

Marine Invaders Fall 2008

Dan Meharg Education Specialist

General observations

- An out going tide is probably best for finding crabs because the area under the rocks are still wet, allowing crabs to replenish their gills.
- Crabs are not found directly beneath rocks half imbedded in the sand, either crabs do not prefer this type of condition, or crabs are buried out of site in the sand.
- It might be hard to study population numbers of crabs because their presence or absence varies based on the position of the tide relative to the rocks being uncovered, and how far sand has accreted around the rocks. Size, gender, and types of crabs found under each rock might be a better long term comparison.
- Crabs prefer to be beneath rocks larger than eight centimeters in length.
- Native mud crabs and Asian shore crabs are found together beneath rocks.
- Even though we prepared students in the previsit activity with skills in identifying other organisms besides crabs, student are unwilling to focus on any plants or organisms other than the crabs. Perhaps enough meaningful data is still being generated by the students if they provide numbers of crabs, species, size, and gender beneath three rocks within a quadrat. The Ed Center will continue to provide all the information necessary to do a complete survey of the other plants and organisms in each quadrat.

Field collection protocol:

I. Creating a Quadrat

-Tosser will toss the bean bag over his/her shoulder so it lands on a random section of the rocky sea shore.

-Then he/she will place four meter sticks on the grid around the bean bag creating a quadrat.



II. Marking the spots

-The tosser will choose three “large rocks” within the quadrat for sampling.

-The tosser will place 3 CDs provided on the 3 sampling spots (rocks). The tosser will tell the group which rocks are spots A B and C/



III. Observing Life In the Footprints



- Two flippers/Grabbers will station themselves by each one of the three rocks designated by the tosser for flipping.



Flipper/grabbers will get a collection pans A, B and C ready by each

rock. Flipper/grabbers will flip a rock to reveal sand under rock. They will catch all of the crabs they find and place them into the collection pan for that specific rock. This outline in the sand will now be known as the footprint.



IV. Finding Footprints

-Observers will measure the dimensions of the footprint and call out the measurements.

-Observers will look into the footprint and call out to the recorder which plants and living organisms they find in the foot print.

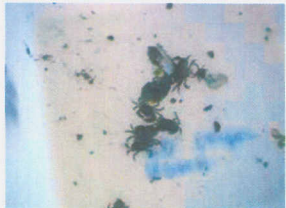


V. Recording Data

-Recorder 2 will put information about size and gender of the crabs on the data sheet.

-Recorder 1 helps recorder 2 document the data.

-Recorders enter all information on data sheet. If the organisms listed on the data sheet are not present, enter "0." Do not leave any blank.



VI. Photographing the data



- Photographer takes a picture of crabs in the collection pan and organisms in the jars.

VII. Finishing with a spot:

- Flipper/Grabbers replace crabs back under the rock, turn and the rock back to its original position. Repeat procedure over again in three different spots. A Total of 18 rocks will be uncovered by the class during each investigation.

