Table 4.2.2.1 Total abundance, mean CPUE (biomass in g/hr), and total length range of fish and macrocrustaceans collected in gill nets from Norton Basin, June 2002.

Norton Basin, Bottom (n=2)
Duration of set: 7 hrs

Scientific Name	Common Name	Total Abund.	Mean CPUE (g/hr)	TL Range (mm)
Prionotus evolans	Striped Searobin	55	1592.86	245-405
Brevoortia tyrannus	Atlantic Menhaden	6	264.29	360-375
Callinectes sapidus	Blue Crab	3	50.00	155-160
Tautoga onitis	Silver Hake	1	6.07	185
Total:		65	1913.21	155-405

Norton Basin, Mid-Depth (n=2)
Duration of set: 7 hrs

Scientific Name	Common Name	Total Abund.	Mean CPUE (g/hr)	TL Range (mm)
Brevoortia tyrannus	Atlantic Menhaden	15	614.29	355-395
Pomatomus saltatrix	Bluefish	1	21.43	295
Total:		16	635.71	295-395

Norton Basin, Surface (n=2)
Duration of set: 7 hrs

Scientific Name	Common Name	Total Abund.	Mean CPUE (g/hr)	TL Range (mm)
Callinectes sapidus	Blue Crab	4	64.29	135-160
Limulus polyphemus	Atlantic Horseshoe Crab	1	78.57	200
Brevoortia tyrannus	Atlantic Menhaden	1	42.86	370
Total:		6	185.71	135-370

Norton Basin, Shallow Area (n=4)
Duration of set: 7 to 8 hrs

Scientific Name	Common Name	Total Abund.	Mean CPUE (g/hr)	TL Range (mm)
Prionotus evolans	Striped Searobin	75	913.68	225-385
Callinectes sapidus	Blue Crab	17	123.78	120-190
Pomatomus saltatrix	Bluefish	12	123.78	275-410
Morone saxatilis	Striped Bass	6	78.18	240-350
Limulus polyphemus	Atlantic Horseshoe Crab	4	172.64	175-270
Brevoortia tyrannus	Atlantic Menhaden	4	94.46	355-400
Paralichthys dentatus	Summer Flounder	1	16.29	330
Total:		119	1522.80	120-410

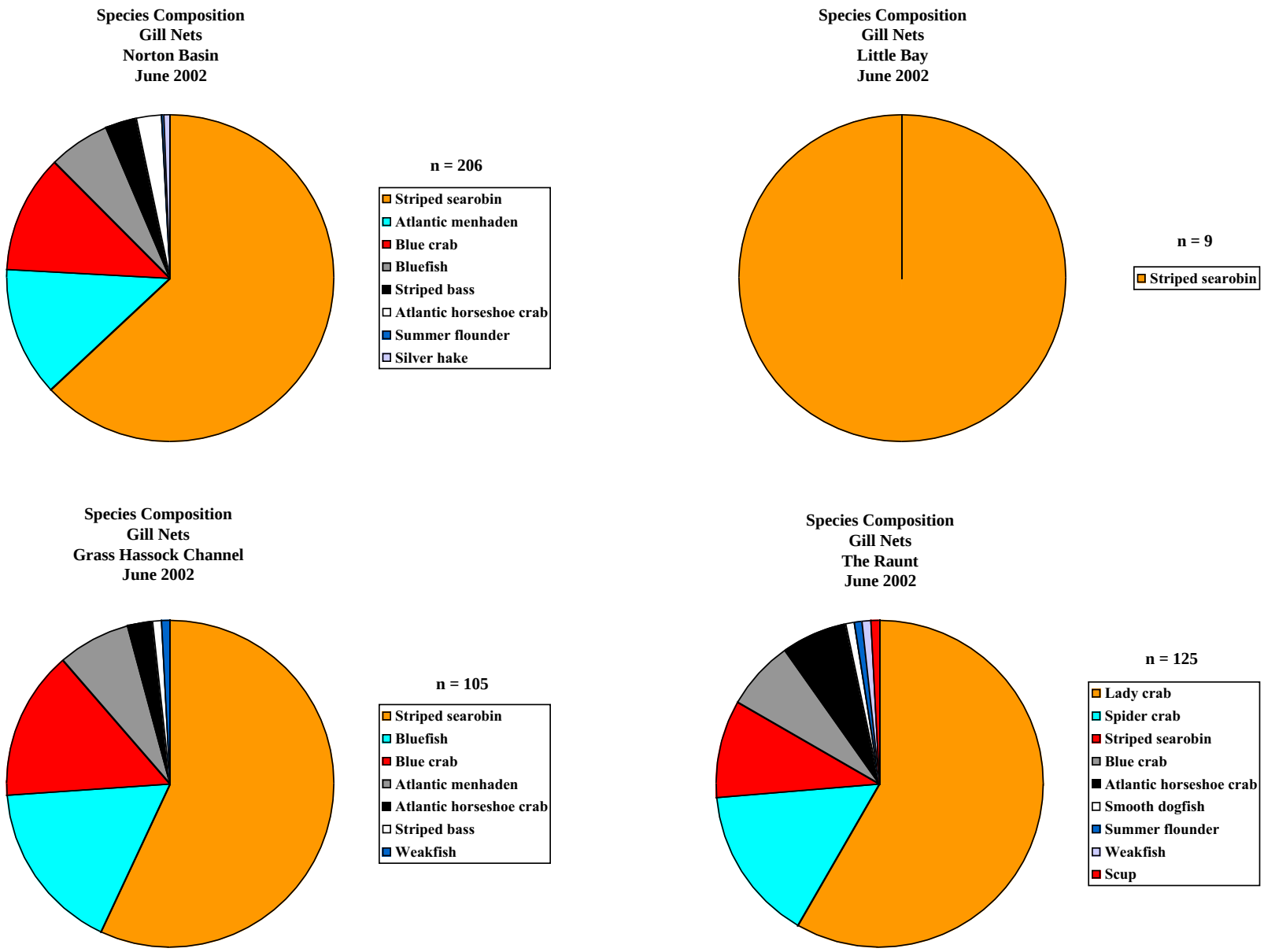


Figure 4.2.2.1 Species composition from gill net sampling efforts, June 2002.

Table 4.2.2.2 Total abundance, mean CPUE (biomass in g/hr), and total length range of fish and macrocrustaceans collected in gill nets from Little Bay, June 2002.

Little Bay, Bottom (n=2)
Duration of set: 7.5 to 8 hrs

Scientific Name	Common Name	Total Abund.	Mean CPUE (g/hr)	TL Range (mm)
Total:		0	0.00	0

Little Bay, Mid-Depth (n=2)
Duration of set: 7.5 to 8 hrs

Scientific Name	Common Name	Total Abund.	Mean CPUE (g/hr)	TL Range (mm)
Total:		0	0.00	0

Little Bay, Surface (n=2)
Duration of set: 7 to 7.5 hrs

Scientific Name	Common Name	Total Abund.	Mean CPUE (g/hr)	TL Range (mm)
Total:		0	0.00	0

Little Bay, Shallow Area (n=2)
Duration of set: 6 to 6.5 hrs

Scientific Name	Common Name	Total Abund.	Mean CPUE (g/hr)	TL Range (mm)
Prionotus evolans	Striped Searobin	9	325.20	312-363
Total:		9	325.20	312-363

Table 4.2.2.3 Total abundance, mean CPUE (biomass in g/hr), and total length range of fish and macrocrustaceans collected in gill nets from Grass Hassock Channel, June 2002.

Grass Hassock Channel, Bottom (n=2)
Duration of set: 6 hrs

Scientific Name	Common Name	Total Abund.	Mean CPUE (g/hr)	TL Range (mm)
Prionotus evolans	Striped Searobin	68	1478.26	185-390
Callinectes sapidus	Blue Crab	12	208.70	110-180
Brevoortia tyrannus	Atlantic Menhaden	7	243.48	85-385
Limulus polyphemus	Atlantic Horseshoe Crab	3	452.17	205-270
Pomatomus saltatrix	Bluefish	3	130.43	338-430
Cynoscion regalis	Weakfish	1	11.13	235
Total:		94	2524.17	85-430

Grass Hassock Channel, Mid-Depth (n=2)
Duration of set: 6.5 hrs

Scientific Name	Common Name	Total Abund.	MeanCPUE (g/hr)	TL Range (mm)
Pomatomus saltatrix	Bluefish	5	146.34	310-330
Prionotus evolans	Striped Searobin	2	52.85	255-260
Callinectes sapidus	Blue Crab	1	28.46	155
Total:		8	227.64	155-330

Grass Hassock Channel, Surface (n=2)
Duration of set: 6.5 hrs

Scientific Name	Common Name	Total Abund.	MeanCPUE (g/hr)	TL Range (mm)
Pomatomus saltatrix	Bluefish	13	320.31	290-355
Callinectes sapidus	Blue Crab	5	74.22	115-158
Brevoortia tyrannus	Atlantic Menhaden	2	85.94	340-357
Morone saxatilis	Striped Bass	1	82.03	457
Total:		21	562.50	115-457

Table 4.2.2.4 Total abundance, mean CPUE (biomass in g/hr), and total length range of fish and macrocrustaceans collected in gill nets from the Raunt, June 2002.

The Raunt, Shallow Area (n=2)
Duration of set: 4.5 hrs

Scientific Name	Common Name	Total Abund.	MeanCPUE (g/hr)	TL Range (mm)
Ovalipes ocellatus	Lady Crab	73	114.22	35-90
Libinia emarginata	Common Spider Crab	19	344.44	50-85
Prionotus evolans	Striped Searobin	12	288.89	195-388
Callinectes sapidus	Blue Crab	9	153.33	130-155
Limulus polyphemus	Atlantic Horseshoe Crab	8	1633.33	190-285
Brevoortia tyrannus	Smooth Dogfish	1	205.56	820
Paralichthys dentatus	Summer Flounder	1	44.44	335
Cynoscion regalis	Weakfish	1	14.22	260
Stenotomus chrysops	Scup	1	2.11	120
Total:		125	2800.56	35-820

Table 4.2.3.1 Total abundance, mean CPUE (biomass in g/hr), and total length range of fish and macrocrustaceans collected in gill nets from Norton Basin, August 2002.

