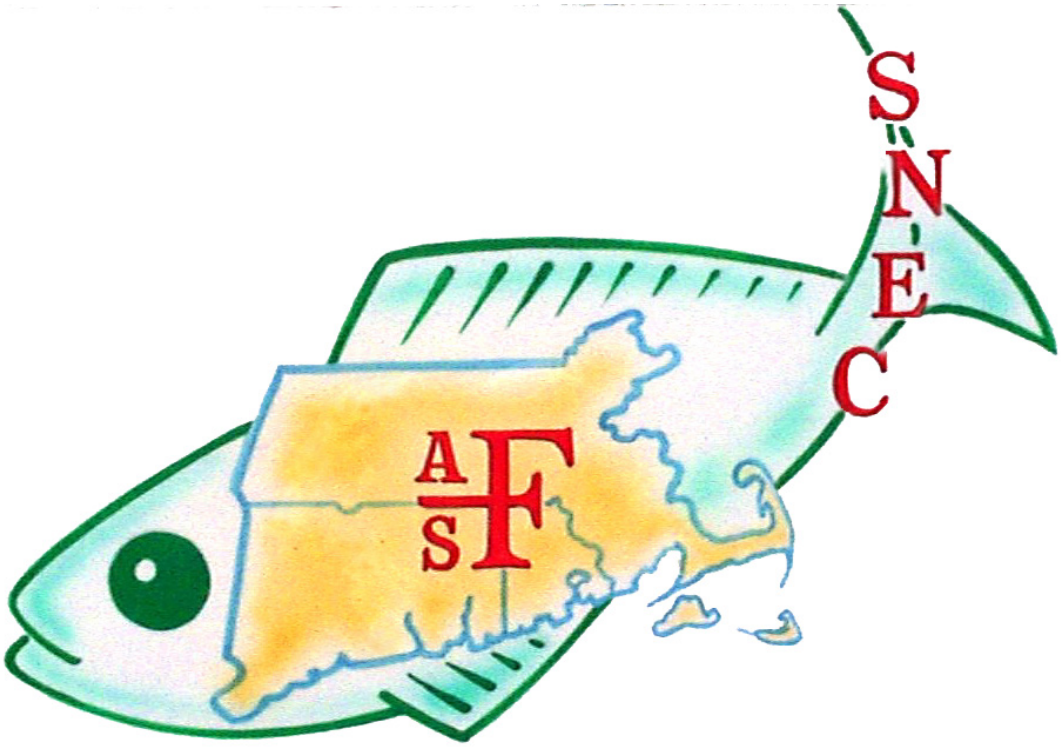
2021 Winter Virtual Science Meeting



Southern New England Chapter

American Fisheries Society

January 11, 2021

Program

AGENDA FOR THE SNEC AFS 2021 WINTER SCIENCE MEETING
Monday, January 11, 2021

9:00 – 9:20 **Opening Comments** Jacob Kasper, SNEC President

9:20 – 9:40 **Spatial Patterns of Habitat Use and Mortality in a Declining Winter Flounder Population.*** Langan, Joseph[1], Puggioni, Gavino[2], McManus, M. Conor[3], Bell, Richard J.[4], Collie, Jeremy S.[1], *[1]University of Rhode Island Graduate School of Oceanography, Narragansett, RI, [2]University of Rhode Island, Kingston, RI, [3]Rhode Island Division of Marine Fisheries, Jamestown, RI, [4]The Nature Conservancy, Narragansett, RI*

9:40 – 10:00 **Planktonic Forage of the Northeast US Shelf.** Walsh, Harvey, Richardson, David, Marancik, Katrin, *NOAA Northeast Fisheries Science Center, Narragansett, RI*

10:00 – 10:20 **Environmental Monitors on Lobster Traps and Large Trawlers (eMOLT): an Update.** Manning, James[1], Pelletier, Erin[2], Van Vranken, Cooper[3], Shank, Burton[1], *[1]NOAA Northeast Fisheries Science Center, Woods Hole, MA, [2]Gulf of Maine Lobster Foundation, Kennebunk, ME, [3]Bering Data Collective, Copenhagen, Denmark*

10:20 – 10:40 *Break*

10:40 – 11:00 **Trends in Epizootic Shell Disease Prevalence for the American Lobster: Indicators for Monitoring Population Stressors Under Climate Change.** McManus, M. Conor[1], Kipp, Jeff[2], Reardon, Kathleen[3], Pugh, Tracy L.[4], *[1]RI Department of Environmental*

