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FINAL REPORT

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INTRODUCTION

The passage of the Atlantic Coastal Fisheries Cooperative Management Act (ACFCMA) in 1993 placed additional responsibilities on Atlantic coast states to cooperatively manage interjurisdictional species through the Atlantic States Marine Fisheries Commission (ASMFC). Currently there are ten ASMFC species management plans that the state of New Hampshire is required to be in compliance with under the ACFCMA. They include fisheries management plans for: American lobster, Atlantic menhaden, Atlantic sturgeon, bluefish, northern shrimp, shad and river herring, summer flounder, winter flounder, striped bass and Atlantic sea herring.

The following projects were implemented to improve recreational and commercial data collection and analysis, implement a new fisheries independent monitoring project for winter flounder and increase law enforcement activities directed at ASMFC managed species in the state of New Hampshire.

The objectives of the four projects are as follows:

1. To improve comparability of marine recreational statistics collected in New Hampshire with other state, regional and coastwide estimates derived from the federal survey (NMFS's Marine Recreational Fisheries Statistical Survey); and to eliminate the duplications of effort currently taking place with concurrent state and federal surveys.
2. To improve the efficiency and accuracy of commercial statistics data summarization/analysis and stock assessment capabilities via computerization.
3. To develop an index of relative abundance for juvenile winter flounder.
4. To increase the effectiveness of law enforcement activities directed at enforcement of rules and statutes promulgated for compliance with ASMFC fisheries management plans.

JOB 1: COOPERATIVE MARINE RECREATIONAL STATISTICS DATA COLLECTION

Final Report

ABSTRACT

In 1997, New Hampshire Fish and Game Department (NHFG) discontinued conducting its own marine recreational fishing survey (NH-MRFS) in favor of cooperating with the National Marine Fisheries Service to conduct the field intercept portion of the Marine Recreational Fishing Statistical Survey (MRFSS). In addition, NHFG conducted 1,514 extra field intercept surveys, above the NMFS base line level, for a total of 1,954 surveys. As of the writing of this report, there were no catch of effort estimates available from NMFS for 1997.

NHFG continued to conduct a survey of effort in its party boat fishery using similar methods to those used in previous years as part of the NH-MRFS. It was estimated that just over 50,000 angler trips were taken aboard New Hampshire party boats this year. This is the highest level of effort observed since 1993.

INTRODUCTION

Information concerning the recreational segments of marine fisheries is vital for making management decisions concerning the resource and the fisheries for them. Since 1979, the National Marine Fisheries Service (NMFS) has conducted a Marine Recreational Fishing Statistical Survey (MRFSS) to gather regional and coastwide information concerning marine recreational fishing in the United States. Due to the regional emphasis of this survey, it has not produce state specific information that is sufficiently precise or accurate, particularly in states with small coastal areas like New Hampshire.

As a result, the New Hampshire Fish and Game Department (NHFG) initiated a state survey of New Hampshire's marine recreational fishery in 1979. From 1979 to 1982, the department conducted a marine recreational fishing survey in New Hampshire coastal waters from June to September to obtain baseline data on total catch, total effort, catch per unit effort, percent species composition of the catch, and length frequency data for harvested fish. The survey was again conducted in 1984 during the months of July and August and in 1986 from

June to October. From 1987 to 1996 the survey was conducted annually from April to October. During these surveys, between 2,000 and 3,000 marine recreational anglers were interviewed, annually.

In 1995, a side by side comparison was conducted of New Hampshire's Marine Recreational Fishing Survey (NH-MRFS) and the MRFSS. For this comparison, both the number of field intercepts and the number of phone surveys for effort were increased in an attempt to increase the precision of the state level catch and effort estimates of the MRFSS to levels comparable to those obtained by the NH-MRFS. The results of that comparison study suggested that the MRFSS underestimated the effort and catch in the party/charter mode during 1995 while the NH-MRFS underestimated the effort and catch in the shore and private/rental modes (Grout and Heckman 1996).

The results of this study combined with the desire to eliminate the duplication of effort, prompted the New Hampshire Fish and Game Department to discontinue the NH-MRFS in favor of cooperating with NMFS in conducting the MRFSS in New Hampshire beginning in 1997. However, due to the continuing concerns about accuracy of the MRFSS methods used to estimate effort in the party/charter mode in New Hampshire, the Department elected to continue to conduct its own effort estimation program for party boats.

The objective of this study was to improve the comparability of marine recreational statistics collected in New Hampshire with other state, regional and coastwide estimates derived from the federal survey (NMFS's Marine Recreational Fishing Statistical Survey); and to eliminate the duplication of effort currently taking place with concurrent state and federal surveys .

PROCEDURES

The MRFSS has two basic components: a random telephone survey of coastal county households for estimating fishing effort and an on-site intercept survey to collect catch data from marine recreational anglers. In 1997, NHFG personnel began conducting the field intercept portion of the MRFSS in New Hampshire. In addition to the 441 base line surveys allocated by NMFS for New Hampshire, NHFG planned to conducted an additional 1,323 field intercepts (a

3X increase) during 1997. Allocation of the additional on-site interviews between wave and fishing mode were provided using methodologies developed by Dr. Gary Grey (NMFS, MRFSS Program, Silver Springs, MD). The intent of this allocation scheme was to improve the precision (as measured by the relative standard error) of the catch estimates for six important recreational species in New Hampshire: bluefish (*Pomatomus saltatrix*), Atlantic cod (*Gadus morhua*), Atlantic mackerel (*Scomber scombrus*), pollock (*Pollachius virens*), striped bass (*Morone saxatilis*), and winter flounder (*Pleuronectes americanus).*

Standard MRFSS procedures were used as outlined in the Intercept Interviewer Proceedures Manual of the MRFSS with the following exception: a maximum of thirty intercepts per assignment were allowed (as opposed to the standard maximum of 20 intercepts per assignment) to assure the wave-mode intercept quotas could be attained given the three fold increase in intercepts that were planned.

Additionally, the NH-MRFS procedures for attaining effort estimates for New Hampshire party boats was continued this year to provide an alternative to the MRFSS effort estimates for this segment of the fishery. The estimates were obtained by a two part survey: 1) a telephone survey of each party boat company to determine the number of boat trips scheduled to be taken each month and 2) randomly selected field intercept surveys to count the number anglers on a party boat trip.

The telephone portion of the survey involved contacting each party boat company prior to the start of each month to obtain their anticipated schedule of boat trips each month by trip type (full day, half day, evening, overnight, etc.). The total number of trips were then summed by trip type and then adjusted up or down based on follow up information obtained during the field intercept survey or, in some cases a follow up phone call. Adjustments to the monthly boat trip numbers were made due to changes in the boat schedules implemented by companies subsequent to the initial phone call or scheduled trips that didn't go out because of bad weather, boat malfunction, lack of customers, etc.. All adjustments were made on a trip by trip basis with the exception of bad weather days in which it was assumed that all scheduled trips for that day for each party boat company were canceled if one company canceled due to weather.

The field intercept surveys to determine angler counts were conducted in conjunction with scheduled MRFSS field intercepts at the sites with party boat operations. During the

survey, interview personnel obtained the number of anglers on the party boat by counting the passengers coming off the vessel or by querying the vessel captain or vessel passengers. In addition, it was determined whether the boat took a half day, full day, evening, or over night trip. This information was collected for every party boat trip encountered during an assignment.

To estimate the total number of angler trips for New Hampshire party boats, the data were stratified by month and half/full day trip types. For the purposes of this survey, full day and overnight trips were classified as full day trips while all other trip types (half day, evening, and two hour trips) were considered as half day trip types. For each strata, the total number of boat trips were multiplied by the mean number of angler per boat trip to obtain an estimate of the number of anglers trips. The estimates by strata were then summed to obtain an annual estimate of party boat effort.

RESULTS

A total of 1,954 anglers were interviewed in New Hampshire during 1997 for the MRFSS field intercept survey (Table 1). Interview quotas were exceeded for all waves and modes except for the party/charter mode in Wave 3.

As of the writing of this report, estimates of catch and effort from the MRFSS are unavailable. When these estimates become available, they will be reported on in future federal aid reports.

Effort estimates for the 1997 party boat fishery in New Hampshire are presented in Table 5-2. Just over 50,000 angler trips were taken aboard party boats in New Hampshire during 1997. Peak effort took place in August and there were roughly three times more half day trips than full day trips.

DISCUSSION

During the first year of NHFG personnel conducting the field intercept portion of the MRFSS, the project went smoothly. The only minor difficulty involved avoiding exceeding the wave/mode interview quotas too early in the wave. This was the result of an increase in the number of interviews obtained per survey assignment compared to what has historically been conducted by Quantech survey personnel (Quantech Inc. is contracted by NMFS to conduct the

field intercept portion of the MRFSS). This could be due to increased recreational fishing effort in New Hampshire and/or a greater productivity by state personnel versus the private contractors in obtaining interviews.

As stated in the results section, catch and effort estimates from the MRFSS are not available from NMFS as of the writing of this federal aid report. When they become available, the estimates for New Hampshire will be published in next year's federal aid report.

In 1997, the number of angler trips on party boats was the highest level observed since 1993 (Table 3). All months but April showed an increase over 1996 estimates.

A minor modification to effort estimation methods were made for June when it was noticed that the original estimate for June (12,121 angler trips) was 50% greater than any other estimate for that month in the past six years. Closer examination of the data revealed that all boat intercepts in June took place on weekend days and that there was information on only 9 of the 263 boat trips taken that month. During June, weekend ridership aboard party boats is generally greater than that observed on weekdays and this, combined with the relatively low sample size, more than likely biased the estimate upward. To compensate for this bias, intercept data from June were combined with May's data on 22 boat trips (which included 11 weekday trips). Using the combined May/June intercept samples brought the June effort estimate down to just over 8,000 angler trips which is more in line with previous years estimates for this month (Table 3).

REFERENCES

Grout, D. E. and K. A. Heckman. 1996. Programs Improving Management of ASMFC Managed Species in New Hampshire. 1995 Final Report. NMFS Federal Aid Project 3-ACA-006. NH Fish & Game Dept.. 34 pp.

Table 5-1. Interviews allocated by NMFS, interviews allocated by the state, interviews obtained, allocation shortfalls, and effort information for MRFSS field intercept surveys collected in New Hampshire, 1997.

NEW HAMPSHIRE	INTERVIEWS ALLOCATED			INTERVIEWS OBTAINED	SHORT FALLS		EFFORT HOURS	EFFORT PER INTERVIEW
	NMFS	STATE	TOTAL		NMFS	STATE		
WAVE 2 (Mar/Apr)								
SH	0	0	0	0	0	0	0	0.00
PC	30	0	30	33	0	0	4.75	0.14
PR	0	0	0	0	0	0	0	0.00
TOTAL	30	0	30	33	0	0	4.75	0.14
WAVE 3 (May/June)								
SH	40	101	141	153	0	0	91	0.59
PC	55	149	204	200	0	4	58.25	0.29
PR	57	147	204	208	0	0	100	0.48
TOTAL	152	397	549	561	0	0	249.25	0.44
WAVE 4 (July/Aug)								
SH	47	176	223	279	0	0	111.5	0.40
PC	39	257	296	344	0	0	172	0.50
PR	68	255	323	346	0	0	108.25	0.31
TOTAL	154	688	842	969	0	0	391.75	0.40
WAVE 5 (Sept/Oct)								
SH	31	61	92	110	0	0	82.5	0.75
PC	34	89	123	147	0	0	56.75	0.39
PR	40	88	128	134	0	0	80.25	0.60
TOTAL	105	238	343	391	0	0	219.5	0.56

Table 5-2. Estimated effort (angler trips) in New Hampshire's party boat fishery, by month, during 1997.

MONTH	EXPANSION #s (# boat trips)		MEAN # ANGLERS/TRIP		EFFORT (angler trips)		
	Full	1/2&Eve	Full	1/2&Eve	Full	1/2&Eve	TOTAL
APR	33	0	23.4	0.0	774	-	774
MAY	78	80	24.3	19.4	1,898	1,552	3,450
JUN	81	182	29.9	31.0	2,425	5,642	8,067
JUL	61	387	40.9	33.9	2,496	13,130	15,626
AUG	60	378	30.9	38.7	1,853	14,616	16,469
SEP	35	112	31.2	31.7	1,091	3,553	4,645
OCT	30	20	32.2	17.0	966	340	1,306
TOTALS					*11,502*	*38,833*	*50,336*

Table 5-3. Estimated effort (angler trips) in New Hampshire's party boat fishery, by month, from 1991-1997.

