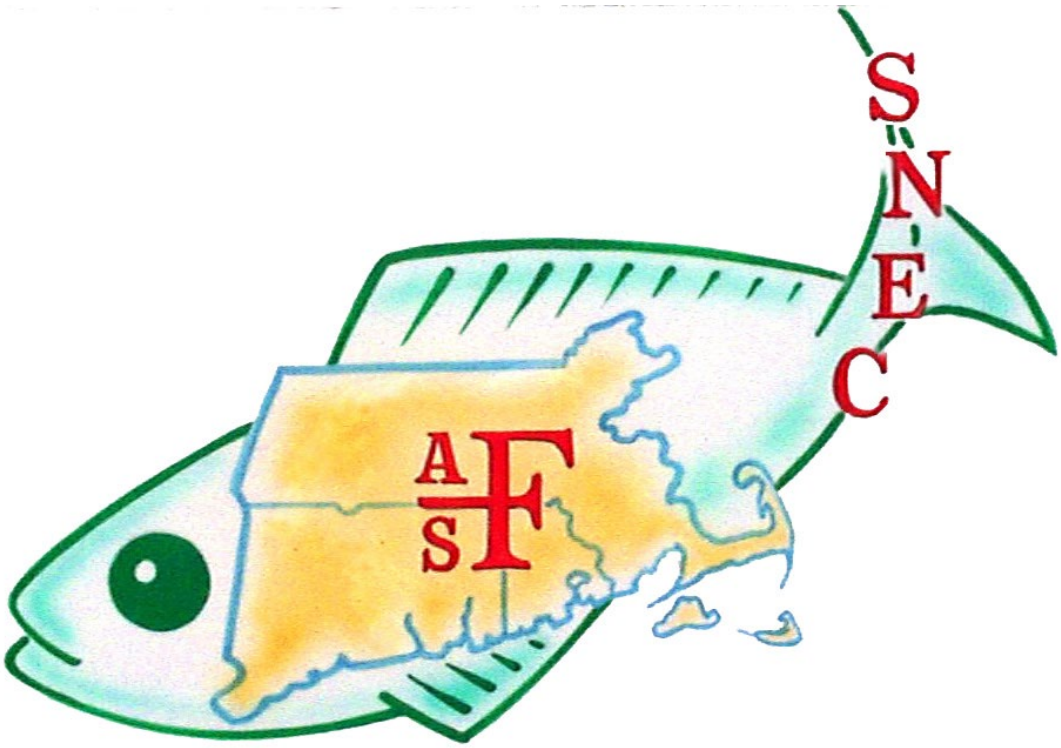
2022 Summer Science Meeting



Southern New England Chapter

American Fisheries Society

June 21, 2022

URI Bay Campus
Narragansett, RI

CODE OF CONDUCT

The Chapter provides a regional forum for fisheries researchers, educators, students, and managers to learn about and discuss the state of science. To uphold the highest level of standards, any form of discrimination based on federally protected classes (gender, gender identity/expression, sexual orientation, age, disability, genetic information, marital status, medical condition, nationality, country of origin, race or ethnicity, religion/religious beliefs, or military/veteran status) or harassment will not be tolerated. Harassment includes derogatory or unwelcome behavior, speech, or writing. Any perceived incidents should be reported to a member of the EXCOM or Board of Directors. Reports will be brought to the SNEC AFS Board of Directors or directly to the AFS Ethics Committee depending on the severity. Further guidance on general professional standards and conduct is available via AFS (https://fisheries.org/about/governance/standards-of-professional-conduct/).