Management, Division of Marine Fisheries, Jamestown, RI, [2]Atlantic States Marine Fisheries Commission, Arlington, VA, [3]ME Department of Marine Resources, Boothbay Harbor, ME, [4]MA Division of Marine Fisheries, New Bedford, MA

11:00 – 11:20 **Using Baseline Data from a Before-After-Control-Impact (BACI) Survey of American Lobster (*Homarus americanus*) and Jonah Crab (*Cancer borealis*) to Explain Relative Abundance and Size Structure in Offshore Southern New England (SNE).*** Zygmunt, Alex, Stokesbury, Kevin, *UMass Dartmouth School for Marine Science and Technology, New Bedford, MA*

11:20 – 11:40 **Changes in Largemouth Bass Mercury Concentrations in Connecticut Lakes from 1995 to 2020.*** Sullivan, Christopher[1], Vokoun, Jason[1], Perkins, Christopher[2], *[1]Department of Natural Resources and the Environment, University of Connecticut, Storrs, CT, [2]Center for Environmental Sciences and Engineering, University of Connecticut, Storrs, CT*

11:40 – 1:00 *Lunch - stay on zoom, and catch up with friends!*

1:00 – 1:20 Poster speed talks

1:20 – 1:40 **Comparison of Upper Thermal Limits in Anadromous Juvenile Alewife and Blueback Herring.*** Guo, Lian[1], Troll, Elizabeth[1], Jordaan, Adrian[1], McCormick, Stephen[2], *[1]University of Massachusetts Amherst, Amherst, MA, [2]US Geological Survey, Turners Falls, MA*

1:40 – 2:00 **Ready and Swimming: Ontogenetic Changes Preceding Emigration in Juvenile Alewife (*Alosa pseudoharengus*).*** Colby, Rebecca S.[1], McCormick, Stephen D.[2], Stephens, Jacqueline[1], Smith, Brandon[1], Shook, Erika[1], Schultz, Eric T.[1],

[1]University of Connecticut, Storrs, CT, [2]US Geological Survey, Turners Falls, MA

2:00 – 2:20 *Break*

2:20 – 2:40 **High-Resolution Acoustic Camera Reveals the Importance of Both Time and Tide for River Herring During Their Upstream Spawning Migration.*** Rillahan, Chris, He, Pingguo, *UMass Dartmouth School for Marine Science and Technology, New Bedford, MA*

2:40 – 3:00 **Keeping Up with the Fish: Using Management Strategy Evaluation to Adapt Recreational Fishery Management to Climate-Driven Population Movements for a U.S. Flounder Fishery.*** Hart, Amanda[1], Fay, Gavin[1], McNamee, Jason[2], Dancy, Kiley J.[3], *[1]UMass Dartmouth School for Marine Science and Technology, New Bedford, MA, [2]RI Department of Environmental Management, Division of Marine Fisheries, Jamestown, RI, [3]Atlantic States Marine Fisheries Commission, Arlington, VA*

3:00 – 3:20 **Collaborating with Fishers to Better Understand Commercial Fishery Risks, Behaviors, and Fishery Dynamics.** Murphy Jr., Robert[1], Harris, Bradley[1], Wolf, Nathan[1], Estabrooks, Austin[2], Gauvin, John[3], Gray, Steven[4], Kroska, Anita[1], *[1]AK Pacific University, Fisheries, Aquatic Science and Technology Lab, Anchorage, AK, [2]Pollock Conservation Cooperative, Seattle, WA, [3]AK Seafood Cooperative, Seattle, WA, [4]Department of Community Sustainability, MI State University, East Lansing, MI*

3:20 – 3:40 **Electronic Monitoring in the New England For-Hire Fishery: Results of the First Pilot in the US.** McGuire, Christopher[1], McManus, M. Conor[2], McNamee, Jason[2], Sullivan, Kevin[3], Bell, Rich[4], Laferriere, Alix[4], Bellavance, Rick[5], Godfroy, Mark[6],

