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Food of Seventeen Species of Northwest Atlantic Fish: Part I, Examination by Predator Length and Geographic Area*

by

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ABSTRACT

The stomach contents of 16,631 fish representing 17 species common to Northwest Atlantic continental shelf waters have been analyzed. Fish were collected during annual spring and autumn bottom trawl surveys conducted in offshore waters between Cape Hatteras, North Carolina, and Western Nova Scotia in the years 1973-1976. Major types of food within the entire study region are determined by examining the diet of predators according to fish length and within geographic areas traditionally referred to as the Middle Atlantic, Southern New England, Georges Bank, Gulf of Maine, and Western Nova Scotia. Examination of stomach contents revealed some species of prey were fairly widespread while others were more characteristic of a particular geographic area. Organisms of major importance as prey throughout the entire region sampled were *Unciola irrorata*, *Dichelopandalus leptocerus*, *Cancer* sp., *Meganyctiphanes norvegica*, *Neomysis americana*, *Loligo pealei*, silver hake (*Merluccius bilinearis*), and herring (Clupeidae). The identification of principal prey utilized by fishes within various geographic areas established that much dietary overlap occurs between species. However, some principal dietary components are often unique to fishes within a particular area, and even more frequently were identified as prey within larger regions which can be characterized as temperate (Middle Atlantic, Southern New England and Georges Bank) or boreal (Gulf of Maine and Western Nova Scotia). The majority of fish prey were found to be fish eggs, fish larvae or juvenile fish, and were taken to some extent by all predators sampled. The mean stomach content weight, when expressed as a percentage body weight according to fish length, indicates smaller fish of most species tend to have relatively larger quantities of food in their stomachs.

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INTRODUCTION

A significant element of the research program at the Northeast Fisheries Center, located in Woods Hole, Massachusetts, has been to describe the complex predator-prey interactions of Northwest Atlantic fishes which contribute to the limits and variability of fish production (Edwards and Bowman 1979; Grosslein et al. 1979, 1980; Cohen et al. 1981, 1982). Principal prey categories and dominant species of prey of many predators have been previously documented (Edwards and Bowman 1979; Langton and Bowman 1980, 1981). However, detailed analysis of the total species composition of prey in relation to size of predator is necessary for quantitative analyses of predator-prey interactions. In addition, temporal and spatial variability must be considered.

The energy flow through pelagic and benthic components of the food web within various marine shelf ecosystems has been described (Okata 1978; Edwards and Bowman 1979; Grosslein et al. 1979, 1980; Cohen et al. 1981). Classification of food organisms into general categories or broad taxonomic levels is almost a necessity when examining entire ecosystems, although major prey species are usually noted in such studies. Because the names of many important or subdominant prey species are often omitted in large scale investigations, their importance to the structure and function of particular communities within the ecosystem may be overlooked. For example, Bowman and Towns (1981) documented that the gammarid amphipod, *Gammarus annulatus*, was a major prey item for many fishes inhabiting the Nantucket Shoals area off Cape Cod, Massachusetts; but *G. annulatus* would seldom, if ever, be mentioned as an important prey in the Northwest Atlantic ecosystem.

In this paper we document the principal species of prey in relation to size of predator, within various geographic areas (Part I), during the spring and autumn for each year from 1973 through 1976 (Part II), and provide a complete listing of organisms (Part II) consumed by 17 species of fish caught within various regions located in offshore waters extending from Cape Hatteras, North Carolina, to Browns Bank, Nova Scotia.

Background

Large scale studies of the diet of Northwest Atlantic fishes have been undertaken during bottom trawl surveys conducted by the Northeast Fisheries Center (NEFC) since 1963. The area sampled covers continental shelf waters extending from Cape Hatteras, North Carolina, to Browns Bank, Nova Scotia, and is routinely surveyed during the spring and autumn of each year. The area has traditionally been subdivided into five geographic areas, namely the Middle Atlantic, Southern New England, Georges Bank, the Gulf of Maine, and Western Nova Scotia (Figure 1). Fishes within each geographic area have been characterized according to their general dietary preferences based on results obtained from initial food studies (1963-1972) (Bowman et al. 1976; Edwards and Bowman 1979; Grosslein et al. 1980; Langton and Bowman 1980, 1981). Species making up the largest portion of the adult fish biomass in the entire study area are euryphagic or stenophagic feeders which fall into one of four generalized feeding categories as follows: (1) principally piscivorous (including squids); (2) predators on plankton other than fish or squid; (3) principal consumers of benthic epifaunal crustaceans; (4) those which feed primarily on benthic infauna and non-crustacean epifauna.

More intensive feeding studies were initiated in 1973 to help determine the feeding chronology, digestion rate, consumption, and gross growth efficiency of selected fish species. Species were chosen according to their general feeding category, relative abundance within a geographic area, and commercial value. The feeding category of a particular species is made up of the principal prey of various trophic levels that link up and tend to focus energy toward the selected fish species (Tyler et al. 1981). The overall plan was to monitor the food of at least one species representative of each general feeding category within each of the five geographical areas to determine spatial and temporal changes that occur (if any) in prey organisms. Species selected for the present study were little skate, Raja erinacea (Mitchill); Atlantic cod, Gadus morhua (Linnaeus); haddock, Melanogrammus aeglefinus (Linnaeus); silver hake, Merluccius bilinearis (Mitchill); pollock, Pollachius virens (Linnaeus); red hake, Urophycis chuss (Walbaum); spotted hake, Urophycis regia (Walbaum), white hake, Urophycis tenuis (Mitchill); ocean pout, Macrozoarces americanus (Schneider); scup, Stenotomus chrysops (Linnaeus); butterfish, Peprilus triacanthus (Peck); redfish, Sebastes marinus (Linnaeus); longhorn sculpin, Myoxocephalus octodecemspinosus (Mitchill); fourspot flounder, Paralichthys oblongus (Mitchill); witch flounder, Glyptocephalus cynoglossus (Linnaeus); American plaice, Hippoglossoides platessoides (Fabricius); and yellowtail flounder, Limanda ferruginea (Storer)[1].

[1]All common and scientific names of fishes after Robins (1980).

