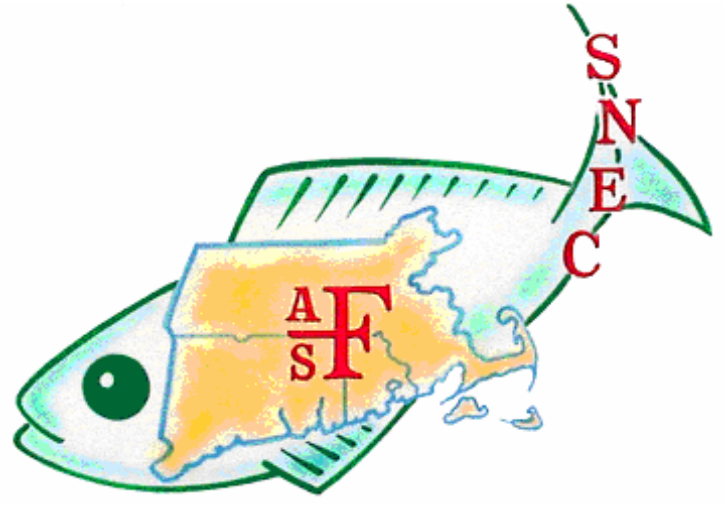
Southern New England Chapter

American Fisheries Society

2015 Winter Meeting



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February 24, 2015 (Rescheduled date)

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

Program

AGENDA FOR SNEC AFS 2015 WINTER MEETING
TUESDAY FEBRUARY 24, 2015

8:30-9:00 ***Registration and Coffee***

9:00-9:10 **Opening Comments.** Heidi Fitzpatrick, SNEC AFS President

9:10-9:30 **Growth, mortality and seasonal hatching of Atlantic Mackerel larvae on the Northeast U.S. Continental Shelf.*** McManus, M. Conor[1,2], Jeremy S. Collie[1], David E. Richardson[3], and Jonathan A. Hare[3], *[1]Graduate School of Oceanography, University of Rhode Island, Narragansett, RI 02882, [2]RPS Applied Science Associates, South Kingston, RI 02879, [3]National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Narragansett, RI 02882*

9:30-9:50 **Using habitat preferences models, ocean forecasts, and cooperative research to avoid River Herring bycatch.** Turner, Sara M.[1], Jonathan A. Hare[1], John Hoey[1], John P. Manderson[2], and David E. Richardson[1], *[1]National Oceanic and Atmospheric Administration, Northeast Fisheries Science Center, Narragansett, RI 02882, [2]National Oceanic and Atmospheric Administration, Northeast Fisheries Science Center, Highlands, NJ 07732*

9:50-10:10 **Abundance and distribution of ichthyoplankton around the Saco River plume in Saco Bay, Maine.*** Bauer, Tracey C. and James A. Sulikowski, *University of New England, Biddeford, ME 04005*

10:10-10:30 **Stock destabilization: Case history of American Shad in the Connecticut River.** Savoy, Tom and Jacque Benway, *Connecticut Department of Energy and Environmental Protection, Fisheries, Marine Fisheries Division, Old Lyme, CT 06371*

10:30-10:50 ***Break***

10:50-11:10 **Energy acquisition and allocation to egg production in relation to fish reproductive strategies.** McBride, Richard[1], Stylianos Somarakis[2], Gary R. Fitzhugh[1], Anu Albert[3], Nathalia Yaragina[4], Mark J. Wuenschel[1], Alexandre Alonso-Fernández[5], and Gualtiero Basilone[6], *[1]National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Woods Hole, MA 02543, [2]Hellenic Centre for Marine Research, Anavyssos Attiki Greece, [3]Estonian Marine Institute, Tallinn, Estonia, [4]Polar Research Institute of Marine Fisheries and Oceanography, Murmansk, Russia, [5]Instituto de Investigaciones Marinas, IIM-CSIC, Pontevedra, Spain, [6]IAMC-CNR UOS of Torretta Granitola*

11:10-11:30 **Life history characteristics of Alewife (*Alosa pseudoharengus*) in freshwater environments.*** Rosset, Julianne[1], Allison H. Roy[2], Benjamin I. Gahagan[3], Andrew R. Whiteley[1], and Adrian P. Jordaan[1], *[1]Department of Environmental Conservation, University of Massachusetts-Amherst, Amherst, MA 01003, [2]U.S. Geological Survey, Massachusetts Cooperative Fish and Wildlife Research Unit, Department of Environmental Conservation, University of Massachusetts, Amherst, MA 01003, [3]Massachusetts Division of Marine Fisheries, Annisquam River Marine Fisheries Station, Gloucester, MA 01930*

11:30-11:50 **Sturgeon of the Connecticut River: CT DEEP research from 1988 to 2014.** Savoy, Tom, *Connecticut Department of Energy and Environmental Protection, Fisheries, Marine Fisheries Division, Old Lyme, CT 06371*

11:50-12:00 ***Awards and Business***

12:00-1:00 ***Lunch***

1:00-2:00 **Poster session**

2:00-2:20 **Movements of Summer Flounder *Paralichthys dentatus* tagged off the coast of Southeastern Massachusetts 2009-2014.** Boardman, John, Paul Caruso, Maria Szczebak, and Michael Bednarski, *Massachusetts Division of Marine Fisheries, New Bedford, MA 02740*