Norton Basin, Bottom (n=2)
Duration of set: 5.5 hrs

Scientific Name	Common Name	Total Abund.	Mean CPUE (g/hr)	TL Range (mm)
Prionotus evolans	Striped Searobin	7	270.27	279-362
Brevoortia tyrannus	Atlantic Menhaden	5	49.39	83-381
Callinectes sapidus	Blue Crab	3	48.28	64-191
Cynoscion regalis	Weakfish	3	39.14	89-318
Pomatomus saltatrix	Bluefish	2	46.60	349-362
Morone saxatilis	Striped Bass	2	186.39	413-489
Prionotus carolinus	Northern Searobin	1	18.64	203
Total:		23	658.71	64-489

Norton Basin, Mid-Depth (n=2)
Duration of set: 5.5 hrs

Scientific Name	Common Name	Total Abund.	Mean CPUE (g/hr)	TL Range (mm)
Brevoortia tyrannus	Atlantic Menhaden	1	2.05	127
Total:		1	2.05	127

Norton Basin, Surface (n=2)
Duration of set: 5 to 5.5 hrs

Scientific Name	Common Name	Total Abund.	Mean CPUE (g/hr)	TL Range (mm)
Callinectes sapidus	Blue Crab	2	28.65	102-152
Brevoortia tyrannus	Atlantic Menhaden	1	0.48	83
Total:		3	29.13	83-152

Norton Basin, Shallow Area (n=4)
Duration of set: 5.5 to 6 hrs

Scientific Name	Common Name	Total Abund.	Mean CPUE (g/hr)	TL Range (mm)
Pomatomus saltatrix	Bluefish	7	299.15	330-406
Brevoortia tyrannus	Atlantic Menhaden	6	3.16	76-89
Callinectes sapidus	Blue Crab	2	34.19	89-152
Morone saxatilis	Striped Bass	2	59.83	267-318
Libinia emarginata	Common Spider Crab	1	19.23	83
Leiostomus xanthurus	Spot	1	3.93	140
Total:		19	419.49	76-406

dominant species was bluefish. Throughout the August gill net sampling in Norton Basin, the dominant species was Atlantic menhaden representing 28.3% of the total collection. Bluefish represented 19.6%, blue crab and striped searobin each represented 15.2%, and all other species represented less than 10% each (**Figure 4.2.3.1**).

Gill nets deployed at the bottom of Little Bay during August (6.5 hrs duration, n=2) yielded no fish (**Table 4.2.3.2**). Gill net collections at mid-depth in Little Bay (6 hrs duration, n=2) yielded 9 individuals representing 3 species (Table 4.2.3.2). The dominant species was Atlantic menhaden. Gill nets deployed from the surface of Little Bay (5.5 hrs duration, n=2) yielded 7 Atlantic menhaden (**Table 4.2.3.2**). Gill nets deployed within the shallow areas of Little Bay (4.75 to 5 hrs duration, n=2) yielded 13 individuals representing 3 species (**Table 4.2.3.2**). The dominant species was Atlantic menhaden. Throughout the August gill net sampling in Little Bay, the dominant species was Atlantic menhaden representing 79.3% of the total collection. All other species each represented less than 10 % (**Figure 4.2.3.1**).

Gill net collections from the bottom of the Grass Hassock Channel (5.5 hrs duration, n=2) yielded 48 individuals representing 9 species (**Table 4.2.3.3**). The dominant species were blue crab and weakfish (*Cynoscion regalis*). Mean CPUE at the bottom of the Grass Hassock Channel (1559.1 g/hr) was greater than at the bottom of Norton Basin (658.7 g/hr) or the bottom of Little Bay (0.0 g/hr). Gill net collections at mid-depth in Grass Hassock Channel (5.5 hrs duration, n=2) yielded 34 individuals representing 3 species (**Table 4.2.3.3**). The dominant species was bluefish. Mean CPUE at mid-depth in Grass Hassock Channel (925 g/hr) was greater than that observed at mid-depth in Norton Basin (11.8 g/hr) or at mid-depth in Little Bay (180.9 g/hr). Gill net collections at the surface of Grass Hassock Channel (5.5 hrs duration, n=2) yielded 35 individuals representing 2 species (**Table 4.2.3.3**). The dominant species was Atlantic menhaden. Mean CPUE at the surface of Grass Hassock Channel (27.3 g/hr) was less than at the surface of Norton Basin (29.1 g/hr) and greater than at the surface of Little Bay (19.6 g/hr). Throughout the August gill net sampling in Grass Hassock Channel, the dominant species was Atlantic menhaden representing 44.4% of the total collection. Bluefish represented 17.1%, blue crab represented 14.5%, weakfish represented 11.1%, and all other species represented less than 10% each (**Figure 4.2.3.1**).

Gill net collections from the shallow areas of the Raunt during August (5.75 hrs duration, n=2) yielded 93 individuals representing 12 species (**Table 4.2.3.4**). Mean CPUE at the Raunt (2161.2 g/hr) was greater than at the shallow areas of Norton Basin (419.5 g/hr) and at the shallow areas of Little Bay (151.9 g/hr). The dominant species was blue crab representing 35.5% of the total collection. Atlantic horseshoe crab and weakfish represented 15.1% and all other species represented less than 10% each (**Figure 4.2.3.1**).

4.3 Bottom Trawling

Trawls conducted in Norton Basin during May (5 min duration, n=3) yielded a total of 3 Atlantic horseshoe crabs and 1 striped searobin (**Table 4.3.1**). Trawls conducted in Grass Hassock Channel during May (10 min duration, n=3) yielded no fish (**Table 4.3.1**). Trawls conducted in the Raunt during May (10 min duration, n=3) yielded a total of 45 individuals representing 10 species (**Table 4.3.1**). The dominant species in the Raunt was Atlantic horseshoe crab representing 53.3% of the total collection. Winter flounder (*Pleuronectes americanus*) represented 13.3%, blue crab represented 8.9%, common spider crab represented 6.7%, and all other species represented less than 5% (**Figure 4.3.1**). Mean CPUE for Norton Basin during May (438.0 g/min) was less than that for the Raunt (855.7 g/min) (**Table 4.3.1**).

Trawls conducted in Norton Basin during June (6 to 9 min duration, n=5) yielded a total of 13 individuals representing 4 species (**Table 4.3.2**). The dominant species in Norton Basin was blue crab representing 76.9% of the total collection. Summer flounder, Atlantic horseshoe crab, and winter

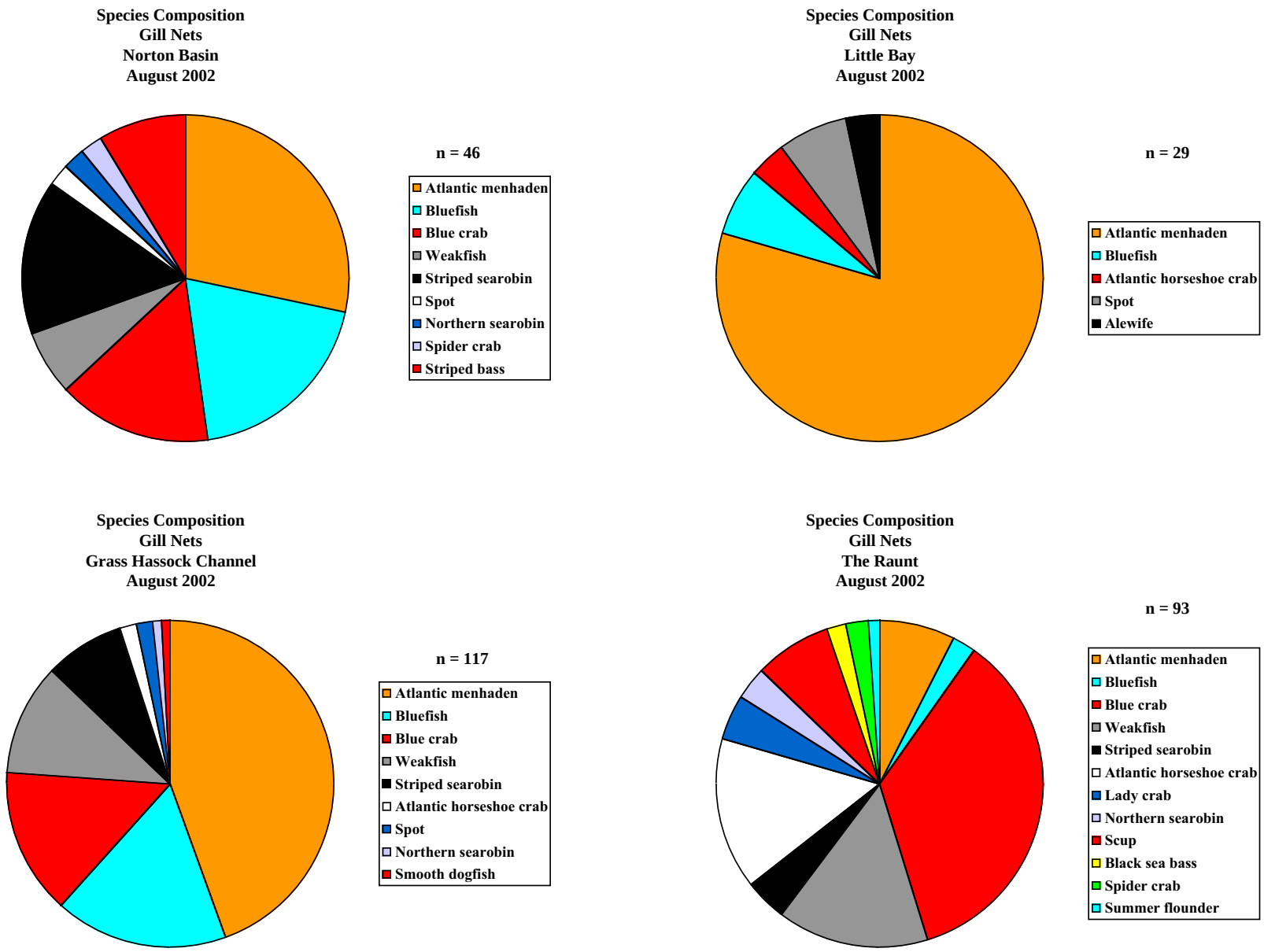


Figure 4.2.3.1 Species composition from gill net sampling efforts, August 2002.

Table 4.2.3.2 Total abundance, mean CPUE (biomass in g/hr), and total length range of fish and macrocrustaceans collected in gill nets from Little Bay, August 2002.

Little Bay, Bottom (n=2)
Duration of set: 6.5 hrs

Scientific Name	Common Name	Total Abund.	Mean CPUE (g/hr)	TL Range (mm)
Total:		0	0.00	0

Little Bay, Mid-Depth (n=2)
Duration of set: 6 hrs

Scientific Name	Common Name	Total Abund.	Mean CPUE (g/hr)	TL Range (mm)
Brevoortia tyrannus	Atlantic Menhaden	6	87.91	76-330
Pomatomus saltatrix	Bluefish	2	67.62	330-337
Alosa pseudoharengus	Alewife	1	25.36	95
Total:		9	180.90	76-337

Little Bay, Surface (n=2)
Duration of set: 5.5 hrs

Scientific Name	Common Name	Total Abund.	Mean CPUE (g/hr)	TL Range (mm)
Brevoortia tyrannus	Atlantic Menhaden	7	19.59	133-133
Total:		7	19.59	133-133

Little Bay, Shallow Area (n=2)
Duration of set: 4.75 to 5 hrs

Scientific Name	Common Name	Total Abund.	Mean CPUE (g/hr)	TL Range (mm)
Brevoortia tyrannus	Atlantic Menhaden	10	7.65	76-92
Leiostomus xanthurus	Spot	2	9.82	146-159
Limulus polyphemus	Atlantic Horseshoe Crab	1	134.44	216
Total:		13	151.91	76-216

Table 4.2.3.3 Total abundance, mean CPUE (biomass in g/hr), and total length range of fish and macrocrustaceans collected in gill nets from Grass Hassock Channel, August 2002.

