

Gill Net & Otter Trawl Sampling
Norton Basin, Little Bay, Grass Hassock Channel,
and The Raunt

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ACRONYMS USED IN THIS REPORT

CPUE – catch per unit effort

DMMP – Dredged Material Management Plan

MCY – million cubic yards

MLW – mean low water

NPS-GNRA – National Park Service Gateway National Recreation Area

NYC – New York City

SPI – sediment profile imagery

TL – total length

USACE-NYD – U.S. Army Corps of Engineers, New York District

USACE-WES – U.S. Army Engineers Waterways Experiment Station

1.0 INTRODUCTION

The U.S. Army Corps of Engineers, New York District (USACE-NYD) has developed a Dredged Material Management Plan (DMMP) for the Port of New York/New Jersey. The beneficial use of dredged materials is a significant component of the DMMP, which presents a variety of placement alternatives to be considered as potential solutions to the ongoing dredging crisis in the Port. One such alternative is bathymetric recontouring of artificially deepened habitats (navigation channels, sub-aqueous borrow pits, This alternative has particular application to borrow pits located within dead-end basins, as these areas are often severely degraded due to hydrodynamic isolation, resulting in poor water quality and accumulation of contaminants.

The goal of the Norton Basin/Little Bay Project is to demonstrate the feasibility of habitat restoration via bathymetric recontouring of the Norton Basin/Little Bay complex, located in Jamaica Bay, Far Rockaway, NY. This would be accomplished by filling several borrow pits (55-65 ft. deep) located within Norton Basin/Little Bay using dredged material derived from navigation improvement projects within the Port to an average depth of approximately 15 ft below mean low water (MLW).

Preliminary fisheries hydro-acoustic surveys conducted by the U.S. Army Engineers Waterways Experiment Station (USACE-WES) indicated limited utilization of the Norton Basin/Little Bay borrow pits by fishes. The fishes detected in preliminary hydro-acoustic surveys were presumably small schooling forage species [e.g. bay anchovies (*Anchoa mitchilli*) or Atlantic silversides (*Menidia menidia*)] which do not rely on the structure of the pits as essential habitat.

In September, 2000, a pilot study was conducted in Norton Basin, Little Bay and two reference areas located in Jamaica Bay (The Raunt and Grass Hassock Channel). This study included sediment characterization, water quality profiles, and a preliminary survey of living resources (fish, macrocrustaceans) using gill nets and otter trawls. These data were intended to provide information on the biological and physico-chemical attributes of Norton Basin/Little Bay with comparison to both shallow and deep reference locations, and to guide the data collection efforts to be conducted during Phase I (Baseline Environmental Studies) of the Norton Basin/Little Bay project.

The Phase I Baseline Environmental Study of the Norton Basin/Little Bay project was initiated in 2001. Data is being gathered to further characterize biotic and abiotic conditions within the study and reference areas identified in the pilot study. This study includes water quality monitoring, hydrodynamic monitoring, characterization of benthic invertebrate communities, SPI surveys, and fish surveys (hydro-acoustics, gill nets, trawl surveys). We report here on fish and macrocrustacean communities surveyed during the spring and early summer of 2002, the second year of the Phase I study.

2.0 STUDY AREA

Norton Basin and Little Bay are two dead-end basins located on the north shore of the eastern Rockaway Peninsula, in the Borough of Queens, New York City (NYC) (**Figure 2.1**). The basins are drained by a common channel into the southeastern edge of Jamaica Bay, and have been subjected to nearly four centuries of anthropogenic impacts. Land use of the surrounding area is predominantly dense residential. Deep borrow pits are present within each basin. These borrow pits were excavated in 1938 during the development of Edgemere Landfill, which constitutes the northwest boundary of Little Bay. Sediments within the borrow pits are a fine, black mud with a strong sulfide odor indicative of reduced conditions. Sediments are usually covered with white flocculent material believed to be colonies of the chemolithotrophic bacteria *Beggiatoa*. Historically, this area supported extensive intertidal salt marsh habitat. In its present condition, the area is not achieving full ecological potential as estuarine habitat available to avian and aquatic species.

2.1 Norton Basin

Norton Basin is located east of the Edgemere Landfill. With its three 45 to 50 ft deep (MLW) borrow pits, the basin has a planar surface area of approximately 55.5 acres, a bottom surface area of approximately 56.9 acres, and a total volume of approximately 2.3 million cubic yards (MCY). The borrow pits have soft, mud substrates, while shallower areas of the basin include sandy substrates. Side-scan sonar surveys conducted in 2000 have revealed at least two 30 - 40 ft wrecks and extensive debris (i.e. tires, pilings, other structures) on the floor of the basin. There are several small submerged structures along the eastern shore of the basin, which are thought to be smaller boats or automobiles.

2.2 Little Bay

Little Bay is located southeast of the Edgemere Landfill. With its 60 to 65 ft deep (MLW) borrow pit, the basin has a planar surface of approximately 24.5 acres, a bottom surface area of approximately 25.2 acres, and a total volume of approximately 1.2 mcy. The borrow pit has soft, mud substrates, while shallower areas of the inlet tend to have sandy substrates. Side-scan sonar surveys detected several 30 - 40 ft wrecks and extensive debris (i.e. tires, pilings, other structures) on the floor of the basin.

2.3 Reference Areas

Two reference areas (The Raunt and Grass Hassock Channel) located within the National Park Service Gateway National Recreation Area (NPS-GNRA) were selected for comparison to Norton Basin/Little Bay. These reference areas were intended to provide information on biotic and physico-chemical conditions from both shallow and deep estuarine habitats within Jamaica Bay.