METHODS AND MATERIALS

Collection

Fish stomachs representing 17 species were collected during eight bottom trawl survey cruises (Table 1). The surveys were conducted during the spring and autumn for the years 1973-1976 as follows: 16 March-15 May 1973; 26 September-20 November 1973; 12 March-4 May 1974; 20 September-14 November 1974; 4 March-12 May 1975; 15 October-18 November 1975; 4 March-8 May 1976; and 20 October-23 November 1976. On spring cruises a two-seam modified Yankee No. 41 trawl was fished, and during fall cruises a standard Yankee No. 36 was used. The cod end and upper belly of both trawls were lined with 13 mm mesh netting to retain smaller fish. A scheme of stratified random trawling was conducted within the study area and fishing continued over 24 hours per day. All tows were 30 minutes in duration at a vessel speed of 3.5 kn in the direction of the next station. Bottom water depths ranged from 27 to 365 meters.

During each cruise technicians were instructed to sample 50 juveniles and 50 adults per selected species from each geographic area. No more than 10 fish from each age group were to be taken at a particular station, and fish were not to be sampled at two consecutive stations. The only exception to this collection method occurred when, as the cruise progressed, it seemed that 50 juvenile or 50 adult fish of a species would not be collected within a particular area. In this case fish were collected as necessary to obtain the sample size requested. Stomachs of large fish were excised aboard ship, individually wrapped in gauze with a label denoting vessel, cruise, station, species, fork length (FL) when applicable, otherwise total length (TL), sex, and maturity, and preserved in a 4.0 percent formaldehyde solution (by volume). Small fish were preserved whole.

Analysis

In the laboratory the preserved stomachs were individually opened and their contents emptied onto a 0.25 mm mesh opening screen sieve to permit washing without the loss of any food items. The stomach contents were sorted, identified, counted, and damp dried on absorbent paper. Major prey items and commonly occurring but relatively minor prey, in terms of weight, were identified to species whenever practical. The wet weight of all stomach content groups was determined to the nearest 0.001 g and all information recorded. A stomach was considered empty when no food items could be identified and the material found in the stomach weighed less than 0.001 g. Data were analyzed with the aid of FORTRAN IV programs written for use on a Honeywell SIGMA 7 computer system located at the Woods Hole Oceanographic Institution in Woods Hole, Massachusetts.

Presentation of data

In the first two sections of the results (Part I), food data are presented in terms of the mean stomach content weight and the percentage weight each prey group made up of the total stomach contents weight. All tables follow a standard format to aid in making dietary comparisons. Two tables are presented for each predator species. The first table lists the stomach contents for five centimeter fish length categories; the second table, which may be found in the appendix, lists the food eaten by predators within each geographic area. However, when describing foods eaten within geographic areas all species are discussed together in the text, and five summary tables (one for each geographic area) are furnished. Part II of this manuscript includes tables listing all stomach contents identified, the number of each item, the total weight of all stomach content groups and the percentage of the

total weight made up by stomach content groups for each predator species. A second set of tables lists the major stomach content groups identified within both the spring and fall of each year (1973-1976). In all the above noted tables subtotals of the percentage weight of major stomach content groups are offset to the left. The number of fish stomachs examined, number of empty stomachs, mean stomach content weight, and mean fish length are given at the bottom of the tables.

The last section of the results in Part I includes calculations of the percentage body weight of the stomach contents representing various fish length categories sampled for individual predator species. The mean stomach content weight of various size fish of each species was converted to percentage body weight (%BW) by first determining the median value of each five centimeter length category and transforming the value to whole fish weight utilizing length/weight equations for each species which were available in the literature or as NEFC laboratory data; subsequently, the mean stomach content weight values for each category were divided by the whole fish weights and multiplied by 100. The %BW calculations were then plotted and comparisons were made between the type of diet, %BW of stomach contents, and gut morphology of the various species. Gut morphological measurements were extracted from data given in a paper by Edwards and Bowman (1979) for all species except spotted hake. Spotted hake data were obtained from NEFC laboratory information.

Variability

Sources of potential variation in the data presented in Part I and Part II of this paper include size, sex, and maturity stage of fish, as well as the time of day, area, season, bottom depth, and temperature when or where the fish were caught. Each variable considered in Part I and Part II is treated separately, i.e., the data were pooled over other variables with no attempt to determine the possible confounding effects of different variables on the results. Dietary trends noted within the variables examined here should be considered only as preliminary observations.

RESULTS

The stomach contents of a total of 16,631 fish were examined. The number of fish stomachs gathered from each species during the spring and autumn for the years 1973-1976 are listed in Table 1. The total number of stomachs collected for each predator is given in the right-hand column in the table. A summary of the number of each species sampled for stomach content analyses within various geographic areas of the Northwest Atlantic for the combined years 1973-1976 is given in Table 2. Also presented in Table 2 is the predator class, shown in the left hand column, which identifies principal types of prey eaten by the various predators. The stomachs of five species were collected in the Middle Atlantic and Western Nova Scotia; seven species were sampled in Southern New England, the Gulf of Maine, and on Georges Bank.

Immediately below we discuss the more important prey groups identified in the length specific analysis of the food data for each species. When shifts in the type of prey consumed occur, apparently related to predator length,

they are noted. Subsequent to the aforementioned evaluation we describe the relatively important foods, overall, of the combined species sampled within each geographic area. Finally, relationships between the %BW of the stomach contents, type of food consumed, and gut morphology among species are presented.

Food in relation to fish length

Little skate

Crustaceans were the dominant prey of all little skate sampled (i.e., 6-55 cm TL, Table 3). However, fish ≤35 cm TL preyed mostly on amphipods such as *Unciola irrorata*, *Gammarus annulatus*, *Leptocheirus pinguis*, and *Monoculodes edwardsi* while those >35 cm TL ate large quantities of decapods (e.g., *Cancer borealis*, *C. irroratus*, *Crangon septemspinosa*, *Pagurus acadianus*, and *Dichelopandalus leptocerus*. Polychaetes, mollusks, and fish were also taken as food but principally only by fish >20 cm TL.

