Frenchman Bay Partners Steering Committee Meeting Minutes
September 27, 2017
Lamoine Town Hall
606 Douglas Street
5:00-6:30 PM

In attendance:
- Jane Disney (MDI Biological Laboratory)
- Ashley Taylor (MDI Biological Laboratory)
- Anna Farrell (MDI Biological Laboratory)
- Fiona de Koning (Acadia Aqua Farms)
- Michael Good (Down East Nature and Birding Tours),
- Elyse DeFranco (UMaine)
- Roger Bowen (Gouldsboro Board of Selectmen)
- Antonio Blasi (Hancock County Commissioner)

Calling in:
- Natalie Springuel (Maine Sea Grant)
- Robin Hadlock Seeley (Cornell University)

1. **Introductions**
2. **Rockweed Conservation Target**
   - Robin sent around some draft text and a contextual model about the rockweed conservation target before the meeting (see end of minutes). She invites thoughts and comments on the text.
   - Hannah Webber started a rockweed data collection program this summer looking at temperature changes underneath and outside the canopy.
     - HOBO loggers
     - Students, interns, and staff at COA and Schoodic Institute helped with data collection
   - Robin recently completed training on Suitability Models, and suggested a mini spatial planning exercise around rockweed would be a good step.
     - Possible GIS layers include existing layers from the DMR.
     - Important to use layers to represent all perspectives.
     - People were receptive to this idea. If we don't have a way to visually present current and baseline data, then what do we have?
   - Roger Bowen mentioned that rockweed harvesters in Gouldsboro Bay have implemented a voluntary ban on rockweed harvesting in the bay. There has been a noticeable increase in the number of birds on the bay.
3. **Conservation Target Updates**
   - **Mudflats** → See Jordan River Sampling Report
     - MDI Biological Laboratory spent the summer helping the Department of Marine Resources collect additional samples in the Jordan River to help monitor bacterial pollution and potentially identify pollution sources.

- They collected 122 samples at both fresh and marine water sites, analyzing samples for *Enterococcus* bacteria and optical brighteners.
- They were set up for adverse rainfall events when rainfall was >0.75" in 24 hours, but it was such a dry summer, these were few and far in between.
- The only exceedances were in freshwater samples, but overall, inconsistent by site and date.
- *Next steps*: share results with the DMR and HCSWCD.

- **Mudflats Continued (communicated via email on 9/28/17)**
  - Chris Petersen worked with a couple of COA students and DMR personnel to do mussel surveys in the Jordan River in spring 2017. See report at the end of this document. This work was summarized in the DMR Summer 2017 Public Health Newsletter.
  - Prior to the UAV survey, DMR worked in partnership with COA to collect samples for evaluating size distribution, abundance, live to dead ratio and length and weight relationship. The length and weight relationship (not previously available for mussels) will provide information that, when combined with size distribution, can be used to estimate the standing crop or bushels (of mussels) per acre.
  - College of the Atlantic processed the samples and also provided a report based upon the date from the sampling effort. The results concluded that: *"Overall, the mussels from Jordan River were relatively small, falling primarily within the 35–39 mm and 40–44 mm size classes. Only a limited number of mussels were above the approximate harvestable size of 50 mm (approximately 2 in; for mussel harvesting, there can be no more than 106 mussels per two-quart container, which would average to 2 in per mussel). In addition, these mussels were distributed unevenly throughout the beds with large areas of mudflat containing no mussels."*
- **Diadromous Fishes (communicated via email on 9/28/17)**
  - Alewife Harvesters of Maine and Downeast Salmon Federation hosted an alewife meeting in Brewer on September 14 called River Herring: Open for Harvest. Chris Petersen attended with Billy Helprin from Somes-Meynell. The meeting included state regulators, harvesters, and people interested conservation of anadromous fishes.
  - The run in Somesville also had record run, with nearly 40,000 fish
- **Eelgrass**
  - 2012: Hottest year in the Gulf of Maine; green crab explosion; eelgrass disappeared in upper bays on the down east coast, including Frenchman Bay.
  - This lead to the Eelgrass in Maine project, which is still on Anecdata.org, asking people to record eelgrass presence/absence.
  - 2013: Eelgrass didn't come back. It did come back in 2014 right on top of previous eelgrass beds, leading to hypothesis that it was coming back up from seed, but other eelgrass researchers in New England suggest it is unlikely eelgrass seeds were dormant.
  - 2014-2017: Continued restorations in the upper bay.

- 2017: Eelgrass was gone again on the west side of Hadley Point, but still present at Hadley Point East and Berry Cove.
    - Conducted a green crab survey in early September.
    - Did some casual sediment coring looking for eelgrass seeds.
    - Put a crab "distractor" in the small restoration area at Hadley Point to see if eelgrass inside the "distractor" fared better than eelgrass outside of it.
    - Water quality continues to meet FBP goals.
      - Further analysis is needed to see if water quality is significantly different from other years.
    - Shared eelgrass grids and disks with the Wampanoag Tribe of Gay Head on Martha's Vineyard

- **Other**
  - There seems to be a trend of new phytoplankton showing up.
    - Frenchman Bay has been closed for the past three weeks due to *Pseudo-nitzschia*.
    - A massive algal bloom (*Karenia mikimotoi*) in Casco Bay has the potential to create low-oxygen dead zones threatening marine life in the bay.
  - Acadia Aqua Farms is part of a pilot project for baseline data collection of wild and cultured mussels using drones.
    - Collaboration with the DMR
    - Intended to become an annual resource study
    - They hope to advance the project to include multi-species planning

