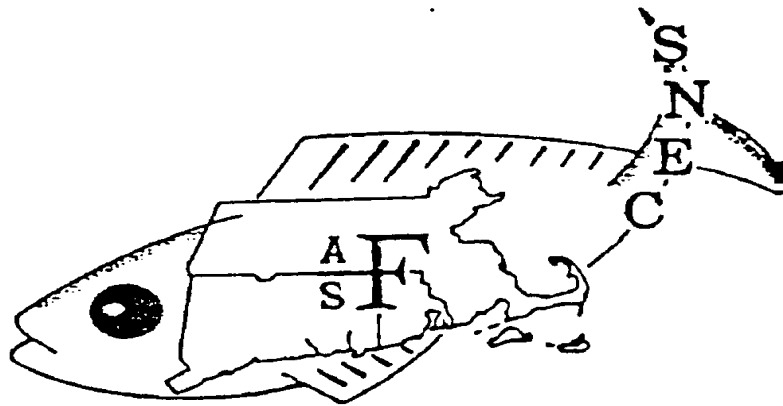


**Southern New England Chapter**

**American Fisheries Society**

**2007 Winter Meeting**



[www.sneec-fisheries.org](http://www.sneec-fisheries.org)

**January 10, 2007**

Connecticut Department of Environmental Management  
Old Lyme, CT

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# Program

## AGENDA FOR SNEC AFS 2007 WINTER MEETING WEDNESDAY JANUARY 10, 2007

- 8:30-9:00      **Registration and Coffee**
- 9:00-9:10      **Opening Comments.** Ruth Haas-Castro, SNEC President
- 9:10-9:30      **Diet and prey selectivity of walleye pollock in the northern Gulf of Alaska.** Charles F. Adams<sup>1,2</sup>, Alexei I. Pinchuk<sup>1</sup>, and Kenneth O. Coyle<sup>1</sup>,  
<sup>1</sup>University of Alaska Fairbanks, Fairbanks, AK, <sup>2</sup>School for Marine Science and Technology, University of Massachusetts Dartmouth, New Bedford, MA, cadams@umassd.edu
- 9:30-9:50      **Determining selectivity and efficiency of ventless traps for American Lobster (*Homarus americanus*).**\* Brent Courchene and Kevin D. E. Stokesbury, School for Marine Science and Technology, University of Massachusetts Dartmouth, New Bedford, MA, g\_bcourchene@umassd.edu
- 9:50-10:10     **Estimating spatially specific abundance and size distribution of skate in the Northwest Atlantic Ocean.\*** Alyssa M. MacDonald and Kevin D. E. Stokesbury, Department of Fisheries Oceanography, University of Massachusetts Dartmouth, New Bedford, MA, alyssa.macdonald@gmail.com
- 10:10-10:30    **Break**
- 10:30-10:50    **Dissolved oxygen tolerance in Atlantic killifish (*Fundulus heteroclitus*).** Sarah M. Winnicki, Diane Nacci, Denise Champlin, Laura Coiro, and Thomas McCrory, U.S. Environmental Protection Agency, Narragansett, RI, winnicki.sarah@epamail.epa.gov
- 10:50-11:10    **Shark essential fish habitat.** Camilla T. McCandless and Nancy E. Kohler, National Marine Fisheries Service, Narragansett, RI, cami.mccandless@noaa.gov