Atlantic cod

Atlantic cod ≤50 cm FL fed mainly on decapod crustaceans with *Hyas coarctatus*, *Pagurus acadianus*, *Dichelopandalus leptocerus*, and *Pandalus montagui* being especially important prey (Table 4). The stomachs of Atlantic cod >50 cm FL contained large quantities of fish; more important species identified, in terms of percentage weight, were *Clupea harengus* and other herrings, *Merluccius bilinearis* and other hakes, *Ammodytes americanus*, Cottidae, *Scomber scombrus*, and *Sebastes marinus*. Also of importance in their diet were decapod crabs (represented by *Cancer irroratus* more than any other species) and mollusks (e.g., pelecypods and cephalopods). Small quantities of

Coelenterata, Polychaeta, and Echinodermata were identified in the stomachs of fish within several length categories ≤50 and >50 cm FL.

Haddock

The smallest haddock sampled (6-25 cm FL) had eaten mostly various crustaceans such as euphausiids (Meganyctiphanes norvegica), amphipods (e.g., Unciola irrorata, U. serrata, and Leptocheirus pinguis), and decapods (mainly Dichelopandalus leptocerus) as can be seen in Table 5. Polychaetes were also an important prey of small haddock. Fish >25 cm FL also preyed upon amphipods, but less intensively than the smaller haddock. The diet of larger haddock also included fairly large quantities of polychaetes and echinoderms (mainly Stronglocentrotus drobachiensis, Echinarachnius parma, Ophiura sarsi, and Ophiopholis aculeata). Coelenterates, mollusks, and fish were identified as part of the diet of both small and large haddock.

Silver hake

Silver hake of all lengths preyed principally on either fish or crustaceans (Table 6). However, the bulk of the food of silver hake ≤20 cm FL was crustaceans (>80% of the diet on average), whereas the food of individuals >20 cm FL was mostly fish and some squid (together these two prey categories averaged well over 50% of the diet). Crustacea eaten by silver hake 1-20 cm FL were found to be amphipods (especially Ampeliscidae and Parathemisto in the 1-5 cm fish length category), decapods (e.g., Crangon septemspinosa and Dichelopandalus leptocerus), euphausiids (exclusively Meganyctiphanes norvegica), mysids (only Neomysis americana identified), and copepods. Fish (mainly juvenile silver hake, Merluccius bilinearis, and American sand lance, Ammodytes americanus) were also consumed by small silver hake. The diet of

silver hake >20 cm FL was primarily fish and included, in part, Clupeidae, Merluccius bilinearis, Ammodytes americanus, Scomber scombrus, and Peprilus triacanthus. Loligo pealei, the long-finned squid, was also important in the diet of large silver hake.

Pollock

Crustaceans were an important dietary constituent of pollock within all length categories, but were especially notable as a food of pollock ≤75 cm FL (Table 7). Crustaceans made up more than 60% of the diet of fish within most length categories ≤75 cm FL. The largest contributors to the crustacean prey were Euphausiacea (Meganyctiphanes norvegica and Thysanoessa inermis) and decapod shrimp (species of consequence were Pasiphaea multidentata, Pandalus borealis, and Dichelopandalus leptocerus). Fish, although an important food for pollock as small as 26-30 cm FL, were heavily preyed upon by pollock >65 cm FL (fish made up >50% of the diet of pollock within four length categories >65 cm FL). Fish taxon identified as important prey of large pollock were Clupeidae, Merluccius bilinearis, Pollachius virens, Aethoprora metopoclampa, Scomber scombrus and Sebastes marinus. Loligo squid was found to be of consequence only in the diet of the largest pollock sampled (>90 cm FL).

Red hake

Red hake ≤25 cm TL preyed almost exclusively on Crustacea (Table 8). Amphipods (mostly Unciola irrorata and Leptocheirus pinguis) and decapods (principally Crangon septemspinosa and Dichelopandalus leptocerus) were the crustaceans found to be of considerable importance as prey of small red hake. Red hake >25 cm TL also ate substantial quantities of crustaceans (especially the two species of decapods noted immediately above along with

Cancer sp., Munida sp., and Pagurus acadianus). In addition to crustaceans, large red hake preyed heavily upon fish (Clupeidae, Ophidiidae, and Pleuronectiformes were identified) and squid. Polychaetes were found in the stomachs of both small and large red hake.

Spotted hake

The diet of spotted hake ≤25 cm TL consisted primarily of crustaceans, whereas fish and squid were the principal food of fish >25 cm TL (Table 9) as was previously noted for red hake. However, spotted hake prey differed from that of red hake in that spotted hake 1-10 cm TL ate large quantities of amphipods (≥50% of their stomach contents by weight), and spotted hake 11-25 cm TL consumed considerable amounts of amphipods, decapods (mostly Crangon septemspinosa and Dichelopandalus leptocerus) and euphausiids (almost exclusively Meganyctiphanes norvegica). The majority of fish and squid found in the stomachs of spotted hake >25 cm TL were not identified (but Merluccius bilinearis and Ophidiidae were recognized as fairly important prey). Spotted hake >25 cm TL also took considerable quantities of decapods as prey (e.g., Cancer irroratus, Crangon septemspinosa, Munida iris, and Dichelopandalus leptocerus).

White hake

More than one-half of the food of white hake (Table 10) 16-40 cm TL was Crustacea (decapod shrimp, Dichelopandalus leptocerus and Pandalus borealis; and the euphausiid, Meganyctiphanes norvegica were the principal species identified). Fish >40 cm TL preyed almost exclusively on Pisces, namely species such as Argentina silus, Clupea harengus, Merluccius bilinearis, Urophycis chuss, U. tenuis, Scomber scombrus, Sebastes marinus, and

Pseudopleuronectes americanus. Small quantities of Mollusca were identified in the dietary of both small and large white hake.

Ocean pout

Amphipod crustaceans (most identified as being in the family Corophiidae) accounted for a large percentage of the diet of 11-35 cm TL ocean pout (Table 11). Also of importance as food for fish in the above mentioned length range were the decapod crab, Cancer irroratus, polychaete worms, mollusks, and echinoderms (especially Echinarachnius parma which made up 88.1% of the identified stomach contents of fish in the 26-30 cm TL category). Echinoderms contributed more than 50% to the dietary of ocean pout in all length categories >35 cm TL. Echinarachnius parma, in particular, was an especially important food. Other echinoderms identified as food were the ophiuroids Euryale sp. and Ophiopholis aculeata. Prey groups of lesser dietary importance to fish >35 cm TL were Polychaeta, various Crustacea such as amphipods and decapods, and Mollusca (primarily Placopecten sp.).