4. **Committee Plans for 2018**
   - Rockweed Committee meeting in November 2017
   - Currently no eelgrass restoration plans for 2018
5. **Award from Acadia Birding Festival**
   - We received $1,000 from the Acadia Birding Festival
   - The money is in a temporary account at MDI Biological Laboratory
   - Proposals will be solicited via email and reviewed by the Executive Committee.
   - The opportunity will be announced on the Frenchman Bay Partners Facebook, website, and via email.
   - Suggestions for using the money at the meeting included: updating the Frenchman Bay Atlas, or giving it to the Regional Shellfish Committee to use for seed clams or netting.
6. **Other Items**
   - Concern over TBT (Tributyltin) and its environmental effects (no one knew anything about it).
   - The buried toxics at 121 Eden Street in Bar Harbor (ferry terminal site) were brought up as well, but no one was familiar with the topic.
7. **Next Steps**
   - Update the entire Frenchman Bay Plan
   - Two grants to consider:
     - Shore and Harbor grant offered by the state of Maine for planning and strategizing

        - Deadline: Likely April 2018, but not announced yet.
    - Program Development grant offered by Maine Sea Grant for strategic plan goals.
        - Deadline: December 1, 2017 (pending federal budget appropriations)

Additional documents included in minutes:

1. Rockweed conservation target draft additions to Frenchman Bay Plan
2. Jordan River Short Report
3. Population Estimate of Blue Mussels (*Mytilus edulis)* of Jordan River, Maine

Proposed text additions to Frenchman Bay Plan:
Rockweed (*Ascophyllum nodosum*) as a conservation target

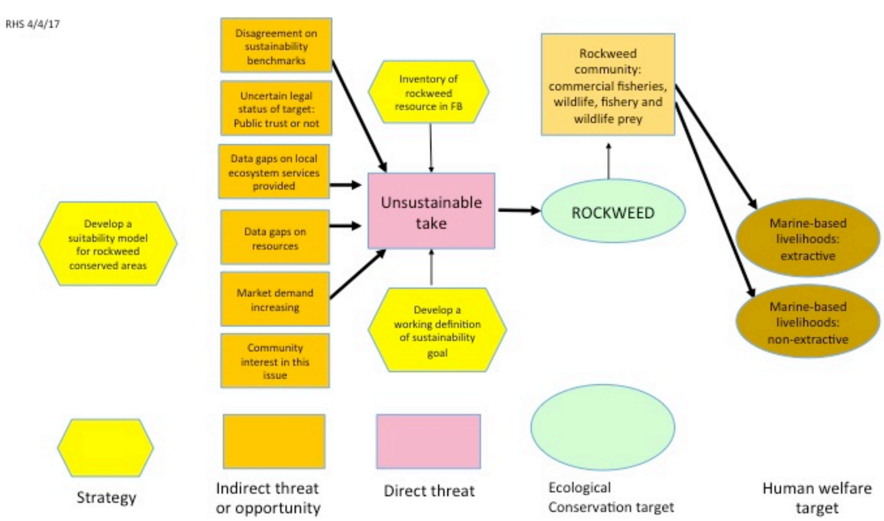
DRAFT 4 April 2017

1. Add to page 5-6:

Using the paragraph in the Plan about eelgrass as a model:
"Eelgrass is a marine flowering that forms a structurally complex and highly productive habitat. Eelgrass serves as habitat during the life cycles of a variety of marine fish and invertebrates, including lobsters and flounder, and in Frenchman Bay, mussel seed has been found in eelgrass. Eelgrass beds also help to stabilize sediments and trap particulate matter from the water column, which improves water clarity."

Rockweed, specifically *Ascophyllum nodosum*, is a brown macroalga and ecosystem engineer (Pilkington et al. 2017) that forms a structurally complex and highly productive habitat of marine "trees" (Olsen, et al. 2010) at high tide and buffers intertidal temperatures at low tide (Pilkington, et al. 2017). Rockweed canopies facilitate understory biodiversity (Jenkins et al., 1999a, b, c, 2004; Jenkins & Hawkins, 2003), and serve as habitat for over 100 species, including 25 species of commercial species of fish, and shellfish, and seabirds and shorebirds in decline (Seeley and Schlesinger, 2012). Rockweed beds help buffer the coast from storm surge [NO RESEARCH REF FOUND] and rockweed decay produces an important detrital input into nearshore ecosystems (Sharp, 1986).

2. CONCEPTUAL MODEL FIGURE



3. TABLE 1: add rockweed to Table: (group discussion)

Table 1. Direct threats of highest concern to the four conservation targets prioritized for conservation planning by the Frenchman Bay Partners and proposed strategies to address threats.

Direct Threats	Conservation Targets	Strategies
Legal but unsustainable harvesting practices -Habitat modification -Overharvesting	-Mudflats -Eelgrass -Subtidal benthic habitats -Diadromous fishes	-Create a communication plan for Frenchman Bay users -Facilitate discussions to encourage community-based management *More strategies are needed but are to be developed by the fishing community*
Exotic invasive species	-Mudflats -Eelgrass	-Promote EPA "no discharge" zoning -Monitor for invasive species -Scenario planning for invasive species -Eradicate green crabs
Dams and physical obstruction to passage	-Diadromous Fishes	-Inventory and prioritize obstructions -Ensure that culvert replacement is designed for fish passage -Develop a model of migratory fish passage along one stream
Sewage treatment and bacterial pollution - Bacterial Pollution - Nutrient Inputs	-Mudflats -Eelgrass -Diadromous Fishes	-Conduct shoreline or watershed surveys -Identify and address major sources of bacterial pollution -Conduct a build-out scenario for whole bay -Create buffers and set backs -Research impact of not treating sewage in winter -Provide incentive ordinances for innovative small-scale sewage treatment -Help residents get septic system replacement grants

4. GOALS FOR CONSERVATION TARGETS

Rockweed

Based on aerial photos from the Department of Marine Resources, there were XXXX acres of rockweed in Frenchman Bay in 19XX. Biomass assessments can be simple (amount of biomass in a unit area- Ugarte XXXX) or more complex ("plant and canopy structure, including length, circumference and density, were much better predictors of associated community structure than rockweed biomass" – Kay et al. 2016)

FIGURE – rockweed maps from aerial photos?

