

SEABROOK ECOLOGICAL STUDIES
JULY THROUGH DECEMBER 1977

FINFISH
TECHNICAL REPORT IX-2

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1.0 INTRODUCTION

Since 1969, finfish studies designed to establish a pre-operational data base of species occurrence, abundance and distribution have been conducted in the Hampton-Seabrook Estuary and near-shore waters (NAI, 1971, 1972, 1973, 1974). A formal preoperational program was initiated in July 1975, resulting in two July-June Annual Reports (NAI, 1977, 1978). This report, compiled to shift subsequent reporting periods to a January-December annual cycle, presents larval and adult finfish results from July through December 1977 and includes comparisons to the two previous years of formal preoperational monitoring..

Based on results of this and previous studies by NAI, the ichthyofauna of the New Hampshire coast are considered in three groups: resident species, summer migrants and winter migrants. Dominant resident species include yellowtail flounder, cunner, winter flounder, sculpins, ocean pout, radiated shanny, seasnails and skates. Migratory species include Gulf of Maine residents that perform inshore-offshore migrations at various times and species that are only seasonal inhabitants of the Gulf of Maine. Summer migrants are generally present from April or May through November or December, and include hake, pollock, mackerel and silver hake. Winter migrants, such as herring and smelt, usually appear in October and remain through June. The number of species utilizing New Hampshire coastal waters is generally highest during the transition periods of October through December, and April through June when resident species, summer migrants, and winter migrants co-occur.

Fish eggs have a definite seasonal pattern of abundance and succession in New Hampshire coastal waters: densities are high during spring and early summer, and low in winter. Eggs of cunner, American plaice, silver hake, and fourbeard rockling dominate the summer fish-egg assemblage; while eggs of the cod/haddock complex and pollock are dominant during winter. Seasonal abundance patterns of total fish larvae have been less clearly defined. Sand lance and American plaice larvae dominate late winter and spring assemblages, and are succeeded during summer by cunner and fourbeard rockling. Other summer dominants include yellowtail flounder, menhaden, silver hake, hake and witch flounder. During fall and early winter, dominant taxa include larvae of herring and pollock, and to a lesser degree, fourbeard rockling and sand lance.

2.0 METHODS

From July through December 1977, finfish populations (eggs, larvae, juveniles and adults) were sampled in the Hampton-Seabrook estuary and offshore waters as part of the year-round finfish sampling program. Otter trawls and gill nets were employed once monthly at three sampling stations (each method) in the offshore region. Ichthyoplankton sampling was conducted in conjunction with macrozooplankton surveys at three offshore locations. Samples were taken twice monthly during months of high plankton density and once monthly during the remaining months. Estuarine finfish populations were sampled with beach seines at three stations twice monthly from July through November. Sampling stations are presented in Figure 2-1.

2.1 OTTER TRAWLS

Four (4) replicate otter trawls were taken at night along Transects 1, 2 and 3 (Figure 2-1) using a 9.2 m shrimp trawl with 3.8 cm (1.5 inch) nylon mesh body and fitted with a 1.3 cm (.5 inch) mesh cod end liner. The net was deployed and towed at 900 rpm (approximately 3 kn) for 10 minutes; replicate tows were taken in opposite directions.

2.2 GILL NETS

Nets were set for three consecutive 24-hr periods per month at all three stations (Figure 2-1). Each station consisted of paired permanent substations, one parallel to and one perpendicular to the isobath. Each substation consisted of two 30.7 x 3.7 m (100 x 12 ft) nets with mesh sizes of 2.5, 5, 10 and 12.5 cm (1, 2, 4, and 5 inches): one was hung at the surface and one at approximately 3 m off the bottom. The nets were positioned on permanent buoys and set and tended by SCUBA divers.

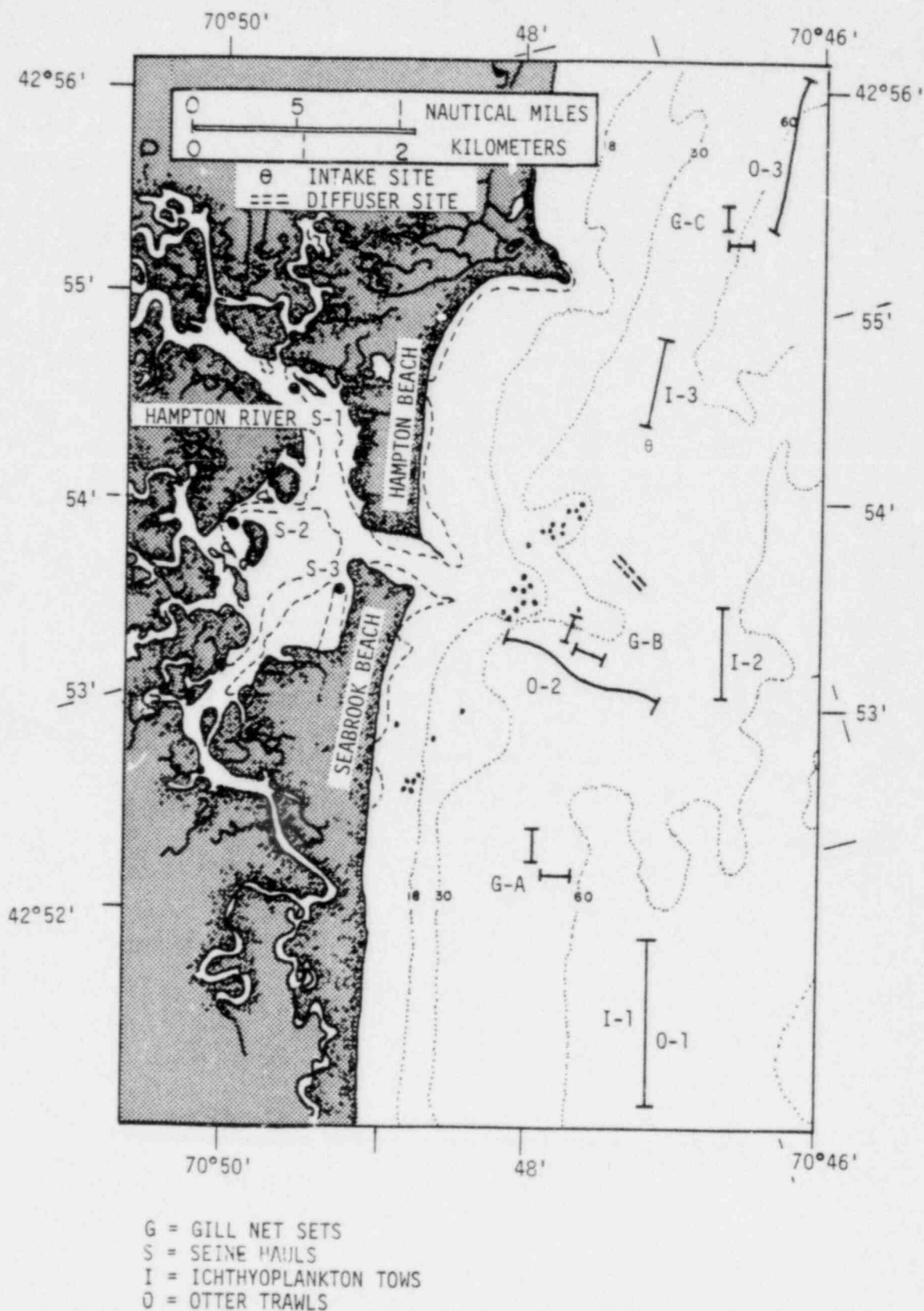


Figure 2-1. Finfish sampling stations. Seabrook Ecological Studies, July through December 1977.

2.3 BEACH SEINE

Seine samples were collected twice monthly July through November at Stations S-1, S-2 and S-3 (Figure 2-1). Two (2) replicate seine hauls were taken with a 30.7 x 0.9 m (100 x 3 ft) bag seine. The outer wings of the seine were 2.5 cm (1 inch) mesh (bar measure); the nylon bag was 2.5 m (8 ft) square with 1.3 cm (.5 inch) mesh (stretch measure).

2.4 ICHTHYOPLANKTON

Four (4) replicate stepped-oblique plankton tows for fish eggs and larvae were conducted at night along Transects 1, 2 and 3 (= ichthyoplankton Transects 6, 5 and 2, respectively) using a 1 m (3.3 ft) diameter 505 μ mesh ring net (Figure 2-1). Tows were taken twice monthly in July, August and December and once monthly September through November. Twice monthly tows were taken because of high egg and/or larval densities historically reported in the study area during those months. The net was lowered with an attached depressor to a depth approximately half that of the bottom depth and towed at 2-3 kn. Speed was varied at two-minute intervals to sample a range of water depths. The standard 10-minute tow was reduced to 5 minutes during periods of high biological productivity to minimize net clogging. Volume filtered was measured with a calibrated General Oceanics digital flowmeter mounted in the net mouth.

Ichthyoplankton samples were presorted for eggs and larvae. When, upon visual inspection, samples were found to contain many more than 200 eggs and/or larvae, the sample was split with a Folsom plankton splitter so that each subsample contained approximately 150-200 eggs and/or larvae. In most cases larvae were identified to species. Some eggs, however, were more difficult to identify, and were grouped with eggs of similar appearance (e.g., cunner [*Tautogolabrus adspersus*] with yellowtail flounder [*Limanda ferruginea*]). Identifications were made using a dissecting microscope at 10X - 80X magnifications.

3.0 RESULTS

Fifty-nine species of juvenile and adult finfishes, and twenty-nine species of fish eggs and larvae were collected in the Hampton-Seabrook area from July through December 1977. Eggs and larvae of three species were found with no older life stages recorded; combining all life stages, a total of 64 species from 48 genera were found (Appendix Table 1).

3.1 OTTER TRAWL

Otter trawls captured 4,395 fish representing 41 species during the six-month period (Table 3-1). Numerically dominant species included *Urophycis* spp. (hake) and *Limanda ferruginea* (yellowtail flounder) followed by *Myoxocephalus octodecemspinosus* (longhorn sculpin) and *Pseudopleuronectes americanus* (winter flounder); collectively these species comprised 76 percent of the total otter trawl catch. Though species richness was similar among transects, catch abundances varied: at Transect 2 the catch was considerably lower than Transects 1 and 3 (Table 3-2). Monthly variations in species richness and abundance within transects were small.

