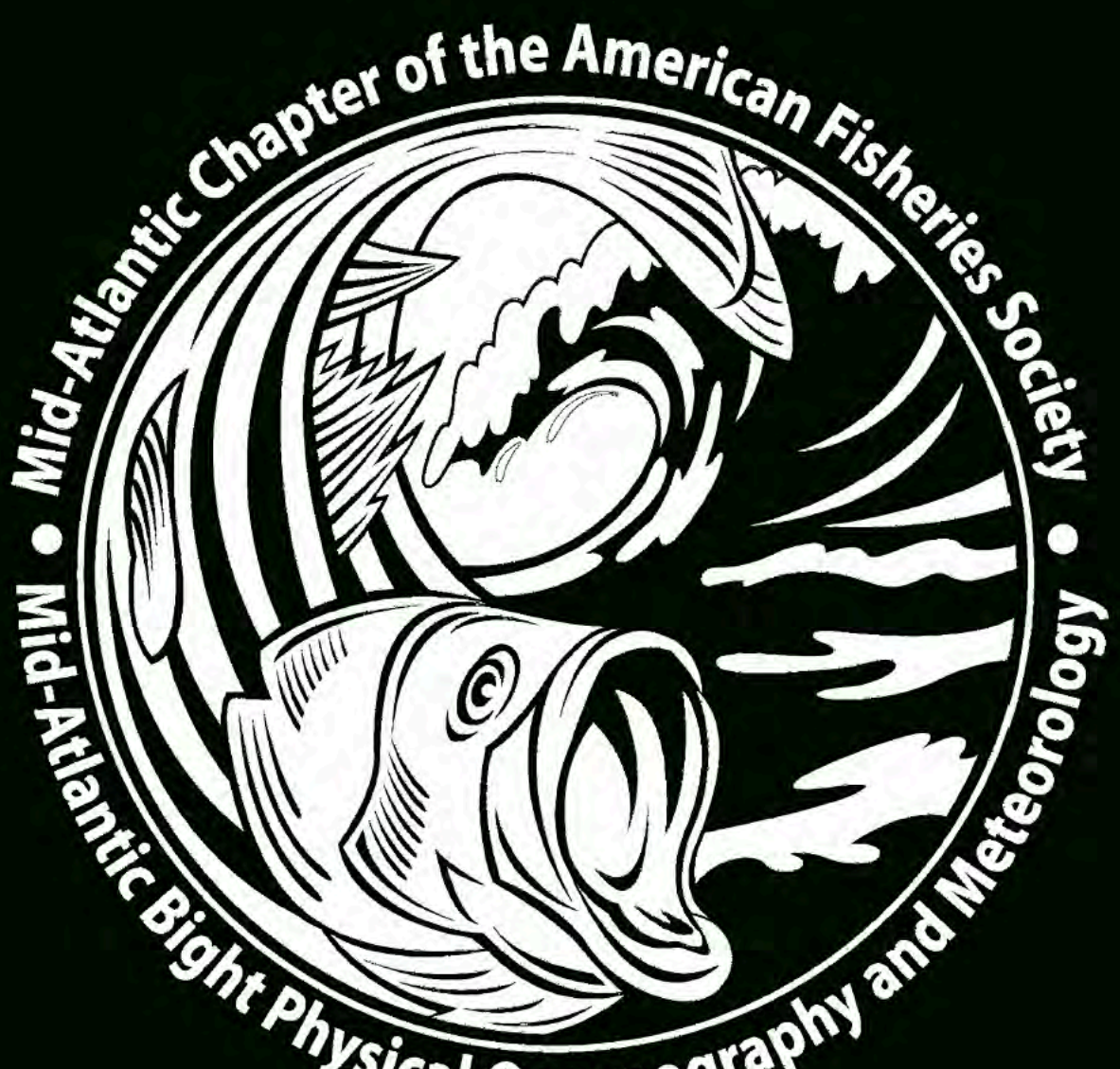

Cape May, NJ

OCTOBER 2015

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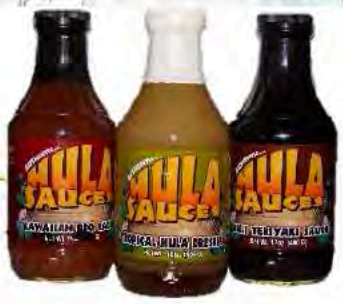

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Co-hosted by the Mid-Atlantic Bight Physical Oceanography and Meteorology (MABPOM) and the Mid-Atlantic Chapter of the American Fisheries Society (MAC-AFS)

Cape May Convention Center, Cape May, NJ
October 28 – 30, 2015

MEETING SCHEDULE **(* indicates student presenter)**

Wednesday - October 28th, 2015 (MABPOM Talks)

8:00 - 9:00: Registration; Coffee and light breakfast provided
9:00 - 9:10: Welcome & Logistics

9:30 - 9:50:
"High-resolution river velocities from airborne image sequences", Richard Mied, NRL

9:50 - 10:10:
"A time series analysis of Virginia barrier island shoreline movement and correlations to sea level, wave height changes, and teleconnection patterns ", James Haluska, Old Dominion University

10:10 - 10:30:
"Sea Breeze Analysis and Prediction for Offshore Wind Energy using Lagrangian Coherent Structures and WRF", Greg Seroka, Rutgers University

10:30 - 11:00: Break

11:00 - 11:20:
"An Investigation into the Distribution and Mixing of River Water in Long Island Sound and Its Influence on Stratification", Steven Schmidt*, University of Connecticut

11:20 - 11:40:
"Meteorological and Climate Forcing of Salinity and Water Temperature Variability in the Long Island Sound", Justin Schulte*, Stevens Institute of Technology

11:40 - 12:00:
"Heat balance in the Northwest Atlantic coastal ocean: the role of atmospheric forcing versus ocean advection during an extreme warming", Ke Chen, Woods Hole Oceanographic Institution

11:50 - 1:30: Lunch; sandwiches and salads provided

1:30 - 1:50:
"MARACOOS as the Backbone of Ocean Observing in the Mid-Atlantic: recent developments around support of marine fisheries management and shellfish aquaculture businesses", Peter Moore, MARACOOS

1:50 - 2:10:
"Repair and Hardening of Mid Atlantic Ocean Observing Assets After Hurricane Sandy", Hugh Roarty, Rutgers University

2:10 - 2:30:
"Coastal ocean processes during Mid-Atlantic tropical cyclones", Travis Miles, Rutgers University

2:30 - 3:00: Break

3:00 - 3:20:
"From sea level slope to temperature: remarkable connections on the Middle Atlantic Bight shelf in a hotspot of climate change", Magdalena Andres, Woods Hole Oceanographic Institution

3:20 - 3:40:
"Influence of Wind and Sea-Surface Topography on Shelf-Slope Exchange near Washington Canyon", Donglai Gong, Virginia Institute of Marine Sciences

3:40 - 4:00:
"Comparison of the Mid-Atlantic Regional Association Coastal Ocean Observing System AVHRR Sea Surface Temperature product to NDBC sites", Matt Oliver, University of Delaware

Thursday - October 29th, 2015 (Joint Talks)

8:00 - 9:00 – Registration; Coffee and light breakfast provided
8:45 - Welcome & Logistics

Plenary Session
9:00 - 9:20:
"Physics, Fish and Fisheries: Collaborative partnerships are required for applied ecosystem research in 21st century", John Manderson, NOAA

9:20 - 9:40:
"The Benefits and Challenges of Integrating Animal Telemetry into Ocean Observatories", Matt Oliver, University of Delaware

9:40 - 10:00:
"Are we preparing the next generation of fisheries professionals for successful careers?", Steve McMullin, Virginia Tech

10:00 - 10:30: Plenary Panel Discussion

10:30 - 11:00 – Break

11:00 - 11:20:
"History of Research in Selected Southern New Jersey Estuaries: 1800s to the Present", Ken Able, Rutgers University

11:20 - 11:40:
"Sustainable Fishery – Sustainable Habitat: Managing Delaware Bay Oysters", David Bushek, Rutgers University

11:40 - 12:00:
"Climate links to Long Island Sound fisheries: Anomalies, trends, and teleconnections based on a 34 year NYHOPS physical model hindcast analysis", Nickitas Georgas, Stevens Institute of Technology

12:05 - 1:15[1] – Lunch; sandwiches and salads provided

1:30 - 1:50:
"Relative Importance of Physical and Biological Processes in Controlling Hypoxia in Narragansett Bay", Dave Ullman, University of Rhode Island

1:50 - 2:10:
"Long-term trends in migration timing based on thermal response of a temperate forage fish", Laura Palamara, Rutgers University

2:10 - 2:30:
"Dynamic Seascapes Predict the Marine Occurrence of an Endangered Species: Atlantic Sturgeon Acipenser oxyrinchus oxyrinchus", Matt Breece*, University of Delaware

2:30 – 2:45 - Break

2:45 – 3:00:
"*It's All About Flounder (Paralichthys dentatus)*", Jenna Kwiecinski*, MATES Academy

3:00 - 3:20:
"Separate and Combined Effects of Anthropogenic Co-stressors in the Early Life-Stages of Atlantic and Shortnose Sturgeons", Chris Chambers, NOAA

3:20 - 3:40:
"An early juvenile (age 0-1) Atlantic Sturgeon abundance estimate and habitat usage within the Delaware River Estuary, USA", Ed Hale, DNREC-DFW

3:40 - 4:00:
"Internal Acoustic Transceivers Reveal the Annual Social Network Patterns in a Coastal Top Predator; a Tale of Two Sharks", Danielle Haulsee*, University of Delaware

4:00 - 5:00: Mid Atlantic Chapter Business Meeting (AFS); short discussion of 2018 National Meeting Status; Poster Session Setup

5:00 - Late: Networking Social; Student Auction and Joint AFS and MABPOM Poster session, appetizers provided

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[1] *We will hold a concurrent teacher workshop breakout session from 12:05 – 2:00, all educators are welcome to attend. Contact Jenny Paterno with questions about the workshop (jenny.paterno@rutgers.edu)*

Friday - October 30th, 2015 (MAC AFS Agenda)

8:00 - 9:00 – Registration; Coffee and light breakfast provided

9:00 - 9:20:
"Ecological Consequences from the Historical Damming of New England Watersheds", Steven Mattocks*, University of Massachusetts Amherst