Overarching Goal: COMPLETE A SUITABILITY MODEL FOR ROCKWEED CONSERVED AREAS BY 2020

Sub-goals:

1. By 2019, complete the data collection necessary for, and create the following layers for a suitability model for spatial planning:

   a) "resource assessment" layer: Rockweed plant and canopy structure throughout Frenchman Bay.
   b) "conserved lands" layer
   c) "traditional harvest area" layer
   d) "dangerous harvest area" layer (physical conditions) ?
   e) etc.

2. By 2020, complete the suitability model.

<u>Strategies underway for Sub-Goal 1</u>

1. Apply for a "Shore and harbor grant" by end of April for resources to plan the acquisition of data needed to complete the layers needed for the suitability model.

2. Engage students (COA and others) to collect data under the grant.

3. Consult with Tora Johnson (UMM) for help with the model

Jordan River Monitoring Report 2017

Ashley Taylor and Anna Farrell, Community Laboratory

MDI Biological Laboratory, Salisbury Cove, ME 04672

Summary

In congruence with the Maine Department of Marine Resources' (DMR) efforts to monitor declining water quality in the Jordan River, Frenchman Bay, Maine, the Community Lab at MDI Biological Laboratory implemented regular water quality monitoring at additional sites in the watershed to supplement the work of the DMR. Water samples were collected weekly between June and August of 2017 by staff and students from the Community Lab. Samples were collected via boat and foot to reach additional intermittent streams and smaller tributaries that feed into the Jordan River. Samples were analyzed for *Enterococcus* bacteria, optical brighteners, and salinity. A goal of this work was to identify potential pollution sources and increase water quality knowledge in this area to help provide additional information to consider in regards to shellfish closures. All monitoring data and results were entered into the Anecdata.org Jordan River Monitoring Project to keep data updated, easily accessible, and open to the public.

Introduction

Between June 9, 2017 and August 31, 2017, 122 Jordan River water samples across 16 sites were collected and analyzed for *Enterococcus* bacteria, optical brighteners, and salinity.

An exploratory visit to sites JR08.1 and JR09.1 was conducted on June 9, 2017 to evaluate site accessibility. With input from project leads at the DMR and institutional knowledge, site selection was finalized by June 13, 2017. Throughout the season, four experimental sites were tested and then included in the weekly monitoring events as they were close in proximity to sites with past or current elevated levels of *Enterococcus* bacteria. While new sites were added during the sampling season, five were only sampled a few times and then discontinued from the monitoring rotation, either due to consistently low bacteria results or because the general area was already receiving sufficient sampling.

Methods

What we tested for: The variables assessed in the water quality sampling were: water temperature, salinity, *Enterococcus* bacteria, and optical brighteners, as well as general field conditions.

Why we monitored for these variables:

Enterococcus is a fecal indicator bacteria. It is found in fecal matter of all mammals and can point to the presence of feces in the water, but without further analysis or testing of water samples, it is impossible to determine if *Enterococcus* bacteria is from a human or wildlife source.

Optical brighteners are added to laundry detergents to increase clothing brightness. They are not harmful themselves, but instead can denote a potential human source of pollution. When optical brighteners are found in a watershed area it can indicate waste water entering the system that was inadequately treated, or not treated at all.

How samples were collected and analyses were conducted (see map):

Samples from sites: JR01.0, JR02.0, JR03.0, JR04.0, JR05.0, JR06.0, JR07.0, JR08.0, JR09.0, JR10.0, JR11.0 were collected via boat every Thursday at 0930, if the tide allowed for sufficient access to upper river sites. At low to mid tide, sites JR05.0 through JR09.0 are inaccessible. Samples from sites: CB01.0, CB02.0, JR08.1, JR09.1, JR09.1A, and JR09.1B were collected on foot via road access every Thursday after boat sampling had finished. These sites were not tide-dependent, and were collected weekly. In addition to the weekly sampling schedule, samples were collected if there was an adverse rain event. As noted in the DMR's protocol, an adverse rainfall event occurs when there has been over 0.75" of rain over the previous 24 hours. We did not collect any adverse rainfall event samples this summer.

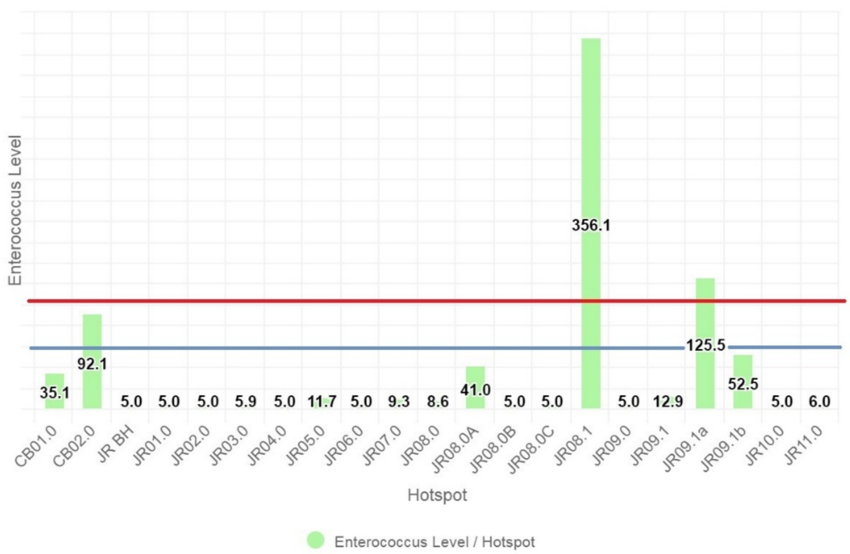


Figure 1. Bar graph of monitoring sites and their average Entercoccus level. Downloaded from Anecdata.org. The red line is the threshold for marine water (104 MPN) and the blue is the freshwater threshold (60 MPN).