Program

AGENDA FOR THE SNEC AFS 2022 SUMMER SCIENCE MEETING
Tuesday, June 21, 2022

8:15 – 8:45 ***Registration and Coffee***

8:45 – 9:00 **Opening Comments** Christopher McDowell, SNEC President

9:00 – 9:20 **Opening the Black Box: New Insights into the Marine Distributions of Pacific Salmon.** Langan, Joseph A.[1], Cunningham, Curry J.[1], Watson, Jordan T.[2], McKinnell, Skip[3], *[1]University of Alaska, Juneau, AK, [2]AK Fisheries Science Center, Auke Bay Laboratories, Juneau, AK, [3]Salmoforsk International Environmental Consulting, Victoria, BC*

9:20 – 9:40 **Assessing Atlantic Horseshoe Crab (*Limulus polyphemus*) Size and Behavior Within Southern New England.** Ameral, Natalie[1], Puritz, Jonathan[2], McManus, M. Conor[1], McNamee, Jason[1], Olszewski, Scott[1], *[1]RI Department of Environmental Management, [2]University of Rhode Island*

9:40 – 10:00 **Climate-Driven Stock Shifts and Expansions in the U.S. Northeast Shelf: Identifying Challenges, Opportunities, and Barriers Through Fishermen and Manager Perspectives.** Swetz, Sophie A.* *University of New England*

10:00 – 10:20 **Break**

10:20 – 10:40 **Counting Eggs Before They Hatch: Reproductive Seasonality of Blueback Herring.** Schultz, Eric T.[1], Ganias, Konstantine[2], Mouchlianitis, Foivos A.[2], Sprankle, Ken[3], *[1]University of Connecticut, [2]Aristotle University, Thessaloniki, Greece, [3]US Fish & Wildlife Service*

10:40 – 11:00 **Harvest Strategies for Climate-Resilient Fisheries.** Collie, Jeremy[1], Bell, Richard[2], Collie, Samuel[3], Minto, Coilin[4], *[1]URI Graduate School of Oceanography, [2]The Nature Conservancy, [3]Bren School, University of California Santa Barbara, [4]Galway-Mayo Institute of Technology, Galway, Ireland*

11:00 – 12:00 **Business meeting**

12:00 – 1:00 **Lunch**

1:00 – 1:20 **Fishery-Dependent Data Informs American Lobster (*Homarus americanus*) Stock Structure and Commercial Fleet Heterogeneity.** Huntsberger, Carl[1], Shank, Burton[2], McManus, M. Conor[3], Ellertson, Aubrey[1], *[1]Commercial Fisheries Research Foundation, [2]NOAA Northeast Fisheries Science Center, [3]RI Department of Environmental Management*

1:20 – 1:40 **Preference, Noncompliance, and Fishing Effort Under Alternative Management: A Choice Experiment Approach.** Chen, Zhenshan[1,2], Kasper, Jacob[1,3], Swallow, Stephen[1], Liu, Pengfei[4], Schultz, Eric[1], *[1]University of Connecticut, [2]Mississippi State University, [3]University of Missouri, [4]University of Rhode Island*

1:40 – 2:20 **Poster session**

2:20 – 2:40 **Bycatch Reduction of Red Hake in the Southern New England Whiting Trawl Fishery.** Chosid, David M., *Massachusetts Division of Marine Fisheries*

2:40 – 3:00 **Spatial and Temporal Dynamics of Fish Communities in an Offshore Wind Lease Area.** Rillahan, Christopher[1], Bank, Crista[2], He, Pingguo[1], *[1]University of Massachusetts Dartmouth, [2]Vineyard Wind*

3:00 – 3:20 **Applying Empirical Dynamic Modeling to Distinguish Abiotic and Biotic Drivers of Population Fluctuations in Sympatric Fishes**. Wasserman, Ben[1], Rogers, Tanya[2], Munch, Stephan[2], Palkovacs, Eric[1], *[1]University of California Santa Cruz, [2]NOAA Southwest Fisheries Science Center*

* Denotes student paper

Poster Session

P1 **Recognizing Salinity Threats in the Climate Crisis.** Burgess, Michael[1]**, Lee, Carol[2], Downey, Kala[3], Colby, Rebecca[1], Freire, Carolina[4], Nichols, Sarah[5], Judy, Kathryn[3,] *[1]University of Connecticut, [2]University of Wisconsin, [3]University of Arkansas, [4]Federal University of Paraná, Brazil, [5]University of Oxford, UK*