9:20 - 9:40:
"American Eel and Crayfish in Freshwaters of the Delaware Drainage", Richard J. Horwitz Academy of Natural Sciences, Drexel University

9:40 - 10:00:
"Examination of Ecological Attributes for Large River Fish Communities in NJ and NY: Implications for Index of Biological Integrity (IBI) Development", Jim Kurtenbach, USEPA

10:00 - 10:20:
"Management of a top inshore predator: Differing goals of recreational and commercial fishers of Atlantic Striped Bass and the unforeseen impacts on other fisheries", Desmond M. Kahn, Delaware Division of Fish and Wildlife

10:20 - 10:40: Break

10:40 - 11:00:
"Implications of expanded age sampling on Bluefish Pomatomus saltatrix *catch at age estimates",* Michael Celestino, NJ Division of Fish and Wildlife

11:00 - 11:20:
"Spatiotemporal variability in survey dredge efficiency and its application in the annual stock assessment of the Eastern Oyster, Crassostrea virginica*"*, Jason Morson*, Rutgers University

11:20 - 11:40:
"Assessment of the New Jersey Volunteer Angler Survey", Jeffrey Brust, NJ Division of Fish and Wildlife

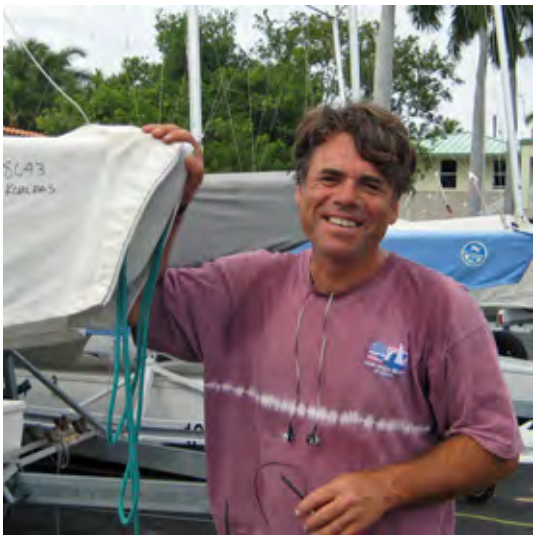
11:40 – 12:00
"Adult blue crabs in the Sedge Island Marine Conservation Zone: Evidence of reduced fishing effects?", Paul Jivoff, Rider University

12:00 - 1:00: Lunch; sandwiches and salads provided

KEYNOTE SPEAKER BIOGRAPHY

John Manderson, PhD

NOAA/NEFSC Cooperative Research Program



John P. Manderson is a research fisheries biologist working for the North East Fisheries Science Center Cooperative Research Program and Ecosystem processes division at NMFS, NOAA. His research interests include relationships between habitat dynamics and the dynamics of populations and ecosystems, applications of Integrated Ocean Observing Systems to marine habitat and ecosystem ecology, and the development of a quantitative seascape ecology supporting assessment and management of marine resources. His approaches include blending the ecological knowledge of academic and fishing industry experts into a holistic science that integrates the understanding of "wild" and human ecological systems to inform strategies of sustainable natural resource use in the oceans. He recently formed and led the OpenOcean study group, a multidisciplinary group of government, academic and fishing industry experts who successfully developed an approach to formally integrate considerations of habitat dynamics related to climate change into the assessment of an important stock of forage fish in the Northwest Atlantic. Dr. Manderson received his PH'D in Natural Resource Conservation from the University of Massachusetts, Amherst.

POSTER PRESENTATIONS

MABPOM Posters

"Circulation Near the Nose Region of a Surface Trapped Coastal Current",
Piero Mazzini*, Rutgers University

"Influence of wind-driven circulation and swimming behavior on estuarine ingress of fish larvae",
Anna Pfeiffer-Hebert, Stockton University

"Potential climate change impacts on the spring phytoplankton bloom in Chesapeake Bay",
Meng Xia, University of Maryland, Eastern Shore

MAC-AFS Posters

"Early Post-Settlement and in Wild Eastern Oyster (Crassostrea virginica) Populations",
Sarah Borsetti, Rutgers University, Haskin Shellfish Research Lab

"Sex Ratio Trends of Waved Whelk (Buccinum undatum) Populations in the mid-Atlantic",
Collin Dobson, Rutgers University, Haskin Shellfish Research Lab

"Use of fine scale positioning system to assess Atlantic Sturgeon behavior in proximity to large mesh sink gillnets in marine waters",
Keith Dunton, Monmouth University, Department of Biology

"Evaluating the ORCS Working Group approach for data-poor catch estimation using the RAM Legacy Stock Assessment Database",
Christopher M. Free*, Rutgers University, Department of Marine & Coastal Sciences

"Development of rapid salamander monitoring and habitat assessment protocols for the Delaware River basin",
David Keller, Academy of Natural Sciences of Drexel University

"Shallow water fish assemblages in the Great Bay-Mullica River estuary: Comparison over time and along the temperature and salinity gradients",
Sage Mitchell*, Rutgers University, Marine Field Station

"Population Biology of Oyster Toadfish, Opsanus tau, in New Jersey Estuaries",
Francesca Roselli*, Rutgers University

"Evacuation Rates of Clearnose Skate, Goosefish, and Summer Flounder",
Linda L. Stehlik, Northeast Fisheries Science Center, National Marine Fisheries Service, NOAA - James J. Howard Marine Sciences Laboratory

"American Eel Density and Length-Frequency Pre-Dam Removal on the Paulinskill River",
Allison M. Stoklosa, Academy of Natural Sciences of Drexel University

"What factors have contributed to the increase of sea nettles in Barnegat Bay?",
Talia Young*, Rutgers University, Ecology & Evolution

EDUCATOR WORKSHOP

Participating Schools

Cape May Technical High School
Lower Cape May Regional High School
Richard M. Teitelman Middle School
Arthur P. Schalick High School
Cape Educational COMPACT School
Marine Academy of Technology and Environmental Science
Woodstown High School

Workshop Goals:

- Brainstorm methods for converting new fisheries research into classroom activities to enhance STEM education
- Review classroom-ready lesson plans developed by Rutgers University staff and discuss the Next Generation Science Standards
- Learn about new online resources and curriculum guides available to educators

Facilitator: Jenny Paterno is a Program Coordinator at the Haskin Shellfish Research Laboratory, Rutgers University. Her graduate research focused on the fish and invertebrate community use of enhanced and natural oyster reefs in the Delaware Bay. In addition to research, she helps coordinate Project PORTS: *Promoting Oyster Restoration Through Schools*, an educational and community-based oyster restoration program that offers K-12 students hands-on classroom programming and an opportunity to participate in a real world oyster restoration project.

Guest presenter: Janice McDonnell is an Associate Professor and Science, Engineering and Technology 4-H Agent at Rutgers University. She is the Director of the NSF funded Center for Ocean Science Education Excellence Networked Ocean World (COSEE NOW). Her experiences include working with a range of audiences in a variety of contexts implementing educational programs to increase "ocean literacy" and helping scientists explain to the public what they do and why it's important.

A special note of thanks to Chris Kobik, Superintendent of Lower Cape May Regional School District for his collaboration and support.

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MID-ATLANTIC CHAPTER
Mid-Atlantic Chapter of the American Fisheries Society

"High-Resolution river velocities from airborne image sequences"
Presenting author: Richard Mied, Remote Sensing Division, Naval Research Laboratory, Washington, DC 20375
Co-authors: Wei Chen, Geoffrey B. Smith, W. David Miller, Ellen J. Wagner, William J. Rhea, Chery, Ann Blain, and Charlotte M. Snow

Determining surface currents remotely in coastal waters has been a persistent need for oceanographers, and a number of techniques have been developed over the last several decades. Aircraft provide the flexibility to image a wide area and enable tailoring the image separation times and pixel size for any specific need. NRL's Global Optimum Solution (GOS) technique extracts velocities from only two remote sensing images, and its accuracy has been verified using numerical models and satellite images of the North Atlantic Ocean. In addition, preliminary comparisons of GOS-derived velocities with those obtained from satellite image sequences and NOAA reference prediction stations in the Potomac River reveal good agreement. The next step is to determine the technique's applicability to airborne imagery of a river environment.

In this talk, we compare between GOS velocities from airborne image pairs and in-situ current measurements in the Potomac River, MD/VA. River traverses with an RDI RiverRay were conducted while an aircraft imaged the same area with IR and hyperspectral Visible/Near Infrared (VNIR) cameras. A salient finding is that the VNIR imagery may be of only limited utility for GOS, because the dominant signal comes from the sediment lofted from the bottom and/or shed from hill-like bathymetric features in the middle of the river. VNIR image pairs are separated by 8 minutes (the aircraft revisit time), during which the smaller sediment-based structures lose their inter-image coherence. In contrast, separation time for IR images is only ~ 15 s, allowing tracking of short-lived features for accurate surface velocity determination. We show the results of both IR and VNIR hyperspectral GOS-derived velocity fields, and quantify the accuracy of each.

"A time series analysis of Virginia barrier island shoreline movement and correlations to sea level, wave height changes, and teleconnection patterns"
Presenting author: James Haluska, Old Dominion University, Chesapeake, VA 23325

The Virginia barrier islands stretch from Assateague Island in the north to Fisherman's Island in the south. This string of islands is subject to Atlantic extra-tropical storm and hurricane influence. In addition, the effect of sea level rise on these islands is expected to continue to cause significant changes to the shoreline of these islands. Sea level rise, changes in wave activity, and teleconnection pattern changes correlate to shoreline changes on eleven of the islands. Changes in island shoreline were determined from satellite and aircraft images using ArcGIS software and the USGS Digital Shoreline Analysis System (DSAS). Geographically registered images were digitized, and multiple transect locations on each island were measured from a common offshore baseline using DSAS. Multiple transects for each island were calculated using DSAS. The resulting distances along with the remote sensing image dates were used to construct time series of shoreline movement for each island. Data points were spaced as frequently as images were available. The data points were then interpolated to give a monthly time series for each transect

location. Only those transects which included all digitized shorelines were used in the analysis. The time series were then correlated with monthly sea level data from a station at the Chesapeake Bay Bridge Tunnel. Correlations were done using wave height, sea level height, the North Atlantic Oscillation (NAO), the Arctic Oscillation (AO), and the Multivariate ENSO Index (MEI). This process shows that the barrier islands are moving to the south as well as becoming narrower. Significant shoreline loss coincided with exceptional wave events such as several hurricanes in a short period of time (12 to 18 months), multiday sub-tropical storm events, El Nino events, and the 2009-2010 AMOC extreme decline event.