Optical brightener samples were collected in conjunction with our bacteria samples. The typical threshold values for contamination is 100 ug/l. However, organic matter can interfere and elevate the reading and thus this threshold is not always a good metric for indicating human-sourced pollution.

Additional data on environmental characteristics were recorded, including: air and water temperature, tidal stage, weather, currents, surface conditions, cooler temperature, precipitation in the last 48 hours, and pollution indicators.

Results and Discussion

Scope of Monitoring: We conducted 15 sampling events between 6/2017 and 8/2017, collecting and analyzing 122 samples.

Bacteria: Of the 122 samples collected and analyzed, 19 exceeded the EPA standard for recreational water contact, which is 104 MPN/100 ml for salt water, and 60 MPN/100 ml freshwater. Of these 19 samples that exceeded the healthy limits, they all came from 5 of our 22 sites sampled. All 5 of these sites are freshwater. None of our saltwater sites ever exceeded the 104 MPN/100 ml threshold.

Sites	6/22/17	6/29/17	7/6/17	7/13/17	7/20/17	7/27/17	8/3/17	8/10/17	8/17/17	8/24/17
JR08.1		172.3		298.7	80.5	435.2	114.5	127.4	2419.6	816.4
CB02.0		350	73.8	118.7		103.9	120.1			
JR09.1a	122.3			104.6	866.4					
CB01.0		135		70.3						
JR09.1b					266					

Table 1. Sites, dates, and Enterococcus levels (MPN) that exceed the EPA threshold.

Of the sampling dates in the table in *Figure 2.* 6/29 and 7/13 both coincided with light rain events (0.1 – 0.4 in over 24 hours).

Optical Brighteners: Roughly half of our samples (60) were shipped to Meagan Sims, Southern Maine Field Coordinator with the Maine Healthy Beaches Program, for optical brightener testing throughout the season. Five of those samples exceeded the 100 ug/l threshold, all of which were collected at two sites, CB01.0 and CB02.0 (see *Figure 3.*).

Site	Date	Concentration
CB01.0	7/6/2017	114.0
CB02.0	7/6/2017	108.0
CB02.0	8/10/2017	109.0
CB01.0	8/10/2017	125.0
CB01.0	8/17/2017	122.0

Table 2. Sites, dates, and optical brightener concentrations.

However, despite these samples having high concentrations, it is unlikely that they are indeed showing a positive result for optical brighteners. The water from these two sites is consistently a tan color and were flagged by the testing lab as having substantial potential interference with tannins/humic substances due to the coloration of the sample and therefore the results are likely inflated.

<u>Conclusions</u>

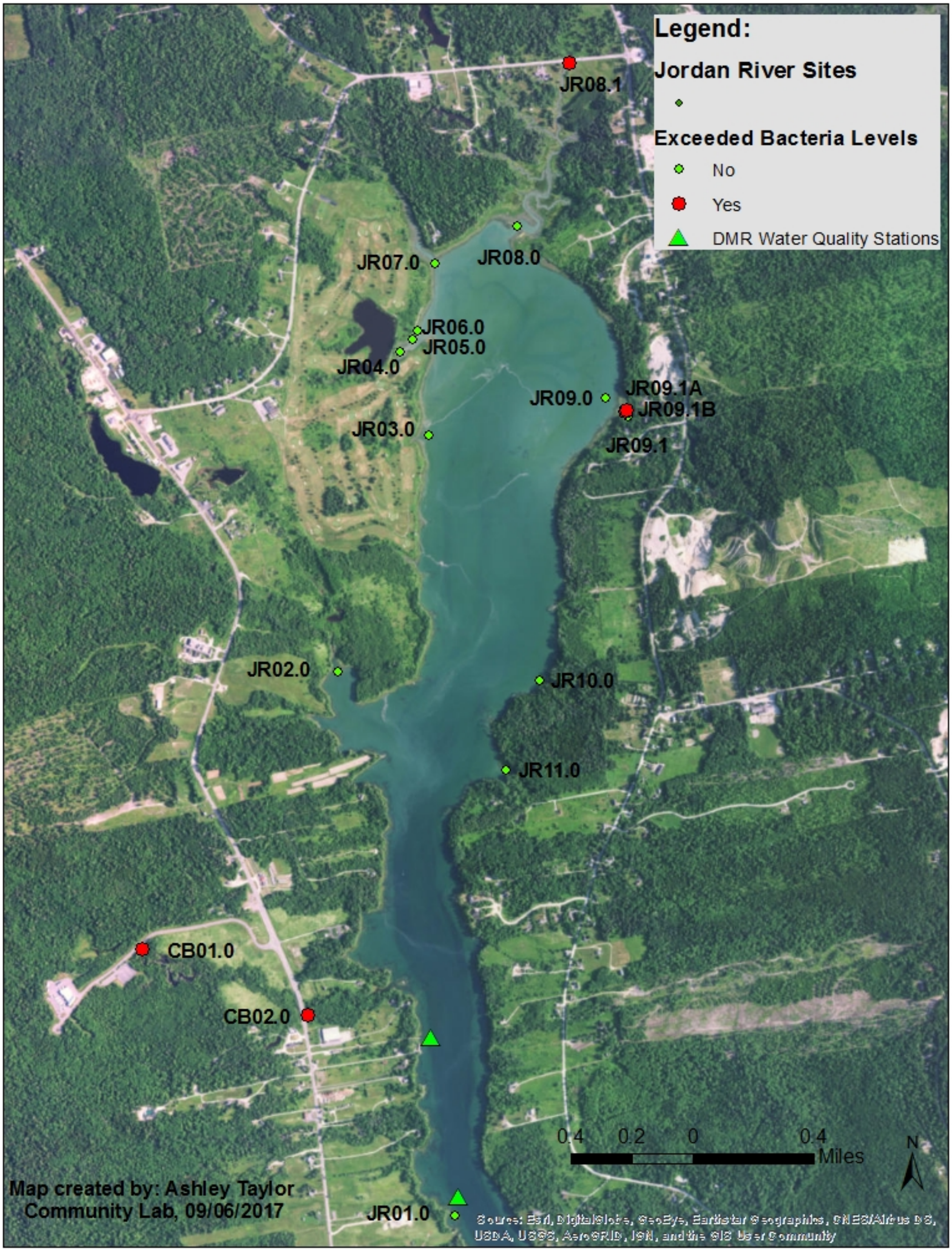
After 15 days of water sample collection and analysis of 122 samples, there were only 19 samples at five sites that exceeded the EPA recreational water safety levels. Site JR08.1, a culvert off of Route 204 in Lamoine, had the most samples that contained bacteria counts above safe levels. It also had the highest *Enterococcus* level of all sites throughout the season at >2,419.6 MPN 100/ml on 8/17/17.

