

The Gastropods of Sarasota Bay

Elena M. Rhodes

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Table of Contents

Table of Contents	2
Purpose	3
General Observations	3
Materials and Methods: Transect Sampling	5
Materials and Methods: The Moran-Zippin Method of Removal Sampling	6
Results	6
Conclusions	7
Appendix A: Photojournal	8
Appendix B: Project Log	13
Bibliography	21

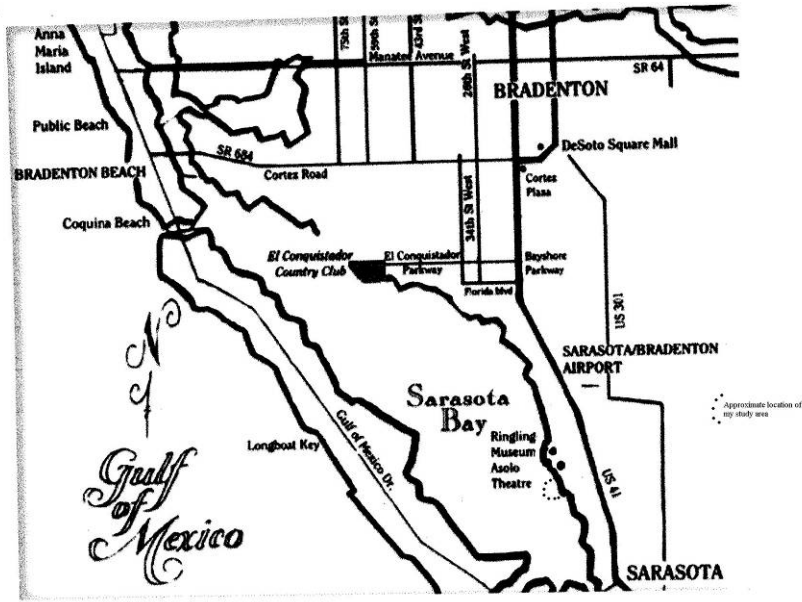
Purpose

I am going to study the Gastropods in Sarasota Bay. I am going to determine what species are out there. I am going to determine the population in a 20 x 20 m area. I will do this with three sampling methods that I will compare. I will compare Transect sampling, Plot sampling, and a type of Removal sampling called the Moran-Zippin Method. I will identify the different species I find and make a photojournal of them.

General Observations

My area used to have a seawall, but the seawall was removed. Ringling Museum is to the north, there is a residential area to the south, Old Caples is to the east, and Longboat Key is to the west across the bay. Next to the Ringling seawall there is a pile of rocks from the old seawall. A little to the south of Old Caples there is a boathouse that has sailboat equipment in it. The sailboats themselves are on the beach in front of the boathouse. There is a bushy area behind the beach south of Old Caples.

With a qualitative analysis, I determined that the soil in the bay has a consistency of silt-loam. During some low tides, a large area is uncovered. During other low tides only some area is fully uncovered. During high tide, there is only about 2-3 meters of beach.



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 Bradenton, FL 34210
 Phone: (941) 758-1466
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Fig. 1: Approximate location of my study area (marked by a half circle of black dots).