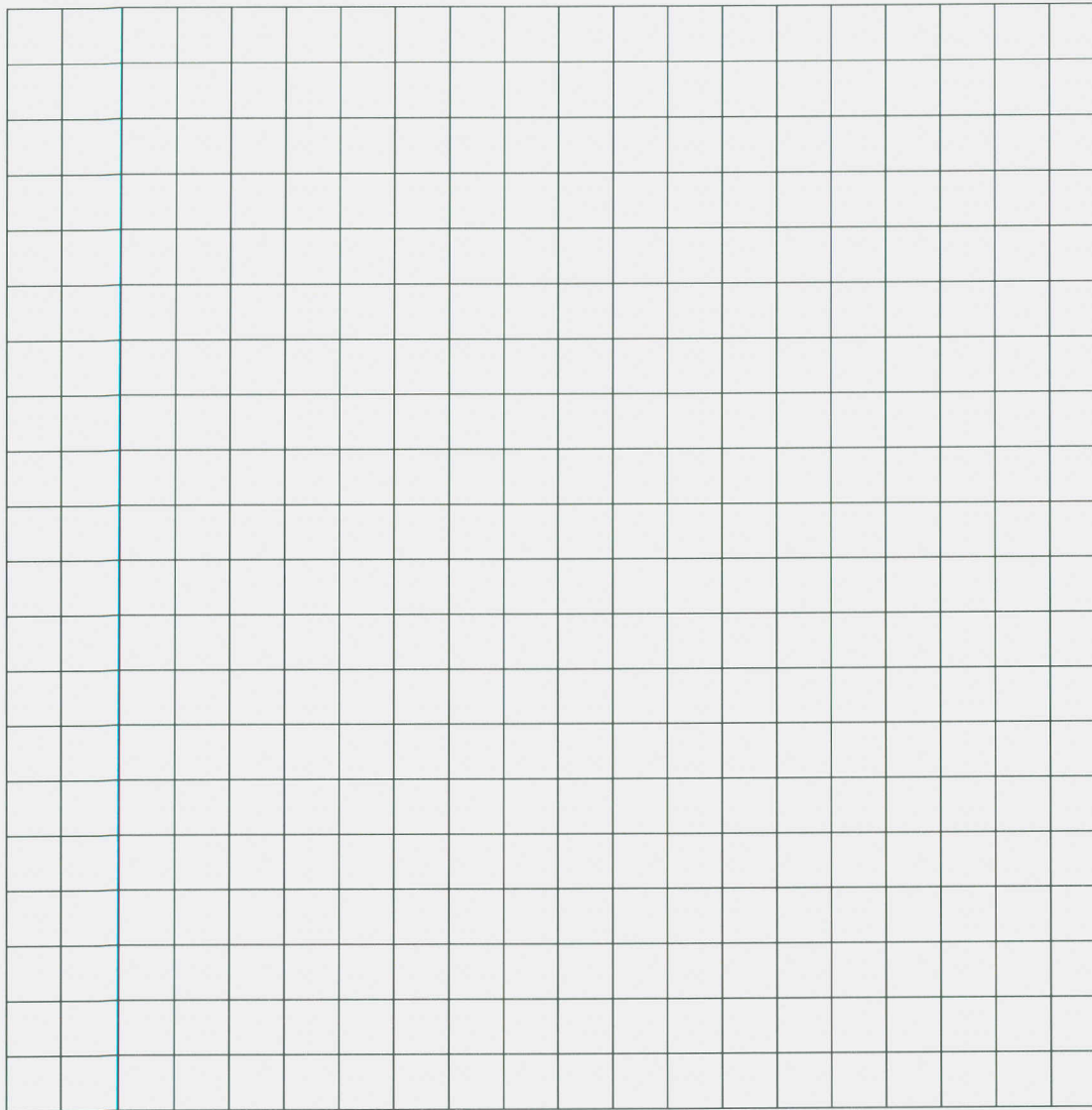
				Spot __ B				Spot __ C			
Name of Crab	Size (cm)	Gender (M/F)		Name of Crab	Size (cm)	Gender (M/F)		Name of Crab	Size (cm)	Gender (M/F)	
Asian Shore Crab		# Of F	# Of M	Asian Shore Crab		# Of F	# Of M	Asian Shore Crab		# Of F	# Of M
Mud Crab		# Of F	# Of M	Mud Crab		# Of F	# Of M	Mud Crab		# Of F	# Of M
Green Crab		# Of F	# Of M	Green Crab		# Of F	# Of M	Green Crab		# Of F	# Of M
Name of Crab	# Of Crabs Found			Name of Crab	# Of Crabs Found			Name of Crab	# Of Crabs Found		
Lady Crab				Lady Crab				Lady Crab			
Rock Crab				Rock Crab				Rock Crab			
Spider Crab				Spider Crab				Spider Crab			
Name of Organism	# of Organisms	Name of Organism	# of Organisms	Name of Organism	# of Organisms	Name of Organism	# of Organisms	Name of Organism	# of Organisms	Name of Organism	# of Organisms
Sand Shrimp		Clam Worm		Sand Shrimp		Clam Worm		Sand Shrimp		Clam Worm	
Mud Snail		Barnacle & Other		Mud Snail		Barnacle & Other		Mud Snail		Barnacle & Other	
Name of Shell	# Of Shells			Name of Shell	# Of Shells			Name of Shell	# Of Shells		
Common Periwinkle				Common Periwinkle				Common Periwinkle			
Ribbed Mussel				Ribbed Mussel				Ribbed Mussel			
Blue Mussel				Blue Mussel				Blue Mussel			
Gem Clam				Gem Clam				Gem Clam			
Slipper Shell				Slipper Shell				Slipper Shell			
Jack Knife				Jack Knife				Jack Knife			
Other				Other				Other			
Name of Plant	# Of Plants			Name of Plant	# Of Plants			Name of Plant	# Of Plants		
Sea Lettuce				Sea Lettuce				Sea Lettuce			
Rockweed				Rockweed				Rockweed			
Irish Moss				Irish Moss				Irish Moss			
Other				Other				Other			

Instructions: Fill out all Quadrata information on this data sheet. Each space on this data sheet requires an answer with a number. **Date:** _____

Name(s): _____

Date: _____

Quadrat ____



Spot _A: Length _____

Width _____

Area _____

Spot _B: Length _____

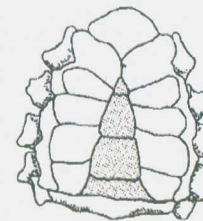
Width _____

Area _____

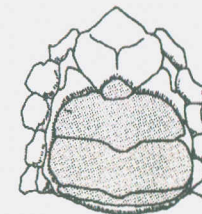
Spot _C: Length _____

Width _____

Area _____



Male



Female

Crab Gender Key
(only for crabs
measuring greater
than 1 cm)

Challenge: If you discover organisms in your quadrat that are NOT UNDER ROCKS, write the names of the organisms, and mark their positions relative to the rocks on your grid.

Reference Guide

WARNING

MaRiNe InVaDeRs

Spider Crab



Brown, has long legs and has spikes.