Species ranking and catch abundance of individual species varied among the three transects (Appendix Tables 2, 3 and 4). At Transects 1 and 3, which are located further offshore and in deeper water than Transect 2, catches per effort of the three most abundant otter trawl species, *Urophycis* sp., *L. ferruginea* and *M. octodecemspinosus*, were noticeably greater than at Transect 2 (Table 3-3). At Transect 2, *P. americanus* was the most abundant species; it was the only dominant species collected in higher numbers at this transect than at either of the other transects (Table 3-3).

TABLE 3-1. SPECIES RANK FOR FISHES COLLECTED IN OTTER TRAWLS.
SEABROOK ECOLOGICAL STUDIES, JULY THROUGH DECEMBER 1977.

SPECIES	TOTAL NUMBER	%
<i>Urophycis</i> sp.	1,656	37.7
<i>Limanda ferruginea</i>	1,001	22.8
<i>Myoxocephalus octodecemspinosus</i>	384	8.7
<i>Pseudopleuronectes americanus</i>	318	7.2
<i>Merluccius bilinearis</i>	183	4.2
<i>Raja erinacea</i>	148	3.4
<i>Melanogrammus aeglefinus</i>	139	3.2
<i>Scophthalmus aquosus</i>	87	2.0
<i>Macrozoarces americanus</i>	86	2.0
<i>Osmerus mordax</i>	81	1.8
<i>Gadus morhua</i>	58	1.3
<i>Pollachius virens</i>	58	1.3
<i>Syngnathus fuscus</i>	33	0.8
<i>Raja radiata</i>	32	0.7
<i>Hemitripterus americanus</i>	29	0.7
<i>Paralichthys oblongus</i>	21	0.5
<i>Alosa pseudoharengus</i>	10	0.2
<i>Urophycis chuss</i>	8	0.2
<i>Aspidophoroides monopterygius</i>	7	0.2
<i>Pholis gunnellus</i>	6	0.1
<i>Raja</i> sp.	6	0.1
<i>Stenotomus chrysops</i>	6	0.1
<i>Raja binoculata</i>	5	<0.1
<i>Myoxocephalus scorpius</i>	4	<0.1
<i>Microgadus tomcod</i>	4	<0.1
<i>Tautoglabrus adspersus</i>	3	<0.1
<i>Clupea harengus</i>	2	<0.1
<i>Cyclopterus lumpus</i>	2	<0.1
<i>Liparis</i> sp.	2	<0.1
<i>Urophycis regius</i>	2	<0.1
<i>Lophius americanus</i>	2	<0.1
<i>Glyptocephalus cynoglossus</i>	2	<0.1
<i>Raja eglanteria</i>	2	<0.1
<i>Myoxocephalus aeneus</i>	1	<0.1
<i>Liparis atlanticus</i>	1	<0.1
<i>Liparis liparis</i>	1	<0.1
<i>Enchelyopus cimbrius</i>	1	<0.1
<i>Scomber scombrus</i>	1	<0.1
<i>Squalus acanthus</i>	1	<0.1
<i>Ulvaria subbifurcata</i>	1	<0.1
<i>Prionotus carolinus</i>	1	<0.1
Total	4,395	100

TABLE 3-2. NUMBER OF SPECIES AND INDIVIDUALS COLLECTED PER MONTH (TOTAL OF FOUR REPLICATE 10-MINUTE TOWS)^{*}
AT EACH OTTER TRAWL TRANSECT (1, 2 AND 3). SEABROOK ECOLOGICAL STUDIES, JULY THROUGH DECEMBER 1977.

COLLECTION DATE	TRANSECT 1		TRANSECT 2		TRANSECT 3	
	# SPECIES	# INDIVIDUALS	# SPECIES	# INDIVIDUALS	# SPECIES	# INDIVIDUALS
7/14	13	640	11	71	14	376
8/18	15	484	12	136	15	363
9/28	16	165	14	93	17	308
10/18	14	375	12	92	14	351
11/16	13	193	13	82	13	144
12/29	13	215	10	55	19	252
TOTAL	28	2072	25	529	30	794

^{*} At Transect 2, tow duration was reduced to five minutes for all replicates during July and one replicate during October due to clogging by algae.

TABLE 3-3. CATCH PER EFFECTIVE UNIT EFFORT (10 min.) AND PERCENT OF TOTAL CATCH BY TRANSECT OF DOMINANT SPECIES COLLECTED IN TRAWLS. SEABROOK ECOLOGICAL STUDIES, JULY THROUGH DECEMBER 1977.

DOMINANT TAXA	TRANSECT 1		TRANSECT 2		TRANSECT 3	
	C/E	% TOTAL	C/E	% TOTAL	C/E	% TOTAL
<i>Urophycis</i> sp.	33.7	39.0	6.2	23.3	30.2	40.4
<i>Limanda ferruginea</i>	26.2	30.4	2.4	8.7	13.6	18.2
<i>Myoxocephalus octodecemspinosus</i>	7.6	8.8	1.3	5.5	7.2	9.6
<i>Pseudopleuronectes americanus</i>	3.8	4.3	17.6	31.8	2.5	3.3

C/E = catch per effective unit effort

% Total = percent of total catch by transect

3.2 GILL NETS

A total of 3,638 individuals representing 22 species were collected in gill nets from July through December 1977 (Table 3-4). Numerically dominant species included *Clupea harengus* (herring), *Merluccius bilinearis* (silver hake), *Alosa aestivalis* (blueback herring) and *Scomber scombrus* (mackerel); collectively these species comprised 88 percent of the total gill net catch, and were dominants at each gill net station (Table 3-5). The total number of species collected at each transect varied monthly. Overall, similar number of species were collected at Stations B and C, and fewest at Station A (Table 3-5). Total catch was greatest at Station C and similar for Stations A and B. Catch abundance peaked at all stations during October, due mainly to high numbers of *C. harengus* and *M. bilinearis* (Appendix Tables 5, 6 and 7). Fewest species and lowest abundances occurred during September.

Overall, surface gill nets collected higher numbers of fish at each transect than near-bottom nets (Table 3-6). Dominant species that were collected in higher numbers by near-surface nets were *C. harengus*, *A. aestivalis* and *S. scombrus*; *M. bilinearis* was more numerous in near-bottom nets (Table 3-5). Differences in species richness by depth were generally small (Table 3-6).

3.3 BEACH SEINE

A total of 17,399 individuals representing 25 species were collected in beach seines from July through November 1977 (Table 3-7). *Menidia menidia* (silversides) were the most abundant species, comprising 60% of the total seine catch. The four top-ranked species accounted for 90.8% of the total.

Though variable, species richness was generally highest from July through early September and declined thereafter (Table 3-8). Catch

TABLE 3-4. SPECIES RANK FOR FISH COLLECTED IN GILL NETS.
SEABROOK ECOLOGICAL STUDIES, JULY THROUGH
DECEMBER 1977.

SPECIES	TOTAL NUMBER	%
<i>Clupea harengus</i> H	1,339	36.8
<i>Merluccius bilinearis</i>	976	26.8
<i>Alosa aestivalis</i>	520	14.3
<i>Scomber scombrus</i>	354	9.7
<i>Pollachius virens</i>	109	3.0
<i>Brevoortia tyrannus</i>	103	2.8
<i>Urophycis</i> sp.	87	2.4
<i>Gadus morhua</i>	39	1.1
<i>Alosa pseudoharengus</i>	33	0.9
Clupeid	20	0.5
<i>Tautogolabrus adspersus</i>	19	0.5
<i>Osmerus mordax</i>	11	0.3
<i>Squalus acanthias</i>	11	0.3
<i>Myoxocephalus octodecemspinosus</i>	7	0.2
<i>Mustelus canis</i>	2	<0.1
<i>Peprilus triacanthus</i>	2	<0.1
<i>Scophthalmus aquosus</i>	1	<0.1
<i>Hemitripterus americanus</i>	1	<0.1
<i>Myoxocephalus</i> sp.	1	<0.1
<i>Lophius americanus</i>	1	<0.1
<i>Pomatomus saltatrix</i>	1	<0.1
<i>Prionotus carolinus</i>	1	<0.1
Total	3,638	100.0

TABLE 3-5. CATCH PER EFFECTIVE UNIT EFFORT (24-hr set) AND PERCENT OF TOTAL CATCH BY TRANSECT OF DOMINANT SPECIES COLLECTED IN GILL NETS. SEABROOK ECOLOGICAL STUDIES JULY THROUGH DECEMBER 1977.

DOMINANT TAXA	DEPTH	TRANSECT A		TRANSECT B		TRANSECT C	
		C/E	% TOTAL	C/E	% TOTAL	C/E	% TOTAL
<i>Clupea harengus</i>	S	34.3	55.6	26.4	56.7	20.9	32.3
	B	4.1	15.5	5.7	21.0	5.5	16.4
	Total	19.2	43.6	16.1	43.5	13.2	27.0
<i>Merluccius bilinearis</i>	S	7.5	15.2	7.3	12.6	9.6	14.8
	B	11.7	55.5	16.0	46.8	17.5	52.7
	Total	9.6	27.3	11.7	25.2	13.6	27.7
<i>Alosa aestivalis</i>	S	4.5	7.3	7.5	12.9	29.2	36.1
	B	0.3	1.3	1.0	2.9	0.8	1.8
	Total	2.4	5.5	4.3	9.2	15.0	24.4
<i>Scomber scombrus</i>	S	8.8	17.8	5.4	11.6	8.0	9.9
	B	0.7	3.5	0.7	2.4	.0	4.8
	Total	4.8	13.5	3.0	8.2	5.0	8.2

C/E = catch per effective unit effort

% Total = percent of total catch by Transect

TABLE 3-6. NUMBERS OF SPECIES AND INDIVIDUALS COLLECTED PER MONTH AT EACH GILL NET STATION (TOTAL OF THREE 24-HR SETS PER STATION). SEABROOK ECOLOGICAL STUDIES, JULY THROUGH DECEMBER 1977.