Wealti, Morgan[7], [1]*The Nature Conservancy, Boston, MA,* [2]*RI Department of Marine Fisheries, Jamestown, RI,* [3]*NH Department of Fish and Game, Durham, NH,* [4]*The Nature Conservancy, Narragansett, RI,* [5]*FV Priority Too,* [6]*FV Lady Tracey Ann II,* [7]*Saltwater Inc.*

* Denotes student paper

Poster Session

P1 **Expert Swimmers and Tank Potatoes: Swimming Behavior of Alewives (*Alosa pseudoharengus*) at Differing Migratory Stages.** Shook, Erika, Colby, Rebecca S., Schultz, Eric T., *University of Connecticut, Storrs, CT*

P2 **Cod Morphometric Analysis Reveals Physical Differences Among Sub-Populations in the Georges Bank Fisheries Stock, Northwest Atlantic.**** Reyes-Delgado, Angel[1], Santos, Nina[2], Langan, Joseph A. [2], Heinichen, Margaret[2], McMahon, Kelton W. [2], *[1]Universidad Ana G. Mendez, San Juan, Puerto Rico, [2]University of Rhode Island Graduate School of Oceanography, Narragansett, RI*

P3 **A Baseline Benthic Habitat Assessment of the Vineyard Wind Lease Area within the MA Wind Energy Area.**** Riley, Caitlyn, Stokesbury, Kevin, *UMass Dartmouth School for Marine Science and Technology, New Bedford, MA*

** Denotes student poster

Abstracts:
Platform Presentations

Ready and Swimming: Ontogenetic Changes Preceding Emigration in Juvenile Alewife (*Alosa pseudoharengus*).* Colby, Rebecca S.[1], McCormick, Stephen D.[2], Stephens, Jacqueline[1], Smith, Brandon[1], Shook, Erika[1], Schultz, Eric T.[1], *[1]University of Connecticut, Storrs, CT, [2]US Geological Survey, Turners Falls, MA*

High periodical stress, like that which diadromous fish experience, can be met with either preemptive preparation or fast-acting, reflexive coping mechanisms (i.e. anticipatory and "cross that bridge when you get to it" approaches, respectively). An anticipatory approach to migration is well documented in some diadromous members of the Salmonidae family wherein distinct, charismatic morphologies are accompanied by physiological changes. The development of a hook-jaw and bright coloration in up-running spawners and silvering of juveniles during smoltification are two famous examples. Diadromous Alewife (*Alosa pseudoharengus*), on the other hand, show no obvious external modifications associated with migration at adult or juvenile stages and evidence for changes at the tissue-specific or whole-body level is limited – but, this does not necessarily indicate an absence of underlying physiological changes. For juvenile Alewife that endure osmoregulatory and swimming challenges, pre-emptive physiological preparation may be crucial for surviving their first migration seaward. We present data from ecologically relevant salinity and swimming challenges on fish collected from Bride Lake (East Lyme, CT) to test the hypothesis that actively-migrating juvenile Alewife have increased osmoregulatory ability, swimming performance, and energetic capacity compared to pre-migratory individuals. Our findings suggest that actively-migrating individuals have larger relative heart size, more fusiform bodies, and greater behavior maintenance ("decisiveness") than pre-migratory individuals, but no difference in gill NKA activity. Increasing our understanding of how juveniles interact with their environment during freshwater-seawater transition is crucial for management and restoration since juvenile growth and survival may have a profound influence on adult spawning stock size.

Comparison of Upper Thermal Limits in Anadromous Juvenile Alewife and Blueback Herring.* Guo, Lian[1], Troll, Elizabeth[1], Jordaan, Adrian[1], McCormick, Stephen[2], *[1]University of Massachusetts Amherst, Amherst, MA, [2]US Geological Survey, Turners Falls, MA*