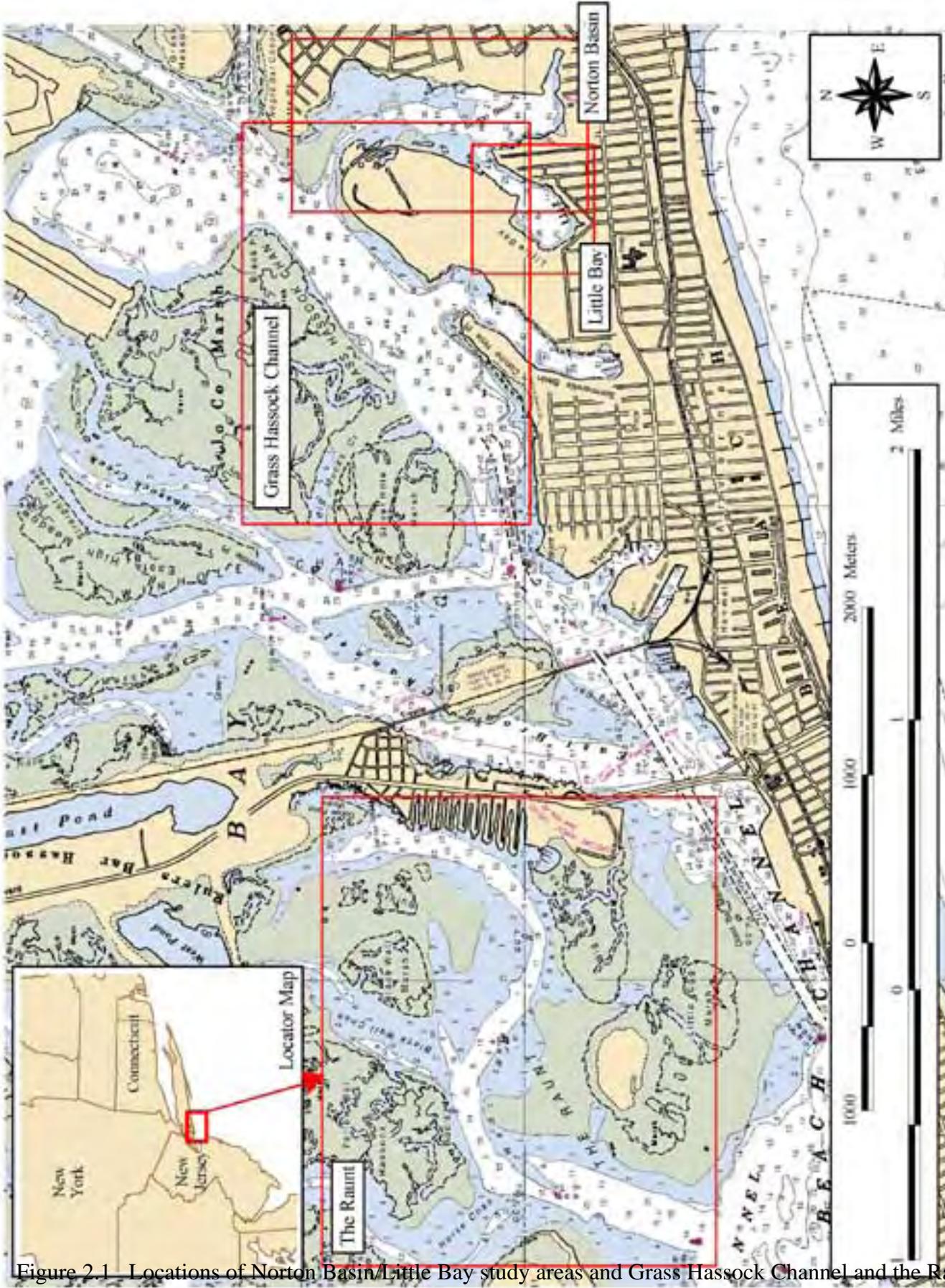


Figure 2.1 Locations of Norton Basin/Little Bay study areas and Grass Hassock Channel and the Raunt reference areas.

2.3.1 The Raunt

The Raunt is a shallow tidal gut which originates at the confluence of Runway Channel and Beach Channel, northeast of Rockaway Inlet. The Raunt flows in a northeasterly direction through Little Egg Marsh, Big Egg Marsh, and Yellow Bar Hassock and terminates at Goose Pond Marsh, in the community of Broad Channel, Queens, NY. Bottom sediments in the Raunt are predominantly sands and silts, with seasonally dense mats of sea lettuce (*Ulva lactuca*) and extensive beds of tube-dwelling amphipods (*Ampelisca abdita*) in the upper reaches. The *Ampelisca* mats gradually transition to hard sand bottom in the lower reaches of the Raunt.

2.3.2 Grass Hassock Channel

Grass Hassock Channel is a wide, deep tidal channel which originates at the confluence of Winhole Channel and Beach Channel, northeast of the Cross Bay Boulevard Bridge, and terminates at the Jo-Co Marsh Pit, east of Runway 4L at JFK Airport. The Channel is bounded by Jo-Co Marsh and Silver Hole Marsh to the west and by Conchs Hole Point, the Edgemere Landfill, Norton Basin, and Motts Point to the east. The substrate of Grass Hassock Channel is very patchy, and includes sand/silt, shell/gravel, extensive *Ampelisca* mats, and dense sponge colonies.

3.0 METHODS

3.1 Gill Net Sampling

Experimental 125' x 8' monofilament gill nets (1", 1.5", 2", 3", and 4" stretch mesh size) were deployed over a range of tidal conditions to characterize fish use of the proposed project and reference areas. On May 6-9 and June 24-26, 2002, gill nets were deployed at a total of three deep-water stations (one in the Little Bay borrow pit, one in the larger Norton Basin borrow pit, and one in the Grass Hassock Channel reference area) and four shallow-water stations (one in Little Bay, two in Norton Basin, and one in the Raunt reference area) (**Figure 3.1.1 and Figure 3.1.2**). Six nets were deployed at each of the deep-water stations (two at the surface, two at mid-water, approximately 20-25 feet below the surface, and two along the bottom). Two nets were deployed at the shallow-water stations (bottom only). All fishes and macrocrustaceans collected in gill nets were processed in the field. Captured organisms were identified to species, enumerated, weighed, measured [total length (TL) or carapace width], and released alive, if possible. Catch per unit effort (CPUE) was calculated by dividing fish and macrocrustacean biomass by the number of hours that gill nets were deployed.

3.2 Bottom Trawling

A 16' otter trawl (1 3/8" mesh walls; 1" mesh cod end) was deployed in the Norton Basin project area and the Raunt and Grass Hassock reference areas. On May 6-9, 2002, three trawls

