Joint Meeting of Watershed & Embayments and Water Quality Monitoring Work Groups
Meeting Notes Wednesday, May 8, 2024
Meeting conducted remotely via Microsoft Teams

Attendees:

Kelly Streich, CT DEEP (WEWG Co-chair)
Chris Eagler, NYSDEC/NEIWPCC (WEWG Co-chair)
Jim Ammerman, NEIWPCC (WQMWG Chair)
Kate Knight, CT DEEP
Katie O'Brien-Clayton, CT DEEP
DeAva Lambert, CT DEEP
Harry Yamalis, CT DEEP
Evelyn Powers, IEC
Michele Golden, NYSDEC
Sarah Healy, NYSDEC/NEIWPCC
Shauna Kamath, NYSDEC
Samarra Scantlebury, NYSDEC
Evelyn Spencer, EPA R1
Cayla Sullivan, EPA R2
Youngmi Shin, EPA
Jonathan Morison, USGS
Brittney Izbicky, USGS
Maggie Cozens, LISS/CTSG
Alex DuMont, NEIWPCC
Peter Linderoth, Save the Sound
Jamie Vaudrey, UCONN/CT NERR
Jim O'Donnell, UCONN
Sarah Deonarine, Manhasset Bay
George Hoffman, Setauket Harbor
Esther Nelson, EPA R2 (EPA Support)
Christine Suter, Friends of the Bay
Paul Stacey, Footprints in the Water
Melissa DeFrancesco, TNC CT
Jimena Beatriz Perez-Viscasillas, NYSG
Mary Becker, CT DEEP
Jim Hagy, EPA ORD
Matthew Lyman, CT DEEP
Melissa Duvall, EPA LISO
Braden Lynn, CT DEEP
Tim Visel, Sound School Retiree
Anthony Caniano, Suffolk County
Rosana Pedra Nobre, Harbor Estuary Program

Introduction: ***Kelly Streich, Jim Ammerman, and Chris Eagler***

The meeting was called to order at approximately 10:05am on teams by co-chairs Chris Eagler and Kelly Streich.

Updates: ***Kelly Streich, Esther Nelson, Chris Eagler***

Management Committee Meeting April 18th

- Base and Supplemental budgets are set, applications for funding due June 7th
- BIL budget will be finalized at July meeting
- EPA Program Evaluation June 26-28

CCMP Revision

- Reiteration of ROG Summary from last meeting
  - Mission, Vision, and Commitments
  - Plan structure – Goals(4), Objectives(12-20), Actions(Max. 50)
- CCMP revision schedule
  - Currently in the public engagement phase
    - Wednesday, May 8, 2–4 p.m. and 6–8 p.m., Lighthouse Point Park, Carousel Building, 2 Lighthouse Rd, New Haven, CT
    - Saturday, May 11, 1:00–2:30 p.m. Remote
    - Tuesday, May 14, 3:00–4:30 p.m. and 7:00–8:30 p.m. Remote

        - Wednesday, May 22, 2:30–4:30 p.m. and 6–8 p.m., NYSDEC Division of Marine Resources, Kings Park, NY
        - Tuesday, May 28, 2–4 p.m. and 6–8 p.m., Alley Pond Environmental Center, Queens, NY
    - Next steps
        - Actions
        - Public Comment Period September – October 2024
        - Plan to be complete in early 2025
- Writing Team Objectives
    - Clean Waters and Healthy Watersheds: Restore and maintain water quality in LIS and its watershed
        - Nutrients: Achieve and maintain nutrient levels across the watershed that restore and protect water quality and ecosystem health in Long Island Sound
        - Watershed Health: Improve the ecosystem health of LIS and its watershed through conservation and positive land use practices
        - Pathogens: Reduce pathogens and increase monitoring to protect water quality and human health, ensuring safe recreational and commercial use
        - Toxic Contaminants: Research, monitor, assess, and reduce emerging and legacy toxic contaminants to mitigate impacts on water and habitat quality in Long Island Sound
        - Physical Debris: Reduce physical debris in the Sound by increasing clean-up efforts and preventing additional debris from entering
    - Thriving Habitats and Abundant Wildlife: Restore and protect the health and resilience of habitats and wildlife in LIS and its ecosystems
        - Coastal habitat: Protect and enhance the current extent and health of coastal habitat and restore an additional 1,000 acres
        - Habitat connectivity: Increase connectivity of coastal habitat by restoring and/or protecting 100 habitat patches that increase biodiversity and support migratory pathways and reconnecting 175 additional miles of riverine migratory corridors in the CT and NY portions of the watershed
        - Conserved open space: Conserve an additional 5,000 acres, while maintaining and enhancing the total area of protected land
        - Open Sound: Protect and enhance the health of the open Sound including both pelagic and benthic habitat
    - Sustainable and Resilient Communities: Empower communities to plan for and respond to environmental challenges in ways that prioritize well-being for all.
        - Informed Decision Makers: Municipal, nonprofit, and community leaders receive training and support to increase capacity for adaptation to environmental challenges, with an average of 100 new participants engaging for the first time every year.
        - Community Driven Resilience Planning: All 134 municipalities within the LISS coastal boundary have identified key resilience priorities through local and/or regional community-driven planning processes.
        - Resilience Initiative Implementation: Communities in the NY and CT portions of the LIS watershed implement 200 initiatives that prioritize sustainable nature-based solutions to improve their resilience to flooding and other environmental challenges.
    - Informed and Engaged Public: Inspire and empower the public to appreciate, value, and protect Long Island Sound and the waters that flow into the Sound.

- Public access and Sense of Belonging: Increased and improved opportunities for everyone to access and engage with Long Island Sound and its watershed.
- Education and Environmental Literacy: Increase, improve, and expand the environmental literacy of people interacting with the LIS watershed.
- Sustainable Behaviors and Stewardship: Increase and maintain public engagement with environmental practices that protect and conserve Long Island Sound and its watershed.

Questions & Comments:

Jim O'Donnell: Where do numbers come from for this (Habitat Objectives)? Why 5,000 acres and not 50,000 acres?

Kelly Streich: It is a 10 year plan, so it is what is achievable in the foreseeable future

Harry Yamalis: Those number came from a variety of things. NY contacts provided estimates. Also looked at last 10 years of conserved land and figured out an average acreage – 5,000 average over 10 years. A few projects in the pipeline for the near future, but hard to predict what is going to happen during years 3-10 of the plan. However, it is a good target, on par with what they have done over the last 10 years. It is also okay if a target is not met and referred to the eelgrass target that has not and will not be achieved.

<u>USGS Data Collection in Embayments</u>: *Jonathan Morrison and Brittney Izbicky, USGS*:

Kelly Streich: Background – Had conversations with contractors and modelers 4 years ago – What information is needed to model our embayments, better understand nutrient inputs into and embayments, and set target levels. Since then, developed data collection protocols and a modeling framework. Have been working with USGS and UCONN to get the data needed.

Jon Morrison: Working with CT DEEP (2nd Generation Nitrogen Strategy in LIS), EPA, and UCONN. Goal of data collection is to have detailed datasets that can be used to create models for specific embayments. Embayment water quality models will be coupled with upper watershed nutrient loading models. 8 Embayments identified as priorities by CT DEEP.

Brittney Izbicky: Embayment monitoring work in more detail

USGS Project Objectives

- Obtain representative water quality (WQ) data under a range of seasonal conditions to characterize the WQ spatially and vertically within each embayment
- Collect selected WQ data with high temporal resolution to provide time-series data needed for water quality model calibration and evaluation
- Collect water-elevation and velocity data at multiple locations in each embayment to provide additional understanding of physical mixing and variability at different spatial scales for each embayment

Study Area of Four Embayments

- Norwalk Embayment - May 2021-April 2023
  - Coastal watershed dominated by medium and high development
- Mystic Embayment – May 2021-April 2023
  - 5 embayment sites tested
  - Less developed compared to Norwalk embayment
- Saugatuck Embayment – May 2022- April 2024
- Southport Embayment – May 2022 – April 2024

Data Collection

- Discrete Water-Quality Data Collection
  - Collected year round for 2 years
    - Bimonthly for first 6 months
    - Monthly for last 18 months
  - Provided information on cycling of nutrients
  - Collected Vertical Profiles – Upper, middle, and lower embayment
    - Specific Conductance vs Depth
    - Dissolved oxygen (DO) vs Depth
    - How the salinity structure affects the physical biological data
    - Correlated discrete samples with vertical profile
      - DO vs Phosphorus
      - DO vs Chlorophyll A

- Continuous Water Quality Data Collection
  - Used YSI EXO
  - 6 minute intervals
  - Collected:
    - Water Temperature
    - Specific conductance
    - Salinity
    - DO
    - Turbidity
    - Chlorophyll
    - Photosynthetic Active Radiation (PAR)
    - Barometric Pressure
  - Diurnal Cycle observed in Norwalk
  - Data can be used to examine the duration and extent of hypoxia

- Estuary Elevation and Velocity Data Collection
  - Velocity Data – Provides daily tidal volume and information regarding mixing
  - Elevation Data – Can make correlations with continuous WQ parameters
  - Tidal Range and Barometric Pressure at Mystic River

    - Pressure drop = Elevation gain

- Total Nitrogen Concentrations in Norwalk and Mystic Embayments
    - Lower embayments have lowest TN concentrations where flushing is occurring
    - Decrease in TN upstream to downstream
    - More flushing in Mystic than Norwalk

- Extreme Fluctuations in DO in Norwalk River July 2022
    - Drought and high temperatures in summertime
    - Low DO and extreme fluctuations
    - Saugatuck and Southport lower embayments also had low DO and fluctuation

Going forward

- Continue to summarize rest of embayment data
- Wrapping up data approval for Mystic and Norwalk, next up is Saugatuck and Southport
- Continue monitoring farm embayment until next year
- Write a summary report

Questions & Comments:

Paul Stacey: Has been advising gentleman from Mystic Aquarium hoping to apply for LISFF. Aquarium is hoping to upgrade their wastewater treatment system to reduce N discharge by 4,000 lbs. per year. Provided relevant contacts to the aquarium. Good opportunity to management in action over next few years, monitoring could show improvement or monitoring can advise the project. Regarding Norwalk River, 1985/86 oxygen profiles look very similar to current profiles. Dense growth of macro algae on the bottom of Norwalk Harbor that might be driving down DO.

Brittney Izbicky: City of Norwalk has been very interested and data and supporting. Have been able to extend the continuous monitoring at Norwalk Aquarium location. Can help capture what is going on there.

Cayla Sullivan: This data will be useful for update of the Eelgrass Habitat Suitability Model. RFP: Funding Available for GIS-Based Eelgrass Habitat Suitability Model • NEIWPCC

Embayment Monitoring to Support Nutrient Management Activities in Connecticut for Long Island Sound | U.S. Geological Survey (usgs.gov)

Macrophyte Data Collection in Embayments: *Jamie Vaudrey, UCONN*

Seaweed = Macroalgae
Seagrass = Eelgrass and widgeon grass – True vascular plants

Continuation of previous work

Three Levels of Sampling

- 100 stations grab – high resolution
  - 100 grab stations and 300 many camera drops
  - Biomass (g/m^2) informs modeling efforts – Feeds into the model and evaluates the accuracy of model predictions
- 10 stations grab – mid-level resolution
- 4 stations rake toss – very coarse, qualitative
  - Data is more useful than expected for comparing embayments

Little Narragansett Bay, June 2014

- Seaweed up to 3 feet thick on bottom
- Average volume of seaweed – 937 g/m^-2 or 2 lbs./m^-2

Characterizing thresholds for macroalgae is difficult due to natural variability in biomass and our ability to measure that variability

Macrophyte Biomass in Embayments

- Similar density of sampling locations across all sites
- Norwalk 2021 – 25 g/m^-2
  - 70% Gracilaria, 27% Ulva, 3% red
  - 37% Carbon – 9.3 g/m^-2
- Saugatuck 2022 – 2 g/m^-2
  - 76% red. 17% Gracilaria
- Mystic 2021 – 14 g/m^-2 (8 g/m^-2 is seaweed, rest is seagrass)
  - 42% seagrass, 32% red, 18% Ulva, 8% brown
  - 25% Carbon – 3.5 g/m^-2
- Little Narragansett Bay 2014 – 937 g/m^-2
  - 100% green
- Biomass maps are not perfect representations, but are generated to help support the modeling effort
- Interannual variability
  - Mystic Harbor 2021 – 2022: Changes in dominance
    - More sargassum (brown)
    - More eel grass
    - More biomass overall
- Benthic Microalgae – phytoplankton in and on sediment
  - Mystic carbon content in benthic microalgae – 2.3 g/m^-2
    - Macrophyte carbon = 2.3 g/m^-2
    - Comparable productivity from micro and macroalgae
  - Norwalk carbon content in benthic microalgae – 1.3 g/m^-2
    - Macrophyte carbon = 1.3 g/m^-2

- Fluxes of nutrients in and out of the sediment - Relating flux characteristics to parameters easier to measure:
    - Sediment pore water sulfide
    - Sediment grain size
    - Sediment organic carbon
    - Sediment total nitrogen
    - Sediment total phosphorus

Next steps

- Get more data from embayments and feed into the models

Questions & Comments:

Paul Stacey: Wondering whether you could partition oxygen respiration and production between the macroalgae and the phytoplankton, which tend to be more towards the surface, and even if it could, would that have any management implications?

Jamie Vaudrey: Short answer – Yes. That is the real next step of this, to take these data and put them into a water quality model that would explore where that oxygen deficit and production is coming from. In the work that I showed that phytoplankton was on the bottom on the sediment, so it is almost a direct comparison between the macrophytes and the benthic microalgae. But Brittney and Jon have chlorophyll in the water column, so all the data is there and it's a question of the next step, which is those models being created. Also wanted to point out that this work is looking at biomass, because the rate of production does differ between phytoplankton, seaweeds, and seagrasses, so the oxygen output is different. This is where modeling is useful – you are able to look at the production of biomass as opposed to its observed state.

Kelly Streich: This project has been supported by Long Island Sound Study, and with additional funding from the study, the models will be completed. Earlier work evaluated types of models. Looking at using EFDC hydrodynamics coupled with the WASP water quality model. Also looking to coordinate with modeling efforts offshore in Long island Sound. Hope to have modelers on board this year as the data is being finalized.

EPA Ocean Acidification Update: *Jim Ammerman*

Background

- EPA supported purchase of Continuous In-Situ Sensors a number of years ago for a number of National Estuary Programs (NEP)
    - Results published in 2021 – No data from LIS in this report
- EPA is doing another round of this
    - Survey has been sent to NEPs about their willingness to participate
    - Looking to get acidification data and put out a synthesis paper
    - Asked for Melissa to comment since she has been involved in data acquisition

Melissa Duvall: Provided them the acidification data that had been collected by CTDEEP, IEC, USGS. Jim O'Donnell will also provide data. Any questions should be directed to Liz Tanzi, as she is the lead on this project.

