

Introduction: Use of Videos Eliza Moore – Senior Environmental Scientist Narragansett Bay Commission





- Benthic video surveys to track benthic community, habitat structure, and general observations over time.
 Started in 2014
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Where

- Providence River Estuary the headwaters of Narragansett Bay – Rhode Island
- Three permanent transects

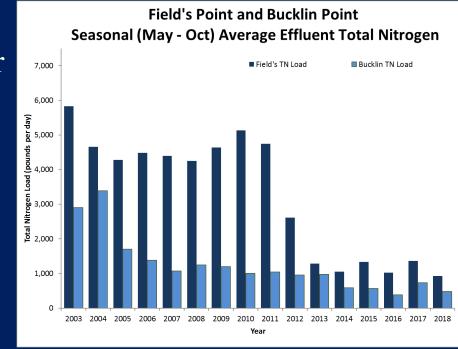


• The Narragansett Bay Commission owns and operates two major wastewater treatment facilities in Rhode Island.





- The Narragansett Bay Commission owns and operates two major wastewater treatment facilities in Rhode Island.
- Nitrogen reduction required ~\$41 million in upgrades to facilities.
- Monitoring to demonstrate the water quality impacts of investment





Amphipod tube mats – indicative of excess organic matter, adequate DO levels

 Monitoring benthic conditions for observable impacts of nitrogen reduction.
 —Indicator species
 —Evidence of biological activity



Tunneling megafauna – adequate DO levels

- Benthic video monitoring is part of a comprehensive water quality monitoring program:
 - Fixed-site (buoy and dock station) Monitoring
 - Water Column Profiles
 - Surface Mapping
 - River & Bay Bacteria
 - River & Bay Nutrient Monitoring
 - Water Clarity
 - Phytoplankton Monitoring
- Sound science to support management decisions
- Stimulate further research





Sampling Design and Execution Eliza Moore – Narragansett Bay Commission



Preparation

- Three permanent transect areas designated non-randomly
 - Edgewood low flushing, poor water quality
 - Bullock Reach fixed-site monitoring buoy collecting water quality data
 - Sabin in between, includes a shoal area on opposite side of channel
- Limited potential to extrapolate over larger region, but targets key areas of interest



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Execution

- SeaViewer camera on custom inhouse built-sled
- Scale lasers added at the end of 2017
- No lights, but possible in the future
- Transects each approximately 1 km long
- Depth varies ~ 2-6 meters
- Aim for monthly surveys, achieve ~ quarterly



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Data Management

- Folders to organize videos by year, labeled with date and transect name
- Screenshots saved with date and transect name
 - -Keyword tagging???
- Data in Excel
 - -Analysis using R in development

Name	Date modified
NG 88_060817_00224.PNG	4/3/2018 1:09 PM
BR_060817_00724.PNG	4/3/2018 1:11 PM
NG 88_060817_01224.PNG	4/4/2018 8:07 AM
BR_060817_01724.PNG	4/4/2018 8:07 AM
BR_060817_02224.PNG	4/4/2018 8:08 AM
BR_060817_02724.PNG	4/4/2018 8:10 AM
BR_060817_03224.PNG	4/4/2018 8:11 AM
BR_060817_03724.PNG	4/4/2018 8:12 AM
BR_060817_04224.PNG	4/4/2018 8:14 AM
BR_060817_04724.PNG	4/4/2018 8:16 AM
BR_060817_05224.PNG	4/4/2018 8:17 AM
BR_060817_05724.PNG	4/4/2018 8:18 AM
BR_060817_10224.PNG	4/4/2018 8:19 AM
BR_060817_10724.PNG	4/4/2018 8:20 AM
尾 BR_060817_11224.PNG	4/4/2018 8:22 AM

What worked well, and what didn't ...

• Establishing permanent transects was essential!

- -Structured approach >> haphazard exploration
- Stimulated further research!
 - -NBC has limited resources for this work
 - -Many partners now doing similar or complimentary monitoring in the area

-Spurred conversation and greater attention

Data Analysis Eliza Moore – Narragansett Bay Commission



Quick Reminder...