Month	1991	1992	1993	1994	1995	1996	1997
4	1,416	1,104	601	855	562	1,120	774
5	9,348	8,512	6,454	4,542	2,428	3,013	3,450
6	8,761	7,094	7,639	6,405	6,656	7,633	8,067
7	9,830	12,394	14,952	13,952	11,626	13,128	15,626
8	13,867	12,684	16,441	15,268	13,388	14,371	16,469
9	6,101	4,929	8,430	4,483	4,153	3,107	4,645
10	2,112	1,772	880	996	501	991	1,306
TOTAL	*51,435*	*48,489*	*55,397*	*46,501*	*39,314*	*43,363*	*50,336*

JOB 2: JUVENILE FINFISH SEINE SURVEY

Final Report

ABSTRACT

Seine hauls were conducted on a monthly basis from June to November 1997 at fourteen fixed location sites and one alternate site in New Hampshire estuaries. Twenty-seven different finfish species were encountered. Catch-per-unit-effort (CPUE) for the three most abundant finfish species, Atlantic silversides (*Menidia menidia*), Atlantic herring (*Clupea harengus*), and rainbow smelt (*Osmerus mordax*), were orders of magnitude greater than all other species encountered. The most abundant crustacean encountered was the green crab (*Carcinus maenas*). Length data collected during the survey indicated that most individuals captured were either juveniles or species that had a small maximum size as adults.

CPUE data by area indicated that species abundance and species diversity is greater in the Little Bay/Great Bay and Piscataqua River areas than Hampton/Seabrook estuary and Little Harbor.

INTRODUCTION

Estuaries are among the most productive natural resource systems and are known to be nursery areas for many recreationally and commercially important marine species as well as many forage fish that they feed upon. Monitoring the annual reproductive recruitment of these species is important information used by fisheries scientists and managers to effectively manage these species.

Beach seines are one of the more common sampling procedures for estuarine based finfish surveys (NHFG 1981, NHFG 1982, NAI 1995, Howell and Molnar 1993, Young et al. 1994, MD DNR 1994). Seines have the advantages of being a relatively simple sampling device and captured specimens can be retained for positive identification and/or collection of biological information (length, weight, age structures, etc.). When surveys are designed with sound

scientific sampling methods an index of relative abundance can be calculated from the catches. These indices can provided an indication of relative spawning success for species such as winter flounder (*Pleuronectes americamus*), striped bass (*Morone saxatilis*) and river herring (*Alosa pseudoharangus* and *Alosa aestivalis*) whose juvenile life history stage utilizes the estuary as a nursery area (Young et al. 1994, MD DNR 1994).

The objective of this project is to implement a beach seine survey that will annually monitor the relative abundance of juvenile finfish utilizing New Hampshire estuaries for nursery habitat. Although the survey is designed to be a general purpose survey, the primary species of interest will be winter flounder, rainbow smelt , river herring, American shad (*Alosa sapidissima*), and Atlantic silversides.

PROCEEDURES

Seine samples were conducted on a monthly basis from June to November at 14 fixed location stations in New Hampshire's estuaries. Four of these stations were located in the Hampton-Seabrook Estuary and ten were located in the Great Bay Estuary (Figures 1-3, Table 1). In addition an alternate station (#72) located in Great Bay Estuary was sampled in all months but October. Within the Great Bay Estuary, three stations were located in Little Harbor, three stations were located in the mid to upper Piscataqua River, and four stations plus the alternate station were located in Little Bay/Great Bay area. Station locations were chosen using one or more of the following criteria: the presence of historical seine sampling data from a given location, spatial distributions of the sites within an area, and the suitability of the site for seining. For example, all stations but stations 39 and 147 had previously been used for seine sampling locations in other studies (NAI 1979, NHF&G 1981, NHF&G 1982, Grout and Heckman 1996). The former two stations locations were chosen because they sampled areas of the estuary not sampled by the historical sites, they were close proximity to the mouths of important rivers in Great Bay Estuary (Cocheco/Salmon Falls Rivers and Oyster River), and it was relatively easy to set a seine at the locations.

Beach seine hauls were conducted by boat using a 30.5 m long by 1.8 m high bag seine with 6.4 mm mesh deployed 10 - 15 m from the beach. A single seine haul was made at each

station during the months of June through November. Seine hauls were all conducted during daylight hours and constrained to the period of approximately two hours before to two hours after low tide. Seines were set into the current and in water depths less than six feet to prevent the foot rope of the net from coming off the bottom.

With each seine haul, surface salinity (ppt) and temperature (°C) were measured and substrate type at the station was observed and recorded.

All fish captured were identified to the lowest possible taxon (the species level was the target) and enumerated. All finfish captured were measured total length to the nearest millimeter up to a maximum of 25 individuals per species per seine haul sample. In addition, if the following crustaceans species of special interest were captured, they were to be identified and enumerated: rock crab (*Cancer irroratas*), Jonah crab (*Cancer borealis*), green crab (*Carcinus maenas*), horseshoe crab (*Limulus polyphemus*), and American lobster (*Homarus americanus*).

RESULTS

A total of 89 seine samples were collected during 1997 (Table 2). All stations were sampled in all months with the exception of the alternate station (#72) during October. The station was not sampled due to a combination of bad weather and time constraints.

A total of 27 finfish species and three crustacean species of special interest were captured during the project (Table 3). Atlantic silversides, Atlantic herring, and rainbow smelt were the most abundant finfish species while green crabs were the most abundant crustacean encountered. Silversides and green crabs were the only species collected at all sampling stations.

Stations 35, 54, and 30 had the greatest abundance in numbers for all species combined over all months (Table 4). Samples during the months of July, September, and August (in decreasing order of abundance) had the largest catches for all species combined (Table 3). The largest single catch of any one species in a seine haul occurred in July at station when over 12,000 juvenile Atlantic herring were captured.

Length data were obtained from 2,817 individuals and 26 finfish species (Table 5). All but two species had mean lengths less than 10 cm. Length frequencies were plotted for the three

most abundant species plus two important species of interest; winter flounder and blueback herring (Figures 4 & 5).

Temperatures during sampling ranged from a low of 3°C at stations 93 and 107 in the Great Bay/Little Bay area during November to a maximum of 25°C at the same two stations in August (Table 6). Salinity measurements ranged from 4 ppt at station 107 in November to highs of 30 and 31 ppt at a variety of stations and during a number of months (Table 7). In general, temperature and salinity measurements were highest during the summer months of July and August and lowest during November. Substrates at the seine stations were, for the most part, dominated by sand, mud, or a sand/mud mixture(Table 1).

DISCUSSION

The objective of this project is to annually monitor the relative abundance of juvenile finfish utilizing New Hampshire estuaries for nursery habitat. Although the survey is designed to be a general purpose survey, the primary species of interest are winter flounder, rainbow smelt , river herring, American shad, and Atlantic silversides.

The survey was designed as a fixed station survey, as opposed to a stratified random survey , because strong tidal currents, rocky shore lines, and various anthropogenic shoreline structures limit the amount of suitable seining areas particularly in the Great Bay Estuary. In addition, many of the fixed sampling locations chosen for this survey were sites used by beach seine surveys conducted in New Hampshire estuaries in the past (NAI 1979, NHF&G 1981, NHF&G 1982, Grout and Heckman 1996). This provided the opportunity to compare data from the current program with historical data from previous surveys.

Since this was the first year of the program, no interannual comparisons can be made. However, some general observations about the results of the survey can be made including some spatial comparisons and some gross comparisons with some previous seine surveys that have been conducted in New Hampshire estuaries.

The three most abundant species in this years survey were forage fish: Atlantic silversides Atlantic herring, and rainbow smelt (Table 3). The relative abundance (mean catch per seine haul) of all three species were orders of magnitude higher than all other species

encountered. Silversides were captured during 66 of the 89 samples and were one of two species that were encountered at all stations. In contrast, Atlantic herring were encountered in only four samples with 94% of the total numbers sampled coming from one seine haul (12,786 at station 35 on July 9). Previous seine surveys conducted in New Hampshire have not encountered such a high abundance of Atlantic herring (NHFG 1981; NHFG 1982, NAI 1995). This combined with the small temporal and spatial extents of samples containing Atlantic herring this year suggests that the large numbers encountered in 1997 may be an unusual occurrence.

The remaining species that rounded out the list of the ten most abundant fish species encountered included, two species of killifish, two species of sticklebacks, blueback herring and winter flounder (see Table 3 & 4). These species were also some of the most numerically abundant fish encountered in other seine surveys conducted in New Hampshire estuaries (NHFG 1981; NHFG 1982, NAI 1995).

Length data show the mean length of most species captured are less than 10 cm. This suggests that most individuals captured are either juveniles of a given species or species that have a small maximum size as adults (Table 5). Bimodal length frequencies for rainbow smelt and winter flounder (Figure 4) suggests the presence of two age groups (age 0 and age 1). Single modes in the length frequencies for sea herring and Atlantic silversides suggests the catch is dominated by a single age group; age 1 for both species (Figures 4 & 5). The bimodal nature of the blueback herring length frequency is primarily the result of a single sample taken during the beginning of August at the mouth of the Lamprey River (station 107) where all 25 length measurements from a sample of 68 fish were 5 cm or less. All other length samples for blueback herring were dominated by 7-9 cm individuals suggesting that the Lamprey river sample was from a later spawned or slower growing cohort.

Figures 6 and 7 show relative abundance levels (CPUE) with stations grouped by four distinct geographical areas: Little Harbor (LH), Hampton/Seabrook Estuary (H/S), Piscataqua River (PR), and Little Bay/Great Bay (LB/GB). From these graphs it is apparent that the two areas that make up a large portion of Great Bay Estuary (PR and LB/GB) have much higher relative abundance of all species combined (and almost all of the most commonly occurring species) than the other two sample areas. In addition, it is evident from Figure 7 and Table 4 that

species diversity is also much greater in the PR area (19 species) and LB/GB area (18 species) compared to LH (9 species) and H/S (6 species).

In summary, three forage fish (Atlantic silversides, Atlantic herring, and rainbow smelt) dominated the catches of the 1997 seine haul survey in New Hampshire estuaries. A total 27 finfish species and three crustaceans species of special interest were captured during the survey. The samples from areas in the Great Bay Estuary (PR AND LB/GB) had greater species abundance and species diversity than those from LH and H/S.

Table 1. **Station number, location, area, and substrate type as well as the presence or absence of historical seining data for fixed location stations for New Hampshire Fish and Game Department seine survey conducted in New Hampshire estuaries, 1997.**

STATION #	AREA	STATION LOCATION	SUBSTRATE	HISTORICAL DATA
5	GBE1	Fort Stark (Little Harbor)	Sand	Grout & Heckman (1996)
7	GBE1	Wentworth (Little Harbor)	Mud	Grout & Heckman (1996)
9	GBE1	Ordiorne Beach (Little Harbor)	Sand	Grout & Heckman (1996)
30	GBE2	Schiller Plant (Piscataqua)	Mud/Sand	NAI (1979)
35	GBE2	General Sullivan Bridge Cove (Piscataqua)	Mud	NHFG (1981); NHFG (1982)
39	GBE2	Upper Piscataqua (Power Lines)	Mud/Sand	None
54	GBE3	Broad Cove (Little Bay)	Mud	NHFG (1981)
72	GBE3	Fox Point (Little Bay)	Mud/Sand	NHFG (1981); NHFG (1982)
93	GBE3	Herods Cove (Great Bay)	Mud/Sand	NHFG (1981); NHFG (1982)
107	GBE3	Moody Point (Lamprey/Squamscott)	Mud	NHFG (1981)
147	GBE3	Oyster River	Mud/Gravel	None
23	HSE	Smith & Gilmore (Hampton)	Sand	Grout & Heckman (1996)
25	HSE	Yankee Coop (Seabrook)	Sand	Grout & Heckman (1996)
29	HSE	Blackwater River	Sand	Grout & Heckman (1996)
33	HSE	Brown's River	Sand	Grout & Heckman (1996)

AREA CODES	AREA NAMES
HSE	HAMPTON/SEABROOK ESTUARY
GBE1	LITTLE HARBOR
GBE2	PISCATAQUA RIVER
GBE3	LITTLE BAY/GREAT BAY

Table 2. **Record of seine samples conducted, by station and month, during a New Hampshire Fish and Game Department seine survey conducted in New Hampshire estuaries, 1997.**