Jim O'Donnell: Will send them the data that's available from the Western Sand buoy effort – decent data from 2019. Started Quality Assurance/Quality Control (QA/QC) process for all the data in a systematic way. Started with the water quality data, then pH data and PCO2 data that was collected over the past 2-3 years.

Katie O'Brien-Clayton: We have received the Ocean Acidization data from 2022-2023 from Penny, and are looking to get that up into WQX, however we need to request that they add a new method. So if we are done with QA/QC and they are still looking for the data, we can share that with them.

Evelyn Powers: We (IEC) are collecting OCA data. Noted that they are switching labs to UCONN this year to be consistent with CTDEEP. Have been collecting the OCA parameters since at least October 2022, and were sending alkalinity and DIC to University of Maryland, where different methods are used than in Penny Vlahos' lab at UCONN. Will probably start that switch in June. All the data through 2023 should be up in WQX.

Jon Morrison: The USGS data is being collected as well, and are participating with Penny on a methods comparison study between USGS methods and the methods in her lab. All of the data will go into QWDX. Currently having DIC analysis done by Reston Laboratory. Alkalinity is done inhouse and just got an instrument to start doing spectrophotometric pH.

Questions & Comments:

Paul Stacey: Question for Jim O'Donnell – Noted significant drop in carbon emissions during COVID. Is the monitoring sensitive enough to detect any signal from that? And longer term, what kind of signals will we be able to detect if there are successful carbon reductions?

Jim Ammerman: Noted that Jim O'Donnell was not in the meeting any longer. One thing about OA is that globally, it is a climate change issue, but it sounds its still predominantly an oxygen issue. You can see clear signals of climate change in the open ocean, but it is unlikely we see that in the Sound at the moment.

Kelly Streich: Is there a certain EPA office or Region putting this effort together?

Jim Ammerman: The EPA ORD Group in Oregon is organizing the current effort.

Kelly Streich: Did they request a certain timeframe of the data since their last publishment?

Jim Ammerman: They are trying to get the latest data. Emphasis was originally on continuous data, and that is most likely still the case. Previous paper and report came out in 2021 - Measuring Coastal Acidification Using In Situ Sensors in the National Estuary Program | US EPA

Summer Water Quality Monitoring Preview: *Jim Ammerman*

Major groups monitoring LIS:

- USGS
- CT DEEP
- NYSDEC

- IEC
- Save the Sound – Unified Water Study
- NYCDEP
- Suffolk County
- Coalition to Save Hempstead Harbor
- And more

Peter Linderoth: Unified Water Study kicked off on May 1. Updated QAP to the new S2 standards, which is more so a formatting change. The Saugatuck will be monitoring by Harbor Watch. Will also be out in West harbor – Fishers Island and Fishers Island Seagrass Management Coalition will be monitoring West Harbor for Tier 1 parameters. Pilot in place this year using Hobo Pendant Light Loggers in 3 embayments. Things are going well, trainings all done on time. Noted full switch over to YSI instruments – YSI Pro DSS and YSI XO 1 Units. Noted that Southport, Norwalk, and Mystic Harbor have Unified Water Study monitoring, so those embayments will have good baseline data for any improvements that are happening. Data collected in 46 LIS embayments.

Paul Stacey: Glad STS is using the light loggers. Used them to monitor shading on terrestrial vegetation plots. In the water, you can get a good idea of productivity based on light penetration, as well as the ambient nutrient levels. Suggested that somebody puts light and algal growth together, then being able to scrape slides on a typical artificial substrate, you can get a lot of information on carbon generation over time.

Peter Linderoth: STS has also provided the Clean Waters CCMP Writing Team with years of DO data. Will be looking at acute hypoxia in embayments.

Jim Ammerman: What is the status of Quick Drops? It went to Alpha users recently.

Peter Linderoth: Yes, there are 5 and they are spread out to help get an idea of how external groups besides the project team are interacting with it. Hoping to have feedback by mid-June. They have found some things that need to be ironed out, but nothing major.

Matthew Lyman: Hoping to have new vessel in operation by early 2026. Currently getting things finalized so they can start the planning process and then construction estimate to take over a year. Anticipating early 2025 to start construction but looking to move that up if possible.

Evelyn Powers: IEC Update – In terms of Western LIS, everything the same except the change made for the OCA lab. Weekly runs will start at the end of June. Pathogen Monitoring network has expanded since its pilot year last year. 9 groups monitoring 16 water bodies – Up from 5 groups monitoring 5 waterbodies last year. Additional groups on the CT side coming in this year include Ash Creek Conservation Association, a group in New London, and CT NERR expanding their monitoring to Baker Cove. On the NY side, the Manhasset Bay Protection Committee monitoring Sheets Creek, Swan Salonga Wetlands Advocates Network, Charlie Mueller's group is doing 3 waterbodies including the Nissequogue, Crab Meadow Creek, and Fresh Pond, and Coalition to Save Hempstead Harbor is expanding to an additional waterbody West Pond, Friends of the Bay will be doing additional outfalls in Oyster Bay area. Big expansion this year.

Jon Morrison: All monitoring is continuing. Have a cooperative monitoring network with CTDEEP that monitors tributaries to LIS. Have a new nitrogen load tool that should be coming out soon to show some of the results from that work. Upper CT River monitoring is ongoing for both discrete and continuous water quality. Just

wrapped up Saugatuck and Southport data collection activities – Pulled all units. Still have monitoring in Farm River embayment, as well as the major tributaries – CT, Housatonic, and Thames. Looking to upgrade Housatonic River mouth station in real time, will hopefully come online within the next month.

Paul Stacey: One problem with connecting N loading to the Sound is that we monitor the rivers and say that is the load to the Sound. For management purposes, we need to make the connection to where it is coming from in the watershed. Are you talking about any connection up to the watershed?

Jon Morrison: The tool itself looks at calculated riverine loads. USGS about to put out a report for the upper CT River watershed where they will tease out what the portion of the load coming from waste water treatment plants. Will be able to look at point vs non point source contributions, and will be updating that for the lower CT River within the next year. Goal is to add those data into the nitrogen loading tool and build a dashboard for that.

Paul Stacey: Suggested separating that out in a way that it does not get lost in the attenuation process. We do not really know the loads to our waterbodies because by the time you monitor, they have already attenuated somewhat from the non point source and stormwater sources. Suggested turning those numbers into a long term steady state loading, because management goes in in a long term steady state condition.

Jon Morrison: USGS has some fairly long data sets for the CT data. Upper CT River watershed datasets are slightly smaller, looking at 4-6 years when that data is released.

Questions & Comments:

Final Comments & Adjourn: ***Chris Eagler***

Next meetings:

- August 14
- November 13

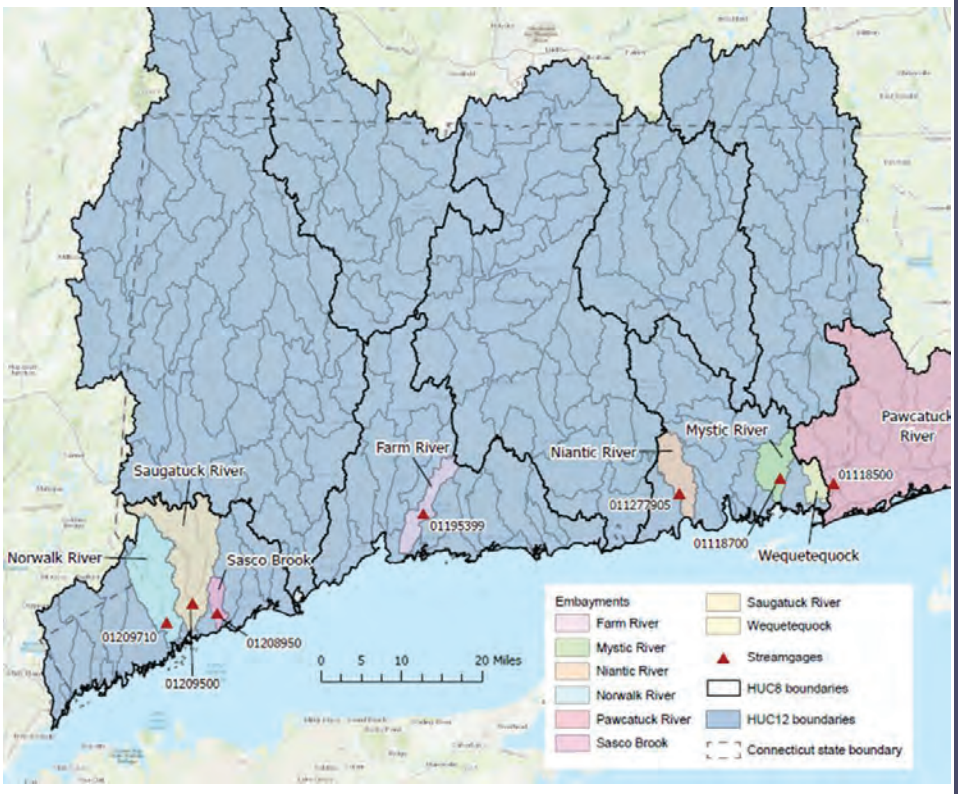
Embayment Monitoring to Support Nutrient Management Activities in Connecticut for the Long Island Sound

May 2021 – April 2024

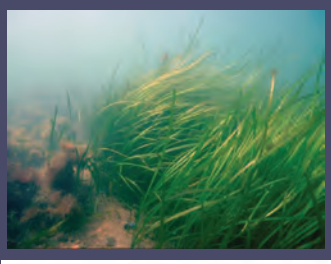
WEWG and WQMWG Meeting

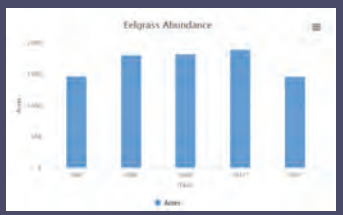
Presented by: Brittney Izbicki and Jon Morrison(USGS)

May 8, 2024



PURPOSE OF STUDY





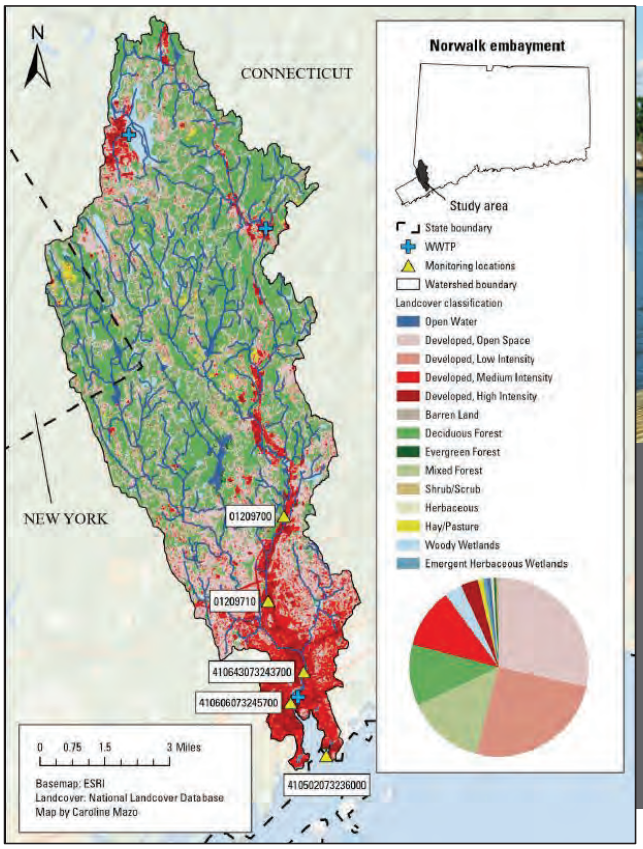
Eelgrass Extent - Long Island Sound Study

Overview

- Purpose of Study
- USGS Project Objectives
- Study Area of 4 Embayments
- Data Collection
  - Discrete Water Quality and Vertical Profiles
  - Continuous Water-Quality
  - Estuary Elevation and Velocity Data
- Total Nitrogen Concentrations in Mystic and Norwalk
- Continuous Data Collection 2021 vs 2022

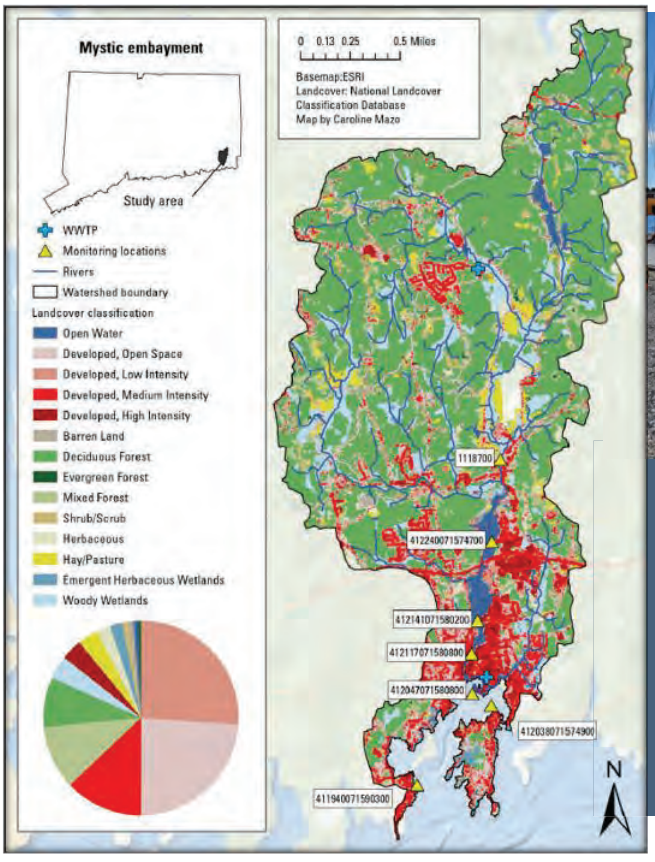
USGS PROJECT OBJECTIVES

1	Obtain representative water-quality data under a range of seasonal conditions to characterize the water quality spatially and vertically within each embayment.
2	Collect selected water-quality data with high temporal resolution to provide time-series data needed for water quality model calibration and evaluation.
3	Collect water-elevation and velocity data at multiple locations in each embayment to provide additional understanding of physical mixing and variability at different spatial scaled for each embayment.



