast Fisheries Science Center, Narragansett, RI 02882*, [2]*Woods Hole Research Center, Falmouth, MA 02540,* [3]*NOAA Northeast Fisheries Science Center, Woods Hole, MA 02543*

14:50 – 15:10 ***Break***

15:10 – 15:30 **Larval Habitat Suitability for Atlantic Bluefin Tuna Spawned in the Slope Sea.*** Hernandez, Christina[1], David Richardson[2], Irina Rypina[3], Ke Chen[3], Larry Pratt[3], Joel Llopiz[3], [1]*Woods Hole Research Center, Falmouth, MA 02540*, [2]*NOAA Northeast Fisheries Science Center, Narragansett, RI 02882,* [3]*Woods Hole Oceanographic Institution, Woods Hole, MA 02543*

15:30 – 15:50 **Examining Sea Star Dynamics in Dense Sea Scallop Beds in the Nantucket Lightship Closed Area.*** Lego, Craig A., N. David Bethoney, Kevin D.E. Stokesbury, *School for Marine Science and Technology, University of Massachusetts Dartmouth, New Bedford, MA 02744*

15:50 – 16:10 **Effects of Climate Change on Winter Flounder and its Impacts on Fisheries in Narragansett Bay.*** Langan, Joseph, Jeremy

Collie, *University of Rhode Island Graduate School of Oceanography, Narragansett, RI 02882*

16:10 – 16:30 **Comparing the Effects of Climate Change on Thorny Skate (*Amblyraja radiata*) in the Northeast US Shelf Using Trawl and Longline Surveys.** Grieve, Brian[1], Jon Hare[2], [1]*NOAA Northeast Fisheries Science Center, Narragansett, RI 02882*, [2]*NOAA Northeast Fisheries Science Center, Woods Hole, MA 02543*

* Denotes student paper

Abstracts:
Platform Presentations

Too Many Haddock Spoil the Tow. Chosid, David, Michael Pol, *MA Division of Marine Fisheries, New Bedford, MA 02744*

Fisheries in New England targeting the small-bodied whiting (silver hake, *Merluccius bilinearis*) were established in the mid-to-late nineties with exemptions from codend mesh size regulations, time-limited areas, and a requirement to use specialized nets known as raised footrope trawls. Since then, the fishery has become an annual source of income for small fishing operations. Whiting stocks are now abundant but commercial landings are at near lows. Fishermen have repeatedly reported that the availability of whiting have shifted to an earlier season since the formation of the fisheries, and have requested an investigation into the viability of earlier fishery access. Therefore, in 2016-17, we worked with whiting fishermen to conduct experimental fishing within the Small Mesh Area 1 (SMA1) fishery for the two weeks prior to the area's normal opening. Target catch and bycatch abundances and distributions were assessed at the tow, trip, and fishery levels and compared to a 5% bycatch discard threshold. These results were also compared against catches during the open SMA1 fishery. Results indicate that target species were abundant during the experimental season and haddock, the most underutilized and abundant managed species, is the major bycatch component. Bycatch discard ratios were generally lower in the weeks following the experimental fishery. An early area opening relies on flexibility of management thresholds in response to the stock status of abundant bycatch species, such as haddock.

Striped Bass Movement Ecology and Management in Massachusetts. Gahagan, Benjamin[1], William Hoffman[1], Micah Dean[1], Adrian Jordaan[2], Andrew Whiteley[3], [1]*MA Division of Marine Fisheries, Gloucester, MA 01930*, [2]*University of Massachusetts Amherst, Amherst MA 01003,* [3]*University of Montana, Missoula, MT 59812*

Over the past few decades technological and quantitative advances have greatly enhanced the available knowledge about the migration ecology of fishes. However, this knowledge has not been applied to the management of many species. The Massachusetts Division of Marine Fisheries began a large scale acoustic telemetry and genomics project in 2015 with the goal of increasing our understanding of striped bass (*Morone saxatilis*) movement patterns in coastal