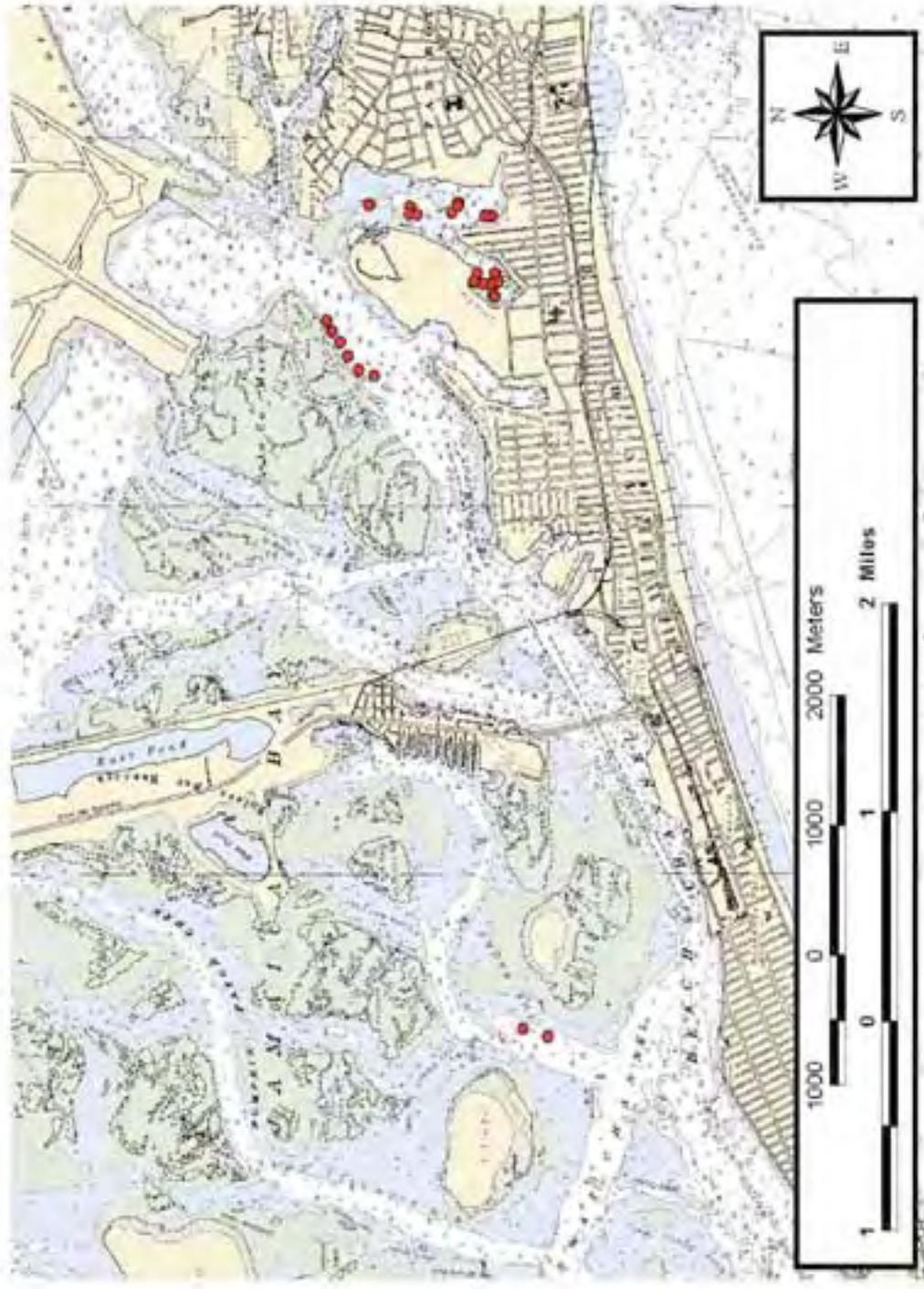


Figure 3.1.1 Locations of gill net sampling stations, May, 2002.

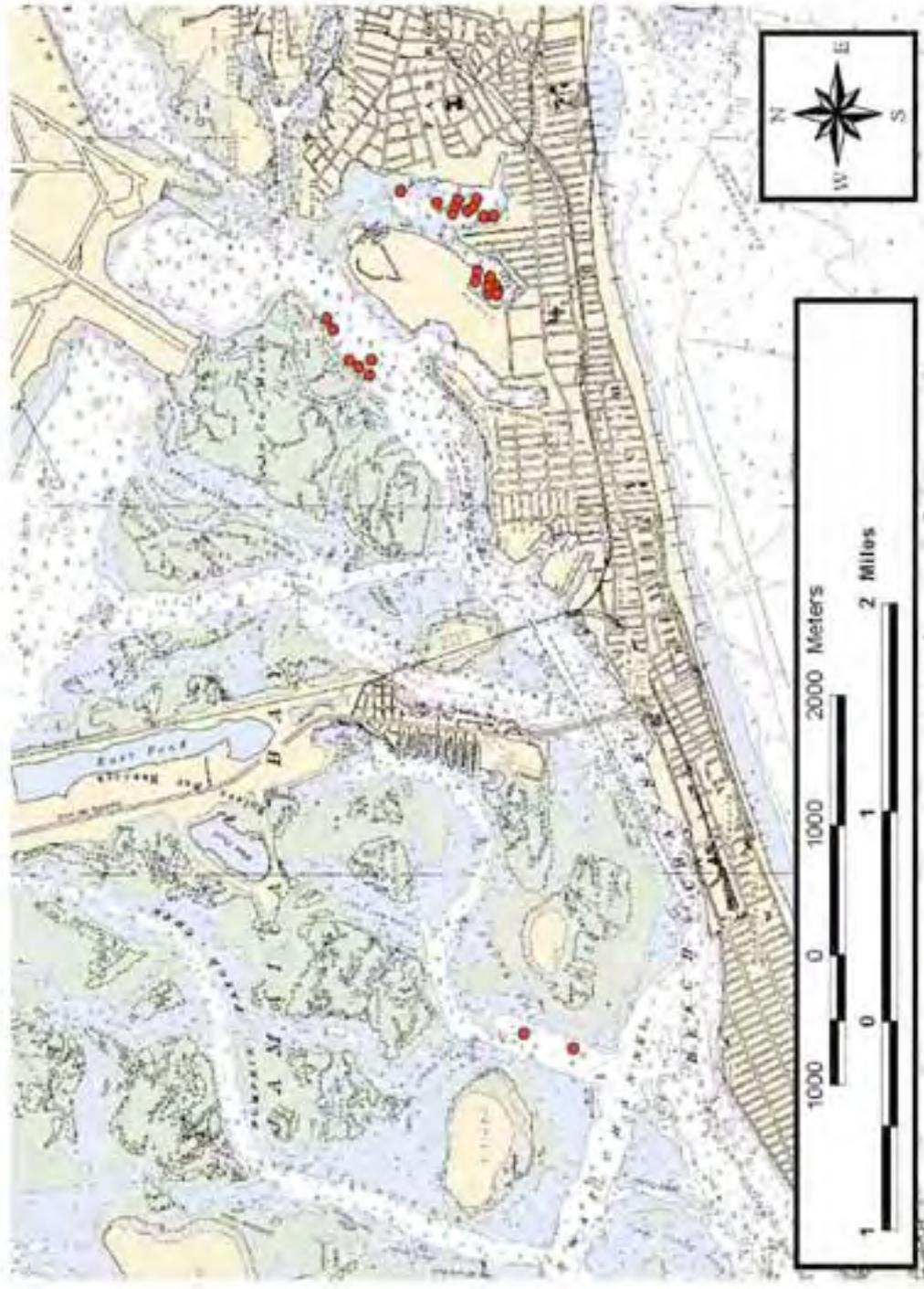


Figure 3.1.2 Locations of gill net sampling stations, June, 2002.

were pulled for a duration of 5 minutes in Norton Basin and three trawls were pulled for a duration of 10 minutes in each reference area (**Figure 3.2.1**). On June 24-26, 2002, five trawls were pulled for a duration of 6 to 9 minutes in Norton Basin, five trawls were pulled for a duration of 10 minutes in the Grass Haddock Channel reference area, and four trawls were pulled for a duration of 2 to 10 minutes in the Raunt reference area (**Figure 3.2.2**). All fishes and macrocrustaceans captured in trawls were processed in the field. Captured organisms were identified to species, enumerated, weighed, measured (TL or carapace width), and released, if possible. Catch per unit effort (CPUE) was calculated by dividing fish and macrocrustacean biomass by trawl duration (in minutes).

4.0 RESULTS

4.1 Gill Net Sampling

4.1.1 May, 2002

Gill net collections from the bottom of Norton Basin during May (18 to 20 hrs duration, n=2) yielded 256 individuals representing 6 species. (**Table 4.1.1.1**). The dominant species was striped searobin (*Prionotus evolans*). Gill nets deployed at mid-depth in Norton Basin (20 to 21 hrs duration, n=2) yielded 85 individuals representing 3 species (**Table 4.1.1.1**). The dominant species again was striped searobin (*P. evolans*). Gill nets deployed at the surface of Norton Basin (20 to 22 hrs duration, n=2) yielded 98 individuals representing 3 species (**Table 4.1.1.1**). The dominant species was Atlantic menhaden (*Brevoortia tyrannus*). Gill net collections from the shallow areas of Norton Basin (18 to 20 hrs duration, n=4) yielded 359 individuals representing 10 species (**Table 4.1.1.1**). The dominant species was striped searobin (*P. evolans*). Throughout the May gill net sampling in Norton Basin, the dominant species was striped searobin (*P. evolans*) representing 75.2% of the total collection. Atlantic menhaden (*B. tyrannus*) represented 18.3%, and all other species represented less than 5% (**Figure 4.1.1.1**).