P2 **Human Dimensions of Rebounding Populations of Seals and White Sharks on Cape Cod, MA.** Jackman, J.[1], Bratton, R.[2], Sette, L.[3], Wood, S.[2], Bogomolni, A.[1,4], Sanderson, M.[5], Nichols, O.C.[3], Winton, M.[6], Long, M.[6], Dowling-Guyer[7], Sykes, S.[5], Wigren, C.[6], Rutberg, A.[7], Baseman, D.[1], Cummings, C.[7], Bramante, V.[1], Kako, V.[1], *[1]Salem State University, [2]University of Massachusetts Boston, [3]Center for Coastal Studies, [4]Northwest Atlantic Seal Research Consortium, [5]Cape Cod Commercial Fishermen's Alliance, [6]Atlantic White Shark Conservancy, [7]Center for Animals and Public Policy of the Cummings School of Veterinary Medicine at Tufts University*

P3 **Energy Budgets on Healthy and Shell-diseased American Lobster.** Secor, Riley**, Oviatt, Candace, *URI Graduate School of Oceanography*

P4 **Scoping Bay Scallop Restoration in Rhode Island: A Synthesis of Knowledge and Recommendations for Future Efforts.** Verkamp, Hannah[1], Nooij, Joshua[2], Helt, William[3], Ruddock, Kevin[3], Gerber Williams, Anna[4], McManus, M. Conor[4], Bethoney, N. David[1], *[1]Commercial Fisheries Research Foundation, [2]Northeastern University, [3]The Nature Conservancy, [4]RI Department of Environmental Management*

** Denotes student poster

Abstracts:
Platform Presentations

Assessing Atlantic Horseshoe Crab (*Limulus polyphemus*) Size and Behavior Within Southern New England. Ameral, Natalie[1], Puritz, Jonathan[2], McManus, M. Conor[1], McNamee, Jason[1], Olszewski, Scott[1], *[1]RI Department of Environmental Management, [2]University of Rhode Island*

The Atlantic horseshoe crab, *Limulus polyphemus*, remains a sought-after species for bait in the Eel and Whelk fisheries and as the originator of a biomedically significant endotoxin detection agent (*Limulus amoebocyte lysate*). Currently, Horseshoe Crabs are commercially managed over four large geographic regions of the east coast, yet evidence exists that finer scale local utilization may be more characteristic of their behavior. Sustainable management, particularly of a dual use species, relies heavily on clearly identifying stock units and segregated populations as each unit may require customized management tools. The work presented here aims to illustrate the physical characteristics and further describe movement of crabs (through a tagging study) in the southern New England region. The two working hypotheses tested here are (1) crab size varies with location and (2) crabs are statistically more likely to be recaptured at their original tagging location than any other sampling location. Crabs were sampled across eight Rhode Island locations, one site in Connecticut, and one site in Massachusetts. Pairwise Wilcoxon tests showed significant differences in carapace width between sites in 28% of male comparisons and 18% of female comparisons. Of these significant differences, 69% and 63% occurred across state lines for males and females, respectively. A significant difference in total weight between sites was observed for 44% significant male comparisons (45% interstate) and 13% significant female comparisons (100% interstate). Overall, tagging data analyzed with Pearson's Chi-squared test showed a significant relationship between tagging and recapture location (p = 0.00005); however, these results are confounded by the large range in recapture data points by location (min n = 1, max n = 1449). When combined with previous studies, these results support a shift towards management units being executed at the state level.