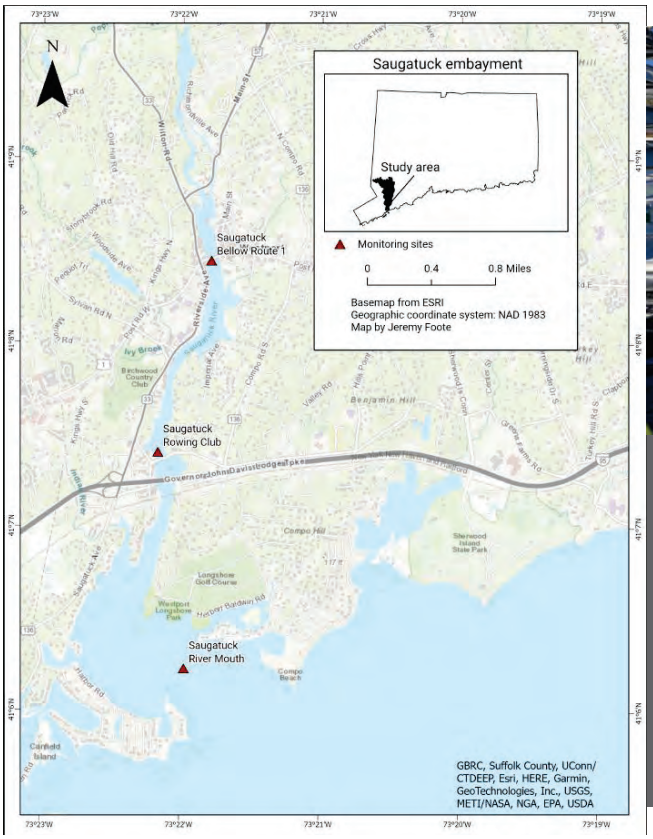
Norwalk Embayment

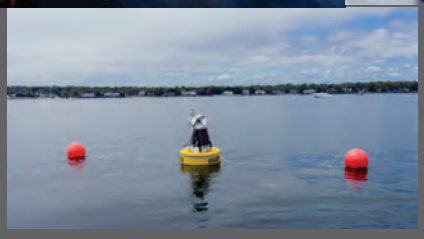
May 2021-April 2023



Mystic Embayment

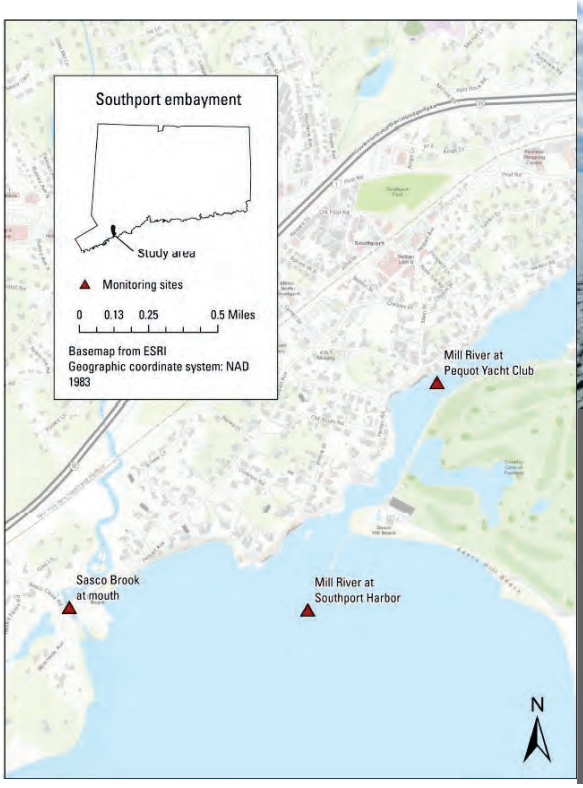
May 2021 – April 2023





Saugatuck Embayment

May 2022-April 2024



Southport Embayment

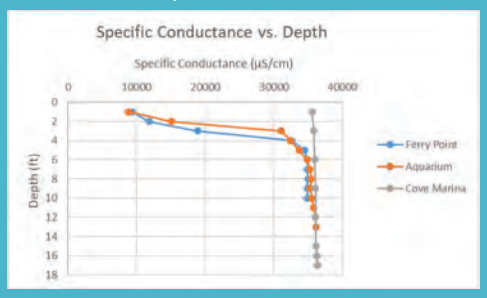
May 2022- April 2024

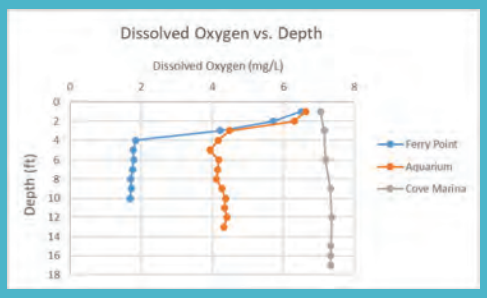
Discrete Water-Quality Data Collection

Measurement	Parameter	Units
Analytical Water Quality Data	Ammonia	mg/L
	Ammonia + Organic N (TKN)	mg/L
	Nitrate + Nitrite as N	mg/L
	Total Phosphorus	mg/L
	Orthophosphate	mg/L
	Alkalinity	mg/L
	Silica	mg/L
	Dissolved Organic Carbon (DOC)	mg/L
	Total Suspended Solids (TSS)	mg/L
	Carbonaceous Biological Oxygen Demand (CBOD)	mg/L
	Chlorophyll a phytoplankton	µg/L
	Pheophytin A, Phytoplankton	µg/L
Calculated Values	Total Nitrogen as N (TKN + (Nitrite + Nitrate))	mg/L
	Organic Nitrogen	mg/L

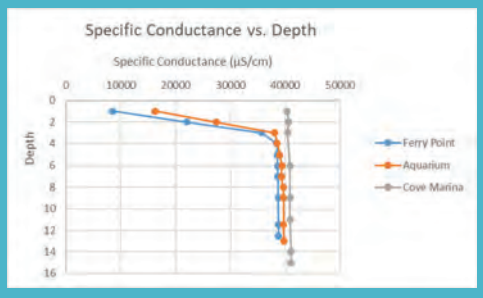
Norwalk Vertical Profiles Summer 2021

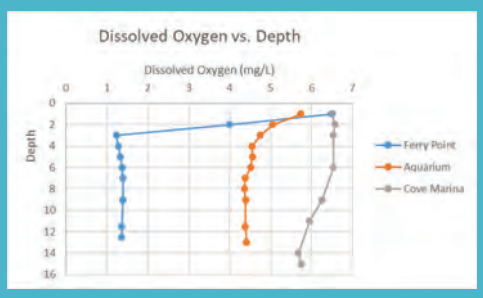
July 13, 2021



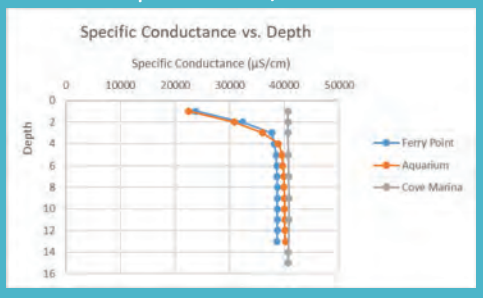


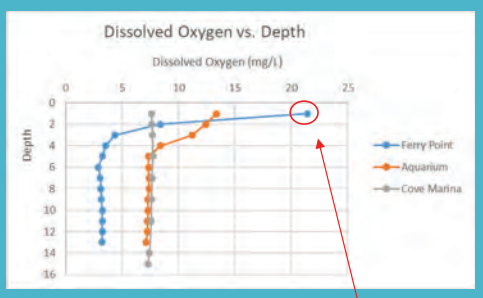
August 24, 2021





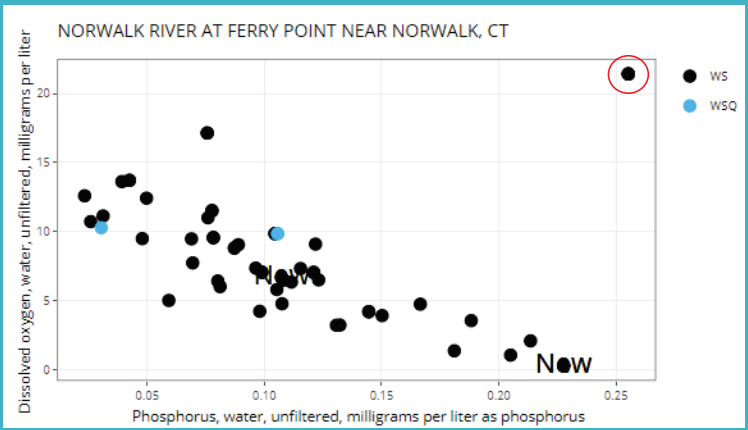
September 21, 2021

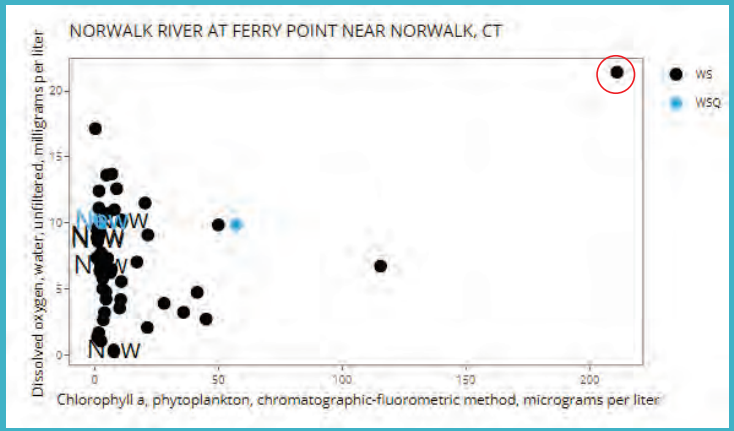


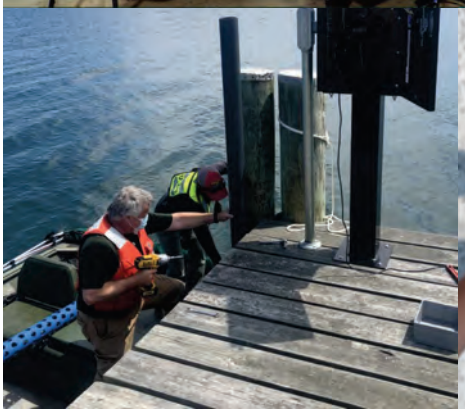


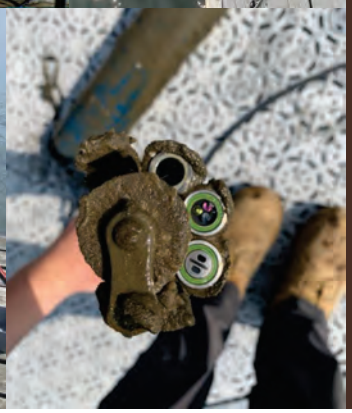
High Dissolved Oxygen measured at 1ft depth

Correlate Discrete Samples with Vertical Profile





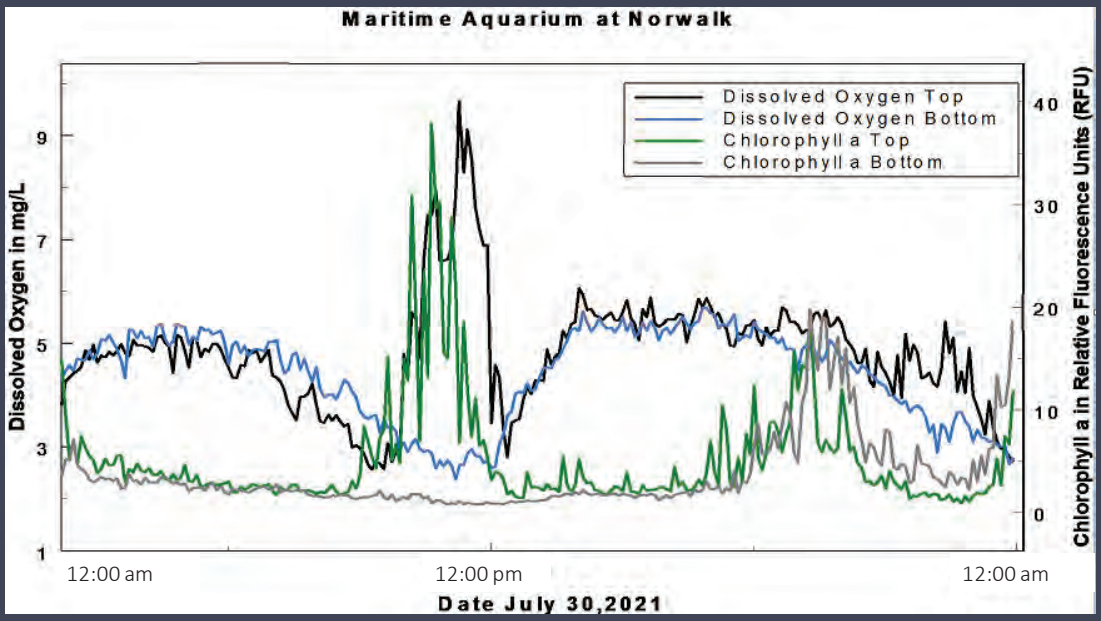


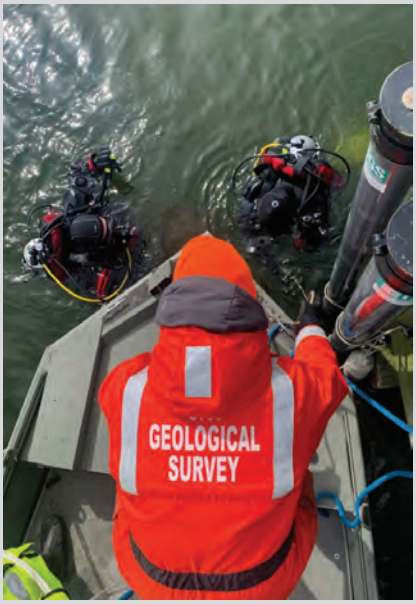


Continuous Water-Quality Data Collection

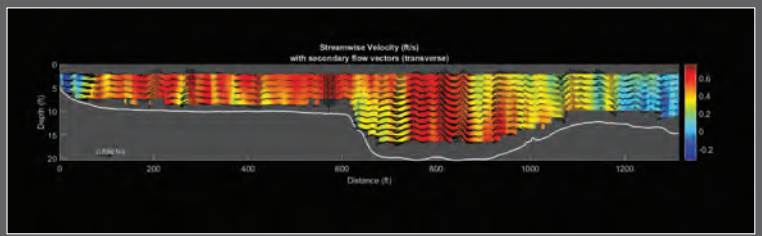
Measurement	Parameter	Units
Continuous Water Quality measurements	Water Temperature	Deg C
	Specific Conductance	µS/cm
	Salinity (Computed)	psu
	Dissolved Oxygen	mg/L
	Dissolved Oxygen (Computed)	% saturation
	Turbidity	FNU
	Chlorophyll	RFU
	Photosynthetic Active Radiation (PAR)	µmoles/m²/s
	Barometric Pressure	mmHg