Gill net collections from the bottom of Little Bay during May (16 to 24 hrs duration, n=4) yielded no fish (**Table 4.1.1.2**). Gill net collections at mid-depth in Little Bay (16 to 24 hrs duration, n=4) yielded 26 individuals representing 2 species (**Table 4.1.1.2**). The dominant species was Atlantic menhaden (*B. tyrannus*). Gill nets deployed at the surface of Little Bay (17 to 23 hrs duration, n=4) yielded 178 individuals representing 5 species (**Table 4.1.1.2**). The dominant species again was Atlantic menhaden (*B. tyrannus*). Gill net collections from the shallow areas of Little Bay (17 to 24 hrs duration, n=4) yielded 271 individuals representing 7 species (**Table 4.1.1.2**). The dominant species was striped searobin (*P. evolans*). Throughout the May gill net sampling in Little Bay, the dominant species was Atlantic menhaden (*B. tyrannus*) representing 51.3% of the total collection. Striped searobin (*P. evolans*) represented 39.1%, Atlantic horseshoe crab (*Limulus polyphemus*) represented 5.4%, and all other species represented less than 5% (**Figure 4.1.1.1**).

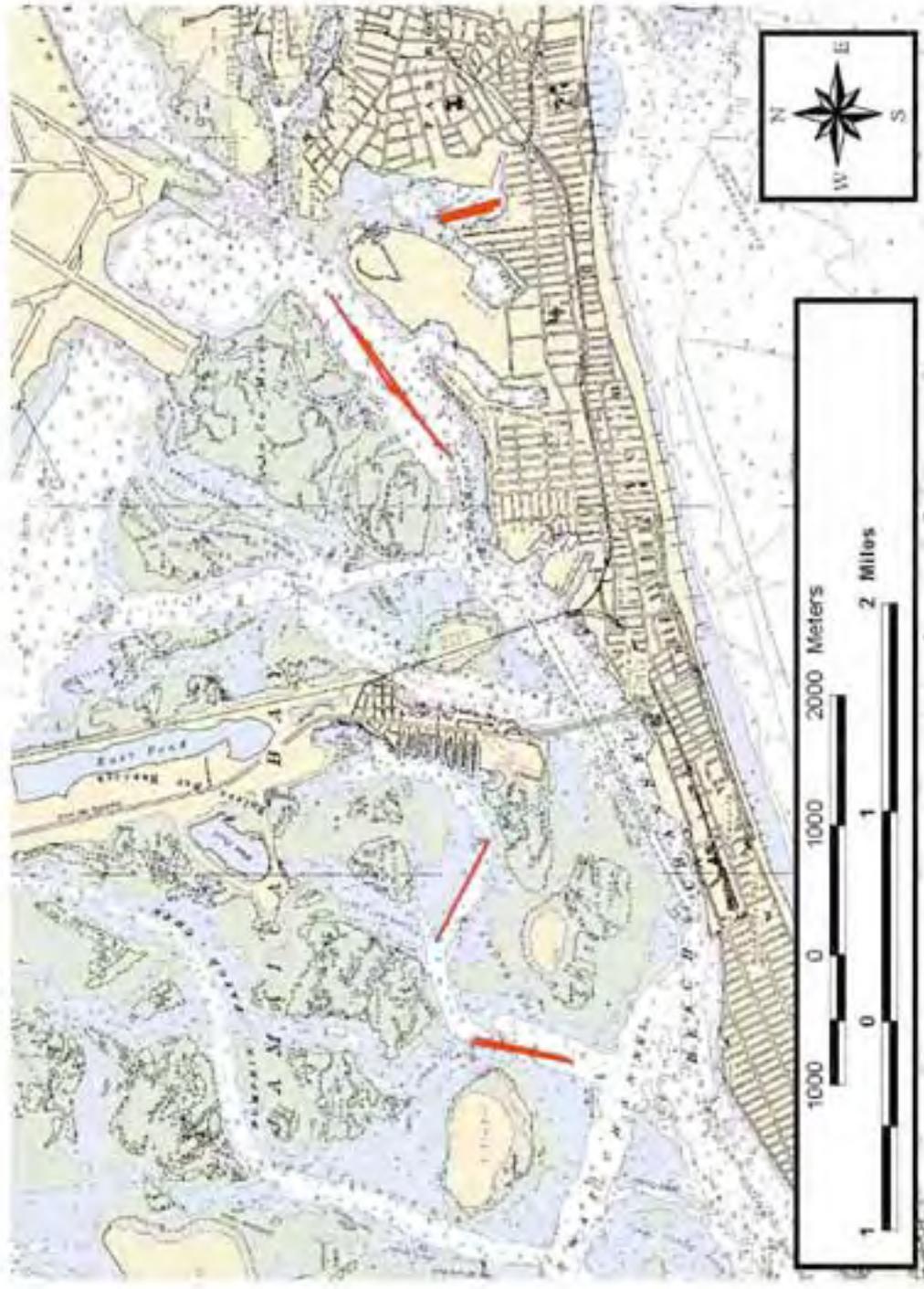


Figure 3.2.1 Locations of otter trawl lanes, May, 2002.