Massachusetts and using this information to improve management in state waters and throughout the coastal range of the species. Between July 2015 and September 2016 we implanted Vemco V-16 transmitters in 261 striped bass, with tagging effort split among three size classes in three distinct locations in coastal Massachusetts. Here, we present early results based on acoustic detections of tagged fish between July of 2015 and December of 2017. Over this period, tagged fish were detected from the Piscataqua River on the Maine/New Hampshire Border to the coastal waters off Cape Henry, Virginia. Bass entered all three major spawning estuaries with a majority of tagged fish appearing to belong to the Hudson River population. Inter-annual fidelity to summer aggregation area was high and migratory routes differed among aggregation areas. The initial results of this study suggest that striped bass in coastal Massachusetts are not a homogeneous group and that striped bass may be subject to differential mortality dependent upon migratory destination, route, and timing.

Spawning Displacement Predicts Fine-Scale Genetic Differentiation. Golden, Heidi[1], Cameron MacKenzie[2], Linda Deegan[2], Mark Urban[1], [1]*University of Connecticut, Storrs, CT 06269*, [2]*Woods Hole Research Center, Falmouth, MA 02540*

The distribution of organisms is often dictated by dispersal limitation, yet fine-scale population genetic structure often occurs within species' dispersal capability, such as when strong selection restricts gene flow. We examined fine-scale genetic differentiation in relation to adult migration proclivity in the highly migratory species, Arctic grayling (*Thymallus arcticus*). We found significant within watershed differentiation for larval and adult Arctic grayling in two distinct river systems: the Kuparuk and Oksrukuyik watersheds. Both watersheds consisted of distinct headwater and downstream populations. PIT-tagged adults expressed variation in migration distance, which corresponded to fine-scale neutral genetic differentiation in the Kuparuk watershed. We speculate that movement patterns of spawning adults might have evolved through strong selection within a dynamic riverine fitness landscape.

Resiliency of Marine Benthic Communities in Sea Scallop Rotational Management Areas on Georges Bank.* Goulet, Melissa, Kevin D.E. Stokesbury, *School for Marine Science and Technology, University of Massachusetts Dartmouth, New Bedford, MA 02744*

The implementation of rotational management of the Atlantic Sea Scallop (*Placopecten magellanicus*) fishery requires information on the effects dredging has on the marine benthic ecosystem. I propose to examine the effects of scallop fishing on the benthic communities of Georges Bank using a Before-After Control-Impact (BACI) environmental study. The substrate

composition, species abundance, and species diversity of an area unimpacted by scallop fishing in Closed Area II (CAII), USA will be compared to an impacted area in ICJ Line Closure (C1), Canada using the our drop camera survey. CAII has been closed to mobile fishing gear since 1994. C1 was voluntarily closed by the Canadian industry from January 1, 2014 to June 1, 2015 then open to extensive harvest. The two areas are directly adjacent to each other on either side of the hague line and have similar substrate composition of mostly gravel/cobble. Species diversity will be measured by the number of taxonomic categories present and species abundance by the number of individuals in each category. This research will address the hypothesis that in a dynamic environment, if management reflects the natural perturbations of the environment, then the benthic community should be similar to that found in a permanently closed area.

Comparing the Effects of Climate Change on Thorny Skate (*Amblyraja radiata*) in the Northeast US Shelf Using Trawl and Longline Surveys. Grieve, Brian[1], Jon Hare[2], [1]*NOAA Northeast Fisheries Science Center, Narragansett, RI 02882*, [2] *NOAA Northeast Fisheries Science Center, Woods Hole, MA 02540*

