NOAA Technical Memorandum NMFS-NE-171

Length-Weight Relationships for 74 Fish Species Collected during NEFSC Research Vessel Bottom Trawl Surveys, 1992-99

U. S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
Northeast Fisheries Science Center
Woods Hole, Massachusetts

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Length-Weight Relationships for 74 Fish Species Collected during NEFSC Research Vessel Bottom Trawl Surveys, 1992-99

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[a]Robins, C.R. (chair); Bailey, R.M.; Bond, C.E.; Brooker, J.R.; Lachner, E.A.; Lea, R.N.; Scott, W.B. 1991. Common and scientific names of fishes from the United States and Canada. 5th ed. *Amer. Fish. Soc. Spec. Publ.* 20; 183 p.

[b]Turgeon, D.D. (chair); Quinn, J.F., Jr.; Bogan, A.E.; Coan, E.V.; Hochberg, F.G.; Lyons, W.G.; Mikkelsen, P.M.; Neves, R.J.; Roper, C.F.E.; Rosenberg, G.; Roth, B.; Scheltema, A.; Thompson, F.G.; Vecchione, M.; Williams, J.D. 1998. Common and scientific names of aquatic invertebrates from the United States and Canada: mollusks. 2nd ed. *Amer. Fish. Soc. Spec. Publ.* 26; 526 p.

[c]Williams, A.B. (chair); Abele, L.G.; Felder, D.L.; Hobbs, H.H., Jr.; Manning, R.B.; McLaughlin, P.A.; Pérez Farfante, I. 1989. Common and scientific names of aquatic invertebrates from the United States and Canada: decapod crustaceans. *Amer. Fish. Soc. Spec. Publ.* 17; 77 p.

[d]Rice, D.W. 1998. Marine mammals of the world: systematics and distribution. *Soc. Mar. Mammal. Spec. Publ.* 4; 231 p.

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[f]McEachran, J.D.; Dunn, K.A. 1998. Phylogenetic analysis of skates, a morphologically conservative clade of elasmobranchs (Chondrichthyes: Rajidae). *Copeia* 1998(2):271-290.

[g]ISO [International Organization for Standardization]. 1981. ISO standards handbook 3: statistical methods. 2nd ed. Geneva, Switzerland: ISO; 449 p.

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Acronyms

FSCS = Fisheries Scientific Computer System
NEFSC = Northeast Fisheries Science Center
NODC = National Oceanographic Data Center

ABSTRACT

This study is the first comprehensive examination of spatially and temporally synoptic length-weight observations collected along the Northeast coast of the United States during the Northeast Fisheries Science Center's (NEFSC's) research vessel winter, spring, and autumn bottom trawl surveys from 1992 to 1999. Linear regression using natural logarithmic transformation data was performed to calculate *a* and *b* coefficients. Analysis of covariance was used to test for seasonal and gender differences. Length-weight parameters were calculated for 74 fish species: 39 species showed seasonal differences, and 28 species showed gender differences. Minimum and maximum length observations for the first 37 years of the time series (*i.e.*, 1963-99) of NEFSC research vessel bottom trawl surveys are also presented. Results from this study can be used within the "real-time" auditing of length-weight data collected by the Fisheries Scientific Computer System, the NEFSC's at-sea electronic data acquisition system.

Keywords: length-weight relationship, groundfish, demersal fish

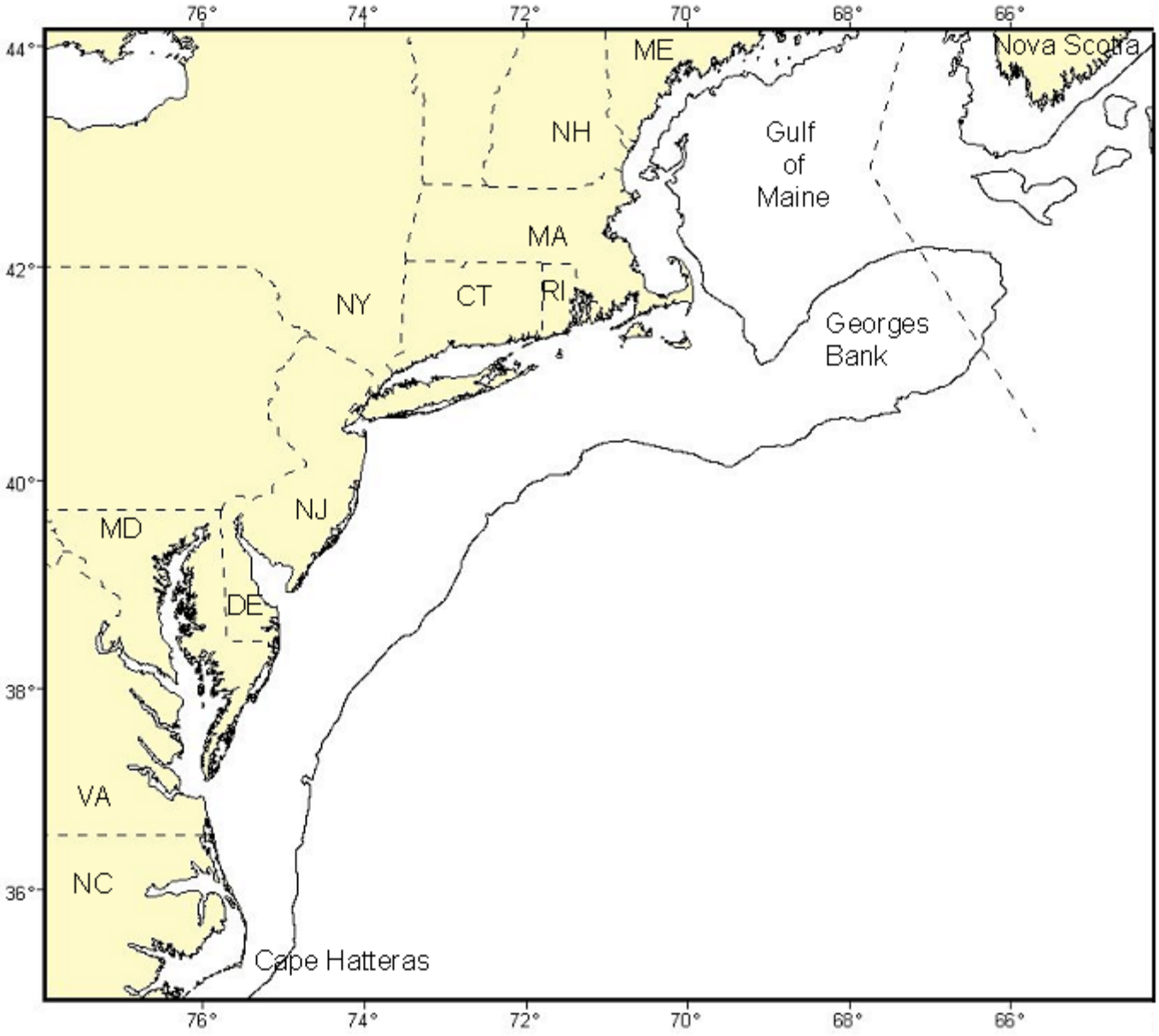

Figure 1. The continental shelf region from Cape Hatteras, North Carolina, to Nova Scotia surveyed during the NEFSC winter, spring, and autumn bottom trawl surveys.

INTRODUCTION

At the Northeast Fisheries Science Center (NEFSC), length-weight parameters are routinely used in the estimation of numbers of fish landed in order to estimate fishery removals for stock assessments (*e.g.*, see Wigley and Serchuk 1992). Additionally, length-weight relationships have been used in the auditing of NEFSC research vessel survey catch and biological data. However, many of the length-weight parameter values currently being used in the audit applications were derived from studies with limited sample sizes, combined genders, incomplete length ranges, restricted seasonal and/or geographical coverage, or, in many cases, from studies of unknown origin. Since the advent of recording individual fish weight during NEFSC bottom trawl surveys in 1992, numerous spatially and temporally synoptic length-weight observations have been obtained. This study is the first comprehensive examination of these data to update the length-weight parameters.

A consideration for updating these length-weight parameters is their use in the NEFSC's survey auditing procedures. Those procedures use length-weight equations at two levels: the species catch level and the individual fish level. At the species catch level, the audit calculates a derived weight for the catch based upon the length frequency of the catch, and compares that derived weight with the observed weight of the catch. At the individual fish level, the audit compares the derived weight of the individual fish with the observed weight of that individual. Updated parameters, especially those sensitive to gender and seasonal differences, could improve the effectiveness of the auditing procedures.

Another consideration for updating the length-weight parameters is the recent implementation of the Fisheries Scientific Computer System (FSCS), an at-sea electronic data acquisition system on board NEFSC research vessels. Within this system, data (*i.e.*, lengths and weights) are digitally recorded, thus enabling real-time auditing of these data using a length-weight equation during the data collection phase. When observed weights deviate from predicted weights, the FSCS produces an error message requiring a manual override which, in turn, slows down data collection. Updated parameters could minimize error messages within the FSCS for those species for which current length-weight relationships are problematic.

METHODS

DATA SOURCES

The NEFSC has conducted research vessel bottom trawl surveys to assess the distribution and relative abundance of groundfish along the east coast of the United States during the past three decades (Grosslein 1969; Azarovitz 1981). The survey employs a stratified random sampling design with tows at depths ranging from 5 to 366 meters. Geographic coverage of the spring and autumn surveys is from Cape Hatteras to Nova Scotia, and the winter survey from Cape Hatteras to the southern flank of Georges Bank (Figure 1).

Beginning in 1992, biological sampling procedures were expanded to include recording individual fish weight, in addition to recording the fish's length, gender, and maturity stage. Aboard ship, the fish are measured live or freshly killed to the nearest centimeter (total length or fork length, depending on the species, except for rays, where disk width is measured from wing tip to wing tip), and weighed (whole fish) to the nearest 0.001 kg. Gender and maturity stage of the fish are examined macroscopically and recorded into the following categories: 1) unsexed, male, or female; and 2) immature, developing, ripe, ripe & running, spent, or resting (Burnett *et al.* 1989).

Although many species exhibit dimorphoric growth by sex, the survey procedures for measuring and enumerating fish is, for the most part, conducted at an unsexed species level. However, a few exceptions occur for those species for which gender can be determined from external physical characteristics. Length data by species and gender are collected for spiny dogfish, smooth dogfish, American lobsters, and various crab species. Common and scientific names used throughout this study are in accordance with those endorsed by the American Fisheries Society (Williams *et al.* 1989; Robins *et al.* 1991; Turgeon *et al.* 1998), with the exception of some flounders (Cooper and Chapleau 1998) and rays (McEachran and Dunn 1998) which have undergone subsequent systematic revision.

Species for which five or more length-weight observations existed were analyzed in this study. For most species, data from two or three seasons were available; however, for a few species, a limited number of observations were available for a single season. Due to the limited geographic coverage of the winter survey, data from the winter surveys were excluded from analyses for several species, such as Acadian redfish, whose primary distribution occurs within the Gulf of Maine.

LENGTH-WEIGHT PARAMETERS

Length and weight observations were transformed using natural logarithms, and were plotted for visual inspection of outliers. Only extreme outliers attributed to data error were omitted from the analyses.

Where sufficient data were available, analysis of covariance (*i.e.*, test for homogeneity of slopes) was performed using PROC GLM (SAS Institute1985) to detect significant differences ($P < 0.05$) between season and gender. Since the NEFSC species audit compares observed catch weight with predicted catch weight based on the length frequency of observed fish, the first task was to test for seasonal differences in length-weight parameters for each species

(with genders combined). Further exploration of the data was then conducted to determine if gender differences existed within seasonal group. Length-weight parameters were estimated by gender within a seasonal group as appropriate, according to the following linear regression using PROC REG (SAS Institute 1985):

$$\ln W = \ln a + b \ln L$$

where W = weight (kg), L = length (cm), a = y-intercept, and b = slope.