Alewife (*Alosa pseudoharengus*) and Blueback Herring (*A. aestivalis*) are two closely related anadromous clupeids that have typically been managed together. However, each species exhibits different reproductive phenology and latitudinal distribution, suggesting they may have distinct thermal tolerances. Whether future climate adaptive management strategies should be applied similarly to both species is unclear. Prior to these studies, no direct comparison of thermal tolerance has been done for Alewife and Blueback Herring. We collected anadromous juvenile Alewife and Blueback Herring from southern Connecticut and conducted critical thermal maximum (CTmax) tests (ramp rate: 2°C/hour) and acclimated chronic exposure tests (ramp rate: 1°C/2 days) to assess species-specific upper thermal limits. Each species was acclimated to 24°C or 28°C (CTmax only) for two weeks prior to tests. Fish reached their CTmax when they were unable to remain in an upright swimming position. In the acclimated chronic exposure test, we monitored food consumption rates and survival, and ended trials at 50% mortality. Both species increased their CTmax when acclimated to 28°C (upper limit = 36.1°C) compared to 24°C (upper limit = 35.0°C), demonstrating thermal plasticity. We found no species-specific difference in upper critical or lethal limits (35°C), though this does not exclude differences in other aspects of thermal performance (e.g., growth, aerobic scope). If further studies support the lack of species-specific differences in juvenile thermal performance, existing differences in phenology or distribution may be due to differential thermal sensitivities in the adult life stage or other ecological factors like competitive exclusion and habitat partitioning.

Keeping Up with the Fish: Using Management Strategy Evaluation to Adapt Recreational Fishery Management to Climate-Driven Population Movements for a U.S. Flounder Fishery.*

Hart, Amanda[1], Fay, Gavin[1], McNamee, Jason[2], Dancy, Kiley J.[3], *[1]UMass Dartmouth School for Marine Science and Technology, New Bedford, MA, [2]RI Department of Environmental Management, Division of Marine Fisheries, Jamestown, RI, [3]Atlantic States Marine Fisheries Commission, Arlington, VA*

Shifting distributions of fish populations due to climate change have resulted in changes in behavior of commercial and recreational fishers seeking to maintain societal benefits of fisheries to coastal areas. Characterizing recreational fishing responses to regulatory and climate changes, crucial to determining fishery performance, has been challenging because participation varies geographically and data on recreational fishing behaviors are limited. The U.S. Summer Flounder recreational fishery is a useful case study because it is a data-rich fishery experiencing both climate and regulatory changes. We developed an economic utility model for Summer Flounder that leveraged choice experiment data to estimate the likely responses of recreational fishermen to changes in regulations and impacts from climate change. Our model

estimates expected welfare changes, catch levels, and discards as a result of state-specific differences in fishing behavior and preferences in response to changing regulatory input controls. Model performance will be assessed against its ability to characterize recreational angling for Summer Flounder in recent years. Explicit consideration of the drivers of angler behavior can serve as a useful step within Management Strategy Evaluation, allowing unintended consequences to be identified when testing management procedures.

Spatial Patterns of Habitat Use and Mortality in a Declining Winter Flounder Population.* Langan, Joseph[1], Puggioni, Gavino[2], McManus, M. Conor[3], Bell, Richard J.[4], Collie, Jeremy S.[1], *[1]University of Rhode Island Graduate School of Oceanography, Narragansett, RI, [2]University of Rhode Island, Kingston, RI, [3]Rhode Island Division of Marine Fisheries, Jamestown, RI, [4]The Nature Conservancy, Narragansett, RI*

Winter Flounder (*Pseudopleuronectes americanus*) has historically supported large commercial and recreational fisheries as a dominant finfish in the southern New England ecosystem. However, its abundance in Narragansett Bay, Rhode Island has declined to an all-time low during the past three decades. Recent research has revealed this decline is due in part to the effects of climate change and predation causing increasing mortality during the first year of life, but it is unclear how these factors manifest across the coastal habitats important to the Winter Flounder life cycle. This work collated multiple long-term datasets from Rhode Island waters to examine shifts in Winter Flounder spatial distribution during the population decline. Spatiotemporal conditional autoregressive models were fit to abundance data of seven life stages to determine if habitat use patterns have changed and if interstage mortality rates vary in space. The results suggest that Winter Flounder have contracted their seasonal distributions and shifted away from historic areas of high abundance. Furthermore, juvenile mortality appeared to be highest in important nursery areas. Taken together, these findings both provide insights for the development of adaptive spatial management measures for Winter Flounder in Rhode Island waters and contribute to the understanding of the climate response of the species encountering rising temperatures throughout its range.