COLLECTION DATE	DEPTH *	STATION A		STATION B		STATION C	
		# SPECIES	# INDIVIDUALS	# SPECIES	# INDIVIDUALS	# SPECIES	# INDIVIDUALS
7/13	S	3	98	6	64	8	112
	B	4	133	4	111	5	157
	Total	5	231	10	175	9	269
8/10	S	5	78	5	65	3	57
	B	5	56	5	36	4	24
	Total	6	134	8	101	5	81
9/14	S	2	10	3	10	3	37
	B	3	7	3	13	7	60
	Total	3	17	4	23	8	97
10/12	S	7	398	7	407	9	289
	B	10	107	10	134	9	162
	Total	10	505	10	541	11	451
11/16	S	6	80	6	74	5	96
	B	3	3	9	56	7	72
	Total	6	83	10	130	7	168
12/30	S	5	82	5	79	3	379
	B	4	11	5	60	6	24
	Total	7	93	7	139	7	403
Total (all months)	S	11	741	12	699	11	654
	B	11	317	14	410	13	499
	Total	14	1058	18	1109	17	1153

* S = surface, B = Bottom

TABLE 3-7. SPECIES RANK FOR FISHES COLLECTED IN BEACH SEINES.
SEABROOK ECOLOGICAL STUDIES, JULY THROUGH DECEMBER 1977.

SPECIES	TOTAL NUMBER	%
<i>Menidia menidia</i>	10,440	60.0
<i>Fundulus</i> sp.	3,725	21.4
<i>Osmerus mordax</i>	898	5.2
<i>Pungitius pungitius</i>	730	4.2
<i>Fundulus majalis</i>	327	1.9
<i>Fundulus heteroclitus</i>	322	1.9
<i>Pseudopleuronectes americanus</i>	274	1.6
<i>Alosa pseudoharengus</i>	250	1.4
<i>Ammodytes americanus</i>	219	1.3
<i>Alosa aestivalis</i>	87	0.5
<i>Liopsetta putnami</i>	30	0.2
<i>Urophycis</i> sp.	25	0.1
<i>Gasterosteus aculeatus</i>	21	0.1
<i>Clupea harengus</i>	16	<0.1
<i>Salmo trutta</i>	11	<0.1
<i>Myoxocephalus aeneus</i>	5	<0.1
<i>Syngnathus fuscus</i>	4	<0.1
<i>Tautoglabrus adspersus</i>	3	<0.1
<i>Salmo gairdneri</i>	3	<0.1
<i>Scophthalmus aquosus</i>	2	<0.1
<i>Myoxocephalus scorpius</i>	2	<0.1
<i>Microgadus tomcod</i>	2	<0.1
<i>Alosa sapidissima</i>	1	<0.1
<i>Myoxocephalus octodecemspinosus</i>	1	<0.1
<i>Peprilus triacanthus</i>	1	<0.1
Total	17,399	100.0

TABLE 3-8. NUMBER OF SPECIES AND INDIVIDUALS COLLECTED PER SAMPLE PERIOD (TOTAL OF TWO REPLICATES) AT EACH SEINE STATION (S1, S2 AND S3). SEABROOK ECOLOGICAL STUDIES, JULY THROUGH DECEMBER 1977.

COLLECTION DATE	STATION S1		STATION S2		STATION S3	
	# SPECIES	# INDIVIDUALS	# SPECIES	# INDIVIDUALS	# SPECIES	# INDIVIDUALS
7/07	7	545	6	130	8	13
7/21	4	21	8	2811	6	155
8/02	7	441	7	82	9	112
8/22	7	390	5	678	3	204
9/01	9	1149	6	1349	9	1504
9/19	4	289	3	263	6	210
9/30	4	258	6	463	6	1102
10/21	4	162	4	135	3	63
11/02	3	468	2	6	5	945
11/21	2	7	1	12	5	3432
TOTAL	15	3730	14	5929	21	7740

abundance fluctuated considerably by month and station as a result of isolated peak catches of dominant species (Appendix Tables 8, 9 and 10). *Menidia menidia* was collected throughout the 6-month period with peak catches varying by station between September and November. Highest concentrations occurred at Station S-2 during early September and at Station S-3 during late September and November. Though *Fundulus* sp. ranked second overall in seine hauls, high concentrations were collected only twice during the six-month period, i.e., Station S-1 during early September and Station S-2 during late July. Similarly, *O. mordax* was the third most abundant species but occurred in high concentrations only once during the six-month period, i.e., Station S-3 during early September. The fourth ranked species, *Pungitius pungitius*, occurred in peak concentrations during early (Station S-1) and late July (Stations S-2 and S-3). Over all months, species richness and total abundance was greatest at Station S-3, located nearest the Hampton-Seabrook estuary (Table 3-8).

3.4 ICHTHYOPLANKTON

Thirteen fish egg taxa and 24 species of fish larvae were identified from ichthyoplankton collections in the study area between July and December 1977 (Appendix Table 1). Numerically dominant fish egg taxa were *Urophycis* sp., Labrid/*Limanda* (cunner/yellowtail) and *M. bilinearis* (Table 3-9). Dominant fish larvae were *Tautoglabrus adspersus* (cunner), *Enchelyopus cimbrius* (fourbeard rockling), *C. harengus* and *M. bilinearis* (Table 3-9). For future reference, eggs and larvae were ranked by biological index values (Appendix Tables 14 and 15).

During the study period, fish eggs were most abundant from July through early September; no consistent spatial trends in total density were apparent (Table 3-10). *Urophycis* sp., *M. bilinearis* and Labrid/*Limanda* comprised the major portion of the fish egg density during this period (Appendix Tables 11, 12, 13). Collected in moderate abundances during summer and early fall were eggs of *E. cimbrius*, *Glyptocephalus cynoglossus* (witch flounder), *Scophthalmus aquosus*

TABLE 3-9. ABUNDANCE ($\#/1000 \text{ m}^3$) SUMMARY TABLE FOR DOMINANT FISH EGGS AND LARVAE. SEABROOK ECOLOGICAL STUDIES, JULY THROUGH DECEMBER 1977.

TAXA	E G G S											
	TRANSECT 1				TRANSECT 2				TRANSECT 3			
	\bar{x}	MAX	- DATE	% OF TOTAL	\bar{x}	MAX	- DATE	% OF TOTAL	\bar{x}	MAX	- DATE	% OF TOTAL
<i>Urophycis</i> sp.	11,714	53,133	- 7/20	48.2	7,235	35,468	- 7/06	31.7	6,497	24,992	- 7/06	38.0
Labrid/ <i>Limanda</i>	6,169	49,115	- 7/06	25.4	9,713	75,903	- 7/06	42.6	4,431	21,837	- 7/06	25.9
<i>Merluccius bilinearis</i>	5,701	18,586	- 8/03	23.5	4,827	16,443	- 7/20	21.2	5,246	22,054	- 8/03	30.7
TAXA	L A R V A E											
	TRANSECT 1				TRANSECT 2				TRANSECT 3			
	\bar{x}	MAX	- DATE	% OF TOTAL	\bar{x}	MAX	- DATE	% OF TOTAL	\bar{x}	MAX	- DATE	% OF TOTAL
<i>Tautoglabrus adspersus</i>	122	486	- 7/20	29.6	248	1,250	- 7/20	35.2	224	884	- 8/23	24.6
<i>Enchelyopus cimbrius</i>	46	115	- 8/03	11.1	105	548	- 7/20	14.9	179	574	- 8/23	19.7
<i>Clupea harengus</i>	55	475	-11/01	13.4	92	817	-11/01	13.0	158	1,408	-11/01	17.4
<i>Merluccius bilinearis</i>	68	262	- 8/23	16.5	85	476	- 7/20	12.1	97	574	- 9/07	10.7

TABLE 3-10. MEAN ABUNDANCE ($\#/1000 \text{ m}^3$) OF FISH EGGS AND LARVAE BY SAMPLE DATE AT TRANSECTS 1, 2 AND 3 IN THE HAMPTON-SEABROOK AREA. SEABROOK ECOLOGICAL STUDIES, JULY THROUGH DECEMBER 1977.

STATIONS	E G G S									
	SAMPLE DATE									
	7/6	7/20	8/3	8/23	9/7	10/4	11/1	12/15	12/27	\bar{x}
1	71,800	70,000	32,100	26,000	18,200	453	176	39	351	24,300
2	125,300	37,800	16,400	6,550	17,800	230	108	31	367	22,800
3	58,500	37,000	29,400	7,050	21,400	194	70	45	67	17,100
\bar{x}	85,200	48,300	26,000	13,200	19,100	292	118	38	262	

STATIONS	L A R V A E									
	SAMPLE DATE									
	7/6	7/20	8/3	8/23	9/7	10/4	11/1	12/15	12/27	\bar{x}
1	361	957	564	478	652	18	495	79	97	411
2	847	2,786	244	453	854	3	838	192	128	705
3	1,250	1,316	427	2,267	1,268	6	1,418	174	59	909
\bar{x}	819	1,700	412	1,100	925	9	917	148	95	

(windowpane) and *S. scombrus*. Egg densities were lowest during November and December when *P. virens* and *Gadus/Melanogrammus* (cod/ haddock) were the only fish egg taxa collected in appreciable densities (Appendix Tables 11, 12 and 13).

Mean densities of fish larvae were generally high from July through September (Table 3-10) when larvae of *T. adspersus*, *E. cimbrius*, and *M. bilinearis* were most prominent (Appendix Tables 11, 12 and 13). *Glyptocephalus cynoglossus*, *Ulvaria subbifurcata* (radiated shanny), *S. aquosus* and *L. ferruginea* were also important during this period. Larval densities declined sharply during October, but increased again during November due to high densities of *C. harengus*. Densities declined during December when *P. virens* and *Ammodytes americanus* (sand lance) comprised the major portion of the total density. Fish larvae were usually most abundant at Transect 3 and least abundant at Transect 1 (Table 3-10).