Green Crab



Black/green body, has hairy back legs. Has 5 marginal teeth on each side of eyes.

Asian Shore Crab



Striped legs

Lady Crab



Pink shell is covered with spots. Has paddle-like legs on back.

Mud Crab



Has two black claws, with white tips

Chinese Mitten Crab



Has hairy front claws

Rock Crab

Red/purple fan shaped shell.

Crabs

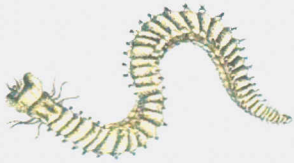
Other Organisms:

Sand Shrimp



Mostly white; < 2 inches

Worm



Little hairs come out from its sides

Mud Snail



Like tiny black rocks with white heads

Barnacle

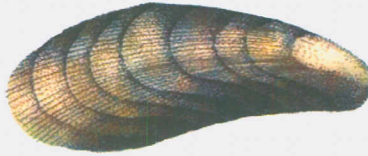


Round with hole on top, 1 in. (2.54 cm)

Illustrations by: AGillustration.com

Shells:

Ribbed Mussel



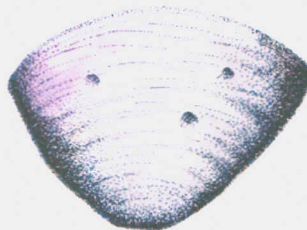
Beige/black shell with lines across it

Blue Mussel



Black and blue and smooth

Gem Clam



< 1/8 in. (.32 cm) Glossy smooth shells or with concentric ridges.

Slipper Shell



< 1.5 in. (3.81 cm), looks like slipper, and is purple/ white.

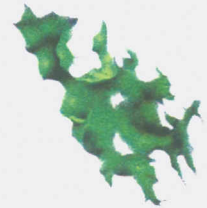
Jack Knife Clam



Long, smooth hard shell

Plants:

Sea Lettuce



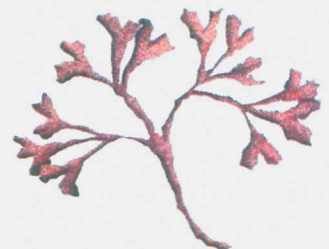
Green/ dark green; lettuce floating in the water

Rockweed



Yellow/ deep green; bulbs at the end

Irish Moss



Purplish/red; near rocks; 7-10 in. (17.8-25.4 cm) tall

Field notes for Midwood High School visit to the Floyd Bennett Field Seaplane ramp 10/10/2008
10:30-11:30 AM Larry Kolotkin, teacher Lat. 40.595218 Lon. -73.880793

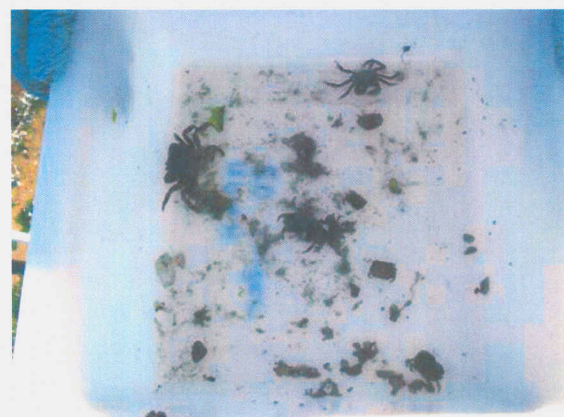
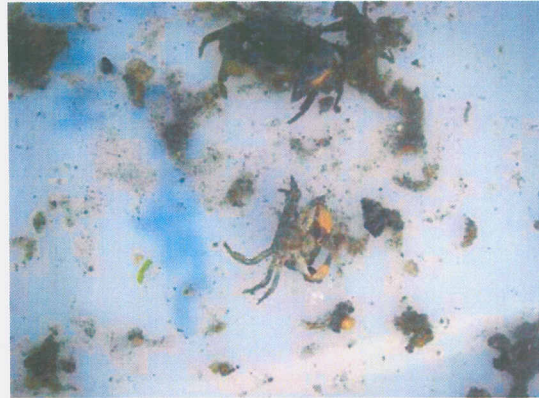


As of this writing (11/25/08) Midwood HS has not turned in any of their field data. As I observed the findings of the group, it was remarkable how native mud crabs outnumbered Asian shore crabs. Native mud crabs were found in large numbers. Until Midwood HS submits data, only the following photographs of the organisms collected from each quadrat serve as proof of the abundance of native black clawed mud crabs.

Low tide 11:45 AM EDT Tide Predictions for Canarsie Pier

<http://tbone.biol.sc.edu/tide/tideshow.cgi>

Midwood High School



Field notes for Beach Channel High School visit to Big Egg Marsh 11/10/2008 11AM -12 PM
EST Lat. 40.594981 Lon. -73.822492
Jennifer Porchedeau, teacher
<http://tbone.biol.sc.edu/tide/tideshow.cgi> Prediction for Canarsie
Low Tide 11:25 AM ESTime

Note: Beach Channel groups tended to flip over all the rocks within the quadrat and collect any crabs found within the quadrat. Groups were allowed to not record information in quadrats that had no crabs, and make records for those quadrats which had crabs beneath the rocks. Students seemed only interested in recording crab data and not the presence and absence of other organisms.