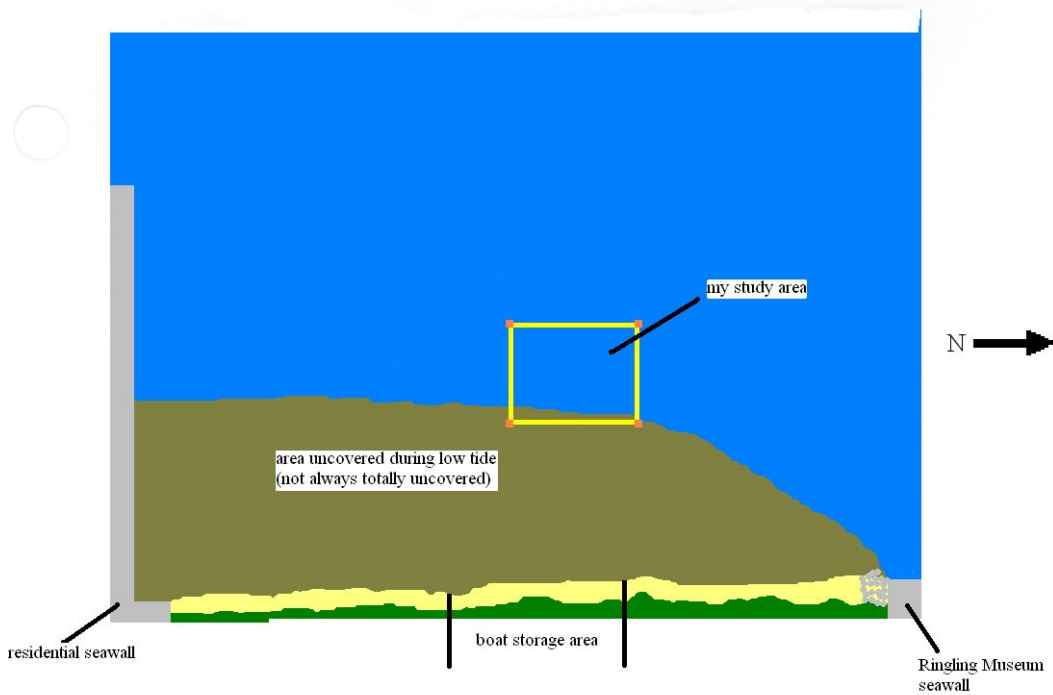


Fig. 2: Map of my study area (not drawn to scale).

Materials and Methods: Transect Sampling

Materials

- Tape measure
- Four stakes
- Twine
- Hammer
- Nine small sticks
- Mask
- Net
- Bucket
- Nine cups

Methods

I will mark off my study area by putting a stake in each corner of the area (once I measure it out) and then rope the area off with twine. My study area will be 20 by 20 meters in area. I will take a transect every two meters using a stick to mark the beginning of each transect. I will drag a net along the bottom of the bay along each transect and place whatever I find in a bucket. I will then take the bucket back to shore where I will put the mollusks I find in a cup marked with the transect number. There will end up being nine transects. Once I have taken all of my transects, I will identify the species I collected. I will also identify any shells I find. I will put the data on shells I find in a separate chart. I will use the mask if I want to look at something while I am sampling.

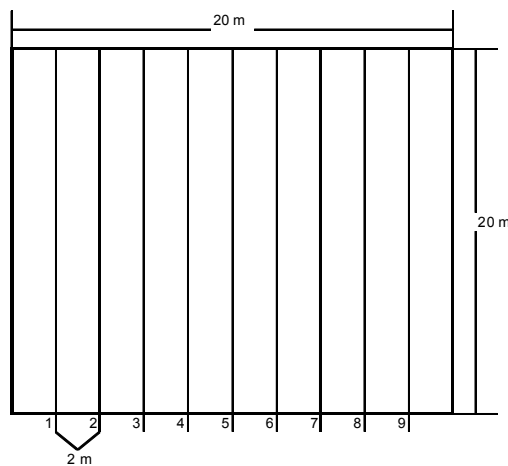


Fig. 3: Transect sampling map.

Materials and Methods: The Moran-Zippin Method of Removal Sampling

Materials

- Four stakes
- Twine
- Net
- Bucket
- Mask

Methods

I will mark off my area with stakes and twine like I did for transect sampling. To make sure I will be in the same place, I will walk out a certain number of paces from a landmark on the beach such as a tree. In the Moran-Zippin method, two samples are taken in the same place on different days at different times. I will drag a net through the whole area. I will stop often to put species and shells I find in a bucket. After I finish sampling my area, I will identify the species I found and then release them away from my area. I will also identify the shells I find. I will put the shell data in a different chart. I will use the mask if I want to look at something while I am sampling.

Results

During transect sampling, I found 11 live *Nassarius vibex*, one live *Littorina irrorata*, one live *Eupleura caudata*, and one live *Terebra concava*. I did not find any shells. The Linear Density Index and Relative Density of these species was very small. The frequency and relative frequency were also small. This was due to the small number of animals I collected.

Table 1: Transect sampling data, Species and number of live animals found

Species Name	1	2	3	4	5	6	7	8	9	Total
<i>Littorina irrorata</i>	0	2	1	0	0	2	3	2	1	11
<i>Nassarius vibex</i>	0	0	0	0	0	0	1	0	0	1
<i>Eupleura caudata</i>	0	0	0	0	0	0	0	1	0	1
<i>Terebra concava</i>	0	0	0	0	0	0	0	0	1	1

Table 2: Transect sampling data, live animal statistics

Species Name	n_i	ID_i	RD_i	j_i	f_i	Rf_i	IV_i
<i>Littorina irrorata</i>	11	0.061	0.79	6	6	0.67	1.45
<i>Nassarius vibex</i>	1	0.0056	0.071	1	1	0.11	0.18
<i>Eupleura calclata</i>	1	0.0056	0.071	1	1	0.11	0.18
<i>Terebra concava</i>	1	0.0056	0.071	1	1	0.11	0.18
Totals	$\Sigma n = 14$	$\Sigma ID = 0.077$	$\Sigma RD = 1$	/	$\Sigma f = 9$	$\Sigma Rf = 1$	/
	n_i = number of individuals			f_i = frequency			
	ID_i = Linear Density Index			Rf_i = relative frequency			
	RD_i = Relative Density			IV_i = Importance value			
	j_i = number of transects in which species i occurs						