Norwalk Diurnal Cycle: Dissolved Oxygen and Chlorophyll (Top vs Bottom)

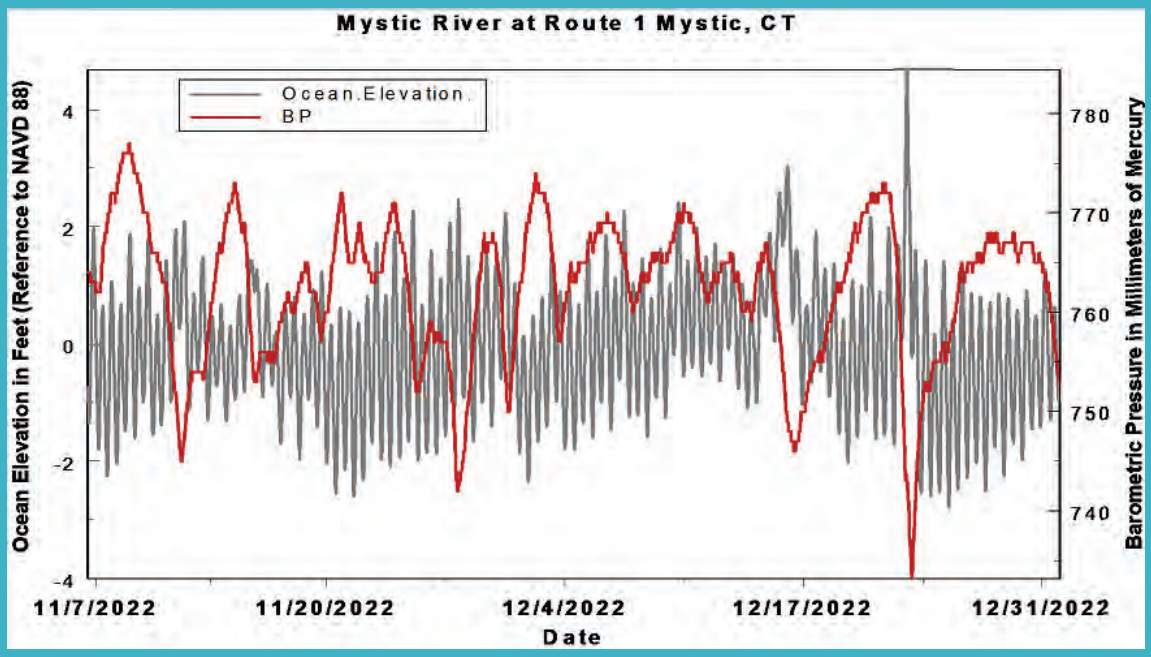




Estuary Elevation and Velocity Data Collection



Monitoring Tidal Range and Barometric Pressure at Mystic River



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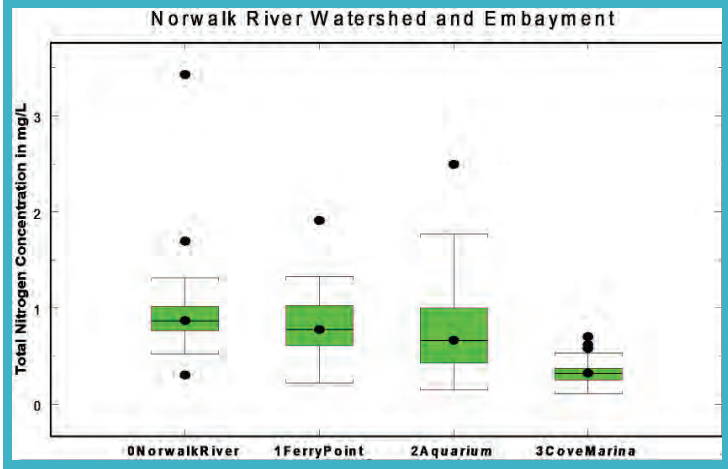
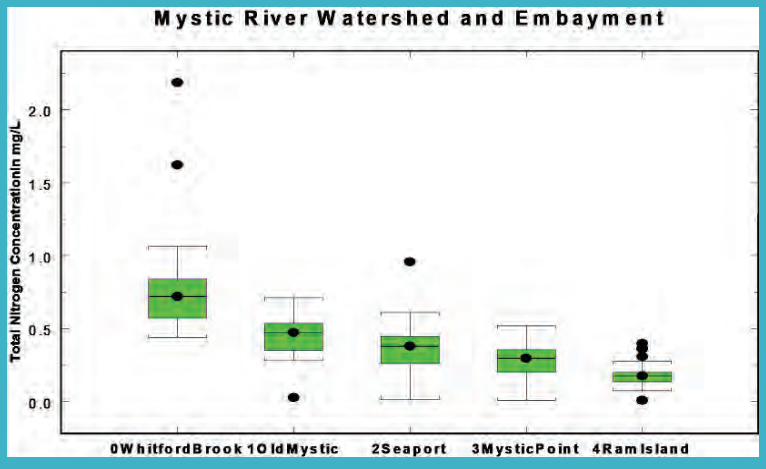
Total Nitrogen Concentrations in Norwalk and Mystic Embayments

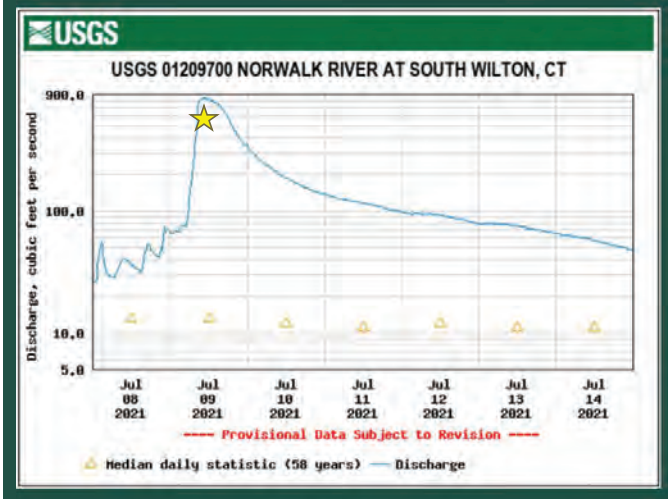
Norwalk

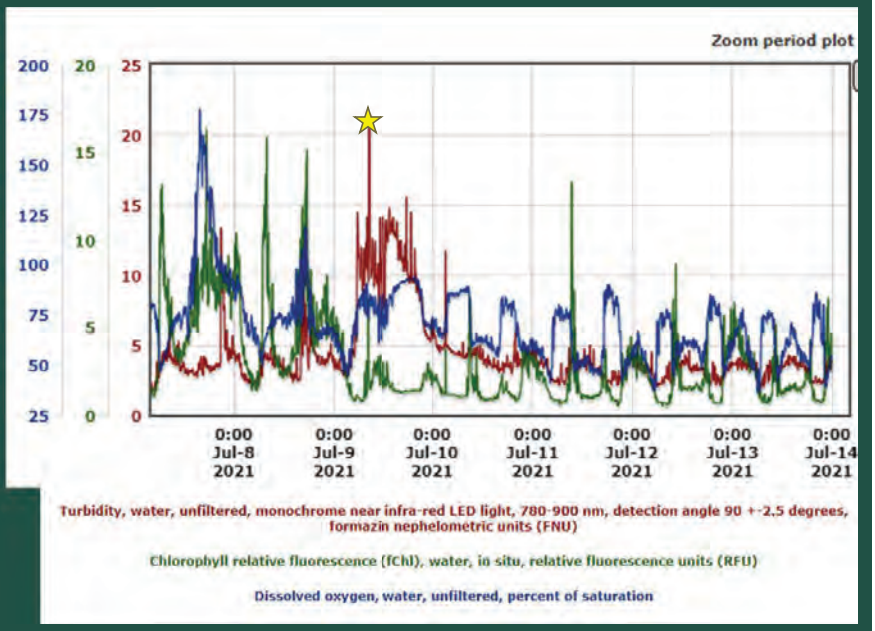


Mystic

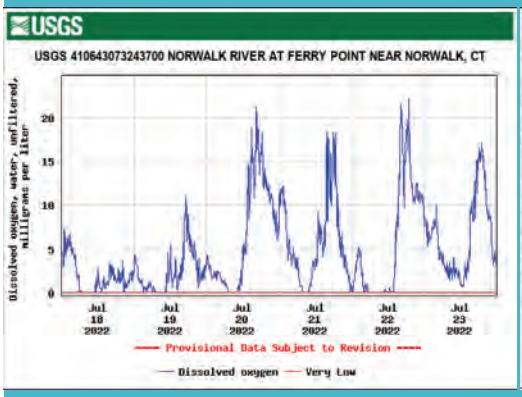


Norwalk Continuous Data July 2021

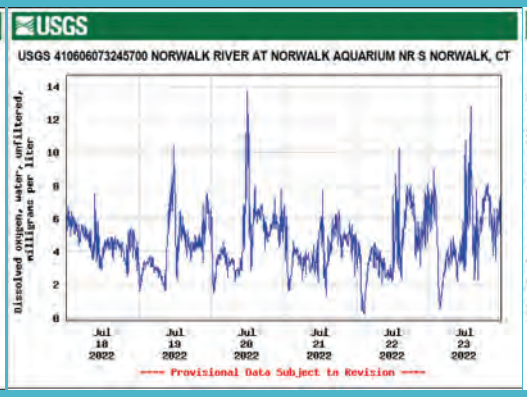




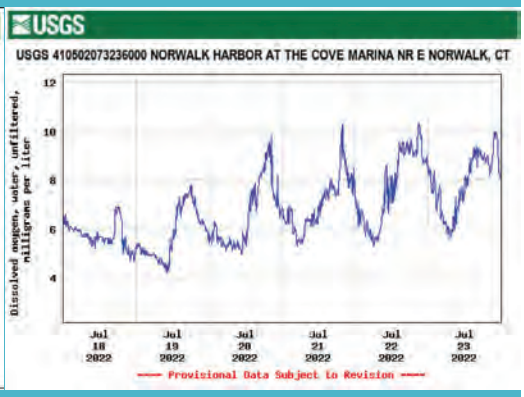
Extreme Fluctuations in Dissolved Oxygen in Norwalk River July 2022



Ferry Point

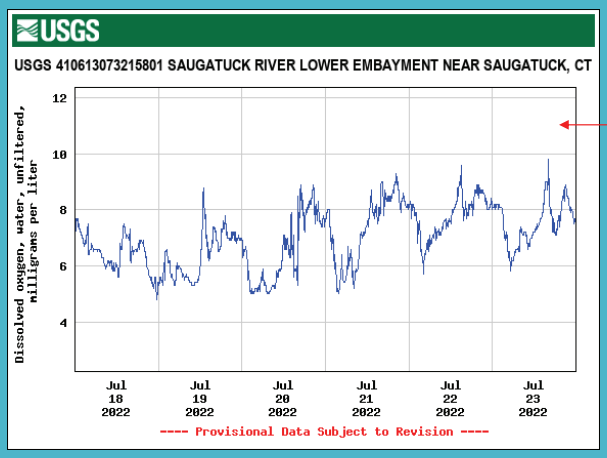


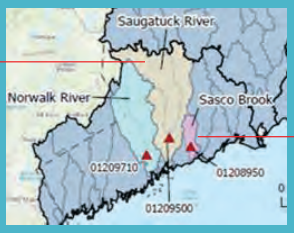
Aquarium

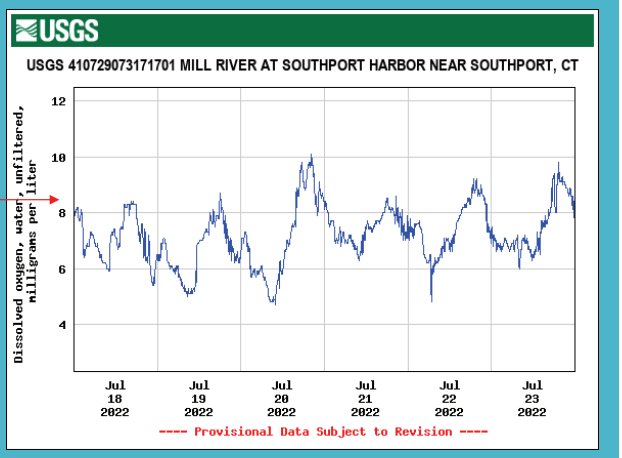


Harbor

Saugatuck and Southport Lower Embayments (Buoys)







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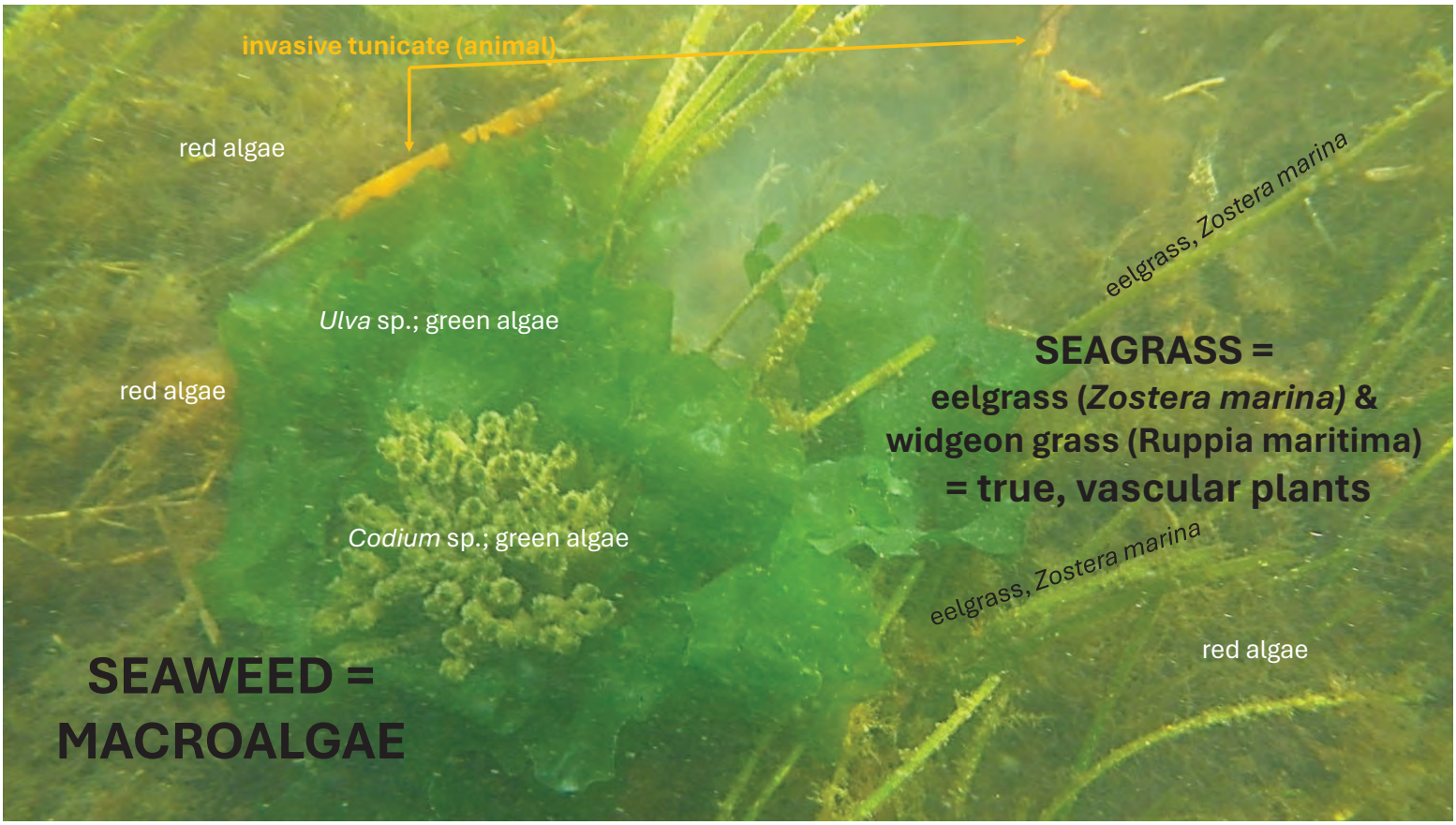
Macrophyte Biomass in Shallow Estuarine Embayments: data to support modeling