Group 1:		Beach Channel HS 11/10/08 & 11/28/2008 11AM-12:30 PM Lat. 40.595218 Lon. -73.880793								
Big Egg Marsh Low tide 11 AM Weather: sunny, windy, air temp 50°F										
Site	Asian Shore Crabs Found			Rock Dimensions (cm)			Site	Mud Crabs Found		
	Male	Female	No Gender	Length	Width	Area (cm ²)		Male	Female	No Gender
Q. 1	0	0	0	---	---	---	Q. 1	2	1	0
	Size (cm)							Size (cm)		
	---	---	---					1.0	---	---
	---	---	---					2.0	---	---
	---	---	---					0.5	---	---
	Male	Female	No Gender					Male	Female	No Gender
Q. 2	1	4	0	---		---	Q. 2	7.0	0	0
	Size (cm)							Size (cm)		
	---	---	1.0					2.0	---	---
	---	---	1.0					2.0	---	---
	---	---	2.0					2.0	---	---
	---	---	2.0					2.0	---	---
	---	---	2.0					2.0	---	---
	---	---	2.0					2.0	---	---
	---	---	---					1.0	---	---
	Male	Female	No Gender					Male	Female	No Gender
Q. 3	4	---	6	---	---	---	Q. 3	0	0	0
	Size (cm)							Size (cm)		
	---	---	---					---	---	---

Group 2:										
Site	Asian Shore Crabs Found			Rock Dimensions (cm)			Site	Mud Crabs Found		
	Male	Female	No Gender	Length	Width	Area (cm ²)		Male	Female	No Gender
Q. 1	0	0	0	---	---	---	Q.1	0	0	0
	Size (cm)							Size (cm)		
	---	---	---					--	--	---
	Male	Female	No Gender					Male	Female	No Gender
Q. 2	2, 0, 0	2, 0, 0	0,4, 3	---	---	---	Q.2	0	0	0
	Size (cm)							Size (cm)		
	---	---	---					---	---	---
	Male	Female	No Gender					Male	Female	No Gender
Q. 3	0	0	0	---	---	---	Q.3	0	0	0
	Size (cm)							Size (cm)		
	---	---	---					---	---	---

Note: The three values for the number of male, female, and no gender are written in order in which they were found under the sample rocks (i.e. the 1st number represents rock 2A, the second rock 2B, etc....).

Field Notes for Curtis High School visit to Fort Wadsworth (South Beach) 11/12/2008

Joe Russo, teacher 10:15-11:30 AM Lat. 40.599827 Lon. -74.052733

<http://tbone.biol.sc.edu/tide/tideshow.cgi> Verrazano Narrows Low Tide: 11:53 AM

Curtis H.S. groups did the most thorough job following the protocol. They collected crabs beneath only the rocks they had designated A,B and C within the quadrat. Groups were given permission to not record data if no crab species found in a quadrat. Students seemed only interested in identifying and recording crab data, and not presence or absence of other organisms.



Group 1:		Curtis High School 11/12/08 11 AM													
Latitude: 40.599827 Lon. -74.057233															
Fort Wadsworth (South Beach) Low Tide 11:53 AM Weather: Cloudy, Calm, Air Temp 50°F															
Site		Asian Shore Crabs Found			Rock Dimensions (cm)			Site		Mud Crabs Found					
		Male	Female	No Gender	Length	Width	Area (cm ²)			Male	Female	No Gender			
Q 1	A	3	0	0	29.0	33.0	957.0	Q 1	A	0	0	0			
		Size (cm)								Size (cm)					
		0.6	---	---						---	---	---			
		1.3	---	---						---	---	---			
		0.6	---	---						---	---	---			
		2.0	---	---						---	---	---			
	B	1	0	0	20.0	24.0	480.0	B	0	0	0				
		Size (cm)							Size (cm)						
			2.0	---	---						---	---	---		
C	1	3	0	25.0	32.0	800.0	C	0	0	0					
	Size (cm)							Size (cm)							
	0.6	1.5	---					---	---	---					
	---	1.3	---					---	---	---					
		---	0.8	---					---	---	---				
Q 2	A	0	2	0	21.0	30.0	630.0	Q 2	A	0	0	0			
		Size (cm)								Size (cm)					
		---	3.0	---						---	---	---			
		---	1.7	---						---	---	---			
	B	1	1	0	32.0	20.0	640.0	B	0	0	0				
		Size (cm)							Size (cm)						
		3.5	1.7	---					---	---	---				
	C	3	0	0	41.0	32.0	1312.0	C	0	0	0				
Size (cm)						Size (cm)									
1.0		---	---				---		---	---					
0.7		---	---				---		---	---					
		0.9	---	---					---	---	---				
Q 3	A	0	1	0	33.0	30.0	990.0	Q 3	A	0	0	0			
		Size (cm)								Size (cm)					
		---	1.6	---						---	---	---			
Continued on Next Two Pages...															