Samples from sites CB01.0 and CB02.0 also were above the safe threshold, twice and five times respectively, this season. These sites were also the only two with positive optical brightener results, however it is unlikely that they are true results. These sites are part of Crippens Brook that contains high humic (dead organic matter)/organic content and is likely skewing the optical brightener results.

<u>Recommendations</u>

It is recommended that adverse rainfall event sampling continue this fall as higher flows may reveal different *Enterococcus* bacterial level trends.

Jordan River Monitoring Sites 2017



Population Estimate of Blue Mussels (*Mytilus edulis*) of Jordan River, Maine

Kaitlyn Clark, Emma Ober, Heather Sieger, and Chris Petersen

Introduction

At low tide on 13 April 2017, the authors, along with Department of Marine Resources (DMR) staff, collected samples from the blue mussel beds in Jordan River, Maine, to determine the size distribution and abundance of mussels in the beds. We collected samples from both Lamoine, the east side of the river, and Trenton, the west side of the river. Before the survey, sampling sites were established using stakes at 100-foot intervals along a transect (Figure 1). One transect of ten stakes was established on the Lamoine side of the river (stake 1: 44.4531°, -68.3494°) and two transects of twelve stakes each were established on the Trenton side of the river (stake 1: 44.4515°,
-68.3503°).

Methods

We collected mussel samples from 22 1x1 ft quadrats: 10 samples were collected from the Lamoine side and 12 samples were collected from the Trenton side, 6 samples from a shore transect and 6 samples from a channel transect. For the Lamoine transect, samples were collected at each stake except for stake 7, which was lost between the establishment of the transect and sampling. For a 10th quadrat, we took another sample 100 feet further to the north of stake 1, which was the northernmost stake on the Lamoine side. For the Trenton shore transect, samples were collected at even stakes. For the Trenton channel transect, samples were collected at odd stakes.

Figure 1: Map of Jordan River with each of the transect stakes marked.

To determine the size distribution of mussels, we used calipers to measure the length of mussels to place mussels into groups at 5 millimeter intervals (rounding down). We also determined the volumetric displacement of groups of mussels from each size category using a beaker with a spout out the side of the container and caught runoff water in a graduated cylinder when mussels were added to the beaker. To determine the relationship between length and weight of individual mussels, we measured 200 mussels to the nearest millimeter in length and weighed them to the nearest 0.1 gram.

Results

Abundance

The average number of mussels per quadrat (1 ft^2) was 46 ± 54.3 (mean ± SD), with the median number of mussels in a sample was 29 and the range was from 0 to 152 (Figure 2). Out of the 22 quadrats, 8 had zero mussels in them (36%).