- Purpose
 - Monitor for ecological response to nitrogen reduction efforts of wastewater treatment facilities
 - Improved dissolved oxygen conditions?
 - Reduced organic loading?
- Approach
 - SeaViewer camera on sled, towed along three permanent transects monthly to quarterly





Approach

- Windows Media Player Video playback
- CMECS Details
 - -Data entry in Excel
 - -Substrate Component and Biotic Component focus
 - -Modifiers:
 - Co-Occurring Elements



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 - -Modifiers:
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 - Associated Taxa



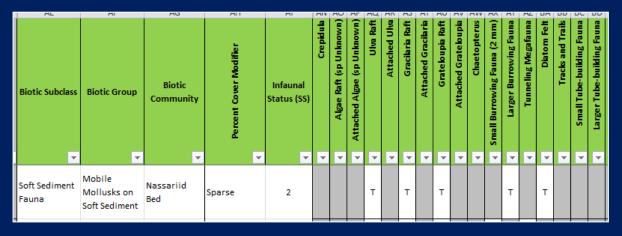


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Approach

- Windows Media Player Video playback
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 - -Data entry in Excel
 - -Substrate Component and Biotic Component focus
 - -Modifiers:
 - Co-Occurring Elements
 - Associated Taxa
 - Percent Cover

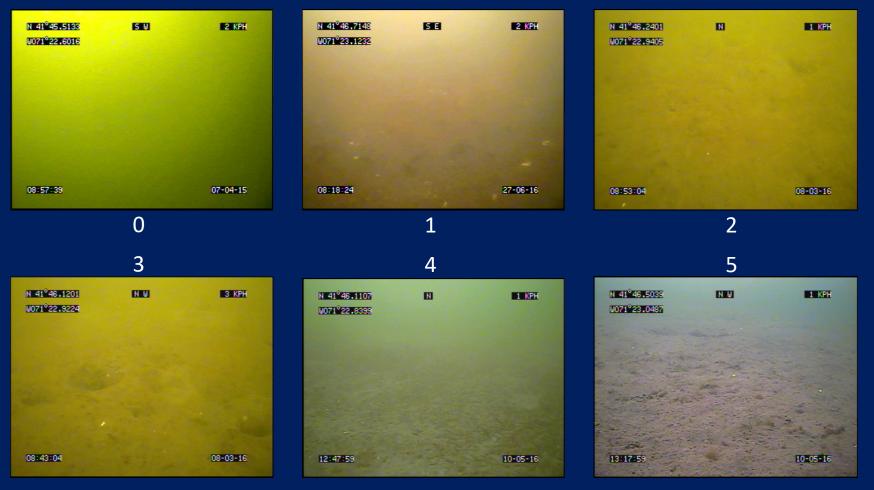
• Community Successional Stage (Infaunal Status)





Approach

• CMECS Modifications —Visibility score





Approach

• CMECS Modifications

- -Visibility score
- -New elements as needed (e.g.)
 - Leaf Debris -
 - Grateloupia Rafts, Attached







Results

- Analysis in R and Excel
- Repeat transect sampling

 Successfully building a long-term monitoring dataset
- Few, long transects
 - Difficult to separate temporal change from spatial variability
 - -More, shorter transects (randomized?) would be ideal





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 - Difficult to separate temporal change from spatial variability
 - -More, shorter transects (randomized?) would be ideal
- Difficult to determine "biotopes"
 - -Too much detail captured?
 - -Need to whittle down to meaningful groups

"Small-med surface burrowers/tube builders occasionally with algae rafts/beds, boring sponge, diatom felt, epifauna (*Crepidula*, mudsnails, crabs), small tube-building fauna, small-med surface burrowers/tube builders, sponges on sandy mud/muddy sand"

> 13 LONG biotopes?

What worked, and what didn't ...

• Data Entry

-What to do with images with no clear dominant?

-Finding CMECS surprisingly subjective...

• Data Analysis

-Visibility score – limit analysis to comparable footage

• Overall – Videos are excellent outreach tools, regardless of data analysis!