Grass Hassock Channel, Bottom (n=2)
Duration of set: 5.5 hrs

Scientific Name	Common Name	Total Abund.	Mean CPUE (g/hr)	TL Range (mm)
Callinectes sapidus	Blue Crab	13	242.54	83-178
Cynoscion regalis	Weakfish	13	522.39	102-508
Prionotus evolans	Striped Searobin	9	289.18	267-330
Brevoortia tyrannus	Atlantic Menhaden	5	47.20	76-343
Pomatomus saltatrix	Bluefish	2	102.61	356-375
Limulus polyphemus	Atlantic Horseshoe Crab	2	270.52	203-241
Leiostomus xanthurus	Spot	2	18.66	152-184
Prionotus carolinus	Northern Searobin	1	0.75	203
Mustelus canis	Smooth Dogfish	1	65.30	533
Total:		48	1559.14	76-533

Grass Hassock Channel, Mid-Depth (n=2)
Duration of set: 5.5 hrs

Scientific Name	Common Name	Total Abund.	MeanCPUE (g/hr)	TL Range (mm)
Pomatomus saltatrix	Bluefish	18	857.14	343-400
Brevoortia tyrannus	Atlantic Menhaden	13	7.59	83-89
Callinectes sapidus	Blue Crab	3	60.27	102-178
Total:		34	925.00	83-400

Grass Hassock Channel, Surface (n=2)
Duration of set: 5.5 hrs

Scientific Name	Common Name	Total Abund.	MeanCPUE (g/hr)	TL Range (mm)
Brevoortia tyrannus	Atlantic Menhaden	34	26.64	82-102
Callinectes sapidus	Blue Crab	1	0.70	51
Total:		35	27.34	51-102

Table 4.2.3.4 Total abundance, mean CPUE (biomass in g/hr), and total length range of fish and macrocrustaceans collected in gill nets from the Raunt, August 2002.

The Raunt, Shallow Area (n=2)
Duration of set: 5.75 hrs

Scientific Name	Common Name	Total Abund.	MeanCPUE (g/hr)	TL Range (mm)
Callinectes sapidus	Blue crab	33	497.82	102-178
Limulus polyphemus	Atlantic Horseshoe Crab	14	1196.51	152-241
Cynoscion regalis	Weakfish	14	25.33	89-133
Brevoortia tyrannus	Atlantic Menhaden	7	9.43	64-152
Stenotomus chrysops	Scup	7	66.81	159-229
Ovalipes ocellatus	Lady Crab	4	12.66	30-57
Prionotus evolans	Striped Searobin	4	61.66	83-305
Prionotus carolinus	Northern Searobin	3	26.20	178-203
Centropristis striata	Black Sea Bass	2	80.35	184-191
Pomatomus saltatrix	Bluefish	2	104.80	362-432
Libinia emarginata	Common Spider Crab	2	9.78	51-76
Paralichthys dentatus	Summer Flounder	1	69.87	381
Total:		93	2161.22	30-432

Table 4.3.1 Total abundance, mean CPUE (biomass in g/min), and total length range of fish and macrocrustaceans collected in otter trawls from Norton Basin, the Raunt, and Grass Hassock Channel, May 2002.

Grass Hassock Channel (n=3)
Trawl duration: 10 min.

Scientific Name	Common Name	Total Abund.	Mean CPUE (g/min.)	TL Range (mm)
Total:		0	0.00	0

The Raunt (n=3)
Trawl duration: 4-10 min.

Scientific Name	Common Name	Total Abund.	Mean CPUE (g/min.)	TL Range (mm)
Limulus polyphemus	Atlantic Horseshoe Crab	24	589.67	120-260
Pleuronectes americanus	Winter Flounder	6	90.67	180-380
Callinectes sapidus	Blue Crab	4	26.67	120-145
Libinia emaginata	Common Spider Crab	3	13.00	50-75
Malaclemys terrapin terrapin	Northern Diamondback Terrapin	2	63.33	95-145
Morone saxatilis	Striped Bass	2	8.67	180-210
Prionotus evolans	Striped Searobin	1	30.33	370
Paralichthys dentatus	Summer Flounder	1	26.33	445
Scopthalmus aquosus	Windowpane	1	7.00	230
Hippocampus erectus	Lined Sea Horse	1	n/a	8
Total:		45	855.67	8-445

Norton Basin (n=3)
Trawl duration: 5 min.

Scientific Name	Common Name	Total Abund.	Mean CPUE (g/min.)	TL Range (mm)
Limulus polyphemus	Atlantic Horseshoe Crab	3	408.00	210-460
Prionotus evolans	Striped Searobin	1	30.00	330
Total:		4	438.00	210-460

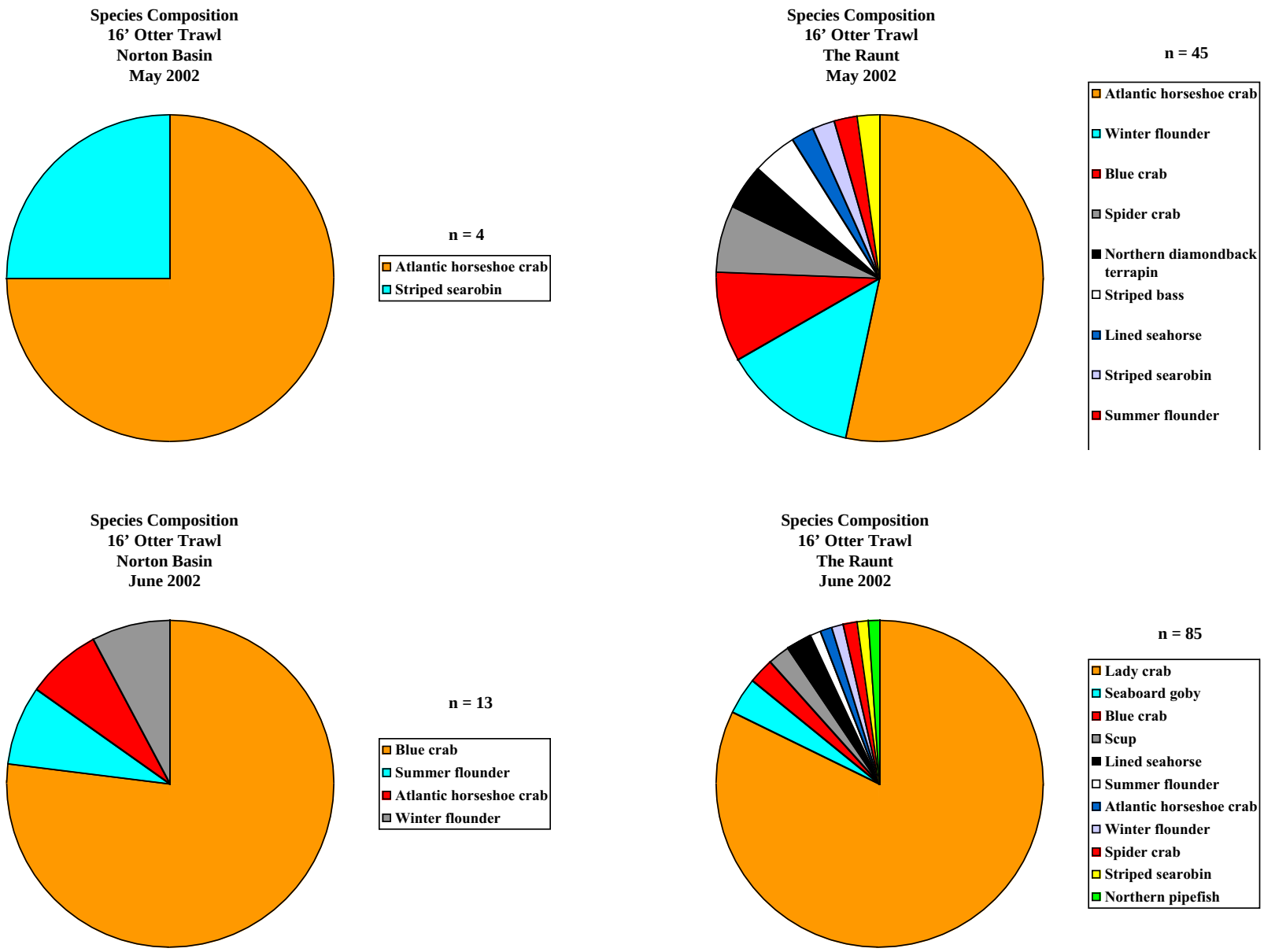


Figure 4.3.1 Species composition from otter trawl sampling efforts, May and June 2002.

Table 4.3.2 Total abundance, mean CPUE (biomass in g/min), and total length range of fish and macrocrustaceans collected in otter trawls from Norton Basin, the Raunt, and Grass Hassock Channel, June 2002.

Grass Hassock Channel (n=5)
Trawl duration: 10 min.

Scientific Name	Common Name	Total Abund.	Mean CPUE (g/min.)	TL Range (mm)
Total:		0	0.00	0

The Raunt (n=4)
Trawl duration: 2 to 10 min.

Scientific Name	Common Name	Total Abund.	Mean CPUE (g/min.)	TL Range (mm)
Ovalipes ocellatus	Lady Crab	70	79.19	45-100
Gobiosoma ginsgurgi	Seaboard Goby	3	0.54	40-55
Callinectes sapidus	Blue Crab	2	13.46	145-155
Stenotomus chrysops	Scup	2	1.35	84-120
Hippocampus erectus	Lined Seahorse	2	0.54	60-120
Limulus polyphemus	Atlantic Horseshoe Crab	1	42.31	209
Paralichthys dentatus	Summer Flounder	1	40.38	465
Pleuronectes americanus	Winter Flounder	1	10.00	250
Libinia emarginata	Common Spider Crab	1	2.58	65
Prionotus evolans	Striped Searobin	1	1.65	120
Syngnathus fuscus	Northern Pipefish	1	n/a	150
Total:		85	192.00	40-465

Norton Basin (n=5)
Trawl duration: 6 to 9 min.