"Sea Breeze Analysis and Prediction for Offshore Wind Energy using Lagrangian Coherent Structures and WRF"

Presenting author: Greg Seroka, Rutgers University, New Brunswick, NJ 08901
Co-authors: Erick Fredj, Travis Miles, Rich Dunk, Josh Kohut, and Scott Glenn

On November 9, 2015, BOEM will hold the lease auction for nearly 344,000 acres offshore NJ designated for offshore wind (OSW) energy development. The OSW developer(s) who win the lease(s) will submit their development application to the NJ Board of Public Utilities (NJ BPU). These applications must include a wind resource assessment and economic analysis. One major focus in the NJ BPU OSW rules is that applications "shall account for the coincidence between time of generation for the project and peak electricity demand." Preliminary data analysis shows two mesoscale processes—coastal upwelling and sea breeze—may have significant impacts on wind generation during peak electricity demand. Tasked by NJ BPU, the Rutgers University Center for Ocean Observing Leadership (RUCOOL) is using the Weather Research and Forecasting (WRF) model to resolve these processes and quantify their impact on the wind resource.

The WRF model set-up used is designed specifically for coastal/offshore regions, with three pertinent features. First, innovative satellite sea surface temperature (SST) composites at 2km resolution are used to resolve coastal upwelling. These composites integrate a) our own declouding algorithm set for the MAB to remove cloudy pixels from Advanced Very High Resolution Radiometer (AVHRR) SST scans, and b) coldest pixel composites of the resulting declouded AVHRR SST scans, rather than warmest pixel composites that would effectively remove coastal upwelling. Second, microscale grid spacing (<1km) is used in WRF to resolve the sea breeze circulation, which can vary at meso- to microscales. Finally, validation of the WRF simulations is performed against coastal/offshore wind monitoring sites with atmospheric heights up to 200m.

Three main results will be presented: (i) Coastal upwelling can produce high wind shear (~8 m/s across rotor blade dimensions). These significant shear values could potentially pose engineering challenges and should be considered in wind resource assessments. (ii) Lagrangian Coherent Structure (LCS) methodology can be used to identify key boundaries within the sea breeze circulation. While the onshore component of the sea breeze is well observed, very little is known about its unobserved offshore component, where OSW turbines will be installed. (iii) Power generation from a hypothetical 3000 MW OSW scenario off NJ was analyzed during three different sea breeze cases (one with strong upwelling, one with weak upwelling, and one without upwelling). Significant variability in power production occurred within each case and across the three sea breeze cases (net capacity factor ranged from 1 to 95%).

WRF OSW potential power production data are being ingested by an electricity grid

model to evaluate the impact of OSW energy penetration into the electrical power grid along with evaluating the economic portion of the applications. NJ is leading development of such an advanced joint atmospheric-economic modeling capability for determining the viability of OSW projects.

Ongoing work includes development of a coupled atmosphere-ocean model (WRF-ROMS, Regional Ocean Modeling System), which will provide improved capabilities to diagnose coastal air-sea processes for OSW resource assessment, and to more accurately predict these processes for operational forecasting during OSW construction and O&M phases.

"An Investigation into the Distribution and Mixing of River Water in Long Island Sound and Its Influence on Stratification"

Presenting author: Steven Schmidt*, University of Connecticut

Long Island Sound (LIS) has tens of rivers that act as a source of freshwater along the Connecticut shoreline. These rivers can influence the dynamics of LIS through the altering of along and cross-estuary salinity gradients, and by strengthening (or weakening) vertical stratification. The dynamical influences of these rivers are of particular concern when considering water quality issues such as nutrient delivery and summertime hypoxia. To better understand river water pathways through the estuary, the lateral and vertical distribution of river effluence is investigated for June 2013 through use of conservative passive dye tracers in the Regional Ocean Modeling System. Each river system's contribution to freshwater in six areas of LIS is characterized. Vertical distribution within the water column is analyzed using a non-dimensional mixing parameter. Finally, each river's individual contribution to the average pycnocline is determined. Water from the Connecticut River (LIS's largest source of freshwater) was found to represent the largest fraction of freshwater throughout LIS and to have the greatest influence on stratification in eastern LIS. The Thames, Housatonic, and Hudson Rivers were found to be the largest contributor to stratification in far eastern, central, and far western LIS respectively. Small coastal rivers were most influential along the western Connecticut shoreline. Vertical distributions show that river water tends to exist higher in the water column and with more variability when closer to their respective point sources. In locations far removed from the river mouths, waters from individual rivers can be more concentrated in the lower water column and act to reduce the total stratification.

"Meteorological and Climate Forcing of Salinity and Water Temperature Variability in the Long Island Sound"

Presenting author: Justin Schulte*, Stevens Institute of Technology, Hoboken, NJ 07030

The variability of temperature and salinity data obtained from a New York Harbor Observing and Prediction System (NYHOPS) 34-year hindcast of the Long Island Sound (LIS) was examined and linked to prevailing atmospheric conditions and prominent modes of climate variability. A correlation analysis revealed statistically significant correlation coefficients between the Pacific Decadal Oscillation (PDO) index and air temperature anomalies of the LIS, with simultaneous correlation coefficients being strongest in the fall. Consistently, the PDO index was also correlated with water temperature anomalies but with a lag of 3 to 5 months. Additionally, the eastern Northern American (ENA) index, an index measuring sea-level pressure fluctuations linked to precipitation, was found to have statistically significant negative

associations with bottom and surface salinity and positive associations with the vertical salinity gradient. A wavelet coherence analysis determined that the ENA index was related to salinity variability on timescales of 2 to 32 months and 80 months, indicating that low-frequency fluctuations in salinity may be related to low-frequency fluctuations of the ENA index. Furthermore, the analysis determined that the strength of the salinity-ENA index relationships varied temporally.

"Heat balance in the Northwest Atlantic coastal ocean: the role of atmospheric forcing versus ocean advection during an extreme warming"
Presenting author: Ke Chen, Woods Hole Oceanographic Institution, Woods Hole, MA 02543

In the coastal ocean of the Northwest Atlantic, the sea surface temperature (SST) in the first half of 2012 was the highest on the record for the past roughly 150 years of recorded observations. This resulted in major impacts on the marine ecosystem and commercial fisheries. The underlying dynamical processes responsible for this extreme event are examined using observations and a numerical model. Analyses based on both observations and realistic numerical modeling show that the warming event was primarily driven by the anomalous air-sea heat flux, while the smaller contribution by the ocean advection worked against this flux by acting to cool the shelf. The anomalous air-sea heat flux exhibited a shelf-wide coherence, consistent with the shelf-wide warming pattern, while the ocean advective heat flux was dominated by localized, relatively smaller scale processes. Further investigation of the linkages to basin-scale forcing suggests that the anomalous atmospheric jet stream position induced smaller heat loss from the ocean and caused a much slower cooling rate in late autumn and early winter of 2011–2012. Strong jet stream intraseasonal oscillations in the first half of 2012 systematically increased the warm anomalies over the continental shelf. On the other hand, the anomalous cooling due to ocean advection primarily resulted from the along-shelf heat flux divergence in the Gulf of Maine, while in the Middle Atlantic Bight the advective contribution from the along-shelf and cross-shelf heat flux divergences was comparable. The integrated analysis of observations and numerical modeling concludes that the changes in the large-scale atmospheric circulation in the winter of 2011–2012 primarily caused the extreme warm anomaly in the spring of 2012. The effect of along-shelf or cross-shelf ocean advection on the warm anomalies from either the Scotian Shelf or adjacent continental slope was secondary. Better understanding of this unprecedented event provides insights into the interannual variability of temperature in the Northwest Atlantic coastal ocean and linkages between the large-scale atmospheric/oceanic forcing and the coastal processes.

"MARACOOS as the Backbone of Ocean Observing in the MidAtlantic: recent developments around support of marine fisheries management and shellfish aquaculture businesses"
Presenting author: Peter Moore, Mid-Atlantic Regional Association Coastal Ocean Observing System (MARACOOS)

MARACOOS is your MidAtlantic regional IOOS-supported coastal ocean observing system. It is USER driven and directed and serves a diverse constituency from Cape Hatteras to Cape Cod and from the MidAtlantic Bight estuaries to the continental shelf break. Peter Moore is the MARACOOS Stakeholder Liaison. His job is to solicit Stakeholder input to help shape the

future "build out" of the Observatory. He wi present an overview of the MARACOOS Observatory and highlight recent initiatives related to marine fisheries and shellfisheries.

"Repair and Hardening of Mid Atlantic Ocean Observing Assets After Hurricane Sandy"
Presenting author: Hugh Roarty, Rutgers University, New Brunswick, NJ 08901

Seventeen High Frequency radars were damaged within the Mid Atlantic Regional Association Coastal Ocean Observing System when Hurricane Sandy passed through the region in October 2012. The objective of this paper is to outline the repair and hardening of the observing system assets. The benefits of this work will increase the coverage and data quality of the surface current measurements in the region. The US Coast Guard uses the surface currents operationally for search and rescue and NOAA Office of Response and Restoration for oil spill response. Other users of the data include New Jersey and Massachusetts Department of Environmental Protection offices, county health offices and Mid Atlantic Fishery Management Council.

"Coastal ocean processes during Mid-Atlantic tropical cyclones"
Presenting author: Travis Miles, Rutgers University, New Brunswick, NJ 08901

The Mid Atlantic Bight continental shelf has one of the largest summer temperature gradients in the world, with near bottom temperatures below 8C and peak surface temperatures over 28C. This is largely due to the summer Cold Pool, remnant winter water that is generated on the northern MAB and transported southward along the continental shelf in spring and early summer. During tropical cyclones that impact the MAB continental shelf, such as Hurricane Irene in 2011, shear driven mixing of Cold Pool water across the thermocline has the potential to cool the oceans surface and reduce storm intensity. In this study we compare coastal ocean advection and mixing processes during Hurricane Sandy and Hurricane Arthur, an offshore tracking tropical cyclone in the summer of 2014, to demonstrate the range of potential storm impacts on the coastal ocean of the MAB. To perform this analysis we use data from advanced Slocum autonomous underwater glider deployments in each storm as well as the Regional Ocean Modeling System (ROMS).