	STATION															
	Little Harbor			*Hampton/Seabrook Estuary*				*Piscataqua River*			*Little Bay/Great Bay*					
MONTH	5	7	9	23	25	29	33	30	35	39	54	72	93	107	147	TOTALS
6	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	15
7	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	15
8	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	15
9	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	15
10	1	1	1	1	1	1	1	1	1	1	1	NS	1	1	1	14
11	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	15
TOTAL	6	6	6	6	6	6	6	6	6	6	6	5	6	6	6	89

NS - Not Sampled

Table 3. **Arithmetic mean catch per seine haul (CPUE), by species and month, for all stations combined from a New Hampshire Fish and Game Department seine survey conducted in New Hampshire estuaries, 1997.**

SPECIES	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	ALL MONTHS
SILVERSIDE, ATLANTIC	3.47	10.00	426.27	446.73	82.86	225.00	200.36
HERRING, ATLANTIC	51.00	850.93	0.00	0.00	0.00	0.00	152.01
SMELT, RAINBOW	5.07	15.20	28.13	100.87	0.21	2.53	25.62
STICKLEBACK, NINESPINE	0.00	0.33	0.80	44.07	0.07	3.80	8.27
KILLIFISH, BANDED	0.07	2.60	7.80	33.33	3.64	0.27	8.00
CRAB, GREEN-	8.80	13.07	6.40	5.33	1.71	1.27	6.15
HERRING, BLUEBACK	0.13	0.00	13.47	5.73	0.14	0.20	3.31
KILLIFISH, COMMON (MUMMICHOG)	0.40	2.00	1.80	7.87	3.93	0.73	2.78
STICKLEBACK, FOURSPINE	0.60	2.40	5.80	5.40	0.29	1.67	2.72
FLOUNDER, WINTER	1.13	0.67	4.00	2.47	2.36	1.60	2.03
TOMCOD, ATLANTIC	9.40	0.20	0.07	0.07	0.00	0.07	1.65
KILLIFISH, STRIPED	0.07	0.00	0.00	5.13	3.86	0.13	1.51
STICKLEBACK, THREESPINE	0.07	0.80	5.27	1.53	0.29	0.20	1.37
MENHADEN, ATLANTIC (POGY)	0.00	0.00	0.00	1.87	0.14	0.00	0.34
FLOUNDER, SMOOTH	0.87	0.47	0.27	0.13	0.07	0.07	0.31
PERCH, WHITE	0.07	0.00	0.53	0.93	0.29	0.00	0.30
SCULPIN, LITTLE (GRUBBY)	0.07	0.60	0.13	0.47	0.14	0.40	0.30
LUMPFISH	0.00	1.20	0.00	0.13	0.00	0.07	0.24
ALEWIFE	0.00	0.00	0.33	0.73	0.00	0.00	0.18
CRAB, ROCK	0.33	0.40	0.07	0.07	0.00	0.13	0.17
HAKE, WHITE	0.07	0.80	0.00	0.00	0.00	0.00	0.15
CRAB, HORSESHOE	0.33	0.27	0.00	0.13	0.00	0.00	0.12
CUNNER	0.00	0.00	0.00	0.60	0.07	0.00	0.11
SCULPIN, SHORTHORN	0.53	0.00	0.00	0.00	0.00	0.00	0.09
PIPEFISH, NORTHERN	0.07	0.07	0.27	0.07	0.00	0.00	0.08
HERRING (UNCLASSIFIED)	0.13	0.07	0.00	0.07	0.00	0.00	0.04
LANCE, SAND (SAND EEL)	0.00	0.13	0.00	0.00	0.00	0.07	0.03
RAVEN, SEA	0.20	0.00	0.00	0.00	0.00	0.00	0.03
FLOUNDER (UNCLASSIFIED)	0.00	0.00	0.13	0.00	0.00	0.00	0.02
SHAD, AMERICAN	0.00	0.07	0.07	0.00	0.00	0.00	0.02
BASS, STRIPED	0.07	0.00	0.00	0.00	0.00	0.00	0.01
GUNNEL, ROCK	0.07	0.00	0.00	0.00	0.00	0.00	0.01
ALL SPECIES	83.00	902.27	501.60	663.73	100.07	238.20	418.35

Table 4. **Arithmetic mean catch per seine haul (CPUE), by species and station, for all months combined from a New Hampshire Fish and Game Department seine survey conducted in New Hampshire estuaries, 1997.**

SPECIES	STATION #															
	Little Harbor			*Hampton/Seabrook Estuary*				*Piscataqua River*			*Little Bay/Great Bay*					
	5	7	9	23	25	29	33	30	35	39	54	72	93	107	147	TOTALS
SILVERSIDE, ATLANTIC	14.67	26.50	30.50	119.17	152.00	31.33	36.50	346.50	521.83	212.33	731.17	574.40	25.33	43.00	202.50	200.36
HERRING, ATLANTIC	0.00	0.00	0.00	125.33	0.00	0.00	0.00	0.00	2122.67	0.00	0.00	0.00	0.00	0.00	6.83	152.01
SMELT, RAINBOW	0.00	0.33	0.17	0.17	0.00	0.00	0.00	251.33	17.50	0.50	70.00	45.60	0.00	0.00	2.00	25.62
STICKLEBACK, NINESPINE	0.00	0.00	0.00	0.00	0.00	0.00	0.17	0.17	0.00	0.67	0.00	0.00	7.50	1.17	113.00	8.27
KILLIFISH, BANDED	0.50	3.83	0.00	0.00	0.00	0.00	0.00	0.00	0.33	27.00	4.50	2.20	37.50	24.50	18.67	8.00
CRAB, GREEN	2.50	2.33	12.67	9.00	11.67	0.83	1.67	17.17	13.00	3.17	3.83	1.40	7.33	1.50	3.33	6.1
HERRING, BLUEBACK	0.00	0.00	0.00	0.00	2.67	0.00	5.83	10.17	3.00	0.33	9.17	0.80	0.50	11.67	5.17	3.31
KILLIFISH, COMMON (MUMMICHOG)	0.00	2.50	0.00	0.00	0.17	0.00	0.00	0.00	0.50	2.00	6.50	0.60	15.67	6.67	6.67	2.78
STICKLEBACK, FOURSPINE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.17	2.50	0.17	0.00	37.00	0.33	0.17	2.72
FLOUNDER, WINTER (BLACKBACK)	0.33	1.33	3.83	6.00	3.50	1.00	0.17	1.67	5.67	0.83	0.00	1.00	0.00	0.50	4.50	2.03
TOMCOD, ATLANTIC	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.33	0.00	0.33	0.00	0.40	0.33	0.33	22.83	1.65
KILLIFISH, STRIPED	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.67	0.67	0.00	5.17	15.67	0.17	1.51
STICKLEBACK, THREESPINE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.17	1.00	0.17	0.00	18.83	0.00	0.17	1.37
MENHADEN, ATLANTIC (POGY)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.33	0.00	4.33	0.33	0.00	0.34
FLOUNDER, SMOOTH	0.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1.67	0.20	0.50	0.33	0.67	0.31
PERCH, WHITE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.00	0.00	0.00	0.33	1.17	0.00	0.30
SCULPIN, LITTLE (GRUBBY)	0.00	0.00	1.50	0.17	0.00	0.00	0.00	0.50	0.50	0.17	0.33	0.00	0.33	0.00	1.00	0.30
LUMPFISH	0.17	0.00	2.83	0.00	0.00	0.00	0.00	0.00	0.17	0.00	0.17	0.20	0.00	0.00	0.00	0.24
ALEWIFE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.50	0.00	1.00	0.00	0.00	0.17	0.00	0.00	0.18
CRAB, ROCK	0.17	0.33	0.83	0.00	0.17	0.00	0.00	0.67	0.00	0.00	0.00	0.40	0.00	0.00	0.00	0.
HAKE, WHITE	0.33	0.00	1.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.17	0.00	0.00	0.00	0.17	0.15
CRAB, HORSESHOE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.33	0.00	0.00	0.00	0.50	0.50	0.50	0.12
CUNNER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.33	0.00	1.17	0.00	0.00	0.17	0.00	0.00	0.11
SCULPIN, SHORTHORN	0.17	0.00	0.17	0.00	0.00	0.00	0.00	0.83	0.00	0.00	0.00	0.20	0.00	0.00	0.00	0.09
PIPEFISH, NORTHERN	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.33	0.00	0.40	0.50	0.00	0.00	0.08
HERRING (UNCLASSIFIED)	0.00	0.00	0.00	0.00	0.00	0.00	0.17	0.00	0.00	0.17	0.00	0.40	0.00	0.00	0.00	0.04
LANCE, SAND (SAND EEL)	0.00	0.33	0.00	0.00	0.00	0.17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03
RAVEN, SEA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.03
FLOUNDER (UNCLASSIFIED)	0.00	0.00	0.00	0.00	0.00	0.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02
SHAD, AMERICAN	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.17	0.00	0.00	0.00	0.00	0.17	0.00	0.02
BASS, STRIPED	0.00	0.00	0.00	0.00	0.00	0.17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
GUNNEL, ROCK	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
TOTALS	19.17	37.50	54.00	259.83	170.17	33.83	44.50	631.33	2686.50	258.17	828.83	628.20	162.00	107.83	388.33	418.35

Table 5. **Mean, minimum, and maximum total length (cm) , by species, as well as sample size (N), for fish species measured during a New Hampshire Fish and Game Department seine survey conducted in New Hampshire estuaries, 1997.**

SPECIES	TOTAL LENGTH (cm)			N
	MEAN	MINIMUM	MAXIMUM	
ALEWIFE	6.8	3.4	11.7	14
CUNNER	3.7	3.3	4	10
FLOUNDER, SMOOTH	8.9	3.7	14	28
FLOUNDER, WINTER (BLACKBACK)	6.1	2.3	11.8	173
GUNNEL, ROCK	11.4	11.4	11.4	1
HAKE, WHITE	7.5	6.0	10.4	13
HERRING (UNCLASSIFIED)	7.0	6.6	7.3	2
HERRING, ATLANTIC	7.4	4.9	9.3	88
HERRING, BLUEBACK	7.1	3.4	14	131
KILLIFISH, BANDED	4.7	2.2	7.5	246
KILLIFISH, COMMON (MUMMICHOG)	5.0	2.9	9	212
KILLIFISH, STRIPED	6.6	3.8	11.4	87
LANCE, SAND (SAND EEL)	9.1	8.6	9.5	3
LUMPFISH	2.8	1.9	3.7	20
MENHADEN, ATLANTIC (POGY)	6.5	5.2	8.8	29
PERCH, WHITE	7.5	3.8	26.6	29
PIPEFISH, NORTHERN	16.5	9.3	21.2	7
RAVEN, SEA	4.4	4.2	4.6	3
SCULPIN, LITTLE (GRUBBY)	5.4	3.3	9.7	24
SCULPIN, SHORTHORN	3.9	3.5	4.5	8
SHAD, AMERICAN	4.2	4.2	4.2	1
SILVERSIDE, ATLANTIC	8.1	3.4	14	1249
SMELT, RAINBOW	7.4	4.4	14.9	135
STICKLEBACK, FOURSPINE	4.0	3.0	6.9	122
STICKLEBACK, NINESPINE	4.6	3.4	5.6	82
STICKLEBACK, THREESPINE	4.0	2.6	5	66
TOMCOD, ATLANTIC	7.5	5.7	15.3	36

Table 6. Surface temperature measurements (°C), by station and month, collected during a New Hampshire Fish and Game Department seine survey conducted in New Hampshire estuaries, 1997.

TEMPERATURE (°C)

	STATION #														
	Little Harbor			*Hampton/Seabrook Estuary*				*Piscataqua River*			*Little Bay/Great Bay*				
MONTH	5	7	9	23	25	29	33	30	35	39	54	72	93	107	147
6	17	18	17	17	15	18	20	19	19	23	20	19	23	22	23
7	15	15	18	20	21	23	22	16	19	24	19	18	24	24	21
8	17	20	20	19	18	19	21	19	22	23	23	21	25	25	24
9	13	13	13	13	15	14	13	20	22	19	18	15	20	21	15
10	14	14	14	14	14	13	14	13	13	13	14	NS	15	17	16
11	7	5	5	9	9	9	9	13	11	10	10	4	3	3	11

NS -not sampled

Table 6. Surface salinity measurements (ppt), by station and month, collected during a New Hampshire Fish and Game Department seine survey conducted in New Hampshire estuaries, 1997.