Scup

The stomach contents of all scup sampled consistently contained substantial quantities (>25%) of polychaetes (various families identified are listed in Table 12). Crustaceans were also found to be an important food of scup of various sizes. However, scup 6-10 cm FL consumed the largest quantities of Crustacea (44.4%). Amphipods (primarily Unciola irrorata, Leptocheirus pinguis and unidentified Gammaridae were noted), decapods, and mysids were the predominant crustaceans identified. Mollusks, in particular squid, were a notable prey of scup 11-15 cm FL, 21-25 cm FL, and 26-30 cm FL. Coelenterata, Nemertea, Echinodermata, and Pisces, are noteworthy prey of scup, but they are of less dietary importance than the items mentioned above.

Butterfish

Large percentages of the stomach contents of butterfish were made up by unidentified animal remains (included in the Miscellaneous stomach content grouping) in all fish length categories (Table 13). Several prey groups were important constituents of the diet of butterfish ranging from 6 to 25 cm FL. They include Coelenterata, Polychaeta (see various families listed in Table 13), Crustacea (mainly the amphipod Parathemisto sp., but also Decapoda and Copepoda), Mollusca, and Thaliacea (mostly Larvacea and Hemimyaria). Coelenterata and Thaliacea were especially important food of the few large fish sampled (21-25 cm FL). Dietary items such as Ctenophora and Nemertea also made up a small percentage of the gut contents of butterfish (note 11-15 and 16-20 cm FL categories).

Redfish

Little variation was observed in the diet of redfish of varying lengths. Crustaceans dominated the diet of all redfish sampled, with the decapods, Dichelopandalus leptocerus and Pasiphaea multidentata, and the euphausiid Meganyctiphanes norvegica being especially important food (Table 14). Fish was the only other prey group identified, and they were taken by larger redfish (e.g., Myoxocephalus octodecemspinosa were eaten by redfish 21-25 cm FL, and Merluccius bilinearis were consumed by 31-35 cm FL predators).

Longhorn sculpin

As with redfish noted immediately above, crustaceans constituted the major portion of the diet of all longhorn sculpin sampled (Table 15). However, longhorn sculpin 1-15 cm TL preyed heavily on amphipods (e.g., Unciola irrorata and Leptocheirus pinguis) and small decapods (mainly Crangon

septemspinosa), and longhorn sculpin >15 cm TL took prey such as Cancer irroratus, Hyas coarctatus, Pagurus sp. and Dichelopandalus leptocerus. Also included in the crustacean portion of their diet were isopods and mysids (exclusively Neomysis americana) which were eaten to some extent by almost all length categories sampled. The only other major prey groups identified in the stomach contents of longhorn sculpin were Polychaeta and Pisces which made up greater percentages of the diet of longhorn sculpin >15 cm TL than fish <16 cm TL.

Fourspot flounder

Fourspot flounder of all length categories sampled fed intensively on decapod crustaceans (Table 16). Cancer irroratus, Crangon septemspinosa, Munida sp., and Dichelopandalus leptocerus were some of the most important prey included in the diet of this flounder. Another important crustacean prey group identified was the Mysidacea (almost solely Neomysis americana) which was taken by fish >15 cm TL. Mollusca (almost totally squid) tended to make up larger percentages of the food of fourspot falling within the longer fish length categories (26-35 cm TL), whereas fish prey made up the largest percentage of the stomach contents of relatively small fourspot flounder (16-20 cm TL).

Witch flounder

Polychaetes were of considerable importance in the diet of witch flounder of all sizes. A fairly extensive list of polychaete prey is presented in Table 17. The smallest (≤20 cm TL) witch flounder sampled were feeding very heavily on the euphausiid crustacean, Meganyctiphanes norvegica (69.8% of their diet). Euphausiids were also eaten in large quantities by fish 26-30 cm

TL (34.9%). Generally, the percentage of the witch flounder diet made up of crustaceans became progressively smaller as the size of fish increased. Conversely, the portion of their diet consisting of Echinodermata (the principal contributor to this prey group was Holothuroidea) tended to get larger for fish length categories representing longer and longer fish. The remainder of the witch flounder diet (for fish of varying lengths) included relatively small amounts of Coelenterata, Mollusca, and Ascidiacea.

American plaice

Polychaeta, Crustacea, Mollusca, and Echinodermata all accounted for large percentages of the food of American plaice ≤25 cm TL (Table 18). Polychaetes were especially important prey of fish ≤20 cm. American plaice >25 cm TL fed to a lesser extent on polychaetes, crustaceans, and mollusks and much more heavily on echinoderms such as the echinoid, *Echinarachnius parma*, and the Ophiuroid, *Ophiura sarsi*. The aforementioned was especially evident for fish within the three longest length categories (i.e., >40 cm TL) where Echinodermata made up >80% of all food.

Yellowtail flounder

Yellowtail flounder of all sizes preyed on Crustacea, but the percentage of their diet made up by crustaceans steadily decreases as fish length increases (Table 19). Amphipods (e.g., *Byblis serrata*, *Unciola irrorata*, and *Leptocheirus pinguis*) and decapods (e.g., *Crangon septemspinosa* and *Dichelopandalus leptocerus*) were identified as the major contributors to the Crustacea portion of the yellowtail flounder stomach contents. For the most part, fish ≤20 cm TL ate amphipods and decapods, while those >20 cm TL fed on a variety of polychaetes. Other stomach content groups which contributed to

the diet of yellowtail flounder include Coelenterata, Nemertea, Mollusca, and Urochordata, all of which were eaten principally by fish >15 cm TL.

Food according to geographic area

Examination of the stomach contents revealed some species of prey were fairly widespread while others were more characteristic of a particular region (Middle Atlantic, Southern New England and Georges Bank, or the Gulf of Maine and Western Nova Scotia) or geographic area. The controlling factor for the distribution of many prey species is likely water temperature and/or bottom sediment type.