Jamie Vaudrey, Ph.D.
CT National Estuarine Research Reserve &
University of Connecticut
May 8, 2024



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no official endorsement should be inferred

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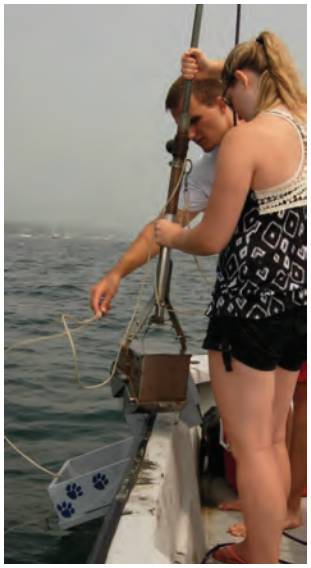
Modeling CT Embayments: **Dr. James O'Donnell**, Christopher Perkins, Jason Love, John Imhoff, Seth Kenner, Andrew Thumann, Richard Isleib, Kelly Streich, Traci Iott, Kathleen Knight, Dr. Chris Knightes, Finnian Cashel, Jonathan Morrison, Brittney Izbicki, Paul Stacey

Three Levels of Sampling

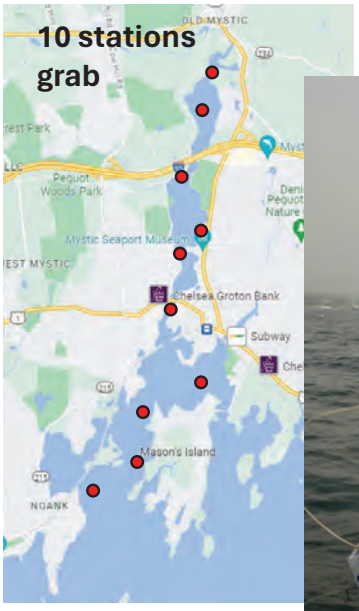
100 stations - grab

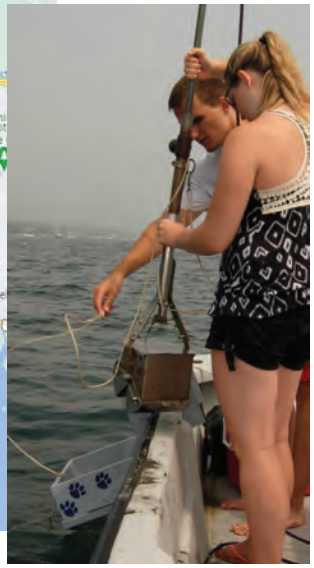


high-level resolution

Three Levels of Sampling

100 stations - grab



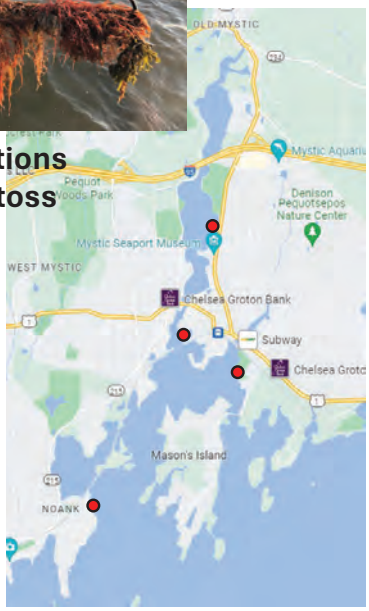


mid-level resolution

high-level resolution

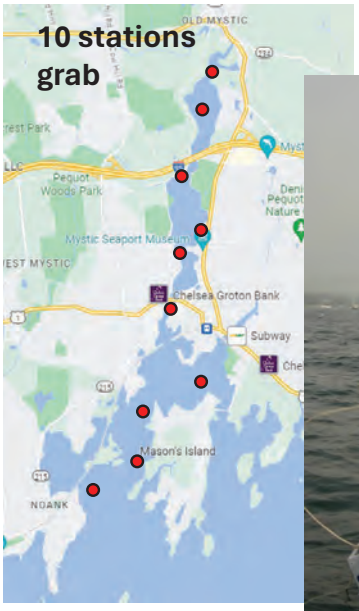
Three Levels of Sampling

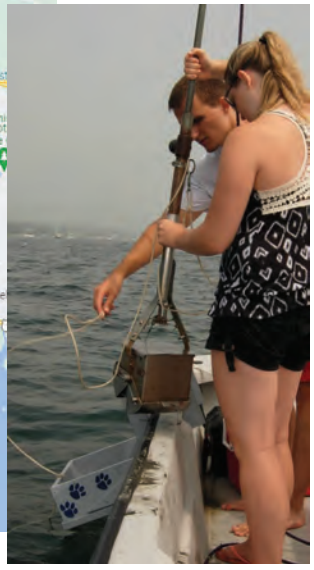
4 stations rake toss



very coarse, qualitative

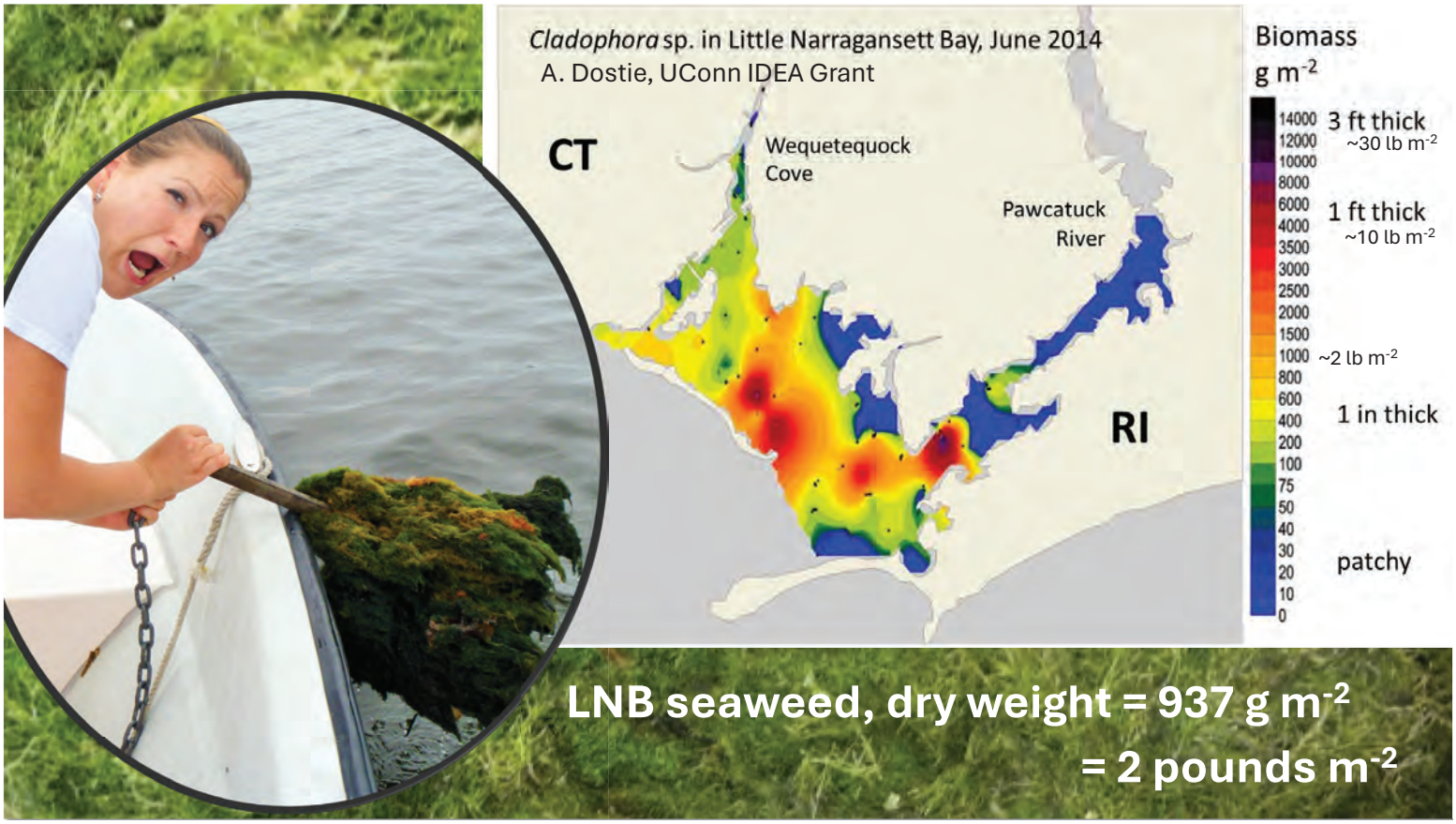
100 stations - grab

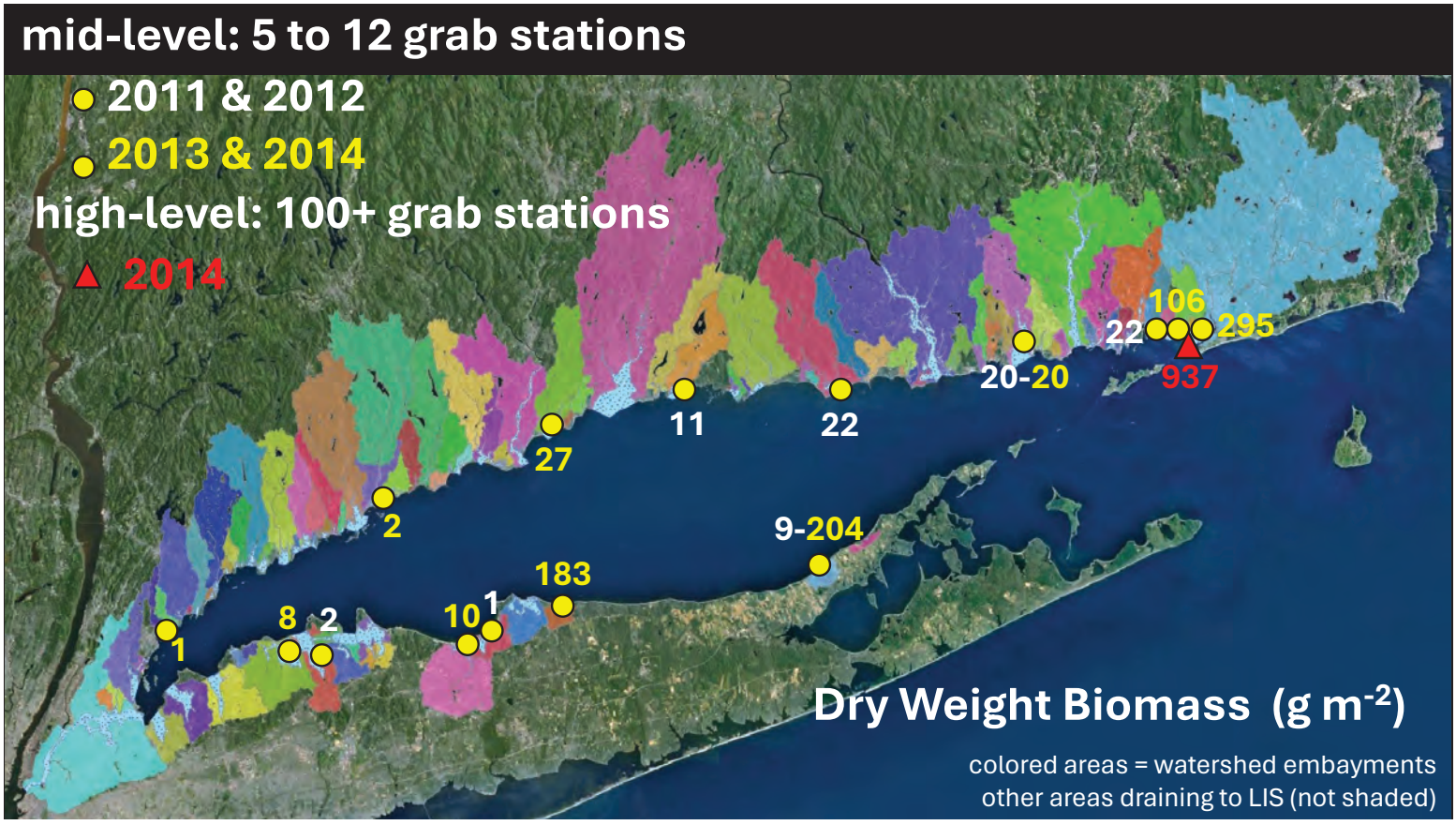




mid-level resolution

high-level resolution


Cladophora sp. in Little Narragansett Bay, June 2014
A. Dostie, UConn IDEA Grant
CT
Wequetequock Cove
Pawcatuck River
RI
Biomass g m-2
14000
12000
10000
8000
6000
4000
3500
3000
2500
2000
1500
1000
800
600
400
200
100
75
50
40
30
20
10
0
3 ft thick ~30 lb m-2
1 ft thick ~10 lb m-2
~2 lb m-2
1 in thick
patchy
LNB seaweed, dry weight = 937 g m-2
= 2 pounds m-2