2:20-2:40 **Fish and invertebrate assemblages in the vicinity of wind energy areas of the Northeast U.S. Shelf.** Walsh, Harvey J.[1] and Vince Guida[2], *[1]National Oceanic and Atmospheric Administration (NOAA), National Marine Fisheries Service (NMFS), Northeast Fisheries Science Center, Narragansett, RI 02882, [2]NOAA, NMFS, Northeast Fisheries Science Center, Highlands, NJ 07732*

2:40-3:00 **Evaluating the management implications of discard mortality in the Gulf of Maine recreational Atlantic Cod (*Gadus morhua*) fishery.*** Langan, Joseph A.[1], James E. Quinlan[1], Michael J. Arciero[1], John W. Mandelman[2], Micah J. Dean[3], William S. Hoffman[3], Douglas R. Zemeckis[4], Connor W. Capizzano[1], and James A. Sulikowski[1], *[1]University of New England, Biddeford, ME 04005, [2]New England Aquarium, Boston, MA 02110, [3]Massachusetts Division of Marine Fisheries, Annisquam River Field Station, Gloucester, MA 01930, [4]University of Massachusetts-Dartmouth, Dartmouth, MA 02747*

3:00-3:20 ***Break***

3:20-3:40 **Genetic structure and diversity of an isolated Largemouth Bass (*Micropterus salmoides*) population in Western Massachusetts.** Strassler, Alan M.[1], Erin McMullin[2], and Robert E. Schmidt[2], *[1]Berkshire Fishing Club, Becket MA 01229, [2]Berkshire Environmental Research Center, Bard College at Simon's Rock, Great Barrington, MA 01230*

3:40-4:00 **Spatial and temporal distribution of early life history stages of Hake on the northeast United States continental shelf.** Marancik, Katrin[1], Rebecca Konijnenberg[2], and David Richardson[3], *[1]Integrated Statistics, Narragansett, RI 02882, [2]Amherst College, Amherst, MA 01002, [3]National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Narragansett, RI 02882*

* Denotes student paper

Poster Session

P1 **Testing for portfolio effects in a species of River Herring.** Jones, Andrew W.[1,2], David M. Post[1], and Eric P. Palkovacs[3], *[1]Yale University, New Haven, CT 06511, [2]Woods Hole Oceanographic Institution, Woods Hole, MA 02543, [3]University of California, Santa Cruz, CA 95060*

P2 **The metabolic costs of osmoregulation in a euryhaline fish, Hogchoker (*Trinectes maculatus*).**** Norstog, Jessica L. and John T. Kelly, *University of New Haven, Department of Biology and Environmental Science, West Haven, CT 06516*

P3 **Observations on diet and prey availability of Atlantic Sturgeon (*Acipenser oxyrinchus oxyrinchus*) in the Saco River, Maine.**** Novak, Ashleigh J.[1], Amy E. Carlson[1], Gail Wippelhauser[2], Gayle Zydlewski[3], Michael Kinnison[3], and James A. Sulikowski[1], *[1]University of New England, Biddeford, ME 04005, [2]Maine Department of Resources, Augusta, ME 04333, [3]University of Maine, Orono, ME 04469*

P4 **Needles in a haystack: Do advanced sampling techniques improve on traditional methods for finding rare prey items in the stomach contents of predators? The case of Atlantic Cod (*Gadus morhua*) and the Spiny Dogfish (*Squalus acanthias*).** Pitchford, Steven C.[1], Brian E. Smith[2], and Richard S. McBride[2], *[1]Northeast Fisheries Science Center, Milford, CT 06460, [2]Northeast Fisheries Science Center, Woods Hole, MA 02543*

P5 **Estimating size classes, spawning periods, and residence times of teleosts in the Saco River Estuary System, Maine based on total lengths.**** Reynolds, Julia M. and James A. Sulikowski, *University of New England, Biddeford, ME 04005*

P6 **Specificity and sensitivity of a PCR-based approach for detecting Winter Flounder in Blue Crab stomachs.**** Scro, Abigail K.[1], Kelly J. Cribari[1], Kathryn R. Markey[2], and David L. Taylor[1], *Roger Williams University, [1]Department of Marine Biology, [2]Aquatic Diagnostic Laboratory, Bristol, RI 02809*

P7 **Ecological and management implications of climate change induced shifts in phenology of coastal fish and wildlife species in the Northeast region.** Staudinger, Michelle D.[1,2], Karen Alexander[2], and Adrian Jordaan[2], *[1]Northeast Climate Science Center, Amherst, MA 01003, [2]University of Massachusetts-Amherst, Amherst, MA 01003*

P8 **Determining sex ratios and sexual maturity of Atlantic Sturgeon (*Acipenser oxyrinchus oxyrinchus)* in the Saco River, Maine.**** Wheeler, Carolyn R.[1], Gail Wippelhauser[2], Gayle Zydlewski[3], Michael Kinnison[3], and James A. Sulikowski[1], *[1]Department of Marine Sciences, University of New England, ME 04005, [2]Maine Department of Resources, Augusta, ME 04333, [3]School of Marine Sciences, University of Maine, Orono, ME 04469*

** Denotes student poster

ABSTRACTS:
Platform Presentations

Abundance and distribution of ichthyoplankton around the Saco River plume in Saco Bay, Maine. (student) Bauer, Tracey C. and James A. Sulikowski, *University of New England, Biddeford, ME 04005; tbauer2@une.ed*