Preference, Noncompliance, and Fishing Effort Under Alternative Management: A Choice Experiment Approach. Chen, Zhenshan[1,2], Kasper, Jacob[1,3], Swallow, Stephen[1], Liu, Pengfei[4], Schultz, Eric[1], *[1]University of Connecticut, [2]Mississippi State University, [3]University of Missouri, [4]University of Rhode Island*

In projecting the impact of changing restrictions on fishing, recreational fisheries managers assume that anglers do not alter their fishing behaviors. However, anglers may be expected to strategically optimize effort and may change their rate of compliance to achieve their objectives. Ignoring these changes in angler behavior reduces the accuracy of projections and undermines the ability to accomplish management goals. We employed a choice-experiment survey instrument to elicit recreational anglers' preferences, fishing effort, and expected noncompliant harvest under current and alternative management scenarios for an overfished stock (Long Island Sound Tautog). To identify preferences, we employed choice questions incorporating the status quo minimum size limit and two alternatives including a more restrictive minimum size limit and one of several slot limits. To estimate effort and noncompliance, we included follow-up questions after each choice set. We estimated noncompliance via an innovative approach designed to elicit information on behaviors that respondents are sensitive to disclose. The survey additionally collected baseline data on fishing behavior, preferences and demographics. Almost 2000 anglers in CT and NY completed the survey in 2019. Respondents preferred slot limits over a more restrictive minimum size limit. Anglers indicated a 7.7% decrease in future fishing effort with either a wide slot limit or a more restrictive minimum size limit, compared to what they would do under status quo regulations. More than 17% of anglers would not comply with new size limits. We projected annual change in biomass for 50 years with slot limit management assuming full compliance and varying rates of noncompliance. Relative to the minimum size limit, the biomass is expected to recover more quickly, and remain larger, with slot limits in all scenarios except for when noncompliance approaches 30%. With these results, more precise biological models can be developed to predict the potential outcomes under alternative management approaches, taking better account of changes in angler behavior.

Bycatch Reduction of Red Hake in the Southern New England Whiting Trawl Fishery. Chosid, David M., *Massachusetts Division of Marine Fisheries*

The southern Red Hake (*Urophycis chuss*) stock is overfished with overfishing occurring and requires rebuilding. However, these fish are caught along with the healthy Silver Hake/Whiting (*Merluccius bilinearis*) in exempted small-mesh trawl fisheries in the Northeast U.S. To reduce impact of the fishery on the Red Hake stock, trip limits have been imposed, but have not been particularly effective. Fishermen are concerned that Red Hake's status could trigger more restrictive measures beyond possession limits or effort controls that will inhibit targeting of Whiting in the Southern New England (SNE) small-mesh fishery. Trawl gear modifications that exploit behaviors within species can provide a way to selectively target Whiting while reducing Red Hake catch. Past research shows some evidence of a proclivity for different vertical

positions of hake species in nets and differences in their abilities to exploit escape opportunities. Therefore, we conducted two fishing research trips in the SNE small-mesh fishery in April and May 2022, testing a standard, control Whiting net against a similar, experimental net with a large-mesh (15-inch diamond) belly panel modification designed to allow Red Hake to escape. The two nets' belly panels were swapped between trips to account for any net effects. Control and experimental alternate tows were paired and conducted day and night. Sixty-four valid tows were completed and preliminary results are being analyzed.

Harvest Strategies for Climate-Resilient Fisheries. Collie, Jeremy[1], Bell, Richard[2], Collie, Samuel[3], Minto, Coilin[4], *[1]URI Graduate School of Oceanography, [2]The Nature Conservancy, [3]Bren School, University of California Santa Barbara, [4]Galway-Mayo Institute of Technology, Galway, Ireland*

A pressing challenge for climate-vulnerable fisheries is how to manage now for present and future climate change. In contrast to climate forecasting approaches, we track integrated signals of change for example populations in a climatically forced region and use stochastic dynamic programming to compare the performance of a range of management-ready policies over all possible future states. Our main results highlight: 1) that biomass-linked harvest control rules (HCRs) can partially compensate for changing production, even if the HCR is time invariant; and 2) that the form of utility (e.g., risk neutral or risk averse) can result in remarkably different optimal decision paths. Performance over future horizons degrades marginally from dynamic HCRs to static HCRs (except at low productivity where differences are more pronounced) but markedly when the biomass level is ignored altogether, as is the case in many managed fish populations globally. Understanding the processes whereby climate affects productivity is important for interpreting past data, but forecasts are not needed for tactical decision making now. Instead, we argue that the priorities for managing fish stocks influenced by climate change are to: measure the current productivity, assess the current abundance of the stock, and respond with a dynamic harvest control rule.