Residuals from the linear regressions were plotted and visually inspected for trends. Since raw data for existing length-weight relationships were not available for more rigorous statistical analysis, comparisons with length-weight relationships derived in this study were performed as follows: 1) 95% confidence intervals were derived for each length-weight relationship; 2) significant differences occurred if the predicted weights from the existing relationship fell outside the 95% confidence interval of the new length-weight relationship.

LENGTH RANGES

To evaluate whether the 1992-99 data used in this study to derive length-weight relationships were representative of the length ranges available to the survey for each species, historical observations of minimum and maximum lengths collected during NEFSC spring, autumn, and winter research vessel bottom trawl surveys from 1963 to 1999 were updated and compared to minimum and maximum lengths in this study. Additionally, range ratios were calculated by dividing the study length range by the historical length range.

The update of these length ranges was expanded beyond the 74 species in this study to include all species sampled during the surveys. This updated information can be utilized as part of the real-time audit of length measurements within the FSCS.

RESULTS

LENGTH-WEIGHT PARAMETERS

Between 1992 and 1999, a total of 24 NEFSC research vessel bottom trawl surveys were conducted, during which 242,693 individual fish length and weight observations were recorded for the 74 fish species (comprising 2 classes, 9 orders, and 35 families) analyzed in this study. Sample sizes ranged from six for greater amberjack, northern kingfish, and smooth butterfly ray, to 26,590 for spiny dogfish (Table 1). In Table 1 and all subsequent tables, species are ordered according to the National Oceanographic Data Center (NODC) taxonomic code.

For 19 species, data were not available for multiple seasons, precluding seasonal analyses for those species. Of the remaining 55 species, 16 did not exhibit significantly different (P <0.05) length-weight relationships by season; 39 did. For four species (*i.e.*, round herring, Atlantic thread herring, Atlantic spadefish and buckler dory), data were not available on gender, precluding gender analyses for these species. Of the remaining 70 species, 28 had significantly different length-weight relationships by gender; 42 did not. Sample sizes, length ranges, length-weight parameter estimates and the standard deviations (standard errors) of those estimates, standard errors of the weight estimates, and regression correlation coefficients are presented in Table 1 by species for appropriate season or seasonal groups and for gender.

Although residual patterns generally showed no trend, a few exceptions should be noted. For some species, residual patterns (either positive or negative) existed for smaller fish, and may relate to the sensitivity of the Marel weighing scales in open-deck environments and/or recorder bias in determining a true weight during scale fluctuations in heavy seas. Small sea ravens exhibited negative residuals, which might be attributed to some size specificity in the characteristic behavior of this species to "gulp" water when captured. The analysis of bluefish in the spring revealed a pattern in which residuals were negative at smaller sizes and became positive at larger sizes; although this pattern would normally result in rejection of the regression, the analysis was retained due to the possibility that fish greater than 40 cm (the length around which the residuals pivoted) collected in the southern portion of the survey might be reproductively active and therefore include the weight of the maturing gonad. Scup exhibited a funnel-shaped residual pattern, with decreasing deviation as fish length increased; this pattern may be related to the log-log transformation model used in the study (Pienaar and Thomson 1969).

Comparisons of length-weight relationships established by this study with those currently used in the NEFSC auditing process indicated no significant differences at the catch level (genders combined) for 42 of 74 species. However, there were nine instances in which the weights predicted by the current length-weight relationships fell entirely outside of the 95% confidence intervals of the weights predicted by this study. These species were: chain dogfish, rosette skate, southern stingray, bluntnose stingray, cownose ray, Atlantic thread herring, fawn cusk-eel, Atlantic spadefish, and spot. For Atlantic angel shark, predicted weights from the current relationship for intermediate-sized fish occurred within the confidence interval, but those for smaller- and larger-sized fish did not. There were five species for which predicted weights from the current relationship were significantly different for larger fish (*i.e.*, Atlantic sturgeon, round herring, Atlantic herring, greater amberjack, and cunner), and 17 species for which smaller fish were problematic (*i.e.*, spiny butterfly ray, Atlantic sharpnose shark, smooth dogfish, spiny dogfish, clearnose skate, Spanish sardine, red hake, alewife, cusk, silver hake, Acadian

redfish, bluefish, black sea bass, scup, southern kingfish, fourspot flounder, and witch flounder).

There were seven species for which gender-specific predicted weights from the current length-weight relationship were significantly different from gender-specific predicted weights in this study (*i.e.*, rosette skate, red hake, white hake, Acadian redfish, striped bass, weakfish, and yellowtail flounder). No comparisons were possible for the seven species for which no current gender-specific relationship existed (*i.e.*, clearnose skate, little skate, winter skate, spiny butterfly ray, longhorn sculpin, ocean pout, and sea raven).

LENGTH RANGES

Generally, the length ranges used to derive length-weight relationships in this study represented a significant proportion of the ranges which have been historically observed, as evidenced by an all-species average range ratio of 72% (Table 2). For 14 species, range ratios were below 0.50, suggesting that the length ranges utilized in this study may not have represented the historically observed length range. However, for 10 of those 14 species, sample sizes were quite small (*i.e.*, Atlantic torpedo ray, smooth butterfly ray, Atlantic sturgeon, alewife, northern searobin, greater amberjack, vermilion snapper, northern kingfish, Atlantic spadefish, and tautog). There appeared to be adequate sample sizes for the remaining four species with range ratios below 0.50, but larger-sized specimens of those species were noticeably absent from the study data set (*i.e.*, Atlantic sharpnose shark, Spanish sardine, fawn cusk-eel, and Spanish mackerel; Table 2).

The observed minimum and maximum lengths (cm) for all species measured during NEFSC bottom trawl surveys since 1963 are summarized in Table 3. Approximately 2.83 million lengths have been obtained from species comprising 9 phyla, 25 classes, 89 orders, and 171 families. For species which are sorted by gender during the survey (*e.g.*, spiny dogfish, American lobster), length values for males, females, and unknown genders are reported in Table 3.

DISCUSSION

Zar (1968), Glass (1969), and more recently Hayes *et al.* (1995) presented information supporting the use of nonlinear least-squares regression techniques for allometric modeling; however, Xiao and Ramm (1994) concluded that the use of log-transformed data was appropriate for describing length-weight relationships in fishes. In this study, the small sample sizes associated with several species were potentially problematic with respect to asymptotic variance properties of nonlinear regression. Our choice of an allometric model was practical; linear regression using log-log transformed data facilitated statistical comparisons of gender and seasonal relationships, and allowed a single method to be applied to all species within the study, regardless of sample size.

Length-weight relationships derived in this study generally compare favorably with those of other published studies. For 35 of 78 species analyzed by Wilk *et al.* (1978) which were also examined in this study, only the relationship for fawn cusk-eel was significantly different. While this might be attributed to the larger sample size and greater size range available to Wilk *et al.* (1978), the use of the Wilk *et al.* (1978) relationship within the FSCS during the NEFSC spring 2001 bottom trawl survey resulted in numerous real-time audit messages indicating an erroneous weight for a given length. When the parameters derived in this study were substituted into FSCS, these error conditions were eliminated for subsequent fawn cusk-eel samples.

There were also no apparent differences between length-weight relationships for four of the six flatfish species derived by Lux (1969) and the relationships derived by this study; differences for witch and fourspot flounders may be related to the restricted geographical range of Lux's (1969) samples. This similarity in relationships is somewhat remarkable given the difficulties in obtaining accurate fish weights at sea prior to the development of modern electronic motion-compensated scales. Wilk *et al.* (1978) froze fish at sea and obtained thawed weights back at the laboratory, while Lux (1969) weighed his samples at sea with hand-held spring scales. This similarity in findings suggests both the diligence of these investigators as well as the underlying robustness of fish length-weight relationships to measurement error.

In summary, this study updates length-weight parameters for many species routinely encountered during NEFSC bottom trawl surveys, utilizing uniform methods and modern scale technology. The availability of whole live body weight from sexed fish collected across seasonal surveys takes into account annual cycles of fish feeding and reproduction, allowing derivation of length-weight relationships at the gender and/or season level. Analysis of these data provided insights into areas, such as length range or sample size for some species, in which additional sampling can be targeted in future surveys. The length-weight relationships derived in this study also support the improved processing of survey data within the recently-implemented FSCS environment, providing critical fishery independent data in a more timely fashion.

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Table 1. Sample size, length range (cm), length-weight parameter estimates (a and b) and the standard deviations (standard errors) of those estimates (s_a and s_b), standard error of the weight estimate (s_W), and regression correlation coefficient (r^2) for 74 fish species, by season or seasonal groups and by gender ("Unsexed" = gender not specified; "Combined" = unsexed, males, and females). (Species are ordered by NODC taxonomic code.)

Species	Season or Seasonal Group	Gender	N	Length Range (cm)	ln a	s_a	b	s_b	s_W	r^2
Sand tiger *Odontaspis taurus*	Autumn	Combined	15	150-260	-13.4887	1.0581	3.2927	0.1984	0.1169	0.9549
Chain dogfish *Scyliorhinus retifer*	Win/Aut	Combined	80	10-45	-12.9053	0.2401	3.1282	0.0667	0.1490	0.9658
		Male	55	18-45	-12.2155	0.3924	2.9322	0.1077	0.1498	0.9332
		Female	25	10-43	-13.5677	0.2266	3.3321	0.0645	0.1065	0.9915
Atlantic sharpnose shark *Rhizoprionodon terraenovae*	Autumn	Combined	101	50-100	-12.8361	0.2955	3.1069	0.0665	0.0801	0.9566
Smooth dogfish *Mustelus canis*	Autumn	Combined	1679	40-135	-12.5532	0.0449	3.0006	0.0103	0.1108	0.9808
		Male	872	40-112	-12.3265	0.0588	2.9436	0.0135	0.0974	0.9821
		Female	807	44-135	-12.7087	0.0646	3.0415	0.0147	0.1179	0.9815
	Spring	Combined	508	52-126	-13.3913	0.1346	3.1641	0.0301	0.1307	0.9563
		Male	296	52-115	-13.1021	0.1710	3.0918	0.0381	0.1135	0.9573
		Female	212	54-126	-13.7926	0.1921	3.2652	0.0431	0.1352	0.9647
	Winter	Combined	357	47-150	-13.7444	0.1290	3.2538	0.0290	0.1368	0.9726
		Male	158	51-112	-12.7517	0.1422	3.0164	0.0323	0.0943	0.9824
		Female	199	47-150	-14.1554	0.1754	3.3543	0.0391	0.1410	0.9740
Sandbar shark *Carcharhinus plumbeus*	Spr/Aut	Combined	34	63-174	-12.6740	0.2798	3.1706	0.0620	0.1222	0.9879
Spiny dogfish *Squalus acanthias*	Autumn	Combined	6986	22-106	-12.6733	0.0256	3.0596	0.0061	0.1220	0.9728
		Male	3117	23-90	-12.3144	0.0378	2.9651	0.0091	0.1141	0.9716
		Female	3869	22-106	-12.8210	0.0328	3.1012	0.0078	0.1194	0.9762
	Spring	Combined	12070	13-114	-13.2302	0.0211	3.1863	0.0050	0.1376	0.9714
		Male	4676	20-91	-12.5455	0.0301	3.0075	0.0072	0.1196	0.9738
		Female	7393	13-114	-13.4073	0.0256	3.2369	0.0060	0.1297	0.9751
	Winter	Combined	7534	22-109	-13.0195	0.0245	3.1231	0.0058	0.1266	0.9745
		Male	3691	22-94	-12.4979	0.0321	2.9871	0.0076	0.1049	0.9766
		Female	3843	22-109	-13.3403	0.0303	3.2108	0.0072	0.1211	0.9811
Atlantic angel shark *Squatina dumeril*	Autumn	Combined	17	35-120	-12.1783	0.2064	3.1420	0.0485	0.0916	0.9964
	Win/Spr	Combined	53	32-84	-11.5279	0.2434	2.9556	0.0605	0.1051	0.9791
Atlantic torpedo ray *Torpedo nobiliana*	Autumn	Combined	7	71-102	-14.4803	2.1196	3.8164	0.4790	0.1339	0.9270