Environmental Monitors on Lobster Traps and Large Trawlers (eMOLT): an Update. Manning, James[1], Pelletier, Erin[2], Van Vranken, Cooper[3], Shank, Burton[1], *[1]NOAA Northeast Fisheries Science Center, Woods Hole, MA, [2]Gulf of Maine Lobster Foundation, Kennebunk, ME, [3]Bering Data Collective, Copenhagen, Denmark*

Approximately one hundred commercial fishing vessels on the Northeast Shelf now have temperature sensors installed on their fixed and mobile gear. Many have fixed sites with hourly time series for nearly two decades. Some have also experimented with salinity monitors, cameras, tide gages, acoustic listening devices, and current meters. The primary focus of the talk will be an update on the real-time telemetry. At the time of this writing, over 50 vessels are fitted with satellite transmitters and have automatically reported close to 13,000 haul-averaged bottom temperatures from 2015 - 2020. Both ocean modelers and stock assessment biologists have used the data to adjust their projections. This eMOLT data is served on-line according to IOOS standards. An effort is underway to compile/merge other datasets to build a master database of bottom temperatures and make it accessible to multiple scientific investigations.

Electronic Monitoring in the New England For-Hire Fishery: Results of the First Pilot in the US. McGuire, Christopher[1], McManus, M. Conor[2], McNamee, Jason[2], Sullivan, Kevin[3], Bell, Rich[4], Laferriere, Alix[4], Bellavance, Rick[5], Godfroy, Mark[6], Wealti, Morgan[7], *[1]The Nature Conservancy, Boston, MA, [2]RI Department of Marine Fisheries, Jamestown, RI, [3]NH Department of Fish and Game, Durham, NH, [4]The Nature Conservancy, Narragansett, RI, [5]FV Priority Too, [6]FV Lady Tracey Ann II, [7]Saltwater Inc.*

Scores of commercial fisheries are testing and implementing Electronic Monitoring (EM) as a tool to collect verified fisheries data. Program goals range from quota accounting to non-fish bycatch estimation (e.g. sea birds, mammals). As commercial fisheries move towards increased accountability, the difference in data quality between private anglers, charter/for-hire, and commercial fishermen is coming into sharp focus. In 2019, the first EM project in the charter/for-hire fishery in the US was completed in New England. The principal goal was to validate the captain's required self-reported catch. Two collaborating captains equipped their vessels with EM systems that ran on every trip for a full fishing season. EM analyzed catch data was compared to corresponding electronic trip reports, and other available data sources including state managed dockside interviewers and ride-along sea samplers. Observed EM length data were also compared to an independent research project. Overall the EM systems collected high quality fisheries data, with negligible adverse feedback from the 4,500 passengers who fished under them. The EM review costs were different between the two vessels based largely on number of passengers per trip (6 vs 40). The lessons learned from this project are being shared widely to inform similar efforts across the US and beyond.

Trends in Epizootic Shell Disease Prevalence for the American Lobster: Indicators for Monitoring Population Stressors Under Climate Change. McManus, M. Conor[1], Kipp, Jeff[2],

Reardon, Kathleen[3], Pugh, Tracy L.[4], *[1]RI Department of Environmental Management, Division of Marine Fisheries, Jamestown, RI, [2]Atlantic States Marine Fisheries Commission, Arlington, VA, [3]ME Department of Marine Resources, Boothbay Harbor, ME, [4]MA Division of Marine Fisheries, New Bedford, MA*

Epizootic shell disease (ESD), visually identified as rotting or deterioration of the shell, represents the most commonly recognizable disease for American Lobster (*Homarus americanus*) in the Northwest Atlantic. While causes of the disease remain unclear, prevalence appears correlated to warming waters and has been found to increase morality. First identified in Rhode Island waters in the mid-1990s in commercial catch, ESD prevalence quickly expanded in the region soon after. While various monitoring programs have assessed ESD prevalence since the 2000s using common criteria, none of the surveys are standardized to provide comparisons across the species' range. Here, we examined ESD in Lobsters across New England using the Coastwide Ventless Trap Survey, a fisheries-independent monitoring program conducted by states in summer months to discern the population trajectory of sub-legal Lobsters. Statistical models were used to understand how spatiotemporal factors and biological characteristics influence the probability of Lobsters having ESD throughout the survey domain. Our results corroborated previous findings, as well as provided new insights on ESD. We found greater ESD prevalence in SNE than the GOM, as well as an apparent gradient of decreasing ESD prevalence with increasing latitude through the GOM. ESD prevalence for Lobsters increased with size, was highest in June, and most common in egg-bearing females. These results highlight how a consistent fisheries-independent sampling program coastwide can be used to understand disease change over a large geographic change. These data will be valuable as scientists and managers look to understand how disease prevalence corresponds to a warming climate.