Organisms taken as prey throughout the entire study area during the 1973-1976 period were Polychaeta (various families), *Unciola irrorata* (amphipod), *Dichelopandalus leptocerus* (decapod shrimp), *Cancer* sp. (decapod crab), *Meganyctiphanes norvegica* (euphausiid), *Neomysis americana* (mysid), *Loligo pealei* (squid), *Merluccius bilinearis* (silver hake), and Clupeidae (herring). The stomach contents of at least one predator species sampled in all areas except the Middle Atlantic included *Aphrodita* sp. (polychaete), *Leptocheirus pinguis* (amphipod), *Axius serratus* and *Pagurus* sp. (decapods), Echinoidea, Holothuroidea, and *Scomber scombrus* (Atlantic mackerel). One prey species, *Ammodytes americanus* (American sand lance), was consumed by one or more predators in each area except Western Nova Scotia. The remaining stomach content groups discussed below were either characteristic as a food of at least one predator species within a particular geographic area (or areas), or were identified as important prey of one or more species sampled only in the Middle Atlantic, Southern New England, and Georges Bank, or the Gulf of Maine and Western Nova Scotia regions. Major prey groups of all species considered

together are listed in Tables 20-24 for ease of comparing prey between geographic areas (also see Appendices A-Q for a listing of prey taken by predators sampled within each area).

No major prey species were identified as unique food sources for the fish in the Middle Atlantic (Table 20). In Southern New England, Gammarus annulatus (an amphipod consumed by little skate) and Stenotomus chrysops (scup, which were eaten by silver hake) can be considered as principally endemic food sources (Table 21). Scallop viscera was the only dietary item found to be fed on solely by fish on Georges Bank (it was eaten by Atlantic cod, haddock, and ocean pout), and this occurrence probably resulted from the fish feeding on the viscera after scallop fishermen discarded it (on Georges Bank) after removing the adductor muscle, as has been reported previously by Wigley 1956; Bowman 1975; and Bowman and Langton 1978 (Table 22). Food found peculiar to Gulf of Maine fishes included Geryon quinquedens (red crab), which were eaten by Atlantic cod; Pollachius virens (pollock), consumed by larger pollock; and Urophycis tenuis (white hake), identified as prey of bigger white hake (Table 23). Two species of fish were the only prey identified as being taken solely by predators sampled in Western Nova Scotia (Table 24); namely Gadus morhua (Atlantic cod), ingested by Atlantic cod of greater size, and Melanogrammus aeglefinus (haddock), devoured by Atlantic cod and haddock longer in length.

Organisms identified in the diet of predators within two or three geographic areas are given immediately below. Ophiuroidea (brittle stars) was of dietary importance to fishes on Georges Bank (Atlantic cod, haddock, and ocean pout), in the Gulf of Maine (Atlantic cod, witch flounder, haddock, and American plaice), and in Western Nova Scotia (Atlantic cod, haddock, witch flounder, and American plaice). Sebastes marinus (redfish) was eaten by

Atlantic cod on Georges Bank (but it only accounted for <0.1% of their diet); in the Gulf of Maine by white hake, Atlantic cod, and pollock; and in Western Nova Scotia by Atlantic cod. Hippoglossoides platessoides (American plaice) was preyed upon by Atlantic cod on Georges Bank and in Western Nova Scotia. The last stomach content category within this group was the Thaliacea, which were identified in the stomach contents of butterfish sampled in the Middle Atlantic and Southern New England.

Two species were noted as major prey of fishes sampled in the Middle Atlantic, Southern New England, and Georges Bank region. Crangon septemspinosa was consumed by silver hake, spotted hake, and fourspot flounder in the Middle Atlantic; silver hake, red hake, little hake, and yellowtail flounder in Southern New England; and silver hake, little skate, longhorn sculpin, and yellowtail flounder on Georges Bank. Peprilus triacanthus (butterfish) was taken as prey by silver hake sampled in all three geographic areas. The two species of prey mentioned immediately above, and other organisms, identified as principal food in this region and commented on in above paragraphs, are known to be primarily associated with warm waters. For example, butterfish and scup are principally located in the southern part of our sampling area (Bigelow and Schroeder 1953; NEFC data[2]) and the distribution of Thaliacea, Gammarus annulatus, Crangon septemspinosa, and Placopecten magellanicus (sea scallop) is mainly within the three geographic areas referred to above (Gosner, 1971; NEFC data[2]).

Three species were noted as co-occurring prey of fishes in the Gulf of Maine and Western Nova Scotia region. Only the stomachs of fishes sampled in the Gulf of Maine and Western Nova Scotia contained fairly large quantities of

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[2]Contact authors for further information.

Pandalus borealis (white hake, pollock, redfish, and American plaice in the Gulf of Maine, and pollock and American plaice in Western Nova Scotia), Pasiphaea multidentata (pollock and redfish in the Gulf of Maine, and pollock in Western Nova Scotia), and Thysanoessa inermis (pollock; only <0.1% in the Gulf of Maine, and 1.5% in Western Nova Scotia). These three species along with other prey noted in above paragraphs as being relatively unique food of fishes within either the Gulf of Maine or Western Nova Scotia are organisms which primarily inhabit cold waters (Gosner 1971; Bigelow and Schroeder 1953; NEFC data[2]). It should be mentioned that Geryon quinquedens, a cold water species taken by Atlantic cod in the Gulf of Maine also occur in large numbers in the cold deep slope waters (mostly below 366 m) south of Cape Cod, beyond the sampling depth range of the bottom trawl surveys. Surprisingly, large populations of juvenile Atlantic cod and haddock occur on Georges Bank, but they were only identified in the stomachs of Atlantic cod and haddock sampled in Western Nova Scotia. The last species to be noted here is redfish, which is a fish common to and preyed upon in the Gulf of Maine and Western Nova Scotia (although <0.1% of the Atlantic cod diet on Georges Bank was also redfish).

