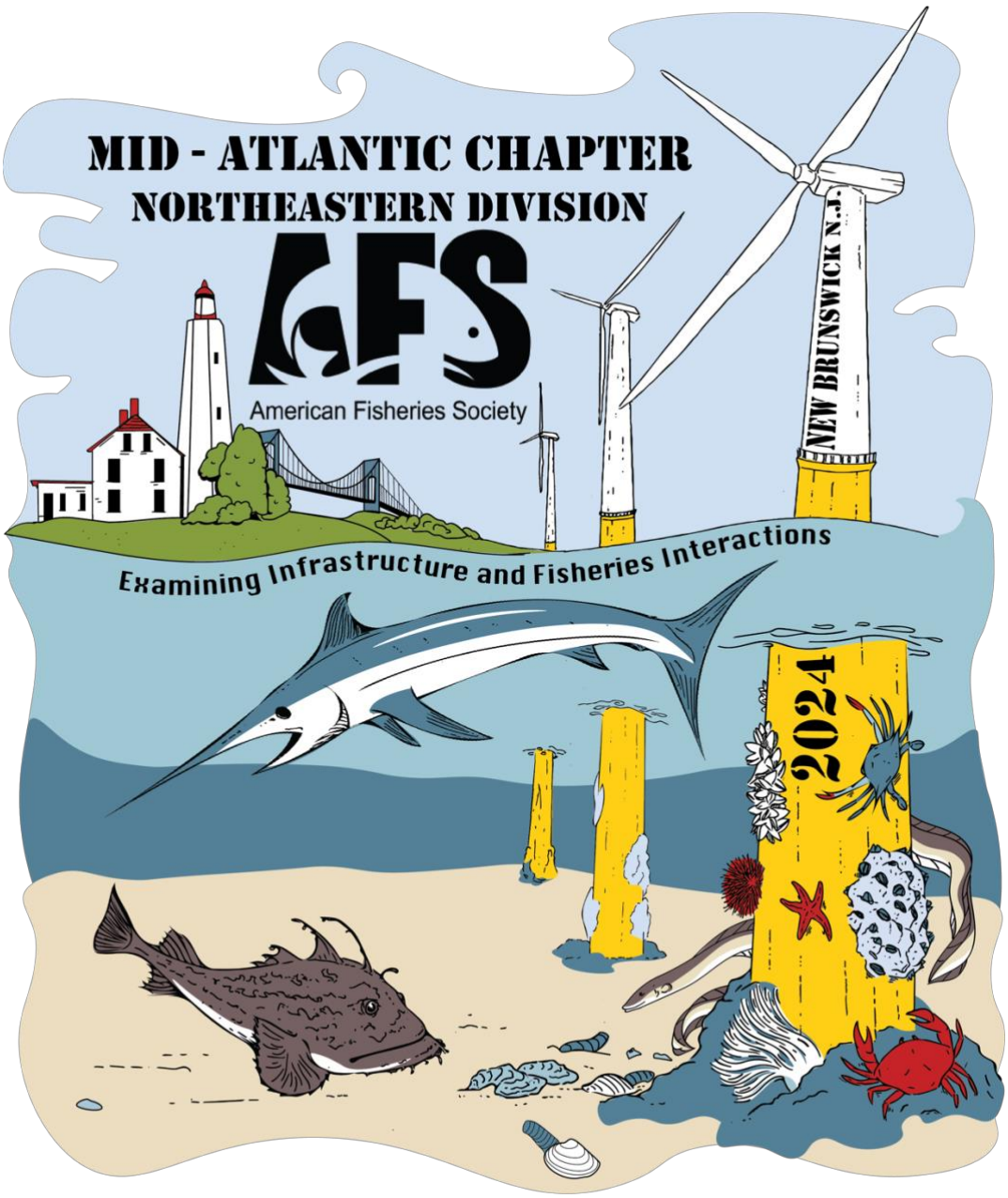

Meeting Program and Abstract Book

The 2024 Joint Meeting of the Mid-Atlantic Chapter and the Northeastern Division of the American Fisheries Society

American Fisheries Society

The Executive Committee of the Mid-Atlantic Chapter of the American Fisheries Society (MAC-AFS)

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Michael Acquafredda, PhD
Rutgers University Haskin Shellfish Research Laboratory

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Hobart & William Smith Colleges

Secretary/Treasurer
Richard Bell
The Nature Conservancy

The Executive Committees of MAC-AFS and NED-AFS would like to thank the following individuals for their support and assistance with planning this meeting.

Local Arrangements Committee

Joe Cassone (Co-Chair)
Connecticut Department of Energy and Environmental Protection

Liza Maguire
CIMAX

Sarah Hudak
Sea Risk Solutions

Samantha Alaimo
Rutgers University

Hails Tanaka
Rutgers University

Dana Christensen
Stockton University

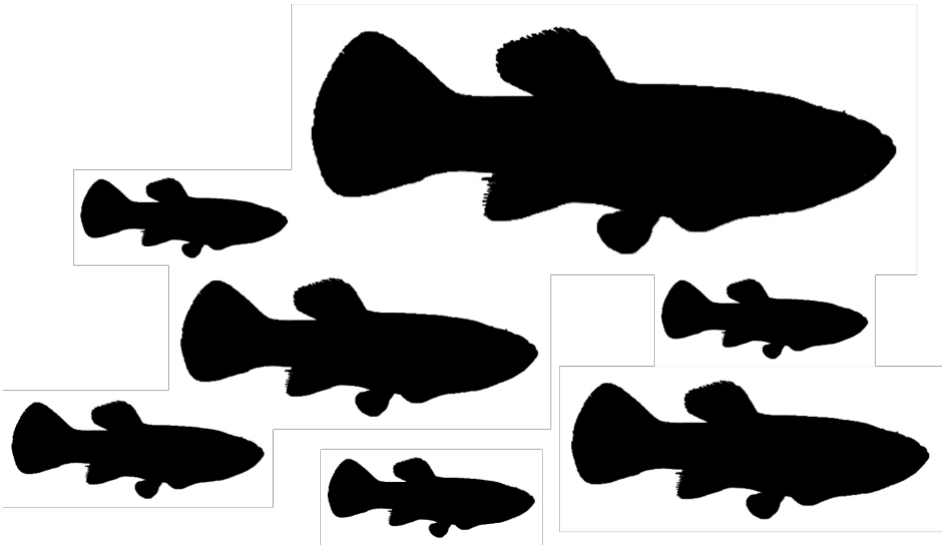

Table of Contents

Welcome!

The Mid-Atlantic Chapter of the American Fisheries Society (MAC-AFS) is a professional organization centered around the science and responsible management of fisheries and aquaculture in the Mid-Atlantic region. Our membership is comprised of scientists, managers, students, and fishing industry members, who are affiliated with the universities, government agencies, non-profits, and companies from New Jersey, Delaware, eastern Pennsylvania, and southern New York.

MAC-AFS is one of six geographic chapters within the Northeastern Division of the American Fisheries Society (NED-AFS). The mission of the Chapter is to fulfill the parent society's objectives within the Mid-Atlantic Region:

- Promote the conservation, development, and wise use of the fisheries
- Promote and evaluate the development and advancement of fisheries science and practice
- Gather and disseminate scientific, technical, and other information about fisheries science and practice
- Encourage the teaching of fisheries science and practice in regional colleges and universities and the continuing education and development of fisheries professionals.

Each year, MAC-AFS hosts a conference that gathers fisheries professionals from the Mid-Atlantic. This year, MAC is excited to be co-hosting its 2024 annual meeting with NED-AFS. This meeting will provide a platform for sharing information and ideas about the latest advancements in regionally-specific fisheries and aquaculture science and management. Cutting-edge science, new policy perspectives, challenges facing the region, and success stories worth celebrating will be discussed through oral presentations, poster displays, and social events.

This year, the 2024 Joint Meeting of MAC/NED-AFS is taking place on October 27-29, 2024, at the Hyatt Regency in New Brunswick, New Jersey.

Schedule at a Glance

Sunday, October 27, 2024 –
Rutgers Department of Marine and Coastal Sciences

10:00 – 12:00	Professional Development Activity: *Grants Management 101*
12:00 – 12:30	Break*
12:30 – 14:30	Professional Development Activity: *Improving Your Scientific Writing*
14:30 – 15:00	Break*
15:00 – 17:00	Professional Development Activity: *Introduction to Gyotaku (Art of Fish Printing)*
17:00 – 18:30	Break*
18:30 – 20:30	Registration at the Hyatt Regency
18:30 – 20:30	Student-Only Mixer Event at Old Man Rafferty's

*All Sunday meals are "on your own" except for the Mixer Event (students only)

Schedule at a Glance

Monday, October 28, 2024 – Hyatt Regency New Brunswick

7:00 – 8:00	Registration and Poster Set-up
8:00 – 8:30	Welcome addresses: Michael Acquafredda, PhD, MAC-AFS President Margaret Murphy, PhD, AFS First Vice President
8:30 – 9:30	Plenary Speaker: Lisa Methratta, PhD
9:30 – 10:00	Coffee Break
10:00 – 11:30	Cumulative Effects of Offshore Wind on Fisheries I
11:30 – 13:00	Lunch*
13:00 – 13:15	General Contributed I
13:15 – 14:15	Cumulative Effects of Offshore Wind on Fisheries II
14:15 – 14:45	Coffee Break
14:45 – 16:00	Cumulative Effects of Offshore Wind on Fisheries (Breakout Groups)
16:00 – 16:30	Break and Poster Session Prep
16:30 – 18:30	Poster Session, Silent Auction, and Reception, presented by RWE/Community Offshore Wind
18:30 – 20:30	Evening Banquet, presented by Atlantic Shores

*Monday breakfast and lunch are “on your own”

Schedule at a Glance

Tuesday, October 29, 2024 – Hyatt Regency New Brunswick

7:00 – 8:00	Registration
8:00 – 8:15	Welcome address: Andrew Bade, PhD, NED-AFS President & Heather Stewart, PhD, NED-AFS Past President
8:15 – 8:30	Report out from Cumulative Effects of Offshore Wind on Fisheries Breakout Groups
8:30 – 9:15	Plenary Speaker: John Waldman, PhD
9:15 – 9:45	Coffee Break
9:45 – 11:45	Concurrent Sessions: • General Contributed II • Exploring the Impacts of Dam Removal on Fisheries Among Northeast U.S. Basins I
11:45 – 13:00	Boxed Lunch and Mentor/Mentee Meal, presented by Attentive Energy
13:00 – 14:45	Concurrent Sessions: • General Contributed III • Exploring the Impacts of Dam Removal on Fisheries Among Northeast U.S. Basins II and Panel Discussion
14:45 – 15:15	Coffee and Snack Break
15:15 – 17:00	NED-AFS Business Meeting
17:00 – 17:15	Stretch Break
17:00 – 18:45	MAC-AFS Business Meeting and Awards Ceremony for Best Student Presentations

*Tuesday breakfast and dinner are “on your own”

Sunday, October 27

Start_Time	Session	Title	Speaker
7:00	[redacted]		
7:15			
7:30			
7:45			
8:00			
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10:00	Professional Development Events	Grants Management 101	White
10:15			
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11:45			
12:00	Break		
12:15			
12:30	Professional Development Events	Improving Your Scientific Writing	Dow
12:45			
13:00			
13:15			
13:30			
13:45			
14:00			
14:15			
14:30	Break		
14:45			
15:00	Professional Development Events	Introduction to Gyotaku (The Art of Fish Printing)	Sawitsky
15:15			
15:30			
15:45			
16:00			
16:15			
16:30	Break		
16:45			
17:00			
17:15			
17:30			
17:45			
18:00			
18:15			
18:30	Registration	Student-Only Mixer Event at Old Man Rafferty's	
18:45			
19:00			
19:15			
19:30			
19:45			
20:00			
20:15			
20:30			

Professional Development Activities will be located at
Rutgers University Department of Marine & Coastal Sciences (Cook-Douglass Campus)
71 Dudley Rd, New Brunswick, NJ 08901

Registration will be located at the main conference venue:
Hyatt Regency – New Brunswick
2 Albany Street, New Brunswick, NJ 08901

Student-Only Mixer Event will be located at
Old Man Rafferty's
106 Albany St, New Brunswick, NJ 08901

Monday, October 28

Start_Time	Session	Title	Speaker
7:00	Registration and Poster Set-up		
7:15			
7:30			
7:45			
8:00	Welcome Message: MAC-AFS President Michael Acquafredda		
8:15	Welcome Message: AFS First Vice President Margaret Murphy		
8:30	Plenary Speaker	Cumulative Effects of Offshore Wind Development: Building Knowledge to Support Co-Existence	Methratta
8:45			
9:00			
9:15	Coffee Break		
9:30			
9:45			
10:00	Cumulative Effects of Offshore Wind on Fisheries I	Offshore wind development advancing regional science through an ecosystem approach	Lucey
10:15		Acoustic telemetry as a regional non-extractive approach for monitoring of fishes within Offshore Wind Lease Areas within the New York Bight	Dunton
10:30		Evaluating the effects of offshore wind development in southern New England on fisheries biodiversity using environmental DNA	O'Donnell
10:45		Incorporating Environmental DNA Into Wind Mitigation Planning in the northeast United States marine ecosystem	Liu
11:00		A pilot hook-and-line survey to mitigate the impacts of offshore wind energy development on long-term fisheries surveys	Morson
11:15		Socioeconomic Monitoring Standards for Offshore Wind Development	Seara
11:30	Lunch (On Your Own)		
11:45			
12:00			
12:15			
12:30			
12:45			
13:00	General Contributed I	Interpreting Juvenile Sakhalin Taimen and Masu Salmon Interspecies Relationships through an Analysis of Habitat Differences at Collection Sites in the Sarufutsu Watershed, Japan	Hayashigatani & Levy
13:15	Cumulative Effects of Offshore Wind on Fisheries II	The Influence of Mid-Atlantic Bight Seasonal Oceanographic Variability on Commercial Species Dynamics	Alaimo
13:30		Sand Ridges Make Troughs: Understanding fish habitat structuring of sand features for micro-siting offshore wind turbine pylons	Grothues
13:45		Critical Subsea Infrastructure and Fisheries - Lessons from Subsea Telecom Cables	Drew
14:00		Win Win Wind: Prioritizing Research on Offshore Wind Development for Sustainable Long-Term Fisheries Management	Brust & Perez
14:15	Coffee Break		
14:30			
14:45	Cumulative Effects of Offshore Wind on Fisheries III	Break-out Groups	All meeting attendees
15:00			
15:15			
15:30			
15:45			
16:00	Break and Poster Session Prep		
16:15			
16:30	Poster Session, Silent Auction, and Cocktail Reception		
16:45			
17:00			
17:15			
17:30			
17:45			
18:00			
18:15			
18:30	Evening Banquet		
18:45			
19:00			
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20:00			
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20:30			

All Monday conference activities will be located at the main conference venue:
Hyatt Regency – New Brunswick 2 Albany Street, New Brunswick, NJ 08901

All oral presentations, the poster session, silent auction, and reception will take place in the Brunswick Ballroom Room 1+2.

Breakout groups for the "Cumulative Effects of Offshore Wind on Fisheries Workshop" will take place in Brunswick Ballroom Room 1+2, and Conference Rooms A, B, and C.

The evening banquet will take place in the Garden State Ballroom.

Tuesday, October 29

Start_Time	Session	Talk Title	Speaker	Start_Time	Talk Title	Speaker	Session
7:00	Registration						
7:15							
7:30							
7:45							
8:00	Welcome Message: NED-AFS President Andrew Bade & Past-President Heather Stewart						
8:15	Cumulative Effects of Offshore Wind on Fisheries	Report Out					Methratta & Jewett
8:30	Plenary Speaker	Restoring Atlantic Anadromous Fishes: It's Time to Seize the Day					Waldman
8:45							
9:00							
9:15	Coffee Break						
9:30							
9:45	Exploring the Impacts of Dam Removal on Fisheries Among Northeast U.S. Basins I	Assessment and Prioritization of Road-Stream Crossings to Restore Aquatic Connectivity	Jackson	9:45	The use of industry acoustics to estimate biomass of Atlantic Menhaden	Gurshin	General Contributed II
10:00		Exploring Migration Histories Through Biomarker Chemistry for the Highly Migratory and Cryptic Blueback Herring (*Alosa aestivalis*)	Herne	10:00	Novel insights into Atlantic menhaden (*Brevoortia tyrannus*) carbon production and mediation on the US Northeast Shelf	Cook	
10:15		Juvenile Blueback Herring (*Alosa aestivalis*) Growth, Condition and Distribution in the Connecticut River	Piscitelli	10:15	Electronic shark deterrents decrease bycatch of Atlantic spiny dogfish (*Squalus acanthias*) in Gulf of Maine recreational	Nyiri	
10:30		Rapid recovery of river herring (*Alosa aestivalis* and *A. pseudoharengus*) spawning habitat use in response to a Maryland dam removal	Legett	10:30	Evaluating terrapin excluder devices to reduce bycatch without sacrificing legal harvest in New Jersey's blue crab fishery.	Brust	
10:45		Evaluating Sustainability Metrics for Maine River Herring Populations in the Penobscot River	McDonald	10:45	Investigating species-specific trends throughout New Jersey Department of Environmental Protection's 30+ year historical trawl dataset	Kuenzli	
11:00		Evaluating Migratory Passage and Estimating Run Size of American Shad and River Herring in the Raritan River: Results of a Ten Year Study	Hernandez	11:00	Local Adaptation and Population Structure in Atlantic Croaker (*Micropogonias undulatus*)	Fitz	
11:15		Restoring Connectivity of Aquatic Habitats to Enhance Fish Passage and Other Ecological and Societal Functions in the Delaware River Basin: Cedar Grove Dam Removal, Pequest River, New Jersey	Murphy	11:15	Geographic differences in the seasonal patterns of the parasite Perkinsus marinus: implications under climate change	Scott	
11:30		Improving Aquatic Connectivity and Advancing River Restoration in the Raritan River Watershed, New Jersey	Stark	11:30	A Dynamic Range Model (DRM) for Black Sea Bass (*Centropristis striata*) in the Northeast US	Bandara	
11:45	Boxed Lunch and Mentor/Mentee Meal						
12:00							
12:15							
12:30							
12:45							
13:00	Exploring the Impacts of Dam Removal on Fisheries Among Northeast U.S. Basins II	If You Build It Will They Come? The Importance of Monitoring Fish Passage through New Fishways: A Case Study on the Peconic River, Long Island, New York	Appel	13:00	Vertebral chemistry traces the life history of migratory shortfin mako sharks	Hennessy	General Contributed III
13:15		Using eDNA to Track Migrating Fish Species Post Dam Removal	Noll	13:15	Tracing movement patterns and natal origins of Striped Bass in Maine: connecting acoustic telemetry with scale chemistry	Gowell	
13:30		Panel Discussion	Selected Speakers	13:30	Using eDNA to Estimate Seasonal Presence of Striped Bass (*Morone saxatilis*) in Southern Maine	Tyrrell	
13:45				13:45	Evaluating the Use of Environmental DNA (eDNA) to Survey Fish Assemblages in wadeable streams of the New Jersey Pinelands	Henning	
14:00				14:00	Extending an approach to developing and implementing fleet-specific fishing mortality reference points	Celestino	
14:15				14:15	Dynamic Biomass Reference Points for Northeast U.S. fisheries in a changing world	Wiedenmann	
14:30				14:30	Preliminary Findings: Surveying the Perceptions of Saltwater Anglers in New Jersey in Bridging the Gap Between Saltwater Anglers and Researchers	Christensen	
14:45	Coffee and Snack Break						
15:00							
15:15	NED Business Meeting						
15:30							
15:45							
16:00							
16:15							
16:30							
16:45							
17:00	Stretch Break						
17:15	MAC Business Meeting and Student Awards Ceremony						
17:30							
17:45							
18:00							
18:15							
18:30							
18:45	End of Meeting						
19:00	[redacted]						
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20:30							

All Tuesday conference activities will be located at the main conference venue:
Hyatt Regency – New Brunswick 2 Albany Street, New Brunswick, NJ 08901

The welcome message, "Cumulative Effects of Offshore Wind on Fisheries Workshop" report out, plenary presentation, NED business meeting, MAC business meetings, and Awards ceremony will take place in Brunswick Ballroom Room 1+2.

The "Exploring the Impacts of Dam Removal on Fisheries Among Northeast U.S. Basins" Workshop sessions will take place in Brunswick Ballroom Room 1.