Site		Asian Shore Crabs Found			Rock Dimensions (cm)			Site		Mud Crabs Found			
		Male	Female	No Gender	Length	Width	Area (cm ²)			Male	Female	No Gender	
Q 3	B	3	1	0	25.0	11.5	287.5	Q 3	B	0	1	0	
		Size (cm)								Size (cm)			
		1.0	1.6	---						---	1.6	---	
		1.0	---	---						---	---	---	
		1.5	---	---						---	---	---	
	C	3	0	0	32.0	48.0	1536.0		C	0	0	0	
		Size (cm)								Size (cm)			
		1.0	---	---						---	---	---	
		0.7	---	---						---	---	---	
0.7		---	---				---	---		---			

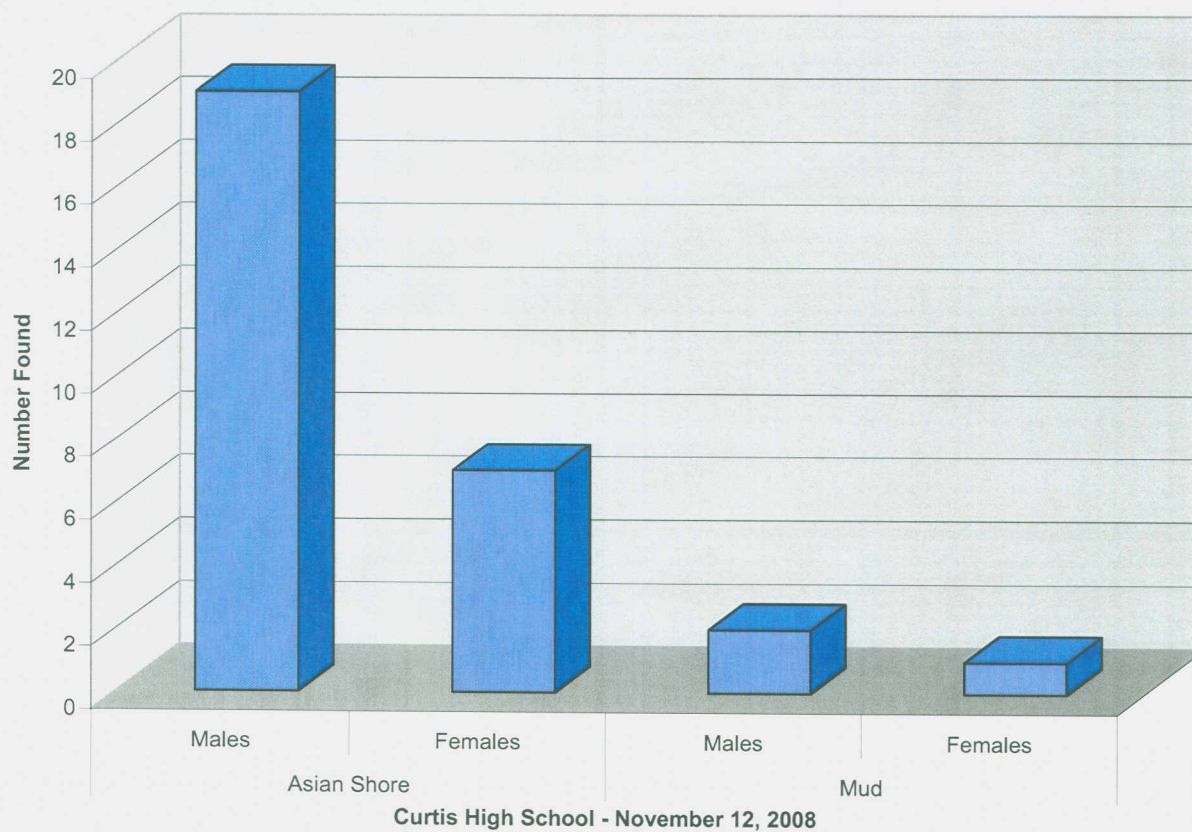
Group 2:

Group 2:

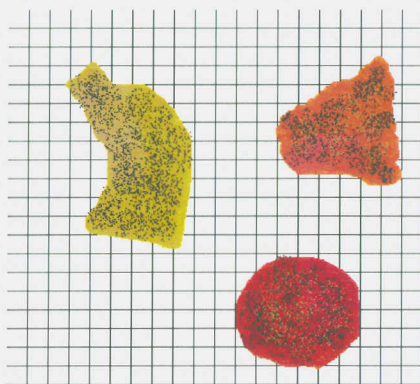
Site		Asian Shore Crabs Found			Rock Dimensions (cm)			Site	Mud Crabs Found			
		Male	Female	No Gender	Length	Width	Area (cm ²)			Male	Female	No Gender
Q 1	A	2	0	0	9.0	26.0	234.0	Q 1	A	1	0	0
		Size (cm)								Size (cm)		
		1.5	---	---						1.0	---	---
		1.0	---	---						---	---	---
	B	0	0	0	33.0	33.0	1089.0		B	0	0	0
		Size (cm)								Size (cm)		
		---	---	---						---	---	---
	C	0	0	0	40.0	27.0	1080.0		C	0	0	0
		Size (cm)								Size (cm)		
		---	---	---						---	---	---
Q 2	A	0	0	0				Q 2	A	0	0	0
		Size (cm)								Size (cm)		
		---	---	---						---	---	---
	B	0	0	0					B	0	0	0
		Size (cm)								Size (cm)		
		---	---	---						---	---	---
	C	0	0	0					C	0	0	0
		Size (cm)								Size (cm)		
		---	---	---						---	---	---