Scientific Name	Common Name	Total Abund.	Mean CPUE (g/min.)	TL Range (mm)
Callinectes sapidus	Blue Crab	10	51.05	20-155
Paralichthys dentatus	Summer Flounder	1	24.36	425
Limulus polyphemus	Atlantic Horseshoe Crab	1	19.23	160
Pleuronectes americanus	Winter Flounder	1	7.64	260
Total:		13	102.28	20-425

flounder represented 7.7% (**Figure 4.3.1**). Trawls conducted in Grass Hassock Channel during June (10 min duration, n=5) yielded no fish (**Table 4.3.2**). Trawls conducted in the Raunt during June (2 to 10 min duration, n=4) yielded 85 individuals representing 11 species (**Table 4.3.2**). The dominant species in the Raunt was lady crab representing 82.4% of the total collection. All other species represented less than 5% of the total collection (**Figure 4.3.1**). Mean CPUE for Norton Basin during June (102.3 g/min) was less than that for the Raunt (192.0 g/min) (**Table 4.3.2**).

Trawls conducted in Norton Basin during August (8 to 9 min duration, n=5) yielded a total of 28 individuals representing 5 species (**Table 4.3.2**). The dominant species in Norton Basin was blue crab representing 75% of the total collection. Atlantic horseshoe crab represented 14.3% and all other species represented less than 5% of the total collection (**Figure 4.3.3**). Trawls conducted in Grass Hassock Channel during August (10 min duration, n=5) yielded a total of 1 bay anchovy (*Anchoa mitchilli*), 1 Atlantic menhaden, and 1 weakfish (**Table 4.3.3**). Trawls conducted in the Raunt during August (10 min duration, n=5) yielded a total of 32 individuals representing 10 species (**Table 4.3.3**). The dominant species in the Raunt was blue crab representing 34.4% of the total collection. Lady crab represented 25.0%, winter flounder represented 12.5%, Atlantic horseshoe crab represented 9.4% and all other species represented less than 5% of the total collection (**Figure 4.3.2**). Mean CPUE during August for Norton Basin (288.8 g/min) was greater than that for the Raunt (125.0 g/min) and for Grass Hassock Channel (0.2 g/min) (**Table 4.3.3**).

4.4 Sediment Profile Imaging (SPI)

Detailed station summaries of the May SPI survey are presented in **Table 4.4.1**. The summaries present information on camera (prism) penetration depth, surface/near-surface features, RPD depth, grain size, and observations of benthic fauna. All SPI images have been catalogued in a hypertext markup language (HTML) database and are included on a compact disk-read only memory (CD-ROM) (**Appendix III-A**). A data dictionary is also included (**Appendix III-B**).

4.4.1 Norton Basin

The dominant sediment types present throughout Norton Basin were silt and fine sand. Within the two borrow pits, sediments were highly aqueous organic fine, and the SPI camera often over-penetrated, precluding the collection of satisfactory images at the water/sediment interface. Sandy sediments overlain by shell hash were encountered in the vicinity of the entrance channel to Norton Basin.

A large number of stations throughout Norton Basin were covered with dense mats of green algae (*Ulva lactuca*). Snail eggs were observed on the green algae in some of the SPI images. These mats were probably 2-4 ft thick in some areas, as evidenced by the volume of algae that had to be removed from the camera frame between deployments (**Figure 4.4.1**).

4.4.2 Little Bay

Nearly all of the SPI samples collected in Little Bay during the May survey over-penetrated in the soft, black, highly aqueous sediments. Despite repeated efforts, the SPI camera did not yield satisfactory images of the sediment-water interface (**Figure 4.4.2**).

4.4.3 Grass Hassock Channel

The dominant sediment type present within Grass Hassock Channel was silt. *Ampelisca* mats were apparent in a large number of sample images from this area (**Figure 4.4.3**).

Table 4.3.3 Total abundance, mean CPUE (biomass in g/min), and total length range of fish and macrocrustaceans collected in otter trawls from Norton Basin, the Raunt, and Grass Hassock Channel, August 2002.

Grass Hassock Channel (n=5)
Trawl duration: 10 min.

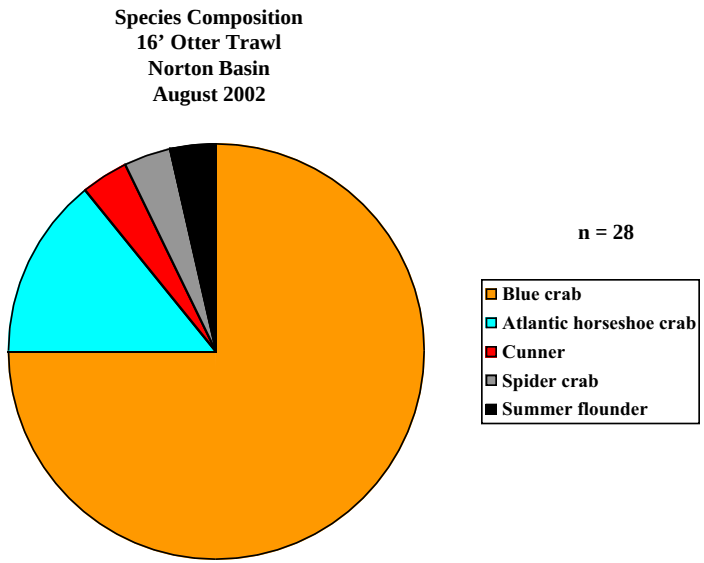
Scientific Name	Common Name	Total Abund.	Mean CPUE (g/min.)	TL Range (mm)
Anchoa mitchilli	Bay Anchovy	1	0.00	44
Brevoortia tyrannus	Atlantic Menhaden	1	0.10	76
Cynoscion regalis	Weakfish	1	0.12	83
Total:		3	0.22	44-83

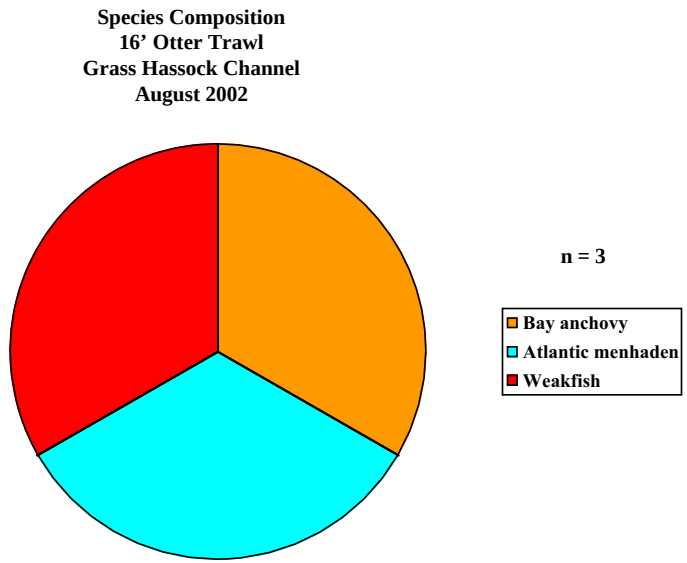
The Raunt (n=5)
Trawl duration: 10 min.

Scientific Name	Common Name	Total Abund.	Mean CPUE (g/min.)	TL Range (mm)
Callinectes sapidus	Blue Crab	11	54.82	76-152
Ovalipes ocellatus	Lady Crab	8	8.04	19-70
Pleuronectes americanus	Winter Flounder	4	0.54	64-121
Limulus polyphemus	Atlantic Horseshoe Crab	3	60.00	203-210
Libinia emarginata	Common Spider Crab	1	1.30	64
Prionotus evolans	Striped Searobin	1	0.12	73
Cancer irroratus	Rock Crab	1	0.08	25
Tautogolabrus adspersus	Cunner	1	0.06	60
Centropristis striata	Black Sea Bass	1	0.02	44
Syngnathus fuscus	Northern Pipefish	1	0.00	108
Total:		32	124.98	19-210

Norton Basin (n=5)
Trawl duration: 8 to 9 min.

Scientific Name	Common Name	Total Abund.	Mean CPUE (g/min.)	TL Range (mm)
Callinectes sapidus	Blue Crab	21	52.02	76-178
Limulus polyphemus	Atlantic Horseshoe Crab	4	223.81	203-267
Paralichthys dentatus	Summer Flounder	1	11.90	330
Libinia emarginata	Common Spider Crab	1	0.88	51
Tautogolabrus adspersus	Cunner	1	0.14	70
Total:		28	288.76	51-330





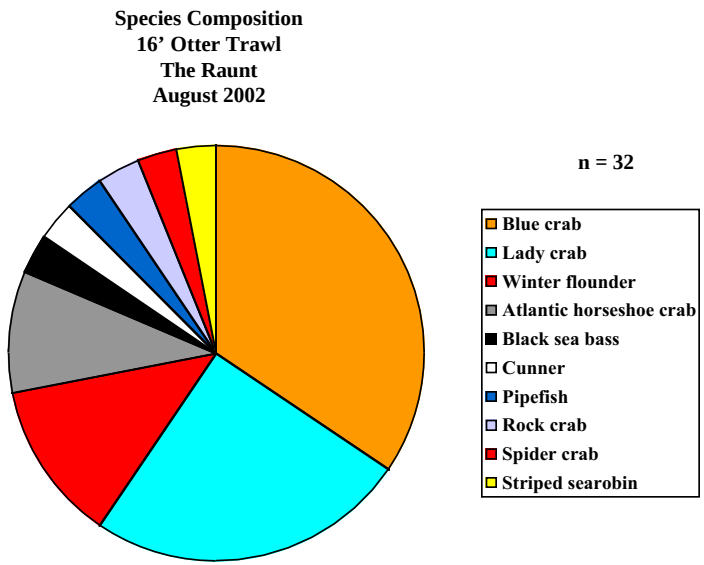


Figure 4.3.2 Species composition from otter trawl sampling efforts, August 2002.

Table 4.4.1 Sediment profile imagery (SPI) station summary from Norton Basin, Little Bay, Grass Hassock Channel, and the Raunt, May 2002.