The Moran-Zippin sample I collected contained two live *Nassarius* and three live *Littorina*. It also contained two *Nassarius* shells, three *Littorina* shells, two shells of *Terebra dislocata*, one shell of *Marginella apicina*, and one shell of *Busycon contrarium*. I was unable to take a second sample because of family matters.

Table 3; Moran-Zippin method data, sample 1

Live Animals		Shells	
Species Name	Total Found	Species Name	Total Found
<i>Nassarius vibex</i>	2	<i>Nassarius vibex</i>	2
<i>Littorina irrorata</i>	3	<i>Littorina irrorata</i>	3
		<i>Terebra dislocata</i>	2
		<i>Marginella apicina</i>	1
		<i>Busycon contrarium</i>	1

Conclusions

I do not believe that my transect data showed an accurate picture of the mollusks in Sarasota Bay. It is too cold to find very many species at this time of the year. A project like this would work much better in the summer. Also, I believe that the Moran-Zippin method would work better for larger animals.

However, I learned a great deal about field work and I learned how to manage my time better. I also learned that when you do a field project, you have to keep your schedule flexible because you never know what the weather will be like when you plan to go out.

Appendix A
Photojournal of the Gastropods of Sarasota Bay

Nassarius vibex
The Common Mud Snail



Nassarius has a range from Cape Cod to Florida and Texas. It can grow to an average of a half an inch in length. It lives on sand or mudflats near or below the low tide line. *Nassarius* is a scavenger. Its shell provides a home for tiny hermit crabs after it dies.

Littorina irrorata
The Marsh Periwinkle



Littorina has a range from New Jersey to Florida and Texas. It grows to an average size of one inch in length. *Littorina* lives on the cord grass *Spartina salterniflora*. It climbs up the *Spartina* stalks to get away from the high tide. During low tide, it grazes on detritus as it crawls along the mud bottom. *Littorina* has a bipedal foot, which means that the foot is divided into left and right halves.

Terebra Concava **The Concave Auger**



Terebra has a range from North Carolina to both Florida coasts. It lives near the low tide line on sand bottoms. It grows to an average size of one inch in length. *Terebra* is a predator, preying on polychaetes and possibly other invertebrates. It immobilizes its prey with a toxin on its radula. The toxin is too mild to be harmful to humans.

Sinum perspectivum **The Common Baby's Ear**



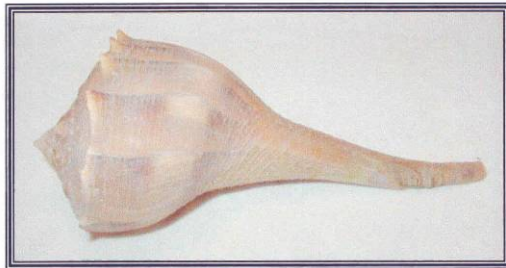
Sinum has a range from Virginia to Florida and Texas. It also lives in the West Indies. It grows to an average size of two inches. It lives on sandy bottoms near and below the low tide line. *Sinum* burrows beneath the surface of the sand. It is a scavenger. Its foot is not retractable. If it is disturbed, *Sinum* will secrete a large amount of mucus.

Melongena corona **The Crown Conch**



Melongena has a range from Florida to Mexico. It grows to a length of two to five inches. It lives near or below the low tide line in shallow water. It feeds on dead crabs, coon oysters, and other bivalves. *Melongena*'s method of attacking live bivalves is unique. When the bivalve opens its shell, *Melongena* destroys the bivalve's muscle with its radula and begins feeding.

Busycon contrarium **The Lightning Welk**



Busycon has a range from North Carolina to Florida and Texas. It can grow from four to sixteen inches in length. It lives in shallow water on shell, sand, and mud bottoms below the low tide line. *Busycon* is sinistral, which means it spirals to the left. It is carnivorous, preying on small bivalves. *Busycon* wedges the edge of its lip between the bivalve's shell to force it open.