"From sea level slope to temperature: remarkable connections on the Middle Atlantic Bight shelf in a hotspot of climate change"
Presenting author: Andres Magdalena, Woods Hole Oceanographic Institution, Woods Hole MA 02543
Co-authors: Glen Gawarkiewicz and J. Forsyth

Since 1977 the MV Oleander has been collecting temperature profiles with expendable bathythermographs (XBTs) across the Middle Atlantic Bight shelf through the NOAA/NEFSC Ship of Opportunity Program along a repeat track from New Jersey to Bermuda. These data provide a 37-year record of monthly temperature cross-sections on the Middle Atlantic Bight shelf. The depth-averaged shelf temperature, Ts, calculated from annually-averaged cross-sections that are spatially-averaged across the shelf, is increasing and the recent trend is substantially larger than the overall 37-year trend. The Oleander temperature sections suggest that the recent acceleration in warming on the shelf is not confined to the surface, but occurs

throughout the water column with some contribution from interactions between the shelf and the adjacent Slope Sea reflected in cross-shelf motions of the shelfbreak front. Superimposed on the trend is strong interannual variability in Ts. While Ts anomalies are not correlated with annually-averaged coastal sea level anomalies at zero lag, positive correlation is found at 2-year lag, suggesting that the region's sea level anomalies may serve as a predictor of shelf temperature. This lagged correlation may be related to changes in along-shelf circulation associated with changes in the cross-shelf sea level gradient.

"Influence of Wind and Sea-Surface Topography on Shelf-Slope Exchange near Washington Canyon"

Presenting author: Donglai Gong, Virginia Institute of Marine Sciences, Gloucester Point, VA 23062

Both atmospheric and oceanic forcing events influence shelf-slope exchange processes. Glider observations, surface wind, and AVISO satellite altimetry data are used to explore the driving mechanisms of shelf-slope exchanges near Norfolk Canyon and Washington Canyon in the southern Mid-Atlantic Bight during Fall 2013. We found that northeasterly along-shelf winds led to strong down-shelf transport as well as shoreward intrusion of saline slope water in the upper water column and offshore excursion of bottom cold pool water from the shelf. When the northeasterly winds relaxed and turned upwelling favorable, the shelf-break flow reversed to the northeast and deeper slope water is upwelled onto the shelf at Washington Canyon. Temperature-Salinity properties of water masses in the canyon suggest active mixing between shelf and slope water masses near the canyon head. In addition, analysis of sea surface topography data from the study period indicates that the outer-shelf/shelfbreak circulation was strongly affected by variation in sea surface height which controls the barotropic component of the horizontal pressure gradient. Due to the rapidly changing forcing condition, the outer-shelf flow was in geostrophic adjustment during the glider's Washington Canyon survey. Our analysis suggests that canyon upwelling favorable flow along the east coast shelf-break requires both favorable wind forcing and sea-surface height conditions to be met.

"Comparison of the Mid-Atlantic Regional Association Coastal Ocean Observing System AVHRR Sea Surface Temperature product to NDBC sites"

Presenting author: Matthew Oliver, University of Delaware, Lewes DE 19958
Co-authors: Mike Crowley, Taylor Daley, Anastasia Procaccini, and Kelley McBride

The Mid-Atlantic Regional Association Coastal Ocean Observing System (MARACOOS) delivers near real-time sea surface temperature from the NOAA AVHRR satellites at one-kilometer spatial resolution over the US Eastern Seaboard and the Gulf of Mexico five times per day via online THREDDS servers (http://tds.maracoos.org/thredds/SST.html). Data are CF compliant, and are available as single passes, one, three and seven day composites. A major obstacle in using AVHRR data is cloud contamination. In this study we evaluate the effectiveness of three cloud filtering approaches and compare them to 205 NDBC stations in the region. We estimate both RMS and bias statistics for each of these sites and show that the application of these cloud filtering algorithms can reduce RMS errors to below 1 degree Celsius. Our bias statistics are slightly negative, indicating that these cloud filtering algorithms are still allowing small amounts of cloud contamination. We also

show that there is a spatial trend in the RMS and bias statistics that should be accounted for in any data assimilative process.

Thursday - October 29, 2015 (Presentation Abstracts)

"Physics, Fish and Fisheries: Collaborative partnerships are required for applied ecosystem research in 21st century"
Presenting author: John Manderson, NOAA/NEFSC Cooperative Research Program

I argue that three important facts underlie contemporary marine ecosystems and the fisheries dependent on them. 1) Most metabolic, energetic and behavioral processes underlying the distribution and dynamics of marine populations are regulated, controlled or limited by hydrographic properties and hydrodynamic processes. 2) The spatial dynamics of hydrographic properties and hydrodynamic processes are driven atmospheric as well as planetary forcing. Therefor rapid changes in atmospheric climate are translated into changes in hydrography and hydrodynamics that are affecting the distribution and productivity of many marine populations. 3) Fish and fisheries that are tied to dynamic hydrographic properties and hydrodynamic processes are "semi-nomadic" to "nomadic". In contrast, terrestrial agriculture and the engineered ecological infrastructure upon which agriculture depends are tied to geological processes and are therefor geostationary over short time scales. Thus, in the face of rapid climate change, fishing, if practiced in ways that sustain crucial ecosystem components and functions, can provide much more secure and resilient sources of food for humans than can terrestrial agricultural systems. However, to achieve harvest strategies that are both economically and ecologically sustainable requires a system of fisheries science and governance that engages with, assesses, and adaptively manages the realities of changing ecosystems and fisheries in real time. I argue that current methods of fisheries science and governance are too disenguaged, and too slow and inflexible for the ecologically responsible management of fisheries in marine ecosystems that no longer exhibit "stationarity" due to rapid climate change. These methods result in a reactive rather than proactive marine fishery systems that are currently in a constant state of crisis. I explore ways in which collaborative interdisciplinary research partnerships of industry, government, academic experts could be combined with real time "crowd sourced" monitoring and adaptive experimentation in a practical program of applied ecosystem based fisheries research. I believe that such program is required for ecologically responsible and realistic management of wild capture fisheries in the face of anthropogenic climate change.

"The Benefits and Challenges of Integrating Animal Telemetry into Ocean Observatories"
Presenting author: Matthew Oliver, University of Delaware, Lewes DE 19958

Physical processes in the coastal Mid-Atlantic create complex and dynamic habitats. Understanding how coastal fishes respond to this complexity has been a major motivation in establishing coastal biotelemetry arrays and databases. Coastal arrays maximize the probability of fish detection by positioning hydrophones nearshore, but coverage decreases offshore thus limiting our view of some species. The development of a real-time ocean observatory allows for synchronous mapping of these dynamic hydrographic structures important to coastal fisheries. These observations provide important fisheries independent context for interpreting the impact of

oceanographic features on the behavior and location of telemetered animals that are important for ecosystem based management and fundamental questions of ecosystem scale. However there are still many technical sensor and data challenges including data ownership and availability, performance of acoustic telemetry methods on ocean observatory platforms, and data interpretation that need to be addressed as these as the ocean observatory and biotelemetry communities expand collaborations.

"Are we preparing the next generation of fisheries professionals for successful careers?"
Presenting author: Steven L. McMullin, Virginia Tech, Department of Fish and Wildlife Conservation, Blacksburg, VA 24061

We surveyed members of the American Fisheries Society to determine the skills and areas of knowledge that employers, university faculty and students felt contributed most to early-career success of fisheries professionals. We also asked employers to assess proficiency of recent entry-level hires in those same skills and areas of knowledge. Faculty and students rated how well their academic programs prepared graduates to succeed relative to skills and areas of knowledge. Skills such as critical thinking ability, ability to communicate effectively both in speaking and writing, and ability to work well in teams rated higher in importance than all academic areas of knowledge for all groups. Undergraduate students rated their preparation for career success much higher than faculty members and employers rated proficiency of recent entry-level hires much lower than either students or faculty. Employers rated proficiency of entry-level hires with post-graduate degrees significantly higher compared to those with bachelor's degrees. We conclude that universities, employers and the American Fisheries Society all share responsibility for developing the skills and knowledge the next generation of fisheries professionals will need to succeed in their careers.

"History of Research in Selected Southern New Jersey Estuaries: 1800s to the Present"
Presenting author: Kenneth W. Able, Rutgers, the State University of New Jersey – Director, Marine Field Station, Tuckerton, NJ 08087

The setting for this history is approached in the context of "Place", and its importance in the development of research in Barnegat Bay and Mullica River – Great Bay estuaries and at the Rutgers University Marine Field Station. This aspect of the history begins in the late 1800s, with the intention of explaining "Why here?" by describing the richness of this research setting. The research is chronicled through the early studies, focused on oyster biology and ecology (and eventually on other shellfish). Later, in the 1970s, research continued in the form of broader environmental impact studies for two power plants (only one of which became a reality). Since then the tempo and variety of research has dramatically increased due to the development of the Department of Marine and Coastal Sciences at Rutgers University and the Jacques Cousteau National Estuarine Research Reserve. We conclude with an overview of ongoing research, which is fostered by the renovated facilities of the old Coast Guard Station (former Station 119) and its location in the cleanest estuary in the northeastern U.S. and one of the cleanest on the entire east coast of the U.