SALINITY (ppt)

	STATION #														
	Little Harbor			*Hampton/Seabrook Estuary*				*Piscataqua River*			*Little Bay/Great Bay*				
MONTH	5	7	9	23	25	29	33	30	35	39	54	72	93	107	147
6	30	30	30	30	30	30	30	30	NM	NM	26	29	24	24	NM
7	30	29	30	29	30	30	30	28	28	18	29	27	28	29	29
8	30	30	30	30	30	29	30	29	30	18	29	29	28	24	30
9	29	30	29	28	29	30	30	29	30	18	29	28	28	24	28
10	30	30	30	28	30	29	28	27	28	12	29	NS	29	20	31
11	27	25	26	26	27	26	27	24	12	7	22	21	20	4	21

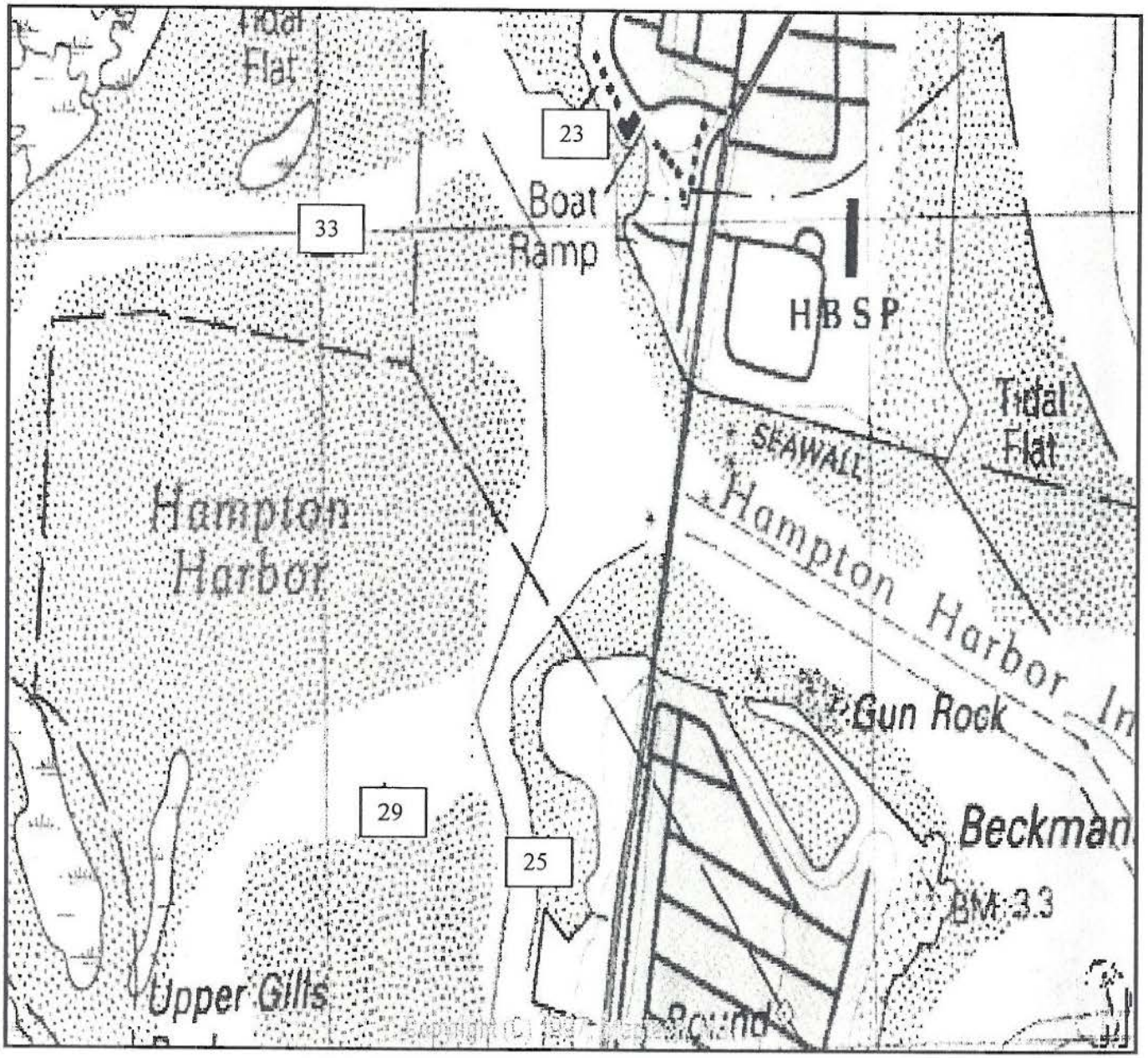


Figure 1. **Sampling stations in Hampton/Seabrook Estuary for the New Hampshire Fish and Game Department seine survey conducted in New Hampshire estuaries, 1997.**

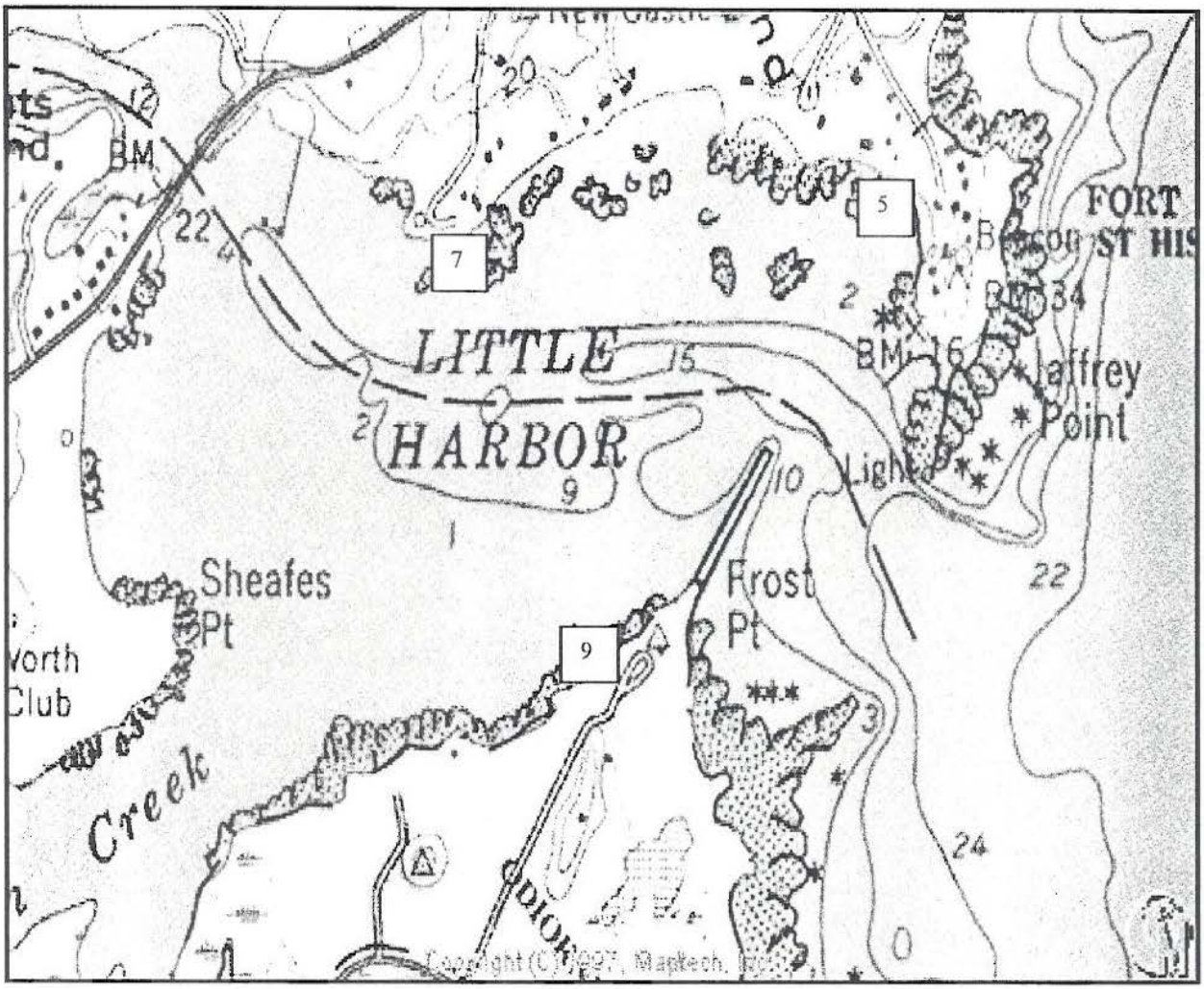


Figure 2. **Sampling stations in Little Harbor for the New Hampshire Fish and Game Department seine survey conducted in New Hampshire estuaries, 1997.**