Percentage body weight of stomach contents

Comparison of %BW of mean stomach content weight data to fish size, fish diet, dietary caloric value and gut morphology of the various species revealed striking relationships exist between many species. Appendix R lists the fish length-weight equations (and their sources) which were used to convert mean stomach content values to %BW. Figure 2 illustrates how the %BW of stomach contents differ with fish size for the various species (data from which

figures were drawn are listed in Appendix S). It can be seen in the figure that the smaller fish of many species tend to have larger quantities of food in their stomachs, in terms of %BW, than the larger fish (e.g., see little skate, scup, butterfish, witch flounder, yellowtail flounder, and longhorn sculpin in Figure 2) and that the stomachs of the largest fish of several species contain more food in terms of %BW than the medium size fishes (e.g., see Atlantic cod, haddock, silver hake, pollock, red hake, and fourspot flounder). The %BW of the stomach contents of various size fish of other species were highly variable (e.g., see spotted hake, white hake, ocean pout, redfish, and American plaice). A possible explanation for these phenomena is given in the discussion.

The average %BW of the stomach contents was calculated (excluding all fish 1-5 cm in length since they were obtained for so few species) and compared with the composition of the diet, dietary caloric value, and gut morphology for each species. The latter two data sets were taken from a paper by Edwards and Bowman 1979. All data are listed in Table 25 where species have been grouped into three categories (i.e., gadiformes, pleuronectiformes, and other fishes) to exemplify relationships noted between species. Further, fish within each group are listed in descending order according to their average %BW. Of interest is that, overall, within each group the species whose stomachs contain the largest quantities of food tend to feed primarily on fish, squid, and decapods (which are high in caloric value) and also have fairly large stomachs in comparison to their intestine (see Nikolsky 1963 for a discussion of morphological differences between various types of predators). The size of stomach is indicated by the S/I ratio which was calculated by dividing the stomach tissue weight by the weight of the intestine and pylorus. Fishes whose stomachs contained the smallest

quantities of food fed on prey of relatively low caloric value (e.g., echinoids, ophiuroids, polychaetes, holothurians, and thaliaceans) and had relatively large intestines (their S/I ratios were generally <0.5. Pollock (within the "gadiformes") and redfish (within the "other fishes") were exceptions to the trend noted above in that the stomachs of both species contained small quantities of food (0.41 and 0.10%BW, respectively) of relatively high caloric value, and they also have fairly large stomachs. It should also be noted that ocean pout and American plaice, both of which fed on large quantities of echinoids and ophiuroids (both low in caloric value as a food) have the smallest S/I ratios within their groups. The points brought out above provide some evidence that a relationship exists between the quantity and type (or caloric value) of food consumed, and the digestive tract morphology of a particular species.

DISCUSSION

Previous investigations have established that the food eaten by many predators changes as they grow in length. Vinogradov (1972) and Bowman (1980b) documented that silver hake in the Northwest Atlantic eat mostly crustaceans when they are juveniles and are piscivores when adults. Daan (1973) studied North Sea cod and found a pronounced shift from crustaceans to fish in their diet as they increased in length. Similar dietary trends have been noted for such species as red hake, white hake, and pollock (Vinogradov 1972, Tyler 1971, Steele 1963, respectively). Prey selection by individual fish is principally dependent on the mouth morphology of the predator (particularly mouth size), and the physical and behavioral adaptations of the

particular species for obtaining available prey. Food related size classes for fish have been identified as "threshold lengths" by Parker and Larkin (1959) and as "feeding stanzas" by Paloheimo and Dickie (1965) and Tyler (1972). Hahm and Langton (1980) examined predator to prey weight ratios and showed that different predators select different size frequencies of prey. Hahm and Langton's work concentrated on a subset of the data considered in the present study. Data presented herein corroborates information from these earlier investigations, and further, documents that dietary shifts related to fish size occur in other species as well (e.g., little skate, haddock, spotted hake, ocean pout, longhorn sculpin, American plaice, and yellowtail flounder).

Overall, the analysis of the stomach contents reported on here indicates that the smallest fish of each species sampled (juveniles) prey mostly on amphipods, euphausiids (almost exclusively Meganyctophanes norvegica) mysids (mostly Neomysis americana) and decapod shrimp (principally Crangon septemspinosis and Dichelopandalus leptocerus). The juveniles of four species (i.e., scup, witch flounder, American plaice, and yellowtail flounder) also fed to varying degrees on polychaetes, and one predator, namely butterfish also took larvaceans as food. The larger adult fish of many species (i.e., Atlantic cod, silver hake, pollock, red hake, spotted hake, and white hake) fed intensively on fish or squid, while others (i.e., little skate, longhorn sculpin, and to a lesser extent, fourspot flounder) ate mostly decapod crabs and shrimp. Of particular interest is that most, if not all, fish consumed are either eggs, larvae, juveniles, or species of relatively small size (e.g., see Table 26 for names and sizes of fish eaten by Atlantic cod, the largest predator sampled). Also note that all species collected prey to some degree on fish (Table 27). Adult haddock, ocean pout, American plaice, and yellowtail flounder took some combination of echinoderms and/or polychaetes as

their principal food. These data are fairly consistent with previous reports on the food of the same species. For example, Bowman (1981) reported on the diet of the juveniles of ten species of Northwest Atlantic groundfish. He found that relatively few prey groups (e.g., copepods, amphipods, Meganyctiphanes norvegica, Crangon septemspinosa, and Neomysis americana) account for a large portion of the food of juvenile fish. Langton and Bowman (1980, 1981) studied the dietary habits of gadiform and pleuronectid fishes collected in the same geographic areas as the present study during the years 1969-1972. Our results for the same species agree well with their findings. Our data are also in agreement with McEachran's conclusions (1973) on little skate. He noted little skate <41 cm TL consumed mostly amphipods, while skates >41 cm TL fed primarily on decapod crabs and shrimp during the 1969-1970 period in the Northwest Atlantic.