Site		Asian Shore Crabs Found			Rock Dimensions (cm)			Site		Mud Crabs Found		
		Male	Female	No Gender	Length	Width	Area (cm ²)			Male	Female	No Gender
Q 3	A	2	0	0	47.0	20.0	940.0	Q 3	A	1	0	0
		Size (cm)								Size (cm)		
		1.0	---	---						2.5	---	---
		1.0	---	---						---	---	---
	B	0	0	0	33.0	15.0	495.0		B	0	0	0
		Size (cm)								Size (cm)		
		---	---	---						---	---	---
	C	0	0	0	28.0	48.0	1344.0		C	0	0	0
		Size (cm)								Size (cm)		
		---	---	---						---	---	---

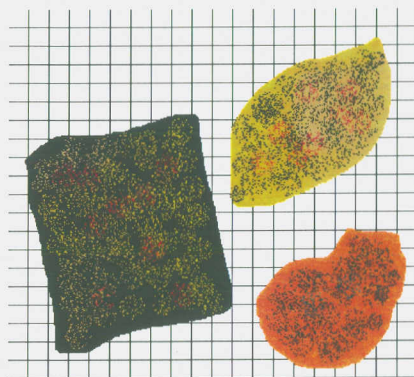
Total Crab Populations



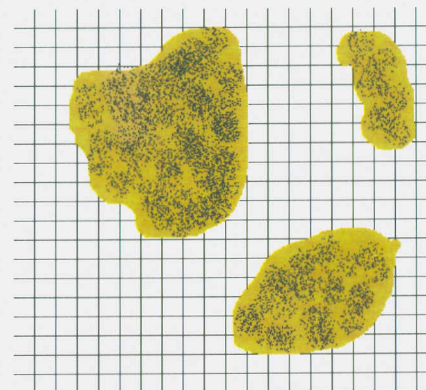
Quadrat Summary -



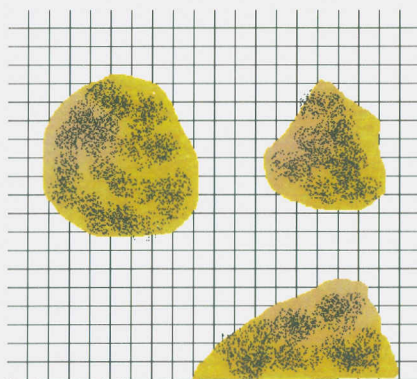
Quadrat #1 - Group 1



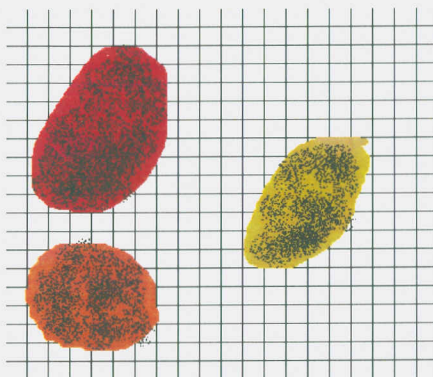
Quadrat #2 - Group #1



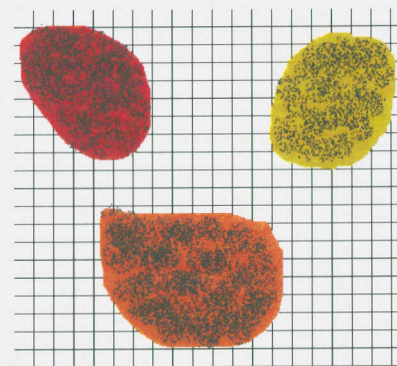
Quadrat #3 Group #1



Quadrat 1 - Group 2



Quadrat #2 - Group 2



Quadrat 3- Group 2

Scale 1 box = 5

Field Notes for Seth Low Middle School visit to Floyd Bennett Field Seaplane ramp

11/13/2008 Dominica Fiume, teacher 11:00AM – 12:00 PM

Lat. 40.595218 Lon. -73.880793

<http://tbone.biol.sc.edu/tide/tideshow.cgi>

Low Tide 1:59 PM

Students from Seth Low sampled the same beach at the Seaplane Ramp that had been sampled by Midwood HS a month earlier. The tide was much higher than it had been on the day that Midwood came, and the rocks seemed much more imbedded in the sand. A total of five male Asian Shore Crabs were the only crabs found. About ten quadrats were selected and three rocks within each quadrat flipped. The day was cold, windy and wet. Students seemed unwilling to record data, except to note the five shore crabs found.