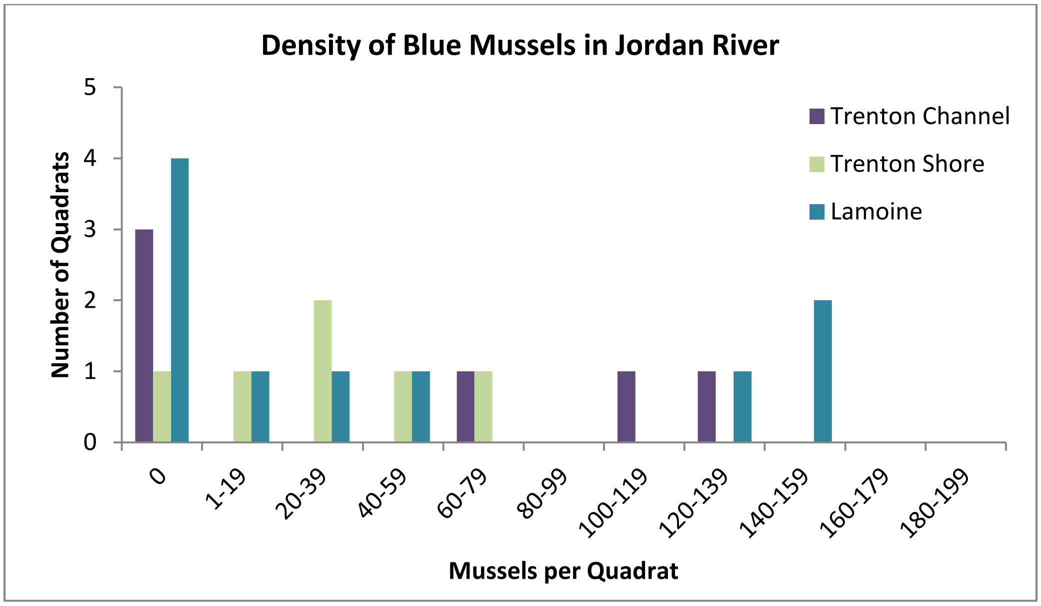


Figure 2: The number of quadrats with different densities of mussels for the three sets of plots in the Jordan River.

Size Distribution

Most mussels were in the 20-65 mm size range (Figure 3). The size classes with the highest abundance were the 35–39 mm and 40–44 mm size classes. The samples from the Trenton shore transect were smaller on average, with the highest abundance in the 30–34 mm size class (Figure 4). Trenton shore was also the least patchy of the three transects, with all six quadrats containing between 0 and 79 mussels.

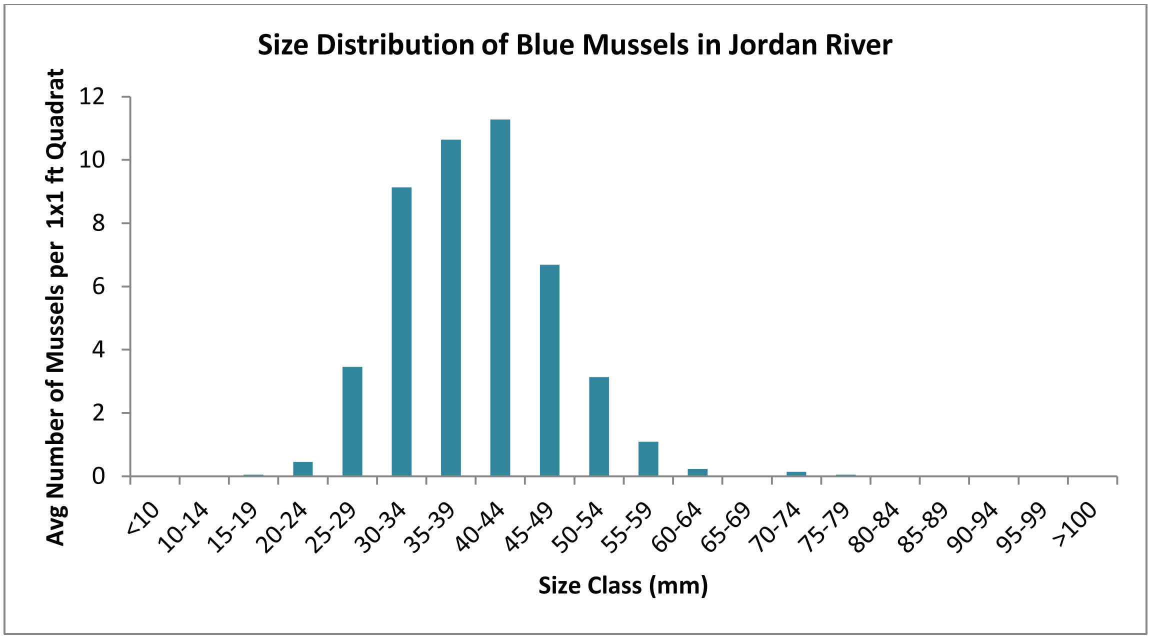


Figure 3: Size distribution of mussels in Jordan River, pooled from all 22 samples that were collected. All 22 samples were averaged together to determine the average number of mussels of each size class per sample.