Climate change has been shown to impact marine fish communities. With low populations, long reproduction times, and a rapidly warming habitat, thorny skate (*Amblyraja radiata*) could be particularly vulnerable. To examine this possibility, we used a two-stage GAM to project future thorny skate abundances under two different climate scenarios. Results were heavily impacted by survey methodology of the input data. Models trained with the NOAA Bottom Trawl Survey projected a decrease in abundance of 73%-77% in the Gulf of Maine and Georges Bank under RCP 8.5. With aggressive mitigation (RCP 4.5), these decreases could be reduced to 44%-51%. Models trained with a short-term longline survey indicated that thorny skate abundance would be reduced 6% under RCP 4.5 and 33% under RCP 8.5 with large seasonal variation. There are substantial methodological differences between the two datasets, including capture technique and efficiency, habitat type surveyed, and spatiotemporal coverage. This underscores the importance of continued, methodologically-diverse surveys on the Northeast US continental shelf. Our results indicate that climate change will continue to threaten thorny skate populations, and should be considered in future Endangered Species Act decisions.

Conservation, Management, and Trade of Porbeagle (*Lamna nasus*).* Haugen, Janne[1], Todey Curtis[2], Gregory Skomal[3], Steven Cadrin[1], [1]*School for Marine Science and Technology, University of Massachusetts Dartmouth, New Bedford, MA 02744*, [2]*NOAA,* [3]*MA Division of Marine Fisheries, New Bedford, MA 02744*

The decline of many of the worlds' shark populations, which can be attributed to overfishing, has prompted substantial efforts by some countries to improve shark management and conservation over the last two decades. The porbeagle (*Lamna nasus*), which is a shark species with almost a century of exploitation in the North Atlantic, is a good example of such efforts. Due to the life history characteristics of porbeagle, which include slow growth and low reproductive rates, it is extremely vulnerable to overfishing and recovery of the depleted populations are projected to span several decades. To evaluate how these recent efforts have influenced the porbeagle populations in the North Atlantic, we reviewed: 1) international fishery management and conservation objectives; 2) management and conservation actions; 3) market factors; and 4) international trade of porbeagle. After the porbeagle was listed in Appendix II of the Convention on International Trade in Endangered Species in 2013, commercial trade declined, but it is still traded in low volumes for exhibition, scientific, educational, and commercial purposes. Our results indicate that the most valuable conservation and management action for North Atlantic porbeagle has been the stock assessment, since it has been the basis for several other conservation and management decisions. Recommendations for future research include the collection of additional data that will be directly used in future stock assessments, such as bycatch and discards of porbeagle. This will reduce uncertainties in stock assessments and ultimately improve management and conservation of porbeagle.

Larval Habitat Suitability for Atlantic bluefin tuna spawned in the Slope Sea.* Hernandez, Christina[1], David Richardson[2], Irina Rypina[3], Ke Chen[3], Larry Pratt[3], Joel Llopiz[3], [1]*Woods Hole Research Center, Falmouth, MA 02540*, [2]*NOAA Northeast Fisheries Science Center, Narragansett, RI 02882,* [3]*Woods Hole Oceanographic Institution, Woods Hole, MA 02543*

Atlantic bluefin tuna (ABT) is currently managed using two stocks, differentiated by their spawning locations in the Mediterranean Sea and the Gulf of Mexico. Recent evidence of spawning in the Slope Sea raises questions about the population dynamics of ABT. This study investigates the distribution and suitability of larval habitat in the Slope Sea through both empirical and modeling techniques. Larval collections from 2013 and 2016 provide data on the distribution of ABT larvae in this region, as well as otoliths for growth analysis. Preliminary results indicate that in 2016, Slope Sea larvae (n=30) and Gulf of Mexico larvae (n=138) grew at similar rates. Larval dispersal modeling was performed in the high-resolution MABGOM2 model to estimate spawning locations of collected larvae from 2013. Backwards particle tracking indicates that all larvae collected in 2013 in the Slope Sea were spawned there. We also performed a region-wide individual-based approach to mapping optimal spawning locations,

according to three constraints: (1) particles are released at SST between 23 and 28 degC, (2) mean SST of the 25-day trajectory must be between 23 and 28 degC, and (3) the 25-day trajectory must remain in the Slope Sea domain. This approach reveals that optimal spawning habitat is located near the shelf break at the northern edge of the Mid-Atlantic Bight and to the east of Georges Bank. Together, this body of evidence further supports that the importance of ABT spawning in the Slope Sea cannot be dismissed without further study.