Fishery-Dependent Data Informs American Lobster (*Homarus americanus*) Stock Structure and Commercial Fleet Heterogeneity. Huntsberger, Carl[1], Shank, Burton[2], McManus, M. Conor[3], Ellertson, Aubrey[1], *[1]Commercial Fisheries Research Foundation, [2]NOAA Northeast Fisheries Science Center, [3]RI Department of Environmental Management*

The offshore American Lobster fishery has no targeted survey leaving many uncertainties in the offshore harvest. The Commercial Fisheries Research Foundation has trained 29 vessels, with broad spatial sampling across the fishery, to collect biological data aimed to fill this data gap. To

identify spatio-temporal trends or vessel effects in this dataset, the demographics of 145,663 lobsters from 2,962 sampling events were evaluated by a k-means cluster analysis. Results grouped sampling events into one of three distinct categories: a majority of the catch being sublegal, a majority of the catch being between legal size and 105 mm, or a majority of the catch being larger than 105 mm (75th percentile). These groups were distributed between broad geographical areas where no effect of individual vessel, depth, season, or stock area were identified using a generalized linear model. Year and statistical area were significant predictors of which cluster each sampling event fell into. The effect of statistical area highlighted small-scale spatial patterns, particularly the difference in the catch characteristics of lobsters on Georges Bank to the lobsters in Southern New England with the break occurring at a location that does not match the current stock boundary between these two populations.

Opening the Black Box: New Insights into the Marine Distributions of Pacific Salmon. Langan, Joseph A.[1], Cunningham, Curry J.[1], Watson, Jordan T.[2], McKinnell, Skip[3], *[1]University of Alaska, Juneau, AK, [2]AK Fisheries Science Center, Auke Bay Laboratories, Juneau, AK, [3]Salmoforsk International Environmental Consulting, Victoria, BC*

Illegal, unreported, and unregulated (IUU) fishing presents a major challenge for global fisheries management, but increasingly available vessel tracking data primarily describe legal and legitimate activities. In vast ocean regions like the North Pacific, this makes the detection of IUU fishing difficult and leaves valuable species with uncertain distributions particularly vulnerable to exploitation. Pacific salmon spend a large part of their life cycle in the open ocean, where climatic conditions are thought to strongly influence habitat selection and survival. Although salmon as a group are abundant in the surface waters of the North Pacific, critical knowledge gaps regarding their ocean ecology and distributions persist. As a result, it is difficult to assess how high seas environmental conditions and IUU fishing impact the culturally and socioeconomically important fisheries salmon support throughout their range. To address this issue, we assembled a novel database of historic high seas survey data and fit species distribution models to: 1) describe the marine spatial distributions of six salmon species, 2) characterize how distributions evolve seasonally, and 3) evaluate species-specific temperature preferences. While sea surface temperature was found to significantly influence the seasonal distribution of all species, the results suggest some salmon are more responsive to temperature than others. This work develops an expanded understanding of salmon ocean distributions, providing a unique window into this often unobserved but crucial portion of the life cycle, and serves as a baseline for future investigations into the mechanisms influencing salmon spatial ecology and vulnerability to harvest in the North Pacific.