It is well established that large river plumes impact ichthyoplankton in many ways, such as providing nutritional benefits and influencing transport in and out of estuaries. However, the effects of smaller, more variable sized river plumes on ichthyoplankton ecology are far less understood. Located in the southern Gulf of Maine, the Saco River represents a unique nearshore ecosystem characterized by a shallow brackish river plume that can rapidly alter abiotic conditions. In order to investigate the effect of the plume on ichthyoplankton distribution, weekly surface and subsurface plankton tows were conducted in plume and nearshore ocean waters from May to November (2013 and 2014). Biotic and abiotic variables to be considered include salinity, temperature, chlorophyll a (a measure of primary production) and zooplankton (a measure of secondary productivity) densities, which were collected at each site (within and outside of the plume). Preliminary results using two-sample t-tests from 2013 indicate that ichthyoplankton density was greater outside the plume compared to within the plume. Outside the plume, ichthyoplankton density was greater at the surface than the subsurface. Within the plume, ichthyoplankton densities did not differ between the surface and subsurface. Currently, the 2014 data is being analyzed and will be compared to the 2013 data to test for interannual variation. The knowledge gained from this study will be applicable to help understand how other small-scale plumes may be affecting the distribution and abundance of larval fish, as well as allow for better management of the Saco River estuary in the future.

Movements of Summer Flounder *Paralichthys dentatus* tagged off the coast of Southeastern Massachusetts 2009-2014. Boardman, John, Paul Caruso, Maria Szczebak, and Michael Bednarski, *Massachusetts Division of Marine Fisheries, New Bedford, MA 02740; john.boardman@state.ma.us*

To examine seasonal movements of Summer Flounder, *Paralichthys dentatus*, we tagged 1390 fish in the coastal waters of southeastern Massachusetts during the summer months (June-August) from 2009-2014. The flounder, ranging in size from 341 – 495 mm (mean = 400 mm), were tagged with fluorescent green Peterson disc tags and immediately released at their capture site. To date, 82 individuals have been recaptured by commercial and recreational fishermen in state and federal waters from Massachusetts to Virginia. These

recaptured fish had moved from the summer inshore tagging areas to offshore wintering grounds from Southern New England to North Carolina, a migratory pattern previously described for this species. Distance moved ranged from 0 – 670 km (mean= 109 km) and time at liberty ranged from 5 -1180 days (mean=145 days). Our preliminary analysis indicates that many individuals tagged in Massachusetts waters during the fishing season were ultimately recaptured by other Atlantic coastal state's recreational and commercial fisheries. Results from this study show evidence of stock mixing and are likely to inform future management decisions.

Evaluating the management implications of discard mortality in the Gulf of Maine recreational Atlantic Cod (*Gadus morhua*) fishery. (student) Langan, Joseph A.[1], James E. Quinlan[1], Michael J. Arciero[1], John W. Mandelman[2], Micah J. Dean[3], William S. Hoffman[3], Douglas R. Zemeckis[4], Connor W. Capizzano[1], and James A. Sulikowski[1], *[1]University of New England, Biddeford, ME 04005, [2]New England Aquarium, Boston, MA 02110, [3]Massachusetts Division of Marine Fisheries, Annisquam River Field Station, Gloucester, MA 01930, [4]University of Massachusetts-Dartmouth, Dartmouth, MA 02747; jlangan@une.edu*

Increased fishing-induced mortality during the late 20th century has led to the severe decline of Atlantic Cod (*Gadus morhua*) populations throughout the Gulf of Maine (GOM). Despite the common supposition that commercial fishing is the foremost factor influencing Cod stocks, recent reductions in annual commercial harvests have not allowed the fishery to recover as expected. This trend suggests that other factors, such as the growing GOM recreational fishery, may be significant drivers of Cod populations. In addition to the mortality attributed to harvest, Atlantic Cod are known to experience increased mortality after being discarded by recreational fishermen. However, the mortality of Cod in response to such recreational fishing activity is not clearly understood. This study aims to evaluate the impacts of this discard mortality on GOM Cod stocks and its implications for fishery management. As part of a larger investigation, 130 specimens were captured using standard recreational fishing practices during the summer of 2013. After release, these cod were tracked using acoustic telemetry in order to assess their movements for evidence of mortality. Total length and environmental parameters were recorded for each individual to determine the influence of these factors on recreational discard mortality. These data are currently being utilized in a Leslie-form matrix model to investigate the effects of varying fishing regulations. Ultimately, this model will serve as a decision tool for fishery managers to project the potential implications and relative efficacy of policy options for the GOM recreational Cod fishery.

Spatial and temporal distribution of early life history stages of Hake on the northeast United States continental shelf. Marancik, Katrin[1], Rebecca Konijnenberg[2], David Richardson[3], *[1]Integrated Statistics, Narragansett, RI 02882, [2]Amherst College, Amherst, MA 01002, [3]National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Narragansett, RI 02882; katey.marancik@noaa.gov*

Examination of species-level early life history data can improve our knowledge of stock structure and spawning habitat. Three species of Hakes from the genus *Urophycis* occur on the northeast United States Continental Shelf; at least two of which are common in ichthyoplankton samples collected during the Ecosystem Monitoring (ECOMON) cruises of the Northeast Fisheries Science Center. Stock structure and locations of spawning habitat are poorly understood for federally managed Red Hake (*Urophycis chuss*) and White Hake (*Urophycis tenuis*). Unfortunately, identification of larval *Urophycis* is currently only possible to the genus level. A subset of ECOMON samples preserved in ethanol allowed us to use genetic identification techniques to examine species-level patterns in the data. 135 *Urophycis* larvae were collected in this subset of samples from 2007-2009, 2011, and 2013. A total of 162 *Urophycis* eggs and 90 larvae were identified through barcoding of the cytochrome oxidase I gene. This small set of samples indicates that relative abundance may be heavily skewed toward Red Hake; spawning locations of these three species may be spatially separated; and the primary spawning locations of Red Hake may occur along the continental shelf edge of the southern New England and Georges Bank regions. Expansion of this work would directly address a New England Fishery Management Council research need to examine Red Hake stock structure. By combining the genetic identification of these limited ethanol samples with morphological identification of the entire ECOMON dataset, we can greatly improve our understanding of the spatial and temporal distribution of abundance and spawning habitat for these and many other federally managed species.