4.0 DISCUSSION

Table 4-1 compares spatial and seasonal distribution of juvenile and adult finfish collected during the 1975/76 and 1976/77 finfish programs with data collected during the July-December 1977 program. Distribution of fish among the various sampling stations was consistent with previous years. For most species captured by otter trawl, highest abundances occurred at the deeper, offshore transects, 1 and 3; while *P. americanus*, was most abundant at Transect 2. Gill net and seine catches were more evenly distributed among stations: highest total gill net catches occurred at Station C and total seine catches at Transect S-3.

Monthly abundance patterns were consistent with earlier years for the majority of dominant species (Table 4-1). Although timing and magnitude of peak occurrences of *A. aestivalis*, *A. pseudoharengus* and *P. virens* varied somewhat among years, the variability is expected due to the migratory nature of the fish and to the temporal spacing of sample collections (once or twice monthly). Catch-abundance of finfish collected in otter trawls was within the range of previous years; however, several species collected in gill nets and seines occurred in numbers 2-4 times greater than during the same period in 1975 and 1976 (Table 4-1). Species collected in higher abundances by gill nets included *C. harengus*, *M. bilinearis*, *A. aestivalis* and *P. virens*. Species collected in higher abundances by seine included *O. mordax* and *P. americanus* (Table 4-1) as well as *A. americanus* and *P. pungitius*.

For several species, catch differences between surface and bottom nets were observed in 1977 program data. *Clupea harengus*, *A. aestivalis* and *S. scombrus* were all more abundant in surface nets. *Scomber scombrus* catch continued a pattern observed in previous years, whereas *C. harengus* and *A. aestivalis* surface/bottom catch differences had been inconsistent in previous years. Three species, *M. bilinearis*, *P. virens* and *Urophycis* sp., were collected in higher abundances in bottom than in surface nets in 1977. All three continued patterns established in 1975 and 1976.

TABLE 4-1. COMPARISON OF MAJOR FINFISH SPECIES COLLECTED DURING THE JULY-DECEMBER 1977 PROGRAM WITH TRENDS ESTABLISHED DURING THE 1975/76 AND 1976/77 PROGRAMS. SEABROOK ECOLOGICAL STUDIES, JULY THROUGH DECEMBER 1977.

SPECIES	ESTABLISHED TRENDS FROM 1975/76 AND 1976/77 STUDIES			COMPARISON OF JULY THROUGH DECEMBER 1977 DATA WITH RESULTS FROM 1975/76 AND 1976/77
	PRIMARY COLLECTION METHOD	SPATIAL DISTRIBUTION	SEASONAL DISTRIBUTION	
<i>Alosa aestivalis</i>	Gill Net Beach Seine	No consistent distributional trends	Most numerous during November 1975; August 1976 and June 1977.	Most abundant in gill nets during December; in seines during August and early September. Gill net catches greater than same period in 1975 and 1976.
<i>Alosa pseudoharengus</i>	Gill Net Beach Seine	No consistent distributional trends	Most numerous during October 1975; June 1976.	Gill net catches consistent with earlier years. Seine catches highest in August/early September; abundances greater than same period in earlier years.
<i>Clupea harengus</i>	Gill Net	Well distributed among all transects	Highest numbers collected October through June	Spatial and seasonal distribution consistent with earlier years. Catch abundance approximately 2-3 times greater than earlier years.
<i>Gadus morhua</i>	Otter Trawl Gill Net	Most numerous at otter trawl Transects 1 and 3. No consistent distributional trends among gill net transects.	Present throughout the year.	Spatial and seasonal distribution consistent with earlier years. Catch abundance in gill nets similar to earlier years; otter trawl catches declined.
<i>Limanda ferruginea</i>	Otter Trawl	Most numerous at Transect 1	Numerous throughout the year.	General agreement with earlier years.
<i>Menidia menidia</i>	Beach Seines	Abundant at all seine stations; highest concentrations at Station S3.	Most numerous from August through November	Spatial and seasonal distribution consistent with earlier years. Catch abundance in the range of values recorded during later half of 1975 and 1976.
<i>Merluccius bilinearis</i>	Gill Nets Trawls	Most numerous at Otter trawl Transects 1 and 3, and Gill net Transect C	Maximum abundances during late spring/early summer and again during fall.	Spatial and seasonal distribution consistent with earlier years; catch abundance in gill nets approximately twice as abundant in July through December 1977.
<i>Osmerus mordax</i>	Beach Seines Otter Trawls	Most numerous in beach seines at Station S3. No consistent spatial distribution trends in otter trawl catches.	Most numerous inshore (seines) during July-September and offshore (trawls) during January-April.	Spatial and seasonal distribution consistent with earlier years. Seine catch-abundance greater than previous years.
<i>Pollachius virens</i>	Gill Nets	No consistent spatial distribution trends.	Most numerous during spring and summer.	Peak catch collected during November. Catch abundance greater than previous years.
<i>Pseudopleuronectes americanus</i>	Otter Trawl Beach Seine	Most numerous at otter trawl Transect 2 and beach seine	Most numerous during spring and early fall.	Spatial distribution consistent with previous years. Numerous through summer and fall -- both methods. Seine catch-abundance greater than same period in previous years.
<i>Scomber scombrus</i>	Gill Net	No consistent spatial distribution trends	Generally present June - December. Most abundant: June/July and October/November 1975. August/September 1976.	Well distributed among all transects. Catch abundance and seasonal trends consistent with 1976.
<i>Urophycis</i> sp.	Otter trawl	Most numerous at Transects 1 and 3.	Generally present April-December. Most abundant: June/July and September-November 1975. August/September 1976.	Spatial distribution consistent with earlier years. Most abundant during July and August. Catch abundance in the range of values recorded during same period of 1975 and 1976.

Ichthyoplankton assemblages sampled during the July-December 1977 sample period were similar to those recorded during the 1975 and 1976 programs (NAI, 1977 and 1978). Similar taxa (eggs and larvae) were identified and, as in earlier years, no consistent distributional trends among sampling stations were evident for either life stage. Seasonal abundance patterns of dominant fish eggs and larvae were consistent with those observed during previous years (NAI, 1977 and 1978). High fish egg abundances during summer were due to eggs of Labrid/*Limanda*, *Urophycis* sp. and *M. bilinearis*; while eggs of *Gadus/Melanogrammus* and *P. virens* were the major component of the late fall/early winter assemblage. High summer fish larval densities resulted from high concentrations of *T. adspersus* and *E. cimbrius*, and November peaks were due to *C. harengus*. *P. virens* and *A. americanus* succeeded as dominants during December.

Densities of fish eggs collected during the July through December 1977 sampling period were generally higher than densities recorded during the same period in 1975 and 1976. This increase was particularly evident for *M. bilinearis*, *Urophycis* sp. and Labrid/*Limanda* (NAI, 1977 and 1978). Increases in the density of fish larvae were not as noticeable as for eggs, and densities of most species were in the range of previous years.

5.0 SUMMARY

Finfish assemblages sampled since July 1975 in the Hampton-Seabrook estuary and offshore region have been reasonably consistent and predictable. Species composition, and seasonal and spatial abundance trends recorded during the July-December 1977 sample period were generally consistent with trends observed during the first two years of formal preoperational monitoring. Actual numbers of individuals collected during the later half of 1977, however, were greater than recorded during the same period of 1975 and 1976. This was particularly evident for finfish collected in gill nets and beach seines, where, on the average, 2-4 times more individuals were collected. In addition to higher abundances of juvenile and adult finfish, densities of fish eggs were also above the range of earlier years; though larval densities did not deviate considerably from previous levels.

The migratory and meandering nature of various fish species coupled with the temporal spacing of sample collections is expected to result in year to year variations in recorded abundance and distribution. Natural variations in recruitment to the adult population due to fluctuations in year-class success and movements of fish into and out of the area may also result in annual variability in catch data. Overall, variations observed in the data were not considered substantial and do not represent large deviations from previously established trends.

APPENDICES

APPENDIX TABLE 1. LIST OF FISH SPECIES ENCOUNTERED IN THE MARINE AND ESTUARINE WATERS IN THE VICINITY OF THE HAMPTON-SEABROOK ESTUARY. SEABROOK ECOLOGICAL STUDIES, JULY THROUGH DECEMBER 1977.