Collaborating with Fishers to Better Understand Commercial Fishery Risks, Behaviors, and Fishery Dynamics. Murphy Jr., Robert[1], Harris, Bradley[1], Wolf, Nathan[1], Estabrooks, Austin[2], Gauvin, John[3], Gray, Steven[4], Kroska, Anita[1], *[1]AK Pacific University, Fisheries, Aquatic Science and Technology Lab, Anchorage, AK, [2]Pollock Conservation Cooperative, Seattle, WA, [3]AK Seafood Cooperative, Seattle, WA, [4]Department of Community Sustainability, MI State University, East Lansing, MI*

The way we manage and set fishery regulations depends considerably on the population dynamics and characteristics of the fish itself, but the success of management is ultimately contingent upon the behavior and effort allocation of fishers. Throughout much of the United States, managers are working to predict how fishers and fishing communities could be

impacted by and respond to new regulations and management schemes before they are enacted. Grounded in a collaborative approach, we have worked with several large-scale fishing fleets in the North Pacific, U.S. to develop strategies for better understanding how future conditions could fundamentally change fishing effort and behavior. Using previously established methods, such as Fuzzy Cognitive Mapping through the online program – Mental Modeler, and new tools to explore non-linearities in commercial fishery social-ecological systems, our work uncovered important linkages between potential regulatory and environmental changes and the on-the-water decision-making of fishers, vessel/crew safety, company profits, and numerous other factors contributing to fishery health and sustainability. Overall, this work aims to develop methodologies for systematically incorporating the study of human behavior, perceptions, and knowledge into management and we are currently in the process of broadening our scope to include several New England-based fisheries to provide contrast and comparisons to previously executed research in the North Pacific.

High-Resolution Acoustic Camera Reveals the Importance of Both Time and Tide for River Herring During Their Upstream Spawning Migration.* Rillahan, Chris, He, Pingguo, *UMass Dartmouth School for Marine Science and Technology, New Bedford, MA*

River herring (Alewife, *Alosa pseudoharengus*, and Blueback Herring, *Alosa aestivalis*) undergo a spring spawning run, migrating from their foraging grounds in the ocean to their spawning grounds in coastal streams and rivers. The movement of these fish was traditionally thought to occur primarily during daytime hours, however several recent studies using new technologies have provided contrary information. We used a high-resolution acoustic camera (ARIS Explorer 3000) to understand the migratory behavior of river herring during their spring spawning run in relation to the time of day and the tidal phase. The acoustic camera was deployed in the Mattapoisett River and Herring River to document the movement and behavior of the migrating river herring during their spawning runs. Hourly count data in both rivers showed that these fish migrated upstream during all hours of the day with peaks of activity around dawn (0500 - 0700) and before dusk (1700 - 2000). Fish passage rate was high during incoming and high tides and low during low tides. The preference for low light conditions and high tides had an interactive effect which manifested in changes in the patterns of fish movements. When these two preferences were in phase (i.e. high tide around dawn and dusk), river herring had a 12-hour periodicity in passage with peaks of activity around dawn and dusk. When the two systems were out of phase (i.e. high tide in the middle of day/night), river herring changed to a 24-hour periodicity with one peak in activity only during the nighttime high tide. This study shows the importance of both time and tide and their phase to river herring upstream spawning migration. The findings improve our understanding of river herring movement which can contribute to unbiased estimates of run counts.

Changes in Largemouth Bass Mercury Concentrations in Connecticut Lakes from 1995 to 2020.* Sullivan, Christopher[1], Vokoun, Jason[1], Perkins, Christopher[2], *[1]Department of Natural Resources and the Environment, University of Connecticut, Storrs, CT, [2]Center for Environmental Sciences and Engineering, University of Connecticut, Storrs, CT*