- 11:10-11:30 **Distribution and abundance of American Lobster (*Homarus americanus*) larvae in Buzzards Bay Massachusetts.\*** Peter J. Milligan, Jefferson Turner, and Kevin D. E. Stokesbury, School for Marine Science and Technology, University of Massachusetts Dartmouth, New Bedford, MA, [u\\_pmilligan@umassd.edu](mailto:u_pmilligan@umassd.edu)
- 11:30-11:50 **Comparison of common thyroid morphology with description of thyroid lesions in three species of wild sharks from the northwestern Atlantic, the blue *Prionace glauca*, shortfin mako *Isurus oxyrinchus* and thresher *Alopias vulpinus*, sharks.** Joanna D. Borucinska, Department of Biology, University of Hartford, West Hartford, CT, [borucinsk@hartford.edu](mailto:borucinsk@hartford.edu)
- 11:50-12:10 **Examining spawning behavior and habitat use of stocked river herring: a preliminary analysis of restoration efforts using radiotelemetry.\*** Holly Frank<sup>1,2</sup>, Martha Mather<sup>1,2</sup>, Joe Smith<sup>1,2</sup>, Jack Finn<sup>1</sup>, Bob Muth<sup>1</sup>, Kristen Ferry<sup>3</sup>, and Michael Armstrong<sup>3</sup>, <sup>1</sup>Department of Natural Resources Conservation, University of Massachusetts Amherst, Amherst MA, <sup>2</sup>Massachusetts Cooperative Fish and Wildlife Research Unit, USGS-BRD, <sup>3</sup>Massachusetts Division of Marine Fisheries, Gloucester, MA [hfrank@forwild.umass.edu](mailto:hfrank@forwild.umass.edu).
- 12:10-1:00 **Lunch**
- 1:00-1:15 **Award Presentations**
- 1:15-2:00 **Lesia Meng and her work in habitat conservation.** Giancarlo Cicchetti, U.S. Environmental Protection Agency, Narragansett, RI, [cicchetti.giancarlo@epa.gov](mailto:cicchetti.giancarlo@epa.gov)
- 2:00-2:20 **Recent stream restoration projects in Eastern Connecticut utilizing a natural channel design approach.** Brian D. Murphy, Connecticut Department of Environmental Protection, Marlborough, CT, [brian.murphy@po.state.ct.us](mailto:brian.murphy@po.state.ct.us)
- 2:20-2:40 **Mapping surficial substrates and megabenthos along the Northwestern Atlantic continental shelf with underwater video surveys.\*** Bradley P. Harris, Jacob I. Nogueira, Michael C. Marino II, and Kevin D. E. Stokesbury, Department of Fisheries Oceanography, University of Massachusetts Dartmouth, New Bedford, MA, [bharris@umassd.edu](mailto:bharris@umassd.edu)
- 2:40-3:00 **Ontogenetic change in feeding of juvenile sandbar sharks, *Carcharhinus plumbeus*, in the Delaware Bay nursery.\*** David W. McElroy<sup>1</sup>, Camilla T. McCandless<sup>2</sup>, and Nancy E. Kohler<sup>2</sup>, <sup>1</sup>Department of Fisheries, Animal and Veterinary Science, University of Rhode Island, Kingston, RI, <sup>2</sup>National Marine Fisheries Service, Narragansett, RI, [wmce3776@postoffice.uri.edu](mailto:wmce3776@postoffice.uri.edu)

3:00-3:20      **Interaction between the sea scallop and multispecies fisheries: avoiding yellowtail flounder bycatch in Closed Area II of Georges Bank.\***  
Michelle Schenk and Kevin D. E. Stokesbury, Department of Fisheries  
Oceanography, University of Massachusetts Dartmouth, New Bedford, MA,  
michelle.schenk@gmail.com

\* Denotes student paper

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## ABSTRACTS

### **Diet and prey selectivity of walleye pollock in the northern Gulf of Alaska.**

Charles F. Adams<sup>1,2</sup>, Alexei I. Pinchuk<sup>1</sup>, and Kenneth O. Coyle<sup>1</sup>, <sup>1</sup>University of Alaska Fairbanks, Fairbanks, AK 99775, <sup>2</sup>School for Marine Science and Technology, University of Massachusetts Dartmouth, 706 South Rodney French Blvd, New Bedford, MA 02744, 508-910-6386, cadams@umassd.edu