Spatial and Temporal Dynamics of Fish Communities in an Offshore Wind Lease Area.
Rillahan, Christopher[1], Bank, Crista[2], He, Pingguo[1], *[1]University of Massachusetts Dartmouth, [2]Vineyard Wind*

Developing fisheries monitoring tools and techniques are vitally important to understanding the impact wind energy development will have on local fish populations. Trawls are a general tool for assessing the biological communities along the seafloor and are widely used by institutions worldwide for ecological monitoring. In 2019, the University of Massachusetts Dartmouth developed a trawl survey to study the development of the Vineyard Wind 1 lease site (OCS-A 0501). The primary goal of the survey was designed to provide data on seasonal fish abundance, distribution, population structure and community composition. To increase standardization and compatibility with ongoing regional surveys, the trawl survey closely emulates the regional Northeast Area Monitoring and Assessment Program (NEAMAP). Over three years this program has conducted 400 tows through 10 seasonal surveys. The catch data obtained shows a dynamic area with a diversity of marine species. A total of 57 species were collected; however, the majority of the catch was comprised of a small subset of the observed species. The five most abundant species (Spiny Dogfish, Little Skate, Scup, Silver Hake and Red Hake) accounted for 78% of the total catch weight in the study areas. All species caught displayed interannual and seasonal variations in distribution and abundance. The data indicated a unique assemblage of species and abundance in each of the four seasons. While this survey focuses on a single development project, this survey methodology is expected to be expanded to several additional development projects in the region. Developing and evaluating standardized methodologies are going to important for large-scale regional assessments.

Counting Eggs Before They Hatch: Reproductive Seasonality of Blueback Herring.
Schultz, Eric T.[1], Ganias, Konstantine[2], Mouchlianitis, Foivos A.[2], Sprankle, Ken[3], *[1]University of Connecticut, [2]Aristotle University, Thessaloniki, Greece [3]US Fish & Wildlife Service*

Careful study of habitat that is critical for spawning and the success of early life stages is warranted for species of conservation concern. Critical spawning habitat has a temporal component: we need to know not only where but when spawning occurs, and whether spawning during some portions of the reproductive season yields more successful offspring than others. The goal of the study reported here was to determine how best to represent the spawning season. We compared depictions of the spawning season requiring progressively more intensive analysis: 1) the catch per unit effort (CPUE) of individuals; 2) the CPUE of females; 3) the CPUE of females in spawning condition, weighted by their ovary size; and, 4) the CPUE of females in spawning condition, weighted by the number of developed oocytes in their

ovaries. We demonstrate that the spawning season, as defined by the abundance of eggs, is slightly earlier than that defined by the abundance of spawners, because reproductive allocation declines as the season progresses. We also find evidence of migratory contingents and differences in the migration of repeat vs. first-time spawners. Ongoing monitoring of Blueback Herring adults will provide a useful baseline representation of the spawning season for analysis of how growth and survival vary among different birth date classes of offspring.

Climate-Driven Stock Shifts and Expansions in the U.S. Northeast Shelf: Identifying Challenges, Opportunities, and Barriers Through Fishermen and Manager Perspectives. Swetz, Sophie A.* *University of New England*

Climate-driven warming in the U.S. Northeast Shelf (NES) has led to changes in the spatial distributions of many marine resources. Shifts and expansions of commercially important fish stocks pose major challenges to fishermen and fisheries managers in this region. American Lobster (*Homarus americanus*) in the Gulf of Maine (GOM) is one of these impacted stocks and is projected to continue its shift towards more northern and offshore areas. Continued ocean warming could potentially reduce the GOM lobster stock by up to 60% over the next several decades. Given Maine's reliance on its lobster fishery—which contributes over 80% of the value of Maine's commercially harvested marine resources—building climate resilience into the fisheries social-ecological system is critical. Southern New England (SNE) serves as an example of a region that has already experienced much of the changes posed to impact the GOM. Through semi-structured interviews with SNE and GOM fishermen and a focus group of NES fisheries managers, Black Sea Bass (*Centropristis striata*) was identified as a potential opportunity for fishermen to adapt to climate-driven changes. However, existing barriers—such as permitting, quota allocations, and bycatch regulations—prohibit the region's fishermen from actualizing emerging opportunities. Results indicated that these barriers are not insurmountable and implementing "social-ecological management" approaches could provide viable pathways to facilitate opportunities and bolster climate resilience in the GOM.