The composition of the diet of few, if any, fish species remains the same throughout their life. However, the type of food eaten by some species varies little as they grow. Rae (1969) observed only a slight change in the diet of different size witch flounder caught on Icelandic fishing grounds off Scotland. He noted crustaceans were eaten more often than polychaetes by smaller fish (11-20 cm TL), but for all other size classes of fish (up to 50 cm TL) polychaetes were the most frequent prey consumed. Witch flounder caught in the Gulf of Maine and Western Nova Scotia for the present study had similar dietary habits to the Northeast Atlantic witch flounder studied by Rae (loc. cit.). Only the stomachs of fish <20 cm TL contained large quantities of crustaceans (e.g., 69.8% Meganyctiphanes norvegica; see Table 17); for all other length categories polychaetes made up the largest portion of the stomach contents. Other predators whose diets only differed slightly between length categories were redfish (prey was almost exclusively euphausiids and decapod

shrimp), scup (food consisted mainly of polychaetes), butterfish (hydrozoans, polychaetes, and amphipods were important prey), and to a lesser extent fourspot flounder (decapod shrimp was the principal prey of all fourspot flounder sampled; however, some squid and decapod crabs were also taken by fish >20 cm TL).

Predation patterns of fishes within each particular geographic area have not changed substantially over time. Langton and Bowman (1980, 1981) described the food of gadiform and pleuronectiform fishes in the same study area for the years 1969-1972. Many of the same or similar differences between areas reported on here were established during their investigations. The identification in this paper of the principal prey utilized by fishes within various geographic areas also establishes that many prey species are widespread in the study area. However, other organisms utilized as food are often restricted to relatively small geographic areas.

Seasonal and spatial changes in the type and quantity of food consumed according to prey availability are well documented (Tyler 1971, 1972; Turuk 1976). The data presented here and in previous reports (e.g., Langton and Bowman 1980, 1981) represent collections made during similar seasons and in the same geographic sampling areas. Therefore, the consistent similarities and differences noted in the prey consumed between areas are a measure of the relative abundance of species utilized as prey. Because the most abundant predators within each geographic area were chosen for this analysis, the principal species of prey consumed within each area likely represent a significant biomass. This can be documented for at least one species, namely *Pandalus borealis*, a common prey of fishes in the Gulf of Maine and Western Nova Scotia region. Commercial vessels landed more than 10,000 tons of this species annually during the early 1970's and the estimated biomass was more

than 20,000 tons during the same period in the Gulf of Maine and Western Nova Scotia region (Clark et al., 1979). Prey considered here to be generally restricted to specific areas likely tend to also segregate the fish species which have developed prey-specific efficiencies. The affinity of some fish species to concentrate in the vicinity of large concentrations of favored food has been established (Templeman, 1965; Tyler, 1971).

Observations on the relationships between %BW of stomach contents, prey types consumed, gut morphology, caloric value of food, and daily ration have been described in some detail by Edwards and Bowman (1979). They noted the caloric value of food (also digestibility of prey) and the S/I ratio (or gut morphology) are related in that fishes which eat food of low caloric value (e.g., polychaetes and thalaceans) and/or food which is hard to digest (e.g., echinoderms) tend to have heavier (and usually longer) intestines (thereby reducing the S/I ratio) than fish which do not. Fish which feed on prey high in caloric value (e.g., fish and squid) generally have relatively small intestines.

Edwards and Bowman (loc. cit.) also hypothesized on the feeding behavior of various size fish. They suggested that small fish feed several times per day; medium size fish feed for the most part only once per day; and large fish (which eat mostly large prey organisms) feed during a particular period of the day, but not necessarily every day. The results presented herein indirectly support their hypothesis in that the stomachs of small juveniles of many species contained large quantities of food in terms of average %BW, which would be expected if they fed several times throughout the day. In this regard it should also be mentioned here that in addition to possibly feeding more than once per day the juveniles of at least two species (haddock and silver hake) are known to have heavier (larger) stomachs, in terms of %BW of

stomach tissue, capable of holding relatively more food than the stomachs of adults (Bowman 1980a, 1980b). Moderate size fish, for the most part, had the smallest %BW values of stomach contents (possibly indicating they may only feed once per day and digest the majority of their food in less than 24 hr). Large fish of species which take relatively large prey had the highest %BW of stomach content values, an expected result if their prey remains in their stomachs over long periods of time while being digested. Certainly there may be other explanations for the above results, but the given hypothesis based principally on empirical data seems reasonable.

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Table 1. Number of fish stomachs collected from each species sampled for the spring and autumn of the years 1973-1976.

	Year and Season								
	1973		1974		1975		1976		
Predator	Spring	Autumn	Spring	Autumn	Spring	Autumn	Spring	Autumn	Total
Little skate	134	76	156	113	164	124	204	150	1121
Atlantic cod	172	361	224	191	180	200	214	172	1714
Haddock	107	213	121	260	122	268	165	223	1479
Silver hake	196	515	389	333	274	357	309	352	2725
Pollock	89	135	95	52	76	64	117	64	692
Red hake	46	84	82	47	56	54	109	112	590
Spotted hake	47	79	30	74	67	54	96	94	541
White hake	45	103	79	87	70	56	56	59	555
Ocean pout	83	21	115	7	72	7	102	32	439
Scup	44	30	20	91	59	167	120	191	722
Butterfish	61	140	35	168	51	161	201	265	1082
Redfish	55	114	53	49	55	53	58	46	483
Longhorn sculpin	50	73	104	71	142	106	106	61	713
Fourspot flounder	45	87	41	58	20	27	51	56	385
Witch flounder	150	142	123	107	62	120	98	45	847
American plaice	193	246	231	218	165	158	207	104	1522
Yellowtail flounder	121	128	137	120	152	73	164	126	1021
								Total	16631

Table 2. Number of each species of fish sampled for stomach content analyses within various geographic areas of the Northwest Atlantic for the years 1973-1976, combined.

Predator class	Predator	Geographic Area				
		Middle Atlantic	Southern New England	Georges Bank	Gulf of Maine	Western Nova Scotia
Fish and squid	Silver hake	789	918	915		
	Atlantic cod			591	418	669
	White hake				470	
	Pollock				374	295
Planktonic invertebrates	Butterfish	678	394			
	Redfish				466	
Epifaunal crustaceans	Little skate		486	579		
	Red hake		481			
	Spotted hake	531				
	Fourspot flounder	366				
	Longhorn sculpin			692		
Benthic infauna and non-crustacean epifauna	Haddock			642	87	747
	American plaice				714	784
	Yellowtail flounder		502	502		
	Witch flounder				426	386
	Scup	450	262			
	Ocean pout		239	184		

Table 3. Composition of the stomach contents of little skate, expressed as a percentage of the total stomach contents weight versus fish length, for little skate collected in the Northwest Atlantic from 1973 through 1976.