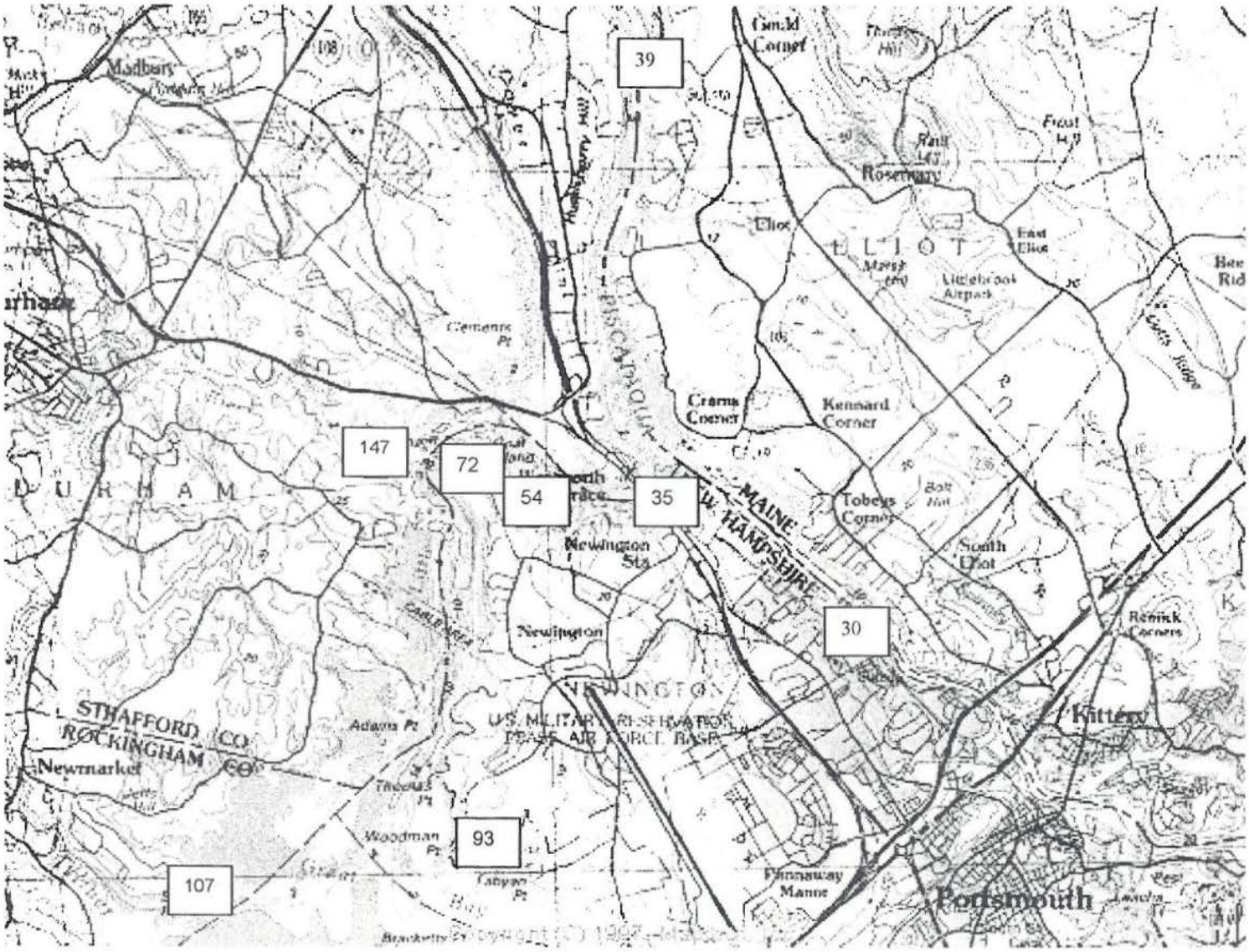
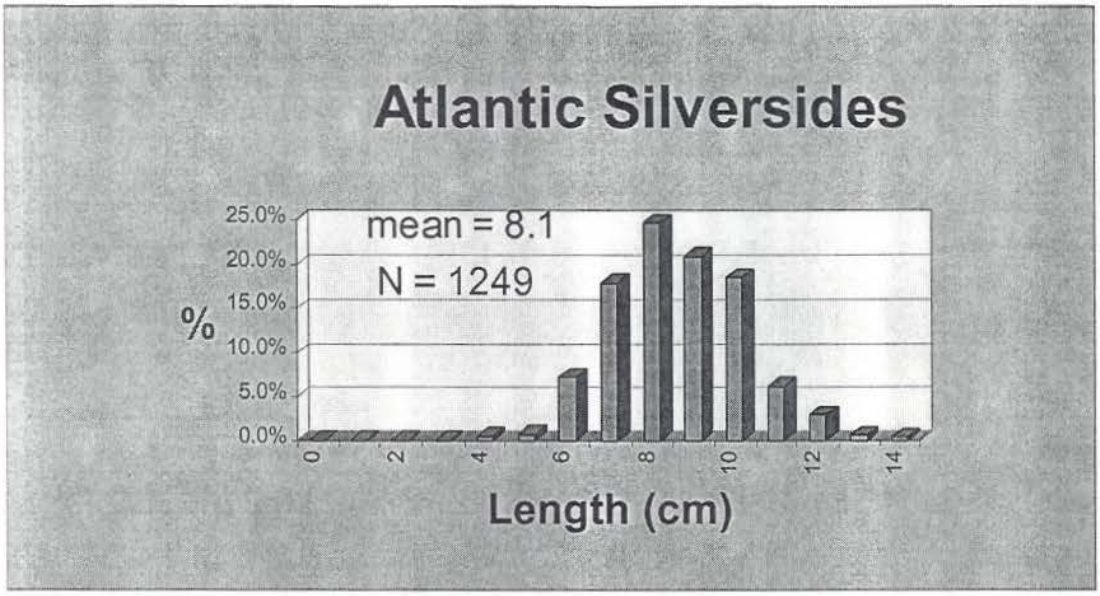
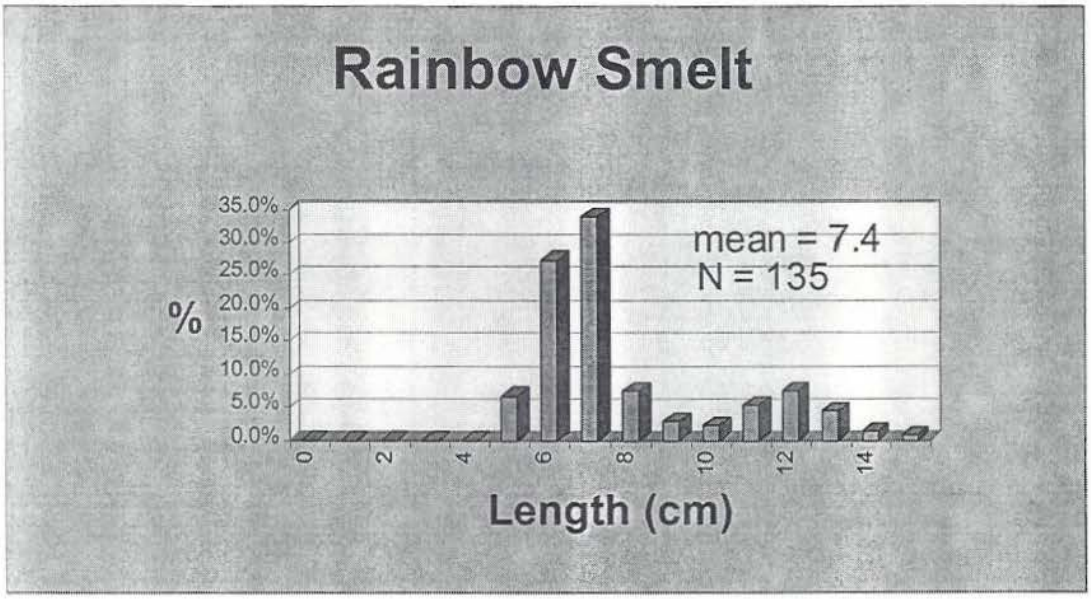


Figure 3. **Sampling stations in the Piscataqua River and Little Bay/Great Bay area for the New Hampshire Fish and Game Department seine survey conducted in New Hampshire estuaries, 1997.**

Figure 4. Length fre encies of Atlantic silversides, ra bow smelt, and winter flounder collected during a New Hampshire Fish and Game Department seine survey conducted in New Hampshire estuaries, 1997.





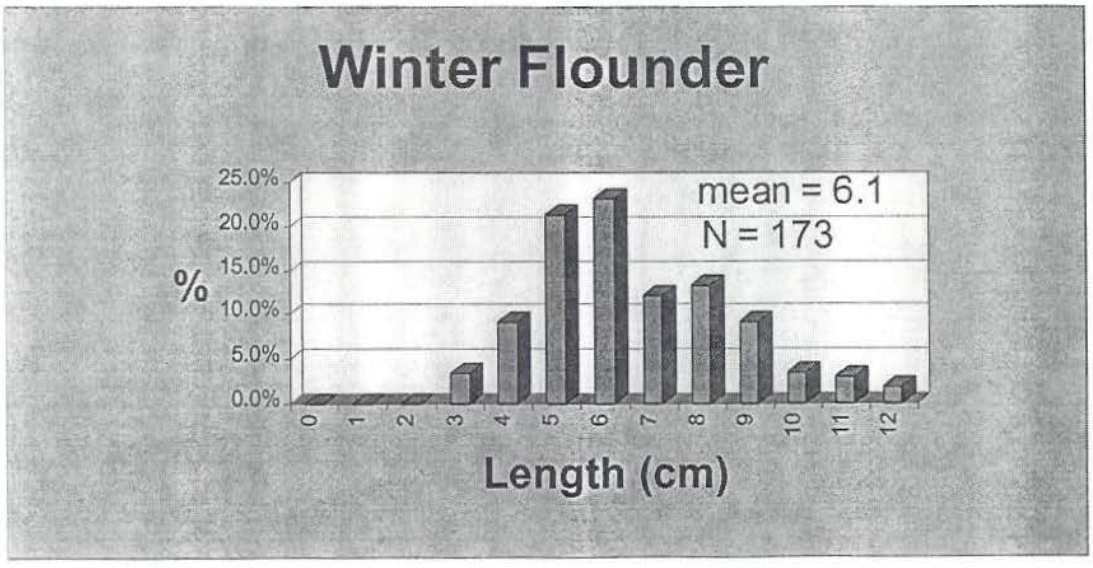


Figure 5. **Length frequencies of Atlantic herring and blueback herring collected during a New Hampshire Fish and Game Department seine survey conducted in New Hampshire estuaries, 1997.**

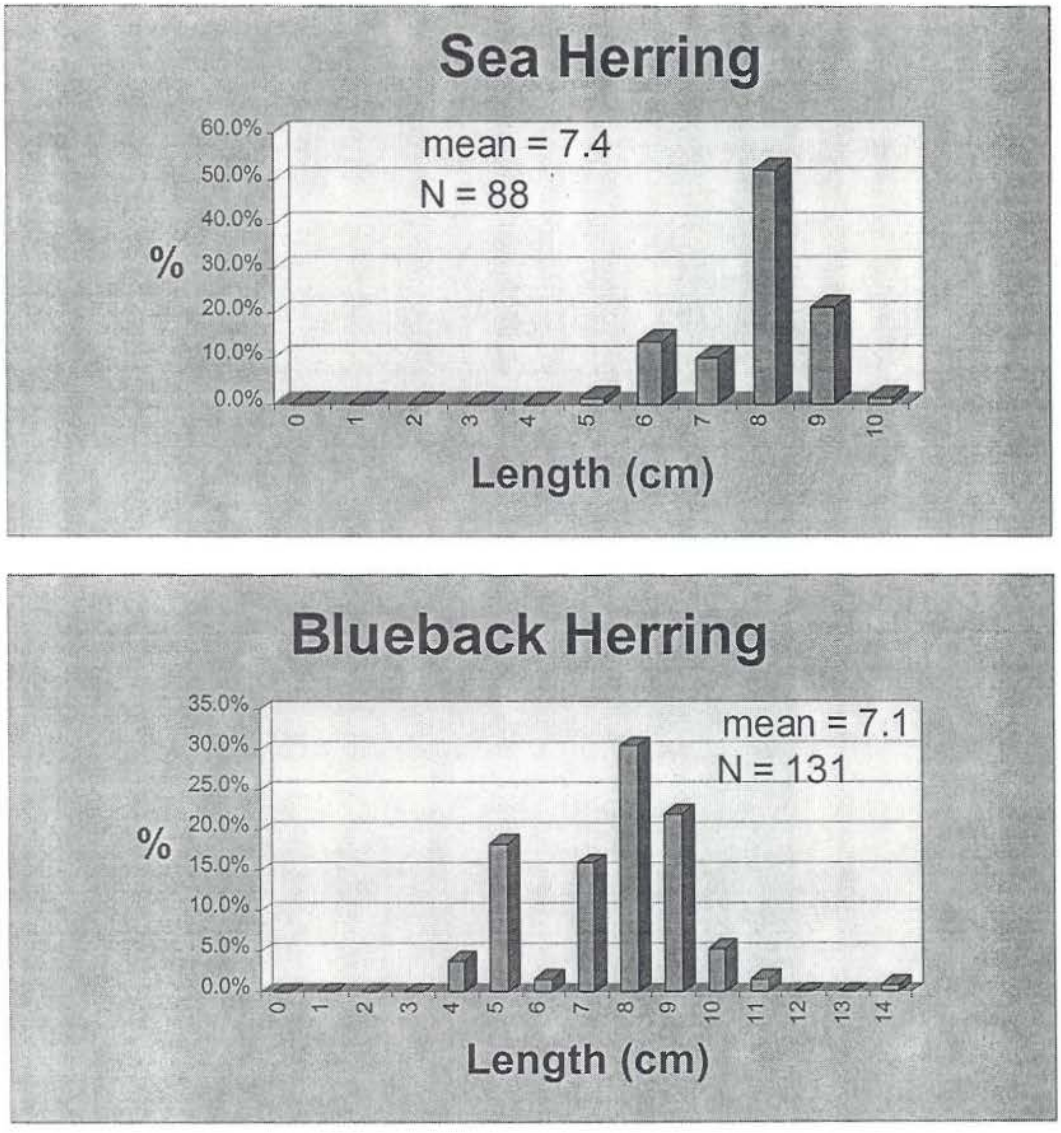


Figure 6. **Mean catch per seine haul (CPUE), by area, for Atlantic silversides, Atlantic herring, and all other species combined from a New Hampshire Fish and Game Department seine survey conducted in New Hampshire estuaries, 1997.**