Effects of Climate Change on Winter Flounder and its Impacts on Fisheries in Narragansett Bay. Langan, Joseph, Jeremy Collie, *University of Rhode Island Graduate School of Oceanography, Narragansett, RI 02882*

Winter flounder (*Pseudopleuronectes americanus*) has historically supported large commercial and recreational fisheries as a dominant finfish in the Narragansett Bay, Rhode Island ecosystem. However, its abundance has declined to an all-time low during the past three decades. As a cold-water, estuarine-dependent species, winter flounder has been hypothesized to experience poor recruitment due to increased predation related to warming winters. Through this mechanism, climate change, in addition to past harvest pressure, is thought to be responsible for this population decline. While there are other stressors that could impact winter flounder survivability at different points in its life cycle, there has yet to be a comprehensive assessment of such factors or how they may interact with exploitation and/or environmental change. This work collates multiple long-term data sets to perform key factor analysis with structural equation modeling. We seek to identify the life-cycle stages at which winter flounder experience increased mortality and identify stressors, including harvest, climate change, predation, and pollution, that best explain this decreased survival. Preliminary results suggest that the key life stages are the first six months and second winter of life, indicating that a suite of factors is likely driving the productivity of this population. This knowledge will be used to build an understanding of life stage-specific mortality and its drivers in order to evaluate if adaptive fishery management methods could enhance survival and ultimately determine the feasibility of recovering one of Narragansett Bay's most important fish species.

Examining Sea Star Dynamics in Dense Sea Scallop beds in the Nantucket Lightship Closed Area.* Lego, Craig A., N. David Bethoney, Kevin D.E. Stokesbury, *School for Marine Science and Technology, University of Massachusetts Dartmouth, New Bedford, MA 02744*

In recent years there have been large recruitments of Atlantic sea scallops (*Placopecten magellanicus*) in the Nantucket Lightship Closed Area (NLCA) on Georges Bank. In 2014, the

abundance of scallops in this area was the highest ever observed in our drop camera survey. Predatory sea stars, Asterias spp., are found in high densities in the NLCA but the abundance declined during an abnormally warm winter in 2012. This may have coincided with the start of the extreme recruitment event of scallops observed in 2014. These aggregations of extremely large scallop abundances are still present, but their effect on the abundance, distribution and size of predatory sea stars has not been studied. Optical data from 2012 to 2018 will be used to calculate a size specific assessment of spatial and temporal distributions as well as density and abundance estimates for sea scallops and sea stars. The dynamics of Asterias spp. in these areas of extremely high scallop abundance and the small-scale predator-prey interactions within the NLCA will be examined with a nearest neighbor analysis. Understanding the reaction of predatory sea stars to high abundances of scallops in the field is important both ecologically and for management decisions in the future, as this relationship directly affects the natural mortality rates of sea scallops.

Bridging the Salt Gap – Finding Common Ground in Fisheries from Land to Sea. Limburg, Karin E. (keynote presenter), *State University of New York College of Environmental Science and Forestry, Syracuse, NY 13210*

Despite the perception that inland and marine fisheries operate in different arenas, commonalities exist. (1) Fish communities are structured in somewhat similar fashion, although the spatial scales of interactions may differ. (2) Fishes move to complete their life histories; movements are more readily observed in inland waters, but new tools are making it possible to track marine movements as well. (3) Climate change exerts similar pressures in terms of changing biophysical properties. (4) Anthropogenic threats rank high among pressures.

Nevertheless, one should not ignore differences. Physical constraints vary in terms of basin morphometry, mixing, and flow regimes. Watershed influences may be more readily apparent in freshwater ecosystems, but scaling rules may help to reduce the disparities. Finally, one should ask if there are inherently different "management cultures" in inland vs. marine fisheries, and what drives those. Coming together and recognizing common threats and opportunities can help to build a stronger, respect-all-salinities professional community.