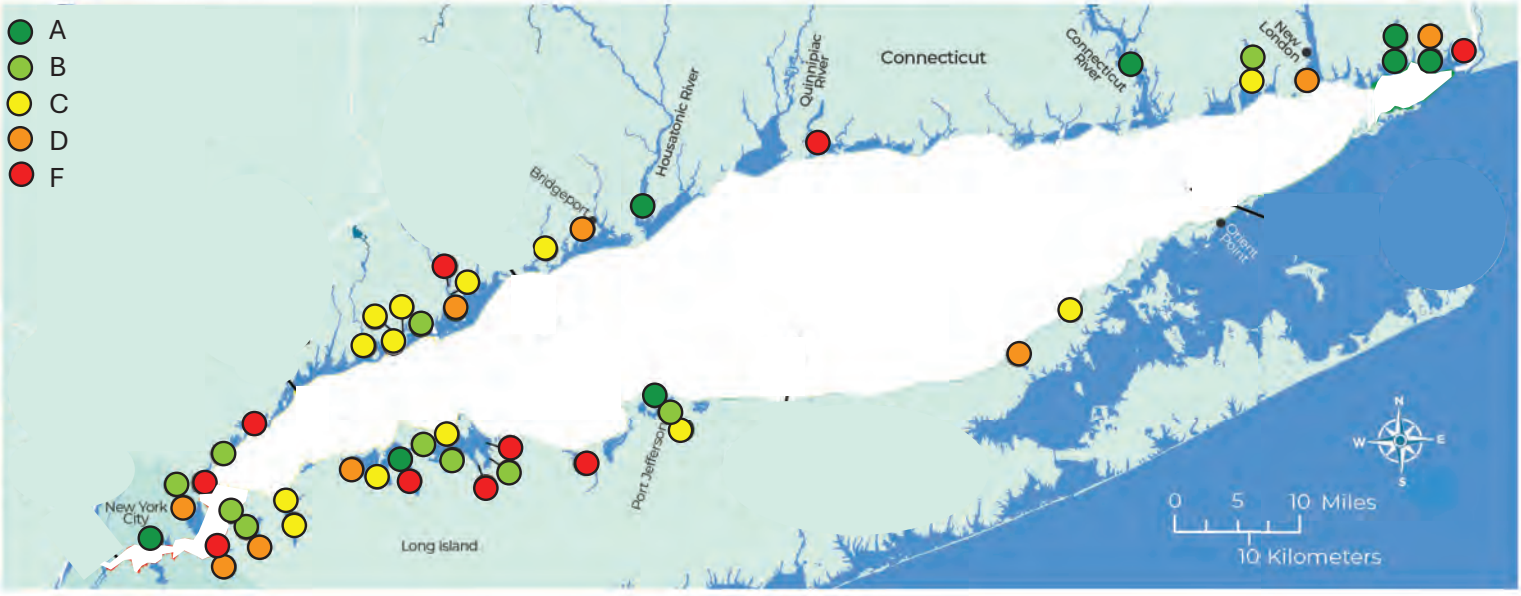

mid-level: 5 to 12 grab stations
2011 & 2012
2013 & 2014
high-level: 100+ grab stations
2014
106
22
295
937
20-20
11
22
27
2
9-204
183
8
2
10
1
1
Dry Weight Biomass (g m-2)
colored areas = watershed embayments
other areas draining to LIS (not shaded)

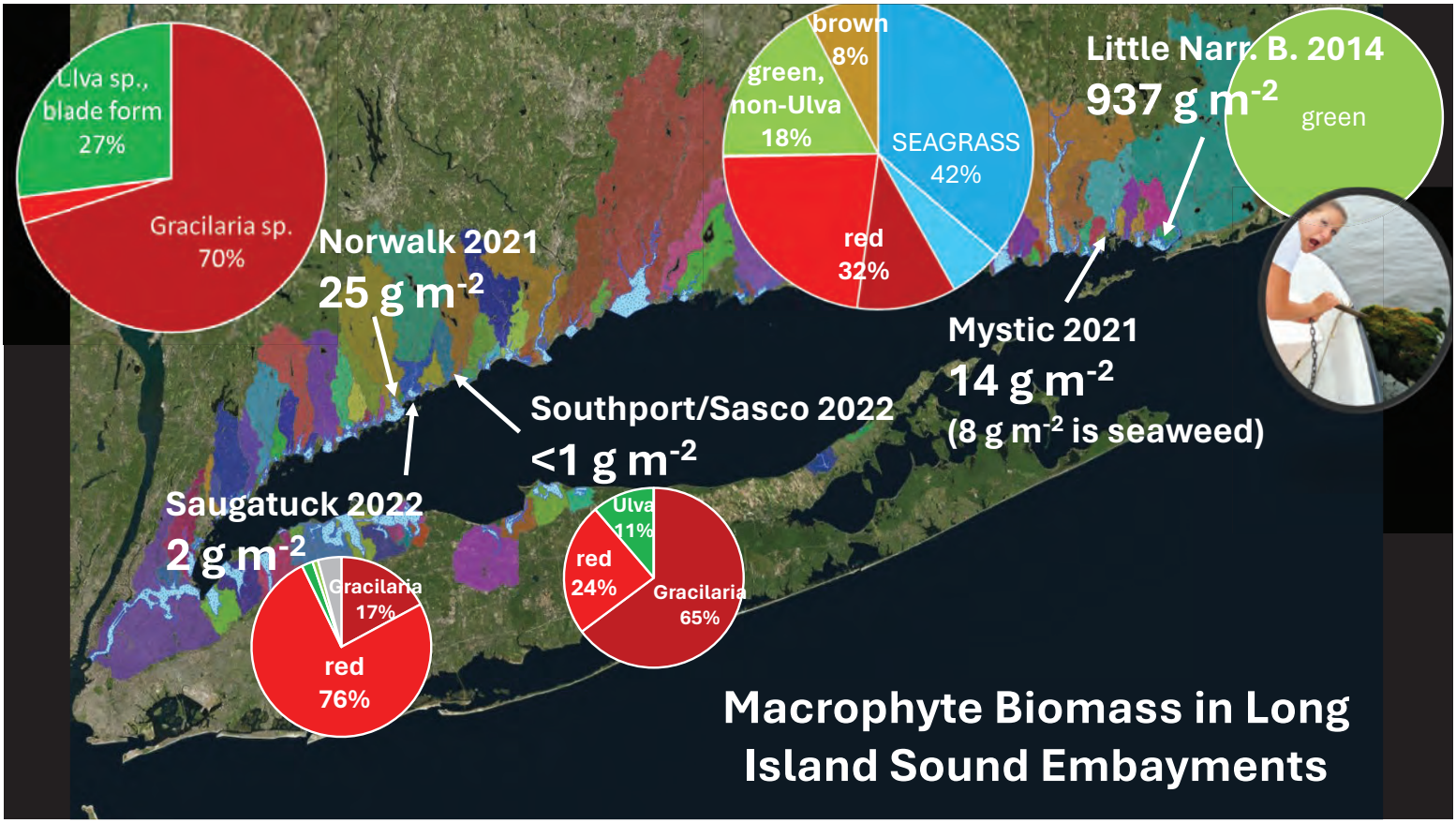
Unified Water Study
Search for worst spots.
Rake tosses

Save the Sound®
Action for our region's environment.

2020 Long Island Sound Seaweed Grades

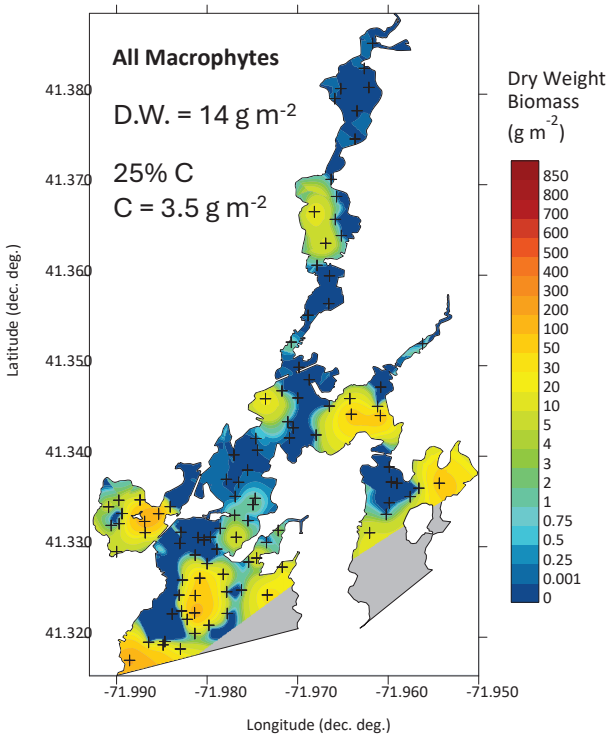
Save the Sound®
Action for our region's environment.