Energy acquisition and allocation to egg production in relation to fish reproductive strategies. McBride, Richard[1], Stylianos Somarakis[2], Gary R. Fitzhugh[1], Anu Albert[3], Nathalia Yaragina[4], Mark J. Wuenschel[1], Alexandre Alonso-Fernández[5], and Gualtiero Basilone[6], *[1]National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Woods Hole, MA 02543, [2]Hellenic Centre for Marine Research, Anavyssos Attiki Greece, [3]Estonian Marine Institute, Tallinn, Estonia, [4]Polar Research Institute of Marine Fisheries and Oceanography, Murmansk, Russia, [5]Instituto de Investigaciones Marinas, IIM-CSIC, Pontevedra, Spain, [6]IAMC-CNR UOS of Torretta Granitola; Richard.McBride@noaa.gov*

Fish spawning frequency varies from daily to once in a lifetime. Some species spawn and feed in separate areas, during different seasons, by storing energy and drawing on it later for reproduction (i.e. capital breeding). Other species spawn using energy acquired locally, throughout a prolonged spawning season, allocating energy directly to reproduction (i.e. income breeding). Capital breeders tend to ovulate all at once and are more common at boreal latitudes where productivity varies seasonally. Income breeding allows small fish to overcome allometric constraints on egg production and respond to current conditions; ceasing egg production when food is in short supply and resuming quickly when conditions improve. Many species exhibit mixed capital- and income breeding patterns, suggesting that breeding patterns are a conditional reproductive strategy that allows females to prioritize their own condition over their propagules' condition at any given spawning opportunity, thereby expending energy cautiously to maximize lifetime reproductive value. Poor-feeding environments can lead to delayed maturation, skipped spawning, fewer spawning events per season or fewer eggs produced per event. In a few cases, variations in feeding environments

appear to affect recruitment variability. These findings have implications for temporal and spatial sampling designs, and for interpreting fishery and ecosystem assessments.

Growth, mortality and seasonal hatching of Atlantic Mackerel larvae on the Northeast U.S. Continental Shelf. (student) McManus, M. Conor[1,2], Jeremy S. Collie[1], David E. Richardson[3], and Jonathan A. Hare[3], *[1]Graduate School of Oceanography, University of Rhode Island, Narragansett, RI 02882, [2]RPS Applied Science Associates, South Kingston, RI 02879, [3]National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Narragansett, RI 02882; michael_mcmanus@my.uri.edu*

Recent low catches of the Northeast U.S. Atlantic Mackerel stock have motivated further research to better understand the species' life history and historical population trends. One of the immediate interests involves constructing annual larval indices for the population to provide an additional estimate of spawning stock biomass and to determine the importance of larval abundance on the variability in annual recruitment. To aid this effort, we constructed larval growth, mortality and seasonality of hatching curves to be used in standardizing larval abundance data for an age-equivalent index. Mackerel larvae abundance-at-length data were analyzed from several multiyear plankton sampling programs, including NOAA's Ecosystem Monitoring (EcoMon) Program. After testing several deterministic growth models, a Holling type-III function best described larval growth. All growth models indicated that EcoMon samples did not efficiently catch larvae less than 2 days old. Mortality-at-age was assessed using two different calculations. The first expressed mortality as daily rates (Z), and the second as the proportion of those surviving from age 2 (PA). Daily mortality rates were quantified as a function of age using a power function: $ZA=\alpha A^{\beta}$. Atlantic Mackerel spawn from May through June on the Northeast U.S. Shelf, with the majority of spawning completed by early June. Proportion of hatching completed through a given date (PHD) indicated that by the end of June, more that 98% of eggs had hatched. The next step in this project is to correct historical data for net extrusion and then develop an index of larval abundance at age 2 days.

Life history characteristics of Alewife (*Alosa pseudoharengus*) in freshwater environments. (student) Rosset, Julianne[1], Allison H. Roy[2], Benjamin I. Gahagan[3], Andrew R. Whiteley[1], and Adrian P. Jordaan[1], *[1]Department of Environmental Conservation, University of Massachusetts-Amherst, Amherst, MA 01003, [2]U.S. Geological Survey, Massachusetts Cooperative Fish and Wildlife Research Unit, Department of Environmental Conservation, University of Massachusetts, Amherst, MA 01003, [3]Massachusetts Division of Marine Fisheries, Annisquam River Marine Fisheries Station, Gloucester, MA 01930; jrosset@eco.umass.edu*

Every spring, Alewives (*Alosa pseudoharengus*) begin their annual spawning run into lakes and ponds along the northeastern coast of the United States and Canada. Adults provide a significant source of marine-derived nutrients to freshwater systems and young of year act as an important food source for piscivorous fish. Over the past two centuries, coastal migratory Alewife populations have drastically declined due to habitat degradation,

overfishing, and the blockage of critical spawning rivers by dams. Alewife populations are typically assessed by counting adult fish as they enter spawning habitats. However, there is seldom an account of the resulting juvenile production within freshwater habitat. The objective of our research was to assess juvenile densities, age, mortality, and growth rates in freshwater lakes, and evaluate environmental and landscape factors that influence nursery productivity. We sampled alewives in 20 freshwater lakes and ponds in eastern Massachusetts three times throughout the summer. Our research will help develop a more complete understanding of the role of habitat quality and cohort dynamics which will help guide Alewife restoration priorities throughout their native range.