Station	Rep	Prism Time	Day	Min Pen	Max Pen	Ave Pen	SR	Qualifyer RPD	Ave RPD	Algae	Mat Bacterial	Snail	Crabs Hermit	Shell	Detritus	Bedforms	GRAIN SIZE	FEATURES SURFACE	TUBES AMPHIPOD	TUBES WORM	INFAUNA	BURROWS	VOIDS OXIC	VOIDS ANAEROBIC	VOIDS GAS	
LB1	2	8:34	5/20/02	IND	IND	>23	IND	IND									SI	IND	IND	IND	0	0	0	0	0	
LB2	2	8:47	5/20/02	IND	IND	>23	IND	IND									SI	IND	IND	IND	0	0	0	0	0	
LB3	1	8:52	5/20/02	IND	IND	>23	IND	IND							x		SI	IND	IND	IND	0	0	0	0	0	
LB3	2	8:55	5/20/02	IND	IND	>23	IND	IND							x		SI	IND	IND	IND	0	0	0	0	0	Light gray over dark
LB4	1	9:00	5/20/02	IND	IND	>23	IND	IND			x						SI	IND	IND	IND	0	0	0	0	0	
LB4	2	9:03	5/20/02	IND	IND	>23	IND	IND									SI	IND	IND	IND	0	0	0	0	0	
LB5	1	9:10	5/20/02	IND	IND	>23	IND	IND									SI	IND	IND	IND	0	0	0	0	0	
LB5	2	9:13	5/20/02	18.9	19.4	19.1	0.5		0.0								SI	IND	IND	IND	0	0	0	0	0	Low DO?
LB6	1	9:44	5/20/02	IND	IND	>23	IND	IND									SI	IND	IND	IND	0	0	0	0	0	
LB6	2	9:47	5/20/02	IND	IND	>23	IND	IND									SI	IND	IND	IND	0	0	0	0	0	
LB7	1	9:55	5/20/02	IND	IND	>23	IND	IND									SI	IND	IND	IND	0	0	0	0	0	
LB8	2	11:14	5/20/02	IND	IND	>23	IND	IND									SI	IND	IND	IND	0	0	0	0	0	
LB9	1	11:18	5/20/02	19.8	21.8	20.8	2.0		0.0								SI	PHY	NONE	NONE	0	0	0	0	0	Low DO?
LB10	2	10:28	5/20/02	IND	IND	>23	IND	IND									SI	IND	IND	IND	0	0	0	0	0	
LB11	2	13:55	5/21/02	IND	IND	>23	IND	IND									SI	IND	IND	IND	0	0	0	0	5	
LB12	1	11:00	5/20/02	IND	IND	>23	IND	IND									SI	IND	IND	IND	0	0	0	0	4	
LB12	2	11:06	5/20/02	IND	IND	>23	IND	IND		X							SI	IND	IND	IND	0	0	0	0	5	
LB13	1	10:34	5/20/02	IND	IND	>23	IND	IND									SI	IND	IND	IND	0	0	0	0	0	
LB13	1	13:59	5/21/02	IND	IND	>23	IND	IND									SI	IND	IND	IND	0	0	0	0	0	
LB13	2	14:04	5/21/02	IND	IND	>23	IND	IND									SI	IND	IND	IND	0	0	0	0	0	
LB14	1	10:42	5/20/02	IND	IND	>23	IND	IND									SI	IND	IND	IND	0	0	0	0	0	
LB14	2	10:48	5/20/02	9.2	10.3	9.8	1.1		0.4								SI	PHY	FEW	MANY	0	0	0	0	0	
LB15	2	14:11	5/21/02	8.3	9.5	8.9	1.2		0.0			1		X			SI	PHY/BIO	NONE	MAT	0	0	0	0	0	
LB15	2	10:54	5/20/02	8.6	10.0	9.3	1.5		0.7					X			SI	PHY/BIO	NONE	MAT	0	0	0	0	0	
NB16	1		5/20/02	1.2	1.7	1.5	0.5	>	1.5			6				x	MS	PHY	NONE	NONE	0	0	0	0	0	
NB16	2		5/20/02	4.0	5.2	4.6	1.2		2.0					x			MSSI	PHY/BIO	SOME	MAT	2	0	0	0	0	
NB17	1	11:27	5/20/02	IND	IND	0.0	IND	IND				15		x			MS?	PHY	NONE	NONE	IND	IND	IND	IND	IND	
NB17	2	11:30	5/20/02	IND	IND	0.0	IND	IND				10		x			MS?	PHY	NONE	NONE	IND	IND	IND	IND	IND	
NB18	1	11:37	5/20/02	6.6	8.7	7.7	2.1		0.2								SI	PHY	NONE	SOME	0	0	0	0	0	
NB18	1	14:14	5/21/02	8.6	9.1	8.8	0.5	<	0.2	X		1		X			SI	PHY	NONE	FEW	0	0	0	0	0	
NB18	2	14:20	5/21/02	2.0	8.7	5.4	6.7		1.0	X		1		X			SI	PHY	NONE	MANY	0	0	0	0	0	Snail eggs on algae
NB18	2	11:39	5/20/02	7.2	8.7	7.9	1.5		1.8					X			SI	PHY/BIO	SOME	MAT	0	0	0	0	0	
NB19	1	16:02	5/20/02	9.9	11.1	10.5	1.2		3.4			1		X			SI	BIOG	MANY	MAT	0	0	0	0	0	
NB19	2	16:07	5/20/02	19.9	20.3	20.1	0.4		0.0								SI	PHY	NONE	NONE	0	0	0	0	0	
NB20	1	16:09	5/20/02	12.6	13.6	13.1	1.0	<	0.2								SI	PHY	NONE	SOME	2	0	0	0	0	Tubes on a thin RPD
NB20	2	16:12	5/20/02	13.6	15.5	14.6	1.9	<	0.2								SI	PHY	NONE	SOME	3	0	0	0	0	Tubes on a thin RPD
NB21	1	16:14	5/20/02	11.9	12.9	12.4	1.0	<	0.2			1					SI	PHY	NONE	SOME	1	0	0	0	0	
NB21	2	16:16	5/20/02	2.1	2.8	2.4	0.8	>	2.4	X				X		X	MS	PHY	NONE	SOME	0	0	0	0	0	
NB22	1	16:18	5/20/02	4.1	6.5	5.3	2.4		1.6	X				X			SIFS	PHY	NONE	SOME	0	0	0	0	0	
NB22	2	16:20	5/20/02	0.4	2.4	1.4	1.9	>	1.4	X				X		X	FSMS	PHY	NONE	SOME	0	0	0	0	0	
NB23	1	16:24	5/20/02	5.0	6.3	5.6	1.3		2.6	X				X		X	FS	PHY	NONE	FEW	0	2	0	0	0	
NB23	2	16:27	5/20/02	2.3	4.2	3.2	1.9	IND		X							FSSI	PHY	NONE	MANY	0	0	0	0	0	
NB24	1	16:28	5/20/02	13.0	14.9	14.0	1.9		1.9	X				X			SIFS	PHY	NONE	MANY	0	0	0	0	0	
NB24	2	16:31	5/20/02	13.7	14.4	14.1	0.7		1.5	X							SIFS	PHY/BIO	SOME	MAT	0	0	0	0	0	
NB25	1	13:21	5/20/02	13.1	15.0	14.1	1.9	<	0.2								SI	PHY	NONE	SOME	0	0	0	0	0	
NB26	1	13:14	5/20/02	IND	IND	>23	IND	IND									SI	IND	IND	IND	0	0	0	0	0	
NB27	2	14:48	5/21/02	14.6	15.6	15.1	1.0		0.0								SI	PHY	NONE	NONE	0	0	0	0	0	Low DO?
NB27	2	12:03	5/20/02	20.4	22.5	21.5	2.2	<	0.2								SI	PHY	NONE	NONE	0	0	0	0	0	Low DO?
NB28	1	11:52	5/20/02	19.9	21.1	20.5	1.2		0.4								SI	PHY	NONE	MANY	0	0	0	0	0	
NB28	2	11:55	5/20/02	15.6	16.6	16.1	1.0		0.8								SI	PHY	NONE	MAT	0	2	0	0	0	
NB29	1	14:26	5/21/02	13.6	15.6	14.6	2.1		0.0								SI	PHY	NONE	SOME	0	0	0	0	0	Low DO
NB29	2	11:47	5/20/02	20.5	20.9	20.7	0.4		0.0		X						SI	PHY	NONE	NONE	0	0	0	0	0	Low DO
NB30	1	13:01	5/20/02	18.8	19.6	19.2	0.7	IND		X							SI	PHY	NONE	NONE	0	0	0	0	0	
NB30	2	13:04	5/20/02	IND	IND	>23	IND	IND		X							SI	IND	IND	IND	0	0	0	0	0	Small tubes on Ulva
NB31	1	13:07	5/20/02	0.0	1.2	0.6	1.2	>	0.6					X			FSMS	PHY	NONE	FEW	0	0	0	0	0	
NB31	1	14:30	5/21/02	13.9	14.7	14.3	0.8		0.0		x						SI	PHY	NONE	NONE	0	0	0	0	0	Low DO
NB31	2	14:35	5/21/02	2.2	3.6	2.9	1.4	>	2.9					X			FSMS	PHY/BIO	FEW	MAT	0	0	0	0	0	
NB31	3	14:39	5/21/02	4.6	5.4	5.0	0.9		3.5					X			FSMS	PHY/BIO	SOME	MAT	0	0	0	0	0	
NB32	1	16:56	5/20/02	4.1	6.5	5.3	2.4		3.0	X				X	X		FSMSSI	PHY	NONE	SOME	0	0	0	0	0	
NB32	2	16:59	5/20/02	12.3	13.8	13.1	1.5		3.0	X				X			FSMSSI	PHY	NONE	MANY	0	3	0	0	0	
NB33	1	16:52	5/20/02	3.9	5.2	4.6	1.3		3.5					X		X	MS	PHY	NONE	NONE	0	0	0	0	0	
NB33	2	16:55	5/20/02	IND	IND	0.0	IND	IND		X				X			IND	PHY	NONE	NONE	IND	IND	IND	IND	IND	Snail eggs on algae
NB34	1	16:47	5/20/02	12.5	13.8	13.2	1.4		1.8	X							SI	PHY	FEW	MANY	0	3	0	0	0	Stick amphipod, snail eggs
NB34	2	16:50	5/20/02	0.7	2.3	1.5	1.6	>	1.5					X		X	MS	PHY	NONE	NONE	0	0	0	0	0	
NB35	1	16:39	5/20/02	10.8	11.9	11.4	1.1		3.0					X			FSSI	PHY/BIO	NONE	MANY	0	4	0	0	0	
NB35	2	16:42	5/20/02	7.6	8.9	8.3	1.4		4.7	X				X		X	FSMS	PHY	NONE	NONE	1	1	0	0	0	
NB35	3	16:44	5/20/02	0.6	2.7	1.7	2.2		0.7	X		3	1	X		X	FSMS	PHY	NONE	NONE	0	0	0	0	0	

Table 4.4.1 con't. Sediment profile imagery (SPI) station summary from Norton Basin, Little Bay, Grass Hassock Channel, and the Raunt, May 2002.