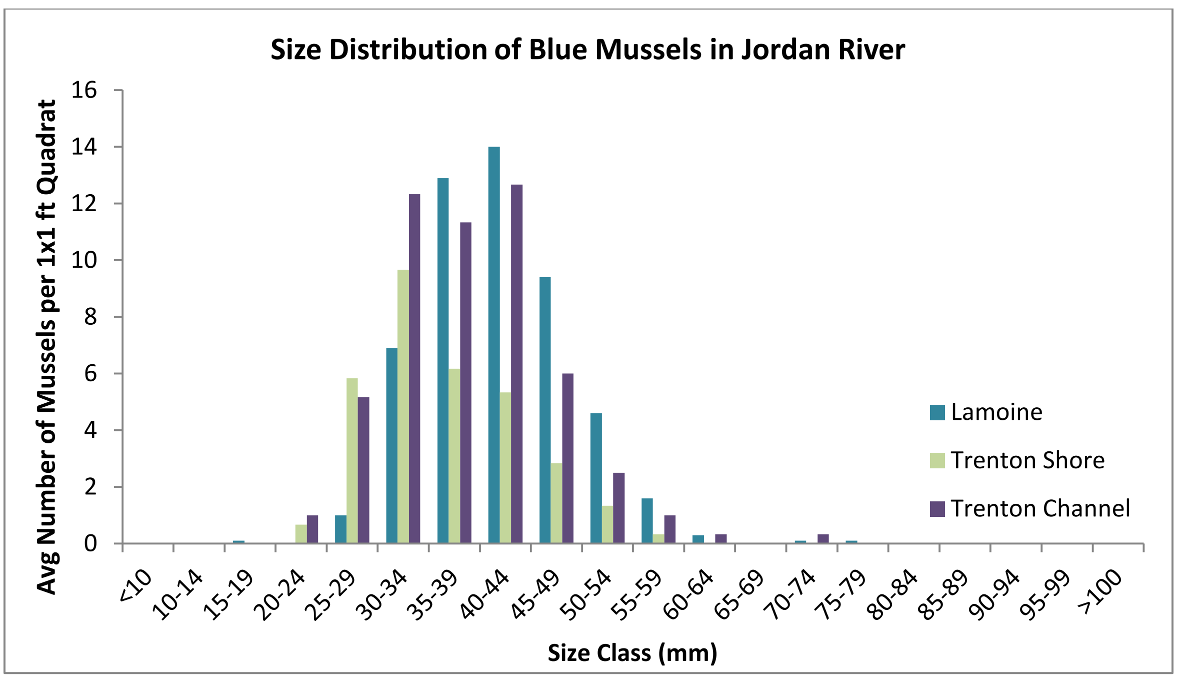


Figure 4: Size distribution of mussels in Jordan River with each transect labeled separately. After adding all of the samples from one transect together, these numbers were divided by the number of samples in that transect so that the three transects could be compared in terms of relative abundance in this graph.

Because of potential concerns about winter mortality, we also measured each dead mussel that was still attached at the hinge. The average number of dead mussels per plot was 35 ± 72.1, and the size distribution was similar to that of live mussels with the highest abundance falling in the 35–39 mm size class (Figure 5). Thus, there does not seem to be recent size selective mortality in this population of mussels.

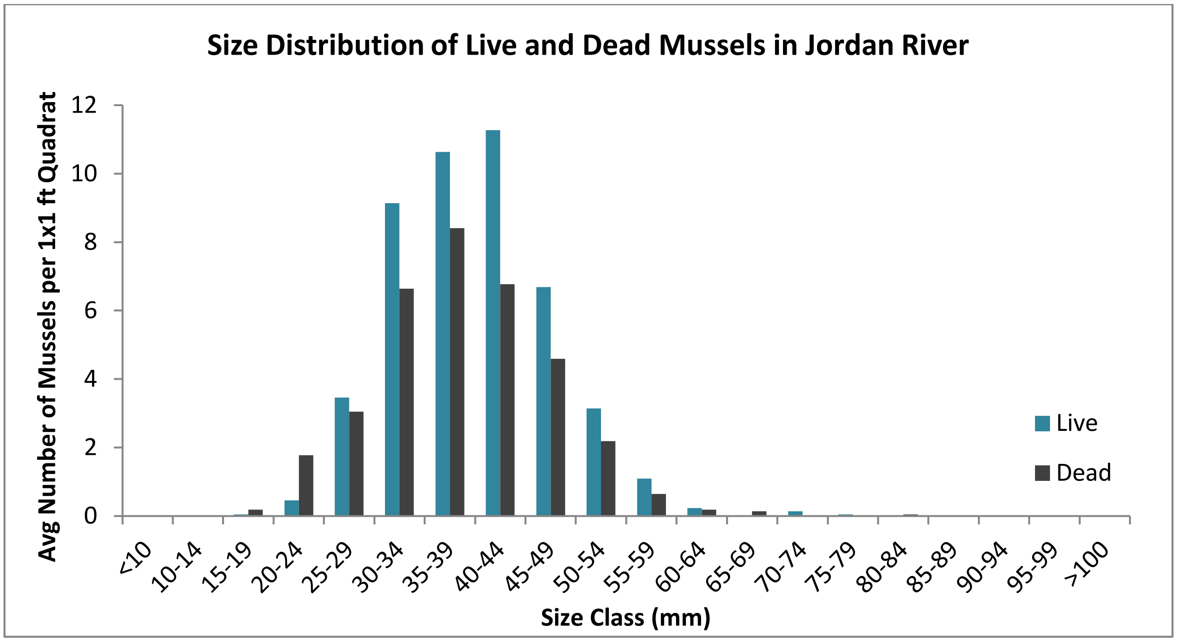


Figure 5: Size distribution of live and dead mussels from Jordan River, pooled from all 22 samples.

Percent Coverage

On the Lamoine side of the river, the distribution of mussels was uneven with substantial bare muddy areas with some areas of high mussel density. To get an estimate of the proportion of bare substrate, we ran four 100-foot, haphazard transects through the mussel bed, keeping track of when the transect was over mussels and when it was over bare mud. All four transects were run parallel to the shore at the same tidal height as the main transect stakes.

For these transects, there was a larger percentage of mudflat without mussels (89.4% ± 5.43) compared to mudflat that was covered by mussels (10.6% ± 5.43).

Volumetric Conversion Chart

To create a volumetric conversion chart for blue mussels, we used a water displacement device to measure the milliliters of water displaced by 10 mussels from a given size class if there were enough mussels of that size class to measure. We repeated this measurement 5 times for each size class that had sufficient individuals in our samples. These measurements were then averaged and divided by the number of mussels in each group to generate the average millimeters of water displaced by a mussel from a given size class (Figures 6 and 7).

Volumetric Conversion Chart	
Length (mm)	**Volume/Mussel (mL)**
<10	-
10-14	-
15-19	-
20-24	1.00
25-29	1.44
30-34	2.98
35-39	3.90
40-44	5.10
45-49	7.58
50-54	9.42
55-59	14.25
60-64	17.00
65-69	22.90
70-74	27.50
75-79	43.00
80-84	43.00
85-89	-
90-94	-
95-99	-
>100	-

Figure 6: Volume (mL) per mussel for size classes 20–24 mm to 80–84 mm. Values for the smallest and largest size classes could not be determined because there were not enough mussels of these sizes to measure.