"Sustainable Fishery – Sustainable Habitat: Managing Delaware Bay Oysters"
Presenting author: David Bushek, Haskin Shellfish Research Laboratory, Rutgers University, Port Norris, NJ 08349

Co-authors: Kathryn Ashton-Alcox and Eric Powell

Opinions on maintaining, managing, and restoring oyster populations are often biased by the apparently opposing objectives of conservation and exploitation. 'Sustainability' is often used to bridge the differences in goals but successful examples are rare. The New Jersey Delaware Bay oyster resource has been successfully managed for decades, allowing the population, habitat, and fishery to be preserved. Oyster disease decimated the resource and crippled the industry years ago and is still prevalent, yet both have survived through rigorous and intensive adaptive management. The fishery operates in the upper half of Delaware Bay with oysters located elsewhere functioning as sanctuaries or reserves. Within the fished beds, non-fishing mortality accounts for about 87% of annual oyster mortality. Area management and a strict quota result in annual harvests at or below 2% of the oysters within the fished population. The industry taxes itself for every bushel harvested to raise money for maintaining and enhancing the oyster population. Planting clean shell in the Delaware Bay routinely enhances natural oyster recruitment compared to non-planted areas on the same bed. This enhancement persists for multiple years as oysters continue to set on the planted shell and each generation of newly recruited oysters. The enhancement creates and maintains habitat within the sustainably fished population that helps fulfill the ecological service goals described in many oyster restoration programs. Thus, quantifying ecosystem services derived from sustainable fisheries is essential to developing a comprehensive ecosystem management program.

"Climate links to Long Island Sound fisheries: Anomalies, trends, and teleconnections based on a 34 year NYHOPS physical model hindcast analysis"

Presenting author: Nickitas Georgas, Stevens Institute of Technology, Hoboken, NJ 07030
Co-authors: Penelope Howell, Vincent Saba, Justin Schulte, Alan Blumberg, Philip Orton, Larry Yin, Yifan Wang, Yu Jiang, Rubin Paredes, Ziyi Wu, and Yulin Zhao.

A recently-completed, comprehensive, validated hindcast of Long Island Sound's water conditions from 1979 to 2013 provides an opportunity to examine the estuary's recent ecospace history for trends and anomalies linked to fisheries habitat. The extensive model validation for 3D temperature, salinity, and stratification is quickly summarized. Habitat suitability indices (HSIs) for cold and warm water guilds (multi-species aggregates with respective optimal temperature ranges) and lobster are quantified based on the high resolution NYHOPS hindcast of water temperatures. HSI anomalies and trends are presented and linked to fisheries anomalies and trends. Climate indices (remote climate teleconnections; see also Justin Schulte's abstract for this MABPOM) are also statistically examined for links to total species counts (a small sample of finfish and inverts) in Long Island Sound from the CT DEEP trawl surveys.

"Relative Importance of Physical and Biological Processes in Controlling Hypoxia in Narragansett Bay"

Presenting author: David S. Ullman, University of Rhode Island, Narragansett, RI 02882
Co-author: Jamie M. P. Vaudrey

Hypoxia in estuaries and shelf regions develops when biological oxygen demand exceeds the rate at which oxygen is resupplied by biological and physical processes. An estimate of the timescale for oxygen resupply due to physical processes is the flushing time of the region of

interest. The temporal variability of flushing time in various sub-regions of Narragansett Bay, a partially mixed estuary that experiences episodic summertime hypoxia, is investigated using numerical model tracer-based estimates. High-resolution numerical dye simulations, performed using the Regional Ocean Modeling System (ROMS), are used to determine property exchange among the elements of a two-layer ecological box model of the Bay for a two-year period. These results are used to estimate flushing times of the ~5 km scale box model elements, and combinations of elements, on a daily basis. Fluctuations in river discharge and wind stress are shown to influence the flushing time on timescales of weeks and days respectively. Results from the ecological model are used to estimate, over the same regions, the timescales for oxygen depletion due to biological processes and the temporal variability associated with them. Comparison of the flushing times and the oxygen depletion rates will be presented for a two-year period for regions of the Bay that experience very different physical forcing regimes.

"Long-term trends in migration timing based on thermal response of a temperate forage fish"
Presenting author: Laura Palamara, Rutgers University, New Brunswick, NJ 08901
Co-authors: Amelia Snow, John Manderson, and Josh Kohut

The physiology of many marine animals is tightly coupled to their surrounding fluid environment. Several habitat features, most notably temperature, determine these animals' fitness by affecting their growth, survival, and reproductive success. In temperate regions, many species are mobile and able to track the specific temperatures encompassed by their thermal niches as the regional temperature distribution changes. Butterfish (Peprilus triacanthus), which demonstrate very strong seasonal and temperature-dependent migration patterns in the Mid-Atlantic Bight (MAB), a region exhibiting some of the highest seasonal and interannual temperature variability in the world, is an excellent example of this phenomenon. We developed a thermal niche model for butterfish based on the statistical relationship between catches and measured temperatures from spring and fall NMFS and NEAMAP surveys and several state inshore surveys, and fit parameters to the Boltzmann-Arrhenius function, a simple yet explanatory model of temperature dependence, so that the resulting curve closely matched the statistical relationship. This thermal relationship was coupled to over 30 years of daily shallow-water OI SST (optimal interpolation sea surface temperature) measured by satellite and various in situ platforms, and daily bottom temperatures estimated by a hydrodynamic hindcast ROMS (Regional Ocean Modeling System) model to examine long-term trends in thermal migration triggers into shallow inshore waters in the spring, and out of them to deep offshore wintering habitat in the fall. In many parts of the MAB, the "thermal fall" migration trigger was delayed during later decades of the time series compared to earlier decades. This suggests potential changes in butterfish productivity and life history stages, as well as potential changes in NMFS survey bias, as the ships are unable to tow in shallow waters and will catch most butterfish in deeper waters after the variable migration trigger.

"Dynamic Seascapes Predict the Marine Occurrence of an Endangered Species: Atlantic Sturgeon Acipenser oxyrinchus oxyrinchus"
Presenting author: Matthew W. Breece*, University of Delaware, Lewes DE 19958
Co-authors: Dewayne A. Fox, Keith J. Dunton, Mike G. Frisk, Adrian Jordaan, and Matthew J. Oliver

1. Landscapes are powerful environmental partitions that index complex biogeochemical processes that drive terrestrial species distributions. However, translating landscapes into seascapes requires that the dynamic nature of the fluid environment be reflected in spatial and temporal boundaries such that seascapes can be used in marine species distribution models and conservation decisions.
2. A seascape product derived from satellite ocean color and sea surface temperature partitioned mid-Atlantic coastal waters on scales commensurate with the Atlantic Sturgeon *Acipenser oxyrinchus oxyrinchus* coastal migration. The seascapes were then matched with acoustic telemetry records of Atlantic Sturgeon to determine seascape selectivity. To test our model, we used real-time satellite seascape maps to normalize the sampling of an autonomous underwater vehicle that resampled similar geographic regions with time varying seascape classifications.
3. We found that Atlantic Sturgeon exhibited preference for one seascape class over those available in the coastal ocean, indicating selection for environmental properties that co-varied with the dynamic seascape class rather than geographical location.
4. The recent listing of Atlantic Sturgeon as Endangered throughout much of their United States range has highlighted the need for improved understanding of their occurrence in marine waters to reduce interactions with various anthropogenic stressors. Narrow dynamic migration corridors may enable seascapes to be used as a daily decision tool by industry and managers to reduce interactions with this Endangered Species during coastal migrations.

"It's All About Flounder (Paralichthys dentatus)"
Presenting author: Jenna Kwiecinski*, Senior at the Marine Academy of Technology and Environmental, Stafford Township, NJ 08050

Flounder can inhabit offshore and inshore habitats, which can have a variation in composition. They are also an important commercial and recreational species that have a season and size requirement for catch. Camouflage variations, visual color selection, and individual scales were analyzed of summer flounder (*Paralichthys dentatus*). Different colored substrates were used to examine chromatophore dispersal while camouflaging. Flounder generally preferred tan substrates and were able to adapt to the colors closest to them. Visual color preference was analyzed using nine different fishing lures in order to determine the most effective color to use while commercially or recreationally fishing. Overall, the results indicated that summer flounder prefer the colors pink and red. Individual scales removed along the lateral line near the peduncle, the area where the scales are most uniform in flounder, were measured to determine the ratio of scale to body size in different size classes. A linear model was developed to examine the relationship between scale size and total body length in summer flounder. The relationship was strongest in juvenile and sub-adult fish. As flounder mature, their diets change, resulting in different scale compositions and a variation in scale sizes for adults. Results from this study could possibly be used for regulatory purposes to ensure that flounder are of regulation size.

"Separate and Combined Effects of Anthropogenic Co-stressors in the Early Life-Stages of Atlantic and Shortnose Sturgeons"
Presenting author: Christopher R. Chambers, NOAA/NMFS/NEFSC Howard Marine Sciences Laboratory, Highlands, NJ 07732
Co-authors: Ehren A. Habeck, Kristin Habeck, and Allison C. Candelmo

Atlantic sturgeon (*Acipenser oxyrinchus*) and shortnose sturgeon (*A. brevirostum*) live in coastal and riverine waters along the Atlantic Coast and spawn in upper reaches of these estuaries. Many estuarine inhabitants are subjected to anthropogenic stressors including contaminants, low dissolved oxygen (DO), and elevated temperatures. We address the impact of these stressors on sturgeon early life-stages by exposing embryos and pre-feeding larvae to graded does of PCBs; low levels of DO, and elevated temperatures singly and in pairwise combinations. Survival to hatch, embryonic period duration, the size and condition of larvae at hatching, and larval behavior were scored. Survival decreased with increasing contaminant concentration and sublethal effects included a shortening of larval size at hatching, yolk-sac edema, retarded eye development, and reduced post-hatching lifespan in food-free environments. Survival to hatch declined precipitously above 16 °C. Developmental rate was linearly related to temperature but a reduction in hatch size occurred above 15 °C. The impact of constant (low and high) and diel fluctuating DO regimes on these same responses were quantified on larval activity and prey consumption. Results show these sturgeons to be at risk to direct effects of modest increases in their thermal habitat which magnify effects of other co-stressors.

"An early juvenile (age 0-1) Atlantic Sturgeon abundance estimate and habitat usage within the Delaware River Estuary, USA"

Presenting author: Edward A. Hale, Delaware Department of Natural Resources and Environmental Control, Little Creek, DE 19961
Co-authors: Ian A. Park, Matthew T. Fisher, Richard A. Wong, Michael J. Stangl, and John H. Clark

The Atlantic Sturgeon *Acipenser oxyrinchus oxyrinchus* is a long lived, highly fecund and late maturing anadromous fish that historically supported a significant commercial fishery along the eastern coast of North America. Overfishing led to significant population declines with contributions from other anthropogenic impacts which continue to impede recovery. Despite the 2012 endangered species listing of five distinct Atlantic Sturgeon population segments, including the New York Bight population segment, to which the Delaware River spawning stock belongs, relatively little is known about the current population status of natal river populations. The adult population within the Delaware River Estuary is estimated to be less than several hundred individuals. Our work is the first to estimate the abundance of Delaware River Estuary early juvenile (age 0-1), resident Atlantic Sturgeon. Using the Schumacher and Eschmeyer mark-recapture estimator for multiple censuses, we estimated 3,656 (95% confidence interval [CI] = 1,979-23,895) individuals used the Delaware River Estuary as a natal nursery in 2014. Further, we identified key habitat areas where age 0-1 juveniles spend considerable amounts of time including the Marcus Hook area within the Delaware River Estuary using a passive acoustic receiver array.