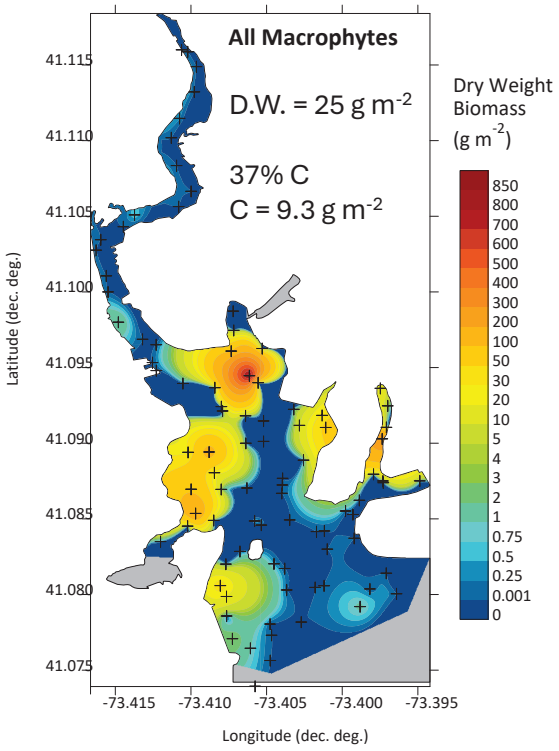


Biomass 2021

Mystic Harbor Complex

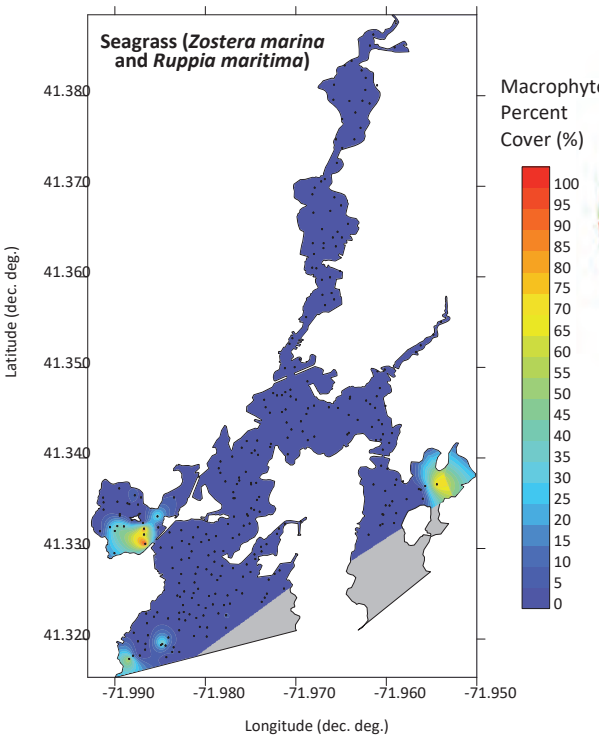


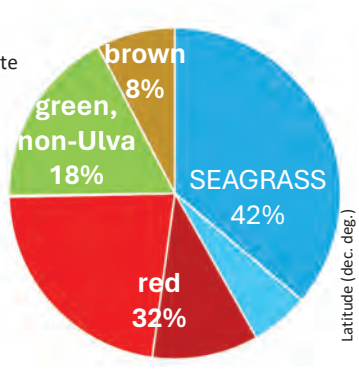
Norwalk Harbor



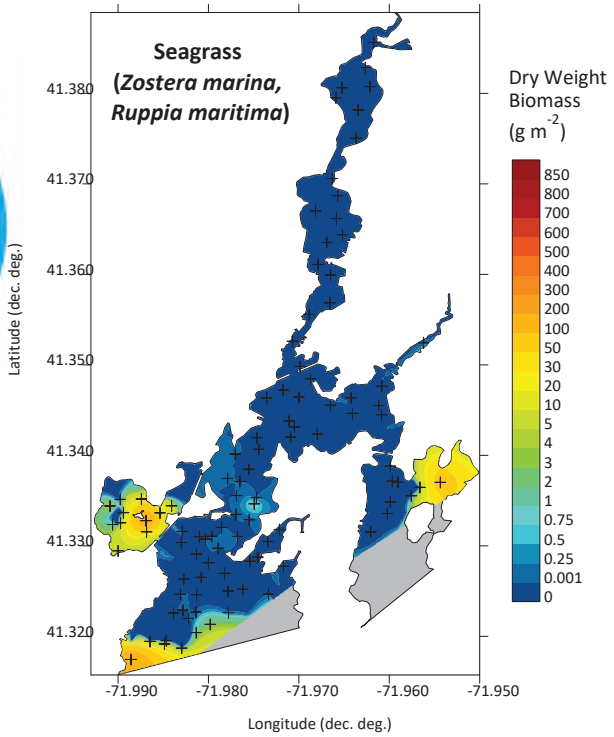
Mystic Harbor Complex – 2021 seagrass

% Cover



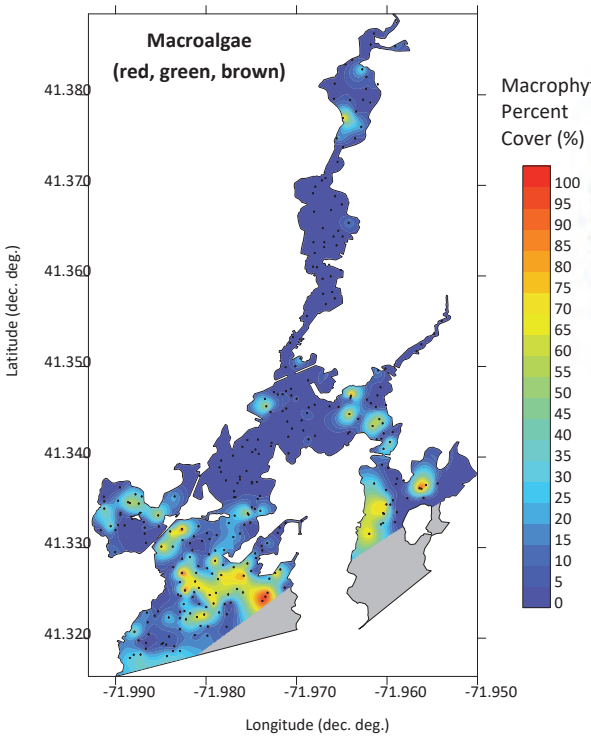


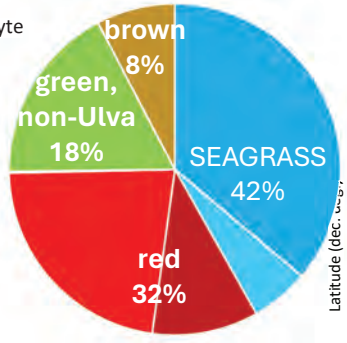
Biomass



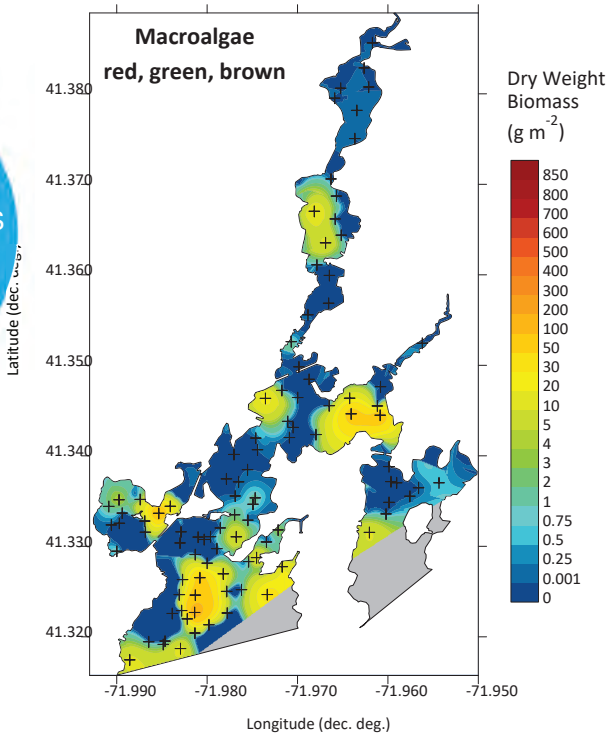
Mystic Harbor Complex – 2021 macroalgae

% Cover

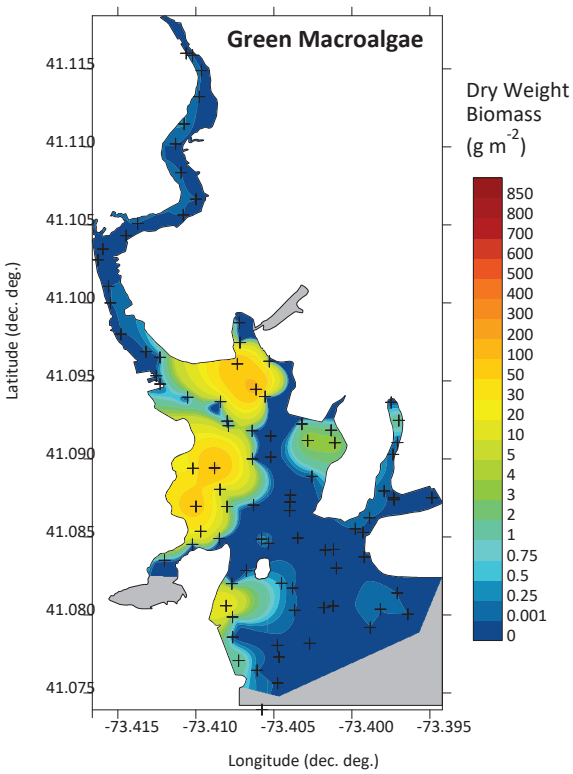


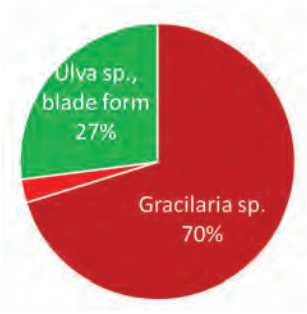


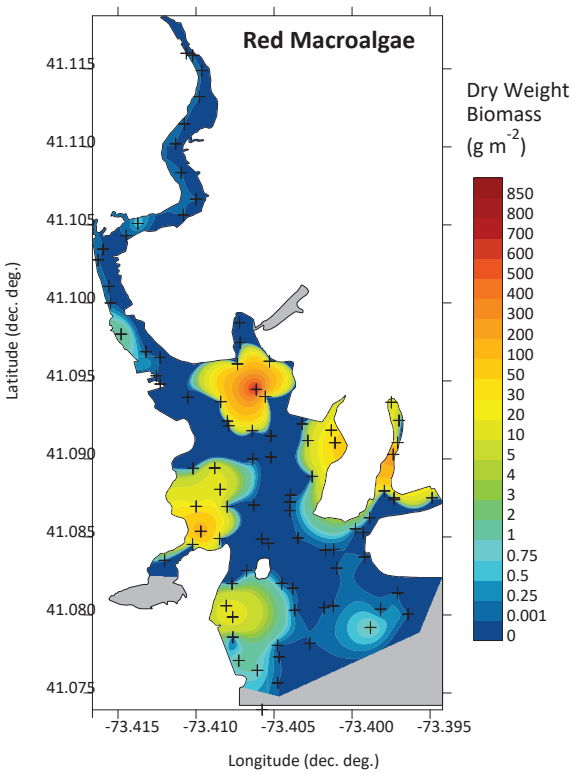
Biomass

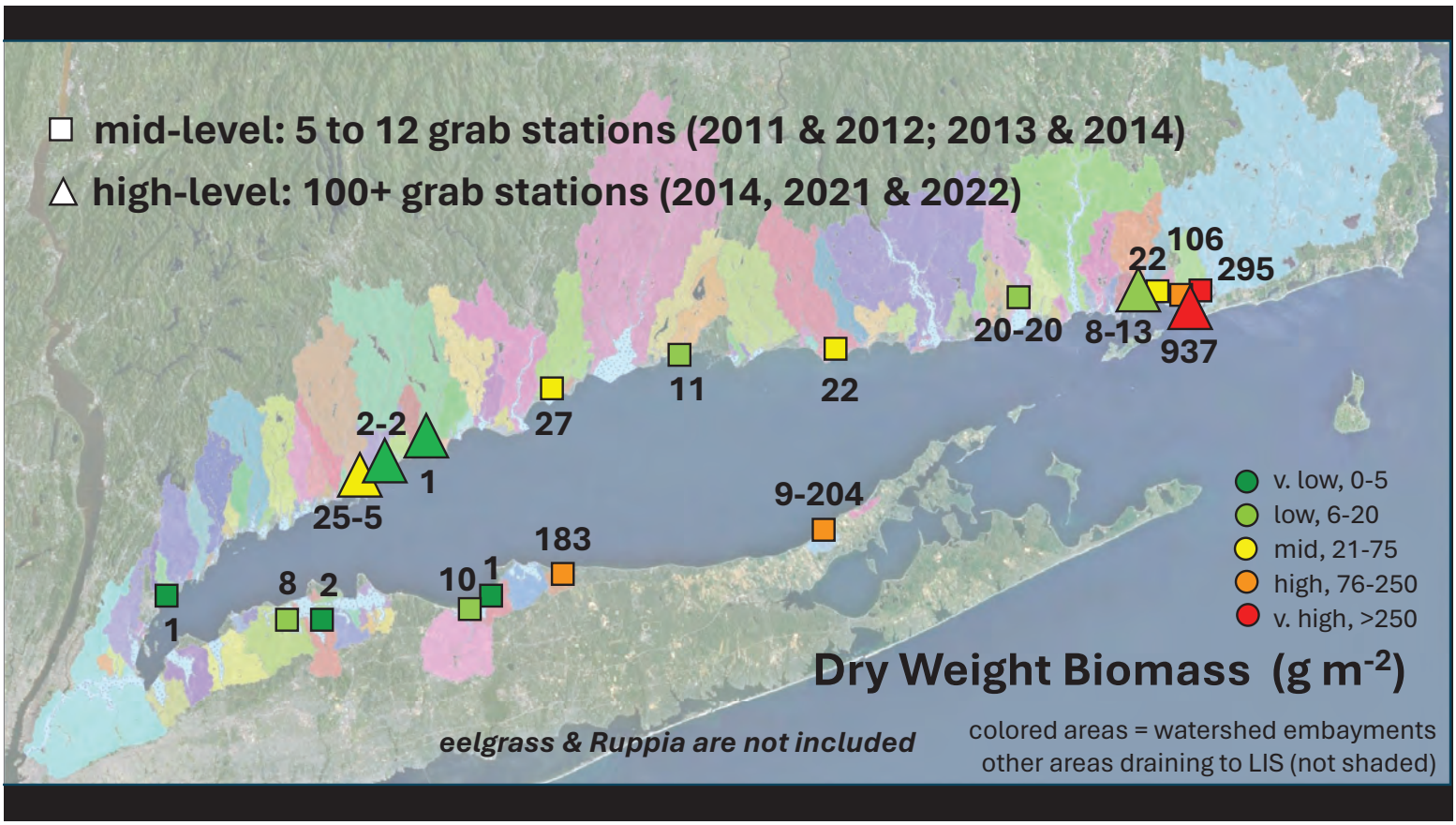


Norwalk Harbor – 2021 macroalgae biomass

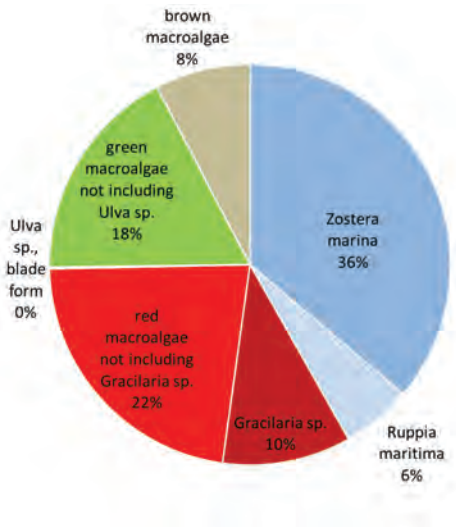




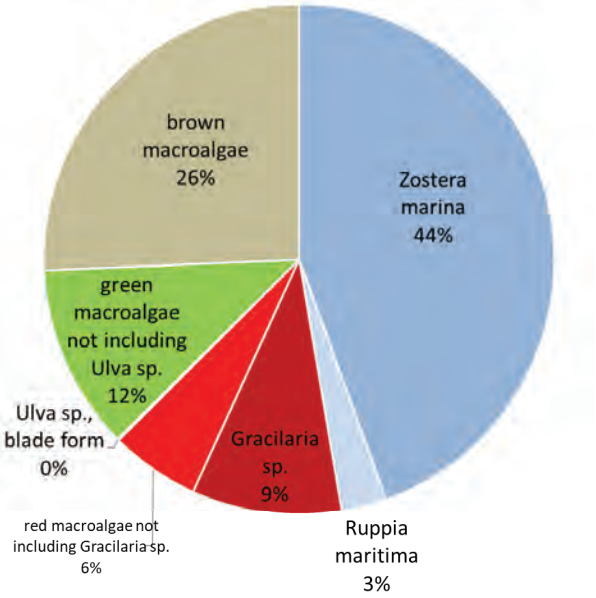


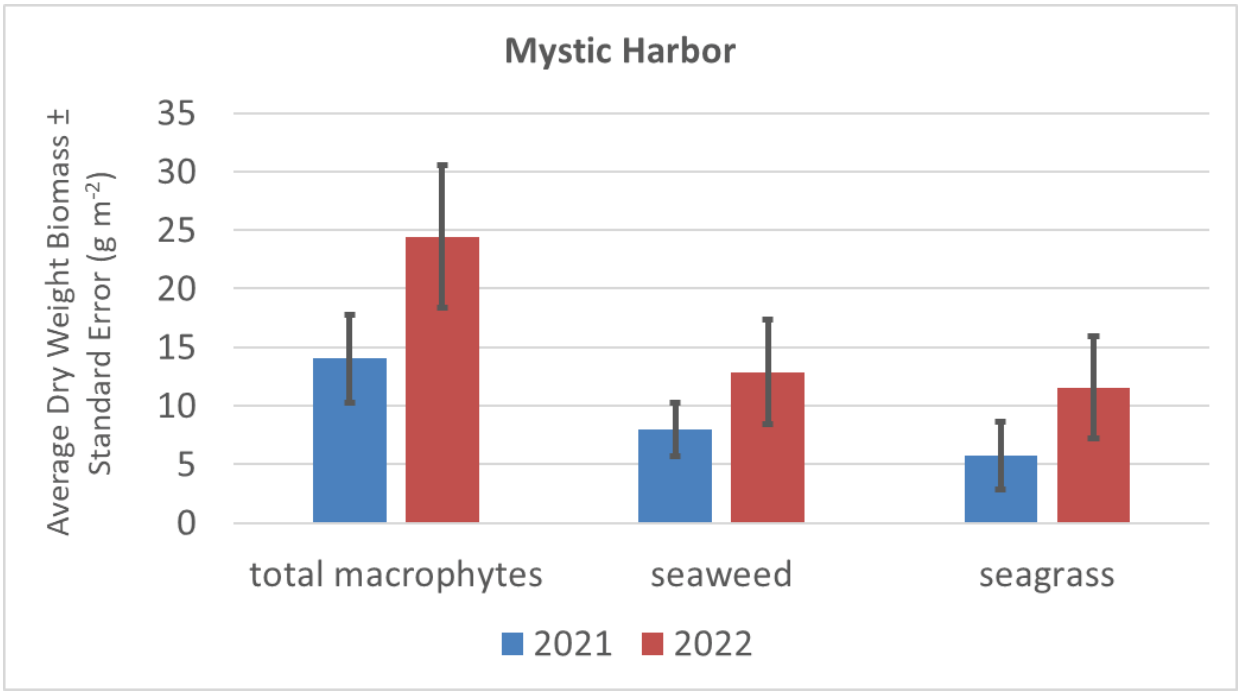


Dry Weight Biomass - Mystic Harbor complex 2021
(14.0 ± 3.8 g m^{-2}; 8.0 ± 2.3 g m^{-2} is seaweed)