Anthropogenically-derived mercury (Hg) is a ubiquitous contaminant in aquatic food webs that poses a human and wildlife health risk via fish consumption. Stricter Hg emission regulations have generally decreased atmospheric deposition into aquatic systems, lowering Hg concentrations in fish via reduced bioaccumulation and biomagnification over recent decades. However, rates of decline are variable among systems, leading to difficulty estimating trends. Our study objective was to evaluate temporal trends in Largemouth Bass *Micropterus salmoides* (hereafter 'Bass'), a top predator, Hg concentrations in 23 Connecticut lakes that had been sampled over the past three decades. Biopsy (non-lethal) and/or whole-fillet (lethal) tissue samples were collected for Hg analysis from bass in 1995, 2005-2006, and 2019-2020, and Hg concentrations were standardized for a 355 mm total length bass, the statewide minimum length for consumption. Biopsy and whole-fillet Hg concentrations were not statistically different, and non-lethal biopsy tissue samples are a viable alternative to lethal whole-fillet homogenization. Mean Bass Hg concentrations were generally lower and declined over time. The northeast and southeast regions of Connecticut remain Hg hotspots with higher Bass Hg concentrations compared to western Connecticut. Contemporary mean Bass Hg concentrations still exceeded 0.5 µg/g (EPA consumption criterion) in some lakes. Bass are a highly sought-after sportfish, but harvest is currently low due to the popularity of catch and release fishing. That said, fish-consuming wildlife are still at risk of biomagnification and human consumption is likely to occur more frequently among certain ethnic minorities and those most economically disadvantaged in the population.

Planktonic Forage of the Northeast US Shelf. Walsh, Harvey, Richardson, David, Marancik, Katrin, *NOAA Northeast Fisheries Science Center, Narragansett, RI*

Regime shifts of the Northeast US Shelf Ecosystem over the past thirty years have been well documented for a number of ecosystem components including hydrographic, lower-trophic levels, and fish recruitment and condition. The goal of this project was to develop ecosystem-level plankton forage anomalies to explore with other components. Forage anomalies were calculated from NOAA Northeast Fisheries Science Center's Ecosystem Monitoring plankton collections made during 2000 to 2019. Anomalies were calculated for eleven prey classifications using stratified mean abundance for each taxon (individuals * 10 m^{-2}). The taxa were chosen based on diet data reported for fish of the ecosystem and taxa considered

important forage by the New England Fisheries Management Council (FMC) and Mid-Atlantic FMC. Zooplankton anomalies were calculated for large copepods, small copepods, krill, mysids, pteropods, and gelatinous plankton. Ichthyoplankton anomalies were created for small pelagics, small demersal fish, gadiformes, pelagics, and flounders. Both Georges Bank and Gulf of Maine forage anomalies were declining or below average during the 2000's and increasing or above average from 2010 to 2019. These trends align well with ecosystem regime shifts of fish condition and fish recruitment over the same time period.

Using Baseline Data from a Before-After-Control-Impact (BACI) Survey of American Lobster (*Homarus americanus*) and Jonah Crab (*Cancer borealis*) to Explain Relative Abundance and Size Structure in Offshore Southern New England (SNE).* Zygmunt, Alex, Stokesbury, Kevin, *UMass Dartmouth School for Marine Science and Technology, New Bedford, MA*

Scheduled offshore wind development in the United States will alter the surrounding ecosystem, potentially impacting the species that co-occur there. A lasting effect will be scour protection; the large volume of stones placed around each turbine structure. This will turn soft sediments into complex habitats, possibly preferable to structure-oriented species. To establish a year-one baseline for a before-after-control-impact (BACI) survey within the Vineyard Wind (VW) 501N lease area, we employed coastwide ventless trap survey protocol that is also utilized by the Northeast coastal states. The 501N area and an adjacent control site were sampled for American Lobster and Jonah Crab relative abundance and size structure. An influx of smaller males influenced the size distribution of Jonah Crab in the 501N area. Both species' relative abundance was seasonal and greater in the 501N area, but trap type specific catch patterns were opposite compared to state data; ventless trap catches observed in RI and MA surveys exceeded vented trap CPUE. Generalized linear models (GLMs) were used to relate environmental and survey characteristics to species presence. Time, depth, and temperature explained the seasonal variability for Lobsters caught in vented traps, while trap saturation by *C. irroratus* bycatch negatively affected the abundance of Lobster in ventless traps. Trap type, time, temperature, depth, latitude, and an interaction between temperature and depth best described *C. borealis* presence. Changes in temperature corresponded to abundance changes for both species, but an affinity for greater depths explained localized distribution and contributed to the difference in abundance between areas.

