WHITAKER BAYOU RECONNAISSANCE REPORT

REGARDING
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MOTE MARINE LABORATORY TECHNICAL REPORT NO. 1036

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INTRODUCTION

Whitaker Bayou heads near the Manatee-Sarasota County line near the Sarasota-Bradenton International Airport, and empties to Sarasota Bay at Sarasota. A trip was made to Whitaker Bayou on July 19, 2005 in the company of Kathy Meaux and Jon Perry of Sarasota County Government (SCG), for the purpose of reconnoitering the stream for potential ecological indicators. The morning was clear but rainstorms arose in mid-day; the tide rose throughout the morning and was at a slack high of 79 cm (2.6 ft) at 1013. A lengthy red tide bloom in Sarasota Bay was waning, with 67,000 cells/L of *Karenia brevis* measured at New Pass on this day.

The trip began at a public ramp on City Island and sampling began at the creek's mouth, river kilometer (RK) 0.0 as determined by SCG (Attachment 1). Some ecological observation proceeded upstream to the limit of navigation until it was time to motor upstream for slack high water, after which depth and meter profiles were made on the return trip. Depth was determined by lead line and salinity, temperature, pH and dissolved oxygen were measured at surface and bottom with a Hydrolab Surveyor 4 and Minisonde 4A. Position was recorded with a Garmin 12 XL GPS.

A second boat trip was made on July 31, 2005 to reconnoiter the stream at mean lower low water, which occurred at 1819 hours. The waterway upstream of its navigable limit was reconnoitered at bridge crossings on various dates.

TRIP NARRATIVE

A transcript of field notes is given in Attachment 2. River kilometer positions are given in Attachment 3.

DATA AND FINDINGS

1. Logistical Assessment. The nearest public boat ramp is at Centennial Park, south of the Bayou. Another public ramp is available on City Island. The approach to the mouth of the bayou is unmarked and there are no navigation aids in the Bayou. On high tide the bayou and creek have sufficient depth for a small motorboat to reach RK 2.4 but a rocky sill prevents further upstream movement. Bridge crossings occur at:

RK 0.55	US 41
RK 1.15	Dr. Martin Luther King, Jr. Way
RK 1.52	Riverview Drive
RK 1.88	32nd Street
RK 2.28	Myrtle Street
RK 2.37	38th Street
RK 2.55	40th Street

RK 3.09 46th Street
RK 3.53 Mecca Drive extension into Village Gardens
RK 3.75 Dog track parking lot culvert

A low bridge at Riverview Drive prevents all but the lowest vessels from passing, and this is a serious obstacle to navigation. Poor water quality poses a contact hazard for research.

2. References. A river kilometer system developed for this project by SCG was valuable. Benchmark and tidal data for Sarasota are given in Attachment 4. Relative to mean lower low water (chart datum), mean tide level is 33.2 cm and mean higher high water is 59.5 cm higher. NAVD is located between mean tide level and mean high water. There is, at present, one continuous measurement system operating in the Creek, a water level recorder "USGS 02299861 WALKER CREEK NEAR SARASOTA FL." On July 19, 2005 water level ranged from 62.5 cm to 79.2 cm (2.05 ft to 2.60 ft). During periods of low flow, water levels at this station are influenced by tide.

3. Stream Geometry. In its four-kilometer length to University Parkway, the maximum width and depth of Whitaker Bayou are 65 m and 1.8 m (MLLW), respectively. From Sarasota Bay, a narrow entrance leads to a wider reach downstream of US 41. The bayou narrows at the US 41 bridge and then runs as a waterway with parallel banks to Dr. Martin Luther King, Jr. Way. A tributary enters from the east between the two bridges. The channel narrows between Dr. Martin Luther King, Jr. Way and Riverview Drive, and another tributary enters from the east upstream of Riverview Drive. From that tributary to near University Parkway, the stream is a narrow, deeply incised and straight channel, with a large tributary joining it between the 38th and 40th Street bridges. The stream runs under closed to partly closed canopy for much of its run upstream of Myrtle Street. Attachment 5 provides stream dimensions as a function of RK.