Species	Season or Seasonal Group	Gender	N	Length Range (cm)	ln *a*	s_a	*b*	s_b	s_W	r^2
Clearnose skate *Raja eglanteria*	Win/Spr/Aut	Combined	99	22-71	-13.8683	0.2567	3.4235	0.0638	0.1446	0.9674
		Male	38	37-68	-14.1912	0.4826	3.4918	0.1193	0.1091	0.9597
		Female	59	22-71	-13.8600	0.3105	3.4291	0.0774	0.1596	0.9718
Little skate *Leucoraja erinacea*	Winter	Combined	4196	10-54	-12.4971	0.0335	3.1310	0.0091	0.1402	0.9656
		Male	1989	10-54	-12.4489	0.0482	3.1110	0.0131	0.1399	0.9659
		Female	2177	11-53	-12.5822	0.0459	3.1604	0.0125	0.1362	0.9670
	Spring	Combined	5897	8-59	-12.4462	0.0237	3.1280	0.0066	0.1507	0.9747
		Male	2610	9-57	-12.3175	0.0323	3.0842	0.0089	0.1384	0.9788
		Female	3253	8-59	-12.6115	0.0334	3.1805	0.0093	0.1494	0.9732
	Autumn	Combined	3555	6-63	-12.6020	0.0273	3.1567	0.0075	0.1309	0.9806
		Male	1559	10-63	-12.5172	0.0375	3.1247	0.0103	0.1265	0.9834
		Female	1971	6-60	-12.6889	0.0381	3.1872	0.0104	0.1271	0.9796
Barndoor skate *Dipturus laevis*	Win/Aut	Combined	67	23-121	-13.3224	0.1289	3.2919	0.0325	0.1063	0.9936
Winter skate *Leucoraja ocellata*	Winter	Combined	2037	13-106	-13.0892	0.0353	3.3111	0.0089	0.1214	0.9855
		Male	1015	20-106	-13.0672	0.0466	3.3029	0.0116	0.1185	0.9877
		Female	1004	16-91	-13.2020	0.0571	3.3428	0.0146	0.1233	0.9811
	Spring	Combined	3058	13-106	-13.0088	0.0329	3.2993	0.0083	0.1293	0.9810
		Male	1286	16-106	-12.9598	0.0462	3.2819	0.0116	0.1256	0.9843
		Female	1760	13-98	-13.1083	0.0464	3.3285	0.0118	0.1299	0.9783
	Autumn	Combined	2754	14-111	-13.1531	0.0302	3.3199	0.0075	0.1177	0.9861
		Male	1161	14-111	-13.0591	0.0417	3.2904	0.0103	0.1178	0.9888
		Female	1583	16-100	-13.3419	0.0430	3.3719	0.0108	0.1133	0.9841
Rosette skate *Leucoraja garmani*	Spring	Combined	10	32-43	-13.6734	1.6389	3.3526	0.4508	0.1003	0.8737
	Autumn	Combined	22	14-42	-12.5504	0.2384	3.0718	0.0690	0.1086	0.9900
		Male	11	14-42	-12.4771	0.1835	3.0307	0.0537	0.0607	0.9972
		Female	11	15-42	-12.4737	0.3467	3.0688	0.0993	0.1073	0.9907
Smooth skate *Malacoraja senta*	Spring	Combined	60	18-65	-12.5408	0.2045	3.0655	0.0553	0.1322	0.9815
	Autumn	Combined	72	15-62	-13.0139	0.1306	3.1812	0.0352	0.1039	0.9915
Thorny skate *Amblyraja radiata*	Win/Spr/Aut	Combined	1044	10-105	-12.0880	0.0363	3.1197	0.0096	0.1521	0.9902
Southern stingray [a] *Dasyatis americana*	Spr/Aut	Combined	10	45-100	-10.9402	0.3289	3.1428	0.0802	0.0558	0.9948
Roughtail stingray [a] *Dasyatis centroura*	Autumn	Combined	27	36-155	-10.3320	0.0582	3.0222	0.0520	0.1632	0.9908

Species	Season or Seasonal Group	Gender	N	Length Range (cm)	ln *a*	s_a	*b*	s_b	s_W	r^2
Bluntnose stingray [a] *Dasyatis say*	Autumn	Combined	149	18-104	-10.8751	0.0944	3.2275	0.0247	0.1295	0.9915
	Spring	Combined	7	39-103	-10.5372	0.1955	3.0527	0.0453	0.0422	0.9989
Spiny butterfly ray [a] *Gymnura altavela*	Spring	Combined	16	52-187	-13.0635	0.3636	3.3060	0.0783	0.1336	0.9922
	Autumn	Combined	67	38-210	-12.4197	0.1267	3.1787	0.0281	0.0906	0.9949
Smooth butterfly ray [a] *Gymnura micrura*	Autumn	Combined	6	40-84	-11.7989	0.4536	3.0742	0.1104	0.0820	0.9949
Bullnose ray [a] *Myliobatis freminvillei*	Autumn	Combined	222	28-129	-12.1806	0.0768	3.2885	0.0195	0.0944	0.9923
Cownose ray [a] *Rhinoptera bonasus*	Autumn	Combined	78	34-103	-11.8649	0.1821	3.2327	0.0464	0.0754	0.9846
	Spring	Combined	5	43-51	-7.8039	0.8913	2.0958	0.2308	0.0309	0.9649
Atlantic sturgeon *Acipenser oxyrhynchus*	Spr/Aut	Combined	9	84-159	-14.2902	0.5509	3.4547	0.1164	0.0821	0.9921
American shad *Alosa sapidissima*	Spr/Aut	Combined	120	8-53	-12.1377	0.1419	3.2207	0.0427	0.1792	0.9797
Blueback herring *Alosa aestivalis*	Spring	Combined	102	7-29	-12.2146	0.1375	3.2428	0.0472	0.1332	0.9792
Alewife *Alosa pseudoharengus*	Spr/Aut	Combined	20	10-27	-13.3875	0.5321	3.6716	0.1796	0.1936	0.9587
Atlantic herring *Clupea harengus*	Autumn	Combined	3779	4-34	-11.5760	0.0391	2.9794	0.0123	0.1314	0.9400
		Male	1908	10-34	-11.3460	0.0575	2.9055	0.0180	0.1235	0.9318
		Female	1812	11-34	-11.6549	0.0660	3.0065	0.0206	0.1365	0.9220
	Spring	Combined	7101	5-37	-11.7972	0.0217	3.0314	0.0070	0.1345	0.9636
		Male	3244	10-37	-11.5442	0.0336	2.9545	0.0107	0.1219	0.9590
		Female	3384	10-34	-11.5600	0.0322	2.9570	0.0103	0.1270	0.9607
	Winter	Combined	2126	8-33	-11.2575	0.0455	2.8559	0.0144	0.1303	0.9486
Round herring *Etrumeus teres*	Autumn	Unsexed	313	11-20	-11.4756	0.1509	2.9645	0.0573	0.1167	0.8959
Atlantic thread herring *Opisthonema oglinum*	Autumn	Unsexed	102	5-18	-12.9785	0.1083	3.7242	0.0426	0.1780	0.9871
Spanish sardine *Sardinella aurita*	Autumn	Combined	98	8-18	-11.8132	0.2994	3.1463	0.1254	0.1390	0.8678
Goosefish *Lophius americanus*	Autumn	Combined	961	5-98	-10.7106	0.0404	2.9227	0.0118	0.2007	0.9845
	Win/Spr	Combined	2850	9-101	-10.7668	0.0334	2.9302	0.0092	0.1900	0.9728
		Male	1427	10-74	-10.5530	0.0504	2.8696	0.0138	0.1813	0.9681
		Female	1356	11-101	-10.8690	0.0494	2.9608	0.0135	0.1957	0.9726

Species	Season or Seasonal Group	Gender	N	Length Range (cm)	ln *a*	s_a	*b*	s_b	s_W	r^2
Atlantic cod *Gadus morhua*	Winter	Combined	755	13-116	-11.7677	0.0411	3.0527	0.0104	0.1065	0.9913
	Spring	Combined	3206	4-141	-11.7803	0.0177	3.0606	0.0045	0.1187	0.9930
	Autumn	Combined	3078	4-120	-11.9920	0.0180	3.1262	0.0047	0.1087	0.9931
Pollock *Pollachius virens*	Autumn	Combined	1097	13-112	-11.8353	0.0316	3.1151	0.0086	0.1099	0.9917
	Win/Spr	Combined	1144	13-105	-11.9004	0.0228	3.1024	0.0062	0.1101	0.9954
Red hake *Urophycis chuss*	Winter	Combined	1391	3-54	-12.2601	0.0295	3.0661	0.0092	0.1703	0.9877
		Male	490	7-39	-12.1244	0.0753	3.0164	0.0232	0.1339	0.9719
		Female	720	7-54	-12.4700	0.0562	3.1338	0.0165	0.1258	0.9804
	Spring	Combined	4967	3-58	-12.3743	0.0151	3.0979	0.0046	0.1395	0.9893
		Male	2152	6-52	-12.4431	0.0259	3.1139	0.0079	0.1220	0.9863
		Female	2488	6-58	-12.6066	0.0242	3.1684	0.0070	0.1153	0.9879
	Autumn	Combined	6223	2-68	-12.0276	0.0132	3.0162	0.0040	0.1690	0.9894
		Male	2355	8-68	-12.1720	0.0356	3.0491	0.0106	0.1193	0.9723
		Female	3213	7-62	-12.4836	0.0297	3.1533	0.0085	0.1242	0.9773
Spotted hake *Urophycis regia*	Winter	Combined	1816	4-43	-12.1682	0.0267	3.1332	0.0086	0.1647	0.9866
		Male	2786	5-35	-12.3328	0.0815	3.1791	0.0263	0.1517	0.9559
		Female	4079	4-43	-12.3610	0.0574	3.1957	0.0174	0.1442	0.9722
	Spring	Combined	2319	3-42	-11.9892	0.0202	3.0823	0.0070	0.1922	0.9881
		Male	778	5-35	-12.1924	0.0396	3.1437	0.0134	0.1482	0.9862
		Female	1079	4-42	-12.0712	0.0273	3.1139	0.0089	0.1378	0.9914
	Autumn	Combined	3378	12-41	-11.9634	0.0317	3.0927	0.0101	0.1174	0.9651
		Male	1331	13-32	-11.0718	0.0524	2.7812	0.0174	0.0982	0.9506
		Female	2038	12-41	-11.8596	0.0423	3.0696	0.0132	0.1124	0.9637
White hake *Urophycis tenuis*	Autumn	Combined	3889	4-126	-12.4000	0.0193	3.1715	0.0052	0.1363	0.9897
		Male	1790	7-95	-12.6846	0.0341	3.2506	0.0094	0.1203	0.9853
		Female	1990	7-126	-12.6741	0.0311	3.2407	0.0081	0.1280	0.9878
	Spring	Combined	2054	10-105	-12.9500	0.0294	3.2903	0.0079	0.1165	0.9884
		Male	883	14-105	-12.9063	0.0548	3.2812	0.0151	0.1198	0.9816
		Female	1155	12-104	-13.0099	0.0392	3.3039	0.0102	0.1130	0.9891
	Winter	Combined	189	26-87	-13.1714	0.0998	3.3669	0.0268	0.0952	0.9883
Cusk *Brosme brosme*	Win/Spr/Aut	Combined	186	6-95	-12.2140	0.0706	3.1785	0.0179	0.1006	0.9942