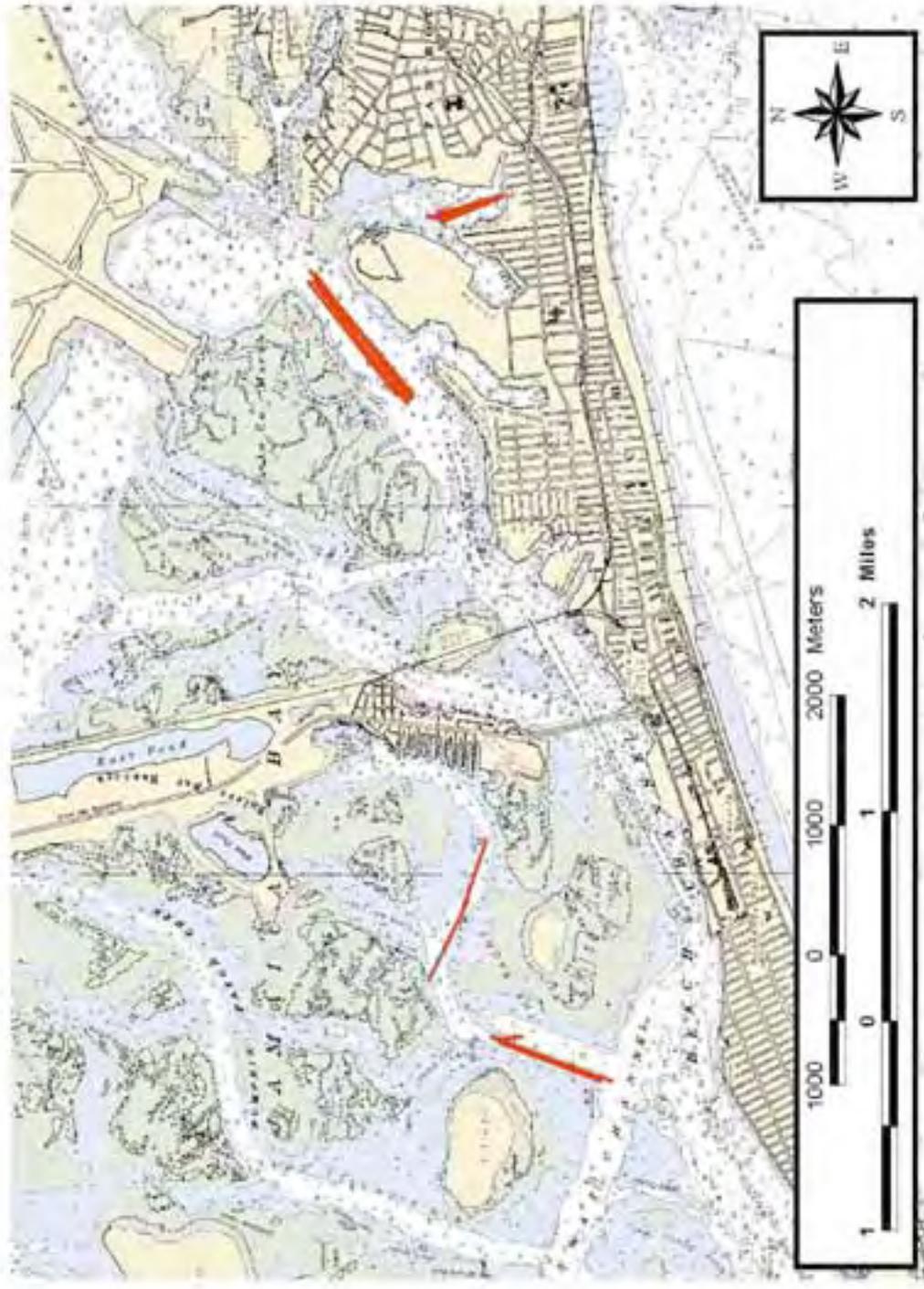


Figure 3.2.2 Locations of otter trawl lanes, June, 2002.

Table 4.1.1.1 Total abundance, mean CPUE (biomass in g/hr), and total length range of fish and macrocrustaceans collected in gill nets from Norton Basin, May, 2002.

Norton Basin, Bottom (n=2)

Duration of set: 18 to 20 hrs

Scientific Name	Common Name	Total Abund.	Mean CPUE (g/hr)	TL Range (mm)
<i>Prionotus evolans</i>	Striped Searobin	232	2520.62	240-430
<i>Brevoortia tyrannus</i>	Atlantic Menhaden	8	114.61	330-370
<i>Libinia emarginata</i>	Common Spider Crab	6	352.59	65-80
<i>Tautoga onitis</i>	Tautog	5	46.89	210-290
<i>Morone saxatilis</i>	Striped Bass	4	10.18	170-250
<i>Raja eglanteria</i>	Clearnose Skate	1	70.49	720
Total:		256	3115.39	65-720

Norton Basin, Mid-Depth (n=2)

Duration of set: 20 to 21 hrs

Scientific Name	Common Name	Total Abund.	Mean CPUE (g/hr)	TL Range (mm)
<i>Prionotus evolans</i>	Striped Searobin	61	697.34	220-390
<i>Brevoortia tyrannus</i>	Atlantic Menhaden	23	197.72	300-380
<i>Libinia emarginata</i>	Common Spider Crab	1	3.44	70
Total:		85	898.50	70-390

Norton Basin, Surface (n=2)

Duration of set: 20 to 22 hrs

Scientific Name	Common Name	Total Abund.	Mean CPUE (g/hr)	TL Range (mm)
<i>Brevoortia tyrannus</i>	Atlantic Menhaden	84	748.76	270-380
<i>Prionotus evolans</i>	Striped Searobin	13	151.82	310-400
<i>Morone saxatilis</i>	Striped Bass	1	n/a	n/a
Total:		98	900.57	270-400

Norton Basin, Shallow Area (n=4)

Duration of set: 18 to 20 hrs

Scientific Name	Common Name	Total Abund.	Mean CPUE (g/hr)	TL Range (mm)
<i>Prionotus evolans</i>	Striped Searobin	294	1457.10	230-460
<i>Brevoortia tyrannus</i>	Atlantic Menhaden	31	174.32	300-390
<i>Morone saxatilis</i>	Striped Bass	9	11.35	125-265
<i>Limulus polyphemus</i>	Atlantic Horseshoe Crab	7	64.93	185-255
<i>Libinia emarginata</i>	Common Spider Crab	8	12.55	60-110
<i>Tautoga onitis</i>	Tautog	3	12.66	220-330
<i>Callinectes sapidus</i>	Blue Crab	4	7.64	110-150
<i>Cynoscion regalis</i>	Weakfish	1	24.78	660
<i>Stenotomus chrysops</i>	Scup	1	2.18	210
<i>Alosa pseudoharengus</i>	Alewife	1	0.11	115
Total:		359	1767.64	60-660

Table 4.1.1.2 Total abundance, mean CPUE (biomass in g/hr), and total length range of fish and macrocrustaceans collected in gill nets from Little Bay, May, 2002.

Little Bay, Bottom (n=4)

Duration of set: 16 to 24 hrs

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

Little Bay, Mid-Depth (n=4)

Duration of set: 16 to 24 hrs

Scientific Name	Common Name	Total Abund.	Mean CPUE (g/hr)	TL Range (mm)
<i>Brevoortia tyrannus</i>	Atlantic Menhaden	24	131.28	275-370
<i>Prionotus evolans</i>	Striped Searobin	2	9.25	240-310
Total:		26	140.54	240-370

Little Bay, Surface (n=4)

Duration of set: 17 to 23 hrs

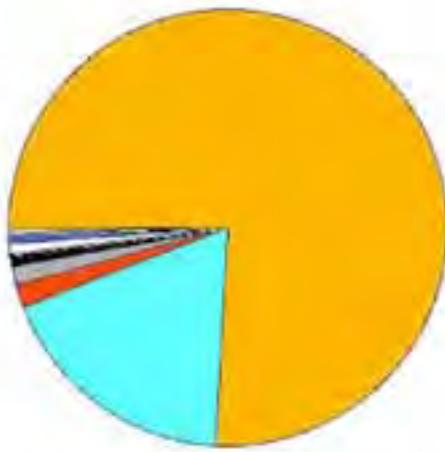
Scientific Name	Common Name	Total Abund.	Mean CPUE (g/hr)	TL Range (mm)
<i>Brevoortia tyrannus</i>	Atlantic Menhaden	165	707.65	170-380
<i>Prionotus evolans</i>	Striped Searobin	13	51.61	300-380
<i>Pomatomus saltatrix</i>	Bluefish	1	7.18	430
<i>Morone saxatilis</i>	Striped Bass	1	1.68	220
<i>Anchoa mitchilli</i>	Bay Anchovy	1	0.57	70
Total:		178	768.68	70-430

Little Bay, Shallow Area (n=4)