The commercial fishery for walleye pollock, *Theragra chalcogramma*, accounts for almost half the total quantity of domestic US landings, and about 20% of total value. As a predator with a biomass averaging 1 million tons in the Gulf of Alaska (GOA) alone, pollock may remove a considerable amount of prey from the ecosystem. Yet relatively little information is available on the diet and prey selectivity of pollock in the northern GOA. Stomachs of midwater trawled adult pollock were collected in April, August and November 2003 in the northern GOA. Euphausiids were the dominant prey in April, averaging 59% by number and 70% by weight. Euphausiids persisted as the dominant prey in August, averaging 84% by number and 95% by weight. Decapods were the dominant prey item in November. This was primarily due to the shrimp *Pandalus borealis*, which averaged 77% by number and 96% by weight. Stomach contents were also compared with available prey fields in April and August using chi-square based resource selection statistics. This analysis revealed significant differences between the environmental and dietary distributions of prey types in both months. Additional analysis found significant selection for euphausiids over all other categories of available zooplankton. Amongst euphausiids, there was significant selection for *Thysanoessa inermis* in April and *T. spinifera* in August.

### **Determining selectivity and efficiency of ventless traps for American Lobster (*Homarus americanus*).**

Brent Courchene and Kevin D. E. Stokesbury, School for Marine Science and Technology, 838 South Rodney French Blvd, New Bedford, MA 02744, 508-910-6367, g\_bcourchene@umassd.edu

At its height in the mid 1990 s, the American Lobster (*Homarus americanus*) resource in Buzzards Bay, Massachusetts was a productive fishery with average landings worth \$7,000,000US. However by 1997 landings had declined 50% below the time series mean, forcing the fishery offshore. The Buzzards Bay lobster resource was monitored using both cooperative trap sampling and trawl surveys. With the shift of fishing effort offshore cooperative trap sampling was no longer feasible while lobster habitat and avoidance behavior impact trawl survey efficiency. Therefore the state of Massachusetts began a ventless trap survey in 2004. To calibrate the ventless trap survey we used SCUBA to conduct transect surveys, estimating absolute lobster abundance and distribution on the sea floor. Lobsters along transects were collected, measured, tagged, and released. A string of

six alternating vented and ventless traps were deployed to compare absolute density estimates of transects to the relative density estimates of the traps using mark recapture techniques. Estimates of density and trap efficiency varied greatly between study sites. Lobsters collected along transects differed in both average carapace length (55mm) and male:female ratio (1.04) compared to the average carapace length (77mm) and male:female ratio (1.67) of lobsters collected in traps. Ventless traps captured six times as many lobsters as vented traps (1300 total lobsters).

### **Estimating spatially specific abundance and size distribution of skate in the Northwest Atlantic Ocean.**

Alyssa M. MacDonald and Kevin D. E. Stokesbury, Department of Fisheries Oceanography, University of Massachusetts Dartmouth, 838 South Rodney French Blvd, New Bedford, MA 02744, 508-910-6340, alyssa.macdonald@gmail.com

Presently, the federal fisheries management plan for the skate complex (*Dipturus*, *Raja*, *Leucoraja*, *Malacoraja* and *Amblyraja* spp.) in New England waters is under development. However, data describing the distribution and abundance of skate species is largely composed of bi-catch information from NMFS multispecies trawl surveys. These data are relative, have high uncertainty, and are not temporally or spatially specific. To estimate the abundance and distribution of the skate complex we used the SMAST video survey database. This survey provides a visual census of the continental shelf from Georges Bank to the Mid Atlantic and includes benthic substrates, macro invertebrates, fishes and skates. However, the video and still camera systems employ underwater lights, which may attract or repel skates. The first step towards estimating absolute skate abundance is to quantify the impacts of the sampling platform on skate behavior. We evaluated 287 samples to determine if skates were attracted to or repelled from the pyramid in order to quantify the accuracy and precision of our abundance estimates. This data will support the spatially and temporally specific decisions required to manage the skate complex.