Species	Season or Seasonal Group	Gender	N	Length Range (cm)	ln *a*	s_a	*b*	s_b	s_W	r^2
Haddock *Melanogrammus aeglefinus*	Autumn	Combined	3959	7-88	-11.8111	0.0127	3.0888	0.0036	0.1183	0.9947
	Win/Spr	Combined	3166	4-87	-11.8062	0.0157	3.0766	0.0044	0.1004	0.9937
		Male	1447	13-77	-11.7438	0.0220	3.0572	0.0061	0.0951	0.9943
		Female	1629	13-87	-11.8655	0.0241	3.0949	0.0066	0.1024	0.9927
Silver hake *Merluccius bilinearis*	Winter	Combined	2975	5-51	-12.3367	0.0205	3.1056	0.0065	0.1555	0.9873
	Spring	Combined	8158	4-58	-12.4934	0.0126	3.1512	0.0042	0.1538	0.9858
	Autumn	Combined	11965	3-63	-12.1353	0.0098	3.0606	0.0032	0.1713	0.9875
		Male	4042	7-41	-12.2351	0.0290	3.0869	0.0092	0.1193	0.9652
		Female	6181	7-63	-12.6439	0.0214	3.2186	0.0065	0.1264	0.9755
Offshore hake *Merluccius albidus*	Win/Spr/Aut	Combined	145	8-51	-12.2964	0.0927	3.1323	0.0276	0.0969	0.9890
Fawn cusk-eel *Lepophidium profundorum*	Spr/Aut	Combined	78	13-28	-13.7333	0.2467	3.2359	0.0813	0.1476	0.9542
Ocean pout *Macrozoarces americanus*	Win/Aut	Combined	1878	10-84	-13.5168	0.0403	3.2995	0.0105	0.1450	0.9813
	Spring	Combined	2242	7-98	-13.6429	0.0466	3.3459	0.0119	0.1610	0.9725
		Male	1060	18-84	-13.6860	0.0688	3.3592	0.0175	0.1632	0.9722
		Female	1142	15-76	-13.6464	0.0710	3.3442	0.0182	0.1579	0.9674
Buckler dory *Zenopsis conchifera*	Spr/Aut	Unsexed	23	9-53	-11.3806	0.1749	3.0387	0.0586	0.1187	0.9922
Acadian redfish *Sebastes fasciatus*	Spr/Aut	Combined	6739	3-47	-11.7005	0.0130	3.2036	0.0041	0.1304	0.9888
		Male	2974	6-44	-11.4401	0.0256	3.1151	0.0082	0.1092	0.9797
		Female	3290	7-47	-11.7713	0.0228	3.2297	0.0070	0.1161	0.9846
Blackbelly rosefish *Helicolenus dactylopterus*	Spr/Aut	Combined	38	4-35	-11.1324	0.1238	3.0512	0.0428	0.1407	0.9930
Northern searobin *Prionotus carolinus*	Spring	Combined	17	21-34	-12.9982	0.3821	3.4712	0.1168	0.0720	0.9833
Sea raven *Hemitripterus americanus*	Winter	Combined	257	14-52	-11.5420	0.1523	3.1822	0.0443	0.1906	0.9529
	Spring	Combined	1449	8-64	-11.3646	0.0575	3.1551	0.0168	0.1988	0.9607
	Autumn	Combined	964	7-68	-11.5001	0.0552	3.1822	0.0162	0.1909	0.9756
		Male	396	9-53	-11.1562	0.0920	3.0726	0.0270	0.1771	0.9705
		Female	513	7-68	-11.7441	0.0808	3.2590	0.0235	0.1922	0.9741
Longhorn sculpin *Myoxocephalus octodecemspinosus*	Spring	Combined	2969	5-37	-11.8348	0.0322	3.1067	0.0100	0.1226	0.9702
	Win/Aut	Combined	2464	4-37	-11.5589	0.0257	3.0250	0.0081	0.1148	0.9828
		Male	861	8-36	-11.6352	0.0581	3.0461	0.0184	0.1030	0.9696
		Female	1514	6-37	-11.7330	0.0447	3.0800	0.0138	0.1099	0.9706

Species	Season or Seasonal Group	Gender	N	Length Range (cm)	ln *a*	s_a	*b*	s_b	s_W	r^2
Striped bass *Morone saxatilis*	Spring	Combined	191	23-93	-11.7959	0.0800	3.1383	0.0206	0.1012	0.9919
		Male	76	23-81	-11.9776	0.1314	3.1998	0.0332	0.0977	0.9921
		Female	110	24-93	-11.5476	0.0762	3.0627	0.0199	0.0751	0.9955
	Autumn	Combined	102	49-102	-11.3773	0.2788	3.0139	0.0065	0.0967	0.9550
		Male	32	49-85	-10.8121	0.5170	2.8888	0.1222	0.0955	0.9491
		Female	53	50-102	-12.2380	0.3904	3.2072	0.0906	0.0932	0.9609
Black sea bass *Centropristis striata*	Autumn	Combined	794	3-45	-11.2205	0.0296	3.0225	0.0108	0.1899	0.9900
		Male	144	6-44	-10.7680	0.1122	2.8679	0.0358	0.1527	0.9783
		Female	393	5-45	-11.0314	0.0747	2.9709	0.0248	0.1295	0.9736
	Spring	Combined	458	4-54	-11.5992	0.0552	3.1220	0.0174	0.1690	0.9860
	Winter	Combined	998	4-49	-11.4782	0.0343	3.0743	0.0112	0.1825	0.9869
Bluefish *Pomatomus saltatrix*	Winter	Combined	54	32-72	-10.5191	0.3314	2.8071	0.0838	0.1318	0.9557
	Spring	Combined	67	3-79	-10.5744	0.1433	2.8040	0.0375	0.1418	0.9885
	Autumn	Combined	2112	4-80	-11.4296	0.0154	3.0548	0.0046	0.1173	0.9952
Greater amberjack *Seriola dumerili*	Autumn	Combined	6	30-80	-9.8906	0.2585	2.7221	0.0659	0.0584	0.9977
Scup *Stenotomus chrysops*	Autumn	Combined	2456	4-30	-11.0698	0.0232	3.1365	0.0091	0.1530	0.9800
	Win/Spr	Combined	853	6-38	-11.5033	0.0448	3.2446	0.0167	0.1705	0.9779
Vermilion snapper *Rhomboplites aurorubens*	Spring	Combined	14	8-21	-11.2151	0.2893	3.0106	0.1133	0.1136	0.9833
Weakfish *Cynoscion regalis*	Autumn	Combined	3027	3-70	-11.4157	0.0159	2.9575	0.0051	0.1277	0.9911
		Male	1277	7-70	-11.3755	0.0305	2.9476	0.0094	0.1108	0.9871
		Female	1374	10-70	-11.4663	0.0263	2.9724	0.0082	0.1060	0.9896
	Spring	Combined	105	13-62	-12.0264	0.0526	3.1338	0.0159	0.0897	0.9946
	Winter	Combined	13	36-63	-11.5030	0.2349	2.9903	0.0607	0.0725	0.9846
Spot *Leiostomus xanthurus*	Spring	Combined	14	15-24	-11.0401	0.7513	2.9481	0.2542	0.1441	0.9181
	Autumn	Combined	92	9-26	-11.8524	0.1859	3.3175	0.0650	0.1259	0.9666
Southern kingfish *Menticirrhus americanus*	Autumn	Combined	12	17-39	-12.9112	0.1793	3.4493	0.0565	0.0328	0.9973
Northern kingfish *Menticirrhus saxatilis*	Autumn	Combined	6	24-29	-12.4904	1.7432	3.2785	0.5332	0.0791	0.9043
Atlantic croaker *Micropogonias undulatus*	Autumn	Combined	995	6-44	-11.5983	0.0368	3.0924	0.0115	0.0884	0.9864
Atlantic spadefish *Chaetodipterus faber*	Spring	Unsexed	22	22-43	-10.1466	0.2692	2.9380	0.0758	0.0753	0.9856

Species	Season or Seasonal Group	Gender	N	Length Range (cm)	ln *a*	s_a	*b*	s_b	s_W	r^2
Tautog *Tautoga onitis*	Autumn	Combined	9	18-39	-10.9649	0.2126	3.0443	0.0626	0.0425	0.9970
Cunner *Tautogolabrus adspersus*	Spring	Combined	23	19-44	-11.1034	0.2544	3.0162	0.0760	0.0842	0.9868
	Winter	Combined	5	8-42	-11.1950	0.2075	3.0416	0.0667	0.0903	0.9986
	Autumn	Combined	14	10-36	-11.3943	0.2186	3.1311	0.0672	0.0917	0.9945
Atlantic wolffish *Anarhichas lupus*	Spr/Aut	Combined	160	24-107	-12.2186	0.1393	3.1439	0.0342	0.1408	0.9816
Atlantic mackerel *Scomber scombrus*	Winter	Combined	1371	17-45	-12.6661	0.0491	3.3128	0.0147	0.1170	0.9738
	Spring	Combined	2909	16-45	-12.6713	0.0264	3.3119	0.0079	0.0975	0.9836
		Male	1340	16-42	-12.7288	0.0395	3.3305	0.0119	0.0943	0.9833
		Female	1475	16-45	-12.6376	0.0376	3.3006	0.0113	0.1004	0.9831
	Autumn	Combined	771	12-42	-12.3766	0.0598	3.2615	0.0186	0.1057	0.9756
Spanish mackerel *Scomberomorus maculatus*	Autumn	Combined	159	18-59	-11.6374	0.1035	3.0242	0.0300	0.0924	0.9848
Butterfish *Peprilus triacanthus*	Autumn	Combined	6809	1-21	-10.6315	0.0182	2.9225	0.0077	0.2547	0.9553
	Win/Spr	Combined	3496	3-23	-11.6824	0.0314	3.2930	0.0122	0.1782	0.9546
Summer flounder *Paralichthys dentatus*	Autumn	Combined	3082	12-74	-12.2841	0.0271	3.2156	0.0075	0.0965	0.9834
		Male	1657	12-57	-12.3572	0.0392	3.2394	0.0111	0.0839	0.9810
		Female	1396	13-74	-12.4203	0.0433	3.2488	0.0118	0.1072	0.9820
	Spring	Combined	1044	15-72	-12.1424	0.0390	3.1651	0.0111	0.0903	0.9874
		Male	508	16-57	-12.1197	0.0588	3.1602	0.0170	0.0847	0.9856
		Female	527	16-72	-12.1866	0.0581	3.1759	0.0162	0.0955	0.9865
	Winter	Combined	5247	14-78	-12.3861	0.0260	3.2305	0.0072	0.1192	0.9749
		Male	2112	16-64	-12.3825	0.0500	3.2323	0.0141	0.1195	0.9612
		Female	3114	18-78	-12.4887	0.0333	3.2563	0.0090	0.1181	0.9766
Fourspot flounder *Paralichthys oblongus*	Spr/Aut	Combined	6140	3-49	-12.3202	0.0223	3.1463	0.0068	0.1186	0.9719
		Male	2823	7-42	-12.2648	0.0427	3.1239	0.0133	0.1134	0.9517
		Female	3226	11-49	-12.5568	0.0334	3.2213	0.0101	0.1118	0.9696
	Winter	Combined	3269	5-45	-12.8160	0.0367	3.2932	0.0112	0.1400	0.9638
		Male	1221	10-41	-12.8046	0.0706	3.2835	0.0219	0.1376	0.9484
		Female	1989	9-45	-12.9049	0.0480	3.3227	0.0144	0.1350	0.9641