"Internal Acoustic Transceivers Reveal the Annual Social Network Patterns in a Coastal Top Predator; a Tale of Two Sharks."

Presenting author: Danielle Haulsee*, University of Delaware, Lewes DE 19958
Co-authors: Dewayne Fox, Matthew Breece, Bradley Wetherbee, Lori Brown, Jeffrey Kneebone, Greg Skomal, and Matthew Oliver

Sand Tigers (*Carcharias taurus*) are large apex predators resident in the coastal ocean along the Eastern US Coast. Although Delaware Bay and surrounding coastal waters are known summer "hot spots" for Sand Tigers, our understanding of their seasonal movements is less well known. Since 2007, we have implanted more than 300 VEMCO acoustic transmitters in Sand Tigers, which have been detected from Cape Canaveral, Florida to Long Island, New York by collaborators in the Atlantic Cooperative Telemetry (ACT) Network. During the summer of 2012, 20 Sand Tigers were implanted with VEMCO Mobile Transceivers (VMTs), which are capable of both transmitting and receiving coded acoustic pings. To date, two of the 20 sharks have been recaptured, and their VMTs recovered. VMTs recorded detections of 350 individuals, from 8 different species. We analyzed their intra- and interspecific social network, which allowed us to reconstruct the approximate locations of Sand Tigers throughout the year. Changes in the interspecific population dynamics throughout the year revealed evidence of fission-fusion social behavior, which is common in mammals, but rarely documented in non-mammalian species. This project is a unique look at the social network of an apex predator and is a useful model for studies quantifying the social structures of marine animals. In addition, understanding how the aggregations of this species changes (in terms of sex and size class segregation) on spatiotemporal scales is critical for effective protection of the species and will be useful as managers develop conservation plans along the East Coast.

Friday - October 30, 2015 (Presentation Abstracts)

"Ecological Consequences from the Historical Damming of New England Watersheds"
Presenting author: Steven Mattocks*, University of Massachusetts Amherst
Co-authors: Carolyn Hall and Adrian Jordaan

The historical damming of New England watersheds has obstructed fish access to spawning habitat beginning in the 1630s. Little historical catch data exist for anadromous river herring yet anthropogenic disturbances predate harvest exploitation. We combine historical habitat obstruction records with freshwater productivity information to estimate historical populations of river herring in New England. We produce a timeline of lost river herring abundances and demonstrate the decline in freshwater and marine forage and adult spawning fish. Using nutrient data, we estimate lost marine-derived nutrients from adult alewives through mortality and excretion. Our results indicate a significant loss in alewife production and marine-derived nutrients by 1900. We also describe the diets of nine predator fishes (n=645) from 28 coastal ponds across New England when juvenile alewives are present. The importance of juvenile river herring to the diets of freshwater fishes reflects the need to incorporate freshwater ecosystem benefits into restoration goals.

"American Eel and Crayfish in Freshwaters of the Delaware Drainage"
Presenting author: Richard J. Horwitz, The Academy of Natural Sciences of Drexel University, Philadelphia, PA 19103
Co-authors: David Keller and Stefanie Kroll

Trends in the abundance of American Eel has been a major management issue, given its commercial importance and changes in abundance in parts of its range. Its occurrence in fresh waters is affected by local blockage of upstream movement by large dams. The Academy of

Natural Sciences has been conducting an extensive monitoring program of local streams as part of the Delaware River Watershed Initiative. This study allows estimation of abundance and biomass of fishes and catch per unit effort of crayfish at the reach scale. In streams without passage blocks, eel abundance comprises a major part (often the majority) of the biomass of fishes. Sites without eels include many with passage blocks (e.g., in the Schuylkill and Lehigh River drainages). Total biomass in these streams does not show consistent patterns of replacement of eel biomass by other species. Almost all streams with American Eel have no non-native crayfish. Eel are rare in the few sites with eels and non-native crayfish. These patterns suggest that American Eels may be able to prevent establishment of non-native crayfish. Native crayfish co-occur with eels at many sites, suggesting behavioral or other adaptations of native crayfish to eel occurrence.

"Examination of Ecological Attributes for Large River Fish Communities in NJ and NY: Implications for Index of Biological Integrity (IBI) Development"
Presenting author: Jim Kurtenbach, USEPA - Region 2, Edison, NJ 08837
Co-author: Emily Nering

Large river monitoring programs with direct assessment and reporting on biological conditions is a need across most of the nation, including New Jersey and New York. Community measures of resident fish, benthic macroinvertebrates, and periphyton assemblages making up the biological community are more limited in large river systems as compared to smaller, wadeable streams. To address this need, various ecological attributes were examined for large river fish communities in NJ and NY, with emphasis on understanding their importance in the development of biological indices. Fish sampling via electrofishing was used to obtain fish data at 57 large river sites during the summers of 2008, 2009, 2013, and 2014, across major drainage basins located in NJ and NY. Four ecological attributes (taxonomic composition, trophic class, life history, and habitat guild) were analyzed by a comparison across five drainages, non-tidal vs tidal rivers, and large rivers vs wadeable streams. In addition, a fish IBI was tested to determine if drainage, tidal influence, and river size affected key taxonomic composition and other autecological traits that comprise the index. The analysis revealed that these traits vary across large rivers in the Eastern Highlands due to these river features, which also influence several of the metrics which comprise the index examined. The results suggest that drainage, tidal influence, and river size matter greatly, and these physical attributes likely represent different physical classes with different corresponding ecological attributes of the fish assemblage.

"Management of a top inshore predator: Differing goals of recreational and commercial fishers of Atlantic Striped Bass and the unforeseen impacts on other fisheries."
Presenting author: Desmond M. Kahn, Delaware Division of Fish and Wildlife (Retired), Newark, DE 19711

Striped Bass are produced in Mid-Atlantic estuaries, then migrate into New England waters in summer. They provide the basis for a fabled recreational fishery in both regions, and are the only inshore teleost in the Northeast that attains big game status. For decades, they have also provided an economically important fishery to commercial baymen and oceanic gill netters in the Mid-Atlantic region. After a crash in the 1980s attributed variously to water quality declines and to overfishing, striped bass recovered by the mid-1990s. Conservative management

brought the stocks to unprecedented abundance by the 2000s. By the mid-late 2000s, biologists conducting stock assessments developed hypotheses that striped bass predation and possibly competition had caused declines in other important fisheries, namely weakfish, American shad and river herring. Due to a single-species tunnel-vision, stock assessment and management people resisted these hypotheses, instead tending to blame fisheries for the declines. High bass densities in the Chesapeake Bay in response to recreational demands for high catch rates and large sizes produced negative density-dependent feedback. Despite very high spawning stock biomass, the Chesapeake Bay failed for seven years to produce a dominant year class, leading to a slow coastwide decline in abundance. Last year, despite the fact that the stock did not exceed the overfished Threshold or the Overfishing Threshold, in response to recreational demands, management enacted 25% cuts in commercial quotas and in recreational bag and size limits. Recreational anglers politically dominate the Atlantic States Marine Fisheries Commission and have inflicted unnecessary economic pain on the commercial sector, which has lost several options for alternative fisheries due to striped bass depredation.

"Implications of expanded age sampling on Bluefish Pomatomus saltatrix catch at age estimates"

Presenting author: Michael Celestino, NJ Division of Fish and Wildlife, Port Republic, NJ 08241
Co-author: Jeffrey Brust

Past coast wide stock assessments for Bluefish have acknowledged limited age information as a source of uncertainty. Bluefish harvest occurs in all Atlantic coast states with landings dominated by the recreational hook and line sector. In assessments through 2014, age data, however, came exclusively from commercial gears in Virginia despite the Virginia commercial fishery accounting for only approximately 2% of the coast wide Bluefish harvest. In response to the concern of insufficient age data, additional Atlantic coast states began sampling Bluefish ages in 2010, and Addendum I to the Bluefish Fishery Management Plan made biological sampling mandatory for most Southern New England and Mid Atlantic coast states in 2012. The objectives of our study were to (1) determine if differences exist in size at age of Bluefish available to different regions, sectors, and/or seasons, (2) quantify the effects of age length key (ALK) source on Bluefish catch at age (CAA) estimates, and (3) quantify the effects of ALK source on population and management parameter outputs from the coast wide stock assessment model. We found regional differences in Bluefish size at age and that Bluefish CAA could vary significantly ($P < 0.01$) as a function of ALK source, but the influence of the differences was minor when compared to the 2014 update assessment model. Bluefish life history traits, collection gear selectivity, data quality, and data quantity might account for differences in CAA. We discuss factors responsible for the scale and patterns in our catch at age and assessment model results.

"Spatiotemporal variability in survey dredge efficiency and its application in the annual stock assessment of the Eastern Oyster, *Crassostrea virginica*"

Presenting author: Jason Morson*, Rutgers University, Port Norris, NJ 08349
Co-authors: Kathryn Ashton-Alcox, David Bushek, and Daphne Munroe

An important source of uncertainty in estimates of population abundance is the efficiency of the sampling gear used to survey the population. In Delaware Bay, a fishery-independent survey is conducted annually to estimate the abundance of Eastern Oysters, *Crassostrea virginica*, using a commercial oyster dredge. Previous experiments conducted in 1999, 2000, and 2003 identified both spatial and temporal variability in the efficiency of the survey dredge, suggesting it may be necessary to periodically update survey dredge efficiency estimates. In 2013, survey dredge efficiency was estimated at twelve oyster reefs in Delaware Bay by collecting samples along paired dredge and patent tong transects. Five of these reefs were sampled previously during the 1999, 2000, and 2003 experiments, and three more were sampled in 2003 only. Using data collected during all experiments, we reevaluated spatiotemporal trends in survey gear efficiency. In addition, we used logistic regression models to identify the variables influencing efficiency. While there appears to be a spatial gradient of decreasing efficiency from the lower to the upper bay, the efficiency in any one location is not significantly changing over the time period in which these experiments were conducted. Results from logistic regression analyses suggest the efficiency of the survey gear is a function of bottom composition and captain behavior. We discuss the implications of these findings in the context of the annual stock assessment for Delaware Bay oysters.