Abstracts:
Poster Presentations

Cod Morphometric Analysis Reveals Physical Differences Among Sub-Populations in the Georges Bank Fisheries Stock, Northwest Atlantic.** Reyes-Delgado, Angel[1], Santos, Nina[2], Langan, Joseph A. [2], Heinichen, Margaret[2], McMahon, Kelton W. [2], *[1]Universidad Ana G. Mendez, San Juan, Puerto Rico, [2]University of Rhode Island Graduate School of Oceanography, Narragansett, RI*

Atlantic Cod is an important food, culture, and economic resource in the Northwest Atlantic as well as an important top-down driver of regional food web dynamics. Currently there are two managed Cod stocks in US waters: the Gulf of Maine and Georges Bank (GB) stocks, the latter of which includes the Southern New England (SNE) subpopulation. In recent decades, the GB Cod stock has declined due to overfishing and rapid ocean warming, while the abundance of SNE Cod has increased. Our study addresses two related questions: 1) What are the physical characteristics of GB and SNE Cod? and 2) Do SNE and GB Cod look different from one another? To do this, we used morphometric analysis on images of SNE and GB Atlantic Cod from the Fisheries Observer Program in Fall 2018/Spring 2019. Images were processed with ImageJ using a 24 point box-truss network technique and established fish landmarks to measure ecologically relevant physical characteristics of body shape and size. Results from principal component analysis and logistic regressions showed that GB Cod were larger and more robust (normalized to total length) than SNE Cod, particularly across their heads, belly to second dorsal fin, first and second dorsal fins, and peduncle width. Our generalized linear model (GLM) was able to correctly classify fish to their regional subgroups 83% of the time. Our results add further scientific support to the growing idea that real and important ecological differences exist between these subpopulations of Cod that are currently managed as one GB stock.

A Baseline Benthic Habitat Assessment of the Vineyard Wind Lease Area within the MA Wind Energy Area.** Riley, Caitlyn, Stokesbury, Kevin, *UMass Dartmouth School for Marine Science and Technology, New Bedford, MA*

As offshore wind energy development experiences a rapid global expansion throughout coastal regions, environmental monitoring programs are necessary to anticipate and mediate impacts on marine ecosystems. As the first large-scale offshore wind developer in the United States,

Vineyard Wind is in the final stage of planning and preparing for development of the Vineyard Wind Lease Area (VWLA) within the Massachusetts Wind Energy Area beginning in early 2021. Our goal is to create a baseline dataset assessment of the current macrobenthic community and substrate habitat of the VWLA, adjacent control area, and broader regions of the northeast U.S. continental shelf. We developed a minimally invasive, image-based survey that allows for practical data collection without causing a disturbance to the seafloor. The drop camera survey method identifies the benthic macrofaunal community composition, substrate habitats, and the spatial and temporal scales of the communities within and surrounding the development areas. We will establish the "before" phase of a Before-After-Control-Impact study, incorporating both asymmetrical and gradient designs, while measuring the seasonal and annual variability of the areas over time.

Expert Swimmers and Tank Potatoes: Swimming Behavior of Alewives (*Alosa pseudoharengus*) at Differing Migratory Stages. Shook, Erika, Colby, Rebecca S., Schultz, Eric T., *University of Connecticut, Storrs, CT*

Alewife (*Alosa pseudoharengus*) is a threatened and diadromous species, for which swimming performance is critical in completing migrations between marine and freshwater environments. While previous research shows that actively-migrating fish (migrants) have greater body size and condition than those not yet migrating (residents), it is unknown whether swimming behavior differs between these groups. To investigate this, a behavioral analysis was conducted on migrant and resident juvenile Alewives collected from Bride Lake in East Lyme, CT. Alewives were swum individually at one body-length per second and video recorded. Behaviors were catalogued in an ethogram and time budgets were documented in a behavioral observation software (BORIS). We hypothesized that migrants would have a greater frequency of long-term and high-energy behaviors than residents. T-tests were used to analyze group differences in behaviors. Migrant and resident juvenile Alewife differ in percent total duration of both high-energy (p = 0.0007) and low-energy (p = 0.0186) swimming behaviors, but not in number of occurrences. The groups were equally likely to exhibit the behaviors, but migrants are able to exhibit those behaviors for a greater duration. This may be due to greater metabolic capacity and may be an indicator of greater migratory fitness. Future studies should observe Alewife behavior in a natural environment to better understand how this may affect their ecological interactions and migratory success.