The General Contributed sessions will take place in Brunswick Ballroom Room 2.

Tuesday's boxed lunch and mentor/mentee meal will take place in Conference Rooms A, B, and C, and Salons A and B.

Key: MAC/NED Business | Registration | Meals & Break | Social Events | Professional Development Activities & Plenary Presentations | Talks & Workshops | Student Talks

Sponsors

This meeting would not be possible without the generous support of our sponsors. These organizations provided material resources, which defrayed the costs of the venue, meals, professional development activities, and social events. These resources were also used to support the attendance of our plenary speakers and to ensure that registration costs were manageable for all attendees. Additionally, the sponsors' donations were used to support student attendance and participation in our meeting, including subsidizing the free lodging offered to eligible students. We are extremely grateful for these sponsors and their support of the Mid-Atlantic Chapter and Northeastern Division of the American Fisheries Society.

Meeting Logo Design

Artfully designed and generously gifted by Anna Gaskill

Distinguished Sponsors – Donations of $2000 or more

attentive energy

COMMUNITY offshore wind

A joint venture of RWE nationalgrid

ATLANTIC SHORES offshore wind

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VINEYARD OFFSHORE

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Cape May, NJ, USA

HDR

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Sea Risk Solutions

Bass Pro Shops

Cabela's

New Jersey Natural Gas

MANASQUAN RIVER
MARLIN & TUNA CLUB

CIMAX

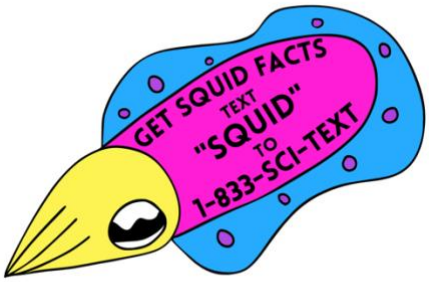
Sponsors – Donations up to $499

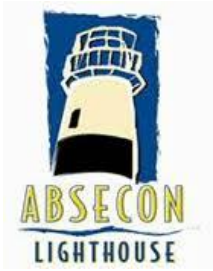
JENKINSON'S Aquarium

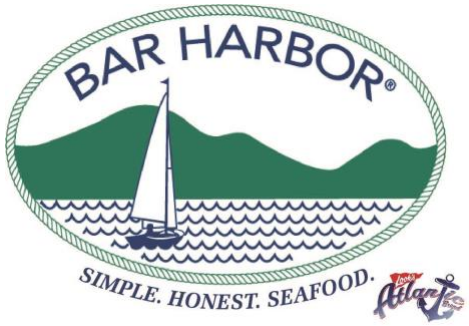
FOLK
ACROSS THE STREET
supporting science through music

Donations to the Silent Auctions

We are also grateful for all the organizations and individuals who donated to our silent auction. All proceeds of the auction go towards supporting student-focused activities throughout the year. This includes supporting our student subunits, contributing to the AFS Hutton Junior Fisheries Biology Program, and covering the costs of student activities at future MAC-AFS Annual Meetings.







…plus many other donations from our MAC and NED-AFS members.

Venue and Event Information

Hyatt Regency – New Brunswick, New Jersey

2 Albany Street, New Brunswick, NJ 08901, United States
https://www.hyatt.com/hyatt-regency/en-US/ewrrn-hyatt-regency-new-brunswick

Registration and Main Conference Events

Sunday, October 27, 2024, 18:00 – 20:30
Monday, October 28, 2024, 7:00 – 20:30
Tuesday, October 29, 2024, 7:00 – 18:45

Rutgers University Department of Marine & Coastal Sciences (Cook-Douglass Campus)

71 Dudley Rd, New Brunswick, NJ 08901

Professional Development Events

Sunday, October 27, 2024, 10:00 – 17:00

Thank you to the Rutgers Department of Marine and Coastal Sciences for generously providing space for our professional development activities!

Student-Only Mixer Event

"Meet and Eat" at Old Man Rafferty's

Where: Old Man Rafferty's, 106 Albany St, New Brunswick, NJ 08901

When: Sunday, October 27th, 2024, at 6:30 – 8:30 PM

What: Join students from across the Division over food and drinks at Old Man Rafferty's on Albany Street! This is a great way to make new friends and research connections before the conference starts. Sign-up is "first come, first serve," with a cap of 45 attendees. Please find the sign-up form here (https://forms.gle/beB9bKfXe1kG8X8c7) and the "eat and meet" menu here (https://drive.google.com/file/d/1UreW4PS2DzwK-AGdBUi1TdG9JZ87Jiha/view?usp=sharing).

Lead contact: MAC Student Representative, Lauren Cook lcook@marine.rutgers.edu

Dinner and Socializing

Restaurants

- **Blackthorn Restaurant and Irish Pub**
  - Monday – Sunday: 12PM–2AM (Happy Hour: 5–7PM)
- **Cuzins Seafood and Clam Bar**
  - Sunday: 1-9PM; Mon–Thur: 12–10PM (Happy Hour: 4:30–6PM)
- **Diesel and Duke Burgers + Stuff**
  - Sunday: 12–11:45PM; Monday–Wednesday: 5–11:45PM
- **Fat Cactus Mexican Cantina**
  - Sun–Mon: 11:30AM–10PM; Tu-Wed: 11:30AM-11PM; Happy Hour 4–7PM
- **Mamoun's Falafel**
  - Monday–Sunday: 11AM–1PM
- **Dashen Ethiopian Cuisine**
  - Sun: 12-8:30PM; Mon (Closed); Tue: 12-9PM
- **Ramen Nagomi**
  - Monday–Thursday: 11:30AM–3PM and 5–9:30PM
- **Sakana Sushi & Japanese Cuisine**
  - Sunday: 11:30AM–9:15 PM; Mon–Tues: 11:30AM–2:45PM, 4:30–9:15PM
- **Salt Seafood and Oyster Bar**
  - Monday: 4–8PM; Tuesday: 4–9PM; Happy Hour: 3–5PM

Desserts

- **Thomas Sweet**
  - Sunday–Tuesday: 12–11PM
- **Surreal Creamery & Breaking Batter**
  - Sun: 1PM–12AM; Mon–Tues: 3–11PM

"Local Legends"

- **Destination Dogs**
  - Sunday: 12PM–12AM; Mon–Tues: 11:30AM–12AM
- **RU Hungry Home of the Original Fat Sandwiches**
  - Sunday–Tuesday: 8AM–4AM

Bars

- **Batch Bin & Barrel**
  - Tuesday: 3–10PM
- **Clydz Casual Food & Drinks**
  - Monday and Tuesday: 4PM–2AM
- **Harvest Moon Brewery & Café**
  - Sun, Tues–Wed: 11:30AM–12:00AM; Mon: 5–11PM

Professional Development Activities

Grants Management 101

Course Description: This course is designed for graduate students and early-career professionals to gain a foundational understanding of grants. Attendees will learn the key requirements typically associated with proposal submissions. Through an interactive approach, the course will analyze a recently announced request for proposal (RFP), breaking down its components and navigating the submission requirements with a particular emphasis on budget development.

Course Objectives: By the end of this course, participants will be able to:

- Identify the essential components of an RFP and a grant proposal
- Understand the commonly used vocabulary related to proposal budgets.
- Gain a general understanding of the elements of a budget

Course Instructor:
Angela White
Business Manager III Supervisor at the Rutgers University Haskin Shellfish Research Laboratory and the Jacques Cousteau National Estuarine Research Reserve

Time and Date: Sunday, October 27, 2024, at 10:00 – 12:00

Location: Rutgers University Cook-Douglass Campus, Department of Marine and Coastal Sciences, 71 Dudley Rd, New Brunswick, NJ 08901

Improving Your Scientific Writing

Course Description: We'll work on making your writing clearer and more compelling. Bring a draft writing project at any stage and have an opportunity to workshop it. We'll be working collaboratively with some time to make individual revisions. You'll leave the workshop with some strategies to revise at the sentence level and at the larger argument as well. We'll be focusing primarily on publishing research, but any professional writing task is welcome, and any level of writing is welcome.

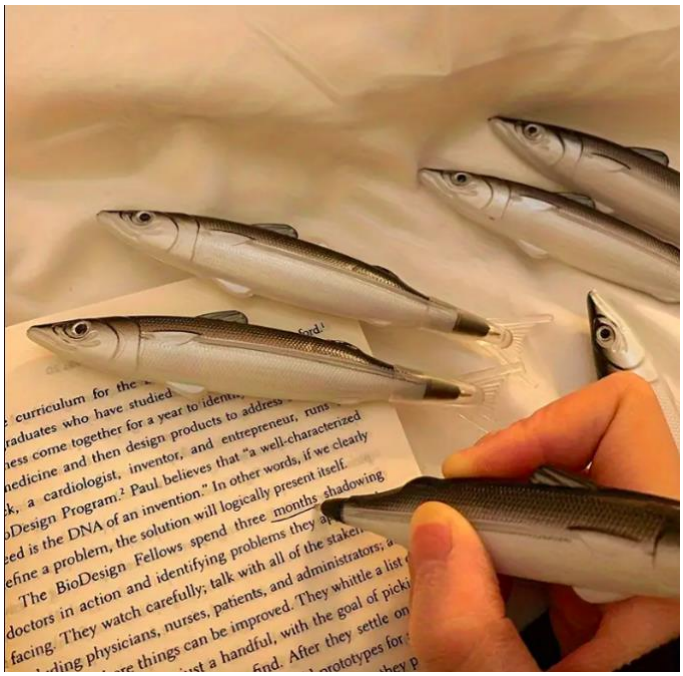
Course Objectives: By the end of this course, participants will be able to:

- Evaluate and apply revision strategies to make passages clearer, shorter, and more energetic.
- Consider how writing positions them in relation to their research and their field and make informed choices on how to convey the relevance of their work.

Course Instructor:
Donald W. Dow, PhD
Associate Teaching Professor
Director, Business & Technical Writing Rutgers Writing Program

Time and Date: Sunday, October 27, 2024, at 12:30 – 14:30

Location: Rutgers University Cook-Douglass Campus, Department of Marine and Coastal Sciences, 71 Dudley Rd, New Brunswick, NJ 08901



Introduction to Gyotaku (Art of Fish Printing)

Course Description: This workshop will include a brief history and a demonstration of the art of Gyotaku. The students will then be led through a step-by-step process of completing their own Gyotaku. This will be followed by instructions on how to paint a realistic fish eye on their print. This format should allow extra time at the end of instruction to continue to practice and create more than one finished print. We will conclude the workshop with a group photo of every participant holding their finished works of art.

Course Instructor:
Bridget Sawitsky
Owner/Artist
Sea & Scales

Time and Date: Sunday, October 27, 2024, at 15:00 – 17:00

Location: Rutgers University Cook-Douglass Campus, Department of Marine and Coastal Sciences, 71 Dudley Rd, New Brunswick, NJ 08901

Workshops

Cumulative Effects of Offshore Wind on Fish and Fisheries

Monday, October 28, 2024

Workshop Description: NOAA Northeast Fisheries Science Center Offshore Wind Ecology Branch is organizing a workshop to foster conversations among researchers, managers, and stakeholders about the cumulative effects of offshore wind on fish and fisheries. “Cumulative” has several connotations: cumulative across all projects in a region, cumulative over time, cumulative across all the individual impact producing factors, and cumulative with other stressors, namely climate change. In this workshop, we will explore the differences among these varied conceptual approaches and their applications. All meeting registrants are welcome to participate in this workshop, which will include a presentation from plenary speaker, Dr. Lisa Methratta, a series of oral presentations, and breakout groups.

Workshop Objectives:

- Explore and discuss the definition of cumulative as it relates to the impacts of offshore wind
- Discuss what information is needed to evaluate cumulative effects and how to collect that information
- Discuss how to model and assess cumulative effects
- Review existing cumulative effects research including lessons learned and gaps identified

Workshop Leaders:

Elizabeth (Lisa) Methratta, PhD (she/her)
Fishery Biologist
NOAA Northeast Fisheries Science Center Offshore Wind and Ecology Branch

Libby Jewett, PhD (she/her)
Research Program Manager
NOAA Northeast Fisheries Science Center Offshore Wind and Ecology Branch

Exploring the Impacts of Dam Removal on Fisheries Among Northeast U.S. Basins

Tuesday, October 29, 2024

Workshop Description: This workshop will introduce the concept of removing dams for the benefit of fish populations. An overview of the history of dam removal, the mechanisms for removing dams, and the impacts of dams and dam removal on fish will be given. Participants will hear about case studies of dam removal projects that have benefitted fish populations and discuss considerations for fresh-saltwater exchange of animals, nutrients, water, and climate refuge. Regional efforts to improve river connectivity from Maine to Maryland will be presented. Participants will have the opportunity to learn how research and monitoring impacts and evaluates restoration outcomes and discuss challenges surrounding restoring rivers with practitioners and researchers. Ultimately, workshop leaders hope to initiate a network of communication between inland and marine fisheries folks working on and supporting dam removal. The workshop includes a presentation from plenary speaker, Dr. John Waldman, a series of oral presentations, and a panel discussion.

Workshop Objectives:

- Increase awareness of the impacts of dams and benefits of dam removal
- How to use science to track success of restoration projects
- Raise awareness of basin-scale initiatives on dam removal throughout the region

Workshop Leaders:

Jessie Thomas-Blate (she/her)
Director, River Restoration
American Rivers

Michelle DiBlasio (she/her)
Freshwater Restoration Manager
The Nature Conservancy

Steve Tuorto, PhD (he/him)
Director of Science and Stewardship
The Watershed Institute

Plenary Speakers

Elizabeth T. Methratta, PhD

NOAA Fisheries
Northeast Fisheries Science Center
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Elizabeth.Methratta@noaa.gov
(she/her)

Bio: Dr. Elizabeth (Lisa) Methratta is a Fisheries and Wind Scientist at the NOAA Northeast Fisheries Science Center Offshore Wind and Ecology Branch. Dr. Methratta holds a BS in Biology from Penn State University and a PhD in Biology from the University of Pennsylvania. Following graduate school, she went on to pursue a National Research Council Postdoctoral Fellowship at NOAA Fisheries in Woods Hole. In her nearly 20-year career, Dr. Methratta has worked on such topics as spatially explicit fish-habitat relationships on the Northeast U.S. Continental Shelf, oyster reef restoration and blue crab fishery dynamics in Chesapeake Bay, and more recently offshore wind effects on finfish populations. Dr. Methratta's work has involved designing approaches to synthesizing large volumes of complex fisheries data, providing advice on survey design methodology, coordinating projects involving multiple agencies, and leading working groups to discuss the best science available to underpin the environmental decision making process. Dr. Methratta's current focus lies at the nexus of offshore wind and fisheries. Her work has included a critical analysis of survey design methodologies used to study finfish impacts and the publication of a meta-analysis of European finfish studies conducted at wind farms.

Cumulative Effects of Offshore Wind Development: Building Knowledge to Support Co-Existence

Monday, October 28, 2024, at 8:30 AM in Room 1+2
in Brunswick Ballroom Room 1+2

Offshore wind development is advancing rapidly in the U.S. and around the world as the demand for renewable energy continues to grow. Impact producing factors associated with each phase of offshore wind development can affect the biological, physical, and chemical environment of the ocean. These include changes in habitat through the installation of manmade structures and scour protections, increased energy emissions, and changes in ocean physics. In reality though, organisms experience many of these effects simultaneously and in aggregate with other co-occurring pressures. While research on individual impact producing factors associated with wind development has accelerated over the last decade, effective evaluation of cumulative effects continues to present an enormous challenge to decision-makers tasked with managing marine ecosystems. These challenges largely stem from diverse interpretations of the definition of cumulative effects, the lack of consistent methodologies for cumulative effects assessment (CEA), and the large uncertainties associated with cause-effect relationships. This presentation will explore the potential effects of each phase of offshore wind development on the marine ecosystem highlighting existing research on each of these topics. We will examine how these effects are often discussed in the context of CEAs and consider some of the approaches that have been proposed to advance the assessment of cumulative effects. The talk will conclude with a charge for the workshop during which we will explore perceptions of cumulative effects as well as the data and methods needed for effective cumulative effects assessment. Building knowledge to advance the assessment of cumulative effects is needed to support co-existence of marine renewable energy and sustainable marine ecosystems.

John Waldman, PhD

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(he/him)

Bio: Dr. John Waldman joined the faculty of Queens College as a tenured professor of Biology in 2004. For the previous 20 years, he was employed by the Hudson River Foundation for Science and Environmental Research. He holds a BA in Biology from Herbert H. Lehman College, City University of New York, a MS in Marine and Environmental Sciences from Long Island University, and a PhD from the Joint Program in Evolutionary Biology between the American Museum of Natural History and the City University of New York. His research interests focus on the ecology and evolution of fishes, the historical ecology of rivers and urban waterways, and estuarine biology. Dr. Waldman has authored more than 100 scientific articles and numerous essays in the New York Times, Yale Environment 360, and elsewhere. He has also published several popular books, including the award winning Heartbeats in the Muck: the History, Sea Life, and Environment of New York Harbor, Still the Same Hawk: Reflections on Nature in New York, and most recently, Running Silver: Restoring Atlantic Rivers and their Great Fish Migrations.

Restoring Atlantic Anadromous Fishes: It's Time to Seize the Day

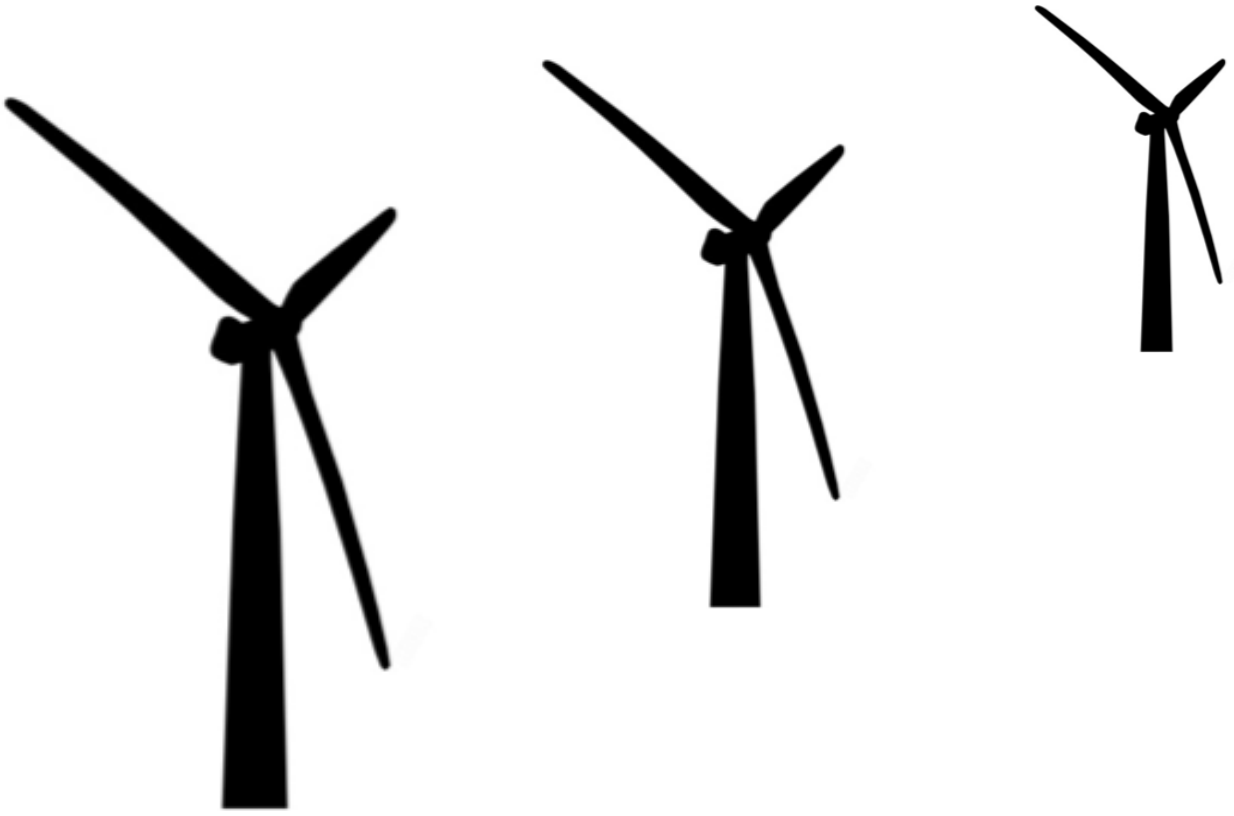
Tuesday, October 29, 2024, at 8:30 AM
in Brunswick Ballroom Room 1+2

The anadromous fishes of the U.S. Atlantic Coast have suffered enormous declines from their pre-Colonial abundances. For example, American Shad in the Susquehanna River have been reduced by six orders of magnitude, from millions to fewer than 100 individuals some years. Other cases include species such as Atlantic Salmon, Striped Bass, Atlantic and Shortnose Sturgeon, and River Herring. The main "drivers" of their declines include overfishing, chemical contamination, climate change, the effects of electric generating stations and non-native species, and dams. All of these drivers are either largely already remediated or are incapable of remediation, with the exception of dams—dam removals offer the one highly effective and tractable solution. The nascent dam removal movement in the U.S. needs to be ramped up to effect meaningful improvement for freshwater-marine fishes, a goal that could be assisted by improved public understanding of their ecological importance and the profound losses that have occurred. There is an urgent need to connect the potential viability of dam removals in the near term with the opportunities presented by the rapidly changing energy landscape. Draining of reservoirs behind dams that are removed will offer land area for replacement forms of energy production. At a far larger scale, electric generation from land-based and offshore wind farms and land-based solar arrays will allow societal "headroom" for manipulations of hydro-dams, in particular. Moreover, U.S. East Coast dams are old and are increasingly failing from the stresses of climate-change accelerated flash floods. Now is the time for an integration of all these factors to resurrect the connectivity of rivers and sea and to restore these iconic fishes.