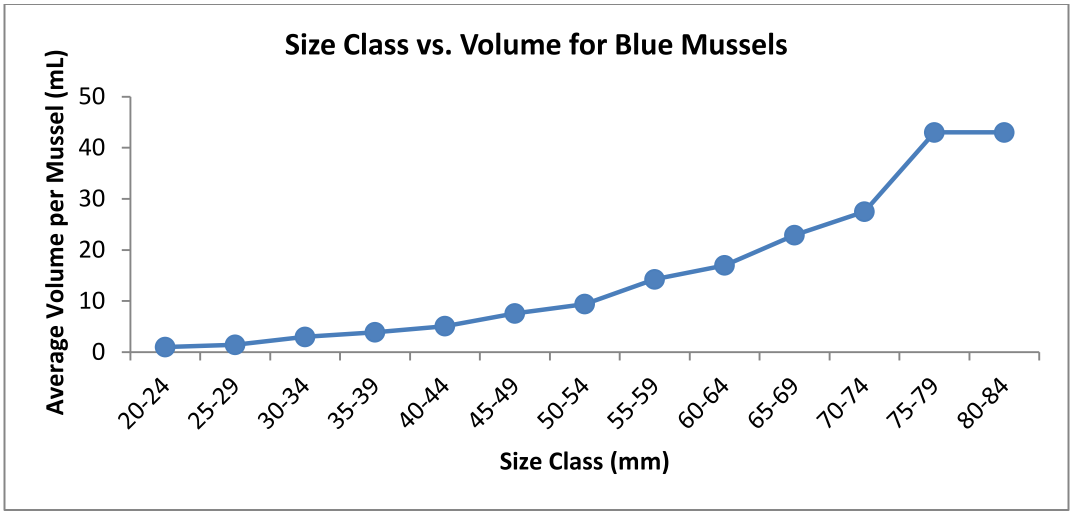


Figure 7: Average volume (mL) per mussel for each size class.

Mass-Length Conversion

To determine the relationship between length and mass at different sizes, we measured 200 mussels to the nearest millimeter and then weighed each of them to the nearest 0.1 gram. The polynomial of best fit was $y = 0.0137x^2 - 0.6971x + 10.686$ ($R^2 = 0.9593$; Figure 8).

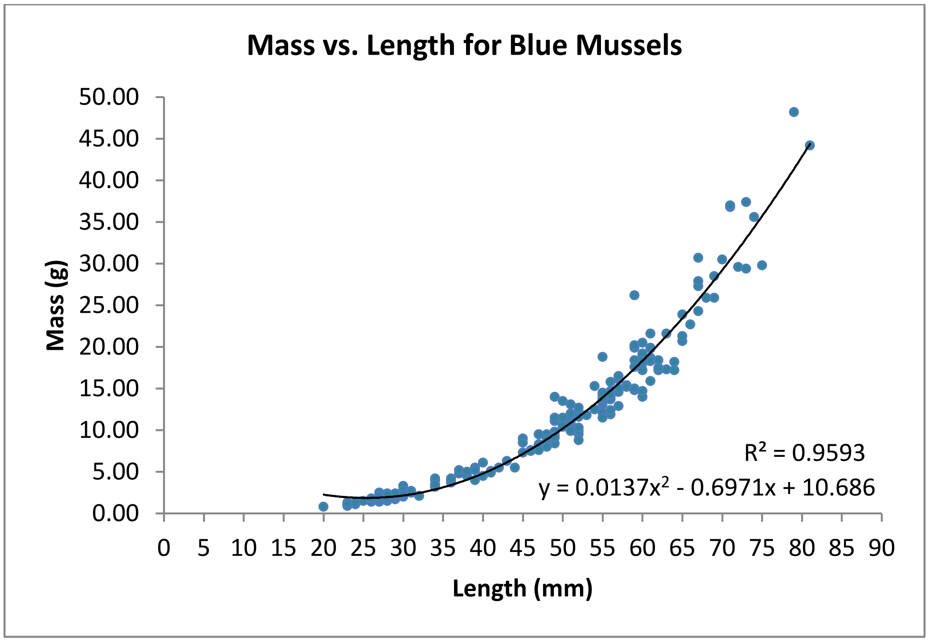


Figure 8: Mass vs. length conversion for blue mussels. A second order polynomial was fit to the data.

Discussion and Conclusion

Overall, the mussels from Jordan River were relatively small, falling primarily within the 35–39 mm and 40–44 mm size classes. Only a limited number of mussels were above the approximate harvestable size of 50 mm (approximately 2 in; for mussel harvesting, there can be no more than 106 mussels per two-quart container, which would average to 2 in per mussel). In addition, these mussels were distributed unevenly throughout the beds with large areas of mudflat containing no mussels.

In the spring 2016 DMR mussel survey, the size class with the highest abundance was the 25–29 mm size class, so the average size of mussels seems to have increased over the past year. However, we were unable to compare the total abundance of mussels between 2016 and 2017 due to differences in sampling methods.

It is interesting to note that, during sampling, we could clearly distinguish evidence of recent mussel drags. For instance, one of our sample plots (L9) was in the middle of a drag, and there were no live mussels in that plot although there were numerous mussel shells pressed into the sediment.

We hope that the volumetric conversion chart and mass-length equation will be useful in determining the overall biomass of mussels in Jordan River as DMR moves forward with regulations for the harvesting of adult and seed mussels in this region.

Raw Data

Spreadsheets with the raw data will be sent separately with the following file names:

Abundance and Size Distribution Data: JordanRiverMussels_SizeDistribution.xlsx

Percent Coverage Data: JordanRiverMussels_CoverageTransects.xlsx

Volumetric Data: JordanRiverMussels_VolumetricData.xlsx

Mass-Length Data: JordanRiverMussels_Mass-LengthData.xlsx