Applying Empirical Dynamic Modeling to Distinguish Abiotic and Biotic Drivers of Population Fluctuations in Sympatric Fishes. Wasserman, Ben[1], Rogers, Tanya[2], Munch, Stephan[2], Palkovacs, Eric[1], *[1]University of California Santa Cruz, [2]NOAA Southwest Fisheries Science Center*

Fluctuations in the population abundances of interacting species are widespread. Such fluctuations could be a response to abiotic factors, biotic interactions, or a combination of the two. Correctly identifying the drivers is critical for effective population management. However,

such effects are not always static in nature. Nonlinear relationships between abiotic factors and biotic interactions make it difficult to parse true effects. We used a type of nonlinear forecasting, empirical dynamic modeling, to investigate the context-dependent species interaction between a common fish (Threespine Stickleback) and an endangered one (Northern Tidewater Goby) in a fluctuating environment: a central California bar-built estuary. We found little evidence for competition, instead both species largely responded independently to abiotic conditions. Stickleback were negatively affected by sandbar breaching. The strongest predictor of Tidewater Goby abundance was stickleback abundance; however, this effect was not a uniform negative effect of stickleback on goby as would be hypothesized under interspecific competition. The effect of stickleback on gobies was positive, though it was temporally restricted. Tidewater Goby abundance in the summer was strongly positively correlated to stickleback abundance in the spring, which represents an offset in the reproductive and recruitment peaks in the two species that may help minimize competition and promote coexistence. Our study demonstrates how empirical dynamic modeling can be applied to understand drivers of population abundance in putative competitors and inform management for endangered species.

Abstracts:
Poster Presentations

Recognizing Salinity Threats in the Climate Crisis. Burgess, Michael[1]**, Lee, Carol[2], Downey, Kala[3], Colby, Rebecca[1], Freire, Carolina[4], Nichols, Sarah[5], Judy, Kathryn[3], *[1]University of Connecticut, [2]University of Wisconsin, [3]University of Arkansas, [4]Federal University of Paraná, Brazil, [5]University of Oxford, UK*

Climate change is causing habitat salinity to transform at unprecedented rates across the globe. While much of the research on climate change has focused on rapid shifts in temperature, far less attention has focused on the effects of changes in environmental salinity. Consequently, predictive studies on the physiological, evolutionary, and migratory responses of organisms and populations to the threats of salinity change are relatively lacking. This omission represents a major oversight, given that salinity is among the most important factors that define biogeographic boundaries in aquatic habitats. In this perspective, we briefly touch on responses of organisms and populations to rapid changes in salinity occurring on contemporary time scales. We then discuss factors that might confer resilience to certain taxa, enabling them to survive rapid salinity shifts. Next, we consider approaches for predicting how geographic distributions will shift in response to salinity change. Finally, we identify additional data that are needed to make better predictions in the future. Future studies on climate change should account for the multiple environmental factors that are rapidly changing, especially habitat salinity.

Human Dimensions of Rebounding Populations of Seals and White Sharks on Cape Cod, MA. Jackman, J.[1], Bratton, R.[2], Sette, L.[3], Wood, S.[2], Bogomolni, A.[1,4], Sanderson, M.[5], Nichols, O.C.[3], Winton, M.[6], Long, M.[6], Dowling-Guyer[7], Sykes, S.[5], Wigren, C.[6], Rutberg, A.[7], Baseman, D.[1], Cummings, C.[7], Bramante, V.[1], Kako, V.[1], *[1]Salem State University, [2]University of Massachusetts Boston, [3]Center for Coastal Studies, [4]Northwest Atlantic Seal Research Consortium, [5]Cape Cod Commercial Fishermen's Alliance, [6]Atlantic White Shark Conservancy, [7]Center for Animals and Public Policy of the Cummings School of Veterinary Medicine at Tufts University*