Oral Presentations

Listed in chronological order

Key:
* = presenting author
‡* = graduate student presenting author
†* = undergraduate student presenting author



Cumulative Effects of Offshore Wind on Fisheries I

Monday 10/28 at 10:00 – 11:30 AM
in Brunswick Ballroom Room 1+2

Offshore wind development advancing regional science through an ecosystem approach

Sean Lucey*[1], Deirdre Boelke[1], Michelle Duval[1], Ricky Alexander[1], Gus Seyler-Schmidt[1], & Rick Robins[1]

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Climate change is having a profound influence on the marine environment. Many regions are experiencing rapid warming and shifting productivity of its marine species. To help address this changing climate, many states and the federal government include offshore wind development as part of their overall strategy to reduce carbon emissions. There are growing concerns amongst current ocean users and the general public about the impact that offshore wind may have on the ecosystem and the ability to monitor marine resources. Offshore wind developers are committed to avoiding and minimizing these effects, monitoring potential changes to the ecosystem, and mitigating issues that may arise. As such, offshore wind represents an opportunity to study the marine environment on a much finer spatial and temporal scale than has previously been undertaken. In essence, offshore wind will create a network of potential sentinel observation platforms and foster the development of novel approaches to monitoring. Recent coastwide scenario planning efforts that focused on climate change included this vision for offshore wind in their potential future scenarios as a way of being proactive rather than reactive to the challenges of climate change. By partnering with fishers, state and federal agencies, and academics, as well as working collaboratively together, developers can provide much needed data on ecosystem interactions. Ultimately, offshore wind can play a key role in advancing ecosystem approaches and help promote the regional scientific and management enterprise of the region.

Acoustic telemetry as a regional non-extractive approach for monitoring of fishes within Offshore Wind Lease Areas within the New York Bight

K. J. Dunton*[1], J. Kneebone[2], B. Gervelis[3], C. Kresge[1], K. Bates[1], N. Piscitelli[1], & J.A. Adolf[1]

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Acoustic telemetry is a proven non-extractive methodology used to track and delineate the spatial/temporal habitat use of marine organisms, while also providing invaluable data on species abundance and behaviors. This high quality and continuous data collection combined with the acoustic receivers' ability to be moored for long deployments to the sea floor or structures make it an ideal approach to evaluate potential impacts from offshore wind on fishes, since they can remain in place uninterrupted and continuously monitor fishes throughout all phases of offshore wind development. With offshore wind being rapidly developed within the Mid-Atlantic, the need for regional research and monitoring of marine and coastal resources during offshore wind development, construction, operation and decommissioning is needed. Acoustic telemetry, is an excellent mechanism to support the rigorous need for research and monitoring within key regions of the coastline to provide an non-extractive approach to gain baseline information and evaluate the spatial/temporal habitat use, movements, residency patterns, relative abundances, and connectivity of various fish species within the offshore wind areas within the New York Bight. Here we present preliminary results on two projects with deployed acoustic array systems designed to evaluate the presence/absence of tagged species, spatial/temporal migratory movements, and residencies of acoustically tagged animals in the proposed offshore wind cable landing areas and the wind lease areas, collecting baseline information during pre-construction phases within the New York Bight. Detection data from this this project will add to existing regional infrastructure from other research agencies and allow us to develop multi-state and multi-agency collaboration while engaging in a regional standardized monitoring framework.

Evaluating the effects of offshore wind development in southern New England on fisheries biodiversity using environmental DNA

Tim O'Donnell*[1], Emma Strand[1], Dylan Comb[1], John Logan[2], Steve Voss[2], & Amanda Davis[2]

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The U.S. is expanding renewable energy sources to combat climate change including large-scale offshore wind developments off every U.S. coast that will likely impact the surrounding fisheries and ecosystems. Construction timelines for wind lease areas in southern New England are well-ahead of the rest of the country, providing an opportunity to establish the impacts of offshore wind development on biodiversity while lease areas elsewhere are still in the planning stages. Therefore, establishing long-term biodiversity monitoring before, during, and after construction using methods that can persist throughout all stages of installation is crucial to fully understanding the environmental impacts of wind development. To monitor biodiversity in wind energy areas, we established a vertebrate eDNA metabarcoding survey from May-November 2023 at 40 sites within three southern New England offshore wind lease areas with the most advanced construction timelines. At each site, one liter of bottom and surface water was collected and filtered in the field using 1 um cellulose nitrate filters and the Smith-root eDNA sampler. DNA was extracted using the Qiagen PowerSoil Pro kit and metabarcoding was performed using custom 12S V5 primers to target all vertebrates. This study provides vital information regarding the distribution and biodiversity of fisheries species in response to wind turbine development. Considering the extensive interest in offshore wind, particularly in Massachusetts, eDNA serves as a powerful tool to assess concerns regarding the potential impacts of renewable energy on commercial and recreational fisheries.

Incorporating Environmental DNA Into Wind Mitigation Planning in the northeast United States marine ecosystem

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Offshore wind energy development will interact with existing NOAA Fisheries' Northeast Fisheries Science Center (NEFSC) scientific surveys, which requires that the agency develops survey mitigation plans to minimize potential impacts. The NEFSC proposes to incorporate environmental DNA (eDNA) surveys – specifically metabarcoding – as a mitigation tool because of the relative simplicity in sampling marine eDNA and the absence of a typical gear bias associated with eDNA sampling. From this plan, we will present three eDNA survey modules that have developed from internal discussions and from peer-review at a wind mitigation planning workshop in May, 2024. By adding eDNA as a new tool to the 30-year survey planning, we hope to enhance three important aspects of existing scientific surveys at the Center. The first eDNA survey module will add a biodiversity component to the NEFSC's Ecosystem Monitoring (EcoMon) survey, which is based on a fixed-transect design over our region's continental shelf and slope. The second module focuses on comparing species abundance from our bottom trawl survey to eDNA amplicon counts. The last module considers an independent eDNA survey that is designed to address wind energy development impact on local biological communities using an experimental approach (i.e., before–after-gradient [BAG] design). Considering the broad effects wind energy development has on our region, we expect that many U.S. states will sample in more concentrated, jurisdictional areas, which will create a de facto nested sampling design. As the data grows from investments by these various eDNA surveys, we envision more coordination between ourselves and these entities to interpret the results at the appropriate spatial and temporal scales.

A pilot hook-and-line survey to mitigate the impacts of offshore wind energy development on long-term fisheries surveys

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Fishery-independent surveys are the primary data source for many stock assessment models. Offshore wind construction and operation will likely preclude many long-term, fishery-independent surveys from accessing areas within or around offshore wind farms due to operational limitations and safety concerns. In order to ensure continuation of survey time series and collection of data on fish abundance, biomass, and demographics, modifications to survey designs, methods, gears, and analyses will be necessary. Hook-and-line fishing is one potential alternative gear that can be used to sample fish in places where traditional fishery-independent survey gear, like bottom trawls, cannot be deployed. In close collaboration with the fishing industry, we piloted a fishery-independent hook-and-line survey in the northeast USA in spring 2024. In order to eliminate angler effects on catch-per-unit effort, we deployed automated jigging machines with configurations and settings that mimic traditional hook-and-line jigging patterns. The machines standardize many aspects of sampling (fishing action, deployment relative to the bottom, drag), allow for more hooks than rod and reel, and detect fish through an internal load sensing mechanism that automatically retrieves the gear. To our knowledge, these machines have not yet been used as a fishery-independent survey tool. Therefore, we have little information on how various machine configurations (e.g. jigging power, time interval), and gear configurations (e.g. hook size, spacing, and number) impact selectivity or catchability for different fish species. We will summarize the survey design and present preliminary analyses from the first season of the pilot survey, including how different machine configurations and hook sizes impact catch efficiency and size selectivity. Results from this pilot survey will be used to inform the design and implementation of survey mitigation plans in the region.

Socioeconomic Monitoring Standards for Offshore Wind Development

Angela Silva[1] & Tarsila Seara*[2]

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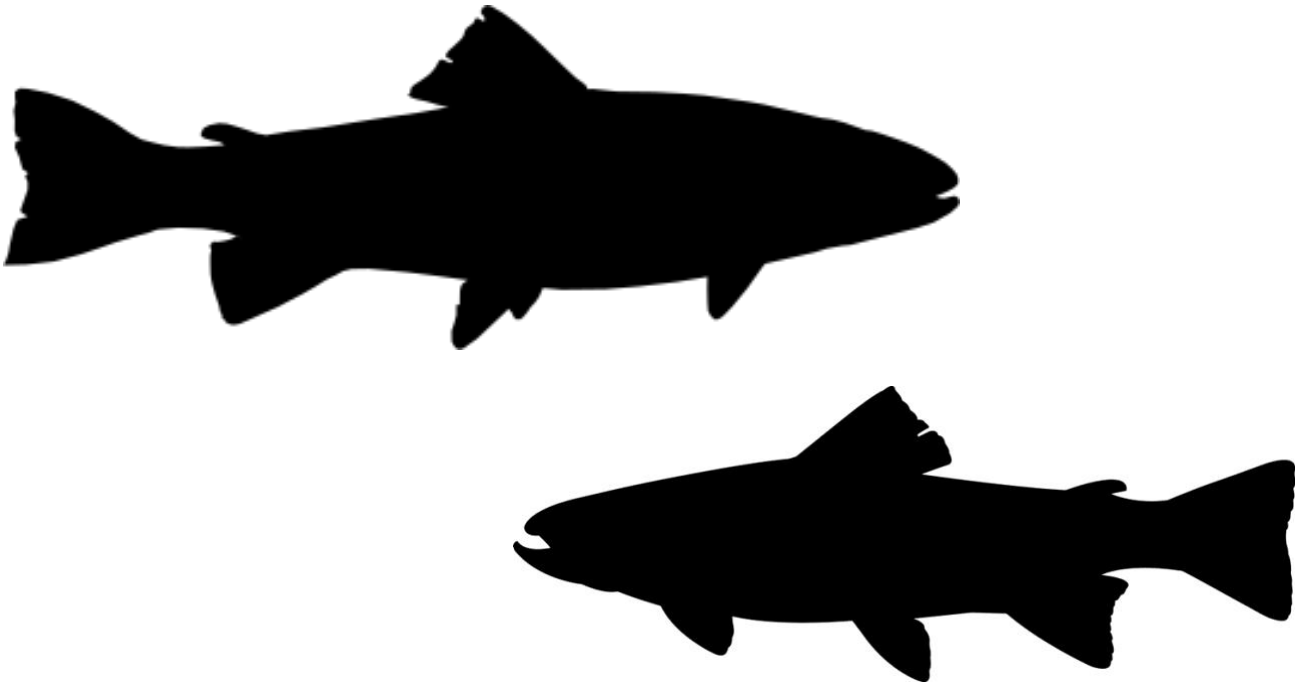
The NOAA Northeast Fisheries Science Center is currently working on the development of standards to guide monitoring the effects of offshore wind development on the biological, ecological, and socio-economic elements of the marine and fishery systems affected from pre-construction, construction, operation to decommissioning. This presentation provides an overview and framework of the monitoring guidelines being developed to understand changes in the socio-economic system at the individual project level. Human elements of that system include individuals and communities involved in commercial and recreational (for-hire and private angler) fisheries at various scales. Monitoring of the socioeconomic system includes considerations of changes in fishing behavior, economic, social and cultural elements, such as but not limited to changes to operations, practices, demographics, employment, capital including human and social, revenues, attitudes and perceptions, and relationships and networks. The framework developed considers three Impact Producing Factors (IPFs) as defined by the Bureau of Energy Management: the presence and installation of structures, port utilization, and traffic. For each IPF the guidelines outline proximal and distal elements that should be monitored to understand effects of offshore wind development on the socio-economic system. Guidelines are also provided for the use and development of existing and new indicators and methods needed to monitor both proximal and distal effects. The distinction between proximal and distal effects provide a framework for further understanding, differentiating, and prioritizing between cumulative and concomitant impacts. Efforts to monitor the effects of offshore wind development on the fishery socio-economic system will contribute to a better understanding and mitigation of potential impacts from offshore wind energy as well as other competing uses of the marine environment.



General Contributed I

Monday 10/28 at 1:00 – 1:15 PM
in Brunswick Ballroom Room 1+2

Interpreting Juvenile Sakhalin Taimen and Masu Salmon Interspecies Relationships through an Analysis of Habitat Differences at Collection Sites in the Sarufutsu Watershed, Japan

Marika Hayashigatani†*[1], Celia Levy†*[1], Michio Fukushima[2], Shin-Ichiro Matsuzaki[2], Lucas Fisher[3], Olaf Jensen[3], & Talia Young[1]

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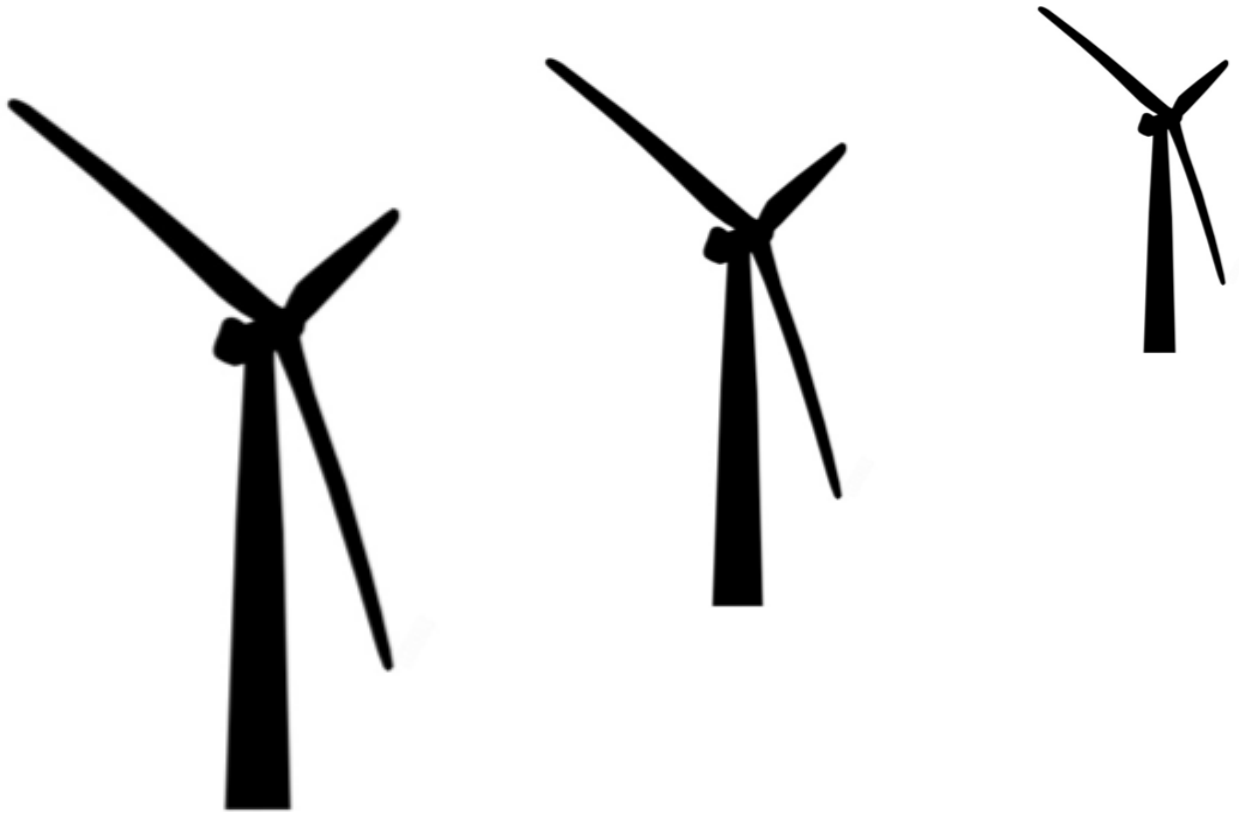
This project compares habitat preferences of juvenile Sakhalin taimen (*Parahucho perryi*) and Masu Salmon (*Oncorhynchus masou*) in the Sarufutsu watershed in Hokkaido, Japan. Sakhalin taimen (*Parahucho perryi*) are the largest and oldest member of the trout family and a critically endangered species found in Hokkaido, Japan and the Russian Far East. Masu salmon (*Oncorhynchus masou*), also found in Japan, Russian Far East, Korea, and Taiwan, are considered threatened. The Sarufutsu watershed is a critical spawning site for both species. Our study aimed to elucidate interspecies interactions and habitat preferences of juveniles of both species within this watershed. Over summer of 2024, we analyzed abundance of each species in relation to water features, velocity, depth, and coverage from vegetation or undercut banks for each collection site. Our research revealed that the taimen prefer deep, slow-moving pools, and the salmon prefer shallower, fast-moving runs, supporting previous research. Both species are found along the shaded banks of the creeks. Future research should investigate and compare the feeding habits of each species in order to implement better protections and conversation management.



<u>Cumulative Effects of Offshore Wind on Fisheries II</u>

Monday 10/28 at 1:15 – 2:15 PM
in Brunswick Ballroom Room 1+2

The Influence of Mid-Atlantic Bight Seasonal Oceanographic Variability on Commercial Species Dynamics

Samantha Alaimo‡*[1], Bill Bright[2], Jeff Brust[3], Colleen Brust[3], Jeff Kaelin[4], Josh Kohut[1], Daphne Munroe[5]

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[3]New Jersey Marine Resources Administration, Nacote Creek Research Station Port Republic, NJ, United States

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The Mid Atlantic Bight (MAB) is a dynamic ocean region characterized by strong seasonal cycles. This seasonal variability in the MAB is dominated by a distinctly cold, nutrient-dense, "pocket" of bottom water that forms annually called the Cold Pool. The timing of the annual Cold Pool spring formation, summer intensification, and fall breakdown can vary interannually. This yearly evolution of the MAB Cold Pool supports ecological services for a variety of commercially and recreationally targeted species. Many proposed winds lease areas overlap with commercial fishing grounds in the MAB. The natural interactions between the seasonal evolution of the Cold Pool and the associated commercial fisheries must serve as context to assess changes observed during and after construction of these offshore facilities. This research examines the connections between commercially and recreationally relevant species and the seasonal dynamics of the Cold Pool. Summer flounder (*Paralichthys dentatus*), striped bass (*Morone saxatilis*), and spiny dogfish (*Squalus acanthias*) were identified at the recommendation of fisheries stakeholders as representative species for this study. The species were selected based on their known association with the annual Cold Pool cycle, and their economic importance to the region. The New Jersey Department of Environmental Protection's Ocean Bottom Trawl Survey contains fisheries and oceanographic data sampled across all seasons for 30 years (1990 to 2019). Using Generalized Additive Models (GAMs), this research assesses whether (1) the nearshore species abundance changes over decades is consistent with decadal changes in seasonal stratification associated with the Cold Pool and (2) the seasonally dependent distribution shifts can be explained by changes in the timing of Cold Pool evolution. Results of this work highlight a mechanistic link between the representative commercial species and their surrounding environment. These results can serve as context for future research studies to discern between offshore wind impacts and other drivers.