SCIENTIFIC NAME	COMMON NAME	LIFE STAGE		
		JUVENILE AND/OR ADULT	LARVAE	EGGS
<i>Alosa aestivalis</i>	Blueback herring	x		
<i>Alosa pseudoharengus</i>	Alewife	x		
<i>Alosa sapidissima</i>	American shad	x		
<i>Annodytes americanus</i>	American sand lance	x	x	x
<i>Aspidophoroides monopterygius</i>	Alligatorfish	x	x	
<i>Brevoortia tyrannus</i>	Atlantic menhaden	x		x
<i>Brosme brosme</i>	Cusk		x	
<i>Clupea harengus</i>	Atlantic herring	x	x	
<i>Cyclopterus lumpus</i>	Lumpfish	x	x	
<i>Fundulus heteroclitus</i>	Mummichog	x		
<i>Fundulus majalis</i>	Striped killifish	x		
<i>Gadus/Melanogrammus</i>	Cod and/or Haddock			x
<i>Gadus morhua</i>	Cod	x	x	
<i>Gasterosteus aculeatus</i>	Threespine stickleback	x		
<i>Glyptocephalus cynoglossus</i>	Witch flounder	x	x	x
<i>Hemitripterus americanus</i>	Sea raven	x		
<i>Hippoglossoides platessoides</i>	American plaice		x	x
<i>Labridae/Limanda</i>	Cunner and/or Flounder			x
<i>Limanda ferruginea</i>	Yellowtail flounder	x	x	
<i>Liopsetta putnami</i>	Smooth flounder	x		
<i>Liparis sp.</i>	Striped and/or common seasnail	x	x	
<i>Liparis atlanticus</i>	Seasnail	x		
<i>Liparis liparis</i>	Striped seasnail	x		
<i>Lophius americanus</i>	Goosefish	x	x	
<i>Macrozoarces americanus</i>	Ocean pout	x	x	
<i>Melanogrammus aeglefinus</i>	Haddock	x	x	
<i>Menidia menidia</i>	Atlantic silversides	x		
<i>Merluccius bilinearis</i>	Silver hake	x	x	x
<i>Microgadus tomcod</i>	Tomcod	x		
<i>Mustelus canis</i>	Smooth dogfish	x		
<i>Myoxocephalus sp.</i>	Sculpin	x		
<i>Myoxocephalus aeneus</i>	Grubby sculpin	x		
<i>Myoxocephalus octodecemspinosus</i>	Longhorn sculpin	x		
<i>Myoxocephalus scorpius</i>	Shorthorn sculpin	x		
<i>Osmerus mordax</i>	Rainbow smelt	x		
<i>Paralichthys oblongus</i>	Fourspot flounder	x		
<i>Peprilus triacanthus</i>	Butterfish	x		x
<i>Pholis gunnelus</i>	Rock gunnel	x		
<i>Pollachius virens</i>	Pollock	x	x	x
<i>Pomatomus saltatrix</i>	Bluefish	x		
<i>Prionotus carolinus</i>	Common searobin	x		x
<i>Pseudopleuronectes americanus</i>	Winter flounder	x	x	
<i>Pungitius pungitius</i>	Ninespine stickleback	x		
<i>Raja sp.</i>	Skate	x		
<i>Raja binoculata</i>	Big skate	x		
<i>Raja eglanteria</i>	Brier skate	x		
<i>Raja erinacea</i>	Little skate	x		
<i>Raja radiata</i>	Thorny skate	x		
<i>Enchelyopus cimbrius</i>	Fourbeard rockling	x	x	x
<i>Salmo gairdneri</i>	Rainbow trout	x		
<i>Salmo trutta</i>	Brown trout	x		
<i>Scomber scombrus</i>	Atlantic mackerel	x	x	x
<i>Scophthalmus aquosus</i>	Windowpane	x	x	x
<i>Sebastes marinus</i>	Rosefish	x		
<i>Squalus acanthias</i>	Spiny dogfish	x		
<i>Stenotomus chrysops</i>	Scup	x		
<i>Syngnathus fuscus</i>	Northern pipefish	x	x	
<i>Tautoga onitis</i>	Tautog		x	
<i>Tautoglabrus adspersus</i>	Cunner		x	
<i>Ulvaria subbifurcata</i>	Radiated shanny	x	x	
<i>Urophycis sp.</i>	Hake	x	x	
<i>Urophycis chuss</i>	Red hake	x		
<i>Urophycis regia</i>	Spotted hake	x		

APPENDIX TABLE 2. FISH SPECIES COLLECTED BY OTTER TRAWL AT TRANSECT 1 OFF HAMPTON-SEABROOK, NEW HAMPSHIRE (TOTAL OF FOUR REPLICATES). SEABROOK ECOLOGICAL STUDIES, JULY THROUGH DECEMBER 1977.

SPECIES	COLLECTION DATE						TOTAL
	7/14	8/18	9/28	10/18	11/16	12/29	
<i>Gadus morhua</i>	2	2		1	1	7	13
<i>Glyptocephalus cynoglossus</i>	1						1
<i>Hemitripterus americanus</i>	2			1	6	1	10
<i>Limanda ferruginea</i>	150	104	38	135	65	139	629
<i>Liparis</i> sp.						1	1
<i>Lophius americanus</i>		2					2
<i>Macrozoarces americanus</i>	12	3	1	7	4	1	28
<i>Melanogrammus aeglefinus</i>	15	21		5	1		42
<i>Merluccius bilinearis</i>	48	7	16	13	10	1	95
<i>Microgadus tomcod</i>		1	1				2
<i>Myoxocephalus aeneus</i>		1					1
<i>Myoxocephalus octodecemspinosus</i>	48	40	8	59	23	4	182
<i>Paralichthys oblongus</i>	9	3	3				15
<i>Osmerus mordax</i>						7	7
<i>Pholis gunnellus</i>			1				1
<i>Pollachius virens</i>			1			27	28
<i>Prionotus carolinus</i>				1			1
<i>Pseudopleuronectes americanus</i>	35	14	6	17	10	8	90
<i>Raja erinacea</i>	5	1	4	14	6		30
<i>Enchelyopus cimbrius</i>		1					1
<i>Scomber scombrus</i>				1			1
<i>Scophthalmus aquosus</i>	4	2	18	14	16	9	63
<i>Stenotomus chrysops</i>			1		4		5
<i>Syngnathus fuscus</i>			8	1	1		10
<i>Tautoglabrus adspersus</i>			1				1
<i>Urophycis</i> sp.	309	282	56	108	46	7	808
<i>Urophycis chuss</i>						3	3
<i>Urophycis regius</i>			2				2

APPENDIX TABLE 3. FISH SPECIES COLLECTED BY OTTER TRAWL AT TRANSECT 2 OFF HAMPTON-SEABROOK, NEW HAMPSHIRE (TOTAL OF FOUR REPLICATES). SEABROOK ECOLOGICAL STUDIES, JULY THROUGH DECEMBER 1977.

SPECIES	COLLECTION DATE						TOTAL
	7/14	8/18	9/28	10/18	11/16	12/29	
<i>Alosa pseudoharengus</i>					9		9
<i>Clupea harengus</i> H			1				1
<i>Cyclopterus lumpus</i>			1				1
<i>Gadus morhua</i>	2		1	1		10	14
<i>Hemitripterus americanus</i>	3		1	4	4	1	13
<i>Limanda ferruginea</i>		21	5	10	6	4	46
<i>Liparis atlanticus</i>				1			1
<i>Liparis liparis</i>			1				1
<i>Liparis</i> sp.					1		1
<i>Macrozoarces americanus</i>	2	2		2	2		8
<i>Merluccius bilinearis</i>	1	4		4	2		11
<i>Myoxocephalus octodecemspinosus</i>	3	16	1	1	7	1	29
<i>Osmerus mordax</i>						29	29
<i>Paralichthys oblongus</i>	1						1
<i>Pholis gunnellus</i>	2	1	1				4
<i>Pollachius virens</i>	5	3	9		9	1	27
<i>Pseudopleuronectes americanus</i>	31	54	30	21	31	1	168
<i>Raja erinacea</i>		2	1	4	1	5	13
<i>Raja radiata</i>		2				2	4
<i>Raja</i> sp.		1					1
<i>Scophthalmus aquosus</i>		1		2	2		5
<i>Sygnathus fuscus</i>			4	11	1		16
<i>Tautoglabrus adspersus</i>			2				2
<i>Ulvaria subbifurcata</i>	1						1
<i>Urophycis</i> sp.	20	29	35	31	7	1	123

APPENDIX TABLE 4. FISH SPECIES COLLECTED BY OTTER TRAWL AT TRANSECT 3 OFF HAMPTON-SEABROOK, NEW HAMPSHIRE (TOTAL OF FOUR REPLICATES). SEABROOK ECOLOGICAL STUDIES, JULY THROUGH DECEMBER 1977.

SPECIES	COLLECTION DATE						TOTAL
	7/14	8/18	9/28	10/18	11/16	12/29	
<i>Alosa pseudoharengus</i>					1		1
<i>Aspidophoroides monopteryginus</i>						7	7
<i>Clupea harengus</i>						1	1
<i>Cyclopterus lumpus</i>			1				1
<i>Gadus morhua</i>		4	1	6		20	31
<i>Glyptocephalus cynoglossus</i>						1	1
<i>Hemitripterus americanus</i>		1			1	4	6
<i>Limanda ferruginea</i>	47	42	42	72	44	79	326
<i>Macrozoarces americanus</i>	13	12	6	8	4	7	50
<i>Melanogrammus aeglefinus</i>	37	26	8	22	4		97
<i>Merluccius bilinearis</i>	11	10	31	20	3	2	77
<i>Microgadus tomcod</i>			1			1	2
<i>Myoxocephalus octodecemspinosus</i>	24	22	31	31	23	42	173
<i>Myoxocephalus scorpius</i>			1			3	4
<i>Osmerus mordax</i>						45	45
<i>Paralichthys oblongus</i>	1	1	1	2			5
<i>Pholis gunnellus</i>	1						1
<i>Pollachius virens</i>	1					2	3
<i>Pseudopleuronectes americanus</i>	10	7	12	17	8	6	60
<i>Raja binoculata</i>	2	3					5
<i>Raja eglanteria</i>			2				2
<i>Raja erinacea</i>	8	13	37	29	14	4	105
<i>Raja radiata</i>	5	4		4		15	28
<i>Raja sp.</i>		1			4		5
<i>Scophthalmus aquosus</i>	1	1	8	3	3	3	19
<i>Squalus acanthias</i>			1				1
<i>Stenotomus chrysops</i>				1			1
<i>Syngnathus fuscus</i>			1	2	4		7
<i>Urophycis chuss</i>						5	5
<i>Urophycis sp.</i>	215	216	124	134	31	5	725

APPENDIX TABLE 5. FISH SPECIES COLLECTED BY GILL NETS AT TRANSECT A OFF HAMPTON-SEABROOK, NEW HAMPSHIRE (TOTAL OF FOUR REPLICATES). SEABROOK ECOLOGICAL STUDIES, JULY THROUGH DECEMBER 1977.

SPECIES		COLLECTION DATE						TOTAL
		7/13	8/10	9/14	10/12	11/16	12/30	
<i>Alosa aestivalis</i>	S B		1		2 3	21 1	30	54 4
<i>Alosa pseudoharengus</i>	S B				5 1	1		6 1
<i>Brevoortia tyrannus</i>	S B	11 6	1 5		5 7			17 18
<i>Clupea harengus</i>	S B			4 1	310 44	55 1	43 3	412 49
Clupeid	S B			1	2	2 1	2	
<i>Gadus morhua</i>	S B				1 4		1 3	2 7
<i>Merluccius bilinearis</i>	S B	75 119	20 15	1	17 40	1 1		113 176
<i>Myoxocephalus octodecemspinosus</i>	S B						1	1
<i>Osmerus mordax</i>	S B						1	1
<i>Pollachius virens</i>	S B	1	1 2		1		4	1 8
<i>Scomber scombrus</i>	S B	12 1	55 4	6 5	58 1	1		132 11
<i>Scophthalmus aquosus</i>	S B					1		1
<i>Squalus acanthias</i>	S B				4			4
<i>Urophycis</i> sp.	S B	6	30		2			38

APPENDIX TABLE 6. FISH SPECIES COLLECTED BY GILL NETS AT TRANSECT B OFF HAMPTON-SEABROOK, NEW HAMPSHIRE (TOTAL OF FOUR REPLICATES). SEABROOK ECOLOGICAL STUDIES, JULY THROUGH DECEMBER 1977.