Species	Season or Seasonal Group	Gender	N	Length Range (cm)	ln *a*	s_a	*b*	s_b	s_W	r^2
Windowpane *Scophthalmus aquosus*	Autumn	Combined	3008	2-40	-11.0093	0.0229	2.8721	0.0073	0.1536	0.9811
		Male	1210	4-36	-10.9828	0.0524	2.8633	0.0166	0.1158	0.9611
		Female	1591	7-40	-10.8411	0.0504	2.8221	0.0155	0.1349	0.9540
	Spring	Combined	2218	3-39	-11.3526	0.0268	2.9982	0.0084	0.1494	0.9829
		Male	943	6-36	-11.3050	0.0672	2.9781	0.0211	0.1134	0.9550
		Female	1163	9-39	-11.7690	0.0693	3.1293	0.0211	0.1424	0.9497
	Winter	Combined	2783	3-44	-11.5177	0.0269	3.0418	0.0083	0.1283	0.9797
Witch flounder *Glyptocephalus cynoglossus*	Win/Spr	Combined	2193	6-64	-13.2151	0.0324	3.3289	0.0093	0.1411	0.9832
	Autumn	Combined	1585	4-63	-12.7334	0.0253	3.1997	0.0077	0.1515	0.9910
American plaice *Hippoglossoides platessoides*	Win/Aut	Combined	4965	3-65	-12.7492	0.0185	3.3062	0.0056	0.1378	0.9862
	Spring	Combined	3779	5-62	-12.8117	0.0195	3.3125	0.0058	0.1217	0.9884
		Male	1658	6-48	-12.7168	0.0317	3.2790	0.0097	0.1084	0.9856
		Female	2020	7-62	-12.9811	0.0292	3.3641	0.0085	0.1196	0.9872
Yellowtail flounder *Limanda ferruginea*	Autumn	Combined	2753	4-50	-11.8381	0.0274	3.0559	0.0080	0.1055	0.9815
		Male	1273	12-49	-11.6605	0.0470	2.9983	0.0139	0.0972	0.9734
		Female	1428	9-50	-11.9764	0.0383	3.0995	0.0110	0.1051	0.9825
	Spring	Combined	2686	6-55	-12.3581	0.0415	3.2099	0.0120	0.1376	0.9638
		Male	1497	11-46	-11.7347	0.0612	3.0161	0.0179	0.1026	0.9501
		Female	1160	6-55	-12.7073	0.0656	3.3235	0.0187	0.1442	0.9646
	Winter	Combined	3336	4-52	-12.4209	0.0319	3.2408	0.0091	0.1224	0.9742
		Male	1520	19-45	-12.0924	0.0591	3.1314	0.0172	0.0912	0.9564
		Female	1768	15-52	-12.9148	0.0585	3.3898	0.0164	0.1174	0.9603
Winter flounder *Pseudopleuronectes americanus*	Winter	Combined	1196	4-59	-11.6892	0.0340	3.1189	0.0104	0.1324	0.9868
		Male	445	8-49	-11.4862	0.0463	3.0459	0.0142	0.0982	0.9904
		Female	673	10-59	-11.8906	0.0473	3.1850	0.0142	0.1116	0.9869
	Spring	Combined	4018	5-59	-11.4718	0.0218	3.0431	0.0065	0.1246	0.9818
		Male	1642	7-54	-11.2363	0.0310	2.9636	0.0094	0.1065	0.9838
		Female	2293	9-59	-11.4598	0.0300	3.0457	0.0089	0.1207	0.9809
	Autumn	Combined	4111	5-60	-11.6356	0.0200	3.1091	0.0059	0.1012	0.9857
		Male	1709	5-53	-11.4725	0.0336	3.0584	0.0100	0.1048	0.9819
		Female	2356	9-60	-11.7022	0.0265	3.1297	0.0077	0.0969	0.9861
Atlantic halibut *Hippoglossus hippoglossus*	Spring	Combined	19	31-154	-12.5865	0.1981	3.2674	0.0495	0.0763	0.9961
	Autumn	Combined	29	8-97	-12.1813	0.1710	3.1904	0.0432	0.1031	0.9951

[a] Disk width is measured for rays and stingrays.

Table 2. Comparison of length ranges and minimum and maximum lengths (cm) used in this study to those observed on NEFSC bottom trawl surveys during 1963-99, including differences in the minimum and maximum lengths relative to the 1963-99 values, and the ratios of this study's ranges divided by the 1963-99 surveys' ranges.

Species	1963-99 Survey Lengths (cm)			This Study's Lengths (cm)			Difference		Range Ratio
	Min.	Max.	Range	Min.	Max.	Range	Min.	Max.	
Sand tiger	98	261	163	150	260	110	52	1	0.67
Chain dogfish	7	50	43	10	45	35	3	5	0.81
Atlantic sharpnose shark	41	175	134	50	100	50	9	75	0.37
Smooth dogfish	29	150	121	40	150	110	11	0	0.91
Sandbar shark	61	186	125	63	174	111	2	12	0.89
Spiny dogfish	5	117	112	13	114	101	8	3	0.90
Atlantic angel shark	16	123	107	32	120	88	16	3	0.82
Atlantic torpedo	35	140	105	71	102	31	36	38	0.30
Clearnose skate	7	93	86	22	71	49	15	22	0.57
Little skate	5	66	61	6	63	57	1	3	0.93
Barndoor skate	19	132	113	23	121	98	4	11	0.87
Winter skate	10	135	125	13	111	98	3	24	0.78
Rosette skate	4	47	43	14	43	29	10	4	0.67
Smooth skate	9	73	64	15	65	50	6	8	0.78
Thorny skate	8	109	101	10	105	95	2	4	0.94
Southern stingray	21	108	87	45	100	55	24	8	0.63
Roughtail stingray	10	190	180	36	155	119	26	35	0.66
Bluntnose stingray	18	135	117	18	104	86	0	31	0.74
Spiny butterfly ray	20	217	197	38	210	172	18	7	0.87
Smooth butterfly ray	22	176	154	40	84	44	18	92	0.29
Bullnose ray	21	143	122	28	129	101	7	14	0.83
Cownose ray	34	103	69	34	103	69	0	0	1.00
Atlantic sturgeon	56	226	170	84	159	75	28	67	0.44
American shad	4	62	58	8	53	45	4	9	0.78
Blueback herring	5	42	37	7	29	22	2	13	0.59
Alewife	3	46	43	10	27	17	7	19	0.40
Atlantic herring	3	46	43	4	37	33	1	9	0.77
Round herring	4	21	17	11	20	9	7	1	0.53
Atlantic thread herring	1	26	25	5	18	13	4	8	0.52
Spanish sardine	3	27	24	8	18	10	5	9	0.42
Goosefish	3	121	118	5	101	96	2	20	0.81
Atlantic cod	2	141	139	4	120	116	2	21	0.83
Pollock	3	160	157	13	112	99	10	48	0.63
Red hake	1	70	69	2	68	66	1	2	0.96
Spotted hake	2	46	44	3	43	40	1	3	0.91
White hake	2	136	134	4	126	122	2	10	0.91
Cusk	6	105	99	6	95	89	0	10	0.90
Haddock	3	93	90	4	88	84	1	5	0.93

Species	1963-99 Survey Lengths (cm)			This Study's Lengths (cm)			Difference		Range Ratio
	Min.	Max.	Range	Min.	Max.	Range	Min.	Max.	
Silver hake	1	78	77	3	63	60	2	15	0.78
Offshore hake	5	60	55	8	51	43	3	9	0.78
Fawn cusk-eel	4	44	40	13	28	15	9	16	0.38
Ocean pout	4	103	99	7	98	91	3	5	0.92
Buckler dory	6	55	49	9	53	44	3	2	0.90
Acadian redfish	3	52	49	3	47	44	0	5	0.90
Blackbelly rosefish	2	47	45	4	35	31	2	12	0.69
Northern searobin	1	45	44	21	34	13	20	11	0.30
Sea raven	3	69	66	7	68	61	4	1	0.92
Longhorn sculpin	3	60	57	4	37	33	1	23	0.58
Striped bass	6	121	115	23	102	79	17	19	0.69
Black sea bass	3	58	55	3	54	51	0	4	0.93
Bluefish	2	88	86	3	80	77	1	8	0.90
Greater amberjack	9	114	105	30	80	50	21	34	0.48
Scup	1	44	43	4	38	34	3	6	0.79
Vermilion snapper	2	52	50	8	21	13	6	31	0.26
Weakfish	2	84	82	3	70	67	1	14	0.82
Spot	3	29	26	9	26	17	6	3	0.65
Southern kingfish	4	40	36	17	39	22	13	1	0.61
Northern kingfish	4	38	34	24	29	5	20	9	0.15
Atlantic croaker	1	49	48	6	44	38	5	5	0.79
Atlantic spadefish	3	51	48	22	43	21	19	8	0.44
Tautog	11	69	58	18	39	21	7	30	0.36
Cunner	3	49	46	8	36	28	5	13	0.61
Atlantic wolffish	3	122	119	24	107	83	21	15	0.70
Atlantic mackerel	4	51	47	12	45	33	8	6	0.70
Spanish mackerel	3	89	86	18	59	41	15	30	0.48
Butterfish	1	29	28	1	23	22	0	6	0.79
Summer flounder	11	78	67	12	78	66	1	0	0.99
Fourspot flounder	3	49	46	3	49	46	0	0	1.00
Windowpane	2	48	46	2	44	42	0	4	0.91
Witch flounder	3	69	66	4	64	60	1	5	0.91
American plaice	3	66	63	3	65	62	0	1	0.98
Yellowtail flounder	2	58	56	4	55	51	2	3	0.91
Winter flounder	3	69	66	4	60	56	1	9	0.85
Atlantic halibut	4	154	150	8	154	146	4	0	0.97

Table 3. Minimum and maximum lengths (cm) observed for species collected during 1963-99 NEFSC bottom trawl surveys, by gender ("Unsexed" = gender not specified; "Combined" = unsexed, males, and females). (Species are ordered by NODC taxonomic code; "uncl" = not classified to species level.)

Species				Length Range (cm)	
Common Name	**Scientific Name**	**Gender**	**N**	**Min.**	**Max.**
Iceland scallop	*Chlamys islandica*	Combined	16	1	6
Sea scallop	*Placopecten magellanicus*	Combined	12158	1	20
Atlantic calico scallop	*Argopecten gibbus*	Combined	6	2	4
Atlantic surfclam	*Spisula solidissima*	Combined	28	3	17
Ocean quahog	*Arctica islandica*	Combined	22	6.9	11
Bobtail squid uncl	Sepiolidae	Combined	306	1	6
Lesser bobtail squid	*Semirossia tenera*	Combined	7	1	3
Warty bobtail squid	*Rossia palpebrosa*	Combined	1	3	3
Butterfly bobtail squid	*Stoloteuthis leucoptera*	Combined	11	2	4
Longfin inshore squid	*Loligo pealeii*	Combined	79723	1	49
Slender inshore squid	*Loligo pleii*	Combined	54	3	21
Atlantic brief squid	*Lolliguncula brevis*	Combined	990	1	10
Eye-flash squid	*Abralia veranyi*	Combined	24	2	4
Northern shortfin squid	*Illex illecebrosus*	Combined	54033	1	37
Octopus uncl	Octopoda	Combined	840	1	16
Common octopus	*Octopus vulgaris*	Combined	11	2	9
Spoonarm octopus	*Bathypolypus arcticus*	Combined	160	1	17
Horseshoe crab	*Limulus polyphemus*	Unsexed	5109	10	36
		Male	1029	12	38
		Female	1764	11	39
Northern shrimp	*Pandalus borealis*	Unsexed	61576	0.7	3.2
		Male	34832	0.6	2.85
		Female	11304	1.75	2.9
American lobster	*Homarus americanus*	Unsexed	1392	3	24
		Male	71070	2	20.6
		Female	72222	2	24.3
Caribbean spiny lobster	*Panulirus argus*	Combined	11	13	16
Ridged slipper lobster	*Scyllarides nodifer*	Combined	44	1	15
Northern stone crab	*Lithodes maja*	Unsexed	304	1	23
		Male	38	1	14
		Female	155	1	14
Galatheid uncl	Galatheidae	Unsexed	33	1	14
		Male	1	3	3
		Female	5	2	7
Calico box crab	*Hepatus epheliticus*	Unsexed	1	5	5
		Male	2	4	7
		Female	2	3	5
Gladiator box crab	*Acanthocarpus alexandri*	Unsexed	12	3	12
		Male	21	1	6
		Female	5	2	4