"Assessment of the New Jersey Volunteer Angler Survey"
Presenting author: Jeffrey Brust, NJ DFW, Port Republic, NJ 08241
Co-author: Mike Celestino

In June 2008, the NJ Division of Fish and Wildlife implemented an online volunteer angler survey (NJ VAS). The primary objectives of the survey are to supplement and complement recreational data collected through the federal recreational survey, improve stakeholder involvement in the management process, and increase management flexibility. The open access design of the survey encourages wide participation, and information collected on size distribution of released fish has been very useful in stock assessment and management. Summary results of the survey since implementation will be presented alongside comparable data from the federal survey. Utility of the survey and the reported data will be discussed.

"Adult blue crabs in the Sedge Island Marine Conservation Zone: Evidence of reduced fishing effects?"
Presenting author: Paul Jivoff, Rider University, Lawrenceville, NJ 08648
Co-authors: L. Moritzen, A. Barton, J. Kels, J. McCarthy, A. Young, P. Ferdinando, F. Pandolfo, and C. Tighe

Conservation zones are important for maintaining the sustainability of ecosystems and populations of economically important species. Commercial and some recreational fishing activities are limited in the Sedge Island Marine Conservation Zone (SIMCZ) in Barnegat Bay but little work has examined the potential impact of the SIMCZ. We compared aspects OF adult blue crab population structure in the SIMCZ with other SAV-dominated areas, as well as other habitats (creek mouths, open bay areas) commonly used by blue crabs in Barnegat Bay. Abundance, size and sex ratio of adult blue crabs were assessed using commercial-style blue crab traps deployed daily for one week in each month May-August, 2012-2013. Compared to other SAV-dominated areas in the Bay, the SIMCZ contained: (1) more adults of both sexes, (2)

more ovigerous females than areas adjacent to the SIMCZ, (3) relatively more legal-sized (>120mm) male crabs and (4) more males than physically similar open bay habitats. Taken together, these results suggest that both sexes of blue crabs benefit from the SIMCZ: adult females use the SIMCZ as a spawning habitat and adult males may find refuge from fishing pressure outside the conservation zone.

Poster Presentation Abstracts - MABPOM

"Circulation Near the Nose Region of a Surface Trapped Coastal Current"
Presenting author: Piero L.F. Mazzini*, Rutgers University, New Brunswick, NJ 08901
Co-authors: Robert J. Chant, John Wilkin, Nick Nidzieko, and Malcolm Scully

Buoyancy-driven coastal currents play a key role in the dynamics and freshwater budget of most continental shelves around the world, and have an important effect on both cross- and along-shelf transport of nutrients, larvae, pollutants, etc. Despite the important role of these currents in both the physics and biogeochemistry of the coastal ocean, very few measurements have been taken addressing the circulation and hydrography near the nose region. A three month-long (April to June, 2015) field program to investigate the Chesapeake Bay Plume (CBP) was conducted off Virginia and North Carolina coasts (USA), which included shipboard surveys, measurements using a REMUS (AUV), 13 moorings and 2 Wire Walkers. Here, we present the three dimensional, high-resolution circulation and hydrography in the vicinity of the nose region of the CBP from this unprecedented data set, complemented by information provided by realistic simulations from a primitive equation numerical ocean model (ROMS).

"Influence of wind-driven circulation and swimming behavior on estuarine ingress of fish larvae"
Presenting author: Anna Pfeiffer-Herbert, Stockton University, Galloway, NJ 08205
Co-author: Chris Kincaid

Transport of larval fish between shelf and estuarine waters can be a bottleneck in the dispersal and recruitment of estuarine-dependent fish species. Many species have stratified vertical distributions or cyclical vertical migration patterns, which mean they not simply passively dispersing particles. We used a particle-tracking routine embedded in a ROMS hydrodynamic model of Narragansett Bay and Rhode Island Sound to investigate the interaction of larval swimming behavior and wind-driven currents near the estuary-shelf interface. Swimming behavior of the larvae influenced the variability of successful transport into the estuary under changing wind conditions. Interestingly, vertical migration timed for flood tide (up-estuary) transport did not produce the higher rates of ingress that have been observed in other estuaries.

"Potential climate change impacts on the spring phytoplankton bloom in Chesapeake Bay"
Presenting author: Meng Xia, University of Maryland Eastern Shore, Princess Anne, MD, 21853

Utilizing a calibrated hydrodynamic-biogeochemical modeling package (FVCOM-ICM) for Chesapeake Bay, we investigated the potential impacts of climate change on the phytoplankton bloom in May, 2010. According to several present climatic projections, the

estuary is very likely to experience the following shifts by the end of this century, 10%-40% increase in winter-spring precipitation, 0.7-1.6 m rise in sea level, 2-6 °C warming in water temperature and up to 30% augment in tidal range. Based on these projections, we ran a series of scenarios by making adjustments in winter-spring Susquehanna discharge, air-sea heat flux, open boundary sea level and tide amplitude, respectively. To delineate the vertical structure of circulation, nutrients and production, two model transects were selected along the main channel and across the productive mid-Bay. Of all the scenarios, phytoplankton biomass on both transects was negatively related to the dissolved inorganic nitrogen (DIN) concentration and the water-column stratification, which implied that physical processes, rather than the DIN deficiency, posed a first-order control on the spring algal bloom. Our modeling results indicated that increased sea level and tidal amplitude could transport more surface riverine nutrients to the deep water via enhanced mixing, and greatly promote the overall phytoplankton growth. Phytoplankton biomass was enlarged by less than 2% under up to 40% increase in Susquehanna discharge/loading. Their non-linear relationship resulted from the stratification condition, which controlled the delivery of nutrients down deep. The warming-up of Chesapeake Bay favored the accumulation of dinoflagellates in spring, while the diatom bloom tended to start and end early. To sum up, climate change is gradually altering the physical environment of Chesapeake Bay, which would very likely cause more severe spring algal bloom and worsen the eutrophication condition.

Poster Presentation Abstracts - MAC AFS

"Early Post-Settlement and in Wild Eastern Oyster (Crassostrea virginica) Populations"
Presenting author: Sarah Borsetti, Haskin Shellfish Research Laboratory, Rutgers University, Port Norris, NJ 08349
Co-authors: Daphne Munroe, Kathy Ashton-Alcox, and David Bushek

Early post-settlement growth of 21 wild Eastern oyster (*Crassostrea virginica*) cohorts in the Delaware Bay were tracked to determined how settlement timing, temperature and salinity influence early growth. Little is known about young-of-the-year oyster growth under variable natural conditions during their first year immediately following settlement. Growth of each of the oyster cohorts was tracked during the first years after settlement by measuring shell height of 100+ oyster samples over time on a unique settlement substrate (planted clam shell). Two distinct growth calculations were made. First, an estimate of shell height of each cohort at 1 year of age (365 days since settlement) was calculated. Second, the time required for each cohort to reach 20mm was estimated. The factors important in determining early growth are complex, vary annually, and include timing of settlement, temperature, salinity and location within the bay.

"Sex Ratio Trends of Waved Whelk (Buccinum undatum) Populations in the mid-Atlantic"
Presenting author: Collin Dobson, Haskin Shellfish Research Laboratory, Rutgers University, Port Norris, NJ 08349
Co-authors: Daphne Munroe, Eleanor Bochenek, Sarah Borsetti, and Sean Martin

The reproductive biology of Waved Whelk (*Buccinum undatum*) in the mid-Atlantic is such that males and females come together for copulation in mid-May. Females then aggregate to begin the egg laying process, which can last multiple weeks. A fishery is developing for this

species and the aggregate behavior of females during the egg laying process could result in a disproportionate number of females being harvested from the stock. Waved Whelk samples were collected in the mid-Atlantic using a modified scallop dredge in June 2014 and 2015. These samples were analyzed to determine if the sex ratios of whelk populations could be skewed towards females during this time of the year, and to identify possible spatial trends in sex ratios. An additional 5 samples were taken using baited pots in June 2014 and analyzed to determine if the fishery could be sex-selective. Results showed that waved whelk populations in lower latitudes and shallower waters can have sex ratios skewed towards females, supporting the hypothesis that females aggregate in the early summer months. The results also suggest that the fishery could be both sex-selective and size-selective, as larger females accounted for a significant portion of the baited pot catch. Female aggregation and sex-selective fishing could lead to compounding impacts on female whelk in the mid-Atlantic stock during the early summer months. Further sampling of catch is required to examine spatial and seasonal patterns in possible fishery sex-selectivity.

"Use of fine scale positioning system to assess Atlantic Sturgeon behavior in proximity to large mesh sink gillnets in marine waters"

Presenting author: Keith J. Dunton, Monmouth University, Department of Biology, West Long Branch, NJ 07764
Co-authors: Lisa A. Bonacci, Michael G. Frisk, Kevin W. Wark, and Dewayne A. Fox

The sink-gillnets employed in the Goosefish (*Lophius americanus*) fishery have been identified as a significant source of mortality for the federally endangered Atlantic Sturgeon (*Acipenser oxyrinchus oxyrinchus*). There is much concern within the fishing industry, that conservation measures to reduce both incidental take and mortality rates of sturgeon may be required. Proposed alternative fishing practices may have the potential to decrease Atlantic Sturgeon encounter rates and post-release mortality rates. During the spring of 2015, we deployed a VEMCO Ltd. Positioning System (VPS) off the coast of Delaware to assess the behavior and interactions of telemetered Atlantic Sturgeon in the vicinity of three sink-gillnet treatments. During the course of the study we fished two strings of gillnets a total of 86 times for 2-4 hour intervals. Each net was comprised of nine 91.4m panels tied together to form a continuous string that were fished within the boundaries of the VPS and also affixed with acoustic transmitters at the junction of individual panels to provide position estimates for individual treatments. Atlantic Sturgeon landings were much greater in the industry standard control nets than compared to the lower profile and larger mesh experimental nets providing evidence that net changes in net configuration may influence sturgeon behavior. Over the course of the approximately two month study we detected a large number of telemetered Atlantic Sturgeon (n=458) within our study boundaries. Fine-scale position estimates will be examined to determine if interactions of Atlantic sturgeon occurred with each net treatment.