Sand Ridges Make Troughs: Understanding fish habitat structuring of sand features for micro-siting offshore wind turbine pylons

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High relief sand deposits off New Jersey include ebb tide deltaic features submerged by sea level rise and reworked by currents. These submerged shore face sand ridges are resources for beach nourishment and construction. Ridges impart bathymetric relief to an otherwise broad, gently sloping continental shelf off New Jersey in contrast to the oceanographically similar shelf off New York allowing for habitat comparison. Many are officially recognized as Prime Fishing Grounds by the New Jersey Department of Environmental Protection based on commercial and recreational fisher input. A review of life history patterns, historical fisheries data, and newly collected data including side scan sonar coupled with short trawls suggests that fish species sort across these structures. We are investigating the patchiness of microhabitat and topographic steering of hydrography as driving factors. The troughs adjacent to the ridges are critical habitat for many species. For example, Atlantic sturgeon congregate in troughs where siltier sediments and tube worm reefs may offer good foraging. The specific associations emerging from this work can help regulators in their consideration of micro-siting turbines and cables for offshore wind power development through and among these features.

Critical Subsea Infrastructure and Fisheries – Lessons from Subsea Telecom Cables

Stephen Drew

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As we consider the potential impacts of offshore wind energy infrastructure and fisheries, it is helpful to examine lessons learned from over 150 years of experience in planning, installing, and operating critical subsea power, telecommunications, and hydrocarbon infrastructure. This presentation will provide examples of cooperative efforts between the fishing industry and telecom companies that have supported ongoing fisheries and the stable subsea telecom infrastructure that carries more than 95% of internet and other traffic between continents.
The northeastern USA hosts landings of more than twenty international subsea telecom cables Whose effects and coexistence with other maritime industries have been studied and managed for decades. Regarding socioeconomic effects, attention to technical issues and consistent, diligent communications are essential. Small, long-term working groups of diverse stakeholders have been highly effective in some areas. Since all offshore wind farms need cables to transmit power, some technical issues are similar between the project types. Issues such as cable routing, burial, seabed penetration of fishing gear and ship anchors, must be addressed by both. The designation of wind energy areas, safety of navigation, turbine layout and spacing are other major technical issues that must be considered.
Since the initiation of offshore wind energy over 30 years ago, the long experience of subsea cable engineers, surveyors, planners, and installers has been applied to its development and operation. Evolving technologies continue to support advances in the study, management, and interaction of diverse maritime interests. There are major differences between subsea cable and offshore wind projects, but there are also opportunities to learn from successful outcomes.

Win Win Wind: Prioritizing Research on Offshore Wind Development for Sustainable Long-Term Fisheries Management

Colleen Brust*[1] & Patricia Perez[2]

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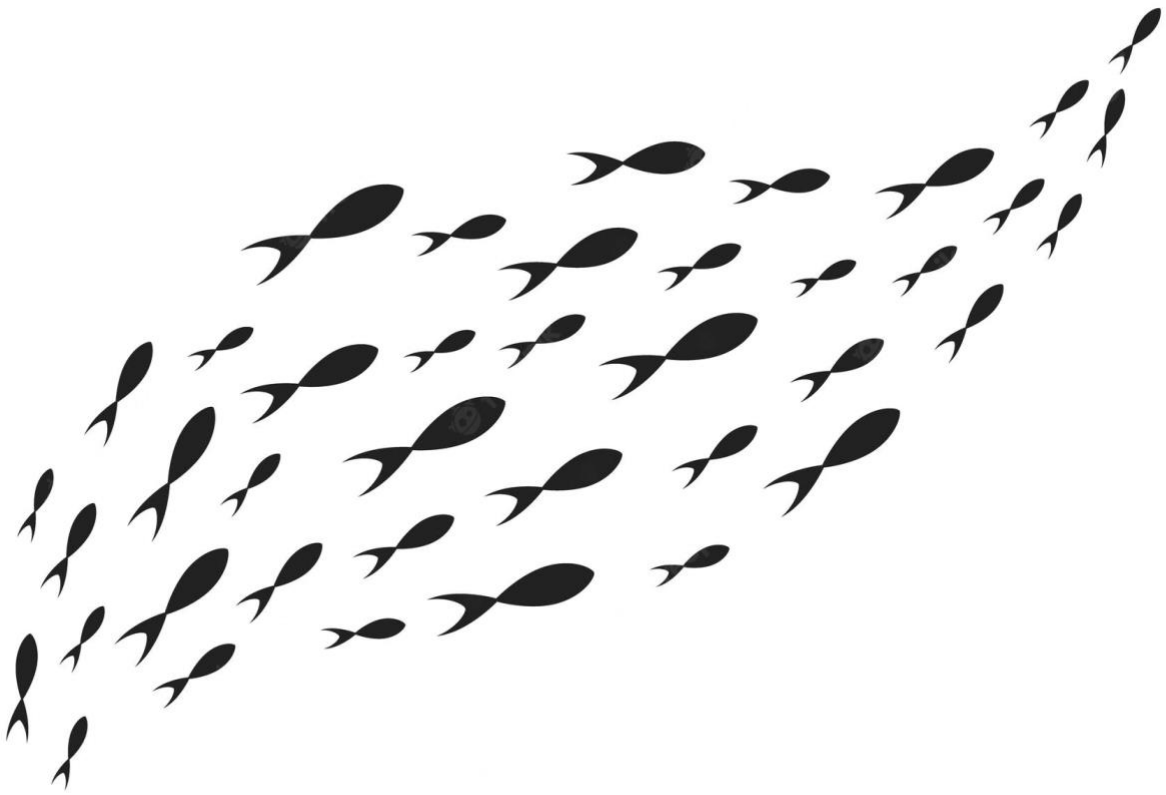
Offshore wind development poses significant challenges for marine resource management but also offers unique opportunities. These opportunities include increased public awareness of the value of marine fisheries, enhanced research funding for marine science, and unprecedented collaboration among researchers, regulatory agencies, industry, and environmental NGOs. Key regional entities, such as NYSERDA Technical Working Groups, the Responsible Offshore Science Alliance (ROSA), the Regional Wildlife Science Collaborative (RWSC), and the New Jersey Research and Monitoring Initiative (RMI), have been instrumental in facilitating this collaboration. These organizations work to identify knowledge gaps and research needs based on stakeholder input.

This presentation will focus on the responsibility we share to prioritize research that supports sustainable fisheries. It will also provide criteria for evaluating scientific questions related to offshore wind and fisheries. Criteria such as the severity and magnitude of risk, and the vulnerability of resources, can be guided by years of research in risk assessment and the effects of offshore wind.

By recognizing long-term fisheries management and the economic viability of fisheries as primary goals for research funding, we can develop mitigation strategies that maximize benefits and minimize impacts on vital fishery resources. Join us as we explore key goals and approaches to identifying the most critical information needs. Together, we'll discuss the synergistic potential of offshore wind and fisheries research as we navigate the future of marine resource management within an evolving coastal landscape.



Exploring the Impacts of Dam Removal on Fisheries Among Northeast U.S. Basins I

Tuesday 10/29 at 9:45 – 11:45 AM
in Brunswick Ballroom Room 1

Assessment and Prioritization of Road-Stream Crossings to Restore Aquatic Connectivity

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The North Atlantic Aquatic Connectivity Collaborative (NAACC) began in 2015 with three principle objectives: 1) establish a network of people and organizations in the 13-state, Northeastern United States, who are interested in aquatic connectivity, 2) develop unified stream crossing assessment protocols for use throughout the region, and 3) create a programmatic infrastructure to support collection and analysis of road-stream crossing data by organizations in the 13-state region. Protocols and training programs were developed to assess aquatic passability at bridges and culverts on tidal and non-tidal streams and rivers. Between its launch in 2015 and September of 2024, over 78,000 aquatic crossing assessments were conducted and their data entered into the NAACC database. Those data are used in aquatic connectivity models (Critical Linkages) to identify stream crossings with the highest ecological restoration potential should they be replaced by more passable structures. NAACC aquatic assessment protocols have been adopted by the Southeast Aquatic Resources Partnership (SARP) and are being used in 14 states in the Southeastern U.S. SARP has also conducted training workshops on the NAACC protocols in the Midwest and Intermountain West. In Canada, the NAACC organizational structure and aquatic protocols are serving as a model for a nationwide crossing assessment program. Data from the NAACC and SARP's Aquatic Connectivity Program, as well as other stream crossing assessment programs in the United States, have been compiled by SARP and made available via their National Aquatic Barrier Inventory & Prioritization Tool. SARP and the NAACC have plans to merge their programs, update and expand the NAACC database, and create a programmatic infrastructure that can serve the needs not only of the Eastern U.S., but also other regions of the United States.

Exploring Migration Histories Through Biomarker Chemistry for the Highly Migratory and Cryptic Blueback Herring (*Alosa aestivalis*)

Justin T. Herne‡*[1], Karin E. Limburg[1], & Elizabeth P. Duskey[2]

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Anadromous blueback herring (*Alosa aestivalis*), a fish of significant economic, cultural, and ecological importance along North America's Atlantic coast, has declined greatly due to commercial fishing, habitat loss, and the proliferation of mainstem dams. The construction of the Erie Canal's Waterford Flight of Locks in the early 19th century linked the Hudson River to the Mohawk River, opening access and facilitating spawning migrations > 250 km from the sea. Recent research has aimed to understand the life histories of blueback herring to identify vulnerabilities and improve management practices, though studies on their natal origins remain limited. To address this gap, adult blueback herring were collected during the 2020-2022 spring spawning seasons near the Hudson-Mohawk confluence. Otoliths and eye lenses were analyzed for elemental composition using laser ablation inductively coupled mass spectrometry (LA-ICP-MS), focusing on strontium to calcium (Sr:Ca) ratios along life-history transects, with barium to calcium (Ba:Ca) ratios used for spatial validation. These analyses provided detailed habitat use histories, categorizing provenance into three groups: Mohawk River (55%), Hudson River (34%), and Hudson River estuary (10%), a new finding. As fish lens analysis is relatively understudied, general elemental composition data were recorded to establish a novel baseline for bluebacks consistent with age. To further evaluate habitat usage and the degree of anadromy, iterative back calculations were performed using the proportional relationship of otolith size to body length. Cross-referencing Sr and Ba ratios at previous ages allowed determination of residency duration and migratory habits for young-of-year (YOY) and yearling stages. Contrary to their presumed "classic anadromy", approximately 49% of specimens showed evidence of yearling ingress (age 1+), with nearly 23% returning as age-2 juveniles, nine of which returned consecutively. These findings suggest complex river usage and life-history characteristics, revealing potential stock vulnerabilities that may inform improved management strategies across New York State.

Growth Rate, Body Condition and Distribution of Juvenile Blueback Herring (*Alosa aestivalis*) in The Connecticut River

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The stock composition of blueback Herring (*Alosa aestivalis*) shows concerning trends regarding reproductive capacity and overall resilience owing to a history of overexploitation. High mortality of adult herring has truncated the age distribution and increased the frequency of virgin spawners, causing this stock to become increasingly semelparous which results in large fluctuations in interannual recruitment as weaker year classes will not be augmented by adjacent cohorts. Under such circumstances, additional importance should be put on understanding and ensuring the strength of year classes before juvenile outmigration. Using average growth rate and body condition as metrics of health and energy stores we can predict which individuals will be more likely to survive outmigration, recruit to the fishery and survive to sexual maturity to reproduce. Identifying the spatial and temporal patterns in when and where those most prepared fish are in the river would prove valuable in informing future resource allocation and management. Using a weighted average of along-river distribution of juvenile cohorts position we can determine if patterns of outmigration change throughout the season or depend on body condition or fish size. Growth rates and body conditions differed significantly between sampling sites with a significantly positive relationship between birthdate and growth rate, but no such relationship for body condition. This indicates site specific factors may contribute to juvenile preparedness for migration. The along-river distribution of all individuals over the whole season shows the center of mass stayed in the same location while cohort movement was much more variable with most seeming to move upstream. Apparent upstream movement may be the result of juveniles from spawning events upriver, outside the spatial extent of this study, moving into our study area.

Rapid recovery of river herring (*Alosa aestivalis* and *A. pseudoharengus*) spawning habitat use in response to a Maryland dam removal

Henry Legett*[1], Claire S. Huang[1], Louis Plough[2], Robert Aguilar[1], Catherine Fitzgerald[2], Benjamin Gregory[2], Keira Heggie[1], Benjamin Lee[2], Kimberly Richie[1], William Harbold[3], & Matthew Ogburn[1]

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River herring, which include alewife (*Alosa pseudoharengus*) and blueback herring (*A. aestivalis*), are anadromous fishes that once supported one of the largest fisheries in the US. However, due to overfishing and dams, the abundance of these fish in many regions is now < 2% of their historical peaks. In addition to fishing moratoria, dam removals have become a major tool for mid-Atlantic state governments and federal agencies seeking to restore anadromous fish populations. How quickly will river herring begin using restored habitats for spawning, and how effective are these dam removals at restoring river herring populations? In this study, we evaluate the response of river herring to the 2018 removal of Bloede Dam in the Patapsco River, Maryland. We monitored fish presence and spawning activity upstream and downstream of the dam four years before removal (2015–2018) and six years post-removal (2019–2024). Methods included eDNA, ichthyoplankton (fish eggs) collections, and boat electrofishing. Pre-removal, river herring were not detected above Bloede Dam. In 2019, the first year post-removal, both alewife and blueback herring eDNA were detected in the restored segment of the river. In 2021, both species were captured in electrofishing surveys in the restored segment. Finally, in May 2024 eggs were detected at one site upstream of the former dam, indicating spawning in restored habitats at detectable levels. While longer-term monitoring is needed to assess population changes, this study provides a timeline over which river herring will naturally begin using restored habitat following dam removals.

Evaluating Sustainability Metrics for Maine River Herring Populations in the Penobscot River

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There are two species of river herring found throughout Maine watersheds, alewife (*Alosa pseudoharengus*) and blueback herring (*A. aestivalis*). River herring hatch in inland lakes and rivers and migrate to the ocean until they are adults, returning inland annually to their natal waters in the spring to spawn. River herring play a vital role in the overall function of several ecosystems, providing nutrients in river, lake, and ocean systems, a food source for larger fish, mammals, and birds, and a fishery for humans. For centuries, dams blocked access to rivers and streams in Maine, drastically reducing fish passage which led to population declines. Currently, efforts are underway to remove dams and improve passage. We investigated biological data of river herring to understand how restoration efforts have changed populations dynamic. We collected 50 river herring each week of the herring run from 2014 to 2024 at Milford Dam on the Penobscot River to collect biological data including, total length, weight, species, sex, age, and iteroparity rates. We prorated daily count data based on the biological samples taken. Counts of river herring have increased from 400 thousand to over 5 million in the past 10 years. Species proportions have shown higher amounts of alewive than blueback herring in each year other than 2016 and 2022. In addition, we found that there were more older river herring in recent years, with blueback herring up to age seven and alewife up to age eight. We observed a higher number of repeat spawners in recent years. We observed that the timing of the run appears earlier in 2021-2023 than in previous years. Our study is essential for understanding how river herring species and their ecosystems are affected by improved habitat and fish passage.

Evaluating Migratory Passage and Estimating Run Size of American Shad and River Herring in the Raritan River: Results of a Ten Year Study

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Restoration of many populations of anadromous American Shad (*Alosa sapidissima)* and river herring (Alewife *A. pseudoharengus* and Blueback Herring *A. aestivalis*) has been hampered by the presence of barriers to their spawning migrations and insufficient monitoring of run size. Here, we describe the results of a 10-year (2012–2021) study of American Shad and river herring passage at the Island Farm Weir (IFW), the downstream-most migration barrier on the Raritan River. We used passive integrated transponder tags applied to fish that were captured and released downstream of the IFW to estimate passage rates and migration delays associated with upstream movements through an antenna array on a vertical slot fishway within the weir. By combining estimated passage rates with video monitoring of the total numbers of American Shad and river herring transiting the fishway, we estimated the annual run size below the weir. Results suggest that the fishway on the IFW is moderately effective for American Shad but ineffective for the smaller-bodied river herring. Additionally, recent advances in environmental DNA (eDNA) demonstrate its promise as a cost-effective means of evaluating fish passage of these species and for estimating relative abundance in a river system. Restoration of these species in the Raritan River will likely require removal of the IFW or replacement of its current fish passage device with one that increases the passage rates of alosines.

Restoring Connectivity of Aquatic Habitats to Enhance Fish Passage and Other Ecological and Societal Functions in the Delaware River Basin: Cedar Grove Dam Removal, Pequest River, New Jersey

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Dam removal efforts within the Delaware River Basin are part of a broader nation-wide effort to remove aging and obsolete dam structures and restore connectivity of aquatic habitats to enhance fish passage and other ecological and societal functions within riverine systems. EHS Support has been engaged by The Nature Conservancy to provide engineering design, permitting, construction oversight, and program management services for removal of the Cedar Grove Dam on the Pequest River in White Township, Warren County, New Jersey. The Cedar Grove Dam removal and restoration project is one of four dam removal projects being implemented by The Nature Conservancy to increase connectivity of aquatic habitats for diadromous fishes within the Pequest River, which is a priority tributary for diadromous fish passage within the Delaware River Basin. We will present a project overview, challenges, and lessons learned to leverage during future dam removal projects.

Improving Aquatic Connectivity and Advancing River Restoration in the Raritan River Watershed, New Jersey

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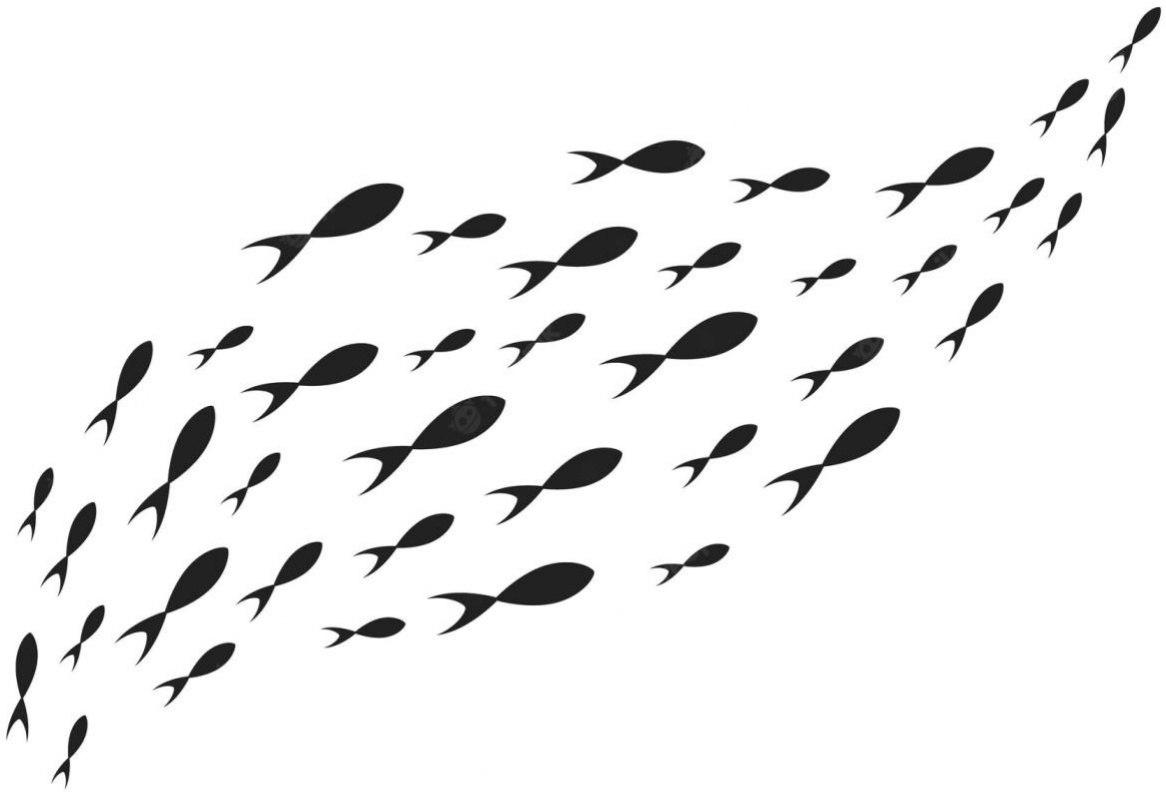
At 1,100 square miles, the Raritan River watershed is the largest watershed located entirely within New Jersey with the longest interior river system. Over 200 barriers exist within the watershed and 44 are located on the mainstem and major tributaries of the Raritan. Since 2008, an initiative to remove obsolete dams and increase fish passage in the watershed has been growing, progressing towards a goal of opening roughly 100 miles of riverine habitat on the major tributaries including the South Branch, North Branch, Lamington, Millstone, and mainstem Raritan River. Six dams in the Raritan River watershed have been removed since 2011, and at least six others are moving towards barrier removal or substantial fish passage improvement. Some of these will reconnect historic spawning ranges out to the Raritan Bay for migratory fish such as American shad (*Alosa sapidissima*), alewife (*Alosa pseudoharengus*), blueback herring (*Alosa aestivalis*), and American eel (*Anguilla rostrata*). Non-profit organizations, federal, state, and local government agencies, utility companies, private firms, and landowners are working together to coordinate these projects at both a local and landscape-level scale. This presentation will highlight some of the recent efforts being made to advance key projects, which will continue to further goals of the initiative by improving water quality, in-stream habitat, and aquatic connectivity on a basin-wide scale.