### **Dissolved oxygen tolerance in Atlantic killifish (*Fundulus heteroclitus*).**

Sarah M. Winnicki, Diane Nacci, Denise Champlin, Laura Coiro, and Thomas McCrory, U.S. Environmental Protection Agency, Office of Research and Development, Atlantic Ecology Division, 29 Tarzwell Drive, Narragansett, RI 02882, 401-782-9672, winnicki.sarah@epamail.epa.gov

*Fundulus heteroclitus*, a hardy estuarine fish species, is characterized by resident populations that have adapted to their local conditions. Specifically, *Fundulus* resident to Superfund sites in Massachusetts and Virginia demonstrate an evolved tolerance to local chemical pollutants. It has been proposed (*Ecol. Appl.* 2003 13(2):490) that one trade-off of this rapid adaptation is reduced tolerance to dissolved oxygen (DO). To test this hypothesis, we collected fish from the MA (New Bedford, NBH) and VA (Elizabeth River, ER) sites as well as local uncontaminated reference sites. Progeny of these fish were raised in the lab

for up to 2 months (larval) or one year (adult). Fish were tested repeatedly for their tolerance to DO using a flowing seawater system with survival as an endpoint. Effective concentrations for both adults and larvae were generally lower than 1 mg/L oxygen for periods up to 8 hours. Adult fish were slightly more tolerant to low levels of DO on an hourly basis when compared to the larval fish. In addition, the adult NBH fish were more tolerant to low dissolved oxygen than other adult populations tested. However, in larval fish, further testing of chemically adapted populations need to be conducted to determine a stronger relationship. Therefore, our data do not strongly support the hypothesis that there is a trade-off of reduced tolerance to DO for increased tolerance of chemical contaminants. Alternatively, our data suggests that *Fundulus* adapt to their local environmental conditions.

### **Shark essential fish habitat.**

Camilla T. McCandless and Nancy E. Kohler, USDOC/NMFS/NEFSC, Apex Predators Investigation, 28 Tarzwell Drive, Narragansett, RI 02882, 401-782-3272, cami.mccandless@noaa.gov

The Magnuson-Stevens Fishery Conservation and Management Act defines essential fish habitat (EFH) as “those waters and substrate necessary to fish for spawning, breeding, feeding or growth to maturity.” The National Marine Fisheries Service (NMFS) regulatory interpretation of this Act requires that EFH be described and identified within the U.S. Exclusive Economic Zone for all life stages of each species in a fishery management unit. Shark species managed under the NMFS Final Consolidated Atlantic Highly Migratory Species Fishery Management Plan are found in a variety of habitats and have diverse life history characteristics. Many of these shark species are highly migratory and cover a variety of areas and habitats during their seasonal migrations. Habitat preferences for some species also differ during changes from one life history stage to the next. These differences combined with the paucity of life history information available for many species create unique problems in the determination of shark EFH. These problems will be discussed with reference to the past and current methodology used for designating shark EFH.

### **Distribution and abundance of American Lobster (*Homarus americanus*) larvae in Buzzards Bay Massachusetts.**

Peter J. Milligan, Jefferson Turner, Kevin D. E. Stokesbury, Department of Fisheries Oceanography, University of Massachusetts Dartmouth, 838 South Rodney French Blvd, New Bedford, MA 02744, 508-910-6385, u\_pmilligan@umassd.edu

In waters from southern Cape Cod to eastern Long Island Sound, the population of legal-sized American Lobster (*Homarus americanus*) has fallen almost 90 percent since the boom years of the early 1990s. Many factors including: over fishing, the North Cape oil spill, non point source pollution, shell disease, predation, and global warming have been suggested as possible causes. Lobster early life history information, particularly the temporal and spatial distribution of larvae, is poorly understood hindering the assessment of population changes.

We examined the temporal and spatial distributions of lobster larvae in Buzzards Bay, MA from June to August 2006. Seven stations were sampled weekly with a 1300 micro-meter neuston net. Over 4,000 lobster larvae ranging from stage 1 through stage 4 were collected. Stage 1 larvae were present from June 1-June 21, stage 2 were present from June 1-July 3, stage 3 were present from June 1-July 24, and stage 4 were present from June 6-Aug 17. The four larval stages were present at all seven stations. Based on the preliminary data, larval density was similar to that of earlier studies conducted in 1976-79. This suggests that larval density may not explain the decline in the adult population.