Sturgeon of the Connecticut River: CT DEEP research from 1988 to 2014. Savoy, Tom, *Connecticut Department of Energy and Environmental Protection, Fisheries, Marine Fisheries Division, Old Lyme, CT 06371; tom.savoy@ct.gov*

Directed collections of Shortnose and Atlantic Sturgeon in the Connecticut River began in 1988. Through 2014, over 4,000 sturgeon have been collected. All were examined, most were tagged and many were selected for other procedures (lavage, ageing and telemetry). Approximately 15% of the catch were recaptures of previously tagged fish. Shortnose Sturgeon recaptures ranged from 4 days at liberty to over 24 years and several fish have been collected multiple times, up to seven times for one individual. Mark recapture data document slow growth in length (mean 0.07 mm FL/day) and suggests the population in the river has doubled in size in the last 15 years. Atlantic Sturgeon recaptures include many tagged by other organizations out of State with these coastal migrants coming from 6 different States. Of 90 Atlantic Sturgeon both tagged and recaptured in Connecticut waters, calculation of growth rates of wild fish were possible and showed highly variable growth but averaged 0.31 mm FL/day. Over 300 Sturgeon were selected for surgical implants with ultrasonic transmitters for determining seasonal movement patterns and important habitats. Passive acoustic receivers were deployed throughout Connecticut waters to document fish presence. While array size and configuration varied widely among years, over 7,000,000 unique identifiable detections were collected within the last 4 years. Atlantic Sturgeon demonstrated high fidelity to Connecticut waters, some fish returning up to four years in a row. Atlantic Sturgeon annually enter into the Connecticut River and many travel well above the salt wedge, some as far North as Hartford (river kilometer 80) and beyond. In 2014, more than 50 individual Atlantic Sturgeon between 20.0 to 55.0 cm FL where collected, suggesting a recent spawning event and suggesting a Connecticut River stock may still be present.

Stock destabilization: Case history of American Shad in the Connecticut River. Savoy, Tom and Jacque Benway, *Connecticut Department of Energy and Environmental Protection, Fisheries, Marine Fisheries Division, Old Lyme, CT 06371; tom.savoy@ct.gov*

Effective fish passage for American Shad in the Connecticut River dates to 1976. From 1976 to 2014, 100,000 to over 700,000 Shad were lifted annually above the Holyoke Dam. To date, passing of 25 to 60% (mean 48%) of the annual run above Holyoke has resulted in

no discernable large increases in population size. In contrast, negative effects dominate in that the stock is now primarily composed of smaller, virgin fish (currently 3 age groups versus 5-7 historically) with few large old repeat spawners. It is generally accepted that larger and/or older fish have higher fecundities and produce more viable eggs. Platooning of many year classes into a spawning run and spreading single year classes over multiple runs are both techniques to account for environmental variability. Loss of repeat spawning and older ages classes in the annual Shad populations have led to increased reliance on single year classes in the spawning population. Currently, a poor year class or more than one in a row reduces population size of the annual run to levels well below the long term average and raises concern over possible recruitment failure. Given that year class strength of Shad in the Connecticut River was linked to moderate environmental conditions in June, adverse abiotic impacts during Spring months can cause year class failure. Simulation modeling efforts with environmental effects document potential year class failure is more likely with a truncated age structure and long term viability of the population is threatened.

Genetic structure and diversity of an isolated Largemouth Bass (*Micropterus salmoides*) population in Western Massachusetts. Strassler, Alan, M.[1], Erin McMullin[2], and Robert E. Schmidt[2], *[1]Berkshire Fishing Club, Becket MA 01229, [2]Berkshire Environmental Research Center, Bard College at Simon's Rock, Great Barrington, MA 01230; Alstras16@gmail.com*

The Berkshire Fishing Club (Club) manages a private 125 acre man made reservoir located in Becket Massachusetts. The lake was built in 1967 and was stocked with Largemouth Bass (*Micropterus salmoides*) in the early 1970's. Since the initial stocking period, this population has been untouched over the past 40 years. The lake is still under the original owners and has never been open to the general public until 1999 when the Berkshire Fishing Club was created. The Club functions as a private country club and depends on a healthy sustainable Largemouth Bass population. Prior to opening the Club, a number of private fishing facilities in Texas were visited to get a better understanding on how they manage their ponds and fisheries. Since our bass have been isolated for over 40 years it was suggested that additional bass should be stocked to increase the genetic diversity in the population. There are a number of reasons for stocking a population and increasing the genetic material in a population is just one of them. Of course stocking also comes with risks such as introducing disease, or hybrids out competing the native population for resources. Tissue samples were collected from 42 Largemouth Bass. To measure the genetic diversity in this population, six microsatellite loci were assayed and 22 different alleles were identified. Heterozygosity ranged from 50 to 81 percent. These results indicate stocking this population to increase genetic material is unnecessary at this time. Now that a baseline genetic structure has been identified, management will be in a position to compare future populations. This will enable managers to make better decisions by having the capability to identify any changes in genetic diversity and heterozygosity in the population.