SPECIES		COLLECTION DATE						TOTAL
		7/13	8/10	9/14	10/12	11/16	12/30	
<i>Alosa aestivalis</i>	S		1		8	28	53	90
	B				2	6	4	12
<i>Alosa pseudoharengus</i>	S	1	6		4	3		14
	B				1	2		3
<i>Brevoortia tyrannus</i>	S	1	1		15			17
	B				2			2
<i>Clupea harengus</i>	S	1		1	338	39	17	396
	B			3	47	13	23	86
Clupeid	S						5	5
	B							
<i>Gadus morhua</i>	S							
	B				2	1	9	12
<i>Hemitripterus americanus</i>	S							
	B					1		1
<i>Lophius americanus</i>	S							
	B	1						1
<i>Merluccius bilinearis</i>	S	53	10		24	1		88
	B	97	20		65	10		192
<i>Mustelus canis</i>	S	1						1
	B							
<i>Myoxocephalus octodecemspinosus</i>	S							
	B	1	1			2		4
<i>Osmerus mordax</i>	S						3	3
	B						6	6

Continued

APPENDIX TABLE 6. (Continued)

SPECIES		COLLECTION DATE						TOTAL
		7/13	8/10	9/14	10/12	11/16	12/30	
<i>Pollachius virens</i>	S B	1	2	6	7	1 18	1 18	2 52
<i>Pomatomus saltatrix</i>	S B			1				1
<i>Prionotus carolinus</i>	S B						1	1
<i>Scomber scombrus</i>	S B	7	47 4	8 4	17 2	2		81 10
<i>Squalus acanthias</i>	S B				1			1
<i>Urophycis</i> sp.	S B	11	9		5	3		

APPENDIX TABLE 7. FISH SPECIES COLLECTED BY GILL NETS AT TRANSECT C OFF HAMPTON-SEABROOK, NEW HAMPSHIRE (TOTAL OF FOUR REPLICATES). SEABROOK ECOLOGICAL STUDIES, JULY THROUGH DECEMBER 1977.

SPECIES		COLLECTION DATE						TOTAL
		7/13	8/10	9/14	10/12	11/16	12/30	
<i>Alosa aestivalis</i>	S	1			4	18	328	351
	B				1	4	4	9
<i>Alosa pseudoharengus</i>	S	4	2	2	1			9
	B							
<i>Brevoortia tyrannus</i>	S	2			33			35
	B				14			14
<i>Clupea harengus</i>	S	1		26	175	72	40	314
	B	1		29	35	4	13	82
Clupeid	S						11	11
	B							
<i>Gadus morhua</i>	S				1	2		3
	B			1	1	11	2	15
<i>Merluccius bilinearis</i>	S	82	21		39	2		144
	B	135	12	8	95	13		263
<i>Mustelus canis</i>	S	1						1
	B							
<i>Myoxocephalus octodecemspinosus</i>	S							
	B					2		2
<i>Myoxocephalus</i> sp.	S							
	B						1	1
<i>Osmerus mordax</i>	S							
	B						1	1
<i>Peprilus triacanthus</i>	S				2			2
	B							

Continued

APPENDIX TABLE 7. (Continued)

SPECIES		COLLECTION DATE						TOTAL
		7/13	8/10	9/14	10/12	11/16	12/30	
<i>Pollachius virens</i>	S	1			1	2		4
	B	2	1	12	1	23	3	42
<i>Scomber scombrus</i>	S	20	34	9	33			96
	B	8	8	1	7			24
<i>Squalus acanthias</i>	S							
	B			5	1			6
<i>Tautagolabrus adspersus</i>	S							
	B			4		15		19
<i>Urophycis</i> sp.	S							
	B	11	3		7			21

APPENDIX TABLE 8. FISH SPECIES COLLECTED BY BEACH SEINING AT STATION S-1 (TOTAL OF TWO REPLICATES PER COLLECTION DATE) IN HAMPTON-SEABROOK ESTUARY. SEABROOK ECOLOGICAL STUDIES, JULY THROUGH DECEMBER 1977.

SPECIES	COLLECTION DATE										TOTAL
	7/07	7/21	8/02	8/22	9/01	9/19	9/30	10/21	11/02	11/21	
<i>Alosa aestivalis</i>				3	21		2		1		27
<i>Alosa pseudoharengus</i>			1	42	79						122
<i>Fundulus heteroclitus</i>	6		316								322
<i>Fundulus majalis</i>	118		89								201
<i>Fundulus</i> sp.		6		1	998	33					1038
<i>Gasterosteus aculeatus</i>	6										6
<i>Liopsetta putnami</i>	3	5					1	1	2	2	14
<i>Menidia menidia</i>	10	5	18	328	30	249	236	146	465		1487
<i>Microgadus tomcod</i>											
<i>Peprilus triacanthus</i>					1						1
<i>Pseudopleuronectes americanus</i>	15	5	5	14	4	4	19	13		5	84
<i>Priglitius pungitius</i>	387		11	1	14	3		2			418
<i>Salmo gairdneri</i>					1						1
<i>Scophthalmus aquosus</i>				1							1
<i>Syngnathus fuscus</i>				1							1
<i>Tautogolabrus adspersus</i>											
<i>Urophycis</i> sp.			1								1

APPENDIX TABLE 9. FISH SPECIES COLLECTED BY BEACH SEINING AT STATION S-2 (TOTAL OF TWO REPLICATES PER COLLECTION DATE) IN HAMPTON-SEABROOK ESTUARY. SEABROOK ECOLOGICAL STUDIES, JULY THROUGH DECEMBER 1977.

SPECIES	COLLECTION DATE										TOTAL
	7/07	7/21	8/02	8/22	9/01	9/19	9/30	10/21	11/02	11/21	
<i>Alosa aestivalis</i>			11				1	8			20
<i>Alosa pseudoharengus</i>			60	1	1						62
<i>Ammodytes americanus</i>		3	1	148		67					219
<i>Fundulus majalis</i>	95		1		22						118
<i>Fundulus</i> sp.		2627		22	33		4				2686
<i>Gasterosteus aculeatus</i>	2										2
<i>Liopsetta putnami</i>	1	1			3		1	1			7
<i>Menidia menidia</i>	17	4	7	506	1286	188	453	113	3	12	2589
<i>Osmerus mordax</i>			1								1
<i>Pseudopleuronectes americanus</i>	3	1			4	8	3	13	3		35
<i>Pungitius pungitius</i>	12	161		1							174
<i>Salmo gairdneri</i>		1									1
<i>Scophthalmus aquosus</i>							1				1
<i>Urophycis</i> sp.		13	1								14

APPENDIX TABLE 10. FISH SPECIES COLLECTED BY BEACH SEINING AT STATION S-3 (TOTAL OF TWO REPLICATES PER COLLECTION DATE) IN HAMPTON-SEABROOK ESTUARY. SEABROOK ECOLOGICAL STUDIES, JULY THRU JGH DECEMBER 1977.

SPECIES	COLLECTION DATE										TOTAL
	7/07	7/21	8/02	8/22	9/01	9/19	9/30	10/21	11/02	11/21	
<i>Alosa aestivalis</i>			23				11		4	2	40
<i>Alosa pseudoharengus</i>			65		1						66
<i>Alosa sapidissima</i>			1								1
<i>Clupea harengus</i>					16						16
<i>Fundulus majalis</i>	1		1								2
<i>Fundulus sp.</i>						1					1
<i>Gasterosteus aculeatus</i>	1	6								6	13
<i>Liopsetta putnami</i>	1				4	3			1		9
<i>Menidia menidia</i>		1	2	188	604	197	1068	47	888	3369	6364
<i>Microgadus tomcod</i>	2										2
<i>Myoxocephalus aeneus</i>		3			1		1				5
<i>Myoxocephalus octodecemspinosus</i>			1								1
<i>Myoxocephalus scorpius</i>	2										2
<i>Osmerus mordax</i>			17		794			11	21	54	897
<i>Pseudopleuronectes americanus</i>	2	28	1	5	57	5	20	5	31	1	155
<i>Pungitius pungitius</i>	1	113			24						138
<i>Salmo gairdneri</i>							1				1
<i>Salmo trutta</i>				11							11
<i>Syngnathus fuscus</i>						3					3
<i>Tautoglabrus adspersus</i>					3						3
<i>Urophycis sp.</i>	3	4	1			1	1				10

APPENDIX TABLE 11. DENSITIES (#/1000 m³) OF FISH EGGS AND LARVAE IN HAMPTON-SEABROOK PLANKTON TOWS AT TRANSECT 1 (AVERAGE OF FOUR REPLICATES). SEABROOK ECOLOGICAL STUDIES, JULY THROUGH DECEMBER 1977.