Exploring the Impacts of Dam Removal on Fisheries Among Northeast U.S. Basins II

Tuesday 10/29 at 1:00 – 2:45 PM
in Brunswick Ballroom Room 1

If You Build It Will They Come? The Importance of Monitoring Fish Passage through New Fishways: A Case Study on the Peconic River, Long Island, New York

Caroline Appel‡*[1], Dr. Peter Daniel[1], Dr. Kellie McCartin[2], Kyler Vander Putten[3]

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This century has experienced a flurry of projects to enhance access to spawning habitats for anadromous fish. In Long Island, New York there have been 15 fish passage projects – 13 technical fishways and 2 nature-like fishways – completed since 2008, and many more are planned or proposed. However, monitoring passage success has in most cases been nonexistent or confined to occasional visual surveys by volunteers. An exception are two fish passages on the Peconic River, a nature-like fishway (Grangebel, completed 2010) at the head of tide dam and a pool and weir fishway (Woodhull, completed 2022) 1 km upstream. Both sites have been monitored for Alewife *(Alosa pseudoharengus)* passage using camera counts and PIT tag telemetry. In 2024, passage efficiency at Grangebel was ~90% but <3% at Woodhull. Detection patterns at the two sites were notably different. Results of our preliminary analysis indicate that compared to Grangebel, detection patterns at Woodhull were characterized by much greater numbers of detections per tag, multiple series of continuous detections punctuated by pauses of at least one hour, and extended presence in the vicinity of the fishway. During the peak of the run, Alewife were observed aggregating in the thousands at the Woodhull fishway base with a clear attraction to the entrance. Observed Alewife appear to struggle navigating the pool and weirs with increasing fallback occurring at each successive weir. Modifications to flow were made by removing or adding boards to both the entrance and exit throughout the season in response to changing water levels and severe precipitation events. Low passage efficiency demonstrated at the pool and weir fishway exemplifies the need for required annual monitoring coupled with the necessary modifications to optimize passage.

Using eDNA to Track Migrating Fish Species Post Dam Removal

Grace Noll* & John Vile

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The Columbia Dam, built in 1909, has been a fish passage barrier for resident and migratory fish species for over a hundred years. The removal of the dam in 2019 has once again opened 10 miles of the Paulins Kill to several migratory species including American shad (*Alosa sapidissima*). The New Jersey Department of Environmental Protection's Bureau of Freshwater and Biological Monitoring has conducted environmental DNA (eDNA) surveys at 4 sites on the mainstem Paulins Kill since 2022 to assess American shad migration and spawning in this restored section of river. Results from 2022 indicate American Shad are once again utilizing the mainstem Paulins Kill for the first time in a century. While American shad were not encountered during electrofishing surveys, quantitative polymerase chain reaction (qPCR) results from eDNA sampling positively detected American shad DNA from mid-April through late July 2022. Peak DNA concentrations were detected during the May 23, 2022 sampling event which also represented the optimal water temperatures for American shad spawning. Environmental DNA monitoring was continued on the mainstem Paulins Kill in 2023 along with deploying drift nets during summer months in an attempt to collect larval American shad to further document successful spawning.

General Contributed II

Tuesday 10/29 at 9:45 – 11:45 AM
in Brunswick Ballroom Room 2

The use of industry acoustics to estimate biomass of Atlantic Menhaden

Christopher W.D. Gurshin*[1], G. M. Nesslage[2], J. Gartland[3], R.J. Latour[3], D. Liang[2], D. Gregg[3], & J.M. Jech[4]

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Despite advancements in acoustic surveys of fish and their habitats, research vessels equipped with scientific-grade sonars and echosounders are relatively costly or may have limited seasonal or geographic availability to meet all scientific survey needs. However, commercial fishing and offshore support vessels already equipped with echosounder and sonar equipment may serve as vessels of opportunity for collaborative research. We present cooperative research that evaluated the performance of industry-series acoustic technologies for estimating biomass of the overwintering resident stock of Atlantic Menhaden in offshore New Jersey, with the goal of addressing industry's need for collection of novel scientific data to enhance sustainable development of the winter bait fishery. The primary bait fishery region 24–80 km offshore between the Hudson Canyon and Delaware was surveyed by the 49-m commercial midwater trawling vessel, *F/V Dyrsten*, equipped with a 38-kHz Simrad ES80 split-beam echosounder and a Furuno FSV25S omnidirectional sonar. Six transects perpendicular to the coast and spaced 23 km apart were systematically sampled (~400 km total) over 8 days starting in late February 2022. In addition to the transects, the omnidirectional sonar informed the vessel when and where to adaptively collect biological samples and acoustic data of schools detected off the transects. Several echogram processing techniques were used to overcome data challenges to provide acoustic biomass estimates. With nearly concurrent catch and acoustic data of several Atlantic menhaden schools, we found the acoustically derived biomass estimates and trawl catch weights of each school were similar in magnitude. The use of vessels of opportunity with industry acoustics to describe the spatial distribution and to provide reasonable biomass estimates of pelagic fish without the need to capture fish may prove valuable for informing fish stock assessments and monitoring potential impacts from offshore wind development and other industrial activities.

Novel insights into Atlantic menhaden (*Brevoortia tyrannus*) carbon production and mediation on the US Northeast shelf

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Forage fish are potentially significant contributors to coastal carbon flux given their abundance and seasonal cross-shelf migratory behavior. Understanding their biogeochemical role in coastal regions is a growing informational need for ecosystem-based fisheries management, especially as fishing companies prepare to meet net-zero carbon emissions goals. Even though marine fish are thought to contribute to approximately 16% of carbon flux out of the euphotic zone, the uncertainty on this estimate is large, and carbon release data for forage fish are practically nonexistent. In order to constrain this estimate and better understand relative contributions of fish metabolic byproducts to carbon cycling and flux, regional estimates are required, but no full carbon production suite (fecal pellet, calcium carbonate, excretion, and respiratory CO_2 release) exists for any fish species. I conducted laboratory trials with a highly abundant and commercially harvested forage fish on the US Northeast Shelf, Atlantic menhaden (*Brevoortia tyrannus*), and present novel, biomass-normalized carbon production rates for all four carbon products. I discuss potential regional-scale applications of the data, including the integration of empirically-derived production rates from fish into biogeochemical models, and future plans for a first-of-its-kind bioenergetics model for adult menhaden that can be used for a wide range of timely applications in a complex and changing shelf habitat.

Electronic shark deterrents decrease bycatch of Atlantic spiny dogfish (*Squalus acanthias*) in Gulf of Maine recreational fisheries

Clayton Nyiri†*[1], Michael D. Nguyen[1], Sara Mirabilio[2], Richard Brill[3], Peter Bushnell[4], Walter Golet[5], Ilan Levine[4], Brian Davis[4] John A. Mohan[1]

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The unintended capture of non-target species in fisheries is known as bycatch. Numerous shark species worldwide are overfished and/or experiencing overfishing, with shark bycatch in both commercial and recreational fishing operations as a significant contributor. For fishers, shark bycatch has financial implications including reduced target catches, gear damage or loss, and increased gear retrieval times. The Atlantic spiny dogfish (Squalus acanthias) is a small coastal shark that comprises a significant portion of bycatch for Western North Atlantic fisheries. In response, we have developed a prototype bycatch reduction device (BRD) that overstimulates shark electrosensory organs. This study quantifies the efficacy of this BRD in deterring spiny dogfish from hooks in a recreational rod-and-reel bottom fishery. We observed a 58% fractional reduction between fishing rods using an active voltage emitting BRD (active treatment) and an electronically inert control BRD lacking the electrical components (control treatment). Spiny dogfish standardized catch rates were significantly reduced on the active treatment in comparison to the control treatment ($p < 0.001$). Additionally, significant differences in lengths of female spiny dogfish caught on the active (75.87 ± 6.85 cm) and control (79.58 ± 6.93 cm) treatment suggests varying efficacy of the BRD due to differences in maturity, potentially related to electric sensitivity. Our findings suggest this prototype device effectively deterred spiny dogfish and supports the further development of this method to deter sharks in rod-and-reel fisheries.

Evaluating terrapin excluder devices to reduce bycatch without sacrificing legal harvest in New Jersey's blue crab fishery.

Jeffrey Brust* & Matthew Heyl

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A recent designation of diamondback terrapin (*Malaclemys terrapin*) as a non-game species in New Jersey has prompted efforts to reduce incidental mortality in New Jersey's commercial and recreational blue crab (*Callinectes sapidus*) pot fisheries. Initially proposed measures included reducing the size of terrapin excluder devices (TED) from the current 5x15 cm to the 4.5x12 cm excluder used in surrounding states. Multiple studies have shown, however, that the proposed size excluder will reduce catch of legal sized blue crabs, resulting in an economic hardship for fishery participants. Using morphometric data from blue crabs and terrapins, NJ fisheries staff have proposed a TED size intended to reduce terrapin interactions without reducing legal blue crab catch and will present results of initial gear trials comparing the proposed TED with sizes used by other states.

Investigating species-specific trends throughout New Jersey Department of Environmental Protection's 30+ year historical trawl dataset

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Changing ocean conditions, including temperature, carbonate chemistry, and oxygen availability, are altering the habitats of marine fishes and impacting their distribution. Utilizing the New Jersey Department of Environmental Protection's historical bottom trawl dataset, we explored trends in abundance for fish species caught from 1988-2022. The 90 most abundant species were selected from their respective decade span (1988-1998, 1999-2009, 2010-2022) to determine if there were any shifts in their ranking between decades. Some species such as the pigfish (*Orthoporistis chrysoptera*) and the gray triggerfish (*Balistes capriscus*) were in the top 90 for the first two decades but fell out of the top rankings in the most recent period. Conversely, a number of species including the dusky shark (*Carcharhinus obscurus*) and the chub mackerel (*Scomber japonicus*) only made the list in the most recent period. Other fish species, including Atlantic cod (*Gadus morhua*), haddock (*Melanogrammus aeglefinus*), and pollock (*Pollachius virens*), were in the top rankng from the earliest (1988-1998) and most recent (2010-2022) decades, but were noticeably absent during the decade between. Notably, most species of elasmobranchs (sharks, skates, and rays) have increased in prevalence in New Jersey coastal waters over the past three decades. Some species such as roughtail stingrays (*Bathytoshia centroura*), spiny butterfly rays (*Gymnura altavela*), bullnose rays (*Myliobatis* freminvillei), and dusky sharks (*Carcharhinus* obscurus) have been present for the duration of the historical survey, but their abundance has increased significantly over the last two decades. Others, such as Atlantic sharpnose sharks (*Rhizoprionodon terraenovae*) only began appearing during the past decade, and their abundance has rapidly increased. Long-term trawl surveys provide valuable context for understanding potential future impacts on fish that may result from further climate change or offshore wind development off the New Jersey coast. Future studies will build upon this data set by carrying out a targeted telemetry effort on target species highlighted through these analyses.

Local Adaptation and Population Structure in Atlantic Croaker (*Micropogonias undulatus*)

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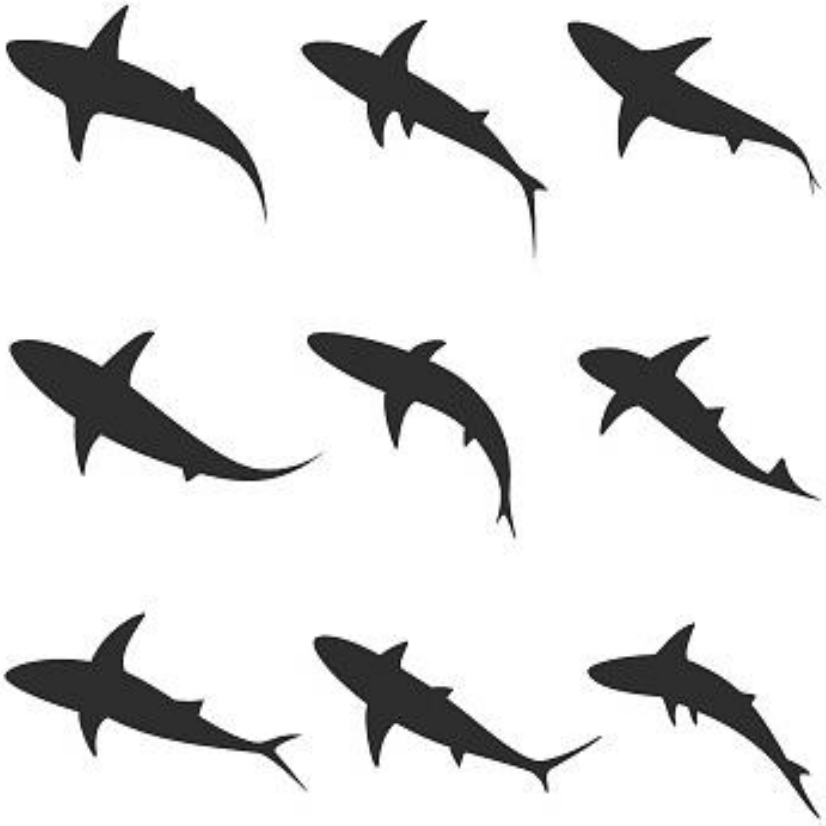
Evaluating the neutral and adaptive genomic variation in marine fish species is critical for understanding their potential to evolve to changing environmental conditions and their ability to survive in future conditions. Atlantic Croaker (*Micropogonias undulatus*) is a bottom-dwelling fish species of recreational and commercial importance found off the United States East Coast. We obtained 400 Atlantic Croaker fin clips caught in trawl surveys between New Jersey and Florida to investigate population structure and local adaptation. We evaluate two questions: 1) Do Atlantic Croaker along the East Coast exhibit population structure?, and 2) Is there genomic evidence of local adaptation among populations of Atlantic Croaker along the East Coast? We expand upon previous studies by using whole genome sequencing to identify signatures of adaptation across the entire genome that might be missed by only studying portions of the genome. We utilized low-coverage whole genome sequencing to genotype SNPs for all 400 fin clips. Population structure was analyzed with principal coordinate, isolation-by-distance, and ancestry-based analyses. We found evidence of a well-mixed population with high gene flow, which corresponds with past work that evaluated mitochondrial DNA. Genomic evidence of local adaptation was evaluated using genotype-environment association analyses. We found 2.6% of SNPs showed significant associations with dissolved oxygen, water temperature, and salinity. Our findings challenge long-held assumptions that local adaptation in marine and high gene flow species is rare. Our results are relevant to pressing issues in the field of ecology, as local adaptation in marine species may play an important role in understanding how populations respond to changing environments.



General Contributed III

Tuesday 10/29 at 1:00 – 2:45 PM
in Brunswick Ballroom Room 2

Geographic differences in the seasonal patterns of the parasite *Perkinsus marinus*: implications under climate change

Leah Scott‡* & David Bushek

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Perkinsus marinus causes dermo disease and increased mortality in the eastern oyster on the Gulf and Atlantic coasts of North America. Its severity and distribution are positively correlated with average water temperature and salinity that are predominantly controlled by climate. This results in seasonal cycles that vary across its range, from complete winter dormancy in more northern regions to a slight dip in intensity in warmer regions. The effect of climate change in these bodies of water is predicted to be multidimensional; not only are temperatures expected to increase, but the duration of summer temperatures is expected to extend further into spring and fall. Understanding how variations in temperature and salinity across the geographic range of *Perkinsus marinus* affect its phenology and the consequential impact on oysters may help predict how dermo disease will impact oysters in response to climate change. These factors complicate the process of predicting how dermo prevalence and intensity could change in the future. We examined long-term monitoring data from the Delaware Bay to determine the difference in how summer duration and average summer temperature affect the seasonal cycle of dermo disease and subsequent oyster mortality. We also compared the seasonal disease patterns in the Delaware Bay to other sites along the Atlantic and Gulf coasts. Results will help inform the impacts of dermo disease on oyster enhancement and restoration efforts in different regions and predict the impact of climate change on success.

A Dynamic Range Model (DRM) for Black Sea Bass (*Centropristis striata*) in the Northeast US

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Climate change has significantly impacted global biogeography with noticeable responses in the marine realm. Species distribution models are valuable tools that allow us to understand the current and future distribution of species. Dynamic range models (DRMs) are a class of process-based models that attempt to explain species distributions by demographic processes instead of correlative approaches. Black sea bass (*Centropristis striata*) is a commercially important fish species that's present across the East Coast of the United States. This species has been expanding northwards into the Gulf of Maine over the past few decades at a rapid rate. The objective of this study was to construct a DRM that explained the recent biogeography of black sea bass. We also assessed how and whether oceanic temperature drove these demographic processes. This DRM is a spatially explicit age-structured hierarchical Bayesian population model allowing for dispersal between each spatial unit. We fitted bottom trawl survey data from the NOAA Northeast US spring survey from 1989 to 2019 for different configurations of the model with winter bottom temperatures linked to recruitment and annual mean bottom temperature linked to mortality and dispersal. We assessed model performance using MAPE (Mean absolute percentage error) for estimated abundance. We found that temperature-driven mortality best explained past population dynamics of black sea bass compared to other model configurations (33.2% MAPE for total abundance) followed by temperature-driven recruitment and temperature-driven dispersal. Recruitment and dispersal were both maximized and minimized at 8.5 °C. Our results give an insight into what may be the drivers of a fast-moving marine species. This is one of the first applications of DRMs in a commercially important species. Our current steps include further refinement of this model and applying the findings of this study to a management strategy evaluation for black sea bass in the Mid-Atlantic region.

Withdrawn

Estimating Population Contingents of Tripletail (*Lobotes surinamensis*) Using Natural Tracers

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Promoting under-developed sportfish species can encourage new fishing opportunities, but fishery managers need to understand the species' resilience to fishing mortality. This project investigates the ecology of the Atlantic tripletail (*Lobotes surinamensis*) in the northern Gulf of Mexico regarding their exploitation vulnerability. Tripletail are seasonally resident in coastal and estuarine waters in the summer, where they are increasingly accessible to anglers before moving offshore for the winter. It is unknown to what degree tripletail exhibit regional fidelity and how far they travel to overwinter. Concurrent to their seasonal estuarine ingress where tripletail are not actively spawning, it is hypothesized that fish remain offshore to spawn, creating a split between spawning and non-spawning contingents. Otoliths from the Alabama Deep Sea Fishing Rodeo (ADSFR) and Louisiana Department of Wildlife and Fisheries (LDWF) will be analyzed. Techniques of otolith aging/micro-chemistry with the LA-ICP-MS for life history models will help uncover this important gamefish. This project hopes to address the following question: What proportion of tripletail make annual migrations into the estuary? The findings will enhance fishery management, promote sustainable fishing, and support conservation strategies by identifying population contingents all of which supports the Louisiana Sea Grant mission of promoting sustainable fisheries.