Using habitat preferences models, ocean forecasts, and cooperative research to avoid River Herring bycatch. Turner, Sara M.[1], Jonathan A. Hare[1], John Hoey[1], John P. Manderson[2], and David E. Richardson[1], *[1]National Oceanic and Atmospheric Administration, Northeast Fisheries Science Center, Narragansett, RI 02882, [2]National Oceanic and Atmospheric Administration, Northeast Fisheries Science Center, Highlands, NJ 07732; sara.turner@noaa.gov*

Recent attention on declines in River Herring (Alewife, *Alosa pseudoharengus*, and Blueback Herring, *A. aestivalis*) populations has brought attention to their incidental harvest in the Atlantic herring (*Clupea harengus*) fishery. While catch caps were recently added to the Atlantic herring Fishery Management Plan, strategic methods to reduce by-catch are also needed (e.g., http://www.umassd.edu/smast/bycatch/). We developed generalized additive models (GAMs) to describe observed habitat preferences for River Herring and Atlantic Herring using data from the NOAA Northeast Fisheries Science Center bottom trawl winter and spring surveys. Observations for all three species (modeled as presence or absence) were related to bottom temperature, bottom salinity, depth, solar azimuth and elevation (proxies for season and time of day), and region. We plan to test the real-time accuracy of these models by coupling the habitat preference models with an ocean forecast model (FV COM), and then sampling the predicted distributions using cooperative research vessels that are participants in the Atlantic Herring fishery.

Fish and invertebrate assemblages in the vicinity of wind energy areas of the Northeast U.S. Shelf. Walsh, Harvey J.[1] and Vince Guida[2], *[1]National Oceanic and Atmospheric Administration (NOAA), National Marine Fisheries Service (NMFS), Northeast Fisheries Science Center, Narragansett, RI 02882, [2]NOAA, NMFS, Northeast Fisheries Science Center, Highlands, NJ 07732; Harvey.Walsh@noaa.gov*

The Department of the Interior's Bureau of Ocean Energy Management has designated lease blocks on the outer continental shelf in federal waters around the country that will be used to site renewable energy, including wind energy areas (WEAs). Efforts are underway to document fish and invertebrate habitat use in the vicinity of WEAs of the Northeast U.S. Shelf. Trawl collections were conducted in the vicinity four WEAs in the spring of 2014 using two gears: a 2-m beam trawl, and a 4-seam, 3-bridle survey trawl. The objectives of this study were to compare and contrast the communities collected with two types of trawl gear and describe the relationships between oceanographic factors and the fish and invertebrate assemblages. Shrimp, Little Skate, Red Hake, Silver Hake, and Windowpane dominated beam trawl collections, and averaged about 55 % of the total proportion of catches based on weight. Little Skate, Winter Skate, Spiny Dogfish, Atlantic Herring, and Horseshoe Crab dominated survey trawl catches, and averaged 73 % of the total proportion of catches based on weight. Mean individual weights of finfish were greater from the survey trawl catches for the 13 most commonly caught species, ranging from 0.5 to 325.0 g more per individual. Higher catch rates of juveniles by the beam trawl accounted for the large differences in weight per individual for several species including: Little Skate, Ocean Pout, Longhorn Sculpin, Windowpane, and Red Hake. Canonical Correspondence Analysis (CCA) was used to examine species-environment correlation among the collections. Gear type

accounted for 10 % of the variance in community composition across stations based on results of CCA with forward selection analysis. Linear combinations of four canonical axes indicated five environmental variables: latitude, longitude, depth, bottom salinity, and bottom temperature accounted for an additional 14 % of the variability. The important contribution of WEAs to juvenile fish habitat can be missed by relaying on survey trawl collections alone, highlighting the need for multiple sampling techniques to collect baseline data within the WEAs.

ABSTRACTS:
Poster Presentations

Testing for portfolio effects in a species of River Herring. Jones, Andrew W.[1,2], David M. Post[1], and Eric P. Palkovacs[3], *[1]Yale University, New Haven, CT 06511, [2]Woods Hole Oceanographic Institution, Woods Hole, MA 02543, [3]University of California, Santa Cruz, CA 95060; ajones@whoi.edu*

The diversity harbored within metapopulations is thought to reduce risk and provides predictable returns. This has been termed a portfolio effect and is one factor that contributes to stable and sustainable fisheries in a number of regions. Here we ask if metapopulations of anadromous River Herring exhibit portfolio effects. To address this question we analyzed time series of adult returns for one of the two species of River Herring (Alewife) from the New England region. Our results suggest the each metapopulation exhibits a slight positive portfolio effect, and that this effect is greatest in the more southern metapopulations. This work supports the notion that this diversity within a species may play an important role in promoting the overall stability of these ecologically, culturally, and economically important fishes.