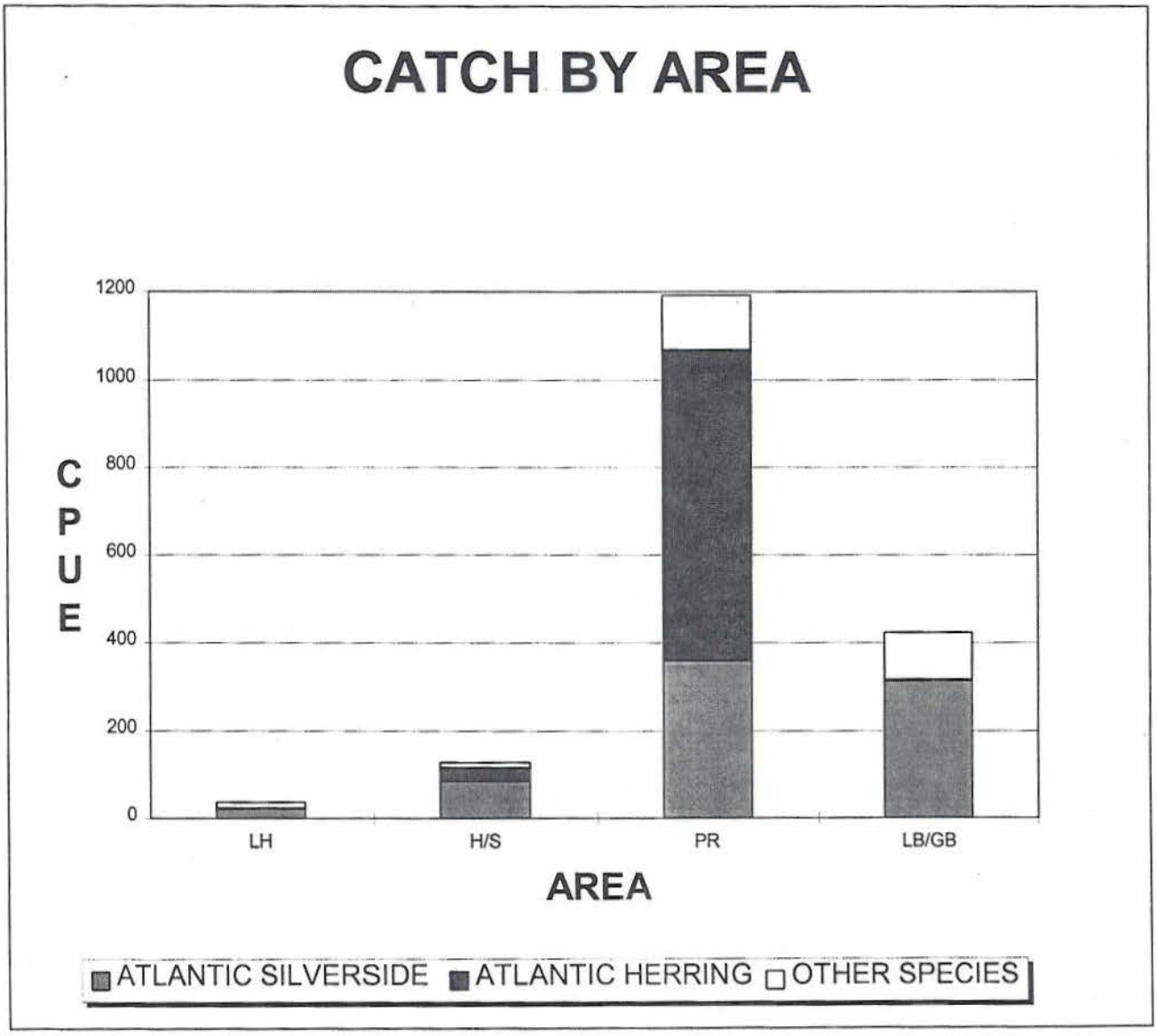
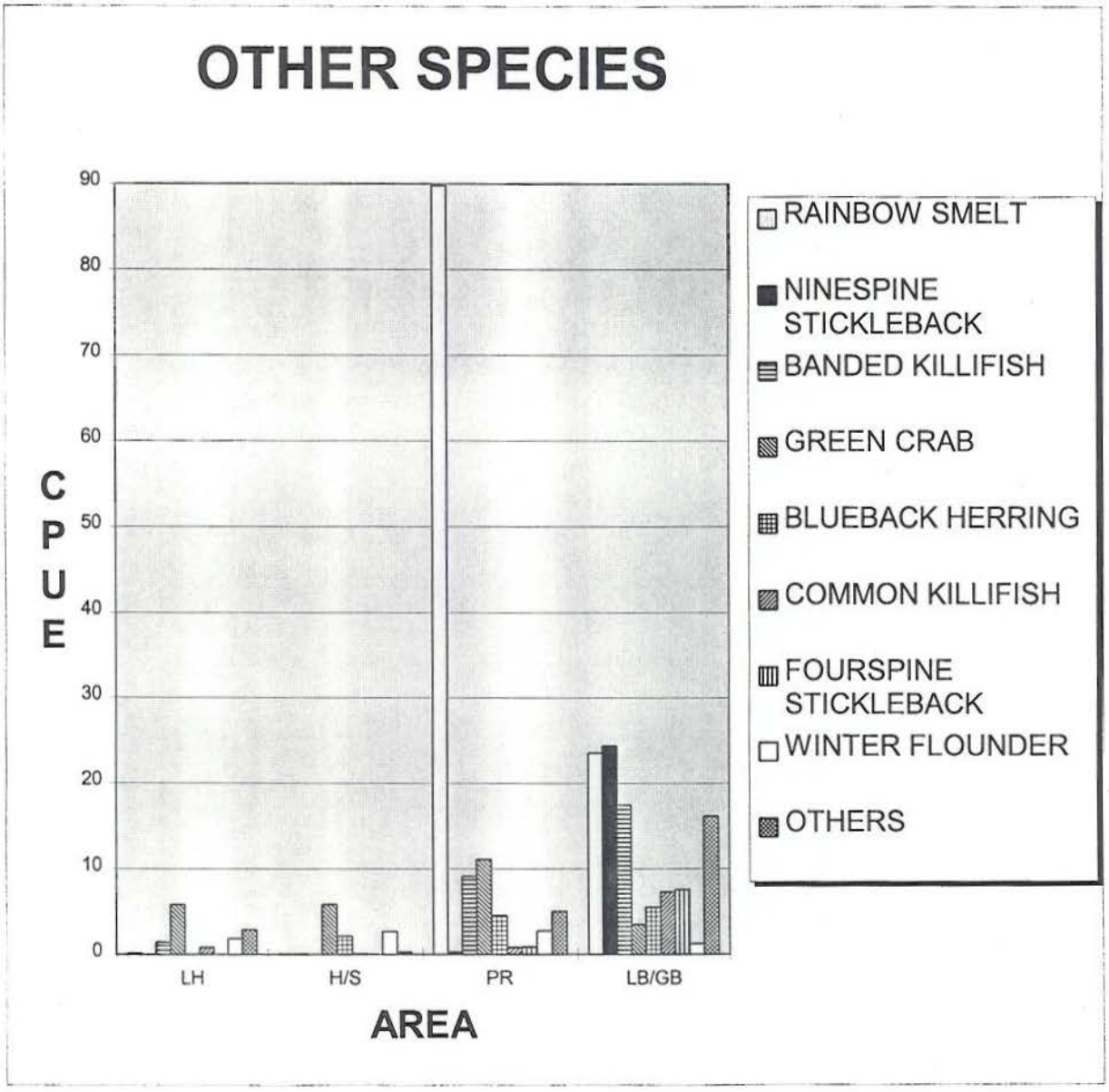


Figure 7. **Mean catch per seine haul (CPUE), by area, for eighth most abundant species classified as "other species" in Figure 4 from a New Hampshire Fish and Game Department seine survey conducted in New Hampshire estuaries, 1997.**



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JOB 3: COMMERCIAL FISHERIES DATA COLLECTION

Final Report

ABSTRACT

Lobster sea sampling was conducted at three general locations in New Hampshire coastal waters during the months of July through October. This was accomplished by placing a biologist aboard a commercial lobster boat for the days tending of traps. Lobsters caught were enumerated, measured, sexed, their molt stage determined and the presence of eggs or V-notching of females noted. Catch per effort was determined based on the numbers caught per lobster trap set over days. Based on these observations the 1997 lobster fishing year is seen as one with a catch per effort slightly below the six year average.

INTRODUCTION

Over the past seven years New Hampshire Fish and Game Department, Marine Fisheries Division has engaged in lobster population studies. The study involved two approaches; collection of lobster data by SCUBA and by sea sampling. Generally speaking, the SCUBA lobster collections provided information on small juveniles; those that are not taken by commercial traps and the sea sampling focused on larger lobster. The data taken on lobster collected by both means were essentially the same; size, sex, shell condition (i.e. molt stage) presence of eggs and occurrence of v-notching. Also relative abundance indices were developed for both methods of collection.

The SCUBA portion of this study is conducted under Interjurisdictional Fisheries Act while the sea sampling phase of study is being conducted under the Atlantic Coastal Fisheries Conservation Management Act. Both federal funding sources are administered by the National Marine Fisheries Service.

The report that follows is the sea sampling portion of the lobster population study.

The objective of this project is to monitor the abundance and distribution of trap-captured sub-legal and legal size lobsters in New Hampshire waters and to monitor the catch characteristics of the commercial lobster fishery.

PROCEDURES

Lobsters were sampled on a monthly basis from July through October in three areas; the Piscataqua River, along the New Hampshire coast, and at the Isles of Shoals (Figure 1).

Samples were taken during day trips aboard a commercial lobster boat fishing New Hampshire waters. An individual day trip would typically be either one combining river and coastal samples or a trip to the offshore Isles of Shoals. The basic unit of effort was the trap haul set over day. Most trawls consisted of a 10 trap set line (i.e. 10 traps tied to one haul rope). During each trip, all legal size lobsters were sampled from nearly every trawl and representative numbers of sublegal lobsters were sampled from randomly selected trawls. Data collected on sea sampled lobsters consisted of sex, length (mid-dorsal carapace length to the nearest millimeter) and shell condition (i.e. molt stage). Additionally v-notched and ovigerous females were counted.

A length frequency distribution was plotted for the total sea sample catch. To calculate the total sample length frequency distribution it was necessary to proportionally expand the limited sublegal catch. This was done by converting all sublegal measurements to group frequency percentages then applying these percentages to the total number of sublegals caught. Catch per unit of effort (CPUE) was plotted by month for all areas to identify trends. Comparison between the current year CPUE and those of previous years provide an index of lobster stock condition. The percent of the sample population with soft shells was calculated by month for each area to analyze trends in molting frequency and occurrence.

RESULTS

A total of 6,856 lobsters were tallied during eight sea sampling days in 1997. Of the total number caught, 1,629 were measured and sexed. These consisted of 1,333 legals (carapace length 83mm or greater) and 296 sublegals (carapace length less than 83mm). Lobsters sampled ranged in size from 56 mmCL to 171 mmCL and averaged 77.42 mmCL and 88.24 mmCL for sublegal and legal respectively. All measured and sexed lobsters were used for characterization of length and sex frequencies.

V-notched females comprised 14.6 % of the trapped legal sized females and 14.4 % of

these females were ovigerous (Table1). These, of course, were released in accordance with New Hampshire law. October was the month of greatest ovigerous female abundance and September showed the lowest percentage. The Isles of Shoals produced the highest percentage of ovigerous females and the coast area was second. The relative presence of V-notched females is greatest at the Isles of Shoals area with the coast second. Table 1 shows some month/area cases of agreement between V-notch and ovigerous percentages, but overall there is no consistent relationship shown for these two conditions. Future examination of these lobster types with regard to spatial and temporal distribution may yield useful information.

To develop a total sea sample length frequency distribution and mean carapace length a proportional expansion of the sublegal data was accomplished. The resulting graphic (Figure 2) shows a size frequency peak around 78 to 82 mmCL and a precipitous drop as the 83 mmCL (legal) size is reached. The overall carapace size average was 79.67 for the entire 1997 catch. Legal sized lobster mean length varies by sample area. A general increase in legal lobster length is seen as one progresses from the estuarine river area to the coast and from there to the offshore Isles of Shoals. The Isles of Shoals showed the greatest mean length for all legal lobsters measured (87.8 mmCL) followed by the coast (85.6 mmCL). The river area produced the lowest mean length (84.9 mmCL). Males sampled had an average carapace length of 86.4 mmCL while females averaged 85.1 mmCL. Males comprised 52.5% of the catch that was measured and sexed.

A comparison of mean carapace length by month for all areas showed only slight differences from June to October. The monthly values from July to October were 85.5, 86.1, 85.8, and 87.6 mmCL.

Review of catch rates per unit of effort (CPUE) data for sea sampled lobsters revealed variable catch rates over the months sampled for all areas (Figure 3). No consistent trends are evident except that July is generally a month of relatively low catches. The river station is highly variable with a peak CPUE in August, a low in September and with October as the second highest CPUE. The coast shows a low CPUE in July, followed in August by a seasonal high. The remaining two months on the coast show reducing CPUEs. At the Isles of Shoals catches are lowest in July, second lowest in August, rise to a seasonal high in September, then drop

slightly in October. Multi-year CPUEs are shown by area for the most recent six years (Figure 4).

Time and location of molting for sea sampled lobsters are shown in Table 2. Overall peaks in molting occur in July and September. It is possible due to area specific warmer water temperatures (see Figure 5), that annual multiple molts for river and coastal lobsters may occur, especially for those that are smaller and not yet sexually mature.