**Comparison of common thyroid morphology with description of thyroid lesions in three species of wild sharks from the northwestern Atlantic, the blue *Prionace glauca*, shortfin mako *Isurus oxyrinchus* and thresher *Alopias vulpinus*, sharks.**

Joanna D. Borucinska, Department of Biology, University of Hartford, West Hartford, CT, 06117, 860-768-4586, borucinsk@hartford.edu

Although sharks are well known to develop goiter in captivity, and histological descriptions of goiter thyroids from sharks were published, little is known about normal variations in thyroid morphology in wild living sharks. This paper describes common histological patterns and lesions encountered in macroscopically normal thyroids collected during the summer months from three species of sharks from the northwestern Atlantic. Thyroids from 22 shortfin mako sharks (*Isurus oxyrinchus*), 24 thresher sharks (*Alopias vulpinus*), and 39 blue sharks (*Prionace glauca*) were examined. All sharks were collected by sports fishing gear between June and August in 2001, 2002 and 2004. Routine, H&E stained paraffin embedded sections were studied by light microscopy. Our results indicate that there is marked variation in histological patterns of thyroid follicles and thyroid stroma among the three different species of sharks, and that there is a minimal variation in morphological patterns within each species. The most common lesions in the examined thyroids included lymphofollicular hyperplasia, and non-suppurative, chronic thyroiditis. In addition, one case of a unique myxosporean infection was found. This study stresses the importance of the knowledge of variations in normal thyroid morphology for a given species of sharks, at any given time of the year and thus their stage of reproductive cycle. Such knowledge is needed for an accurate diagnosis of thyroid diseases including conditions resulting from exposure to endocrine disrupting environmental contaminants.

**Examining spawning behavior and habitat use of stocked river herring: a preliminary analysis of restoration efforts using radiotelemetry.**

Holly Frank<sup>1,2</sup>, Martha Mather<sup>1,2</sup>, Joe Smith<sup>1,2</sup>, Jack Finn<sup>1</sup>, Bob Muth<sup>1</sup>, Kristen Ferry<sup>3</sup>, Michael Armstrong<sup>3</sup>, <sup>1</sup>Department of Natural Resources Conservation, University of Massachusetts Amherst, 140 Holdsworth Way, Amherst, MA, <sup>2</sup>Massachusetts Cooperative Fish and Wildlife Research Unit, USGS-BRD, <sup>3</sup>Massachusetts Division of Marine Fisheries, Annisquam River Marine Fisheries Field Station, 30 Emerson Avenue, Gloucester, MA 01003, 978-766-9384, hfrank@forwild.umass.edu

Trap and transfer programs, which involve trapping adult anadromous river herring (*Alosa aestivalis* and *A. pseudoharengus*) in a donor river and transferring the fish to a recipient river, are commonly employed yet rarely evaluated restoration method. In April 2006, we conducted a radiotagging study to examine: (a) why river herring have not been reestablished in the Ipswich River despite stocking for over a decade, and (b) movement and habitat use of spawning herring. Specifically, we tagged 46 stocked alewives and 18 adult herring that were trapped while naturally moving upstream (Lotek nanotags NTC-6-1, NTC-3-2). Fish movements were tracked with Lotek SRX\_400 receivers placed throughout the lower 20 miles of the Ipswich River. Forty stocked fish were detected by our receivers. Two left our array in <1 day, 22 remained in the lower river for <3 days ( $X = 1.4$  days), 5 stayed in the lower river area for >3 days, and 5 fish were detected primarily in the upper river ( $X = 20$  days). Of the 18 uprunner herring, 4 were in our array of receivers <1 day, 8 stayed in the lower river area ( $X = 9.6$  days), 5 were observed in the mid river ( $X = 8$  days), and only 1 passed over the second dam to the upper river. Both groups of herring spent the most time in the lower river's impounded habitat above the first dam. Movements and habitat use will again be examined in 2007 to see if this habitat results in spawning, egg production, and juvenile outmigrants.