The metabolic costs of osmoregulation in a euryhaline fish, Hogchoker (*Trinectes maculatus*). (student) Norstog, Jessica L. and John T. Kelly, *University of New Haven, Department of Biology and Environmental Science, West Haven, CT 06516; jnors1@unh.newhaven.edu*

Fish that live in euryhaline environments are required to regulate water and ion concentrations in their body in order to combat passive diffusion across their cell membranes. This process involves the active transport of ions and requires energy, but the actual metabolic costs of osmoregulation remains unclear. Estimates from previous studies range widely from 0.5% to 27% of the total energy budget of the fish. The purpose of this study was to determine the actual energetic costs of osmoregulation in a euryhaline fish, Hogchoker (*Trinectes maculatus*). Eighty-two fish were acclimated to either hypo-, iso-, or hyperosmotic conditions (0, 10, 30 ppt respectively) and their metabolic rates measured through static respirometry. Gill samples were taken to assess enzyme activity and whole-body water content was measured. There was no significant difference in metabolic costs or in water content in any treatment; however, the activity of the active transport enzymes Na^+/K^+-ATPase and citrate synthase were both significantly elevated in the hyperosmotic treatment. These results suggest that while increased environmental salinity does present a

challenge to the fish, the energetic costs of the physiological response are quite low at the whole organism level.

Observations on diet and prey availability of Atlantic Sturgeon (*Acipenser oxyrinchus oxyrinchus*) in the Saco River, Maine. (student) Novak, Ashleigh J.[1], Amy E. Carlson[1], Gail Wippelhauser[2], Gayle Zydlewski[3], Michael Kinnison[3], and James A. Sulikowski[1], *[1]University of New England, Biddeford, ME 04005*, *[2]Maine Department of Resources, Augusta, ME 04333*, *[3]University of Maine, Orono, ME 04469*; *anovak@une.edu*

Atlantic Sturgeon (*Acipenser oxyrinchus oxyrinchus*) are a highly migratory anadromous fish species, ranging from Labrador, Canada to Florida. Populations of this large and late maturing species decreased significantly along the coast in the early 20th century due to overharvest, development of dams, and pollution. As a result, this species of Sturgeon was extirpated from many river systems, including the Saco River, Maine, by the 1950s and is currently considered a threatened species in this ecosystem. To investigate the reappearance of this species to the watershed, a comprehensive study on the distribution and movement patterns by means of acoustic telemetry and diet analysis was established in 2008. A total of 51 Sturgeon collected using gill nets were measured, fixed with external and internal tags, including surgically implanted acoustic transmitters. Preliminary observations from the acoustic array in the Saco River have shown that Sturgeon preferred to stay within the first few river kilometers of the estuary. Analysis of stomach contents, obtained through gastric lavage, revealed that American Sand Lance (*Ammodytes americanus*), which school at the mouth of the river, are the most common prey item retrieved. In addition, the preliminary results of benthic grabs, beam and otter trawls, and beach seines conducted within the Saco River suggest that the distribution of prey items found in the stomach contents were correlated with the acoustic data. Linking diet to movement patterns of Atlantic Sturgeon will provide a better framework for management and protection for this threatened species.

Needles in a haystack: Do advanced sampling techniques improve on traditional methods for finding rare prey items in the stomach contents of predators? The case of Atlantic Cod (*Gadus morhua*) and the Spiny Dogfish (*Squalus acanthias*). Pitchford, Steven C.[1], Brian E. Smith[2], and Richard S. McBride[2], *[1]Northeast Fisheries Science Center, Milford, CT 06460, [2]Northeast Fisheries Science Center, Woods Hole, MA 02543; Steven.Pitchford@noaa.gov*

The Northeast Fisheries Science Center (NEFSC) has amassed a huge amount of data on the trophic relationships of 184 commercial and non-commercial fishes for the northeast U.S. continental shelf. The species sampled the most by far has been the Spiny Dogfish (*Squalus acanthias*). One reason for this high priority and also a source of much controversy has been the perceived threat that Dogfish predation poses to rebuilding commercial fish stocks. According to traditional macroscopic examination of 70,401 Dogfish stomachs recorded in the NEFSC Food Habits Database, only 13 Cod (*Gadus morhua*) have been observed (0.02%). On the other hand a high proportion of Dogfish gut contents (up to 28% by weight) have also been classified as either unknown fish and/or well digested prey.

Could there in fact be more partially or wholly digested Cod, otherwise visually unidentifiable, present in these unknown remains? The goal of this current project is to assess the presence of Cod in potentially unidentifiable fish remains of Spiny Dogfish with molecular techniques. Dogfish > 20cm are being collected monthly from the Gulf of Maine and Georges Bank by the Northeast Cooperative Research Program. Procedures for the extraction of usable DNA from degraded, unidentifiable fish remains as well as from homogenized chyme and mucous have been optimized. A quantitative real-time PCR (qPCR) assay with a TaqMan probe specific for Cod has been successfully tested and is now in use. Results, although still preliminary, support the very low presence of Cod in Spiny Dogfish diets. Considering the high connectivity of this shelf's food web and the opportunistic feeding strategy of Spiny Dogfish, answering this question with advanced sampling techniques (i.e. molecular versus macroscopic) is of high value.

Estimating size classes, spawning periods, and residence times of teleosts in the Saco River Estuary System, Maine based on total lengths. (student) Reynolds, Julia M. and James A. Sulikowski, *University of New England, Biddeford, ME 04005; jreynolds8@une.edu*

Coastal estuaries serve as vital nursery grounds for many commercially valuable fish species despite the variability in abiotic conditions. Within the Gulf of Maine (GOM) and in comparison to other larger estuarine regions, the Saco River estuary has shown significant species diversity in its fish assemblage. From 2007, ongoing fish surveys have been conducted in order to better understand the diversity, abundance, and distribution of larval fish within the Saco River estuary. To further reveal and understand the ecological value of this watershed, it is essential to define the size classes, spawning periods, and residence times of species utilizing the estuary system. Thus far, a total of 61 fish species have been identified including the commercially important Atlantic Herring (*Clupea harengus*) and Atlantic Cod (*Gadus morhua*) as well as the NOAA species of concern Cusk (*Brosme brosme*). This high species diversity indicates the system serves a vital role in the GOM. Preliminary analyses confirms this significance through increasing growth trends in larval and juvenile fish, evidence of larger class sizes of fish settling out, and spawning events. This research is essential in further investigating the importance of the Saco River estuary and working to clarify the ecological characteristics of its valuable inhabitants.