Vertebral chemistry traces the life history of migratory shortfin mako sharks

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In the ocean, dissolved trace elements vary over space and time due to biogeochemical processes. Trace elements, such as Li, Mg, Ca, Mn, Zn, Sr, and Ba, become locked into metabolically inert calcified tissue like chronologically mineralized shark vertebrae, reflecting environmental conditions experienced over life. Analysis of vertebral trace elements can illuminate aspects of an individual's life history. In this study, a global collection of shortfin mako shark (*Isurus oxyrinchus*) vertebrae (n = 70) were analyzed for trace element concentrations of Li, Mg, Ca, Mn, Zn, Sr, and Ba. Sharks were collected opportunistically from the North, Northeast, South, and West regions of the Pacific, the Northwest, and South Atlantic regions, as well as the Gulf of Mexico and Indian Ocean (n = 6 regions). Trace elements were measured by laser ablation ICP MS from the center of the vertebrae to the edge, representing the shark's lifespan. Multi-elemental signatures were created for sharks from each region of capture for both the maternal region of the vertebrae (pre-birth) and from the birth band to the first band pair (first year of life). Multivariate analysis revealed limited success in differentiating between all regions (maternal: 66%) but found greater success when the scope was narrowed to regions in only one ocean (Atlantic: 90%, Pacific: 75%) and between ocean basins (86%), suggesting intra-ocean basin connectivity. We then investigated the use of peaks and valleys in vertebral manganese concentration as an aging proxy to visual band pair counts. Algorithm based peak and valley counts were applied to time series graphs of Mn concentration and aligned with band pair imaging. Algorithm parameters were adjusted to account for decreasing peak spacing with age and parameter optimization is ongoing. This study presents preliminary results on the limitations and advantages of using vertebral chemistry to reveal life histories of sharks.

Tracing movement patterns and natal origins of Striped Bass in Maine: connecting acoustic telemetry with scale chemistry

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Striped bass (*Morone saxatilis)* are an anadromous species and exhibit long distance migrations along the Atlantic coast. Populations of Atlantic striped bass collapsed in the 1980s, but stocks were rebuilt with fisheries management action. Emergency management measures were enacted in 2023 to protect strong year classes of striped bass cohorts. An increasing challenge in striped bass fisheries management is the complex seasonal movement patterns of juveniles and adults. The migratory stocks include fish from the Chesapeake Bay, Delaware River, and Hudson River. These multiple spawning stocks exhibit varying degrees of residency and migration, and the stocks mix as fish move north during the spring, and south during the fall. It is unclear what spawning habitat contributes the majority of fish captured in Maine recreational fisheries and if that source varies year to year. This study explores the fine scale movement patterns of striped bass that utilize the Saco River system through acoustic telemetry. From 2022 to 2024, thirty-eight fish ranging in size from 47 to 110 cm total length were implanted with V13 acoustic tags. Both fine scale and broad scale patterns in fish detections will be explored. Further, this study aims to link migratory movements to spawning origins through trace elemental signatures of non-regenerative scales. This novel paired approach will characterize striped bass stocks and movement behaviors exhibited in Maine recreational fisheries with the overarching goal to enhance management and conservation.

Using eDNA to Estimate Seasonal Presence of Striped Bass (*Morone saxatilis*) in Southern Maine

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Environmental DNA (eDNA) is a unique genetic signature that is produced from biological material such as skin fragments, scales, urine, feces, gametes and mucus. eDNA is a noninvasive approach for collecting standardized presence/absence data of fish using water samples. To investigate the seasonal presence/absence of striped bass (*Morone saxatilis*) in the Saco River, duplicate water samples and negative field controls were taken at three locations over 11 months from October 2023 to September 2024. To compare striped bass presence in the Saco River to the Maine coast samples were analyzed from both a Saco River boat dock site and coastal Ram Island site, separated by just under 3 kilometers. Fine scale temporal variation was explored using 24-hour sampling at Ram Island for both surface (2m) and deep (6m) samples across three years. Samples were filtered through 0.45um filters, extracted using the Qiagen blood and tissue test kit and analyzed using qPCR and pre-designed 102 base pair primers. The calculated DNA concentration from each monthly Saco River sample was compared to respective acoustic telemetry detection data from another tagging study. Overwintering striped bass DNA concentrations were detected in the months of December and February in the Saco River. eDNA and acoustic telemetry data were complementary for estimating that striped bass abundance in the Saco River decreased from 2023-2024. The samples from the boat dock revealed that entrance and exit times into and out of the Saco River for the annual striped bass migration were consistent and overwintering striped bass were found in all three years. Both surface and deep samples were similarly correlated, and concentrations varied each month. This monitoring research will be continued to further elucidate seasonal striped bass abundance in the Saco River and Maine coast.

Evaluating the Use of Environmental DNA (eDNA) to Survey Fish Assemblages in wadeable streams of the New Jersey Pinelands

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There is currently no biological index based on fish or vertebrate assemblages to assess the biological condition of wadeable streams in the New Jersey Pinelands for Clean Water Act assessments and reporting. The NJ Pinelands accounts for one fifth of the state's land area and features naturally occurring water quality characteristics that present challenges for sampling fish assemblages. Pinelands streams are low gradient, often have soft muck substrates, are acidic and have low specific conductance. The emergence of environmental DNA (eDNA) as a more efficient, sensitive and cost-effective method to measure biodiversity may overcome several of these sampling limitations in the Pinelands. We conducted a pilot study to determine which fish sampling method (eDNA metabarcoding or single pass electrofishing) is best to determine fish species richness and document the entire fish assemblage present at stream sites. Additionally, two different commercially available eDNA sampling techniques (Jonah Ventures, 60 mL syringe with 1 micron filter and Smith Root, Inc self-desiccating 5-micron filter sampled using a Smith Root, Inc eDNA sampler) were tested side by side. We found that fish richness sampled by eDNA metabarcoding and electrofishing were not significantly different. The fish assemblage sampled by eDNA was not significantly different than the fish assemblage sampled by electrofishing. Fish richness did not differ significantly between the eDNA technique used even though the Smith Root sampler filtered significantly more water than the syringe method. Fish richness did not differ significantly between sampling season (spring vs. summer) or the number of samples taken from a site (3 vs. 5). Our results indicate that eDNA metabarcoding produces similar results to those collected by electrofishing and can be used as an effective method for characterizing the fish assemblage of Pinelands streams.

Extending an approach to developing and implementing fleet-specific fishing mortality reference points

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One goal of the ASMFC's/MAFMC's recreational reform initiative (RFI) is to achieve access to fisheries that is aligned with availability and stock status for a number of recreationally-important species including scup (*Stenotomus chrysops*). Additionally, stakeholders have expressed concerns regarding how large-scale recreational data collection systems (e.g., MRIP) are used to manage fisheries. In recent years, the RFI has added flexibility to scup management, but management is still linked to a recreational harvest limit (RHL) that is compared against an MRIP estimate. Managers have expressed interest in evaluating whether fishing mortality-based measures could serve as the basis for recreational harvest decision making as opposed to absolute measures of harvest or catch. The goals of this project were to 1) apply methods developed for partitioning striped bass (*Marone saxatilis*) fishing mortality reference points (by area) to scup (partitioning by fleet), and 2) to extend these methods to prevent recent trends in fishing from influencing established allocation schemes between the recreational and commercial sectors. We modified the striped bass approach as recent sector fishery removals have not been aligned with their intended sector allocations. The baseline striped bass approach represents a practical method to partition a fishing mortality reference point into component parts, but suffered from an emergent allocation scheme that differed from what regulations specify. If the relative rates of fishing intensity are not controlled, reference point partitions "reward" sectors for any increase in their relative removal rate by adjusting the fleet reference point upwards. However, a method to tune the relative fishing intensities by fleet as part of the process to determine the reference points resulted in reference points that were consistent with the allocation scheme offering promise for application of fleet-based reference points. Future work will address adjustments for retrospective patterning and short- vs long-term allocations that emerge from this approach.

Dynamic Biomass Reference Points for Northeast U.S. fisheries in a changing world

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Biomass reference points are an essential component of the fisheries management system, and are used to determine status (e.g., overfished or rebuilt) and set catch limits for stocks throughout the U.S. In the Northeast U.S., biomass reference points are calculated using average recruitment calculated over some historical period. However, climate change can result in long-term changes in recruitment, which can result in a mismatch between current productivity of the stock, and the biomass reference point upon which management decisions are made. Here, I explore two approaches for estimating dynamic reference points, and apply them to 11 stocks in New England, a region that is experiencing rapid warming and showing large changes in recruitment for many stocks. The aim of this study is to understand how these approaches compare to the current ad-hoc methods currently used, both in terms of variability in the biomass reference point but also in stock status. The two methods explored exhibited differences in how the biomass reference points changed over time, but both were generally more dynamic than the approaches currently used. In addition, these approaches often resulted in improved status of the stock. The results of this study indicate that the adoption of an adaptive approach for setting biomass reference points could allow for more responsive and effective management in face of directional climate change in New England, and other regions.

Preliminary Findings: Surveying the Perceptions of Saltwater Anglers in New Jersey in Bridging the Gap Between Saltwater Anglers and Researchers

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In order for citizen science projects to be successful they must appeal to various stakeholders. The recreational saltwater angler community and the scientific community both share interests in and have unique knowledge about saltwater fish ecology. There is a gap in language, understanding and trust between these communities despite often having shared common goals. In order to address this gap, I have surveyed New Jersey's saltwater anglers': (1) Initial perceptions, (2) demographics, (3) fishing preferences & occurrences, (4) knowledge & trust, and (5) technology specific preferences. The Qualtrics platform was used to distribute an anonymous voluntary survey primarily at angler clubs, fishing events, bait shops, an angler magazine and through social media. Results lend toward understanding the demographics, perceptions, concerns, motives, preferences, knowledge base, and trust of anglers in NJ. Increased participation in these types of surveys and engagement with the scientific community may contribute to conservation practices overall. This ongoing project has captured feedback from approximately 700 anglers. Distribution methods, initial descriptive statistics, and preliminary results may support current researchers who have an interest in engagement with the saltwater angler community. The results will be presented alongside a parallel project supported by the framework of using anglers and researchers to support striper (*Morone saxatilis*) catch and conservation. Further analysis will not only provide insight on recreational angler perspectives but could be used to drive the development of project based technological platforms that would best serve local anglers, researchers and other stakeholders.

Poster Presentations

Listed in alphabetical order by presenting author's last name

Key:
* = presenting author
‡* = graduate student presenting author
†* = undergraduate student presenting author
ß* = high school student presenting author

Integration of non-extractive environmental DNA in monitoring potential impacts of offshore wind development

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Monitoring the potential impacts of offshore wind development on the marine ecosystem requires development of novel approaches that specifically address the challenges presented by this large-scale endeavor. Non-extractive environmental DNA (eDNA) is a one such approach to that can be integrated with capture surveys to advance the science of fisheries monitoring. eDNA metabarcoding provides data on species presence, and presence- or relative abundance-based community composition. Strengths of the eDNA approach to fisheries monitoring include its relative ease of deployment and scalability, including the ability to access new or hard to navigate areas such as constructed wind farms. As part of a New Jersey Department of Environmental Protection / Board of Public Utilities Resource Monitoring Initiative project we are establishing a methodological and ecological baseline by sampling eDNA in an experimental design that captures the cross-shelf (including the surf zone) and along shelf environmental gradients within which offshore wind development areas exist. This includes examination of the relationship between eDNA metabarcoding results and capture surveys by pairing eDNA measurements with the NJ Ocean Trawl, NJ Artificial Reef Survey, NJ Raritan Inventory Project, as well as other trawl and baited remote underwater video (BRUV) surveys. Initial results demonstrate the ability of eDNA to detect seasonal as well as cross- and along-shelf differences in fish community composition that correspond with capture surveys, but also highlight important differences in 'gear bias' associated with eDNA vs. capture methods. eDNA has an important role to play in monitoring potential impacts of offshore wind development. Establishment of a methodological and ecological baseline sampling is critical to understanding and exploiting the strengths of the eDNA approach and will be key to its further integration into fisheries monitoring plans as offshore wind development proceeds.

Video Documentation of the Marine Community using Oyster and Clam Farms as Habitat in Barnegat Bay, NJ

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Shellfish growers routinely observe fish and invertebrates interacting with their aquaculture gear. To quantitatively assess these observed interactions, point-of-view (GoPro) cameras were used to document fish activity in and around an oyster and clam farm in the Little Egg Harbor region of Barnegat Bay, New Jersey (2019 and 2023, respectively). Floating bags and oyster cages were observed on the oyster farm and predation nets over seeded bottom were observed on the clam farm. Nekton abundance was determined using MaxN, defined as maximum number of individuals of a given species present within each 1-minute segment of video. Thirty-seven species were identified across both farms with 16 species unique to the oyster farm and 10 species unique to the clam farm. More individuals were observed on each farm than at the adjacent natural habitats. Specifically at the oyster farm more individuals were observed at the floating bags than the oyster cages. High levels of fouling on the floating bags on the oyster farm attracted more individuals while fouling on oyster cages fouling had little impact on abundance. A moderate level of fouling on the predation nets attracted the highest number of individuals compared to low or high levels of fouling. Farm tending activities did not change abundance and habitat use on the oyster farm, more individuals were observed at the predator net when clam farm tending activities occurred at a distance from camera locations. These data support how shellfish farms, and their attributes, such as gear types, fouling level, and farm tending activities, can provide habitat provisioning for local species and be used to inform management.

Using BRUVs to Evaluate Impacts of Offshore Wind Development on Demersal Species

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With the rapid and expansive development of offshore wind energy in the Northeast U.S., there is a need to monitor fisheries resources that may be impacted by wind farm construction and operation. An emerging survey method in this region are Baited Remote Underwater Video (BRUV) systems, a non-extractive, low-impact surveying method which is commonly used in other regions. Our project utilized BRUVs within a multi-method Before-After Control-Impact (BACI) fisheries monitoring survey to assess the baseline abundance and assemblages of structure-associated species in Ørsted's Ocean Wind 1 wind farm off New Jersey. From 2022-2023, 400 hours of video footage was collected over 42 seasonal survey days. Our initial priority was to develop an efficient method for processing the vast amount of footage collected. To accomplish this, we evaluated the effectiveness of two subsampling methods by comparing MaxN results to those obtained from full-duration videos for our 2022 deployments. The methods tested were: 1-minute scored per 5 minutes and 1-frame scored per 30 seconds. The 1-minute subsampling method yielded results statistically similar to the full-watch approach, while requiring only one-sixth of the processing effort. Using the identified subsampling method, the remaining deployments were scored to capture different ecological metrics over seasons and site types. We identified 19 taxa across 16 families, with the commonly observed species (COS) being *Centropristis striata*, *Squalus acanthias*, and *Prionotus carolinus*. Additionally, average arrival and accumulation times for target and COS finfish indicate future BRUV deployment durations can shortened from their initial 60-minute soak time. Moving forward, we look to increase our BRUV sampling efforts and optimize their effectiveness for these regional applications. These optimizations include modifications to survey and gear design and using existing footage as training data for artificial intelligence machine learning (AI/ML) models that will automate future video scoring efforts.

Swarm-Capable AI-Driven Underwater Glider with Stereo Sensing and Pneumatic Motion Control for Scalable, Adaptable Fisheries Monitoring and Marine Biome Surveillance

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Autonomous Underwater Vehicles (AUVs) are essential for exploring and monitoring marine environments, yet challenges such as cost, adaptability, and effectiveness in complex environments like coral reefs and seamounts remain significant. The Geery Glider addresses these challenges through a novel and efficient, simple winged, aerodynamically sculpted 'pumpkin seed' design, tested for its high glide ratio. The Geery Glider's innovative design, functional capabilities and affordable oceanic scaling make it a critical tool for marine biome surveillance, oceanic research, as well as advancing scalable autonomous marine technologies. This design is combined with pneumatic actuators for precise buoyancy and motion control, ensuring the vehicle's adaptability and stability in diverse underwater conditions.
The scalable, cost-effective design integrates advanced stereo vision, AI-driven navigation, and Time Reversal (TR) signal processing, which enables precise, real-time mapping and localization in underwater environments that present difficulties for traditional AUVs.
In coordination with multiple gliders, surface buoys, and autonomous surface vehicles, the Geery Glider shares real-time data, enhancing its localization and navigation capabilities. This system is ideally suited for applications such as coral reef revitalization, fisheries management, and offshore construction monitoring, offering scalability across a wide range of marine sectors. The incorporation of TR signal processing improves underwater communication and fish tag detection, making the Geery Glider highly effective even in acoustically complex and noisy environments. Additionally, the project employs human-in-the-loop AI training, where simulated missions gather operator data to refine the glider's autonomous navigation and decision-making algorithms. This approach allows for continuous learning and adaptability, especially in dense, dynamic underwater habitats.

Ribbed Mussel *(Geukensia demissa)* Aquaculture Techniques: Investigating an Alternative Diet

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Ribbed mussels (*Geukensia demissa*) are understudied bivalves that play a critical role in US East Coast marshes. They are in high demand due to their ecological engineering applications, but aquaculture for the species is underdeveloped. Ribbed mussels are one of the few bivalves capable of feeding on small-sized bacterioplankton. Due to their ability to feed upon small particles, we hypothesized that *Nannochloropsis oculata* (Nanno), a relatively small green microalgae with high lipid content, would be a beneficial supplement to the standard diet of *Tisochrysis lutea* (Tiso), improving survival and growth. We compared the results of feeding larval and juvenile ribbed mussels a controlled diet of 100% Tiso and an experimental diet of 2:1 Nanno:Tiso. Shell lengths of the two larval diets did not statistically differ at the termination of the diet, but the dataset's linear regression slopes did. The shell lengths of the two juvenile diets did not statistically differ on the termination of the diets well as in their linear regression slopes. A frequency distribution of all shell lengths on the final day of the study showed that Nanno-fed larval mussels displayed a bimodal distribution of shell lengths and Tiso-fed larval mussels displayed a unimodal distribution. This suggests competition among the Nanno-mix mussels for the Tiso portion of the mixed diet. This pattern was not seen in the juvenile frequency distributions, where both diets were distributed relatively normally. There was no statistical difference in percent survival between the two larval diets. These results show that while larval ribbed mussels prefer Tiso, Nanno can be used as a viable "backup" diet for their larviculture. Ribbed mussel juveniles equally prefer Tiso and Nanno. The difference in preference between larvae and juveniles suggests intraspecific niche partitioning, which outlines areas for further study into ribbed mussel population dynamics.

Gear Up: The Importance of Diverse Sampling Efforts

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Fisheries monitoring surveys are becoming increasingly important with the expansion of offshore wind development (OWD) as the surveys can provide baseline data, such as relative biomass, distribution, and demographics of fishery resources in developmental sites. Surveying via multiple sampling approaches can increase the power to detect potential changes from OWD beyond what would be possible with using one survey gear alone. Additionally, using various gear types can help ensure a more accurate and unbiased representation of the survey site. Data collected for the Ørsted Ocean Wind 1 Fisheries Monitoring Plan was used to examine how diversity measures differed within the same survey area when using different gears [structured habitat survey (rod-and-reel and chevron traps), surfclam dredge survey, benthic trawl survey]. Additionally, a non-metric multidimensional scaling analysis was used to statistically differentiate the compositions of the three Ocean Wind 1 surveys. Using different types of survey gear, as done in the Ørsted Ocean Wind 1 Fisheries Monitoring Plan, allowed us to more holistically sample the area as each gear has its own selectivity. Thus, the overall aim of this study was to investigate all gears collectively to explore how the diversity measures and composition varied by survey. Results indicated that the benthic trawl survey had the highest richness, while the structured habitat survey observed the highest diversity and evenness. Species composition of samples captured by these gears [rod-and-reel, chevron trap, hydraulic dredge, and net] also differed ($p < 0.05$). Furthermore, species accumulation curves for the benthic trawl survey revealed that there were sufficient sampling efforts, suggesting that all species present in the area were likely sampled. These findings show the importance of utilizing multiple gear types when sampling to understand the spatial ecology of marine habitats and ecosystems due to the significant differences in species composition across the three fishing gears.

Glider-Based Passive Acoustic Monitoring for Marine Mammals and Cod Spawning in Southern New England WEAs

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Offshore wind development has the potential to impact Atlantic Cod (*Gadus Morhua*) spawning. During two spawning seasons, we monitored for cod spawning in OCS-A 0517 (South Fork Wind) in March 2023 and OCS-A 0486 (Revolution Wind) from January – April 2024 using a Jasco OceanObserver™ Passive Acoustic Monitor mounted on a Slocum glider (Teledyne Webb Research, G3). In addition, the glider was fitted with a FLBBCD fluorometer (WETlabs), a conductivity-temperature-depth (CTD) device, and an oxygen Optode. In 2024, active acoustics via a VMT (Vemco) were added.
In OCS-A 0517, cod spawning was rare and only one cod grunt was detected in 24 days. While cetaceans were not the monitoring target of this first season, we did hear North Atlantic right whale *(Eubalaena glacialis),* humpback whale (*Megaptera novaeangliae*), fin whales (*Balaenoptera physalus),* and sei whale (*Balaenoptera borealis*) calls. In OCS-A 0486, we monitored for 86 days and 16 tagged fish were detected, 12 of which were tagged cod. There were 227 grunts detected, though it was unclear whether they were produced by gray seals (*Halichoerus grypus)* or cod. During the second season we performed additional analysis for cetaceans; 751 North Atlantic right whale upcalls were identified over 18 recording days as well as the acoustic signals of humpback whales (30 days), fin whales (27 days), gray seals (17 days*)*, and moans that could have been produced by either sei or blue whale *(Balaenoptera musculus)*.