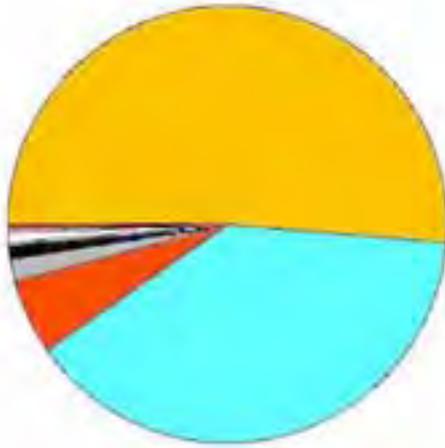
Duration of set: 17 to 24 hrs

Scientific Name	Common Name	Total Abund.	Mean CPUE (g/hr)	TL Range (mm)
<i>Prionotus evolans</i>	Striped Searobin	172	879.12	245-450
<i>Brevoortia tyrannus</i>	Atlantic Menhaden	56	327.58	280-385
<i>Limulus polyphemus</i>	Atlantic Horseshoe Crab	26	410.49	175-270
<i>Morone saxatilis</i>	Striped Bass	7	26.01	110-260
<i>Libinia emarginata</i>	Common Spider Crab	6	11.67	45-80
<i>Tautoga onitis</i>	Tautog	3	14.41	160-345
<i>Ovalipes ocellatus</i>	Lady Crab	1	0.37	40
Total:		271	1669.65	40-450

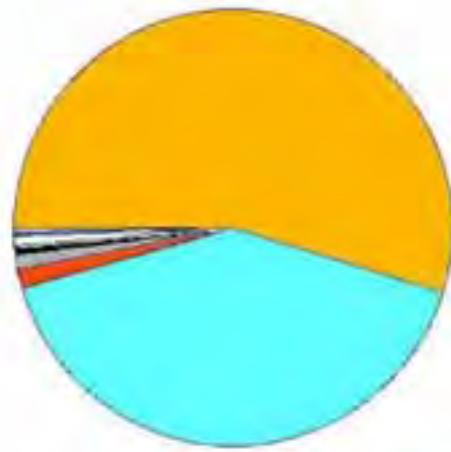
Species Composition
Gill Nets
Norton Basin
May 2002



Species Composition
Gill Nets
Little Bay
May 2002



Species Composition
Gill Nets
Grass Haddock Channel
May 2002



Species Composition
Gill Nets
The Raunt
May 2002



Figure 4.1.1.1 Species composition from gill net sampling efforts, May, 2002.

Gill net collections from the bottom of the Grass Hassock Channel during May (5.5 hrs duration, n=2) yielded 33 individuals representing 6 species (**Table 4.1.1.3**). The dominant species was striped searobin (*P. evolans*). CPUE at the bottom of Grass Hassock Channel (6400.0 g/hr) was greater than at the bottom of Norton Basin (3115.4 g/hr) or the bottom of Little Bay (0.0 g/hr). Gill net collections at mid-depth in Grass Hassock Channel (6.5 hrs duration, n=2) yielded 110 individuals representing 4 species (**Table 4.1.1.3**). The dominant species was Atlantic menhaden (*B. tyrannus*). CPUE at mid-depth in Grass Hassock Channel (4037.6 g/hr) was markedly greater than at mid-depth in Norton Basin (898.5 g/hr) or mid-depth in Little Bay (140.5 g/hr). Gill net collections at the surface of Grass Hassock Channel (6.5 hrs duration, n=2) yielded 42 individuals representing 2 species (**Table 4.1.1.3**). The dominant species again was Atlantic menhaden (*B. tyrannus*). CPUE at the surface of Grass Hassock Channel (1597.8 g/hr) was greater than at the surface of Norton Basin (900.6 g/hr) or the surface of Little Bay (768.7 g/hr). Throughout the May gill net sampling in Grass Hassock Channel, the dominant species was Atlantic menhaden (*B. tyrannus*) representing 54.7% of the total collection. Striped searobin (*P. evolans*) represented 40.9%, and all other species represented less than 5% (**Figure 4.1.1.1**).

Gill net collections from the shallow areas of the Raunt during May (7.3 hrs duration, n=2) yielded 32 individuals representing 12 species (**Table 4.1.1.4**). The dominant species in the Raunt were Atlantic horseshoe crab (*L. polyphemus*) and striped searobin (*P. evolans*). CPUE at the shallow areas of the Raunt (1676.7 g/hr) was slightly lower than at the shallow areas of Norton Basin (1767.6 g/hr) but slightly greater than at the shallow areas of Little Bay (1669.7 g/hr). Throughout the May gill net sampling in the Raunt, the dominant species was Atlantic horseshoe crab (*L. polyphemus*) representing 30.3% of the total collection. Striped searobin (*P. evolans*) represented 24.2%; striped bass (*Morone saxatilis*), summer flounder (*Paralichthys dentatus*), Atlantic menhaden (*B. tyrannus*), and blue crab (*Callinectes sapidus*) each represented 6.1%; and all other species represented less than 5% (**Figure 4.1.1.1**).

4.1.2 June, 2002

Gill net collections from the bottom of Norton Basin during June (7 hrs duration, n=2) yielded 65 individuals representing 4 species (**Table 4.1.2.1**). The dominant species was striped searobin (*P. evolans*). Gill nets deployed at mid-depth in Norton Basin (7 hrs duration, n=2) yielded 16 individuals representing 2 species (**Table 4.1.2.1**). The dominant species was Atlantic menhaden (*B. tyrannus*). Gill nets deployed at the surface of Norton Basin (7 hrs duration, n=2) yielded 6 individuals representing 3 species (**Table 4.1.2.1**). The dominant species was blue crab (*C. sapidus*). Gill net collections from the shallow areas of Norton Basin (7 to 8 hrs duration, n=4) yielded 119 individuals representing 7 species (**Table 4.1.2.1**). The dominant species was striped searobin (*P. evolans*). Throughout the June gill net sampling in Norton Basin, the dominant species was striped searobin (*P. evolans*) representing 63.1% of the total collection. Atlantic menhaden (*B. tyrannus*) represented 12.6%, blue crab (*C. sapidus*) represented 11.7%, bluefish (*Pomatomus saltatrix*) represented 6.3%, and all other species represented less than 5% (**Figure 4.1.2.1**).

Table 4.1.1.3 Total abundance, mean CPUE (biomass in g/hr), and total length range of fish and macrocrustaceans collected in gill nets from Grass Haddock Channel, May, 2002.

Grass Haddock Channel, Bottom (n=2)

Duration of set: 5.5 hrs

Scientific Name	Common Name	Total Abund.	Mean CPUE (g/hr)	TL Range (mm)
<i>Prionotus evolans</i>	Striped Searobin	112	4504.50	240-405
<i>Brevoortia tyrannus</i>	Atlantic Menhaden	25	1328.83	340-390
<i>Cynoscion regalis</i>	Weakfish	3	180.18	380-405
<i>Libinia emarginata</i>	Common Spider Crab	3	58.56	70-90
<i>Cancer irroratus</i>	Rock Crab	2	41.44	80-120
<i>Morone saxatilis</i>	Striped Bass	1	286.49	680
Total:		33	6400.00	70-680

Grass Haddock Channel, Mid-Depth (n=2)

Duration of set: 6.5 hrs

Scientific Name	Common Name	Total Abund.	Mean CPUE (g/hr)	TL Range (mm)
<i>Brevoortia tyrannus</i>	Atlantic Menhaden	97	3471.20	310-405
<i>Prionotus evolans</i>	Striped Searobin	10	367.20	250-360
<i>Limulus polyphemus</i>	Atlantic Horseshoe Crab	2	136.00	185-190
<i>Cynoscion regalis</i>	Weakfish	1	63.20	410
Total:		110	4037.60	185-410

Grass Haddock Channel, Surface (n=2)

Duration of set: 6.5 hrs

Scientific Name	Common Name	Total Abund.	Mean CPUE (g/hr)	TL Range (mm)
<i>Brevoortia tyrannus</i>	Atlantic Menhaden	41	1522.60	295-395
<i>Pomatomus saltatrix</i>	Bluefish	1	75.20	445
Total:		42	1597.80	295-445

Table 4.1.1.4 Total abundance, mean CPUE (biomass in g/hr), and total length range of fish and macrocrustaceans collected in gill nets from the Raunt, May, 2002.