4. Bottom Types. Attachment 6 enumerates bottom types of Whitaker Bayou. Seventeen distinct bottom types were identified, of which eight (47%) are natural. In terms of areal coverage, no empirical data are available at present but field results indicate that altered bottoms greatly exceed natural ones in Whitaker Bayou. One distinctive bottom type deserves further study—it is a highly organic, consolidated material comprised of settleable solids with high water content, and it occurs in the first kilometer of the waterway. A sample taken near RK 0.3 had mean and median grain sizes of 53.18 µm and 51.30 µm, respectively. The material had a moisture content of 66.1% and was 33.9% solids and 14.2% organic. Intertidal accumulations of this material and other fine sands and muds occur at nine sites along both banks of the bayou, up to RK 1.1 (near Dr. Martin Luther King, Jr. Way).

5. Water Chemistry. Surface and bottom values for conductivity, salinity, temperature, pH, and dissolved oxygen are given by river kilometer in Attachment 7. Measurements were made at slack high water. Surface salinity decreased abruptly with

upstream distance, at RK 0.6, and decreased slowly thereafter. Bottom salinity decreased uniformly with upstream distance to the maximum extent of the salt wedge, near RK 1.6, and then mirrored surface salinity. This pattern resulted in strong vertical stratification to RK 1.3. Temperature tended to be lower at the surface than at depth. Dissolved oxygen (DO) was low overall, with three of twenty-one measurements greater than 4.0 mg/l. Surface DO ranged from 3.04 to 4.48 mg/l and bottom DO ranged from 1.70 to 3.95 mg/l; most DO concentrations were less than 50% saturated for their corresponding temperatures and salinities.

6. Shorelines and Accessibility. Seawalls, unhardened residential shorelines, and steep, stabilized banks represent the majority of shorelines in Whitaker Bayou. Mangrove-dominated shorelines are few; comprised mostly of the white mangrove *Laguncularia racemosa*, and extend no farther than RK 1.3. Access to seawalls is unimpeded.

7. Qualitative Seagrass Observations. No seagrasses were encounted in Whitaker Bayou, although shoal grass, *Halodule wrightii*, grows in Sarasota Bay close to the mouth of the Bayou. Although not vascular, filamentous algal periphyton covered some shallow areas of the Creek but no extensive mat development was seen. There were no nuisance accumulations of algae anywhere in the study area. The invasive aquatic weed *Hydrilla verticillata* grew in light gaps near bridge crossings above Myrtle Street.

8. Qualitative Macro-mollusk Observations. Twelve species of gastropods and bivalves were collected in the bayou and creek. One, *Corbicula fluminea*, was freshwater and an introduced species. Another, *Perna viridis*, is marine and also an introduced species. A list of species and their distribution by RK and tide is given in Attachment 8. The mouth of the bayou supports the most species (7) when high-tide and low-tide collections are combined. Species richness falls rapidly with RK and five of nine high tide stations lacked mollusks. Oysters occur within the bayou and large oysters were common. Oysters extend upstream as a thinning intertidal band and end near RK 1.1, downstream of Dr. Martin Luther King, Jr. Way.

9. Intertidal Index Candidates. The intertidal zone of the bayou and creek downstream of Dr. Martin Luther King, Jr. Way is almost entirely hardened by seawall. Natural intertidal habitat occurs as isolated point bars, shoals, and upland banks. Upstream of RK 1.3, banks are unhardened and managed as lawns or left overgrown by landscape and introduced species. Mangroves are mostly white mangroves and occur in small patches. Most intertidal faunal diversity is confined to the mouth of the bayou and only oysters, barnacles, and wood borers extend more than one kilometer into the creek. Oyster abundance, size, morbidity and condition could be useful index metrics, and wood-borers may be useful intertidal indicators. Otherwise few species are available as intertidal index candidates.

10. Potential Ecological Homologs. The stream is divisible into tidal and non-tidal reaches, with the head of tide not far from the USGS gage at RK 2.4. The tidal reach is highly altered throughout but vaguely divisible into the upland-forested and mangrove-forested reaches, with a transition in the vicinity of RK 1.6. Water chemistry during a wet season indicates a salt wedge extending to RK 1.6. The mangrove-forested reach is highly fragmented and confined to a short reach. Oysters occur as bands on seawalls but a few small reefs occur near the mouth of the bayou. There are no viable stream reaches that can be used as ecological homologs.