Identification of Migration Status and Spawning Phase of Blueback Herring.* Mouchlianitis, Foivos Alexandros[1], Justin Davis[2], Ganias Konstantinos[1], Eric Schultz[3], [1]*School of Biology, Aristotle University of Thessaloniki, Thessaloniki, Greece*, [2]*CT Department of Energy and*

Environmental Protection, Old Lyme, CT 06371, [3]*Department of Ecology and Evolutionary Biology, University of Connecticut, Storrs, CT 06269*

In anadromous fish species it is essential to distinguish the uprunners from the downrunners to accurately estimate parameters of their reproductive biology, such as the spawning migration period, the spawning period, the spawning frequency and the annual fecundity. In species that lack demarcated spawning grounds - like the blueback herring (*Alosa aestivalis*) at Connecticut River - the identification of the migration status is challenging. However, histological markers could provide such information (e.g. spent ovaries correspond to downrunners) along with the spawning phase of each fish sampled (pre-spawner or active spawner). Ovarian histological slides were prepared for 167 blueback females caught during their spawning period and were scanned. The inspection of the digital photomicrographs revealed the presence of post ovulatory follicles (POFs) throughout all phases of spawning cycle. In that respect, all individuals that lacked POFs were assigned as pre-spawners and the ones with POFs as active spawners. The reliable distinction of the migration status and the spawning phase of each female offer the opportunity to accurately estimate the annual fecundity at both individual and population level.

Atlantic Tuna Spawning Off the Northeast United States. Richardson, David[1], Katey Marancik[1], Christina Hernandez[2], Elisabeth Broughton[3], Harvey Walsh[1], [1]*NOAA Northeast Fisheries Science Center, Narragansett, RI 02882*, [2]*Woods Hole Research Center, Falmouth, MA 02540,* [3]*NOAA Northeast Fisheries Science Center, Woods Hole, MA 02543*

Atlantic bluefin tuna are generally depicted as having two spawning grounds, one in the Gulf of Mexico and the other in the Mediterranean Sea. However, in 2013 early-stage bluefin tuna larvae were collected during opportunistic sampling in the Slope Sea off the northeast United States, greater than 2000 km from the Gulf of Mexico. Larval abundances during the 2013 Slope Sea sampling exceeded levels in the Gulf of Mexico. These larval collections, when combined with electronic tagging data and reproductive studies, were consistent with size-structured spawning across a wide area in the western Atlantic, a life history model first proposed in the late 1950s. Here we present the results of further sampling in the Slope Sea in 2016. Larval bluefin tuna abundances during the 2016 sampling were similar to the 2013 sampling, and again indicated that the Slope Sea is an important western Atlantic spawning ground. Furthermore, we will present the results of an examination of archived samples housed at the Harvard Museum of Comparative Zoology. One definitively identified and three tentatively identified bluefin tuna early juveniles (< 40 mm) were found in samples collected in the Slope Sea in 1976. Overall, these updated results highlight the importance of continuing research into bluefin tuna spawning in the Slope Sea, and the need to incorporate this additional spawning ground in the development of modelling and population structure studies.

Age Structure and Recruitment of Atlantic Sturgeon (*Acipenser oxyrinchus*) and Shortnose Sturgeon (*Acipenser brevirostrum*) in the Cooper River, South Carolina.* Ruddle, Victoria[1,2], Walter Bubley[3], Chad Holbrook[3], Gorka Sancho[1], Virginia Shervette[4], [1]*College of Charleston, Charleston, SC*, [2]*US Fish and Wildlife Service, Hadley, MA 01035,* [3]*South Carolina Department of Natural Resources, Charleston, SC,* [4]*University of South Carolina, Aiken, SC*