The Raunt, Shallow Area (n=2)

Duration of set: 7.3 hrs

Scientific Name	Common Name	Total Abund.	Mean CPUE (g/hr)	TL Range (mm)
<i>Limulus polyphemus</i>	Atlantic Horseshoe Crab	10	753.42	175-260
<i>Prionotus evolans</i>	Striped Searobin	8	256.85	260-350
<i>Morone saxatilis</i>	Striped Bass	2	271.23	230-710
<i>Paralichthys dentatus</i>	Summer Flounder	2	154.11	370-530
<i>Brevoortia tyrannus</i>	Atlantic Menhaden	2	61.64	300-340
<i>Callinectes sapidus</i>	Blue Crab	2	27.40	50-150
<i>Raja eglanteria</i>	Clearnose Skate	1	102.74	630
<i>Scophthalmus aquosus</i>	Windowpane	1	19.18	260
<i>Libinia emarginata</i>	Butterfish	1	11.64	240
<i>Libinia emarginata</i>	Common Spider Crab	1	8.90	60
<i>Cancer irroratus</i>	Rock Crab	1	7.53	80
<i>Centropristis striata</i>	Black Sea Bass	1	2.05	80
Total:		32	1676.71	50-710

Table 4.1.2.1 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)
<i>Prionotus evolans</i>	Striped Searobin	55	1592.86	245-405
<i>Brevoortia tyrannus</i>	Atlantic Menhaden	6	264.29	360-375
<i>Callinectes sapidus</i>	Blue Crab	3	50.00	155-160
<i>Tautoga onitis</i>	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)
<i>Brevoortia tyrannus</i>	Atlantic Menhaden	15	614.29	355-395
<i>Pomatomus saltatrix</i>	Bluefish	1	21.43	295
Total:		16	635.71	295-395

Norton Basin, Surface (n=2)

Duration of set: 7 hrs

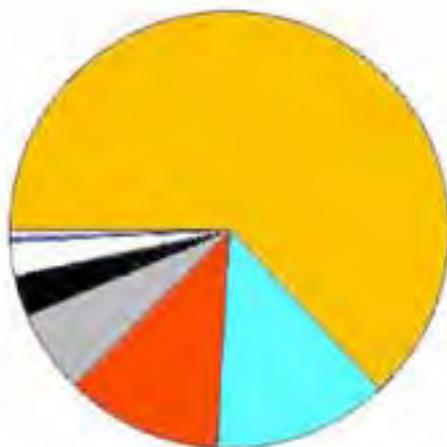
Scientific Name	Common Name	Total Abund.	Mean CPUE (g/hr)	TL Range (mm)
<i>Callinectes sapidus</i>	Blue Crab	4	64.29	135-160
<i>Limulus polyphemus</i>	Atlantic Horseshoe Crab	1	78.57	200
<i>Brevoortia tyrannus</i>	Atlantic Menhaden	1	42.86	370
Total:		6	185.71	135-370

Norton Basin, Shallow Area (n=4)

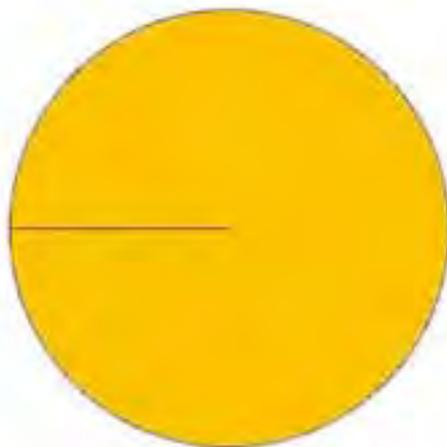
Duration of set: 7 to 8 hrs

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

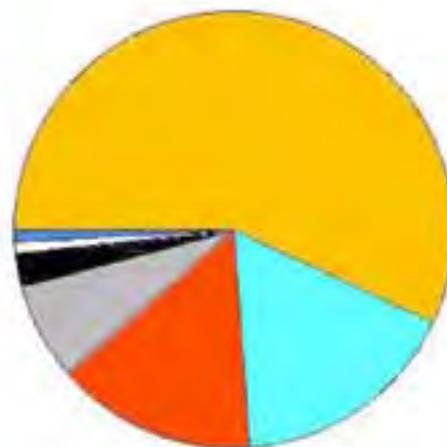
Species Composition
Gill Nets
Norton Basin
June 2002



Species Composition
Gill Nets
Little Bay
June 2002



Species Composition
Gill Nets
Grass Haddock Channel
June 2002



Species Composition
Gill Nets
The Ramble
June 2002

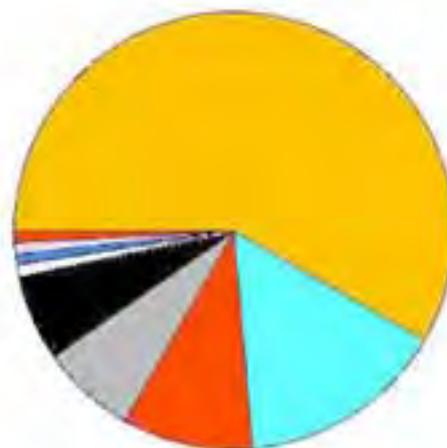


Figure 4.1.2.1 Species composition from gill net sampling efforts, June, 2002.

Gill net collections from the bottom, mid-depth, and surface of Little Bay during June (7 to 8 hrs duration, n=2) yielded no fish (**Table 4.1.2.2**). Gill net collections from the shallow areas of Little Bay (6 to 6.5 hrs duration, n=2) yielded a total of 9 individuals, all of which were striped searobins (*P. evolans*).

Gill net collections from the bottom of the Grass Hassock Channel during June (6 hrs duration, n=2) yielded 94 individuals representing 6 species (**Table 4.1.2.3**). The dominant species was striped searobin (*P. evolans*). CPUE at the bottom of Grass Hassock Channel (2524.2 g/hr) was greater than at the bottom of Norton Basin (1913.2 g/hr) or the bottom of Little Bay (0.0 g/hr). Gill net collections at mid-depth in Grass Hassock Channel (6.5 hrs duration, n=2) yielded 8 individuals representing 3 species (**Table 4.1.2.3**). The dominant species was bluefish (*P. saltatrix*). CPUE at mid-depth in Grass Hassock Channel (227.6 g/hr) was lower than at mid-depth in Norton Basin (635.7 g/hr) but greater than at mid-depth in Little Bay (0.0 g/hr). Gill net collections at the surface of Grass Hassock Channel (6.5 hrs duration, n=2) yielded 21 individuals representing 4 species (**Table 4.1.2.3**). The dominant species again was bluefish (*P. saltatrix*). CPUE at the surface of Grass Hassock Channel (562.5 g/hr) was greater than at the surface of Norton Basin (185.7 g/hr) or the surface of Little Bay (0.0 g/hr). Throughout the June gill net sampling in Grass Hassock Channel, the dominant species was striped searobin (*P. evolans*) representing 56.9% of the total collection. Bluefish (*P. saltatrix*) represented 17.1%, blue crab (*C. sapidus*) represented 14.6%, Atlantic menhaden (*B. tyrannus*) represented 7.3%, and all other species represented less than 5% (**Figure 4.1.2.1**).