Evaluating the Physical Adaptations of Orconectes immunis in Chemically Manipulated Low pH Freshwater Ecosystems

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Environmental contamination of ecosystems that ultimately leads to system degradation may occur from many things including but not limited to agricultural, industrial and municipal runoff. The unregulated water laws in Mexico have led to 48.8 % of the nation's freshwater to be contaminated. The floral and faunal biodiversity of Mexico is at risk due to threats that these run off pollutants create imbalanced pH levels and acidity in the water. A species currently struggling in low pH conditions is the Mexican orange dwarf crayfish (Cambarellas patzcuarensis), an endangered, and endemic species in Michoacan Mexico. This project has focused on examining and understanding the long-term effects that a low pH has on crayfish, exploring if any side effects can be reversed to allow for a continuation of the species in the wild. Moreover, to mitigate potential harm to the already limited population of C. patzcuarensis, the calico crayfish (Orconectes immunis) which is a species that inhabits areas with similar water parameters, was chosen as a test subject. A Delaware State University (DSU) aquatic rack system houses four separate crayfish groups at four different pH levels by using 31.45% HCL (Muriatic Acid). Observations include post molt malformations and growth (total length, carapace length, weight). It is expected that with long term exposure to environmental stressors like a lower pH, O. immunis exoskeletons may become weak and/or deformed. This in turn may make it harder for O. immunis to complete a healthy growth cycle. It is further expected that O. immunis held at a pH closer to neutral (7) will grow larger and have better survival than O immunis held at a lower, more acidic pH. Additional data is currently being collected and includes daily water quality monitoring of O2 , oC and pH and weekly analysis of NH3-N, NO2-N, and calcium hardness.

The Effect of Heat Stress on Metabolic Rate of Atlantic Surfclam (*Spisula solidissima*) Subspecies and Hybrids

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The Atlantic surfclam (*Spisula solidissima*) is an economically important shellfish species that supports a large commercial fishery along the eastern coast of the United States. The surfclam is exposed to anthropogenic ocean warming, and changes in its population distribution have been attributed to an increase in bottom water temperature. High temperatures negatively affect the physiological state of surfclams by hindering immune defenses and filtration rates, leading to decreased growth rates, increased disease rates, and reduced fertilization. It is therefore essential to study how the physiological state, as measured by metabolic rate, of surfclams will change due to ocean warming, as well as testing if surfclams with a specific genetic background can withstand higher temperatures. Two genetically distinct subspecies, “southern” subspecies *S.s. similis* and “northern” subspecies *S.s. solidissima*, have been found in the fishery. Hybrids of the two subspecies are also known to exist in the wild and in captivity. To determine if metabolic rate differs between surfclam type in response to thermal stress, an experiment was conducted at the Rutgers University Haskin Shellfish Research Laboratory using the two subspecies and a *S.s. similis* female x *S.s. solidissima* male hybrid cross. Clams were acutely acclimated (1–2 days) to a 20°C control treatment and a 26°C heat-stressed treatment. Preliminary results suggest that although there are no significant differences in weight-standardized oxygen consumption rates between surfclam type, *S.s. solidissima* shows a higher average oxygen consumption rate than *S.s. similis* and the hybrid cross. As the “northern”, more cold-adapted subspecies, *S.s. solidissima* is expected to consume more oxygen in higher temperatures. Heat-stressed clams also display a higher average oxygen consumption rate than control clams. Further replicates will provide more resolution to these trends and demonstrate the ability of purebred and hybrid surfclams to respond to ocean warming.

Spatial and temporal use of a coastal back-bay by Sandbar sharks (*Carcharhinus plumbeus)*

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Coastal bays provide critical ecosystem services for keystone species, including acting as nursery habitats that provide food sources and protection for them. In New Jersey, the Great Bay-Mullica River and Little Egg Harbor bays have been proposed as one of the only nursery areas other than Delaware Bay for Sandbar sharks. However, there is a critical data gap in the spatial and temporal habitat use of these bays by them, making the management and conservation of the species difficult. This project will fill these data gaps by providing population demographics and the relative abundance of sharks captured within the nurseries and by providing spatial and temporal movements, including residence time within the nurseries, through acoustic telemetry.
Larger juveniles and mature adults were targeted at night using rod and reel on saltmarshes or aboard boats. Once captured, sharks were sexed, measured, and externally tagged with a Floy tag. A subset of sharks were surgically implanted with an Innovasea V-16 acoustic transmitter. To monitor their spatial and temporal distribution, movement rates, and residence time within the bays 13 Innovasea VRTX acoustic receivers were deployed from July through October with detection data periodically downloaded. Coastal and offshore data were also obtained through the ACT-MATOS network.
Twenty-two sharks were tagged for this study, with the majority being juveniles. Overall tagged animals provided 18,496 unique detections within the array and 34,588 detections including collaborator detections. Sharks displayed an average residency time of 28.1 days in and around the system with some staying for extended periods of > 60 days. The results of this study show the importance of this shallow water marsh region as a nursery habitat for juvenile Sandbar sharks.

Investigating the Effects of Offshore Wind Development on the Trophodynamics of a Commercially Important Reef Facultative Species in New Jersey

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With the pending development of offshore wind farms on the Mid-Atlantic outer continental shelf, monitoring changes in trophodynamics of commercially and recreationally important fish species will be important for identifying impacts to fisheries resources. The addition of turbines and rock scour revetments into a previously open soft-bottom habitat can affect assemblage structure and therefore trophodynamics within leases. To support holistic ecosystem-based fisheries management, diet analysis can provide insight into community dynamic responses to wind farm development. Stomachs of black sea bass (*Centropristis striata*) were collected during the summer and fall cruises of a quarterly bottom trawl survey within the Ørsted Ocean Wind 1 wind lease site and adjacent control sites. Three black sea bass individuals for three adaptively determined size classes were sampled when available from each tow. Their stomachs were removed on board and fixed in 10% formalin to stop continued digestion before being brought back to the lab for analysis. Stomachs were emptied and their contents analyzed gravimetrically, volumetrically, and numerically after being separated and identified to the lowest verifiable taxonomic level. Feeding intensity and frequency of occurrence for varying prey types were calculated and compared across seasons. Additionally, baseline diet assemblages were characterized through the indices of fullness, preponderance, and relative importance; these characterizations allow comparisons to identify changes in foraging behavior during construction and post-construction monitoring. In conjunction with the accompanying bottom trawl survey catch data, this diet data can provide key insight into occurrence and community dynamic data of the species utilizing the leased habitat and how development impacts behavior.

Assessing the Role of Oyster Aquaculture in Enhancing Marine Habitat

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Populations of the Eastern oyster, *Crassostrea virginica,* in New Jersey have seen reduced numbers based on historical populations due to overharvesting, illness, and water quality changes. In the time since, efforts to repair their presence and resume their cultivation have been made in areas like Barnegat Bay, NJ, with farmers successfully seeding, growing, and harvesting oysters on shellfish leases. As part of a new initiative to encourage farmers to participate in sustainable practices on aquaculture sites, water quality and aquatic habitat were monitored at four participating oyster farms from Mantoloking to Great Bay in coastal New Jersey. This study aims to evaluate the effectiveness of these aquaculture practices as habitat for other marine species, especially those that use structure as habitat. Data was collected primarily through the use of seines and fish traps during the summer of 2024. To assess species abundance and diversity, collected individuals were identified and their lengths and wet weights measured. These metrics were compared to off-site control areas at each farm. It was hypothesized that the farm sites would show increased species abundance and richness compared to the control areas, however results varied at each site. Species that were found associated with these farms included Tautog (*Tautoga onitis*), Atlantic Menhaden (*Brevoortia tyrannus*), and Atlantic Silversides (*Menidia menidia*), with occasional standouts from other species. Further statistical analysis will determine how shellfish leases influence habitat for demersal fish and invertebrates.

Tracing movement patterns and natal origins of Striped Bass in Maine: connecting acoustic telemetry with scale chemistry

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Striped bass (*Morone saxatilis)* are an anadromous species and exhibit long distance migrations along the Atlantic coast. Populations of Atlantic striped bass collapsed in the 1980s, but stocks were rebuilt with fisheries management action. Emergency management measures were enacted in 2023 to protect strong year classes of striped bass cohorts. An increasing challenge in striped bass fisheries management is the complex seasonal movement patterns of juveniles and adults. The migratory stocks include fish from the Chesapeake Bay, Delaware River, and Hudson River. These multiple spawning stocks exhibit varying degrees of residency and migration, and the stocks mix as fish move north during the spring, and south during the fall. It is unclear what spawning habitat contributes the majority of fish captured in Maine recreational fisheries and if that source varies year to year. This study explores the fine scale movement patterns of striped bass that utilize the Saco River system through acoustic telemetry. From 2022 to 2024, thirty-eight fish ranging in size from 47 to 110 cm total length were implanted with V13 acoustic tags. Both fine scale and broad scale patterns in fish detections will be explored. Further, this study aims to link migratory movements to spawning origins through trace elemental signatures of non-regenerative scales. This novel paired approach will characterize striped bass stocks and movement behaviors exhibited in Maine recreational fisheries with the overarching goal to enhance management and conservation.

Stock Origins, Micro-Habitat Preference, and Population Health *of Morone saxatilis*

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Striped bass are the most sought-after inshore game fish on the east coast, generating tourism, business, and industry for New Jersey. However, there is ambiguity around the micro-habitat preference, migration behavior, and stock origins of this important recreational, commercial, and ecological marine resource. Though the general migration patterns of spawning size striped bass are somewhat understood, there are nuances across fish size and age. The behavior of smaller bass is very different from the larger spawning size bass, and the former's behavior will vary across different areas. Striped bass have high fidelity to the spawning grounds in which they were hatched. The Jersey shore is not a major spawning ground, but rather a highway of mixed-migratory groups of stripers during spring and fall. The derived proportions from the major (and minor local) spawning grounds of this migratory stock are unclear. With the use of tagging instrumentation, catch logs, and scale-/tissue-sampling, followed by DNA sequence comparisons, clarity maybe gained on 1) changes in migration and location preference and 2) the extent to which each spawning ground contributes to our local mixed-migratory stock, and possibly illuminate differences between that of the fall and spring groups. Statistical analysis was also performed on researchers' catch log data for illumination of striped bass behavioral/feeding patterns.

Characterization of oyster (*Crassostrea virginica*) settlement on concrete reef modules in an annular flume

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Artificial reefs (ARs) are increasingly used to protect vulnerable shorelines and provide habitat for many organisms, including shellfish. Commonly, ARs rely on natural settlement of encrusting organisms, to colonize the structures after installation. To better understand how the design and configuration of ARs can affect oyster settlement, lab experiments were conducted using newly developed Reefense Modules (RMs) in an annular flume. Three different arrays of varying height 1/10th scale RMs (3 rows x 5 columns = 15 RMs per array) were placed in the flume and competent oyster larvae were added under flowing conditions (5 cm/s). Arrays formed a flat plateau, a convex mountain or a concave valley relative to the direction of flow. After 3 weeks, the abundance and locations of oysters on RMs were recorded. Statistical analyses explored differences in standardized oyster density by the array type, column, row, and RM level (height). Spatial autocorrelation was calculated using Moran's I to find the degree to which settlement was clustered. Standardized oyster density differed among columns across the array types and showed the greatest differences in the two columns at the leading edge. Furthermore, array type influenced oyster density across the RM level (Two-way ANOVA). There was a moderate degree of spatial autocorrelation, or clustering, within all array types (Moran's I). The differences in oyster density indicated that hydrodynamic forces act on larvae to impact the distribution of their settlement across the structures. This is supported by the moderate clustering apparent in all array types, primarily in areas of rapid velocity change, such as eddies and leading edges that were identified via computational fluid dynamics modelling. When designing artificial reefs for living shorelines or restoration, hydrodynamic forces should be considered as they play an important role in dictating the settlement of encrusting organisms like oysters.

Histological Comparison of the Reproductive Cycle in *Crassostrea virginica* in Delaware Bay from 2014 and 2024

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Understanding of the specific timing of oyster spawning in Delaware Bay has important implications for oyster restoration, enhancement and overall management. This information is specifically valuable for optimizing shell planting, shellfish transfers, and harvesting strategies. Improved understanding of local spawning patterns and environmental interactions will enhance the conservation and management of oyster populations, benefiting both the shellfish industry and ecosystem health.

In Delaware Bay, the oyster spawning season has historically occurred from late spring through early summer with a possible second spawn in mid to late summer, controlled predominantly by the seasonal temperature cycle and the corresponding timing of food availability. Like other regions, Delaware Bay has been warming and this could shift the timing of oyster reproduction.

This study used gross observations of the reproductive stage to provide immediate feedback to the industry and resource managers followed by a histological examination to gain detailed insights into gonadal tissue development and the timing of spawning. Ten to fifteen oysters were collected weekly from commercial landings during 2024 and compared to historical data from monthly sampling of 20 oysters in 2014. Histological gonad ratings were correlated with gross observations and used to determine the timeline of gonad development and spawning during 2024, then compared with a histological timeline from 2014 to assess change over the last decade. Corresponding temperature and salinity data were analyzed to understand environmental influence on the observed spawning periods. Despite an average annual increase in temperature of 0.91 C since 2014, results indicate the predominant spawning period remains in mid to late June.

Depth and Habitat Distribution of *Mustelus canis* and *Squalus acanthias* across a Shoreface Sand Ridge

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Smooth dogfish *Mustelus canis* and Spiny dogfish *Squalus acanthias* range along the North American Atlantic coast. Both species are generally demersal, occupy similar depths range-wide, and have similar form and size, but they have differing migratory patterns, dentition, and diets. In the New York Bight, *M. canis* is dominant in the late Spring and Summer, and the *S. acanthias* population is dominant in late Fall, and Winter. In 2022, NOAA fisheries reported 436,346 lbs of *M. canis*, and 1.5 million lbs of *S. acanthias* landed in New Jersey alone, both catches valued at hundreds of thousands of dollars. A series (n = 98) of short trawls (1 inch liner and 100 foot net, 5 minute tows) surveying fine scale habitat partitioning across a shoreface sand ridge on 13 dates from 2022-2024 revealed habitat use across the entire study area. *M. canis* and *S. acanthias* co-occured in only two samples, but this was due to temporal segregation. Depth use of both species reflected the entire sample depth (mean = 13.2 S.D 1.4) with a mean of 12.5 m S.D. = 1.8 m for *S. acanthias* and 13.2 m S.D. 1.5 for *M. canis a*nd this also reflected a range of benthic features. Coupled with a wide individual range and short residence time among sand ridge habitat as determined from acoustic telemetry, the broad habitat use may mitigate a response to sand removal for beach nourishment for these species.

Forecasting Species Distribution Shifts in a Warming Gulf of Maine: Implications for Fisheries and Resilient Coastal Communities

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The Gulf of Maine is rapidly warming and causing shifts in suitable marine habitat. The unknown distribution shifts of exploitable fish populations pose significant challenges to fisheries management. Species distribution models (SDMS) can forecast these changes. Various modeling techniques employing either known presence and absence data or known presence with model-generated pseudo-absence data, can be utilized to predict species distributions. In this study, we used species presence data from the Maine/New Hampshire inshore trawl survey, conducted by the Maine Department of Marine Resources (DMR) as our indication of current species distribution, with a focus on five species of high commercial and recreational fishery importance. The physical environmental covariate data were extracted from the present and future climate simulations of the Bedford Institute of Oceanography North Atlantic Model (BNAM) high resolution ocean circulation model of the North Atlantic Ocean with the Gulf of Maine region being the focus for this research. The environmental covariates include sea surface and bottom temperature, surface and bottom salinity, and bathymetry. The models were projected onto the year 2050 under various Representative Concentration Pathway (RCP) scenarios (e.g., RCP 2.6, RCP 4.5, RCP 8.5), where higher values indicate more severe warming potential. We aim to create a fine-scale representation of distribution shifts within coastal Maine using 3 modeling algorithms (Generalized Additive Model (GAM), Maximum Entropy (Maxent), and Artificial Neural Network (ANN)) and include an analysis of model performances. We hypothesize that environmental conditions are key predictors of future distribution shifts of fish populations in coastal Maine. Creating predictive species distribution maps can inform future management decisions for the dynamic coast of Maine.

Pigment Analysis as a Biomass Indicator in Algal growth in Aquaculture Ponds

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Evaluating the chlorophyll and carotenoid content is an essential factor to monitor growth and algal production. The two types of chlorophyll are Chlorophyll *a* and Chlorophyll *b.* Chlorophyll *a* is the predominant pigment found in algae and is essential to the process of photosynthesis. Chlorophyll *b* is a complementary pigment that allows for a wider range of energy from the light spectrum to be absorbed. Carotenoids assist in light harvesting and protecting algae from photodamage. Chlorophyll content has a direct relationship with growth and indicates the health of an aquatic ecosystem. High chlorophyll concentrations are associated with harmful algal blooms, eutrophication, and decreased levels of dissolved oxygen, creating concern for aquatic ecosystems. Higher chlorophyll levels are also indicators of higher algal growth. However, low chlorophyll concentrations reveal insight into light availability, decreased primary production, and the prevalence of environmental stressors. Analyzing the carotenoid content gives information about the environmental conditions of the algae. Thus, regular monitoring of chlorophyll and carotenoid levels has important implications for protecting aquatic life and maintaining ecosystem balance. Before pigment analysis, algae samples were collected from pond rafts at an on-campus aquaculture facility. This study's objective is to observe high levels of chlorophyll, as algae is grown on a turf system and more growth is desirable in this instance. Pigments were quantified using a microplate reader. The preliminary results indicate high chlorophyll levels equating to high biomass production.

Examining the Seasonal Relationships Between Oceanographic Variables and Echosounder-Derived Zooplankton Abundance Estimates Using an Autonomous Underwater Glider

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The zooplankton community of the Mid-Atlantic Bight (MAB) supports a productive and diverse food web. However, their distribution is patchy and highly variable over different timescales which makes traditional vessel-based sampling approaches challenging. Furthermore, the drivers of MAB zooplankton distribution and patchiness are not well-studied. Recent developments in autonomous underwater vehicles (AUVs) have made it possible to observe and measure zooplankton biomass and distribution throughout the entire water column with high- and multi-frequency echosounders. Using deployments of a glider AUV equipped with such an Acoustic Zooplankton Fish Profiler echosounder (120, 200, 455, 769 kHz), we observed seasonal zooplankton abundance, biomass, and distribution during Spring 2023, Fall 2023, and Winter 2024. Small copepods were typically the most abundant zooplankton taxa in all seasons, whereas large copepods dominated the biomass in all seasons (up to 97.7% of the total zooplankton). Depth-integrated copepod biomass was highest in fall, and the highest fall biomass was concentrated in mid- to outer-shelf waters. Conversely, copepods were more homogenously distributed during spring and winter, with slightly higher depth-integrated biomass nearshore. This presentation will also include results from ongoing analyses investigating how concurrently-collected oceanographic variables are related to zooplankton biomass and distribution. Establishing a dataset of paired oceanographic and ecological parameters is crucial to understand the drivers of species distribution and future change and to inform the development of predictive models to locate dynamic “hot spots” of predators on zooplankton. This is particularly urgent now as offshore wind (OSW) construction will soon begin in New Jersey, and potential impacts of OSW on the oceanography and local ecology are currently unknown.