Species				Length Range (cm)	
Common Name	**Scientific Name**	**Gender**	**N**	**Min.**	**Max.**
Spider crab uncl	Majidae	Unsexed	164	1	13
		Male	146	1	11
		Female	101	2	12
Snow crab	*Chionoecetes opilio*	Unsexed	24	2	13
		Male	11	4	12
		Female	13	2	8
Jonah crab	*Cancer borealis*	Unsexed	585	1	17
		Male	7374	1	21
		Female	5319	1	18
Atlantic rock crab	*Cancer irroratus*	Unsexed	930	1	16
		Male	14157	1	19
		Female	10923	1	19
Speckled swimming crab	*Arenaeus cribrarius*	Unsexed	1	8	8
		Male	14	3	11
		Female	6	6	9
Blotched swimming crab	*Portunus spinimanus*	Unsexed	35	1	7
		Male	10	2	11
		Female	14	2	7
Bathyal swimming crab	*Bathynectes longispina*	Unsexed	35	2	10
		Male	24	3	10
		Female	29	2	9
Blue crab	*Callinectes sapidus*	Unsexed	1728	2	20
		Male	246	2	16
		Female	537	2	18
Lady crab	*Ovalipes ocellatus*	Unsexed	5586	1	16
		Male	744	1	11
		Female	639	1	12
Coarsehand lady crab	*Ovalipes stephensoni*	Unsexed	421	1	11
		Male	110	1	11
		Female	51	2	9
Red deepsea crab	*Chaceon quinquedens*	Unsexed	537	3	17
		Male	204	6	15
		Female	318	2	15
Golden deepsea crab	*Geryon fenneri*	Female	1	11	11
Sea lamprey	*Petromyzon marinus*	Combined	131	13	80
Atlantic hagfish	*Myxine glutinosa*	Combined	649	14	66
Sand tiger	*Carcharias taurus*	Combined	48	98	261
Basking shark	*Cetorhinus maximus*	Combined	2	432	440
Thresher shark	*Alopias vulpinus*	Combined	4	137	176
Chain dogfish	*Scyliorhinus retifer*	Combined	1845	7	50
Atlantic sharpnose shark	*Rhizoprionodon terraenovae*	Combined	591	41	175
Smooth dogfish	*Mustelus canis*	Unsexed	12213	29	130
		Male	10014	40	115
		Female	8616	32	150

Species		Gender	N	Length Range (cm)	
Common Name	**Scientific Name**			**Min.**	**Max.**
Dusky shark	*Carcharhinus obscurus*	Combined	96	49	211
Sandbar shark	*Carcharhinus plumbeus*	Combined	184	61	186
Blacknose shark	*Carcharhinus acronotus*	Combined	2	98	102
Blacktip shark	*Carcharhinus limbatus*	Combined	1	138	138
Night shark	*Carcharhinus signatus*	Combined	2	65	67
Scalloped hammerhead shark	*Sphyrna lewini*	Combined	11	59	186
Spiny dogfish	*Squalus acanthias*	Unsexed	6096	20	112
		Male	181881	14	104
		Female	219579	5	117
Rough sagre	*Etmopterus princeps*	Combined	10	13	28
Broadband dogfish	*Etmopterus gracilispinis*	Combined	13	11	22
Black dogfish	*Centroscyllium fabricii*	Combined	46	6	31
Atlantic angel shark	*Squatina dumeril*	Combined	1524	16	123
Atlantic torpedo	*Torpedo nobiliana*	Combined	53	35	140
Lesser electric ray	*Narcine brasiliensis*	Combined	7	23	37
Clearnose skate	*Raja eglanteria*	Combined	6017	7	93
Little skate	*Leucoraja erinacea*	Combined	73656	5	66
Barndoor skate	*Dipturus laevis*	Combined	1056	19	132
Winter skate	*Leucoraja ocellata*	Combined	43855	10	135
Rosette skate	*Leucoraja garmani*	Combined	4833	4	47
Smooth skate	*Malacoraja senta*	Combined	6099	9	73
Thorny skate	*Amblyraja radiata*	Combined	20610	8	109
Southern stingray [a]	*Dasyatis americana*	Combined	180	21	108
Roughtail stingray [a]	*Dasyatis centroura*	Combined	385	10	190
Atlantic stingray [a]	*Dasyatis sabina*	Combined	27	22	90
Bluntnose stingray[a]	*Dasyatis say*	Combined	2955	18	135
Spiny butterfly ray [a]	*Gymnura altavela*	Combined	1138	20	217
Smooth butterfly ray[a]	*Gymnura micrura*	Combined	104	22	176
Bullnose ray [a]	*Myliobatis freminvillei*	Combined	1488	21	143
Cownose ray [a]	*Rhinoptera bonasus*	Combined	774	34	103
Manta [a]	*Manta birostris*	Combined	6	120	150
Atlantic sturgeon	*Acipenser oxyrhynchus*	Combined	60	56	226
Ladyfish	*Elops saurus*	Combined	1	29	29
American eel	*Anguilla rostrata*	Combined	32	2	78
Spotted moray	*Gymnothorax moringa*	Combined	7	36	78
Blackedge moray	*Gymnothorax nigromarginatus*	Combined	1	49	49
Honeycomb moray	*Gymnothorax saxicola*	Combined	26	36	51
Conger eel	*Conger oceanicus*	Combined	608	6	135
Bandtooth conger	*Ariosoma balearicum*	Combined	5	22	69
Snake eel uncl	Ophichthidae	Combined	112	13	84
Shrimp eel	*Ophichthus gomesi*	Combined	1	39	39
Margined snake eel	*Ophichthus cruentifer*	Combined	124	13	74
Palespotted eel	*Ophichthus puncticeps*	Combined	98	9	70
Spotted spoon-nose eel	*Echiophis intertinctus*	Combined	4	48	86
Snubnose eel	*Simenchelys parasiticus*	Combined	2	6	10

Species		Gender	N	Length Range (cm)	
Common Name	**Scientific Name**			**Min.**	**Max.**
Slender snipe eel	*Nemichthys scolopaceus*	Combined	231	20	99
American shad	*Alosa sapidissima*	Combined	3145	4	62
Blueback herring	*Alosa aestivalis*	Combined	6006	5	42
Hickory shad	*Alosa mediocris*	Combined	23	7	36
Alewife	*Alosa pseudoharengus*	Combined	16688	3	46
Atlantic herring	*Clupea harengus*	Combined	86946	3	46
Atlantic menhaden	*Brevoortia tyrannus*	Combined	951	5	42
Gizzard shad	*Dorosoma cepedianum*	Combined	1	12	12
Round herring	*Etrumeus teres*	Combined	2268	4	21
Atlantic thread herring	*Opisthonema oglinum*	Combined	1247	1	26
Spanish sardine	*Sardinella aurita*	Combined	1295	3	27
Anchovy uncl	Engraulidae	Combined	18	2	17
Silver anchovy	*Engraulis eurystole*	Combined	161	4	18
Striped anchovy	*Anchoa hepsetus*	Combined	4300	2	21
Bay anchovy	*Anchoa mitchilli*	Combined	4751	1	20
Dusky anchovy	*Anchoa lyolepis*	Combined	47	3	11
Longnose anchovy	*Anchoa nasuta*	Combined	25	4	9
Flat anchovy	*Anchoviella perfasciata*	Combined	10	4	7
Capelin	*Mallotus villosus*	Combined	90	5	21
Rainbow smelt	*Osmerus mordax*	Combined	333	4	26
Atlantic argentine	*Argentina silus*	Combined	932	4	49
Striated argentine	*Argentina striata*	Combined	123	3	30
Lightfish uncl	Gonostomatidae	Combined	24	3	26
	Gonostoma atlanticum	Combined	3	11	15
Longtooth anglemouth	*Gonostoma elongatum*	Combined	7	15	21
Weitzmans pearlsides	*Maurolicus weitzmani*	Combined	650	2	11
	Polymetme thaeocoryla	Combined	9	7	18
Hatchetfish uncl	Sternoptychidae	Combined	82	1	11
Silver hatchetfish	*Argyropelecus aculeatus*	Combined	24	1	7
	Polyipnus clarus	Combined	124	1	8
Viperfish	*Chauliodus sloani*	Combined	85	7	35
Boa dragonfish	*Stomias boa*	Combined	93	5	40
Slickhead uncl	Alepocephaliidae	Combined	7	6	14
Bluntnose smoothhead	*Xenodermichthys copei*	Combined	2	13	14
Inshore lizardfish	*Synodus foetens*	Combined	2848	3	43
Sand diver	*Synodus intermedius*	Combined	44	6	34
Offshore lizardfish	*Synodus poeyi*	Combined	530	3	40
Red lizardfish	*Synodus synodus*	Combined	19	4	14
Largescale lizardfish	*Saurida brasiliensis*	Combined	21	4	10
Shortjaw lizardfish	*Saurida normani*	Combined	36	3	29
Snakefish	*Trachinocephalus myops*	Combined	991	4	33
Shortnose greeneye	*Chlorophthalmus agassizi*	Combined	799	3	14
Longnose greeneye	*Parasudis truculenta*	Combined	116	5	24
White barracudina	*Arctozenus rissoi*	Combined	53	7	27
	Paralepis coregonoides	Combined	3	20	31

Species		Gender	N	Length Range (cm)	
Common Name	**Scientific Name**			**Min.**	**Max.**
Longnose lancetfish	*Alepisaurus ferox*	Combined	1	10	10
Horned lanternfish	*Ceratoscopelus maderensis*	Combined	6	5	7
Lanternfish uncl	Myctophidae	Combined	1765	2	26
Headlightfish	*Diaphus dumerili*	Combined	2	8	8
Hardhead catfish	*Arius felis*	Combined	9	2	23
Atlantic midshipman	*Porichthys plectrodon*	Combined	594	2	23
Oyster toadfish	*Opsanus tau*	Combined	2	25	31
Leopard toadfish	*Opsanus pardus*	Combined	5	4	31
Goosefish	*Lophius americanus*	Combined	28458	3	121
Blackfin goosefish	*Lophius gastrophysus*	Combined	4	12	13
Singlespot frogfish	*Antennarius radiosus*	Combined	4	3	18
Redeye gaper	*Chaunax stigmaeus*	Combined	13	3	37
Shortnose batfish	*Ogcocephalus nasutus*	Combined	32	2	16
Roughback batfish	*Ogcocephalus parvus*	Combined	35	1	22
Longnose batfish	*Ogcocephalus corniger*	Combined	24	3	19
Atlantic batfish	*Dibranchus atlanticus*	Combined	17	8	16
Pancake batfish	*Halieutichthys aculeatus*	Combined	61	3	17
Blue hake	*Antimora rostrata*	Combined	7	11	22
	Laemonema barbatulum	Combined	13	15	22
Metallic codling	*Physiculus fulvus*	Combined	15	4	24
Atlantic cod	*Gadus morhua*	Combined	72801	2	141
Atlantic tomcod	*Microgadus tomcod*	Combined	1	18	18
Pollock	*Pollachius virens*	Combined	18780	3	160
Red hake	*Urophycis chuss*	Combined	135909	1	70
Spotted hake	*Urophycis regia*	Combined	64311	2	46
White hake	*Urophycis tenuis*	Combined	69627	2	136
Longfin hake	*Urophycis chesteri*	Combined	661	3	42
Carolina hake	*Urophycis earlli*	Combined	32	8	52
Southern hake	*Urophycis floridana*	Combined	3	22	28
Cusk	*Brosme brosme*	Combined	2985	6	105
Beardless codling	*Gadella imberbis*	Combined	9	8	19
Haddock	*Melanogrammus aeglefinus*	Combined	64173	3	93
Fourbeard rockling	*Enchelyopus cimbrius*	Combined	2347	5	40
Silver hake	*Merluccius bilinearis*	Combined	251613	1	78
Offshore hake	*Merluccius albidus*	Combined	2686	5	60
Cusk-eel uncl	Ophidiidae	Combined	83	3	39
Mottled cusk-eel	*Lepophidium jeannae*	Combined	14	6	30
Fawn cusk-eel	*Lepophidium profundorum*	Combined	14427	4	44
Blotched cusk-eel	*Ophidion grayi*	Combined	49	6	25
Bank cusk-eel	*Ophidion holbrooki*	Combined	382	5	31
Mooneye cusk-eel	*Ophidion selenops*	Combined	1	13	13
Crested cusk-eel	*Ophidion welshi*	Combined	6	9	17
Striped cusk-eel	*Ophidion marginatum*	Combined	784	4	30
Polka-dot cusk-eel	*Otophidium omostigmum*	Combined	70	4	23
Pearlfish	*Carapus bermudensis*	Combined	28	6	15