Gill net collections from the shallow areas of the Raunt during June (4.5 hrs duration, n=2) yielded 125 individuals representing 9 species (**Table 4.1.2.4**). The dominant species in the Raunt was lady crab (*Ovalipes ocellatus*). CPUE at the shallow areas of the Raunt (2800.6 g/hr) was markedly greater than at the shallow areas of Norton Basin (1522.8 g/hr) or the shallow areas of Little Bay (325.2 g/hr). Throughout the June gill net sampling in the Raunt, the dominant species was lady crab (*O. ocellatus*) representing 58.4% of the total collection. Common spider crab (*Libinia emarginata*) represented 15.2%, striped searobin (*P. evolans*) represented 9.6%, blue crab (*C. sapidus*) represented 7.2%, Atlantic horseshoe crab (*L. polyphemus*) represented 6.4%, and all other species represented less than 5% (**Figure 4.1.2.1**).

4.2 Bottom Trawling

Trawls conducted in Norton Basin during May (5 min duration, n=3) yielded a total of 3 Atlantic horseshoe crabs (*L. polyphemus*) and 1 striped searobin (*P. evolans*) (**Table 4.2.1**). Trawls conducted in Grass Hassock Channel during May (10 min duration, n=3) yielded no fish (**Table 4.2.1**). Trawls conducted in the Raunt during May (10 min duration, n=3) yielded a total of 45 individuals representing 10 species (**Table 4.2.1**). The dominant species in the Raunt was Atlantic horseshoe crab (*L. polyphemus*) representing 53.3% of the total collection. Winter flounder (*Pleuronectes americanus*) represented 13.3%, blue crab (*C. sapidus*) represented 8.9%, common spider crab (*L. emarginata*) represented 6.7%, and all other species represented less than 5% (**Figure 4.2.1**). Mean CPUE for Norton Basin during May (438.0 g/min) was less than

Table 4.1.2.2 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)
<i>Prionotus evolans</i>	Striped Searobin	9	325.20	312-363
Total:		9	325.20	312-363

Table 4.1.2.3 Total abundance, mean CPUE (biomass in g/hr), and total length range of fish and macrocrustaceans collected in gill nets from Grass Haddock Channel, June, 2002.

Grass Haddock Channel, Bottom (n=2)

Duration of set: 6 hrs

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

Grass Haddock Channel, Mid-Depth (n=2)

Duration of set: 6.5 hrs

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

Grass Haddock Channel, Surface (n=2)

Duration of set: 6.5 hrs

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

Table 4.1.2.4 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)
<i>Ovalipes ocellatus</i>	Lady Crab	73	114.22	35-90
<i>Libinia emarginata</i>	Common Spider Crab	19	344.44	50-85
<i>Prionotus evolans</i>	Striped Searobin	12	288.89	195-388
<i>Callinectes sapidus</i>	Blue Crab	9	153.33	130-155
<i>Limulus polyphemus</i>	Atlantic Horseshoe Crab	8	1633.33	190-285
<i>Brevoortia tyrannus</i>	Smooth Dogfish	1	205.56	820
<i>Paralichthys dentatus</i>	Summer Flounder	1	44.44	335
<i>Cynoscion regalis</i>	Weakfish	1	14.22	260
<i>Stenotomus chrysops</i>	Scup	1	2.11	120
Total:		125	2800.56	35-820

Figure 4.2.1 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 the 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)
<i>Limulus polyphemus</i>	Atlantic Horseshoe Crab	24	589.67	120-260
<i>Pleuronectes americanus</i>	Winter Flounder	6	90.67	180-380
<i>Callinectes sapidus</i>	Blue Crab	4	26.67	120-145
<i>Libinia emaginata</i>	Common Spider Crab	3	13.00	50-75
<i>Malaclemys terrapin terrapin</i>	Northern Diamondback Terrapin	2	63.33	95-145
<i>Morone saxatilis</i>	Striped Bass	2	8.67	180-210
<i>Prionotus evolans</i>	Striped Searobin	1	30.33	370
<i>Paralichthys dentatus</i>	Summer Flounder	1	26.33	445
<i>Scophthalmus aquosus</i>	Windowpane	1	7.00	230
<i>Hippocampus erectus</i>	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)
<i>Limulus polyphemus</i>	Atlantic Horseshoe Crab	3	408.00	210-460
<i>Prionotus evolans</i>	Striped Searobin	1	30.00	330
Total:		4	438.00	210-460



Figure 4.2.1 Species composition from otter trawl sampling efforts, May and June, 2002.

that for the Raunt (855.7 g/min) but greater than that for Grass Hassock Channel (0.0 g/min) (**Table 4.2.1**).

Trawls conducted in Norton Basin during June (6 to 9 min duration, n=5) yielded a total of 13 individuals representing 4 species (**Table 4.2.2**). The dominant species in Norton Basin was blue crab (*C. sapidus*) representing 76.9% of the total collection. Summer flounder (*P. dentatus*), Atlantic horseshoe crab (*L. polyphemus*), and winter flounder (*P. americanus*) each represented 7.7% (**Figure 4.2.1**). Trawls conducted in Grass Hassock Channel during June (10 min duration, n=5) yielded no fish (**Table 4.2.2**). Trawls conducted in the Raunt during June (2 to 10 min duration, n=4) yielded 85 individuals representing 11 species (**Table 4.2.2**). The dominant species in the Raunt was lady crab (*O. ocellatus*) representing 82.4% of the total collection. All other species represented less than 5% (**Figure 4.2.1**). Mean CPUE for Norton Basin during June (102.3 g/min) was less than that for the Raunt (192.0 g/min) but greater than that for Grass Hassock Channel (0.0 g/min) (**Table 4.2.2**).

Table 4.2.2 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)
<i>Ovalipes ocellatus</i>	Lady Crab	70	79.19	45-100
<i>Gobiosoma ginsburgi</i>	Seaboard Goby	3	0.54	40-55
<i>Callinectes sapidus</i>	Blue Crab	2	13.46	145-155
<i>Stenotomus chrysops</i>	Scup	2	1.35	84-120
<i>Hippocampus erectus</i>	Lined Seahorse	2	0.54	60-120
<i>Limulus polyphemus</i>	Atlantic Horseshoe Crab	1	42.31	209
<i>Paralichthys dentatus</i>	Summer Flounder	1	40.38	465
<i>Pleuronectes americanus</i>	Winter Flounder	1	10.00	250
<i>Libinia emarginata</i>	Common Spider Crab	1	2.58	65
<i>Prionotus evolans</i>	Striped Searobin	1	1.65	120
<i>Syngnathus fuscus</i>	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)
<i>Callinectes sapidus</i>	Blue Crab	10	51.05	20-155
<i>Paralichthys dentatus</i>	Summer Flounder	1	24.36	425
<i>Limulus polyphemus</i>	Atlantic Horseshoe Crab	1	19.23	160
<i>Pleuronectes americanus</i>	Winter Flounder	1	7.64	260
Total:		13	102.28	20-425