An Update on the Disappearing Salt Marshes of Jamaica Bay, New York



Prepared by:

**Gateway National Recreation Area,
National Park Service, U.S. Department of the Interior**

Jamaica Bay Watershed Protection Plan Advisory Committee

August 2, 2007

Photo Credit:

M. Kathryn Mellander. 2002, July. National Park Service, Gateway National Recreation Area.
Section of Black Wall Marsh.

AN UPDATE ON THE DISAPPEARING SALT MARSHES OF JAMAICA BAY, NEW YORK

**Prepared by Gateway National Recreation Area, National Park Service, U.S. Department of the Interior
and the Jamaica Bay Watershed Protection Plan Advisory Committee**

August 2, 2007

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Appendix A: Local Law 71

Appendix B: List of Committee Members Including Affiliations and Biographies

Appendix C: Int. No. 376

Appendix D: Mapping Reference Panel

Appendix E: Mapping Classification Descriptions

Appendix F: Vegetated Marsh Maps for East High, Yellow Bar, Black Wall, Elders Point, and Pumpkin Patch
Marshes

Executive Summary

For at least a decade, it has been recognized that Jamaica Bay's tidal wetlands are rapidly disappearing. In 2001, mapping analysis conducted by the New York State Department of Environmental Conservation (DEC) showed that between 1924 and 1999, half of the bay's vegetated marsh islands disappeared.¹ Even more alarmingly, DEC determined that the rate of loss had been increasing over time.² Between 1994 and 1999, for example, the rate of loss had nearly doubled from that of 1974-1994; assuming that rate of loss continued baywide into the future, it was calculated that the marsh islands would completely vanish by 2024.³

The Jamaica Bay Watershed Protection Plan Advisory Committee (Advisory Committee or Committee), created by New York City municipal law in 2005, and the Gateway National Recreation Area (GNRA), which encompasses more than half of the bay within its Jamaica Bay Unit, conducted this study to obtain a current understanding of the marsh loss problem, and specifically to determine whether the rate of loss had continued to accelerate since DEC released its 1999 results. For this report, the Committee and GNRA relied upon comprehensive (baywide) analysis of 2003 satellite imagery and aerial photography previously conducted by GNRA. The Committee and GNRA also obtained 2005 aerial photography of representative marshes from DEC, which was then analyzed and extrapolated to the bay as a whole, for the purpose of updating the 2003 analysis. Like the DEC analysis, this analysis focused only on the salt marsh islands where loss is known to be the most severe, and did not encompass fringe marshes or the upper reaches of the bay beyond John F. Kennedy International Airport. It is assumed that the bay's fringe marshes, the bay's upper salt marsh, and the margins of the dredge-spoil islands will degrade at a slower pace.

The analysis of the 2003 satellite imagery and aerial photography and 2005 aerial photography, and comparisons to earlier aerial photography using the protocols described *infra*, indicate that the rate of tidal wetlands loss in Jamaica Bay continues to accelerate. Field observations support this conclusion. From 1989-2003, the calculated average rate of loss was 33 acres per year, compared to a fairly consistent rate of approximately 18 acres per year from 1951-1989. This supports DEC's earlier conclusion that the marsh loss rate started to rapidly accelerate in the 1990s. By 2003, just 37 percent of the salt marsh islands that had been present in Jamaica Bay in 1951 were calculated to be left. Analysis of the 2005 aerial photography for five selected marshes representing different areas in the bay, and comparisons to the 2003 baywide map, yielded startling results. From 2003-2005, just a two-year period, it was calculated that four of the five marshes lost 54 acres, or almost 30 percent of the extent in 2003 (187 acres) (the fifth marsh, Elders Point, which had already lost more than 90 percent of its wetlands, remained approximately the same). The analysis indicated that a marsh in the south of the bay, Black Wall, which had been relatively stable, lost more than half of its remaining tidal wetlands over the two-year period. At a landscape scale, what is generally happening on the marsh islands is that tidal creeks are expanding and vegetated areas are transforming into mud flats, then to sand flats as they disappear.

Because the rate of marsh island loss appears to have continued to increase, prior projections that the marsh islands will disappear by 2024 are also likely too optimistic, probably by a significant margin. In a manner similar to prior projections, if the 2003-2005 observed loss for the five representative marshes is extrapolated to the entire bay, the bay's marsh islands would be projected to all disappear by 2012, just five years from now. Because this projection is based on a short time period and marsh loss rates vary between individual marsh islands, some islands may persist for longer and some for shorter. It should also be noted that only two years of data to represent current trends, as well as adequate aerial photography for only five marshes, was available. It will be important to collect and analyze additional years of data, including for additional marshes, to check for possible bias in this dataset. Also, if loss rates slow when only elevated vestiges of marsh island remain, then these projections will be overly pessimistic, while a continued trend towards accelerating loss rates would have the opposite effect. Finally, intervention to successfully reverse these trends will obviously affect the future scenario.