TAXA	SAMPLE DATE									
	7/06/77	7/20/77	8/03/77	8/23/77	9/07/77	10/04/77	11/01/77	12/15/77	12/21/77	
E G G S										
Transsect 1										
<i>Urophycis</i> sp.	11,377	53,433	10,386	21,793	9,221	13	0	0	0	0
<i>Labrid/Limnoda</i>	49,115	3,955	2,892	141	511	3	0	0	0	0
<i>Neolucius bilinearis</i>	9,291	11,664	18,506	3,373	7,969	430	0	0	0	0
<i>Scomber scombrus</i>	942	458	553	19	0	0	0	0	0	0
<i>Enchelyopus cimbrius</i>	368	390	248	89	707	5	0	0	0	0
<i>Scopelogadus aquosus</i>	154	246	189	140	124	1	0	0	0	0
<i>Gadus melanocephalus</i>	116	60	16	161	0	1	176	14	63	0
<i>Glyptocephalus cyanocephalus</i>	309	95	110	244	0	0	0	0	0	0
<i>Alliactis virens</i>	0	0	0	0	0	0	0	0	0	0
<i>Peprilus triacanthus</i>	0	0	0	0	0	0	0	2%	208	0
<i>Rhipoglossoides platessoides</i>	123	86	0	45	0	0	0	0	0	0
Eggs (unidentified)	0	29	98	0	0	0	0	0	0	0
<i>Brevortia tyrannus</i>	0	0	32	0	0	0	0	0	0	0
<i>Prionotus carolinus</i>	0	0	0	0	0	0	0	0	0	0
<i>Ammodytes americanus</i>	0	0	0	0	0	0	0	0	0	0
TOTALS	71,797	70,020	32,111	26,014	18,216	453	176	39	351	
L A R V A E										
Transsect 1										
<i>Tautoglabrus adspersus</i>	106	486	227	40	236	0	0	0	0	0
<i>Enchelyopus cimbrius</i>	16	114	115	50	105	2	9	0	0	0
<i>Clupea harengus</i>	0	0	0	0	0	14	475	4	3	0
<i>Neolucius bilinearis</i>	17	108	89	262	136	0	0	0	0	0
<i>Limanda ferruginea</i>	24	11	58	47	3	0	0	0	0	0
<i>Glyptocephalus cyanocephalus</i>	39	53	12	52	1	1	0	0	0	0
<i>Urophycis</i> sp.	0	0	3	13	128	0	0	0	0	0
<i>Pollachius virens</i>	64	45	41	7	1	0	7	53	32	0
<i>Ulvaria subbifurcata</i>	2	89	4	0	8	0	0	0	0	0
Larvae (unidentified)	48	16	0	0	0	0	0	0	0	0
<i>Scomber scombrus</i>	23	23	3	3	26	1	0	0	0	0
<i>Scopelogadus aquosus</i>	1	0	0	0	0	0	0	0	0	0
<i>Ammodytes americanus</i>	11	0	8	0	0	0	0	21	49	0
<i>Rhipoglossoides platessoides</i>	3	9	0	0	0	0	0	0	0	0
<i>Gadus morhua</i>	1	0	0	0	0	0	3	1	12	0
<i>Brosmo brosme</i>	1	0	0	0	2	0	0	0	0	0
<i>Melanogrammus aeglefinus</i>	0	0	0	0	0	0	0	0	0	0
<i>Synsphythys fuscus</i>	1	0	0	0	0	0	0	0	0	0
<i>Cyclopterus lumpus</i>	1	0	1	0	0	0	0	0	0	0
<i>Pseudopleuronectes americanus</i>	0	0	0	0	0	0	0	0	0	0
<i>Tautoga onitis</i>	0	0	0	0	0	0	0	0	0	0
<i>Lophius americanus</i>	0	0	0	1	4	0	0	0	0	0
<i>Sebastes marinus</i>	2	0	1	2	0	0	0	0	0	0
<i>Liparis</i> sp.	2	0	0	0	0	0	0	0	0	0
<i>Macroraia americana</i>	0	0	0	0	0	0	0	0	0	0
<i>Aspidophoroides monopterygius</i>	0	0	0	0	0	0	0	0	0	0
TOTALS	361	957	564	478	652	18	495	79	97	

APPENDIX TABLE 12. DENSITIES (#/1000 m³) OF FISH EGGS AND LARVAE IN HAMPTON-SEABROOK PLANKTON TOWS AT TRANSECT 2 (AVERAGE OF FOUR REPLICATES). SEABROOK ECOLOGICAL STUDIES, JULY THROUGH DECEMBER 1977.

TAXA	SAMPLE DATE								
	7/06/77	7/20/77	8/03/77	8/23/77	9/07/77	10/04/77	11/01/77	12/15/77	12/27/77
	E G G S								
Transect 1-2									
<i>Urophycis</i> sp.	35,468	8,427	4,321	5,273	11,626	3	1	0	0
Labrid/ <i>Limanda</i>	75,903	9,114	1,830	156	408	2	0	0	0
<i>Merluccius bilinearis</i>	11,639	16,443	9,406	834	4,907	219	4	0	0
<i>Scomber scombrus</i>	1,261	779	241	35	0	0	0	0	0
<i>Enchelyopus cimbrius</i>	246	711	150	15	564	6	4	0	0
<i>Scophthalmus aquosus</i>	390	290	302	105	152	0	1	0	0
<i>Gadus/Melanogrammus</i>	9	1,902	15	37	0	0	99	17	33
<i>Clyptocephalus cynoglossus</i>	403	176	91	88	27	0	0	0	0
<i>Pollachius virens</i>	0	0	0	0	0	0	0	13	334
<i>Peprilus triacanthus</i>	0	0	0	0	143	0	0	0	0
<i>Hippoglossoides platessoides</i>	19	0	0	15	0	0	0	0	0
eggs (unidentified)	0	0	0	4	0	0	0	0	0
<i>Brevoortia tyrannus</i>	0	0	0	0	0	0	0	0	0
<i>Prionotus carolinus</i>	0	0	0	0	0	0	0	0	0
<i>Ammodytes americanus</i>	0	0	0	0	0	0	0	0	0
TOTALS	125,337	37,841	16,357	6,551	17,828	230	108	31	367
L A R V A E									
Transect 1-2									
<i>Tautoglabrus adspersus</i>	333	1,250	104	179	367	0	0	0	0
<i>Enchelyopus cimbrius</i>	64	548	70	150	107	0	8	0	0
<i>Clupea harengus</i>	0	0	0	1	0	1	817	3	2
<i>Merluccius bilinearis</i>	81	476	3	24	181	1	0	0	0
<i>Limanda ferruginea</i>	40	0	21	40	11	0	0	0	0
<i>Glyptocephalus cynoglossus</i>	88	143	9	26	20	0	0	0	0
<i>Urophycis</i> sp.	0	0	0	3	132	0	2	0	0
<i>Pollachius virens</i>	0	0	0	0	0	0	6	180	31
<i>Ulvaria subbifurcata</i>	93	37	18	0	2	0	0	0	0
Larvae (unidentified)	17	163	4	0	8	0	0	1	0
<i>Scomber scombrus</i>	65	150	0	0	7	0	0	0	0
<i>Scophthalmus aquosus</i>	40	11	4	24	12	2	0	0	0
<i>Ammodytes americanus</i>	0	0	1	0	0	0	2	8	84
<i>Hippoglossoides platessoides</i>	10	0	7	0	0	0	0	0	0
<i>Gadus morhua</i>	5	4	1	3	0	0	3	0	11
<i>Brosme brosme</i>	1	0	0	0	0	0	0	0	0
<i>Melanogrammus aeglefinus</i>	3	0	0	0	0	0	0	0	0
<i>Syngnathus fuscus</i>	0	0	0	0	3	0	0	0	0
<i>Cyclopterus lumpus</i>	5	0	0	0	0	0	0	0	0
<i>Pseudopleuronectes americanus</i>	0	0	0	0	0	0	0	0	0
<i>Tautoga onitis</i>	0	0	0	0	4	0	0	0	0
<i>Lophius americanus</i>	0	4	0	1	0	0	0	0	0
<i>Sebastes marinus</i>	1	0	0	0	0	0	0	0	0
<i>Liparis</i> sp.	1	0	0	0	0	0	0	0	0
<i>Macrozoarces americanus</i>	0	0	0	0	0	0	0	0	0
<i>Aspidophoroides monopterygius</i>	0	0	0	0	0	0	0	0	0
TOTALS	847	2,786	244	453	854	3	838	192	128

APPENDIX TABLE 13. DENSITIES (#/1000 m³) OF FISH EGGS AND LARVAE IN HAMPTON-SEABROOK PLANKTON TRANSECT 3 (AVERAGE OF FOUR REPLICATES). SEABROOK ECOLOGICAL STUDIES, JULY THROUGH DECEMBER 1977.

TAXA	SAMPLE DATE								
	7/06/77	7/20/77	8/03/77	8/23/77	9/07/77	10/04/77	11/01/77	12/15/77	12/27/77
E G G S									
Transect 1-3									
<i>Urophycis</i> sp.	24,992	14,320	1,371	5,495	12,290	5	0	0	0
Labrid/ <i>Limanda</i>	21,837	13,245	4,297	9	405	2	0	0	0
<i>Merluccius bilinearis</i>	8,330	8,121	22,054	1,000	7,431	185	2	0	0
<i>Scomber scombrus</i>	759	615	221	1	0	0	0	0	0
<i>Enchelyopus cimbrius</i>	281	476	300	71	697	2	0	0	0
<i>Scophthalmus aquosus</i>	1,799	144	205	201	89	1	0	0	0
<i>Gadus/Melanogrammus</i>	17	0	598	7	31	1	68	15	12
<i>Clyptocephalus cynoglossus</i>	396	27	210	55	13	0	0	0	0
<i>Pollachius virens</i>	0	0	0	0	0	0	0	27	55
<i>Peprilus triacanthus</i>	32	0	0	0	172	0	0	0	0
<i>Hippoglossoides platessoides</i>	17	0	103	0	0	0	0	0	0
Eggs (unidentified)	0	0	0	0	0	0	0	0	0
<i>Brevoortia tyrannus</i>	0	0	0	0	26	0	0	0	0
<i>Prionotus carolinus</i>	0	32	0	0	0	0	0	0	0
<i>Ammodytes americanus</i>	0	0	0	0	0	0	0	2	0
TOTALS	58,461	36,980	29,360	7,048	21,355	194	70	45	67
L A R V A E									
Transect 1-3									
<i>Tautoglabrus adspersus</i>	234	569	98	884	230	1	0	0	0
<i>Enchelyopus cimbrius</i>	331	370	183	574	149	0	8	0	0
<i>Clupea harengus</i>	0	0	0	0	0	1	1,408	2	8
<i>Merluccius bilinearis</i>	89	100	11	102	574	0	0	0	0
<i>Limanda ferruginea</i>	114	0	78	567	12	0	0	0	0
<i>Clyptocephalus cynoglossus</i>	159	87	20	77	44	0	0	0	0
<i>Urophycis</i> sp.	0	0	0	11	220	0	0	0	0
<i>Pollachius virens</i>	0	0	0	0	0	2	1	166	27
<i>Ulvaria subbifurcata</i>	98	19	22	3	4	0	0	0	0
Larvae (unidentified)	15	74	0	0	6	0	0	1	2
<i>Scomber scombrus</i>	65	22	0	0	14	0	0	0	0
<i>Scophthalmus aquosus</i>	40	41	3	37	12	1	0	0	0
<i>Ammodytes americanus</i>	0	0	0	0	0	0	0	4	16
<i>Hippoglossoides platessoides</i>	53	0	10	7	0	0	0	0	0
<i>Gadus morhua</i>	17	25	0	0	0	0	0	1	4
<i>Brosme brosme</i>	9	9	0	0	0	0	0	0	0
<i>Melanogrammus aeglefinus</i>	12	0	0	0	0	0	0	0	0
<i>Syngnathus fuscus</i>	0	0	0	4	3	0	0	0	0
<i>Cyclopterus lumpus</i>	3	0	0	0	0	0	0	0	0
<i>Pseudopleuronectes americanus</i>	9	0	0	0	0	0	0	0	0
<i>Tautoga chitis</i>	0	0	0	0	0	0	0	0	0
<i>Lophius americanus</i>	0	0	0	0	0	0	0	0	0
<i>Sebastes marinus</i>	1	0	0	0	0	0	0	0	0
<i>Liparis</i> sp.	0	0	0	0	0	0	0	0	0
<i>Macrozoarces americanus</i>	0	0	0	0	0	0	0	0	0
<i>Aspidophoroides monopterygius</i>	0	0	0	0	0	0	0	0	1
TOTALS	1,250	1,316	427	2,267	1,268	6	1,418	174	59