DISCUSSION

Results from the 1997 sea sampling year show differences in mean lobster size by area, and month. The largest mean size for legal lobsters were those taken at the Isles of Shoals and the smallest in the river. This pattern of differential size across the entire study area has been shown for all previous years studied (NHF&G 1993, 1994, 1995, 1996, 1997). Though there is little information from the data presented above as to actual migration of lobsters, it is possible the larger size noted for offshore lobster compared to those in the river is the result of an overall net movement seaward as they mature. The data also support the idea of a seasonal movement of larger (generally legal-sized) lobsters inshore during warm water periods and offshore as cooler water sets in. Such a seasonal movement is well documented in lobster literature (Herrick, 1909, Phillips et al., 1980, Duggan and Duggan, 1989, Robichaud and Campbell, 1991). Since sea sampling only occurs during the warm water months this supposition cannot be thoroughly tested. Such a movement for lobsters might be directed by several things: variable life stage temperature or salinity preference, size influenced physical habitat selection, some inherent natural dispersion mechanism or by combinations of these possibilities or others not yet explained.

Alternatively this mean size gradient seen inshore to offshore may only reflect variable fishing pressure with the less intensively fished offshore area merely containing more large lobster than the more intensively fished inshore areas. If this is indeed the case, then continued fishing in the offshore area should eventually reach the point that this spatial size disparity is less evident. On the other hand a continuing mean size differential between inshore and offshore areas argues in favor of the net movement of larger sized lobster seaward.

Monthly size differences are likely due to molt and growth occurrence. Also playing a

role in seasonal size differences may be the well known inshore/offshore movement of reproductive lobster which should result in larger sized lobster inshore during the molt and copulation period.

A slight difference in size can also be shown between sexes. Previous work (NHF&G 1996 and 1997) shows that this is found only in the larger size range and is likely due to reduced frequency of molting by reproductive females and to the energy expenditure associated with egg production.

Year to year comparisons that focus on monthly CPUE information show some marked early season (July-August) variations for the six years examined (Figure 4). Early season months show variability because of the unpredictable success of river traps that sometimes intercept comparatively large numbers of lobsters moving into this area. The coast shows this variation also, but it is not seen in the offshore Isles of Shoals. Less variable yearly CPUEs are shown at all locations during September-October.

The data seem to suggest that 1997 was a season of low average catches for the July - October period. The offshore (Isles of Shoals) area was relatively productive during the last two months of sampling in 1997. Other areas show a more inconsistent pattern in comparing 1997 to previous years. The coast station shows 1997 to be generally more productive than other seasons for the first two months but less productive during the latter two. Strikingly high CPUEs were found for this area in early-season 1992. The river 1997 CPUEs are generally below those of other years for July and September, but are high for August and October. The yearly area CPUEs are:

1992	1.93
1993	1.11
1994	1.63
1995	1.66
1996	1.20
1997	1.34

Six Year Average CPUE = 1.48

This provides a simplified overall view of the 1997 lobster catch in comparison to other years

(and by inference lobster abundance). From this, one can see that 1997 was only slightly below the six year average CPUE (which is 1.48).

The continuation of this study is essential as it provides information vital to local lobster management decisions.

Table 1. **Percentage of 1997 sea sampled legal female lobsters that were ovigerous and (V-notched) by sample area and by month.**

MONTH	SAMPLE SITES			
	River	Coast	Isles of Shoals	All Areas
July	3.0 (18.2)	7.8 (9.8)	12.5 (10.0)	9.1 (11.6)
August	22.2 (22.2)	5.5 (18.0)	22.9 (9.4)	14.8 (14.2)
September	15.8 (13.1)	5.3 (13.4)	7.8 (19.6)	7.9 (15.9)
October	9.1 (5.7)	26.8 (14.2)	25.4 (20.0)	21.5 (15.3)
ALL MONTHS	**10.1 (10.7)**	**10.6 (14.2)**	**18.6 (16.3)**	**14.4 (14.6)**

Table 2. **Percentage of 1997 sea sampled lobsters that were soft shell (i.e. recently molted) by sample site and by month.**

MONTH	SAMPLE SITES			
	River	Coast	Isles of Shoals	All Sites
July	4.0	18.3	12.6	13.6
August	0	3.4	9.6	5.4
September	4.4	11.7	8.2	8.8
October	2.4	1.1	0.5	1.3
ALL MONTHS	**3.1**	**10.4**	**6.6**	**7.4**

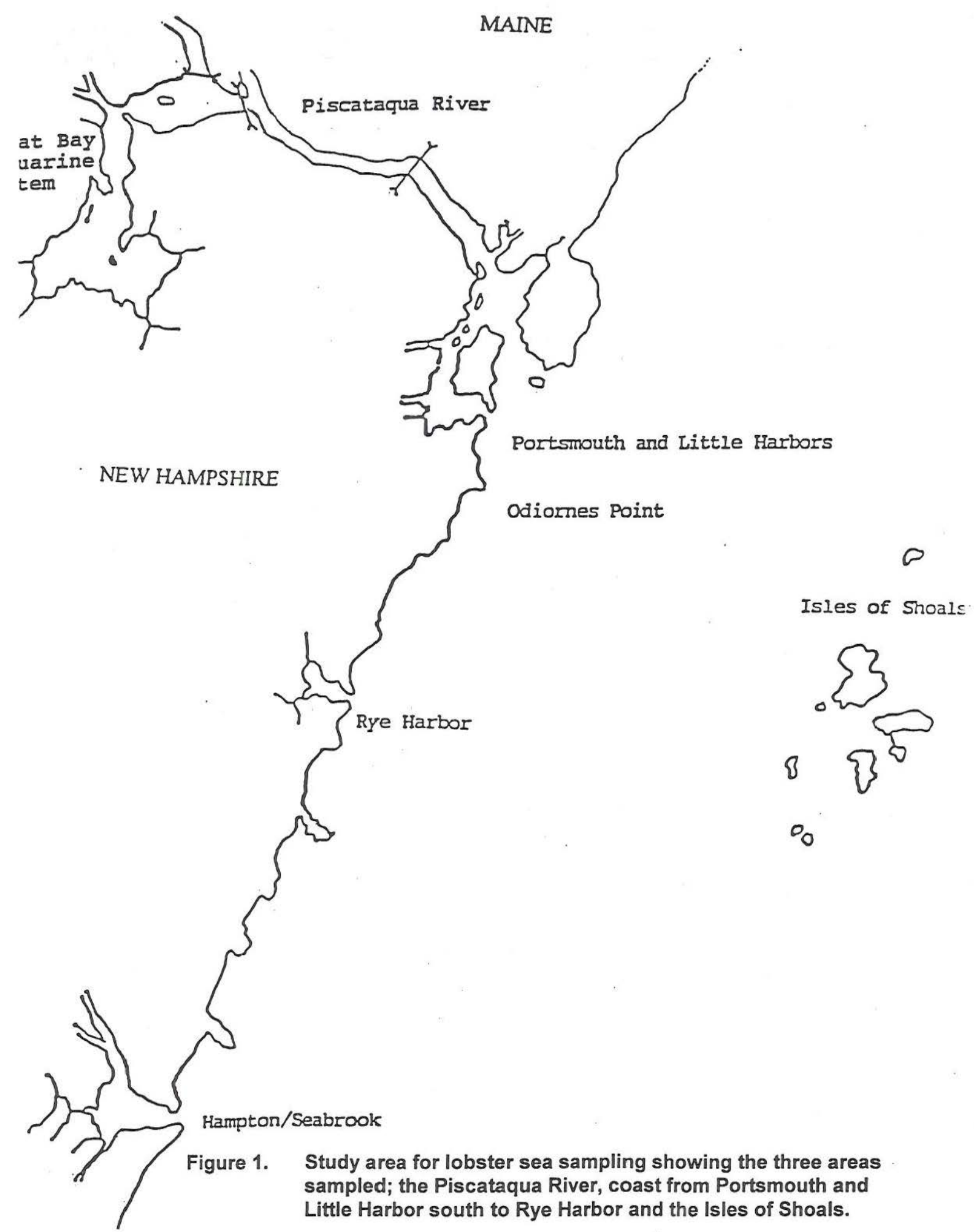

Figure 1. **Study area for lobster sea sampling showing the three areas sampled; the Piscataqua River, coast from Portsmouth and Little Harbor south to Rye Harbor and the Isles of Shoals.**

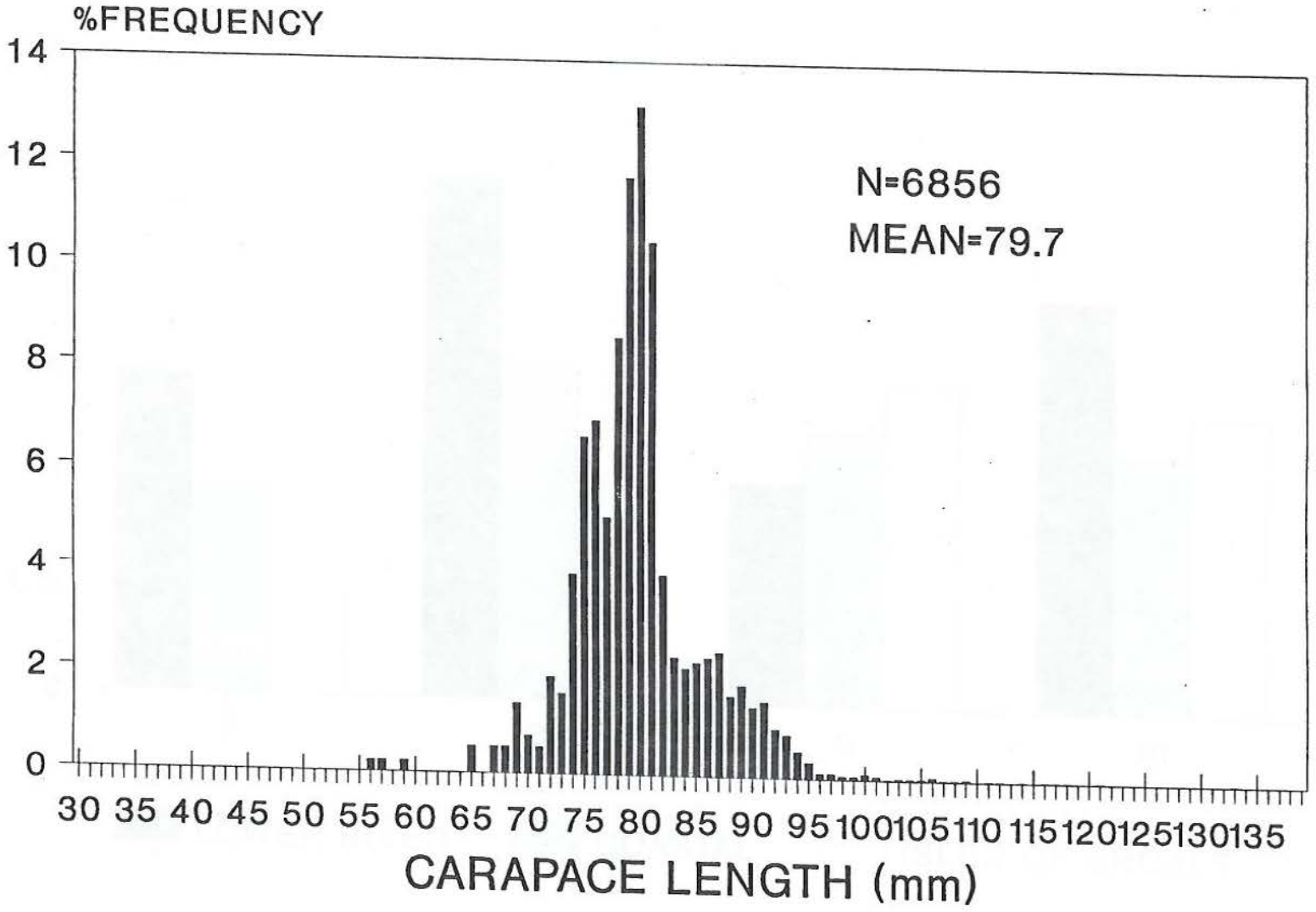

Figure 2. Length frequency distribution of sea sampled lobsters, 1997.