Dry Weight Biomass - Mystic Harbor complex 2022
(24.4 ± 6.1 g m^{-2}; 12.9 ± 4.5 g m^{-2} is seaweed)

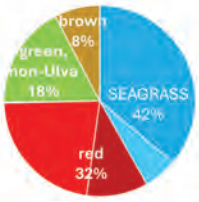


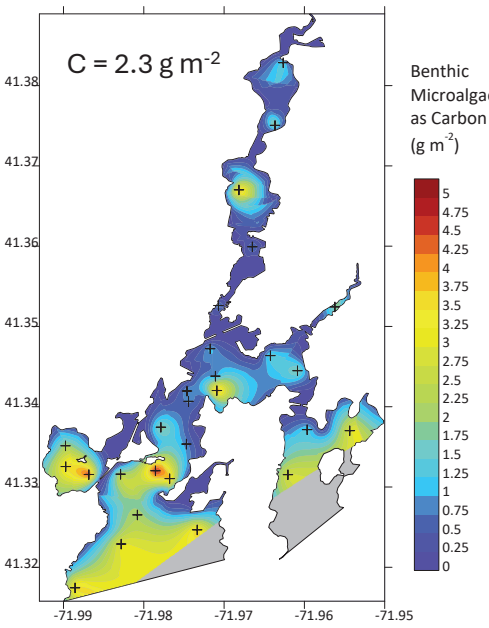


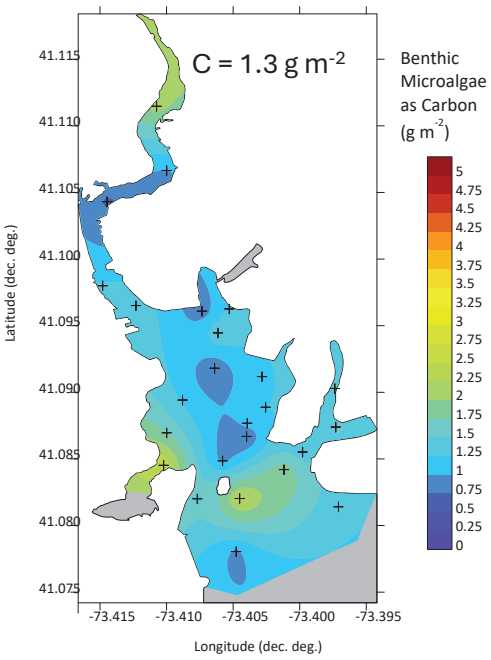
Benthic Microalgae (phytoplankton in and on the sediment)

Mystic

for comparison: macrophyte C = 3.5 g m^{-2}





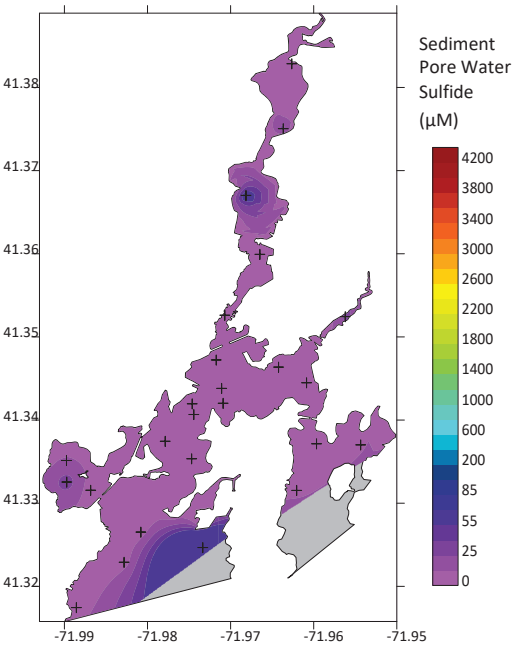


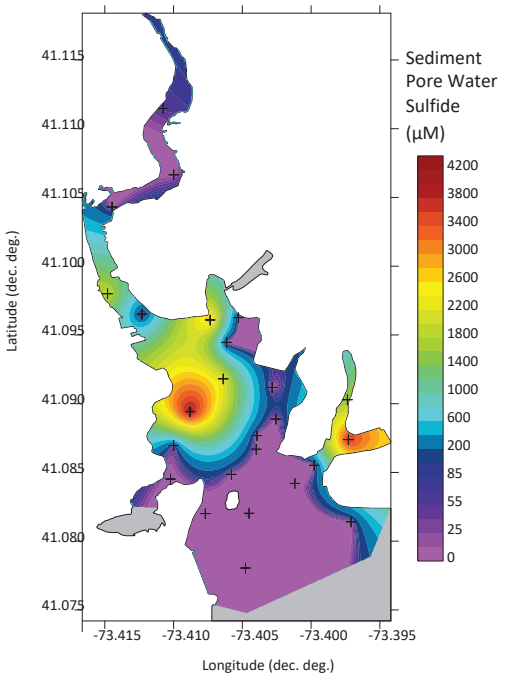
Norwalk

for comparison: macrophyte C = 9.3 g m^{-2}

Sediment Pore Water Sulfide

Mystic

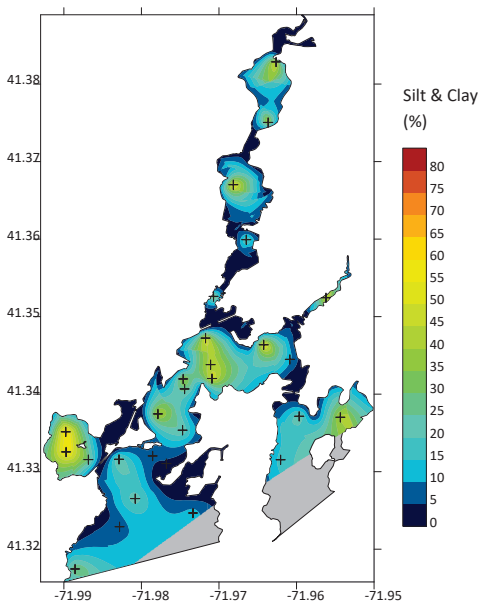




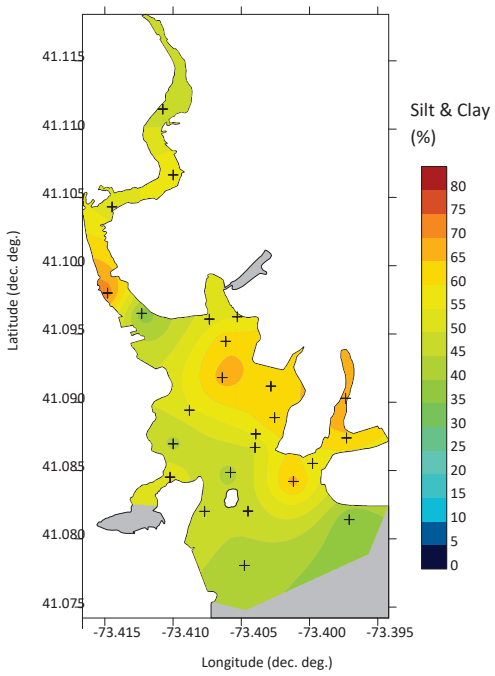
Norwalk

Sediment Grain Size = % Silt Clay

Mystic

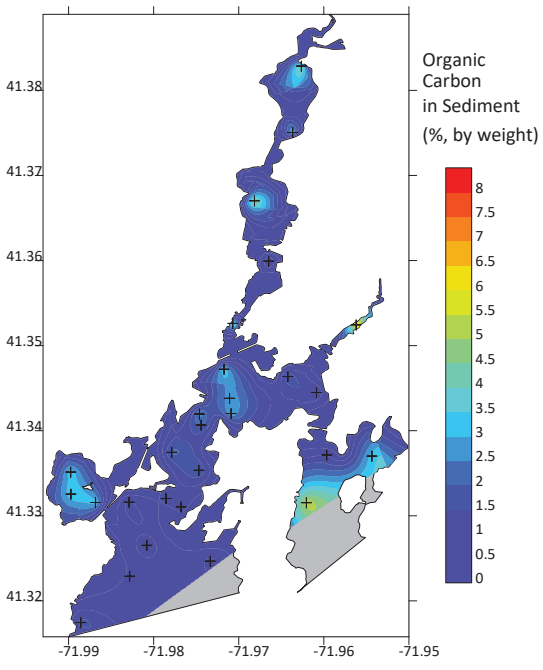


Norwalk



Sediment Organic Carbon

Mystic



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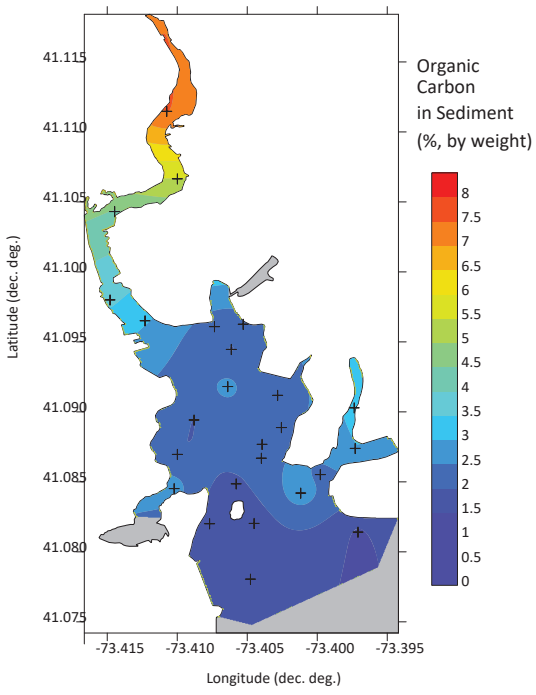
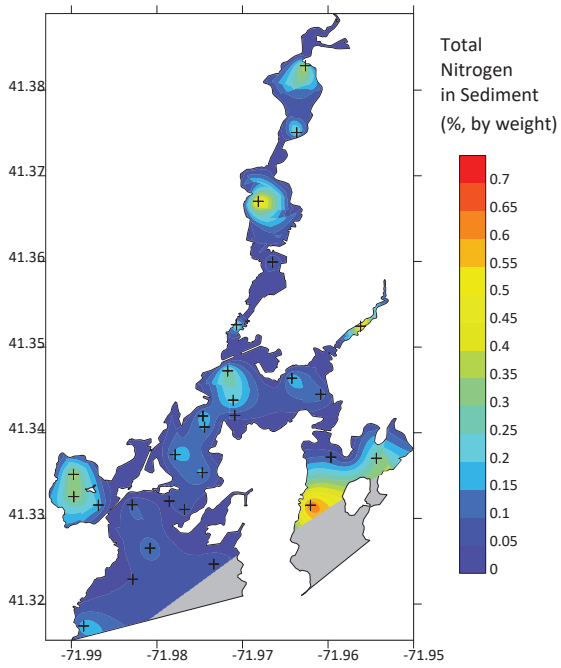


Sediment Total Nitrogen

Mystic



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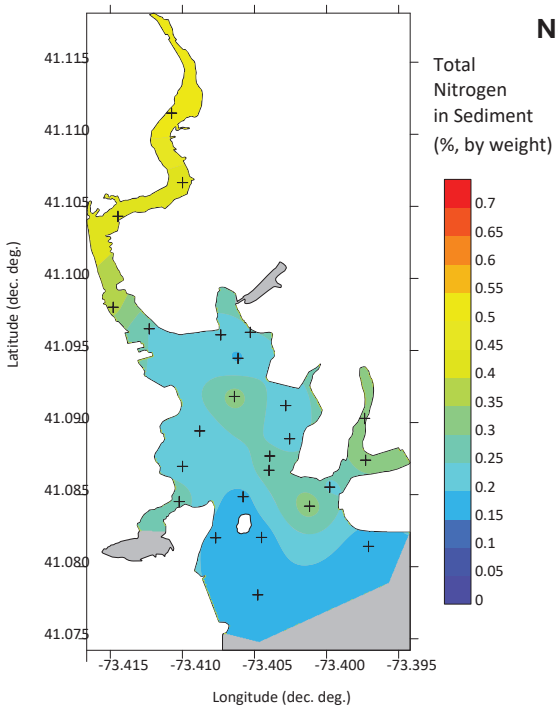
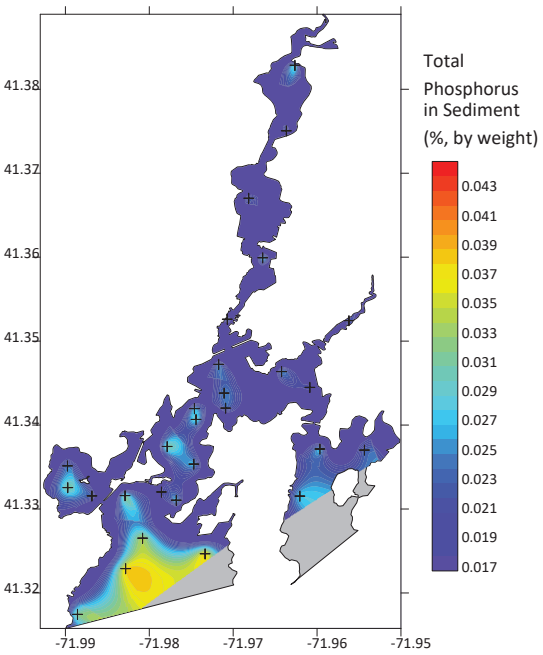


Sediment Total Phosphorus

Mystic



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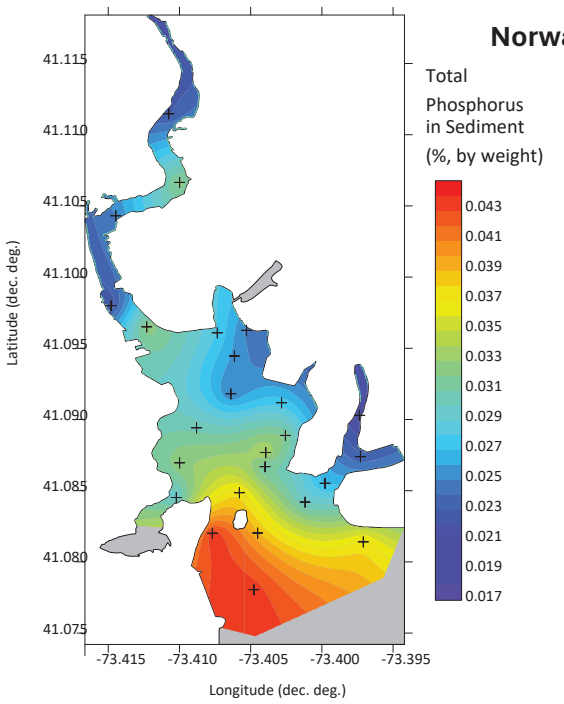

Next steps – More embayments, and models!

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