Atlantic sturgeon (*Acipenser oxyrinchus*) and Shortnose sturgeon (*Acipenser brevirostrum*) are anadromous fishes found in coastal rivers from northern Florida to New Brunswick, Canada. Both species are federally protected under the Endangered Species Act. In South Carolina, the damming of the Santee-Cooper River system in the mid-20th century significantly altered sturgeon populations. In order to clarify the current distribution and demography of sturgeon in the Santee-Cooper system, the South Carolina Department of Natural Resources and the Army Corps of Engineers developed a baseline age structure of both species populations. The second marginal pectoral fin ray was validated in hatchery-raised Atlantic Sturgeon, and evaluated as a new ageing technique for both species. There was no significant difference between side sampled (left vs. right pectoral fins) in Atlantic sturgeon (n = 47, t = 0.000, p = 1.00) and Shortnose sturgeon (n = 48, t = 1.1985, p = 0.2367). Shortnose sturgeon sampled were estimated to be between 13 to 41 yrs old (N = 39) and Atlantic sturgeon sampled were estimated to be between 3 to 21 yrs old (N = 9). The range of age classes observed in Shortnose sturgeon sampled suggests that either successful reproduction has occurred in the recent past (13 - 17 years ago), or reproductive adults immigrate to the Cooper River to spawn. The limited number of Atlantic sturgeon sampled suggests that the species does not have a resident population in the Cooper River.

Multifactorial Analysis of Early-Stage American Shad Feeding Ecology in the Hudson River Estuary. Schultz, Eric T.[1], Michael G. Smircich[1], David L. Strayer[2], [1]*Unversity of Connecticut, Storrs, CT 06269*, [2]*Cary Institute of Ecosystem Studies, Millbrook, NY 12545*

Changes in feeding success and diet composition of early-stage fishes reflect population stressors and ecosystem processes. We analyzed the feeding ecology of young American Shad in the Hudson River, where population declines have been attributed in part to invasive zebra mussels. We hypothesized that zebra mussels compete for food with young shad. In archived specimens collected in a comprehensive monitoring program over 25 years, we evaluated gut fullness, condition, and prey taxa. We analyzed these data using regression analyses, in which predictors included variables representing ecosystem production, prey availability, competition, and abiotic factors. Higher feeding success was associated with more abundant bacteria or

phytoplankton, and more abundant copepod prey; success was reduced by feeding of zebra mussels. Salinity, temperature and freshwater flow also affected feeding success. Feeding on copepods was associated with more abundant bacteria, whereas feeding on cladocerans was associated with more cladocerans. Feeding on amphipods occurred when cladocerans were scarce. The impact of zebra mussels on feeding of young shad, via reduction of phytoplankton-mediated production of zooplankton, may be moderated by alternative bacterial production.

Determining Eyeshine in Scallops to Improve Optical Survey Methods.* Whitman, Sarah V., Kevin D.E. Stokesbury, *School for Marine Science and Technology, University of Massachusetts Dartmouth, New Bedford, MA 02744*

Most scallop fisheries are surveyed using dredges modified from the commercial dredge. These surveys have the limitation of varying efficiency and selectivity, and are generally used as an index. New alternative surveys have successfully used visual samples of the seafloor, either video or digital still images, to provide estimates of abundance using density. However, this technique is limited to scallops that are easily identifiable on the seafloor, but many scallops are cryptic. Eyes of some vertebrates and invertebrates produce a detectable reflection called eyeshine. Scallops have many complex eyes located on their mantle that use a mirror composed of guanine crystals to focus light onto the retinas. Here we examine the possibility of detecting eyeshine in scallops. First, we will examine different types of LED's (light-emitting diodes) with a spectrometer to identify specific wavelength bands. Then we will determine which wavelength bands are reflected as detectible eyeshine in the sea scallop (*Placopecten magellanicus*). We will then expand this examination to other scallop species *Argopecten irradians, Pecten maximus*, and *Chlamys islandica*, which are more cryptic than the sea scallop. The detection of eyeshine could improve the identification methods of cryptic scallops in video surveys making this survey technique more widely accessible.