**Lesla Meng and her work in habitat conservation.**

Giancarlo Cicchetti, U.S. Environmental Protection Agency, Atlantic Ecology Division, 27 Tarzwell Drive, Narragansett, RI 02882, 401-782-9620, cicchetti.giancarlo@epa.gov

Lesla Meng worked extensively on habitat conservation throughout her career as a fish ecologist, and her contributions to this field are remarkably wide-ranging. Lesla worked in California and in the Northeastern United States, as well as in the Pacific Islands and the Seychelles. She applied a variety of advanced statistical approaches to data collected with a number of methods including trawls, ichthyoplankton samplers, growth cages, seine surveys, lift nets, drop rings, and camera gear. She worked in particular with suites of native and introduced fishes in California, with winter flounder and estuarine fish communities in the Northeast, and with reef fish communities in the tropics. Lesla published work on fish life history stages from ichthyoplankton to juvenile to adult. The habitats she studied range from highly urbanized estuaries to coral reefs, and include every estuarine habitat along the entire salinity gradient on both coasts. Several of Lesla's projects on both U.S. coasts (and five of her many publications) contributed to her view that the upper reaches of estuaries provide important fish nursery habitat even when severely altered or urbanized. Lesla argued that, given adequate DO, even highly developed urban estuaries can support significant juvenile fish abundances, and that these often-undervalued areas of estuaries need protection. Her ideas have been influential in the coastal and estuarine science and management community, and her data have been directly used in environmental decision-making. Lesla Meng's influences continue to shape our understanding and conservation of fish habitat in a wide variety of ways.

### **Recent stream restoration projects in Eastern Connecticut utilizing a natural channel design approach.**

Brian D. Murphy, Connecticut Department of Environmental Protection, Inland Fisheries Division, Habitat Conservation and Enhancement Program, 209 Hebron Avenue, Marlborough, CT 06447, 860-344-2115, brian.murphy@po.state.ct.us

The CTDEP Inland Fisheries Division has utilized fluvial geomorphology and soil bioengineering concepts, often referred to as “natural channel design”, to stabilize stream channels, reduce bank erosion and to restore instream fish habitats. Two such restoration projects were located on the Blackledge and Hop Rivers in Eastern Connecticut. Streambank instability within a 1,100 foot stretch of the Hop River was a direct result of channel relocation and channelization upstream of the project area that occurred due to past highway construction. Approximately 710 feet of streambank along the Blackledge River had experienced severe channel instability and erosion that was traced back to large flood events in 1973 and 1982. Differences in restoration project designs will be discussed, which include the installation of vortex rock weirs, J-hooks, root wads, coir fascines, livestakes and live brush layering. Rock structures provided for grade control, energy dissipation and flow deflection in restored channels as well as restored instream fish habitats through the creation of scour pools. The Hop River Restoration Project was completed in 2002 for \$158,000, whereas the Blackledge River project was completed at a cost of \$122,000 in 2004. Measures for determining project success included, monitoring of channel cross-sections, fish population sampling and visual assessment of channel and bank stability after storm events. Project designs were tested in October 2005 when both watersheds experienced significant flooding. Albeit still early in the post restoration evaluation process, both projects appear to have developed a stable channel morphology since minimal damage was observed after this major freshet.

### **Mapping surficial substrates and megabenthos along the Northwestern Atlantic continental shelf with underwater video surveys.**

Bradley P. Harris, Jacob I. Nogueira, Michael C. Marino II, and Kevin D. E. Stokesbury, Department of Fisheries Oceanography, University of Massachusetts Dartmouth, 838 South Rodney French Blvd, New Bedford, MA 02744, 508-910-6359, bharris@umassd.edu

Comprehensive assessments of marine ecosystems incorporating abiotic and biotic components, natural and anthropogenic disturbances, including fishery harvests, are being pursued with increasing frequency. Mapping the benthos at appropriate spatial scales is an essential first step, providing a backdrop for assessing fisheries as well as the impacts of environmental change. Presently, the benthos of the Northeastern USA continental shelf are poorly understood. Substrate distribution information relies heavily on geological sampling (e.g. grabs and cores), while megabenthos information is typically derived from by-catch in fisheries surveys. These historical datasets are spatially and temporally inconsistent. Sidescan, and more recently, multibeam sonar methods provide improved sediment and sea floor morphology information but presently little of the continental shelf has been mapped. Further, these methods do not directly sample megabenthos. Beginning in 1999, we

conducted a visual census of surficial substrates and megabenthos based on the distribution of the dominant macroinvertebrate, sea scallops, *Placopecten magellanicus*, using underwater video in a centric, systematic, quadrat survey design. We have examined 172,848 quadrats, viewing >250,000 sq. m of sea floor along 60,000 sq. km of continental shelf. These data were used to map the distributions of surficial substrates and megabenthos, and provide fishery managers spatially explicit sea scallop density and size distribution information.