Station	Rep	Prism Time	Day	Min Pen	Max Pen	Ave Pen	SR	Qualifyer RPD	Ave RPD	Algae	Mat Bacterial	Snail	Crabs Hermit	Shell	Detritus	Bedforms	GRAIN SIZE	FEATURES SURFACE	TUBES AMPHIPOD	TUBES WORM	INFAUNA	BURROWS	VOIDS OXIC	VOIDS ANAEROBIC	VOIDS GAS	
NB36	1	16:33	5/20/02	4.1	8.1	6.1	4.0		2.6				2	X			SIFS	PHY/BIO	NONE	MAT	1	2	1	0	0	
NB36	2	16:37	5/20/02	11.7	13.3	12.5	1.6		4.0	X		1		X			SIFS	PHY/BIO	NONE	MANY	0	1	0	0	0	Snail eggs on algae
NB37	1	13:33	5/20/02	1.1	2.7	1.9	1.6		1.0					X			FSMSSI	PHY	NONE	SOME	0	0	0	0	0	
NB37	1	14:52	5/21/02	5.2	6.3	5.7	1.1		2.8			1		X			SIFS	PHY	NONE	MANY	0	0	0	0	0	
NB37	2	14:54	5/21/02	8.5	9.9	9.2	1.4		1.3	X					X		SI	PHY	NONE	FEW	0	0	0	0	0	
NB38	1	13:29	5/20/02	5.7	6.8	6.2	1.1	IND		X				X			SI	PHY	NONE	NONE	0	0	0	0	0	
NB38	2	13:31	5/20/02	8.0	8.8	8.4	0.8	IND		X							SI	PHY	NONE	FEW	0	0	0	0	0	
NB39	1	13:01	5/21/02	18.5	18.9	18.7	0.4	<	0.2								SI	PHY	NONE	SOME	0	0	0	0	0	
NB39	2	13:03	5/21/02	18.6	19.8	19.2	1.3		1.8					X			SI	PHY/BIO	MAT	MANY	0	2	0	0	0	
NB40	1	17:33	5/20/02	IND	IND	0.0	IND	IND		X							FS	PHY	NONE	NONE	IND	IND	IND	IND	IND	
NB40	2	17:35	5/20/02	1.1	1.4	1.3	0.3	>	1.3	X		14		X		X	FSMS	PHY	NONE	NONE	0	0	0	0	0	
NB41	1	17:28	5/20/02	IND	IND	0.0	IND		0.0	X				BED			SH	PHY	NONE	FEW	IND	IND	IND	IND	IND	Hydroids
NB41	2	17:30	5/20/02	IND	IND	0.0	IND		0.0	X				BED			SH	PHY	NONE	NONE	IND	IND	IND	IND	IND	Hydroids
NB42	1	17:22	5/20/02	IND	IND	0.0	IND		0.0	X				BED			SH	PHY	NONE	NONE	IND	IND	IND	IND	IND	Hydroids
NB42	2	17:25	5/20/02	0.6	1.3	0.9	0.7	>	0.9			1		X		x	MS	PHY	NONE	NONE	0	0	0	0	0	
NB43	1	17:17	5/20/02	3.6	6.3	4.9	2.7		4.4	X		1		X			FSMS	PHY	NONE	MANY	0	0	0	0	0	Snail eggs on algae
NB43	2	17:19	5/20/02	IND	IND	0.0	IND	IND						BED			SH	PHY	NONE	NONE	IND	IND	IND	IND	IND	
NB44	1	17:12	5/20/02	11.8	14.0	12.9	2.1		3.6			4		X			SI	BIOG	MAT	SOME	1	3	0	0	0	
NB44	2	17:14	5/20/02	4.6	5.5	5.0	0.9		0.8			2		X			SI	BIOG	MAT	SOME	0	1	0	0	0	
NB45	1	12:53	5/20/02	14.4	15.4	14.9	0.9	IND		X							SI	PHY	NONE	FEW	0	0	0	0	0	
NB45	1	15:02	5/21/02	19.1	19.5	19.3	0.4		0.0	X	X						SI	PHY	NONE	NONE	0	0	0	0	0	
NB45	2	12:55	5/20/02	9.9	13.6	11.8	3.6	IND		X							SI	PHY	NONE	SOME	0	0	0	0	0	
NB45	2	15:04	5/21/02	17.1	18.7	17.9	1.6	<	0.2	X	?						SI	PHY	MAT	NONE	0	0	0	0	0	
NB46	1	17:01	5/20/02	3.2	12.1	7.6	8.9		1.0	X		3		X			FSSI	PHY	NONE	MANY	0	0	0	0	0	Snail eggs on algae
NB46	2	17:05	5/20/02	7.7	8.3	8.0	0.6		1.6			1		X			FSSI	PHY	NONE	MANY	0	3	0	0	0	
NB46	3	17:08	5/20/02	6.0	6.4	6.2	0.4		3.0			1		X			FSSI	PHY	NONE	SOME	0	1	2	0	0	
NB47	1	15:49	5/20/02	0.0	0.5	0.3	0.5	>	0.3			1		X			MS	PHY	NONE	SOME	IND	IND	IND	IND	IND	
NB48	1	15:44	5/20/02	0.2	0.6	0.4	0.4	>	0.4	X		30		X		X	MSCS	PHY	NONE	SOME	IND	IND	IND	IND	IND	
NB48	2	15:46	5/20/02	0.9	1.2	1.1	0.3	>	1.1	X		15		X		X	MSCS	PHY	NONE	MANY	0	0	0	0	0	
NB49	1	15:37	5/20/02	0.1	0.7	0.4	0.6	>	0.4			15		X		X	MSCS	PHY	NONE	SOME	IND	IND	IND	IND	IND	
NB49	2	15:39	5/20/02	0.7	1.0	0.8	0.4	>	0.8			30		X		X	MSCS	PHY	NONE	SOME	0	0	0	0	0	
NB50	1	15:33	5/20/02	0.0	0.4	0.2	0.4	>	0.2	X		30		X		X	MSCS	PHY	NONE	FEW	IND	IND	IND	IND	IND	
NB50	2	15:34	5/20/02	0.0	1.2	0.6	1.2	>	0.6	X		30		X		X	MSCS	PHY	NONE	MANY	0	0	0	0	0	
NB51	3	14:12	5/20/02	10.4	13.7	12.0	3.3	IND				3					SI	PHY	NONE	FEW	0	0	0	0	0	
NB52	1	14:20	5/20/02	0.0	0.9	0.5	0.9	>	0.5	X		30		X		X	FSMS	PHY	NONE	NONE	0	0	0	0	0	
NB52	2	14:23	5/20/02	1.6	2.8	2.2	1.2		1.4	X		15		X		X	FSMS	PHY	NONE	NONE	0	0	0	0	0	
NB53	1	15:25	5/20/02	2.2	3.0	2.6	0.8	IND		X				BED			SHSA	PHY	NONE	NONE	0	0	0	0	0	
NB53	2	15:27	5/20/02	1.5	5.6	3.6	4.1		1.6	X		1		BED			SHSA	PHY	NONE	SOME	0	0	0	0	0	
NB54	1	15:19	5/20/02	1.1	1.7	1.4	0.7		1.0			25		X		X	FSMS	PHY	NONE	NONE	0	0	0	0	0	
NB54	2	15:21	5/20/02	0.6	1.1	0.8	0.5	>	0.8			30		X		X	FSMS	PHY	NONE	NONE	0	0	0	0	0	
NB55	1	15:09	5/20/02	IND	IND	0.0	IND	IND		X		1					ALGAE	PHY	NONE	NONE	IND	IND	IND	IND	IND	All algae
NB55	2	15:13	5/20/02	IND	IND	0.0	IND	IND		X							ALGAE	PHY	NONE	FEW	IND	IND	IND	IND	IND	All algae
NB56	1	15:02	5/20/02	3.9	4.5	4.2	0.6		2.0			30		X		x	FS	PHY	NONE	NONE	0	2	0	0	0	
NB56	2	15:06	5/20/02	0.0	6.6	3.3	6.6		2.6	X		10		X		X	FS	PHY	NONE	NONE	0	0	0	0	0	
NB57	1	14:56	5/20/02	0.5	0.8	0.7	0.3	>	0.7	X		25		X		X	FSMS	PHY	NONE	NONE	0	0	0	0	0	
NB57	2	15:00	5/20/02	4.1	4.8	4.5	0.7		3.3			2		X		X	FSMS	PHY	NONE	NONE	0	0	0	0	0	
NB58	1	14:44	5/20/02	0.7	1.2	0.9	0.4	>	0.9	X		30+		X		X	FS	PHY	NONE	NONE	0	0	0	0	0	
NB58	2	14:47	5/20/02	1.3	3.2	2.3	1.8	IND		X		7		X			ALGAE	PHY	NONE	NONE	0	0	0	0	0	All algae
NB59	1	14:50	5/20/02	IND	IND	0.0	IND	IND		X		20		X			ALGAE	PHY	NONE	NONE	IND	IND	IND	IND	IND	All algae
NB59	2	14:54	5/20/02	IND	IND	0.0	IND		0.0	X		30+		X		X	FS	PHY	NONE	NONE	IND	IND	IND	IND	IND	
NB60	1	14:34	5/20/02	IND	IND	0.0	IND	IND		X		30+		X			FS	PHY	NONE	NONE	IND	IND	IND	IND	IND	
NB60	2	14:39	5/20/02	0.4	0.9	0.6	0.5	>	0.6	X		30+		X			FS	PHY	NONE	NONE	0	0	0	0	0	
NB61	1	14:27	5/20/02	IND	IND	0.0	IND	IND		X		4					ALGAE	PHY	NONE	SOME	IND	IND	IND	IND	IND	All algae
NB61	2	14:32	5/20/02	IND	IND	0.0	IND	IND		X		30+		X			FS	PHY	NON	NON	IND	IND	IND	IND	IND	
R62	1	8:12	5/21/02	13.0	14.4	13.7	1.4		3.2					X			FSSI	PHY	NONE	SOME	0	3	0	0	0	
R62	2	8:15	5/21/02	9.8	10.6	10.2	0.8		3.3								FSSI	PHY/BIO	MAT	MANY	0	3	0	0	0	
R63	1	8:18	5/21/02	16.1	17.7	16.9	1.5		1.0								SI	PHY	MAT	MANY	0	0	0	0	0	
R63	2	8:20	5/21/02	3.7	5.1	4.4	1.3	IND									SI	PHY	MAT	MANY	0	0	0	0	0	Disturbed surface
R64	1	8:23	5/21/02	15.1	15.6	15.3	0.5		3.4	X		1					SIFS	BIOG	MAT	SOME	1	2	1	0	0	
R64	2	8:25	5/21/02	10.4	11.3	10.8	0.9		3.9	X		1					SIFS	BIOG	MAT	SOME	2	5	1	0	0	Snail eggs on algae
R65	1	8:28	5/21/02	8.3	9.7	9.0	1.4	IND		X				X			SI	PHY	NONE	SOME	0	0	0	0	0	
R65	2	8:30	5/21/02	11.3	12.9	12.1	1.6	IND		X		4		X			SI	PHY	NONE	SOME	0	0	0	0	0	
R66	1	8:34	5/21/02	11.7	13.4	12.6	1.7		1.6								SI	PHY/BIO	MAT	MANY	0	3	0	0	0	
R66	2	8:36	5/21/02	12.3	12.9	12.6	0.7		3.3								SI	PHY/BIO	MAT	MANY	0	5	1	0	0	
R67	1	8:41	5/21/02	14.2	14.9	14.6	0.7	IND						X			SI	PHY	MANY	SOME	0	0	0	0	0	Disturbed surface
R67	2	8:43	5/21/02	14.0	16.3	15.2	2.3		2.2								SI	BIOG	MAT	MANY	0	3	0	0	0	

Table 4.4.1 con't. Sediment profile imagery (SPI) station summary from Norton Basin, Little Bay, Grass Hassock Channel, and the Raunt, May 2002.