Species		Gender	N	Length Range (cm)	
Common Name	**Scientific Name**			**Min.**	**Max.**
Eelpout uncl	Zoarcidae	Combined	7	12	62
Wolf eelpout	*Lycenchelys verrilli*	Combined	55	5	21
Atlantic soft pout	*Melanostigma atlanticum*	Combined	565	4	19
Ocean pout	*Macrozoarces americanus*	Combined	23532	4	103
Grenadier uncl	Macrouridae	Combined	350	5	37
Longnose grenadier	*Coelorhynchus carminatus*	Combined	16	5	25
Marlin-spike	*Nezumia bairdi*	Combined	162	5	31
Western softhead grenadier	*Malacocephalus occidentalis*	Combined	12	5	27
Roughhead grenadier	*Macrourus berglax*	Combined	10	18	26
Margined flyingfish	*Cypselurus cyanopterus*	Combined	4	30	40
Silverstripe halfbeak	*Hyporhamphus unifasciatus*	Combined	2	20	30
Flying halfbeak	*Euleptorhamphus velox*	Combined	2	25	30
Flat needlefish	*Ablennes hians*	Combined	2	23	53
Houndfish	*Tylosurus crocodilus*	Combined	1	20	20
Atlantic saury	*Scomberesox saurus*	Combined	138	15	37
Silverside uncl	Atherinidae	Combined	42	6	18
Rough silverside	*Membras martinica*	Combined	3	6	8
Atlantic silverside	*Menidia menidia*	Combined	2006	3	17
Beardfish	*Polymixia lowei*	Combined	290	6	28
Big roughy	*Gephyroberyx darwini*	Combined	7	29	48
Blackmouthed alfonsin	*Hoplostethus mediterraneus*	Combined	66	3	20
Squirrelfish	*Holocentrus adscensionis*	Combined	60	7	37
Longspine squirrelfish	*Holocentrus rufus*	Combined	2	24	27
Blackbar soldierfish	*Myripristis jacobus*	Combined	18	7	15
Bigeye soldierfish	*Ostichthys trachypoma*	Combined	3	4	11
Spinycheek soldierfish	*Corniger spinosus*	Combined	2	13	15
Red dory	*Cyttopsis rosea*	Combined	11	8	13
Buckler dory	*Zenopsis conchifera*	Combined	751	6	55
Spotted tinselfish	*Xenolepidichthys dalgleishi*	Combined	10	7	11
Deepbody boarfish	*Antigonia capros*	Combined	306	3	20
Shortspine boarfish	*Antigonia combatia*	Combined	1	11	11
Unicornfish	*Eumecichthys fiski*	Combined	1	43	43
Threespine stickleback	*Gasterosteus aculeatus*	Combined	145	2	8
Fourspine stickleback	*Apeltes quadracus*	Combined	2	5	5
Trumpetfish	*Aulostomus maculatus*	Combined	6	22	28
Bluespotted cornetfish	*Fistularia tabacaria*	Combined	23	16	62
Red cornetfish	*Fistularia petimba*	Combined	94	22	143
Longspine snipefish	*Macrorhamphosus scolopax*	Combined	208	5	25
Pipefish seahorse uncl	Syngnathidae	Combined	118	4	30
Northern pipefish	*Syngnathus fuscus*	Combined	775	2	30
Chain pipefish	*Syngnathus louisianae*	Combined	3	23	30
Bull pipefish	*Syngnathus springeri*	Combined	1	9	9
Lined seahorse	*Hippocampus erectus*	Combined	63	3	16
Longsnout seahorse	*Hippocampus reidi*	Combined	1	7	7
Acadian redfish	*Sebastes fasciatus*	Combined	49983	3	52

Species		Gender	N	Length Range (cm)	
Common Name	**Scientific Name**			**Min.**	**Max.**
Blackbelly rosefish	*Helicolenus dactylopterus*	Combined	3270	2	47
Spinycheek scorpionfish	*Neomerinthe hemingwayi*	Combined	25	3	45
Longspine scorpionfish	*Pontinus longispinis*	Combined	75	4	25
Longfin scorpionfish	*Scorpaena agassizi*	Combined	22	6	19
Barbfish	*Scorpaena brasiliensis*	Combined	119	3	31
Smoothhead scorpionfish	*Scorpaena calcarata*	Combined	48	5	16
Hunchback scorpionfish	*Scorpaena dispar*	Combined	6	10	15
Spotted scorpionfish	*Scorpaena plumieri*	Combined	4	8	29
Northern searobin	*Prionotus carolinus*	Combined	12665	1	45
Striped searobin	*Prionotus evolans*	Combined	4582	1	48
Leopard searobin	*Prionotus scitulus*	Combined	169	2	26
Bighead searobin	*Prionotus tribulus*	Combined	92	3	31
Spiny searobin	*Prionotus alatus*	Combined	111	3	22
Bandtail searobin	*Prionotus ophryas*	Combined	18	10	21
Bluespotted searobin	*Prionotus roseus*	Combined	14	8	18
Blackwing searobin	*Prionotus rubio*	Combined	134	3	28
Shortwing searobin	*Prionotus stearnsi*	Combined	49	2	13
Shortfin searobin	*Bellator brachychir*	Combined	3	11	13
Streamer searobin	*Bellator egretta*	Combined	10	4	14
Horned searobin	*Bellator militaris*	Combined	74	3	14
Slender searobin	*Peristedion gracile*	Combined	5	8	11
Armored searobin	*Peristedion miniatum*	Combined	498	5	38
Hookear sculpin uncl	*Artediellus* sp.	Combined	468	2	15
Sea raven	*Hemitripterus americanus*	Combined	12384	3	69
Shorthorn sculpin	*Myoxocephalus scorpius*	Combined	27	6	44
Longhorn sculpin	*Myoxocephalus octodecemspinosus*	Combined	29842	3	60
Grubby	*Myoxocephalus aenaeus*	Combined	202	3	19
Moustache sculpin	*Triglops murrayi*	Combined	1176	2	28
Alligatorfish	*Aspidophoroides monopterygius*	Combined	778	4	16
Atlantic spiny lumpsucker	*Eumicrotremus spinosus*	Combined	2	3	3
Atlantic seasnail	*Liparis atlanticus*	Combined	140	2	8
Inquiline snailfish	*Liparis inquilinus*	Combined	10	2	7
Lumpfish	*Cyclopterus lumpus*	Combined	624	3	57
Flying gurnard	*Dactylopterus volitans*	Combined	13	4	44
White perch	*Morone americana*	Combined	3	17	17
Striped bass	*Morone saxatilis*	Combined	3300	6	121
Black sea bass	*Centropristis striata*	Combined	22146	3	58
Bank sea bass	*Centropristis ocyurus*	Combined	278	2	28
Rock sea bass	*Centropristis philadelphica*	Combined	130	3	22
Rock hind	*Epinephelus adscensionis*	Combined	1	43	43
Yellowedge grouper	*Epinephelus flavolimbatus*	Combined	1	25	25
Red hind	*Epinephelus guttatus*	Combined	8	43	51
Red grouper	*Epinephelus morio*	Combined	2	64	85
Warsaw grouper	*Epinephelus nigritus*	Combined	6	84	123
Snowy grouper	*Epinephelus niveatus*	Combined	32	29	108

Species		Gender	N	Length Range (cm)	
Common Name	**Scientific Name**			**Min.**	**Max.**
Gag	*Mycteroperca microlepis*	Combined	45	16	90
Black grouper	*Mycteroperca bonaci*	Combined	3	14	14
Yellowmouth grouper	*Mycteroperca interstitialis*	Combined	8	14	76
Scamp	*Mycteroperca phenax*	Combined	8	17	92
Yellowfin bass	*Anthias nicholsi*	Combined	84	4	28
Sand perch	*Diplectrum formosum*	Combined	217	2	24
Dwarf sand perch	*Diplectrum bivittatum*	Combined	1	1	1
Red barbier	*Hemanthias vivanus*	Combined	33	4	16
Streamer bass	*Hemanthias aureorubens*	Combined	25	7	28
Creole-fish	*Paranthias furcifer*	Combined	1	29	29
School bass	*Schultzea beta*	Combined	18	6	8
Blackear bass	*Serranus atrobranchus*	Combined	10	3	13
Tattler	*Serranus phoebe*	Combined	312	3	27
Roughtongue bass	*Holanthias martinicensis*	Combined	1	5	5
Spotted soapfish	*Rypticus subbifrenatus*	Combined	1	11	11
Bigeye	*Priacanthus arenatus*	Combined	299	3	40
Glasseye snapper	*Priacanthus cruentatus*	Combined	10	3	50
Short bigeye	*Pristigenys alta*	Combined	116	2	40
Bulleye	*Cookeolus japonicus*	Combined	8	5	15
Cardinalfish uncl	Apogonidae	Combined	139	2	16
Flamefish	*Apogon maculatus*	Combined	1	4	4
Twospot cardinalfish	*Apogon pseudomaculatus*	Combined	53	2	11
	Epigonus pandionis	Combined	29	5	12
Sherborn's cardinalfish	*Howella sherborni*	Combined	2	7	7
Blackmouth bass	*Synagrops bellus*	Combined	200	2	19
Keelcheek bass	*Synagrops spinosus*	Combined	6	5	11
Blueline tilefish	*Caulolatilus microps*	Combined	4	42	76
Goldface tilefish	*Caulolatilus chrysops*	Combined	2	11	13
Tilefish	*Lopholatilus chamaeleonticeps*	Combined	63	8	68
Bluefish	*Pomatomus saltatrix*	Combined	26715	2	88
Cobia	*Rachycentron canadum*	Combined	504	14	145
Remora	*Remora remora*	Combined	29	7	54
Sharksucker	*Echeneis naucrates*	Combined	10	11	68
Rough scad	*Trachurus lathami*	Combined	1071	2	21
African pompano	*Alectis ciliaris*	Combined	51	4	33
Yellow jack	*Caranx bartholomaei*	Combined	77	2	23
Crevalle jack	*Caranx hippos*	Combined	300	3	28
Horse-eye jack	*Caranx latus*	Combined	1	17	17
Blue runner	*Caranx crysos*	Combined	1117	2	34
Bar jack	*Caranx ruber*	Combined	3	7	17
Atlantic bumper	*Chloroscombrus chrysurus*	Combined	201	2	24
Leatherjack	*Oligoplites saurus*	Combined	1	22	22
Bigeye scad	*Selar crumenophthalmus*	Combined	286	2	25
Lookdown	*Selene vomer*	Combined	239	1	23
Atlantic moonfish	*Selene setapinnis*	Combined	613	1	25