INTERPRETATION AND RECOMMENDATIONS

Whitaker Bayou and Walker Creek are impaired waterways affected by decades of urbanization, habitat alteration, waste discharges, and other factors. Very little natural bottom or shoreline exists in the system. Bottom sediments in the tidal reach are adverse to benthic fauna. The flora and fauna are depauperate with highest species richness and abundances at the juncture of the bayou and Sarasota Bay. Biota are reduced to very low levels within 300 meters from the bay. Biotic assemblages are therefore not clearly discernable as marine, estuarine, and brackish-water groups. True lotic conditions were not encountered in the first four river kilometers of the tidal stream and the ephemeral fresh water reach is basically a drainage canal. The patterning of habitats and communities that indicate a structurally authentic tidal stream is lacking. Whitaker Bayou and Walker Creek are dramatically different that Gottfried Creek, the latter being considered as a valid reference stream for SCG's watershed management initiative.

ACKNOWLEDGMENTS

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LIST OF ATTACHMENTS

ATTACHMENT 1. Location of Whitaker Bayou and Walker Creek, and ecological and chemistry sampling sites.

ATTACHMENT 2. Narrative of trips on Whitaker Bayou and Walker Creek, July 19 and July 31, 2005.

1. High Tide, July 19, 2005

A Strong red tide was present in Sarasota Bay with dead and dying fish in the Bay and near the mouth of the Bayou. Vessel traffic was minimal.

RK 0.0, 0857 DST
Subtidal bottom was firm with rock rubble and a fine surficial layer of fine organic silt. *Gracilaria* and dead fish present. One live *Nassarius* in petite-ponar grab. Strong outgoing current. Drifted south over *Halodule* on soft mud bottom. Live tellins, *Chaetopterus*, *Onuphidae*, and *Diopatra*. On intertidal rocks of a breakwater north of channel, filamentous green algae and *Ulva* grew with a compact red alga. Small to medium oysters and small barnacles grew on the breakwater's bayside. *Littoraria* abundant in splash zone. Small crabs present but uncommon. *Mnemiopsis* in water with live sheepshead and dead and dying mullet; a school of mullet entered the Bayou.

At this time, to be on station for a meter run, crew motored to limit of navigation. Low bridge at 32nd Street passed with difficulty; practical limit for most vessels. USGS gage at 38th Street.

RK 2.4, 0923.
Steep banks with cobble bottom. Banks with indurated clay or sandstone outcrops. Hydrilla is the only aquatic vegetation and appears in light gaps. Large amphipods and abundant live and dead *Corbicula*. No borers.

RK 2.0, 0947
Meter work; firm bottom

RK 1.8, 1004
Meter work, evidence of salt wedge; firm bottom

RK 1.6, 0959
Coarse sand and rock, no organic sediments. Planorbid snail present with relict marine material; no borers.

RK 1.4, in transit
Acrostichum to near here, no borers.

RK 1.3, 1035
Laguncularia to near here, also *Aratus* in canopy.

RK 1.1, 1042
Same as 1.3; submerged tree limb at seawall with large live and dead barnacles, large *Sphaeroma* and small unk. crabs, bryozoan. *Gambusia* nearby.

RK 0.8, 1055
Depth less than 1.5 meters between banks, shoals extensive. Fine sediment with little organic material; pebbles. *Ischadium* and *Mytilopsis* present, also unk. lucine (?). Small *Corbicula* live and dead.

RK 0.7, in transit
Spartina on island with mangroves.

RK 0.6, 1105
Soft mud bottom, some gelatinous with hydrogen sulfide odor; fine organics deepening.

RK 0.3, 1111
Meter work.

RK 0.0, 1116
Meter work, *Lygia* on seawall.

RK -0.2 (in Bay), 1121
Miscellaneous bivalves; juvenile *Callinectes*, three species of polychaetes, brittle stars all alive.

2. Low tide, July 31, 2005

An evening run. No evidence of red tide mortality. Day began clear and trip ended as storm approached. Few vessels but numerous people on bay shore and creek banks. Slack low tide.

A seawall on Sarasota Bay south of the Bayou (at Whitaker Gateway Park) was reconnoitered. Flora included *Caulerpa*, *Ulva*, and *Bostrychia*. Medium to large sponges and tunicates present, along with some attached bryozoans. Barnacles were topmost in the intertidal followed by a narrow band of live and dead oysters. Sedentary limpets, mobile periwinkles and *Lygia* were common.