APPENDIX TABLE 13. DENSITIES (#/1000 m³) OF FISH EGGS AND LARVAE IN HAMPTON-SEABROOK PLANKTON TOWS AT TRANSECT 3 (AVERAGE OF FOUR REPLICATES). SEABROOK ECOLOGICAL STUDIES, JULY THROUGH DECEMBER 1977.

TAXA	SAMPLE DATE									
	7/06/77	7/20/77	8/03/77	8/23/77	9/07/77	10/04/77	11/03/77	12/15/77	12/27/77	
EGGS										
Transect 1-3										
<i>Urophycis</i> sp.	24,992	14,320	1,371	5,495	12,280	5	0	0	0	0
<i>Limanda</i>	21,837	13,245	4,297	96	405	2	0	0	0	0
<i>Merluccius bilinearis</i>	8,130	9,121	22,054	1,008	7,431	185	2	0	0	0
<i>Scomber scombrus</i>	759	615	221	36	0	0	0	0	0	0
<i>Necholepis cimbrius</i>	281	476	300	71	697	2	0	0	0	0
<i>Scophthalmus aquosus</i>	1,799	144	295	201	49	1	0	0	0	0
<i>Gadus/Melanogrammus</i>	17	0	598	7	31	1	68	15	12	0
<i>Clupea harengus</i>	396	27	210	55	13	0	0	0	0	0
<i>Pollachius virens</i>	32	0	0	0	0	0	0	27	55	0
<i>Pepilius triacanthus</i>	17	0	103	0	0	0	0	0	0	0
<i>Hippoglossoides platessoides</i>	0	0	0	0	0	0	0	0	0	0
Eggs (unidentified)	0	0	0	0	0	0	0	0	0	0
<i>Brevoortia tyrannus</i>	0	0	0	0	28	0	0	0	0	0
<i>Prionotus carolinus</i>	0	32	0	0	0	0	0	0	0	0
<i>Ammodytes americanus</i>	0	0	0	0	0	0	0	0	2	0
TOTALS	58,461	36,980	29,360	7,048	21,355	194	70	45	67	0
LARVAE										
Transect 1-3										
<i>Tautoglabrus adspersus</i>	234	569	98	884	230	1	0	0	0	0
<i>Enchelyopus cimbrius</i>	331	370	181	574	149	0	0	0	0	0
<i>Clupea harengus</i>	0	0	0	0	0	1	1,408	2	8	0
<i>Merluccius bilinearis</i>	89	100	11	102	574	0	0	0	0	0
<i>Limanda ferruginea</i>	114	0	78	567	12	0	0	0	0	0
<i>Glyptocephalus cynoglossus</i>	159	87	20	77	44	0	0	0	0	0
<i>Urophycis</i> sp.	0	0	0	11	220	0	0	0	0	0
<i>Pollachius virens</i>	0	0	0	0	0	2	1	166	27	0
<i>Uluvaria subbifurcata</i>	98	19	22	3	4	0	0	0	0	0
Larvae (unidentified)	15	74	0	0	6	0	0	1	2	0
<i>Scomber scombrus</i>	65	22	0	0	14	0	0	0	0	0
<i>Scophthalmus aquosus</i>	40	41	3	37	12	1	0	0	0	0
<i>Scophthalmus americanus</i>	0	0	0	0	0	0	0	0	0	0
<i>Hippoglossoides platessoides</i>	53	0	10	7	0	0	0	4	16	0
<i>Gadus marinus</i>	17	25	0	0	0	0	0	1	4	0
<i>Brevoortia tyrannus</i>	9	9	0	0	0	0	0	0	0	0
<i>Melanogrammus aeglefinus</i>	12	0	0	0	0	0	0	0	0	0
<i>Syrnathus fuscus</i>	3	0	0	4	3	0	0	0	0	0
<i>Cyclopterus lumpus</i>	9	0	0	0	0	0	0	0	0	0
<i>Pseudopleuronectes americanus</i>	0	0	0	0	0	0	0	0	0	0
<i>Tautoga onitis</i>	0	0	0	0	0	0	0	0	0	0
<i>Lopholaimus americanus</i>	1	0	0	0	0	0	0	0	0	0
<i>Sebastes marinus</i>	0	0	0	0	0	0	0	0	0	0
<i>Liparis</i> sp.	0	0	0	0	0	0	0	0	0	0
<i>Macrosoma americana</i>	0	0	0	0	0	0	0	0	0	0
<i>Aspidophoroides monopterygius</i>	0	0	0	0	0	0	0	0	0	0
TOTALS	1,250	1,316	427	2,267	1,268	6	1,418	174	59	0

APPENDIX TABLE 14. RANKED DOMINANCE AND BIOLOGICAL INDEX VALUE OF FISH EGGS AND LARVAE BY DATE IN THE HAMPTON-SEABROOK AREA. SEABROOK ECOLOGICAL STUDIES, JULY THROUGH DECEMBER 1977.

TAXA	E G G S									POINTS ^a
	7/6	7/20	8/3	8/23	9/7	10/4	11/1	12/15	12/27	
<i>Merluccius bilinearis</i>	8	9	10	9	9	10	9	7	0	71
<i>Urophycis</i> sp.	9	10	9	10	10	9	7	0	0	64
<i>Gadus/Melanogrammus</i>	2	7	4	5	3	5	10	9	9	54
Labrid/ <i>Limanda</i>	10	8	8	7	7	7	0	0	0	47
<i>Enchelyopus cimbrius</i>	4	5	6	4	8	8	8	0	0	43
<i>Scophthalmus aquosus</i>	6	4	5	8	5	6	6	0	0	40
<i>Scomber scombrus</i>	7	6	7	3	0	0	0	0	0	23
<i>Glyptocephalus cynoglossus</i>	5	3	3	6	4	0	0	0	0	21
<i>Pollachius virens</i>	0	0	0	0	0	0	0	10	10	20
<i>Hippoglossoides platessoides</i>	3	2	2	2	0	0	0	0	0	9
<i>Anmodytes americanus</i>	0	0	0	0	0	0	0	8	0	8
<i>Peprilus triacanthus</i>	1	0	0	0	6	0	0	0	0	7
Unidentified	0	0	1	1	0	0	0	0	0	2
<i>Brevoortia tyrannus</i>	0	0	0	0	2	0	0	0	0	2
<i>Prionotus carolinus</i>	0	1	0	0	0	0	0	0	0	1

L A R V A E

TAXA	7/6	7/20	8/3	8/23	9/7	10/4	11/1	12/15	12/27	POINTS ^a
<i>Enchelyopus cimbrius</i>	9	9	9	9	7	8	9	0	0	60
<i>Tautogolabrus adspersus</i>	10	10	10	10	9	4	0	0	0	53
<i>Merluccius bilinearis</i>	6	8	7	7	10	6	0	0	0	44
<i>Clupea harengus</i>	0	0	0	0	0	10	10	8	7	35
<i>Glyptocephalus cynoglossus</i>	8	6	5	6	6	3	0	0	0	34
<i>Pollachius virens</i>	0	0	0	0	0	7	8	10	9	34
<i>Scophthalmus aquosus</i>	3	3	3	5	5	9	0	0	0	28
<i>Limanda ferruginea</i>	5	1	8	8	4	0	0	0	0	26
<i>Anmodytes americanus</i>	0	0	0	0	0	0	6	9	10	25
Unidentified	1	7	2	0	2	0	0	6	6	24
<i>Gadus morhua</i>	0	2	0	0	0	0	7	7	8	24
<i>Urophycis</i> sp.	0	0	1	4	8	5	5	0	0	23
<i>Ulvaria subbifurcata</i>	7	4	6	3	0	0	0	0	0	20
<i>Scomber scombrus</i>	4	5	0	0	3	0	0	0	0	12
<i>Hippoglossoides platessoides</i>	2	0	4	2	0	0	0	0	0	8
<i>Macrozoarces americanus</i>	0	0	0	0	0	0	0	0	5	5
<i>Aspidophoroides monopterygius</i>	0	0	0	0	0	0	0	0	4	4
<i>Syngnathus fuscus</i>	0	0	0	1	0	0	0	0	0	1
<i>Tautoga onitis</i>	0	0	0	0	1	0	0	0	0	1

^a Biological Index Points