Thais haemastoma **The Rock Snail**



Thais has a range from North Carolina to Florida, Texas, and Mexico. It also lives in the West Indies. It grows to an average size of five inches in length. It lives on solid objects, such as rocks, between the tide lines. *Thais* preys on oysters and is a pest on oyster farms. There are two subspecies of *Thais haemastoma*: *Thais haemastoma canaliculata* and *Thais haemastoma floridana*. However, it is debated whether this is necessary as intermediate forms have been found.

Terebra dislocata **The Common Atlantic Auger**



Terebra has a range from Virginia to Florida and Texas. It also lives in the West Indies. It can grow to one and a half to two inches. *Terebra* lives near and below the low tide line on sandy bottoms. It is carnivorous and it is thought that it feeds on acorn worms. *Terebra* crawls just under the surface of the sand.

Marginella apicina

The Pointed Marginella



Marginella lives on the Florida Gulf Coast. It grows to an average size of one half an inch. It is abundant in shallow sandy regions. *Marginella* is very active. It is fast for its size.

Appendix B
Project Log

Project Log

10/10/2000 - I determined that I would measure air temperature, water temperature, DO, pH, and salinity daily and I made charts for this purpose. I went out to Old Caples where my study area will be. I made some general observations about the area. I measured out a $20 \times 20 \text{ m}^2$ area so I could see how big my study area would be. I then wandered around different parts of the bay to see what was there. I did not see any echinoderms which was disappointing. Next I measured out 4 pieces of rope to 20 m and I tied them to the stakes. When I returned to my room, I did some research on the Sarasota Bay area and I found a map of the area.

11/1/2000 - I determined the different sampling techniques that I want to compare. I want to compare Plot sampling, Transect sampling, and the two methods of Removal sampling explained in the textbook. I went to the beach behind Old Caples Campus. I examined the tide pools and dragged my net along the bottom of the bay, past the low tide mark, for a little over two hours. I did not find anything. Tomorrow, I will bring my mask & snorkel. AS I dried out on the beach I read some

general information about echinoderms from my background information. When I returned to my room and cleaned myself I read the info. I found about Sarasota Bay. It was not very useful, unfortunately. I looked through the Beachcombers book and marked off useful pages.

1/12/00 - Today I decided to get organized. I made a schedule of what I want to get done each day. I decided not to take water quality samples because ~~that~~ it would just be ~~redundant~~ information. In the morning, I wrote down materials and methods for the species identification part of my project and for the transect sampling which I plan to do tomorrow. I also wrote a brief introduction for my field notebook. I bought a hat to shield my face from the sun. I went to the library to find out where ~~to go~~ to get information on the tides. ~~also~~ I also looked through some of the magazines but I didn't find anything useful. I went down to the beach to make sure I didn't leave anything there yesterday and to make sure my stakes ~~are~~ were still where I hid them. They were fine. The tide was still out so I took some pictures of low tide. Next, I went to the lab and found a net I will use for my transect sampling tomorrow. I will

borrow the net tomorrow on my way out. I also discovered something I may be able to use as ~~the~~ my plot sampler next Monday. When I returned to my room, I looked through some ecology books I have for any useful information. I did not find any because the books are too general. I also made a cover page for my field notebook.

1/13/00 - I went to the library to find out when low tide would be. I discovered it would be ~~at~~ ~~low~~ ~~at~~ at 11:30 am today. I decided to head out to the beach at 11:00 am so I would have some time to get my stuff ready and so I would have time to borrow a net from the lab. I borrowed a net from the lab and then headed out to the beach. I set up the stakes and then I measured out 2 meters from the first corner stake. I put a stick at the two meter mark. I continued this until I had placed 9 stakes each 2m apart across my area. I snorkeled along each transect line but I did not find anything. Next, I dragged the net I borrowed from the lab across the ground along each transect. I found lots of shells and crabs but I did not find any echinoderms. I cleaned my stuff up and went back to shore.

After lunch, I returned the net to the lab and cleaned it up as best I could. When I returned to my room, I cleaned up all of my stuff. I reared my results for today and I write this journal entry. Tomorrow, I will not go out to the beach.

1/14/00 - It is a good thing that I planned not to go to the beach today. It is very windy and cold. I couldn't do any statistics for transect sampling because I did not find anything yesterday. I planned my plot sampling that I will do on Monday. I made charts for the purpose and I went to the lab to find a quadrat. I found something that I think will work. I ~~made~~ compiled my bibliography and I had to go to the library to get the complete bibliography for a book I returned before break. I also made a map of my area on a draw program on my computer and I found a website ~~about~~ with tide schedules for Sarasota. When I went to the library, I found that the network was down so I could not find my book.

1/15/00 - I went to the library but discovered that although the network was back up, the card catalogue computers were still down. I again looked for the book on the shelves but I couldn't find it. I will check again on Tuesday.