RK 0.0, 1747
South seawall zonation from top down included barnacles, a band of dark algae, *Littoraria* and limpets, a 15 inch band of oysters, and a mussel zone. The mussels were concentrated at MLLW and included *Ischadium* and the green mussel, *Perna viridens*. Mobile fauna were abundant at and just below the water surface, including small unid. crabs, isopods, and amphipods.

RK 0.1
An oyster reef with live oysters and barnacles. No spat, mussels, boring sponges, or gastropod predators.

RK. 0.12

A point of land accreting from the north bank is vegetated by native supratidal coastal plant species. The point is comprised of relict *Mercenaria* shells of unknown provenance. Fiddler crabs (*Uca*) abundant on west face; small gastropods were abundant in a fine organic layer with interwoven algal mat that covered coarse sand on the east face.

RK 0.25
South seawall zonation from top down included barnacles with isopods and wood borers, a robust zone of large gray-tinged oyster, live and dead. A sediment sample was collected from a mud bank here for lab analysis.

RK 0.55
North seawall zonation from top down included isopods, live and dead barnacles, and live and dead large oysters. No mussels or crabs. Barnacles under the US 41 bridge tinged with amber-gold coloration of unknown origin.

RK 0.6
Mangroves and cord grass growing on a shoal on east side of channel. Bottom thixotropic. Small crab and numerous polychaete burrows in surficial sediment. Active sorting and transport of clay nodules in evidence. No borers.

RK 0.7
A canal enters from the east. The bayou from RK 0.6 to 0.8 is very shoal, mostly mud banks. Shoaling is constricting high flows resulting in active bed scouring and deposition.

RK 1.0
Oyster zone thins with upstream distance and ends just above this location. West seawall clean. Opposite wall with few oysters and barnacles. A stain on the wall is a mixture of fine, short algae and a deposit of silt. *Lygia* and *Aratus* here.

ATTACHMENT 3. Whitaker Bayou and Walker Creek station locations and depths in meters. RK, river kilometer.

RK	Latitude, deg. N.	Longitude, deg. W.	Depth*
-0.20	27.35252	82.55438	3.50
0.00	27.35321	82.55245	1.50
0.30	27.35396	82.54896	1.90
0.60	27.35509	82.54711	2.60
0.80	27.35708	82.54701	1.20
1.10	27.35932	82.54590	1.60
1.30	27.36103	82.54544	2.10
1.60	27.36166	82.54281	1.45
1.80	27.36268	82.54291	1.10
2.40	27.36822	82.54436	0.40

* High tide measurements only; uncorrected for tide; slack high tide was 79 cm above chart datum.

ATTACHMENT 4. Tidal reference data for Sarasota, Florida.

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Ocean Service

Station ID:	**8726083**	**PUBLICATION DATE:**	**09/26/2003**
Name:	**SARASOTA, SARASOTA BAY FLORIDA**		
NOAA Chart:	**11424**	**Latitude:**	**27ø 19.9' N**
USGS Quad:	**SARASOTA**	**Longitude:**	**82ø 32.7' W**

To reach the tidal bench marks in Sarasota, proceed west on U.S. Highway 41 to Sarasota Island Park. The bench marks are located in the park area. The tide gage and staff were located on the park pier.

PRIMARY BENCH MARK STAMPING: 6083 A 1977
DESIGNATION: 872 6083 A TIDAL

MONUMENTATION: Tidal Station disk VM#: 6122
AGENCY: National Ocean Survey (NOS) PID#: AG7714
SETTING CLASSIFICATION: Concrete sea wall

The primary bench mark is a disk set flush in the north concrete sea wall of Sarasota Island Park, 12.74 m (41.8 ft) east of a lamp post, 2.80 m (9.2 ft) north of the north walkway, and 0.30 m (1.0 ft) south of the north edge of the seawall water line.