Station	Rep	Prism Time	Day	Min Pen	Max Pen	Ave Pen	SR	Qualifyer RPD	Ave RPD	Algae	Mat Bacterial	Snail	Crabs Hermit	Shell	Detritus	Bedforms	GRAIN SIZE	FEATURES SURFACE	TUBES AMPHIPOD	TUBES WORM	INFAUNA	BURROWS	VOIDS OXIC	VOIDS ANAEROBIC	VOIDS GAS	
R68	1	8:47	5/21/02	12.0	14.5	13.3	2.5		5.1	X		2		X			SI	BIOG	MAT	MANY	0	9	0	0	0	
R68	2	8:49	5/21/02	9.7	20.1	14.9	10.4	IND		X		1		X			SI	PHY	NONE	FEW	0	0	0	0	0	Disturbed surface
R69	1	8:51	5/21/02	10.4	11.1	10.7	0.6		2.1								SI	BIOG	MANY	MANY	1	4	0	0	0	
R69	2	8:58	5/21/02	8.2	9.5	8.8	1.3		2.5								SI	BIOG	MAT	MANY	1	5	0	0	0	
R70	1	9:02	5/21/02	14.2	17.6	15.9	3.4	IND									SIFS	PHY	SOME	SOME	0	0	0	0	0	Disturbed surface
R70	2	9:06	5/21/02	4.7	7.4	6.0	2.7		4.0	X							SIFS	PHY/BIO	MANY	SOME	0	1	0	0	0	
R71	1	9:11	5/21/02	16.1	17.4	16.8	1.3		6.0			1					SI	BIOG	MAT	NONE	0	3	0	0	0	
R71	2	9:14	5/21/02	4.2	11.3	7.8	7.2		3.6	X		1					SI	BIOG	MAT	SOME	0	0	0	0	0	
R72	1	9:18	5/21/02	14.5	16.8	15.7	2.3		6.3			1					SI	BIOG	MAT	NONE	0	3	0	0	0	
R72	2	9:21	5/21/02	9.6	10.8	10.2	1.2		3.4								SI	BIOG	MAT	SOME	0	2	0	0	0	
R73	1	9:24	5/21/02	2.9	3.2	3.0	0.3		2.5			20		X		X	FS	PHY	NONE	NONE	0	0	0	0	0	
R73	2	9:27	5/21/02	1.9	3.3	2.6	1.3		1.9			15		X		X	FS	PHY	NONE	NONE	0	0	0	0	0	
R74	1	9:29	5/21/02	1.0	1.5	1.3	0.5	>	1.3					X			FSMS	PHY	NONE	NONE	0	0	0	0	0	
R74	2	9:31	5/21/02	1.8	3.4	2.6	1.5		1.6	X				X			FSMS	PHY	NONE	NONE	0	0	0	0	0	
R75	1	9:40	5/21/02	15.3	16.7	16.0	1.4		5.0	X		1					SI	BIOG	MAT	SOME	1	4	0	0	0	
R75	2	9:42	5/21/02	2.5	4.0	3.3	1.4	>	3.3	X		3			X		SI	PHY	FEW	MANY	0	0	0	0	0	
R76	1	9:47	5/21/02	15.3	16.1	15.7	0.8		4.9	X		20					SI	BIOG	MAT	FEW	0	0	0	0	0	
R76	2	9:50	5/21/02	11.6	14.5	13.1	2.9	IND				4					SI	BIOG	MAT	FEW	0	2	0	0	0	Disturbed surface
R77	2	9:57	5/21/02	0.9	1.7	1.3	0.8	>	1.3			10	4		X	X	FS	PHY	NONE	NONE	0	0	0	0	0	
GH78	2	10:42	5/21/02	18.2	19.4	18.8	1.2		3.9								SI	BIOG	MAT	SOME	0	3	0	0	0	
GH79	1	10:56	5/21/02	18.8	19.6	19.2	0.8		1.1								SI	BIOG	MAT	NONE	0	1	0	0	0	
GH79	2	10:58	5/21/02	12.1	13.3	12.7	1.2	IND									SI	BIOG	MAT	SOME	0	0	0	0	0	Disturbed surface
GH80	1	11:33	5/21/02	13.4	14.5	13.9	1.1		2.2								SI	BIOG	MAT	SOME	0	2	0	0	0	
GH80	2	11:35	5/21/02	12.4	13.5	13.0	1.1	IND									SI	BIOG	MAT	NONE	0	2	0	0	0	Disturbed surface
GH81	1	11:51	5/21/02	15.8	16.5	16.2	0.7		3.8								SI	BIOG	MAT	SOME	0	2	0	0	0	
GH81	2	11:53	5/21/02	7.7	9.6	8.6	1.9		2.5			1					SI	BIOG	MAT	SOME	0	5	0	0	0	
GH82	1	12:09	5/21/02	IND	IND	>23	IND	IND									SI	IND	IND	IND	0	0	0	0	0	
GH82	2	12:12	5/21/02	14.0	14.4	14.2	0.4		0.8								SI	BIOG	MAT	SOME	0	0	0	0	0	
GH82	21	12:14	5/21/02	2.4	19.8	11.1	17.3	IND									SI	BIOG	MAT	NONE	0	0	0	0	0	Disturbed surface
GH83	1	12:31	5/21/02	16.9	18.0	17.5	1.1	IND									SI	BIOG	MAT	NONE	0	0	0	0	0	Disturbed surface
GH83	2	12:34	5/21/02	4.8	7.8	6.3	3.0		3.1								SI	BIOG	MAT	SOME	0	0	0	0	0	
GH84	1	12:50	5/21/02	8.6	11.7	10.2	3.1	IND									SI	PHY/BIO	MANY	MANY	0	0	0	0	0	Disturbed surface
GH84	2	12:52	5/21/02	17.6	18.7	18.1	1.1		2.0								SI	BIOG	MAT	MANY	0	0	0	0	0	Disturbed surface
GH85	1	13:14	5/21/02	0.5	1.2	0.9	0.7	>	0.9	X		2					CSGRPB	PHY	NONE	SOME	0	0	0	0	0	Calcarious serpulid tubes
GH85	2	13:18	5/21/02	19.0	20.6	19.8	1.6		1.7								SI	BIOG	MAT	SOME	1	2	0	0	0	Disturbed surface
GH86	1	13:22	5/21/02	16.7	17.7	17.2	1.0		1.2								SI	BIOG	MAT	MANY	0	0	0	0	0	
GH86	2	13:26	5/21/02	6.0	6.9	6.5	1.0	IND									SI	BIOG	MAT	SOME	0	0	0	0	0	Disturbed surface
GH87	1	12:44	5/21/02	18.8	19.8	19.3	1.0		1.6								SI	BIOG	MAT	MANY	0	0	0	0	0	
GH87	2	12:47	5/21/02	18.8	21.4	20.1	2.6	IND									SI	BIOG	MAT	MANY	0	0	0	0	0	Disturbed surface
GH88	1	12:40	5/21/02	13.4	14.6	14.0	1.3		5.0								SI	BIOG	MAT	MANY	0	3	0	0	0	
GH88	2	12:42	5/21/02	19.5	21.3	20.4	1.7		3.1								SI	BIOG	MAT	MANY	0	2	0	0	0	
GH89	1	12:04	5/21/02	5.5	8.0	6.8	2.5		2.0								SI	BIOG	MAT	SOME	0	3	0	0	0	
GH89	2	12:05	5/21/02	15.8	16.5	16.2	0.7		1.0			1					SI	BIOG	MAT	SOME	0	3	0	0	0	
GH90	1	11:57	5/21/02	4.4	11.8	8.1	7.4		3.2			2					SI	BIOG	MAT	SOME	0	2	0	0	0	
GH90	2	11:59	5/21/02	1.2	4.6	2.9	3.5		2.3			2		X	x		SI	BIOG	MAT	SOME	0	0	0	0	0	
GH91	1	11:28	5/21/02	14.8	16.9	15.8	2.1		3.4								SI	BIOG	MAT	SOME	0	0	0	0	0	
GH91	2	11:30	5/21/02	8.6	11.3	9.9	2.7		1.5								SI	BIOG	MAT	MANY	0	0	0	0	0	Disturbed surface
GH92	1	11:02	5/21/02	8.5	10.8	9.6	2.3		3.1			1		X			SI	BIOG	MAT	SOME	0	4	0	0	0	
GH92	2	11:06	5/21/02	6.8	8.3	7.5	1.5		3.6					x			SI	BIOG	MAT	MAT	0	1	0	0	0	
GH93	1	10:03	5/21/02	2.6	3.6	3.1	1.0	>	3.1	X		1		X		x	FSMS	PHY	NONE	NONE	0	0	0	0	0	
GH94	1	10:44	5/21/02	13.4	16.3	14.8	2.9		2.5								SI	BIOG	MAT	MANY	1	3	0	0	0	
GH94	2	10:47	5/21/02	17.9	19.3	18.6	1.4		2.9								SI	BIOG	MAT	MANY	0	1	0	0	0	
GH95	1	10:48	5/21/02	14.3	14.7	14.5	0.4	IND									SI	PHY	NONE	NONE	0	0	0	0	0	
GH96	1	11:39	5/21/02	13.1	15.3	14.2	2.3		1.6			1					SI	BIOG	MAT	SOME	0	1	0	0	0	
GH96	2	11:40	5/21/02	6.7	9.3	8.0	2.5		1.8			4					SI	BIOG	MAT	MANY	0	0	0	0	0	
GH97	1	11:44	5/21/02	12.8	14.0	13.4	1.2		1.6			4					SI	BIOG	MAT	MANY	0	1	0	0	0	
GH97	2	11:48	5/21/02	5.7	7.3	6.5	1.7		2.7			2					SI	BIOG	MAT	MANY	0	0	0	0	0	
GH98	1	12:20	5/21/02	12.5	15.9	14.2	3.3		2.7								SI	BIOG	MAT	SOME	1	2	0	0	0	
GH98	2	12:22	5/21/02	6.7	9.3	8.0	2.6		3.2								SI	BIOG	MAT	SOME	0	2	0	0	0	
GH99	1	12:25	5/21/02	17.8	18.5	18.2	0.7		1.5								SI	BIOG	MAT	NONE	0	0	0	0	0	Disturbed surface
GH100	1	12:55	5/21/02	IND	IND	>23	IND	IND									SI	IND	IND	IND	0	0	0	0	0	
GH100	2	12:57	5/21/02	IND	IND	>23	IND	IND									SI	IND	IND	IND	0	0	0	0	0	
GH101	1	13:05	5/21/02	14.3	15.8	15.1	1.5	IND									SI	PHY	NONE	SOME	0	0	0	0	0	
GH101	2	13:10	5/21/02	IND	IND	0.0	IND	IND				1		X			GRPB	PHY	NONE	NONE	IND	IND	IND	IND	IND	

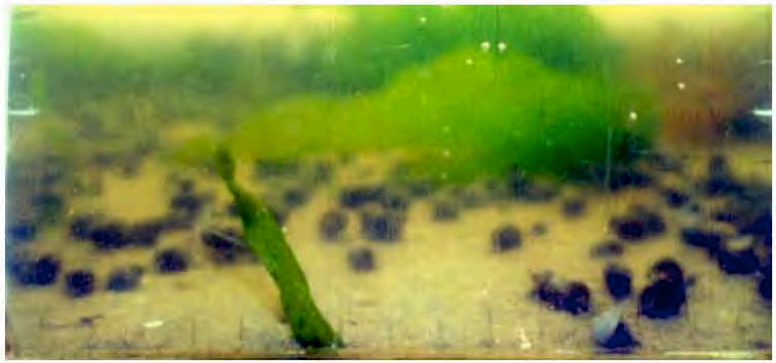


Figure 4.4.1 SPI image from Norton Basin entrance channel: Mud snails and sea lettuce.