1/17/00 - The low tide will be at 2:37 pm today. I went to the lab this morning to make sure it was open. It was. I wrote out the materials and methods for the Moran-Zipper method of removal sampling. ~~Also~~ I also looked over my tide sheet and determined when I would go out. I cannot go out on Wednesday because the ~~low~~ low tides are at 6:11 am when it is still dark and at 4:34 pm which is only an hour and a half before sunset. I will not go out on Friday because I will do statistics then. I will go out on Monday, Tuesday, Wednesday, and Thursday of next week because the Regression method of removal sampling requires ~~about~~ more samples than the Moran-Zipper method. I will not go out next Friday because I will do the statistics for the Regression method. After lunch, I got my stuff ready. I went to the lab and borrowed something to use as a plot sampler and I went down to the beach around 2:00 pm. ~~When I got~~ When I got to the beach, the wind had kicked up. It was not safe to go out. Also, my stakes would have been knocked over in the surf waves. I checked to make sure my stakes were still where I left them. They were. I wandered in the shallows and on the beach for about an hour to see if the wind would die down. It did not. I returned the plot sampler to the lab. When I returned to my room I redid the drawing of my area on my computer. I also revised my schedule.

1/18/00 - In the morning, I made a cover for my ~~photo~~ photojournal, I checked the tides, and I added some things to my observations. After lunch, I went to the library. I looked up the tide times in the newspaper. The times were, not surprisingly, the same as on the website. I also searched for the book ~~which I need to get~~ I need to get the bibliography for. The computer with the card catalogue on it is

still down. I tried to use the virtual library but it was no help. I went upstairs and looked for the book again. I found it. ~~It was in the same place as last time. I checked it out and returned it over the weekend. I~~ decided to switch my focus to mollusks because I found some when I was sampling. I made a new schedule this afternoon and did some research in the library & on the web.

1/19/00 - I rewrite the species ~~identifications~~ and identification parts of my notebook, the transect, Moran-Egger method of removal sampling, and plot sampling methods, and I rewrite the Bibliography. After lunch, I write up the ~~code~~ materials and methods and charts for point-quarter sampling. I re-printed the tide sheet and planned when I will go out tomorrow, Friday, and next week. I have decided not to do the regression method of removal sampling because I do not have enough time. I read the information I collected yesterday.

1/20/00 - In the morning, I prepared to go out and do transect sampling. After lunch, I went to the lab and borrowed a net. However, it is very, very, VERY windy today. I cannot sample when it is windy. Cold I can deal with but not wind. ~~I stayed at the beach for about an hour and a half to see if the wind would die down. It didn't. I brought the net back to the lab. When I got back to my room, I revised my schedule and did some more research on the web.~~

1/21/00 - I typed up the purpose, my observations, all of the materials and methods, and the bibliography today. I got my stuff ready and got the net from the lab. I got down to the beach at around 2:30pm. I set up my area and took the transects. I found four different species.

of gastropods. I did not find any shells. I cleaned & reset the net to the lab. When I got back to my room, I organized my data. I will identify the species I found tomorrow or Sunday. ~~Today~~

1/22/00 - My dad brought a digital camera today. We went to the beach to collect some specimens and then we took pictures of them. Unfortunately, my dad had to take the camera back home.

1/24/00 - In the morning, I identified the shells I found on ~~the~~ Friday. After lunch, I identified most of the shells I found on Saturday. I added a book and a card I bought to my Bibliography. It was too windy to go out today. I did the statistics for transect sampling and put them into Excel. I also revised my schedule and re-printed out the tide website.

1/25/00 - I got up and got ready to go out. I took the first Moran-Zippen sample. I will take the second one tomorrow. I counted my samples and put the live ones and shells which I already have a sample of back in the water. I took the shells I have never seen before back to my room. I cleaned up my stuff when I got back to my room. After lunch, I identified the new shells

I found and I entered my results into the computer. I also got my stuff ready for going out tomorrow.

1/26/00 - It is much too cold to go out. I searched around town for a three-hole punch but I could not find one.

1/27/00 - Still too cold to go out. I have decided to redo the first M-Z sample if I can. I have also decided not to do point-counter sampling as I don't have enough time to do it. I redid my schedule and erased my M-Z data. After lunch, I did some research on the computer. I also got some stuff ready for plot sampling. I took some pictures of my samples and I began preparing my essays for my photojournal.

1/27/99 - My Grandmother died suddenly and I had to go home to attend the funeral. I will not be able to return until Feb. 6 because my parents have to work. I will finish what I can at home next week.

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