Specificity and sensitivity of a PCR-based approach for detecting Winter Flounder in Blue Crab stomachs. (students) Scro, Abigail K.[1], Kelly J. Cribari[1], Kathryn R. Markey[2], and David L. Taylor[1], *Roger Williams University, [1]Department of Marine Biology, [2]Aquatic Diagnostic Laboratory, Bristol, RI 02809; ascro520@g.rwu.edu; kcribari681@g.rwu.edu*

Increasing water temperatures in the Northwest Atlantic have resulted in Blue Crabs (*Callinectes sapidus*) extending their geographic range northward to Southern New England coastal habitats, including the Narragansett Bay Estuary (RI, USA). The increased abundance of Blue Crabs in this area may have important consequences to resident biota. For example, Blue Crabs may adversely affect juvenile Winter Flounder

(*Pseudopleuronectes americanus*) populations via trophic interactions. In this study, Polymerase Chain Reaction (PCR)-based methods were used to detect Blue Crab predation on juvenile Winter Flounder. To evaluate the sensitivity and specificity of the approach, a Winter Flounder-specific (WF208) primer set was tested against Winter Flounder, Blue Crab, and alternative prey items. The effect of digestion time on detecting Flounder DNA in crab stomachs was also determined in laboratory feeding experiments (0-10 hr post-feeding). DNA extractions of tissue and gut contents were carried out using a Qiagen DNeasy Blood and Tissue Kit and the 208 base-pair primer set. WF208 primers successfully and exclusively amplified Winter Flounder tissue (high sensitivity and specificity). The DNA concentration and quality of digested Flounder tissue consistently declined as digestion time increased. PCR results were more variable, however, with Flounder DNA being positively detected in 50-100% of Crab stomachs examined between 0 and 10 hr post-feeding. In the future, this protocol will be tested with field collected Blue Crab stomach samples.

Ecological and management implications of climate change induced shifts in phenology of coastal fish and wildlife species in the Northeast region. Staudinger, Michelle D.[1,2], Karen Alexander[2], and Adrian Jordaan[2], *[1]Northeast Climate Science Center, Amherst, MA 01003, [2]University of Massachusetts-Amherst, Amherst, MA 01003; mstaudinger@usgs.gov*

Climate change is causing species to shift their phenology, or the timing of recurring life events, in variable and complex ways. This can potentially result in mismatches or asynchronies in food and habitat resources that impact individual fitness, population dynamics, and ecosystem function. This project seeks to improve our understanding of climate-induced shifts in the seasonal timing of migration, spawning or breeding, and rates of biological development in coastal fishes, marine mammals, and migratory shore and seabirds along the U.S Atlantic coast. Long-term biological observations and environmental monitoring data are being collected to evaluate the spatial and temporal scales at which phenological shifts are occurring, the primary environmental variables driving them, and to identify shared traits or behavioral changes that are common among different species. Comparisons of phenological shifts among higher trophic level predators and marine forage species will help characterize the adaptive capacity and vulnerability of individual species and regional sub-populations to changing environmental conditions. It will also identify where potential trophic mismatches may occur due to rapid climate change, and reveal gaps in monitoring networks intended to detect such responses among species of commercial, ecological, and conservation importance.

Determining sex ratios and sexual maturity of Atlantic Sturgeon (*Acipenser oxyrinchus oxyrinchus)* in the Saco River, Maine. (student) Wheeler, Carolyn R.[1], Gail Wippelhauser[2], Gayle Zydlewski[3], Michael Kinnison[3], and James A. Sulikowski[1], *[1]Department of Marine Sciences, University of New England, ME 04005, [2]Maine Department of Resources, Augusta, ME 04333, [3]School of Marine Sciences, University of Maine, Orono, ME 04469; cwheeler2@une.edu*

The Atlantic Sturgeon (*Acipenser oxyrinchus oxyrinchus)* is a long-lived, anadromous fish species ranging from Labrador, CA to Florida, USA. In the Saco River, located in the Gulf of Maine, Atlantic Sturgeon were common in the 1920's, but were extirpated by the 1950's due to overfishing. However, after a 60 year absence, Atlantic Sturgeon reappeared in the Saco River in 2007. Although the reason for the return of this species to this river system remains unknown, research on basic life history information is necessary to facilitate the conservation of this federally protected species. Understanding reproductive parameters such as sex ratios and sexual maturity are vital to effective management of any species. Unfortunately, this information is typically obtained by lethal gross dissection, or stress inflicting endoscopy. Thus, in order to better understand these important life history parameters, three non-invasive techniques (steroid hormone analysis, ultrasonography, and external morphological features) are being utilized to non-lethally determine sex ratios, sexual maturity, and reproductive status for sturgeon captured within the Saco River watershed. Preliminary results suggest that the combination of these three techniques provide an accurate assessment of reproductive parameters in Atlantic Sturgeon. Results of this study will help facilitate better conservation and management of this species.