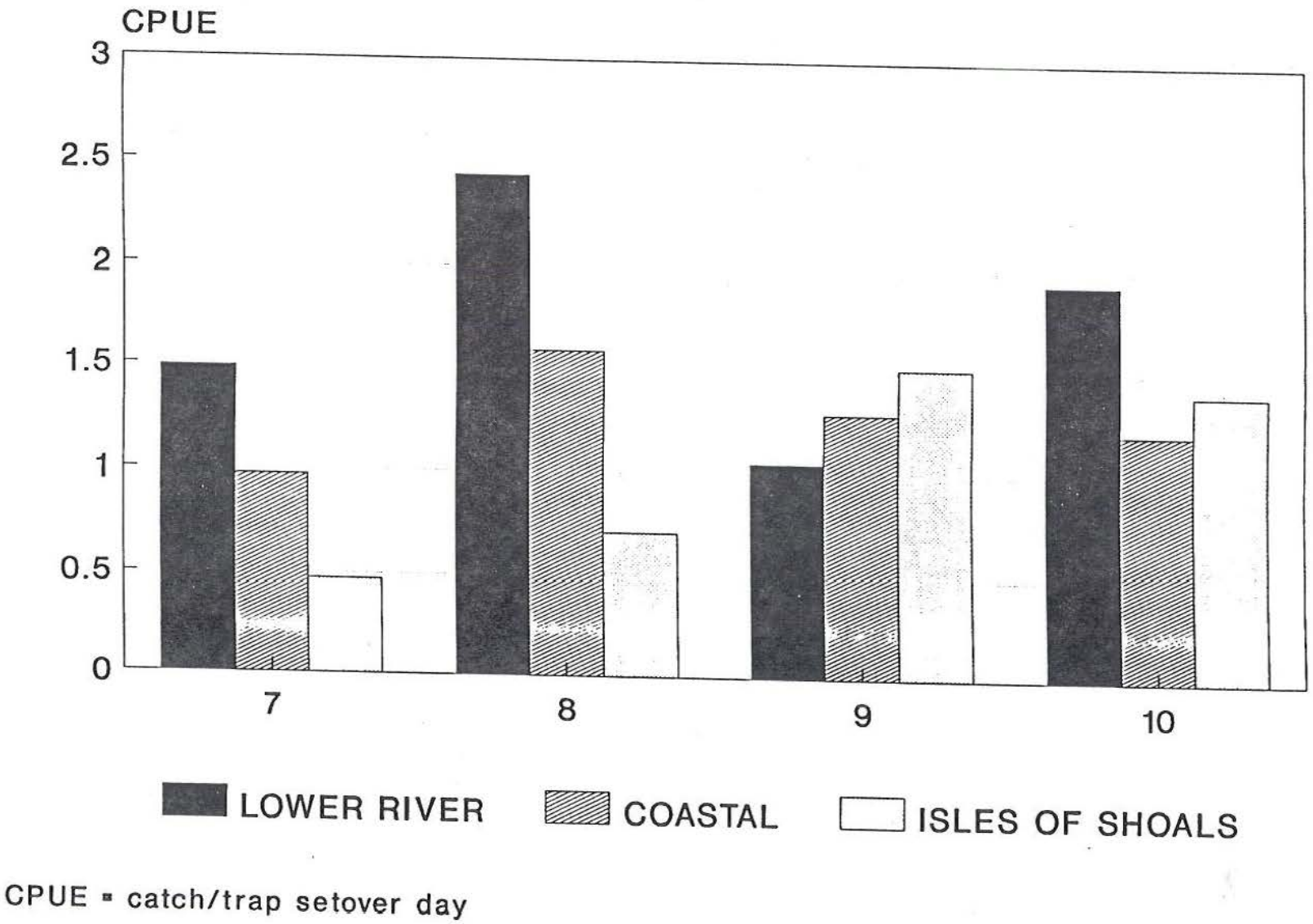

Figure 3. Catch rate of 1997 sea sampled lobsters by area and month.

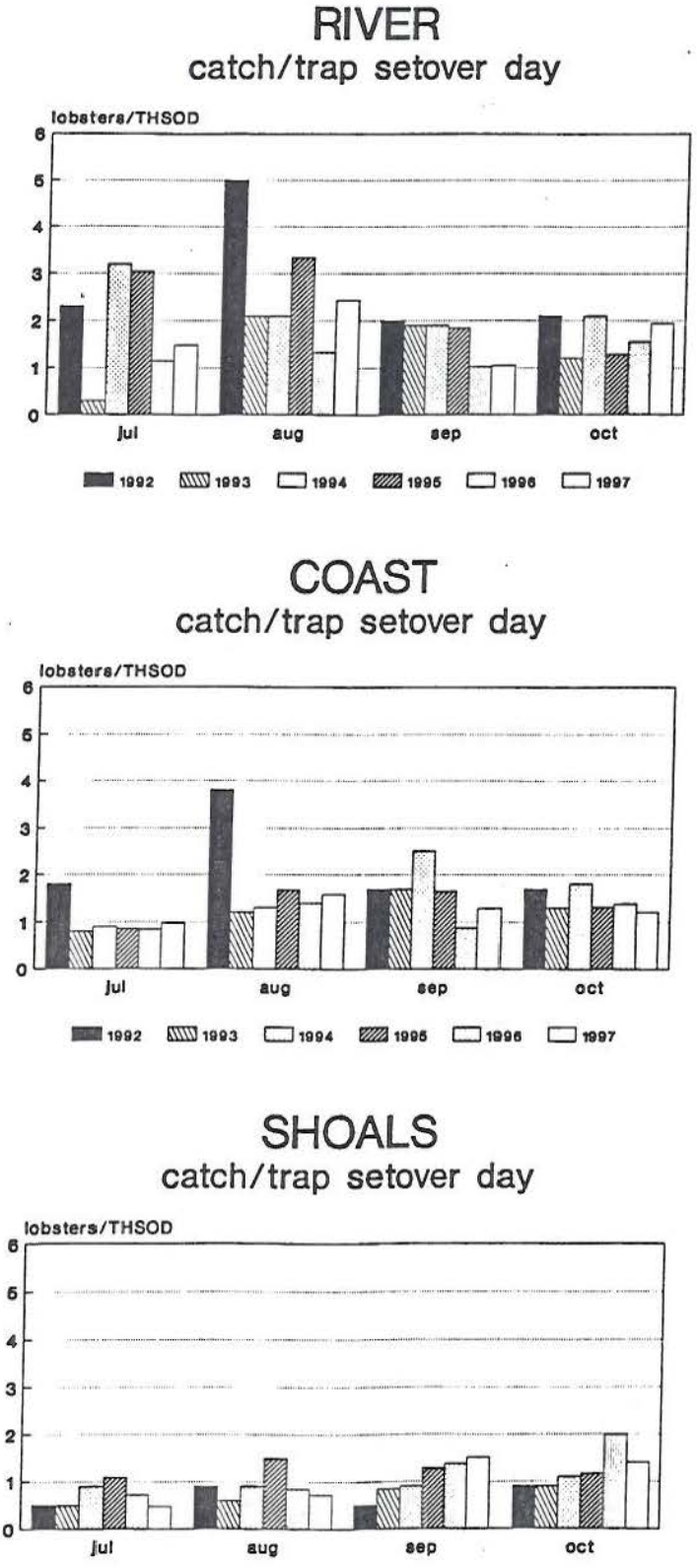

Figure 4. Comparison of sea sampled lobster catch per unit effort for 1992 to 1997.

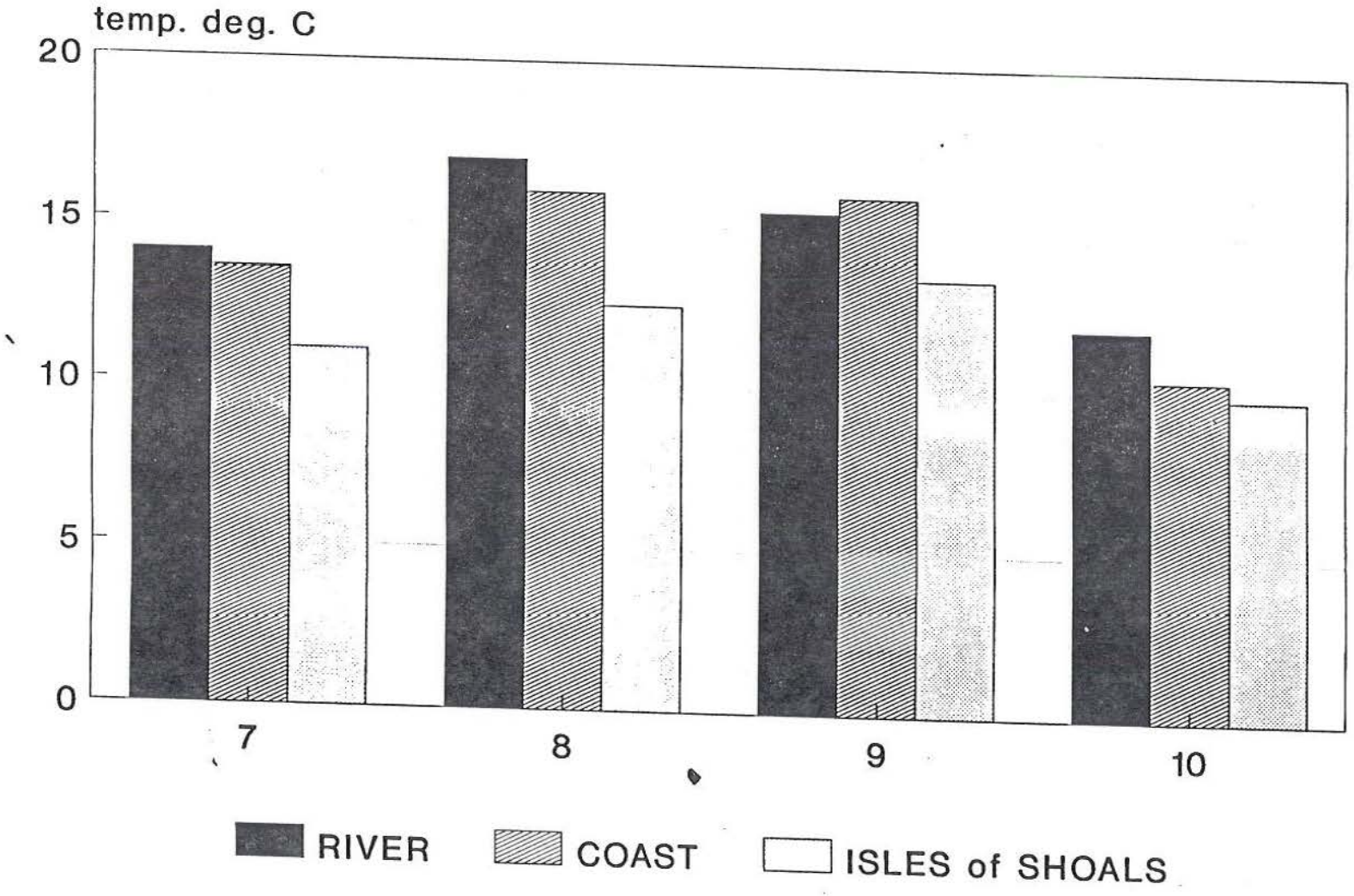

Figure 5. Water Temperature July - October, 1997.

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STATE OF NEW HAMPSHIRE FISH AND GAME DEPARTMENT
Federal Grant Financial Report

Title: Atlantic Coastal Act Program

Federal ID: NA66FG0335
Grant Period: 10/01/96-12/31/97
Report date: 3/3/98

Division Chief: John Nelson
Project Manager:

FINANCIAL ACTIVITY

	STATE			FEDERAL			TOTAL		
	ACTUAL	BUDGET	VARIANCE	ACTUAL	BUDGET	VARIANCE	ACTUAL	BUDGET	VARIANCE
Project	0.00	0.00	0.00	31,973.30	64,343.00	32,369.70	31,973.30	64,343.00	32,369.70
Equipment	0.00	0.00	0.00	10,412.25	9,589.00	(823.25)	10,412.25	9,589.00	(823.25)
In-Kind Match	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Indirect Cost	0.00	0.00	0.00	3,245.35	6,418.00	3,172.65	3,245.35	6,418.00	3,172.65
Adjustments -Round	0.00	0.00	0.00	0.35	0.00	(0.35)	0.35	0.00	(0.35)
TOTALS	0.00	0.00	0.00	45,631.25	80,350.00	34,718.75	45,631.25	80,350.00	34,718.75