Bottom Trawl Surveys for Monitoring Offshore Wind Farms in the US Mid-Atlantic

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As offshore wind energy development advances on the US Mid-Atlantic outer continental shelf, it is important to monitor for effects on fisheries resources. Bottom trawling is a common fishing method in this region and a reliable survey approach for quantifying the relative abundance and species assemblage of benthic communities before, during, and after offshore wind farm construction. Initial surveys are useful for examining the sensitivity of these communities through power analysis and demonstrating the value of supplementary sampling methods. A bottom trawl survey was conducted on the F/V Darana R off the New Jersey coast at the Ørsted Ocean Wind 1 lease area (n=20 tows/season) and an adjacent control site (n=20 tows/season) in July and September of 2023. Tow lanes were designed to avoid the planned turbines and cable routes to allow for consistent sampling throughout the lifetime of the project. Catch data were collected to examine community assemblage, relative biomass, and size frequency. Power analysis of pre-construction sampling suggested that our surveying effort was sufficient to detect change in the most abundant species (Longfin Squid, Lady Crabs, and Northern Sea Robins) and increasing sampling effort within reasonable levels would not have increased the ability to detect changes in less common species. Environmental DNA (eDNA) water samples were collected to supplement bottom trawl survey catch data. Preliminary analysis comparing eDNA metabarcoding results and trawl catch shows agreement in species composition and relative abundance of taxa within communities sampled. This work highlights the advantages of a paired sampling design using extractive and non-extractive sampling methods which allows for a more robust analysis of fish assemblage and environmental parameters. Future bottom trawl surveys at other offshore wind leases may benefit from considering our lessons learned in survey design, sampling protocols, and data analysis.

Characterizing Key Factors Influencing Agrobacterium-Mediated Genetic Transformation in Unicellular Green Alga *Chlorella sp.*

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This study establishes an Agrobacterium-mediated transformation platform for the unicellular microalga *Chlorella* sp. (UTEX B 3198). The microalga was cultivated in BG11 and Modified Bold 3N media, with total biomass and relative growth rate analyzed as key metrics to optimize downstream processes. The *Agrobacterium tumefaciens* strain LBA4404, carrying the pCAMBIA1305.1 plasmid (Add Gene plasmid number: 64401), expressing green fluorescent protein (GFP) and β-glucuronidase (GUS) reporter genes under a 35S promoter, was utilized for transformation. Several critical factors were systematically explored to maximize transformation efficiency. These included IPTG concentration, selection antibiotics, the ratio of microalga to *Agrobacterium*, and medium ratios, all of which were carefully optimized to ensure successful integration of foreign genes. The approach provided a high degree of precision in balancing these parameters, thereby enhancing the overall efficiency and reproducibility of the transformation process. The use of both GFP and GUS as reporter genes offered dual validation techniques, enabling real-time visualization of gene expression and enzymatic assays for deeper functional analysis. This dual approach not only confirmed the presence of the introduced genes but also allowed for the assessment of their active expression in the microalga. Such versatility in validation methods strengthens the platform's potential for broader applications in microalgal biotechnology. Molecular confirmation of successful transformation was achieved through PCR amplification of the GFP and GUS reporter genes, providing clear evidence of gene expression in *Chlorella* sp. (Figure 1 a-h). This molecular validation reinforced the robustness of the platform, offering a reliable and efficient method for genetic engineering in *Chlorella*, with potential applications in biofuel production, environmental monitoring, and other biotechnological fields.

Associating Fish Tag Detections to Satellite Derived Water Masses and Ocean Front Gradients

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Marine fish habitats are defined by dynamic water column properties and static benthic features. Fish move to stay within suitable oceanographic conditions, making it crucial to track water masses due to shifting habitat ranges. Ocean characteristics like sea surface temperature (SST) and color that differentiate water masses and the boundaries between them can track these dynamic habitats on the ocean's surface. This analysis investigates the distribution of fish by water mass and the fronts between them, examining their relationship in terms of stratified versus unstratified water column conditions. Acoustic tag detections of fish from Slocum glider missions (2020 – 2022) are compared to water masses and ocean fronts. Biological data, for the tags detected, was compiled by requested information from tag owners. The concurrent temperature, density, salinity, O2 concentration and saturation, water depth, chromatic dissolved organic materiel (CDOM), and chlorophyll-a from glider sensors provide context for interpreting the movement and distribution of the tagged fish in relation to sub-surface evolving water column properties.

Additionally, water mass and ocean fronts matched to the glider-based fish detections, were derived from NASA's MODIS-Aqua satellite data (2020 – 2022) in 1-day composites, defining the water masses and fronts between them based on observed SST and color. An index score created by taking the ocean front strength score and dividing it by the distance between the detection and the front, is used to determine if there is an association between fish and ocean fronts.

Future research will require more detections and filling in the gaps of satellite coverage loss to better understand fish distribution in their dynamic habitat. While available data constrained this study in producing viable results, it served as a proof of concept that this method can be employed. Incorporating species' associations with water masses and ocean fronts into biomass estimates during stock assessments could improve the accuracy.

Comparative Analysis of Physical Water Quality in Adult and Juvenile Catfish Ponds

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Physical water quality is paramount for catfish health and growth, with specific needs varying between life stages. Adult catfish thrive in temperatures of 18-30°C and prefer low turbidity and dissolved solids to minimize stress and support metabolic functions. Juvenile catfish, being more susceptible to environmental changes, require stable temperatures and minimal turbidity to ensure proper development and high survival rates. Understanding physical water quality is crucial as it directly influences fish metabolism, oxygen availability, and overall health. High turbidity can reduce light penetration and affect feeding behavior, while significant temperature variations can stress fish, leading to immune suppression and increased disease susceptibility. This study involves systematic sampling and analysis of water from both adult and juvenile ponds. The water temperature, Dissolved Oxygen (Do), pH, and salinity were recorded using a YSI Multiprobe DSS. Preliminary findings indicated that both the juvenile and adult catfish are living in suitable conditions for their given life stages. Future research will examine the long-term effects of physical water quality variations on catfish growth performance and physiological responses, further contributing to sustainable aquaculture management strategies

Naticid Predation in New Jersey and Virginia Continental Shelf Benthos

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A hole in a clamshell is an easily identifiable trace of predation made by snails in the family Naticidae. These snails consume their molluscan prey by softening the shell of their prey with acid produced by a specialized organ called the accessory boring organ. Then, they use their toothy tongue called the radula to scrape away the softened shell. These naticid snails are known to be predators for young bivalves and can impact the survival of early recruits. In the summers of 2022 and 2023, benthic grab samples were collected off the coast of New Jersey and Virginia, respectively, using a Peterson grab. The benthic fauna collected were then sorted by species and the number of holes in empty clamshells were enumerated to estimate the frequency of predation by naticid snails in the samples collected. In the samples collected off New Jersey, ten bivalve families were identified, three of which did not have any shells that showed signs of predation. Across those ten families, naticid predation frequency ranged from 4.8% in Nuculidae to 18.5% in Astartidae. In the Virginia samples, fourteen bivalve families were identified. The overall range of naticid predation frequency was greater in Virginia than in New Jersey, ranging from 13.3% in Veneridae to 53.6% in Crassatellidae. These results are important for understanding community dynamics in the continental shelf benthos and can assist in decision-making regarding commercially important species in these communities.

Detection of eastern oyster (*Crassostrea virginica*) larvae behavior under hatchery conditions using a particle size analyzer

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Eastern oyster (*Crassostrea virginica*) larvae exhibit vertical swimming behavior, but less is known about this behavior within oyster hatcheries. Water conditions and larvae are assumed to be uniform in tanks, but this assumption doesn't consider innate behaviors. We used a particle-size analyzer (Sequoia LISST-100X) and CTD to detect oyster larvae distribution and water conditions within hatchery rearing tanks at the Horn Point Laboratory Oyster Hatchery. Two out of the five tanks showed larval density as a function of depth. Additionally, water conditions were not found to be homogenous within and among tanks. Results from this study point to new avenues of research for improving larvae production.

Assessing Global Climate Change Effects in Crayfish: Does Lowered pH Interfere with The Ability of *Orconectes immunis* To Reproduce

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With global climate change occurring at a more rapid pace than ever, it is important to assess how those environmental changes affect known sentinel species. Crayfish, although abundant in overall species numbers in North America (300+), may be considered a sentinel species because they are often found in niche habitats where slight changes have large consequences. As an adult, crayfish must first molt into a reproductive state to mate and reproduce. Once reproduction is complete, they will again molt out of this reproductive state but are still considered adults. Because pH has previously been shown to affect molting in crayfish, we chose to evaluate the effects of lowered pH on adult female and male *Orconectes immunis* molting in and out of their reproductive state (♂= Form 1/Form 2: ♀= Mature/Immature). Once female and male *O. immunis* reach adult size we will use a Delaware State University (DSU) aquaculture rack system to house four separate crayfish groups at four different pH levels. Females and males will be stocked randomly across systems with pH values: 4.5; 5.0, 6.0 and 7.0 (control). Observations and data collected will include reproductive form, molt frequency, and any molt malformations. It is expected that with long term exposure to lower pH, both adult female and male *O. immunis* will not molt into their reproductive form. It is also expected that *O. immunis* held at a neutral (7.0) pH will molt into their respective reproductive form. Additionally, water quality will be monitored from the experimental system daily (O^2, °C, pH) and analyzed weekly (NH_3-N, NO_2-N, calcium hardness).

Fish Community Structure at Sandbar Microhabitats on The Kansas River

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Sandbars are natural formations of sand that accumulate along riverbanks, created by the deposition of sediment carried by river currents. These dynamic microhabitats frequently shift in response to changes in water flow, especially in rivers where dams alter natural patterns. This study focuses on the biodiversity and fish community structure within sandbar microhabitats along the Kansas River. Researchers collected fish samples using seine nets at three distinct sites, capturing a range of environments from stagnant pools to flowing currents, with varying vegetation that provides essential cover, food, and spawning grounds for different fish species. A total of nine fish species were identified using sandbar microhabitats, highlighting a diverse fish community. The findings indicate that certain fish may preferentially select specific microhabitats on the sandbars, suggesting that the management of river flow regimes to enhance these habitats could significantly influence fish populations. This regulation may improve access to optimal feeding and spawning conditions, ultimately affecting the overall structure of fish communities in the river.

Increasing Oyster Recruitment on Artificial Reefs

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A living shoreline is a structure for coastal restoration composed of natural and man-made materials to protect shorelines while promoting ecological enhancement through the recruitment of key foundation species such as shellfish or native vegetation. Eastern oysters (*Crassostrea virginia*) are a common target species because they form reefs that provide ecosystem services such as increased water filtration, habitat development, and coastal defense. This study examined three ways to optimize recruitment of *Crassostrea virginica* on low carbon concrete (LCC) used for living shorelines. First, recruitment to LCC modules was compared to traditional materials (shell and rock). Second, the effects of three post-manufacturing surface texturing treatments on recruitment were compared. Third, the effect of a poly-catechol styrene primer applied via three different solvents was compared against an untreated control. Results indicated that LCC reef units perform as well or better than traditional materials. Somewhat surprisingly, surface texturing methods performed significantly worse than the untreated control indicating that the texture from the manufacturing process was more than adequate. Additionally, there was no clear effect on LCC treated with a SeaTak™ Poly-catechol styrene primer regardless of the solvent used, however, tests of attachment strength remain to be completed. This research contributes to ongoing efforts to develop resilient coastal protection strategies via the US Defense Advanced Research Projects Agency (DARPA) Reefense Program (https://www.darpa.mil/program/reefense). The outcomes of this study will help inform the design and implementation of future oyster restoration and shoreline protection projects, leading to increased protection of vulnerable coastal areas.

An Enhanced Evaluation of Survey Gear Performance

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Determining an absolute estimate of fishery stock abundance over time is important for detecting changes in the population. Adapting innovated methods that assess survey gear efficiency and selectivity can reduce the time and cost of evaluating gear performance and improve the accuracy of stock abundance estimates. Our case study analyzes the gear selectivity and capture efficiency of a novel clam dredge developed for scientific surveys. Selectivity was evaluated by directly comparing the catch composition from the scientific dredge to an established survey dredge which targeted Atlantic surfclams at 39 sample sites. Each dredge tow was analyzed for catch volume and size frequency. Estimating capture efficiency of the scientific dredge involved a depletion study in which a given tow area is sampled repeatedly until the target species is depleted. It is challenging to discern if sections of the target area are missed by the sampling gear causing large spatial uncertainties. Enhancing both tow-by-tow spatial and catch analysis allowed each experiment to be monitored in real time. Each target site was tracked with a high-resolution GPS receiver combined with navigation software that was loaded into ArcGIS and ArcPy which calculated the percent overlap of the tows. While vessel location was logged every two seconds, tow catch was concurrently recorded in abundance (number of clams) and volume (bushels). Catch volume and abundance were evaluated relative to the highest observed catch at each sample site, and by using a depletion curve fit to the catch time series. Experiments were considered ‘depleted’ when catch in volume and abundance dropped below 20% of the highest observed catch, the slope of the depletion curve dropped below 20% of the maximum slope, and percent overlap of each tow was at least 80%. These methods provide a reliable understanding of gear performance and improved estimates of fishery stock abundance.

Assessing Size and Abundance of Juvenile Atlantic Surfclams (*Spisula solidissima*) in Offshore Wind Project Areas

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The Atlantic surfclam (*Spisula solidissima*) is an important commercial fishery species across the Mid-Atlantic. There has been a federally managed fishery for the surfclam since the 1980s that stretches from Cape Hatteras to Georges Bank that surveys the population through time. With the onset of offshore wind development along the eastern Atlantic coast, improving our understanding of how the surfclam population may be changing will be vital to detecting how wind turbines may alter natural habitats or populations. This project examines the distributions of juvenile surfclams collected in and around offshore wind lease areas off New Jersey (2022-2023) and Virginia (2023) during offshore wind fisheries monitoring plans for surfclams. These three surveys each sampled up to 40 stations using a Petersen benthic grab, which retrieves the top 5 to 10 centimeters of sediment from the bottom of the ocean. This method collects animals living in these upper sediments, including newly settled surfclams. Sediment samples were sorted and each surfclam was measured. From each of these surveys, the majority of the surfclams collected were <6 mm in shell length and likely represent recent settlement and growth of surfclams that spawned in the spring. The same average amount of live juvenile surfclams were found in New Jersey sites (4.5 clams/grab or 45 clams/m^2) compared to Virginia sites (4.5 clams/grab or 45 clams/m^2), indicating a similar recruitment effort in both the northern and southern parts of the surfclam's range. This equal distribution could be related to a resurgence of the surfclam stock in the southern region of their range after many decades without an active commercial fishery. Future studies should further explore the juvenile composition of surfclam across the Mid-Atlantic to assess the recruitment potential of the population and fishery.

Effects of Low pH and Elevated Temperature on Settlement of Eastern Oyster (*Crassostrea virginica*) Larvae

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Global warming and ocean acidification are affecting all life on Earth, with marine calcifiers being particularly threatened, as most anthropogenic CO_2 and heat are absorbed by the ocean. While studies on bivalves have largely focused on the effects of pH and temperature on larval development, shell formation, and adult biology, research on larval settlement is lacking. We tested the effects of different pH levels and temperatures on the settlement success of eastern oyster (Crassostrea virginica) larvae. Competent pediveligers were cultured with substrate for 9 days in replicated beakers under four combinations of pH and temperature: control/ambient pH (~7.9) at 20°C, low pH (~7.3) at 20°C, control pH at 28°C, and low pH at 28°C. The pH fluctuated and was readjusted with HCl twice daily. Settlers out of 1000 were counted on Days 4, 7, and 9. Temperature significantly ($p<0.001$) affected settlement success on all days, with 28°C producing 3.5 times as many settlers as 20°C on Day 9. Overall, fluctuating low pH alone had no significant effect on larval settlement, but its interaction with temperature was significant. At 28°C, low pH produced significantly fewer settlers than control pH on Day 4 ($p=0.018$) and Day 7 ($p=0.005$), with the difference becoming non-significant on Day 9 ($p=0.108$). This suggests that low pH delayed settlement and that larvae partially recovered over time. At 20°C, low pH produced more settlers than control pH on all days, although the differences were not significant. These results indicate that high temperature promotes larval settlement, while the effects of low pH are complex and dependent on temperature. Low pH negatively affects larval settlement at high temperatures but may promote settlement at lower temperatures. This study contributes to our understanding of how global warming and ocean acidification may impact the population health of oysters and other marine bivalves.

Will Wind Power Development Disrupt the Estuary to Ocean Connections of Summer Flounder (*Paralichthys dentatus*) in the Mid-Atlantic Bight?

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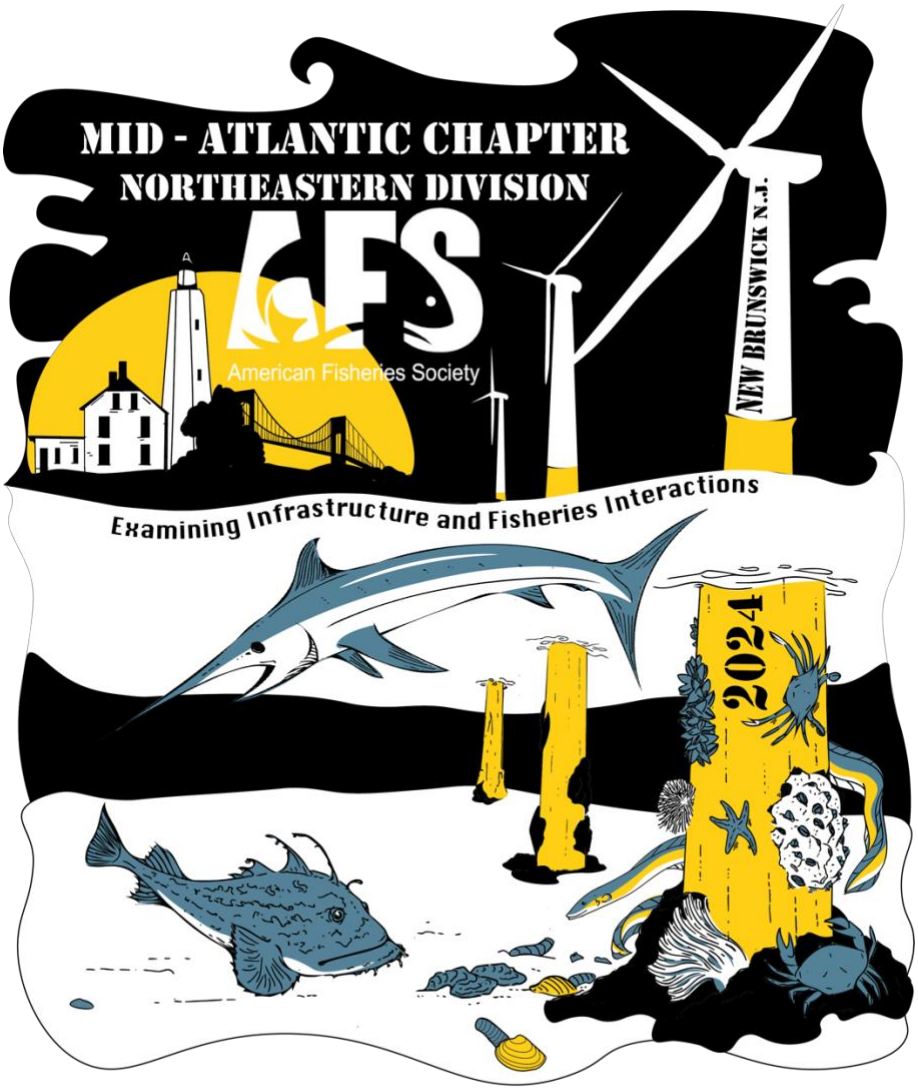
Summer flounder (*Paralichthys dentatus*) are common in estuaries of the Middle Atlantic Bight (MAB) from late spring through the summer growth period, but are also present on the continental shelf during this period. Stakeholders have voiced concern that cross-shelf migration and estuarine entry will be disrupted by offshore wind power (OSW) infrastructure development, including EMF from export cables that cross the shelf. Acoustic telemetry coupled with volunteer angler conventional tagging offers a method for better understanding dynamics of habitat connection use by sampling movement of individual fish unbiased by fishing gear-type or effort. Thirty VR2W-69 kHz acoustic receivers monitored fish passage at each of New Jersey's estuarine inlets and bays. A total of 120 summer flounder were tagged with Innovasea V13-1x acoustic transmitters in 2024, including in three estuaries (Barnegat Bay, n = 36); Great Bay, n = 39); Avalon, NJ, n = 27) and in the coastal ocean (n =18). Detection data provides insights into fish residency, immigration, and emigration between estuarine and offshore habitats. Response metrics including dates of immigration and emigration and residence times in the estuaries will be tested for correlations to environmental variables (e.g, water temperature). This research will provide an understanding of the ecological and physical drivers of summer flounder movements and help predict both vulnerability and the nature of response to change, including that from OSW.



Thank you for coming! See you in 2025!

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