Jamaica Bay remains one of the largest and most productive coastal ecosystems in the northeastern United States, and includes the largest tidal wetland complex in the New York metropolitan area.⁴ The bay's waters and marshes are considered a critical stopover point for migrating birds – estimated to be visited annually by nearly twenty percent of the continent's different bird species – and home for more than eighty fish species, as well as many threatened and endangered species.⁵ Jamaica Bay's tidal marshes also provide flood protection for nearby businesses and residences, and serve as, together with the wildlife that depend on them, a unique recreational, aesthetic, and cultural resource for New York City.

Although the exact causes of the accelerating marsh loss remain unknown, the gravity of the problem warrants immediate action. Where possible contributing causes and how to address them have been identified, action should be taken immediately. Poor water quality in the bay, and specifically significant nitrogen pollution from the city's wastewater treatment plants, falls into this category. In other words, as the Advisory Committee has previously recommended, steps to dramatically reduce nitrogen discharges into the bay should be undertaken immediately. In addition, marsh island restoration should be continued and expanded in order to help balance out marsh island loss until its underlying causes are addressed. Finally, the scientific and engineering effort to pinpoint the causes of the marsh loss and how to effectively address them (*e.g.*, determine how to address possible causes other than excess nitrogen) should be immediately and significantly scaled up.

Background

In the late 1990s, DEC began analyzing aerial photography of Jamaica Bay dating back to 1924 in collaboration with concerned local groups, such as the Jamaica Bay Eco Watchers. In 2001, the agency produced the first official report on the extent of the bay's tidal wetlands loss. It would be an underestimate to say that this report confirmed concerns that the bay's wetlands had been disappearing – indeed, DEC calculations show that between 1924 and 1999 the bay had lost fully half of its tidal wetlands.⁶ Even more alarming, the analysis showed that the rate of loss had been accelerating over time. From 1924 to 1974, DEC calculated that 780 acres of marsh islands were lost because of direct dredge and fill activities (which were more strictly regulated after the 1970s) and 510 acres were lost due to other reasons at roughly 10 acres a year.⁷ More than 500 acres were again lost between 1974 and 1994 – approximately the same loss of land in half the time. And between 1994 and 1999, the rate increased again, with DEC calculating an additional 220 acres of loss.⁸ DEC roughly estimated that if the loss were to continue at the rate of 44 acres per year, it was predicted that – 100 years after the first aerial mapping of the bay in 1924 – all of the marsh islands in Jamaica Bay could be gone.⁹

While restoration efforts in the bay had been ongoing for a number of years, DEC's report triggered an intensified effort to protect and restore salt marsh and to determine the cause of the wetlands loss and possible solutions. In 1999, the Jamaica Bay Ecosystem Research and Restoration Team (JABERRT) investigated twelve potential salt marsh restoration sites within Jamaica Bay, and several of these sites (*e.g.*, Gerritsen Bay and Spring Creek) have been partially restored.¹⁰ In 2001, GNRA convened a “blue ribbon” panel of national experts to examine the possible causes of the bay's marsh loss, focusing mainly on reduced sediment supply and suspension problems. The panel recommended a number of additional studies and restoration projects, such as the Big Egg Marsh thin layer sediment spraying, to add sediment to areas, which are then planted to help restore healthy marsh elevations.¹¹

In 2005, New York City responded to the marsh loss crisis, as well as other problems besetting Jamaica Bay, by enacting Local Law 71. The law required the New York City Department of Environmental Protection (DEP) to develop a comprehensive *Jamaica Bay Watershed Protection Plan* (Plan) to “restore and maintain the water quality and ecological integrity of Jamaica bay.”¹² (See Appendix A.) The new law also established the Advisory Committee; its seven members are charged with assisting DEP in Plan development. (See Appendix B.)^{*}

Not surprisingly, Jamaica Bay's marsh loss became one of the Advisory Committee's priority concerns. The Committee was surprised to find, despite the recognized gravity of the problem and the attention it has received, the current extent of the marsh loss was unknown, and specifically that it was unknown whether the rate of loss was continuing to increase. DEC has not updated its analysis with post-1999 data. Although GNRA staff had

^{*} The original timeline in the law called for submission of the final Plan by September 1, 2006; this timeline was extended to October 1, 2007 by Introduction 376 (See Appendix C). Local Law 71, as amended, provided an iterative process for the Plan's development, with several opportunities for the Advisory Committee to provide formal input to DEP. Pursuant to this process, on June 29, 2006, the Advisory Committee provided *Planning for Jamaica Bay's Future: Preliminary Recommendations on the Jamaica Bay Watershed Protection Plan*, on September 1, 2006, DEP submitted an *Interim Report on the Jamaica Bay Watershed Protection Plan*, and on March 1, 2007 DEP submitted its *Draft Jamaica Bay Watershed Protection Plan* (Draft Plan). On June 1, 2007, the Advisory Committee provided its *Final Recommendations on the Jamaica Bay Watershed Protection Plan*; however, because the Committee believes that the DEP's Draft Plan did not contain the level of detail called for by the legislation, the Committee intends to supplement their recommendations following the submission of DEP's final Plan on October 1, 2007.