T I D A L D A T U M S

Tidal datums at SARASOTA, SARASOTA BAY based on:

LENGTH OF SERIES:	2 MONTHS
TIME PERIOD:	June 1977 - July 1977
TIDAL EPOCH:	1983-2001
CONTROL TIDE STATION:	8725943 BLACKBURN POINT

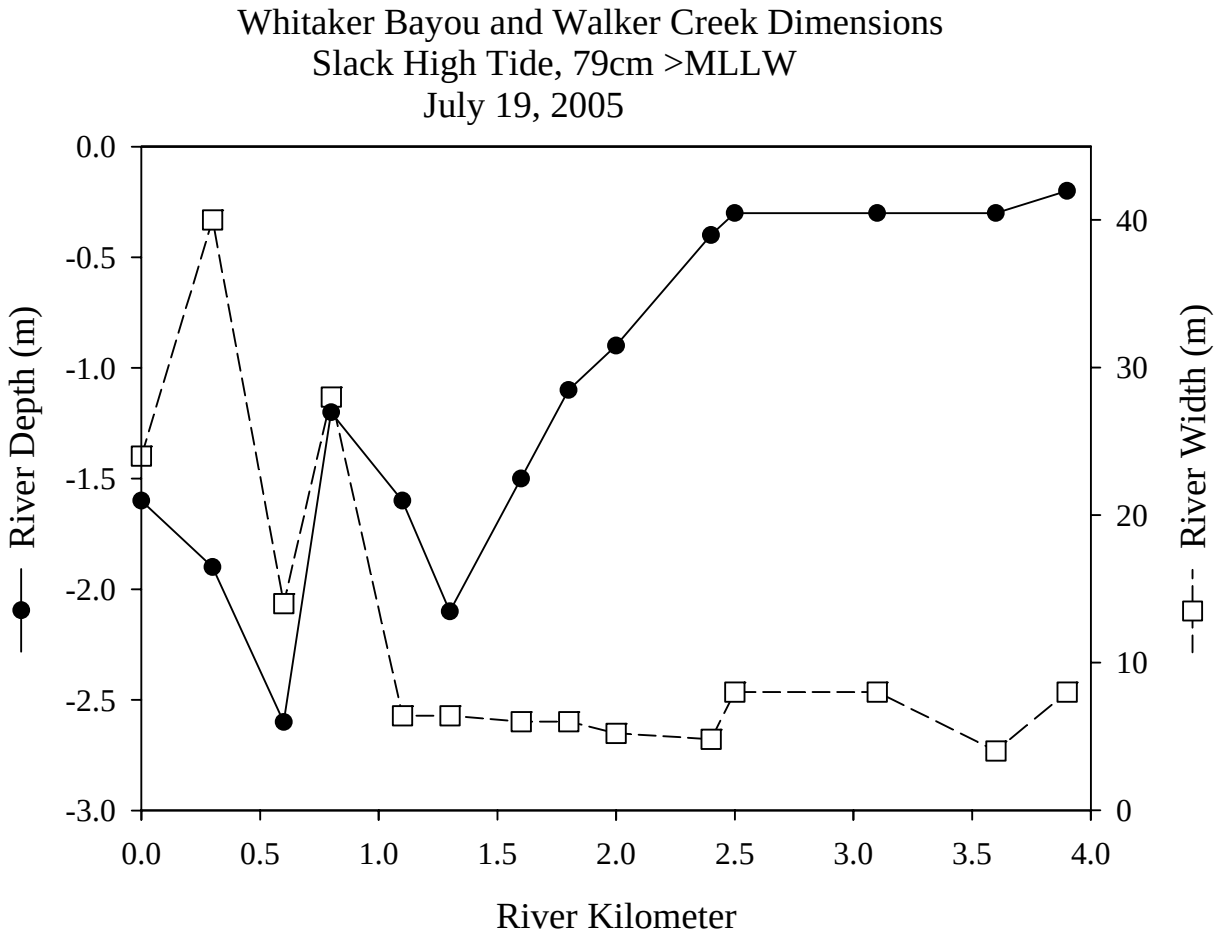
Elevations of tidal datums referred to Mean Lower Low Water (MLLW), in METERS:

MEAN HIGHER HIGH WATER (MHHW)	= 0.595
MEAN HIGH WATER (MHW)	= 0.522
NORTH AMERICAN VERTICAL DATUM-1988 (NAVD)	= 0.475
MEAN TIDE LEVEL (MTL)	= 0.332
MEAN SEA LEVEL (MSL)	= 0.325
MEAN LOW WATER (MLW)	= 0.142
MEAN LOWER LOW WATER (MLLW)	= 0.000

Bench Mark Elevation Information In METERS above:

Stamping or Designation	MLLW	MHW
6083 A 1977	1.137	0.615
6083 B 1977	1.127	0.605
6083 C 1977	1.187	0.665
6083 G 1982	2.420	1.898

ATTACHMENT 5. Creek width and depth relative to distance from Sarasota Bay.