Bounty hunting in 19th and 20th centuries led to the local extinction of seals from Massachusetts coastal waters by the 1950s. Northwest Atlantic White Shark populations

experienced substantial declines as a result of commercial fisheries bycatch and recreational fishing, suffering population reductions as high as 80% between the 1960s and end of the century. With legal protections, populations of both seals and sharks have begun to rebound. Increases in the local abundance of seals and sharks are considered conservation success stories. Re-establishment of seal and shark populations has generated new tourist industries and constituencies. However, conflicts related to seal and shark populations threaten continued conservation of both species. With support from Woods Hole Sea Grant and the goal of fostering coexistence, enhancing public safety, and mitigating conflicts, a team from Salem State University, University of Massachusetts-Boston, Center for Coastal Studies, Tufts Center for Animals and Public Policy, Cape Cod Commercial Fishermen's Alliance, and Atlantic White Shark Conservancy in 2021 surveyed representative samples of Cape Cod residents, tourists and commercial fishers about their views of and experiences with seals and sharks. We will share findings from our 2021 study about values, beliefs, and knowledge related to marine wildlife in general, and seals and sharks in particular, within these key stakeholder groups.

Energy Budgets on Healthy and Shell-diseased American Lobster. Secor, Riley**, Oviatt, Candace, *URI Graduate School of Oceanography*

Like many crustacean species, the American Lobster, *Homarus americanus,* is susceptible to varying forms of shell disease. The appearance of a novel form of shell disease termed "epizootic shell disease" (ESD) in Rhode Island in the late 1990s has raised concerns over its impact on lobster physiology, population dynamics, and the fishery. The present study seeks to expand on known physiological impacts by conducting laboratory energy budgets on healthy and shell- diseased juvenile lobster. When a shell-diseased lobster's innate immune system is activated, it is very energetically demanding. We wish to know if energy is being diverted from other components of the energy budget in shell-diseased lobster. Over the course of six months, energy pathways including ingestion, egestion, excretion, resting metabolism, and growth were tracked for a cohort of 43 immature lobster. Preliminary analysis indicate that diseased lobster have a lower fecal caloric content, implying a higher digestion efficiency and more energy retained. Diseased lobster also show decreased ammonia production indicative of a lower rate of deamination of amino acids. As described in previous studies, diseased lobster were found to have a decreased growth increment. No difference was found in ingestion rates or resting oxygen consumption. Taken together these observations indicate that while diseased lobster do not consume more energy than healthy ones, they may be more efficient at digesting incoming energy, and expend less energy on deamination in order to retain intact amino acids for their innate immune systems.

Scoping Bay Scallop Restoration in Rhode Island: A Synthesis of Knowledge and Recommendations for Future Efforts. Verkamp, Hannah[1], Nooij, Joshua[2], Helt, William[3], Ruddock, Kevin[3], Gerber Williams, Anna[4], McManus, M. Conor[4], Bethoney, N. David[1], *[1]Commercial Fisheries Research Foundation, [2]Northeastern University, [3]The Nature Conservancy, [4]RI Department of Environmental Management*

The Bay Scallop is a culturally important species that once supported significant fisheries along the United States east coast. However, mass population declines in the 1900s led to a nearly total loss of the fishery in most states, including Rhode Island. In certain areas, intensive, long-term restoration efforts have effectively restored populations and fisheries on a small scale, but indicate that such plans must be scoped specific to the system. In an effort to support the upcoming Rhode Island Shellfish Restoration Plan, relevant knowledge on Bay Scallops was collated and summarized, and this information was used to create a habitat suitability index that can act as a guide to identify suitable restoration sites for renewed Bay Scallop restoration efforts in one of the largest coastal salt ponds in Rhode Island, Point Judith Pond. Point Judith Pond was once the epicentre of the state's Bay Scallop fishery, and the ranked index suggests multiple sites throughout the pond are likely to once again provide adequate habitat for Bay Scallops. Restoration strategies such as caged spawner sanctuaries and the release of competent larvae sited in areas identified as suitable by the index should be prioritized in future restoration planning for this species.