"Evaluating the ORCS Working Group approach for data-poor catch estimation using the RAM Legacy Stock Assessment Database"

Presenting authors: Christopher M. Free*, Department of Marine & Coastal Sciences, Rutgers University, New Brunswick, NJ 08901

Co-authors: Olaf P. Jensen, John Wiedenmann, and Jonathan J. Deroba

In response to the 2006 reauthorization of the Magnuson-Stevens Act, the National Marine Fisheries Service established a requirement to set acceptable biological catch limits for all stocks, including those for which reliable catch data are the only information available. The "Only Reliable Catch Stocks" (ORCS) Working Group approach for the data-poor estimation of acceptable biological catch is being increasingly used but has yet to be properly evaluated. We evaluated the ORCS method using data-rich stocks from the RAM Legacy Stock Assessment Database. First, we identified stock assessments considered reliable by knowledgeable experts and scored a subset of these assessments according to the "Table of Attributes" (TOA) criterion defined in the ORCS method. We used this training dataset to assess the ability of each TOA criterion to predict stock status using boosted regression trees, which identified threshold values that most accurately classify stocks into vulnerability categories. We applied this refined approach to the subset of data-rich stocks reserved for testing classification accuracy and compared the estimated status to the known status for each stock. We will also evaluate the consistency of TOA scores from different stakeholders to identify criteria that will be widely seen as objective.

"Development of rapid salamander monitoring and habitat assessment protocols for the Delaware River basin"

Presenting authors: David Keller, Academy of Natural Sciences of Drexel University, Philadelphia, PA 19103
Co-authors: Richard J. Horwtiz

Salamanders are recognized as being abundant, important members of stream communities and sensitive to habitat loss and stream impairment. However, there are no standard protocols for assessing stream salamanders and their habitats. Existing protocols use minimal salamander-specific habitat assessment. As a result, determinations from salamander monitoring may confound water quality impairment with habitat quality. Our objectives were to 1) determine the optimum reach length for determining richness, 2) identify habitat variables that account for variability in richness and relative abundance, and 3) propose rapid assessment protocols. From 2013-2014, 40-60 m (reach length) visual encounter surveys were conducted at 48 sites in the Delaware River basin. Richness was not even across the basin and was highest in least degraded streams. These data suggest that a 60-80 m reach length may be needed to index richness throughout basin. To identify variables explaining the most variation in relative abundance, we grouped our environmental variables into 3 classes (aquatic, terrestrial, and upstream land use) and then partitioned the variation in species composition for each class using Redundancy Analysis (RDA). Members of each class were then filtered by forward stepwise selection to identify variables that explained the most variation. In the aquatic parameter class, 42.8% of the variation in composition was explained by average wetted width, the modal value of submerged aquatic macrophytes, and % wood. Percent small boulder explained 13.1% of the variation in the terrestrial class. Percent forested land upstream explained 7% of the variation.

"Shallow water fish assemblages in the Great Bay-Mullica River estuary: Comparison over time and along the temperature and salinity gradients"

Presenting author: Sage Mitchell*, Rutgers University, Marine Field Station, Tuckerton, NJ 08087
Co-authors: Kenneth Able and Thomas Grothues

We examined and compared estuarine fish assemblage data from seine netting done in the Great Bay-Mullica River estuary in 1972 and 2015 along with temperature and salinity data at each seine location to determine if long-term changes in the estuary's physical characteristics might correlate with fluctuations in assemblage dynamics. We found that over the 45-year period from 1970 to 2015, the estuary's temperature gradient had a slight shift from a heat peak upriver to a peak in the bay area, in addition to an overall decrease in salinity at all sites. In addition, fish assemblages increased from 1972 to 2015, with 4,247 more individuals caught in 2015 than 1972. Catches for both years were dominated by the Atlantic silverside *Menidia menidia* and the mummichog *Fundulus heteroclitus*, two species normally abundant in estuarine waters. However, 11 species were caught only in 1972 and 28 species were unique to 2015, indicating a shift in species recruitment to the estuary with an increase in richness over the past 45 years. Principal component analysis of the catch data resolved along two primary modes of variance: salinity tolerance and migratory habits. These findings, though partially stemming from incomplete data gathered in the 1970s, may contribute to the understanding of the long-term variation in the Great Bay-Mullica river environment and how that variation affects the present fauna.

"Population Biology of Oyster Toadfish, Opsanus tau, in New Jersey Estuaries"
Presenting authors: Francesca Roselli*, Rutgers University, New Brunswick, NJ 08901
Co-authors: Daphne Munroe and Jason Morson

From Massachusetts to Florida, *Opsanus tau*, commonly known as Oyster Toadfish, is found in estuaries on sandy, muddy bottoms of oyster reefs. Toadfish make nests within cavities of empty shells or debris, and are an important trophic link in estuarine food webs. Information about their growth and reproductive ecology in the northern half of the species' range is limited. This project focuses on populations of oyster toadfish in New Jersey, using a total of 158 toadfish samples collected in the Barnegat Bay area. Each fish was measured (total fork length) and weighed, then dissected to macroscopically determine sex and stage of maturity. In Barnegat Bay, a total of 25 fish were mature (all female). The highest average gonad-to-body mass index occured in June, suggesting peak spawning around this time. With a growing live fishery, and this species' important role in estuarine ecosystems, it is imperative to expand our understanding of the basic biology and ecology of this species in New Jersey. The data collected in this project will help provide information needed to manage the population if necessary.

"Evacuation Rates of Clearnose Skate, Goosefish, and Summer Flounder"
Presenting author: Linda L. Stehlik, Northeast Fisheries Science Center, National Marine Fisheries Service, NOAA - James J. Howard Marine Sciences Laboratory
Co-authors: John Rosendale, Beth Phelan, and Jonathan Hare

The digestion and evacuation rates of three predators on the northeast Atlantic continental shelf were determined in the laboratory. Goosefish, *Lophius americanus*, Summer Flounder *Paralichthys dentatus*, and Clearnose skate *Leucoraja* have different modes of feeding. All are

predators upon fish, particularly young stages of commercially desirable fish, and the skate also frequently preys upon crustaceans. In the experiments, fish were fed known weights of herring or sand eels, and were left to digest for a variety of hours or days. Then individuals were taken out, sedated, and their stomachs were lavaged. It was found that the evacuation rate of Clearnose Skates in the laboratory is much higher than the commonly used estimate for elasmobranchs, and even for the average teleosts (Stehlik et al., 2015). Goosefish evacuated on a rate of days not hours, the time to complete evacuation was calculated to be 11 d at 10°C and 7 d at 15°C. Summer flounder stomach capacity is much less, and time to complete evacuation was approximately 25 hr at 20°C. Evacuation rates are used in single and multispecies models of food webs to aid in quantifying prey consumption.

"American Eel Density and Length-Frequency Pre-Dam Removal on the Paulinskill River"

Presenting authors: Allison M. Stoklosa, Academy of Natural Sciences of Drexel University, Philadelphia, PA 19103
Co-authors: David H. Keller, Paul F. Overbeck, and Richard J. Horwitz

American eel (*Anguilla rostrata*) distribution and abundance is impacted in part by migration barriers such as dams which reduce the amount of accessible habitat. Columbia Lake Dam (CLD) is near the mouth of the Paulinskill which flows into the Delaware River and acts as a partial blockage to American eel. Upstream of CLD is another partial blockage, the Paulina Dam (PD). Both CLD and PD are scheduled to be removed in 2016. Our objective for this study is to evaluate American eel density (CPUE) and length-frequency along the Paulinskill before and after dam removal. Four stations were sampled by backpack electrofishing in July 2015 of which one station was downstream of CLD and three were upstream. Three to four 50m long x 3m wide reaches were sampled at each station to collect American eel, crayfish, and lamprey spp. Downstream of CLD 132 eels ranging in lengths from 10.4 to 46cm were documented in three samples with the modal length being 14.4cm. Upstream of CLD 6 eels were documented in 12 samples from three stations ranging in length from 35.2 to 50cm with five of the six eel being over 40cm in length. The preliminary data suggests a difference in eel abundance and length-frequency between the stations upstream and downstream of CLD. We hypothesize that American eel CPUE will increase and length-frequencies will shift towards smaller eels in reaches upstream of Columbia Lake and Paulina Lake post CLD and PD removal.

"What factors have contributed to the increase of sea nettles in Barnegat Bay?"

Presenting author: Talia Young*, Ecology & Evolution, Rutgers University, New Brunswick, NJ 08901
Co-authors: Jim Vasslides, Eden Buenaventura, and Mary Beth Decker

Recent work has focused on the role of "global ocean sprawl" – the proliferation of human-built structures in marine habitats – in providing habitat for jellyfish polyps. To investigate the effect of human-built structure on jellyfish abundance, we used a combination of shoreline-type GIS data and in situ jellyfish abundance and environmental data to build a two-stage generalized linear model for abundance of the sea nettle (*Chrysaora quinquecirrha*), an estuarine jellyfish, in Barnegat Bay, NJ, USA. To evaluate our model, we used it to hindcast jellyfish abundance based on historical environmental and shoreline data, and then qualitatively compared the hindcasted abundance values with local ecological knowledge (LEK) on jellyfish

abundance collected from interviews with local resource users. The hindcasted model results corresponded with the LEK historical data (both showing an increase in jellyfish over the same time period). Shoreline development was one of several highly significant predictors in the model, along with water temperature, salinity, dissolved oxygen, and water residence time. Salinity appeared to be the primary limiting factor in geographic distribution of sea nettles in Barnegat Bay. These results underscore scientific consensus that jellyfish abundance is tied to a complex suite of environmental factors, and support a growing body of work linking anthropogenic development and jellyfish abundance. The project also demonstrates that LEK data can be used effectively in complement with scientific data, as well as provide a useful tool for engaging and empowering stakeholders in resource management and conservation.