ATTACHMENT 6. Bottom types of Whitaker Bayou.

I. INTERTIDAL

A. *Unvegetated*
1. Sandbar/shoal
2. Natural upland shore
3. Filled shore, unhardened
4. Seawall

B. *Vegetated*
1. Landscaped bank
2. Mangrove
3. Marsh

II. SUBTIDAL

A. *Unvegetated*
1. Sandbar/shoal
2. Seawall
3. Level sands
4. Level muds
5. Thalweg*
6. Dredged holes and borrow areas
7. Stony debris and rubble
8. Unknown**

B. *Vegetated*
1. Hydrilla
2. Shallow bottom with periphyton cover

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* A line following the lowest part of a stream bottom.
****** highly organic, consolidated settleable solids: see text.

ATTACHMENT 7. Surface (S) and bottom (B) water chemistry in relation to river kilometer (RK). Time is EST.

RK	Time HMS	Sal ppt	Temp degC	pH Units	SpCond mS/cm	DO mg/l	DO% Sat	Dep meters
2.4	092417	0.23	28.14	7.24	0.462	4.48	57.5	1.85
2.0	094741	0.23	27.99	7.27	0.464	4.14	53.0	1.81
	094817	0.23	27.96	7.26	0.465	3.95	50.5	2.48
1.8	100431	0.24	27.98	7.30	0.467	3.91	50.0	1.87
	100527	0.24	27.97	7.29	0.468	3.61	46.2	2.80
1.6	095848	0.66	28.14	7.23	1.262	3.50	45.0	1.81
	095925	11.44	30.09	7.17	19.30	1.70	24.1	3.08
1.3	103455	1.19	28.58	7.26	2.230	3.73	48.5	1.81
	103530	17.97	30.47	7.48	29.13	2.43	36.2	3.53
1.1	104251	1.56	28.88	7.32	2.895	3.38	44.3	1.95
	104325	20.21	30.69	7.59	32.40	2.34	35.4	2.93
0.8	105512	1.48	29.46	7.39	2.731	4.28	56.7	1.81
	105541	18.79	30.64	7.58	30.33	3.19	47.8	2.66
0.6	110506	2.00	29.64	7.41	3.680	3.60	47.8	1.89
	110544	24.64	30.85	7.74	38.70	1.82	28.4	3.32
0.3	111110	14.28	30.55	7.53	23.66	3.39	49.4	1.82
	111138	21.68	30.96	7.73	34.33	2.79	42.8	2.63
0.0	111643	17.53	30.93	7.70	28.49	3.04	45.5	1.92
	111707	30.01	31.52	8.05	46.16	3.22	52.4	2.59
-0.2	112110	28.93	31.39	8.03	44.68	3.18	51.3	1.79
	112156	30.20	31.23	8.02	46.42	2.04	33.0	4.39

ATTACHMENT 8. Mollusks of Whitaker Bayou and Walker Creek by RK, river kilometer.

High Tide	**0.0**	**0.3**	**0.8**	**1.1**	**1.3**	**1.6**	**1.8**	**2.0**	**2.4**
Nassarius vibex	X								
Tellina sp.	X								
Crassostrea virginica	X								
Littoraria irrorata	X								
Ischadium recurvum			X						
Mytilopsis leucophaeata			X						
Lucina pectinata			X						
Corbicula fluminea						X			X
Planorbidae						X			
Species Richness	4	0	3	0	0	2	0	0	1
By Integer RK				7				2	1

Low Tide	**-0.3**	**0.0**	**0.12**	**0.25**	**0.55**	**0.6**	**1.0**
Littoraria irrorata	X	X					
Crassostrea virginica	X	X	X	X	X		X
Nassarius vibex	X						
Acmaeidae sp.	X	X					
Ischadium recurvum		X					
Perna viridis		X					
Gastropoda sp.			X				
Species Richness	5	5	2	1	1	0	1
By Integer RK		5					7