Figure 4.4.2 SPI image from Grass Hassock Channel: Dark silt with *Ampelisca* mats.

Figure 4.4.3 SPI image from Little Bay entrance channel: Dark silt with *Ampelisca* mats.

Figure 4.4.4 SPI image from the Raunt: Dark silt with *Ampelisca* mats.

4.4.4 The Raunt

The dominant sediment type throughout the Raunt was silt, with fine sand present at the stations located near the confluence with Runway Channel. This is indicative of higher wave/current energy in the area, relative to conditions in Grass Hassock Channel or Norton Basin/Little Bay. The majority of the samples collected from the Raunt included images of dense *Ampelisca* mats. Sample images from the upper, lower-energy reaches of this waterway were characterized by finer, darker, sediments, with fewer occurrences of macrofauna and *Ampelisca* mats (**Figure 4.4.4**).

5.0 SUMMARY

The 2002 baseline investigations continue to supplement our understanding of the biological attributes of Norton Basin and Little Bay, as there is little data previously available on the ecology of this area. The baseline data may be used to develop restoration targets and to establish monitoring protocols and success criteria, should future restoration activities be undertaken in the study area.

Benthic macroinvertebrates were virtually absent from the fine, organic, highly aqueous sediments in the Little Bay borrow pit. Arthropods dominated the benthic macroinvertebrate communities of Grass Hassock Channel and the Norton Basin borrow pits during June and October. Annelids were the dominant major taxa in the shallow areas of Norton Basin. Arthropods and annelids were co-dominant major taxa in the Raunt during June; however, arthropods were numerically dominant at this site during October. Molluscs and other invertebrates represented a minor component of the macroinvertebrate community among all sites during both seasons.

Macroinvertebrate densities were significantly lower in the intermediate depths of Little Bay, relative to Grass Hassock Channel or the Raunt. Total abundance of benthic macroinvertebrates was lower in the borrow pits and the intermediate depths of Norton Basin relative to Grass Hassock Channel or the Raunt in both June and October.

Norton Basin appears to support a more abundant and diverse benthic macroinvertebrate community and exhibits greater substrate/habitat heterogeneity in comparison to Little Bay. The borrow pits located in Norton Basin exhibit substrate/habitat characteristics which resemble those of Little Bay; however, macroinvertebrate assemblages of intermediate and shallow-depth in Norton Basin are comparable to those of reference areas.

May gill net collections in Norton Basin were dominated by striped searobin. Most individuals were collected within the deeper strata of the Norton Basin borrow pits. Species composition and richness within Norton Basin was comparable to that of Grass Hassock Channel; however, collections from the Raunt were dominated by decapod crustaceans. Catch per unit effort (CPUE) in surface and bottom strata within Grass Hassock Channel was twice that of equivalent depth strata within Norton Basin during May. CPUE in mid-depth strata within Grass Hassock Channel was four times greater than that of Norton Basin. CPUE within the Raunt was comparable to that of shallow areas within Norton Basin. Surface CPUE in Little Bay was comparable to that of Norton Basin, and approximately one half of CPUE measured within Grass Hassock Channel. Relatively few fish were collected from mid-water strata in Little Bay during May, and none were collected in the deeper strata of the Little Bay borrow pit.

June gill net collections in Norton Basin were dominated by striped searobin. Most individuals were collected within the deeper strata of the borrow pits. Species composition and richness within Norton Basin was similar to that of Grass Hassock Channel; however, collections from the Raunt were dominated by decapod crustaceans. CPUE from deeper strata within Norton Basin was comparable to equivalent depths within Grass Hassock Channel. CPUE at mid-depth strata within Norton Basin was twice that of equivalent depth strata within Grass Hassock Channel. Surface CPUE within Grass Hassock Channel was more than twice that observed within surface waters of Norton Basin. No fish

were collected from surface and mid-water strata in Little Bay, and none were collected at the bottom of the Little Bay borrow pit. CPUE in the Raunt was nearly twice that of shallow water habitats in Norton Basin.

August gill net collections in Norton Basin were dominated by striped searobin, bluefish, and Atlantic menhaden. Collections from Grass Hassock channel were dominated by blue crab, weakfish and Atlantic menhaden. Gill net collections from the Raunt were dominated by blue crab, Atlantic horseshoe crab, and weakfish. Very few fish were collected from surface and mid-water strata within Norton Basin. CPUE was markedly greater at reference areas relative to the Norton Basin and Little Bay pits. CPUE at the bottom of the Norton Basin borrow pits was one-half that of equivalent depth strata in Grass Hassock Channel. CPUE at the shallow water sampling station in Norton Basin was one-fourth that of the Raunt. No fish were collected at the bottom of the Little Bay borrow pit. Very few fish were collected from surface water and intermediate depth strata within Little Bay.

Trawl surveys of Grass Hassock Channel yielded no fish during May and June, and only a few individuals during August. The bottom of Grass Hassock Channel is spatially complex, with areas of bare substrate interspersed with dense *Ampelisca* mats and sponge colonies, as documented by the seabed classification conducted by USACE-NYD during 2000. Shell hash and fragments of *Ampelisca* mats were frequently present in trawl samples, confirming the correct orientation of the net at the bottom of the channel. The complex structure and potential refuge provided by the *Ampelisca*/sponge assemblage may affect trawl selectivity in this area, reducing catch efficiency in comparison to shallow, unvegetated habitats such as the Raunt and certain areas of Norton Basin. While use of a larger trawl (e.g. 30 ft.) might have yielded a greater catch in Grass Hassock Channel, it would have been impossible to deploy a larger net in the confined sampling area within Norton Basin. Norton Basin trawl samples were dominated by macrocrustaceans (blue crab and Atlantic horseshoe crab) during May, June and August. Trawl samples from the Raunt were dominated by Atlantic horseshoe crab in May, and lady crab in June. Blue crab and lady crab were the two most abundant species collected in trawl samples from the Raunt during August.

SPI images from Norton Basin exhibited a range of sediment characteristics, depending on depth. Borrow pit sediments were organic fines, while intermediate-depth and entrance channel sediments ranged from silt to fine sand. Entrance channel sediments were primarily sand and shell hash. SPI samples from Little Bay over-penetrated the soft aqueous sediments present therein and did not yield satisfactory images of the sediment-water interface. Gas voids and bacteria mats were characteristic features of SPI images from Little Bay. Grass Hassock Channel sediments ranged from silt to fine sand, and *Ampelisca* mats were present in 90% of SPI images from this area. The dominant sediment type in the Raunt was silt, with fine sand present at stations located near the confluence of the Raunt and Runway Channel. Approximately 75% of the SPI images from the Raunt included *Ampelisca* colonies.

In general, Norton Basin appears to support a more abundant and diverse biota and exhibits greater substrate/habitat heterogeneity in comparison to Little Bay. The borrow pits located in Norton Basin exhibit substrate/habitat characteristics which resemble those of Little Bay; however, sampling locations of intermediate and shallow depths in Norton Basin appear to support habitats and communities which resemble those of intermediate-depth and shallow reference areas in Jamaica Bay.

6.0 LITERATURE CITED

Barry A. Vittor & Associates, Inc. (2001). "Norton Basin restoration project: Baseline data collection at project and reference sites – 2000." Barry A. Vittor & Associates, Inc. prepared for U.S. Army Corps of Engineers, New York District. November 2001.

Barry A. Vittor & Associates, Inc. (2003). "Norton Basin/Little Bay restoration project: Baseline data collection at project and reference sites – 2001." Barry A. Vittor & Associates, Inc. prepared for U.S. Army Corps of Engineers, New York District. February 2003.

CR Environmental, Inc. (2001). "Multibeam and seabed classification surveys: Little Bay, Norton Basin, Grass Hassock Channel, and the Raunt, Jamaica Bay, New York." Report prepared for Barry A. Vittor & Associates, Inc., 76 pp.

Diaz, R.J. and Schaffner, L.C. (1988). "Comparison of sediment landscapes in the Chesapeake Bay as seen by surface and profile imaging." M. P. Lynch and E. C. Krome, eds. Understanding the Estuary; Advances in Chesapeake Bay Research. Chesapeake Research Consortium Pub. 129, CBP/TRS 24/88, 222-40.

Folk, R.L. (1980). "Petrology of Sedimentary Rocks." Hemp Hill Publishing Company, Austin, TX, 184 pp.

Hawkins, S.J., Allen, J.R., Russell, G., White, K.N., Conlan, K., Hendry, K., and Jones, H.D. (1992). "Restoring and managing disused docks in inner city areas." Restoring the Nation's Marine Environment. G.W. Thayer, ed., Maryland Sea Grant, College Park, MD, 473-582.

Maxted, J.R., Weisberg, S.B., Chaillou, J.C., Eskin, R.A., and Kutz, F.W. (1997). "The ecological condition of dead-end canals of the Delaware and Maryland coastal bays," Estuaries 20, 319-27.

Rhoads, D.C. (1974). "Organism sediment relations on the muddy sea floor," Oceanography and Marine Biology Annual Review 12, 263-300.

Rhoads, D.C., and Germano, J.D. (1986). "Interpreting long-term changes in benthic community structure: A new protocol," Hydrobiologia 142, 291-308.

Valente, R.M., Rhoads, D.C., Germano, J.D., and Cabelli, V.J. (1992). "Mapping of benthic enrichment patterns in Narragansett Bay, Rhode Island," Estuaries 15, 1-17.

Viles, C. and Diaz, R.J. (1991). "Bencore, an image analysis system for measuring sediment profile camera slides," School of Marine Science, Virginia Institute of Marine Science, College of William and Mary, Gloucester Point, VA. 13 pp.