### **Ontogenetic change in feeding of juvenile sandbar sharks, *Carcharhinus plumbeus*, in the Delaware Bay nursery.**

David W. McElroy<sup>1</sup>, Camilla T. McCandless<sup>2</sup>, Nancy E. Kohler<sup>2</sup>, <sup>1</sup>Department of Fisheries, Animal and Veterinary Science, University of Rhode Island, 20A Woodward Hall, 9 East Alumni Ave, Kingston, RI 02881, <sup>2</sup>Apex Predators Investigation, Narragansett Laboratory, NOAA/NMFS, 28 Tarzwell Dr., Narragansett, RI 02882, wmce3776@postoffice.uri.edu

The sandbar shark, *Carcharhinus plumbeus*, is a common coastal shark along the U.S. Atlantic coast, and it is one of the most heavily exploited shark species. Sandbar sharks use coastal estuaries as nursery areas, and Delaware Bay is one of the largest nursery areas in U.S. waters. Presented here is a portion of a larger feeding ecology study characterizing the diet of common elasmobranchs in the Bay. Sharks were captured using longlines and gillnets throughout the entire bay. Stomachs were everted to collect their contents before releasing the sharks. Stomach contents were identified to the lowest taxon possible, and the diet characterized using several methods to compare three different size classes based on biological characters. A total of 654 of 1,173 sandbar sharks sampled contained food in their stomach. The diet was predominantly composed of teleosts (82% by IRI), with crustaceans (16%) and elasmobranchs (1%) as the other major prey categories. Important teleost prey species included *Brevoortia tyrannus*, *Trinectes maculatus*, *Ophidium marginatum*, *Micropogonias undulatus*, and *Anchoa mitchilli*, by decreasing %IRI value. *Libinia emarginata*, *Ovalipes ocellatus*, and *Callinectes sapidus* are the most important crab species in order of decreasing importance. Neonate sandbar sharks fed to a greater extent on crustaceans, and benthic and smaller fish species. Small juveniles and to a greater degree larger juveniles preyed upon a greater diversity of prey, including larger bodied and more mobile species, as well as beginning to include elasmobranch prey. These changes were significant and progressed toward a diet similar to that reported for adults in the northwest Atlantic.

### **Interaction between the sea scallop and multispecies fisheries: avoiding yellowtail flounder bycatch in Closed Area II of Georges Bank.**

Michelle Schenk and Kevin D. E. Stokesbury, Department of Fisheries Oceanography, University of Massachusetts Dartmouth, 838 South Rodney French Blvd, New Bedford, MA 02744, 508-910-6396, michelle.schenk@gmail.com

Federal law requires fisheries managers to simultaneously maximize biological yield, economic efficiency, and social benefits. Ecosystem based management (EBM) that incorporates complex ecosystem processes requires much more information than is presently available, and most species are modeled and managed individually. However, in the near-term, externalities created when one fishery interacts with another (e.g. bycatch) may be examined to provide a starting point for developing an EBM framework. For example, during 2006 the sea scallop fishery was closed prematurely due to bycatch of yellowtail flounder in the Nantucket Lightship Closed Area and Closed Area II of Georges Bank. We are examining the externalities created by the interactions of spatially-specific scallop management and hard total allowable catch limits for yellowtail flounder. From the perspective of the scallop industry, early closure of the NLCA and CAII fisheries resulted in further uncertainty in management, a race-to-fish, and likely cost the industry millions of dollars. This research will support the explicit integration of biological and socioeconomic objectives relevant to present management issues.