Species		Gender	N	Length Range (cm)	
Common Name	**Scientific Name**			**Min.**	**Max.**
Greater amberjack	*Seriola dumerili*	Combined	384	9	114
Lesser amberjack	*Seriola fasciata*	Combined	13	17	32
Almaco jack	*Seriola rivoliana*	Combined	17	26	125
Banded rudderfish	*Seriola zonata*	Combined	235	3	29
Florida pompano	*Trachinotus carolinus*	Combined	45	15	34
Permit	*Trachinotus falcatus*	Combined	6	15	20
Mackerel scad	*Decapterus macarellus*	Combined	724	2	31
Round scad	*Decapterus punctatus*	Combined	2843	2	21
Pilotfish	*Naucrates ductor*	Combined	1	5	5
Cottonmouth jack	*Uraspis secunda*	Combined	8	24	33
Dolphin	*Coryphaena hippurus*	Combined	2	20	42
Snapper uncl	Lutjanidae	Combined	18	3	133
Mutton snapper	*Lutjanus analis*	Combined	2	3	3
Red snapper	*Lutjanus campechanus*	Combined	54	3	76
Lane snapper	*Lutjanus synagris*	Combined	20	2	14
Silk snapper	*Lutjanus vivanus*	Combined	13	17	56
Vermilion snapper	*Rhomboplites aurorubens*	Combined	424	2	52
Wenchman	*Pristipomoides aquilonaris*	Combined	24	5	23
Spotfin mojarra	*Eucinostomus argenteus*	Combined	121	3	18
Silver jenny	*Eucinostomus gula*	Combined	62	6	19
Tomtate	*Haemulon aurolineatum*	Combined	849	2	29
White grunt	*Haemulon plumieri*	Combined	150	8	53
Striped grunt	*Haemulon striatum*	Combined	76	4	19
Pigfish	*Orthopristis chrysoptera*	Combined	1046	2	40
Scup	*Stenotomus chrysops*	Combined	14564	1	44
Pinfish	*Lagodon rhomboides*	Combined	603	1	24
Sheepshead	*Archosargus probatocephalus*	Combined	58	3	60
Spottail pinfish	*Diplodus holbrooki*	Combined	488	5	27
Saucereye porgy	*Calamus calamus*	Combined	12	12	40
Whitebone porgy	*Calamus leucosteus*	Combined	669	6	42
Knobbed porgy	*Calamus nodosus*	Combined	129	8	47
Littlehead porgy	*Calamus proridens*	Combined	6	30	32
Sheepshead porgy	*Calamus penna*	Combined	2	35	37
Red porgy	*Pagrus sedecim*	Combined	232	3	47
Spotted seatrout	*Cynoscion nebulosus*	Combined	8	21	56
Silver seatrout	*Cynoscion nothus*	Combined	3	23	24
Weakfish	*Cynoscion regalis*	Combined	32736	2	84
Silver perch	*Bairdiella chrysoura*	Combined	627	2	23
Spot	*Leiostomus xanthurus*	Combined	6431	3	29
Banded drum	*Larimus fasciatus*	Combined	645	2	23
Southern kingfish	*Menticirrhus americanus*	Combined	4050	4	40
Gulf kingfish	*Menticirrhus littoralis*	Combined	2	24	25
Northern kingfish	*Menticirrhus saxatilis*	Combined	1196	4	38
Atlantic croaker	*Micropogonias undulatus*	Combined	6220	1	49
Black drum	*Pogonias cromis*	Combined	56	16	105

Species		Gender	N	Length Range (cm)	
Common Name	**Scientific Name**			**Min.**	**Max.**
Red drum	*Sciaenops ocellatus*	Combined	34	9	114
Star drum	*Stellifer lanceolatus*	Combined	2	13	14
Jackknife-fish	*Equetus lanceolatus*	Combined	26	17	32
Cubbyu	*Equetus umbrosus*	Combined	244	9	36
Red goatfish	*Mullus auratus*	Combined	99	6	18
Spotted goatfish	*Pseudupeneus maculatus*	Combined	17	7	22
Dwarf goatfish	*Upeneus parvus*	Combined	59	6	15
Atlantic spadefish	*Chaetodipterus faber*	Combined	454	3	51
Spotfin butterflyfish	*Chaetodon ocellatus*	Combined	81	4	19
Bank butterflyfish	*Chaetodon aya*	Combined	21	5	15
Reef butterflyfish	*Chaetodon sedentarius*	Combined	69	7	14
Queen angelfish	*Holacanthus ciliaris*	Combined	1	19	19
Blue angelfish	*Holacanthus bermudensis*	Combined	52	18	45
Damselfish uncl	Pomacentridae	Combined	2	13	13
Yellowtail reeffish	*Chromis enchrysurus*	Combined	46	3	12
Striped mullet	*Mugil cephalus*	Combined	19	11	33
White mullet	*Mugil curema*	Combined	6	10	15
Northern sennet	*Sphyraena borealis*	Combined	307	4	40
Guaguanche	*Sphyraena guachancho*	Combined	55	4	40
Tautog	*Tautoga onitis*	Combined	177	11	69
Cunner	*Tautogolabrus adspersus*	Combined	5325	3	49
Creole wrasse	*Clepticus parrae*	Combined	6	6	8
Red hogfish	*Decodon puellaris*	Combined	2	17	17
Pearly razorfish	*Hemipteronotus novacula*	Combined	20	4	20
Hogfish	*Lachnolaimus maximus*	Combined	50	2	75
Parrotfish uncl	Scaridae	Combined	18	5	23
Stargazer uncl	Uranoscopidae	Combined	4	2	2
Northern stargazer	*Astroscopus guttatus*	Combined	96	3	52
Southern stargazer	*Astroscopus y-graecum*	Combined	37	3	46
Lancer stargazer	*Kathetostoma albigutta*	Combined	102	4	35
Crested blenny	*Hypleurochilus geminatus*	Combined	4	5	9
Seaweed blenny	*Parablennius marmoreus*	Combined	5	3	6
Atlantic wolffish	*Anarhichas lupus*	Combined	3126	3	122
Clinid uncl	Clinidae	Combined	1	1	1
Daubed shanny	*Lumpenus maculatus*	Combined	503	5	28
Snakeblenny	*Lumpenus lumpretaeformis*	Combined	273	4	54
Wrymouth	*Cryptacanthodes maculatus*	Combined	377	4	97
Radiated shanny	*Ulvaria subbifurcata*	Combined	212	4	20
Rock gunnel	*Pholis gunnellus*	Combined	165	2	20
Northern sand lance	*Ammodytes dubius*	Combined	6437	3	28
Spotfin dragonet	*Foetorepus agassizi*	Combined	52	3	32
Goby uncl	Gobiidae	Combined	47	2	20
Naked goby	*Gobiosoma bosc*	Combined	6	4	4
Ocean surgeon	*Acanthurus bahianus*	Combined	6	3	13
Black gemfish	*Nesiarchus nasutus*	Combined	1	32	32

Species		Gender	N	Length Range (cm)	
Common Name	Scientific Name			Min.	Max.
Conejo	*Promethichthys prometheus*	Combined	63	7	41
Simonys frostfish	*Benthodesmus simonyi*	Combined	58	12	61
Atlantic cutlassfish	*Trichiurus lepturus*	Combined	741	6	92
Atlantic bonito	*Sarda sarda*	Combined	52	23	58
Striped bonito	*Sarda orientalis*	Combined	2	55	57
Chub mackerel	*Scomber japonicus*	Combined	317	4	37
Atlantic mackerel	*Scomber scombrus*	Combined	29799	4	51
King mackerel	*Scomberomorus cavalla*	Combined	114	2	117
Spanish mackerel	*Scomberomorus maculatus*	Combined	966	3	89
Swordfish	*Xiphias gladius*	Combined	4	85	131
White marlin	*Tetrapturus albidus*	Combined	3	3	3
Barrelfish	*Hyperoglyphe perciformis*	Combined	2	7	35
Silver rag	*Ariomma bondi*	Combined	116	3	50
Brown driftfish	*Ariomma melanum*	Combined	8	5	19
Spotted driftfish	*Ariomma regulus*	Combined	37	1	25
Bigeye cigarfish	*Cubiceps pauciradiatus*	Combined	32	6	17
Butterfish	*Peprilus triacanthus*	Combined	32991	1	29
Harvestfish	*Peprilus alepidotus*	Combined	553	1	28
Gulf stream flounder	*Citharichthys arctifrons*	Combined	9502	1	26
Horned whiff	*Citharichthys cornutus*	Combined	6	3	15
Anglefin whiff	*Citharichthys gymnorhinus*	Combined	2	4	5
Spotted whiff	*Citharichthys macrops*	Combined	57	4	24
Bay whiff	*Citharichthys spilopterus*	Combined	5	12	18
Fringed flounder	*Etropus crossotus*	Combined	35	3	16
Smallmouth flounder	*Etropus microstomus*	Combined	2307	2	43
Gray flounder	*Etropus rimosus*	Combined	17	5	11
Summer flounder	*Paralichthys dentatus*	Combined	54540	11	78
Gulf flounder	*Paralichthys albigutta*	Combined	4	26	46
Southern flounder	*Paralichthys lethostigma*	Combined	78	2	54
Fourspot flounder	*Paralichthys oblongus*	Combined	87984	3	49
Broad flounder	*Paralichthys squamilentus*	Combined	7	17	35
Windowpane	*Scophthalmus aquosus*	Combined	85545	2	48
Three-eye flounder	*Ancylopsetta dilecta*	Combined	1	15	15
Ocellated flounder	*Ancylopsetta quadrocellata*	Combined	26	9	37
Peacock flounder	*Bothus lunatus*	Combined	2	2	2
Eyed flounder	*Bothus ocellatus*	Combined	47	2	25
Twospot flounder	*Bothus robinsi*	Combined	29	8	16
Spotfin flounder	*Cyclopsetta fimbriata*	Combined	21	12	32
Shrimp flounder	*Gastropsetta frontalis*	Combined	4	14	24
Deepwater flounder	*Monolene sessilicauda*	Combined	34	3	19
Channel flounder	*Syacium micrurum*	Combined	3	11	23
Dusky flounder	*Syacium papillosum*	Combined	1176	2	30
Witch flounder	*Glyptocephalus cynoglossus*	Combined	29829	3	69
American plaice	*Hippoglossoides platessoides*	Combined	90000	3	66
Winter flounder	*Pseudopleuronectes americanus*	Combined	89991	3	69

Species		Gender	N	Length Range (cm)	
Common Name	**Scientific Name**			**Min.**	**Max.**
Yellowtail flounder	*Limanda ferruginea*	Combined	65187	2	58
Greenland halibut	*Reinhardtius hippoglossoides*	Combined	42	15	52
Atlantic halibut	*Hippoglossus hippoglossus*	Combined	912	4	154
Hogchoker	*Trinectes maculatus*	Combined	442	9	20
Naked sole	*Gymnachirus melas*	Combined	14	10	18
Tonguefish uncl	*Symphurus* sp.	Combined	153	1	18
Blackcheek tonguefish	*Symphurus plagiusa*	Combined	1740	2	21
Spottedfin tonguefish	*Symphurus diomedianus*	Combined	6	4	18
Northern tonguefish	*Symphurus pusillus*	Combined	2	7	14
Spottail tonguefish	*Symphurus urospilus*	Combined	7	6	17
Jambeau	*Parahollardia lineata*	Combined	2	7	7
Orange filefish	*Aluterus schoepfi*	Combined	89	2	58
Dotterel filefish	*Aluterus heudeloti*	Combined	49	12	50
Unicorn filefish	*Aluterus monoceros*	Combined	26	10	53
Scrawled filefish	*Aluterus scriptus*	Combined	9	13	27
Gray triggerfish	*Balistes capriscus*	Combined	436	2	52
Queen triggerfish	*Balistes vetula*	Combined	10	10	46
Ocean triggerfish	*Canthidermis sufflamen*	Combined	2	26	31
Fringed filefish	*Monacanthus ciliatus*	Combined	2	7	12
Planehead filefish	*Monacanthus hispidus*	Combined	2240	1	31
Scrawled cowfish	*Lactophrys quadricornis*	Combined	27	16	41
Honeycomb cowfish	*Lactophrys polygonia*	Combined	12	21	43
Smooth puffer	*Lagocephalus laevigatus*	Combined	68	1	34
Northern puffer	*Sphoeroides maculatus*	Combined	1494	1	40
Marbled puffer	*Sphoeroides dorsalis*	Combined	74	2	16
Southern puffer	*Sphoeroides nephelus*	Combined	10	8	17
Blunthead puffer	*Sphoeroides pachygaster*	Combined	7	9	20
Bandtail puffer	*Sphoeroides spengleri*	Combined	19	1	17
Sharpnose puffer	*Canthigaster rostrata*	Combined	4	5	7
Striped burrfish	*Chilomycterus schoepfi*	Combined	68	4	28
Spotted burrfish	*Chilomycterus atinga*	Combined	1	21	21
Balloonfish	*Diodon holocanthus*	Combined	24	8	26
Ocean sunfish	*Mola mola*	Combined	6	107	155
Loggerhead seaturtle	*Caretta caretta*	Combined	90	40	107

[a]Disk width measurement.

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Publications and Reports of the Northeast Fisheries Science Center

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