Stomach contents	Length category (cm) 6-10	11-15	16-20	21-25	26-30	31-35	36-40	41-45	46-50	51-55
COELENTERATA	-	-	-	-	-	-	0.4	1.3	0.4	0.2
NEMERTEA	-	-	-	0.6	-	0.1	<0.1	0.7	1.2	-
POLYCHAETA	1.1	-	4.7	15.9	6.0	8.2	13.6	12.2	7.9	30.5
Flabelligeridae	-	-	-	-	0.3	0.2	2.4	0.5	0.2	0.2
Aphroditidae	-	-	-	-	-	-	0.8	1.3	1.8	6.5
Glyceridae	-	-	-	-	-	-	0.4	2.3	0.4	2.9
Nephtyidae	-	-	-	-	0.3	-	0.9	1.5	0.6	2.8
Nereidae	-	-	-	-	-	1.1	<0.1	0.4	1.2	6.7
Other Polychaeta	1.1	-	4.7	15.9	5.4	6.9	9.1	6.2	3.7	11.4
CRUSTACEA	63.2	78.5	84.4	68.7	86.0	69.4	62.9	67.0	68.8	51.6
Amphipoda	29.2	39.3	39.3	46.0	35.1	32.7	18.1	14.7	10.7	4.0
Ampeliscidae	-	3.0	6.0	3.0	2.9	1.4	1.2	1.4	0.3	<0.1
Unciola irrorata	-	10.3	13.7	9.0	2.7	1.8	2.4	1.6	0.5	<0.1
Other Corophiidae	-	0.7	0.1	0.3	0.1	0.7	5.7	1.3	0.2	-
Gammarus annulatus	-	6.3	-	10.1	5.2	-	0.1	0.1	1.8	-
Other Gammaridae	16.0	-	6.1	5.1	7.3	10.1	1.4	1.0	1.2	0.4
Leptocheirus pinguis	-	3.6	3.1	3.2	4.7	4.3	5.0	5.3	3.9	2.6
Monoculodes edwardsi	2.4	1.0	3.3	7.9	10.1	7.8	1.1	2.0	1.1	0.1
Other Oedicerotidae	10.8	8.4	1.2	1.3	0.9	2.4	0.2	0.9	1.1	0.5
Other Amphipoda	-	6.0	5.8	6.1	1.2	4.2	1.0	1.1	0.6	0.4
Decapoda	4.9	24.3	32.7	15.3	40.2	21.4	36.2	45.1	53.8	42.9
Axius serratus	-	-	-	-	-	-	1.0	1.1	2.6	1.8
Cancer borealis	-	-	-	-	-	<0.1	0.7	0.7	2.6	5.2
Cancer irroratus	-	-	-	0.2	15.7	1.3	0.5	7.2	5.2	5.3
Other Cancridae	-	-	0.8	0.2	2.1	3.4	4.4	4.0	2.9	16.5
Crangon septemspinosa	4.6	14.4	29.5	12.3	16.3	13.2	15.3	8.7	6.3	5.8
Other Crangonidae	0.3	4.8	1.2	1.6	0.6	1.9	0.6	1.2	0.5	0.9
Pagurus acadianus	-	-	-	-	-	-	5.7	9.3	13.4	0.8
Other Paguridae	-	-	0.3	0.1	0.3	0.6	2.2	1.9	11.0	2.7
Dichelopandalus leptocerus	-	2.3	-	-	3.3	0.1	3.8	5.9	4.0	0.8
Other Decapoda	-	2.8	0.9	0.9	1.9	0.9	2.0	5.1	5.3	3.9
Isopoda	1.3	0.3	0.1	1.2	1.6	6.3	2.3	1.3	0.8	2.0
Cirolanidae	0.4	0.3	0.1	1.0	1.5	6.3	2.3	1.3	0.8	2.0
Other Isopoda	0.9	-	<0.1	0.2	0.1	-	<0.1	-	<0.1	-
Other Crustacea	27.8	14.6	12.3	6.2	9.1	9.0	6.3	5.9	3.5	2.7
MOLLUSCA	-	-	-	0.4	0.1	3.2	5.5	3.0	4.2	2.8
Pelecypoda	-	-	-	0.4	-	3.1	3.9	2.2	3.7	0.5
Other Mollusca	-	-	-	-	0.1	0.1	1.6	0.8	0.5	2.3
PISCES	-	1.0	0.2	0.1	0.5	3.1	3.5	5.0	7.0	2.8
Ulvaria subbifurcata	-	-	-	-	-	-	-	-	3.6	-
Other Pisces	-	1.0	0.2	0.1	0.5	3.1	3.5	5.0	3.4	2.8
MISCELLANEOUS	35.7	20.5	10.7	14.3	7.4	16.0	14.1	10.8	10.5	12.1
Number of stomachs examined	43	52	73	44	42	70	110	247	391	45
Number of empty stomachs	6	2	3	2	2	6	9	18	50	2
Mean stomach content weight(g)	0.018	0.051	0.158	0.257	0.522	0.537	0.874	1.268	1.624	1.395
Mean fish TL (cm)	9	13	17	22	28	33	38	43	47	51

Table 4. Composition of the stomach contents of Atlantic cod, expressed as a percentage of the total stomach contents weight versus fish length, for Atlantic cod collected in the Northwest Atlantic from 1973 through 1976.

Stomach contents	Length category (cm) 6-10	11-15	16-20	21-25	26-30	31-35	36-40	41-45	46-50	51-55	56-60
COELENTERATA	-	-	-	-	-	0.5	0.4	0.2	1.1	0.8	0.7
POLYCHAETA	0.7	-	0.6	1.1	2.5	5.0	4.3	3.3	5.1	4.2	2.4
Aphroditidae	-	-	-	-	-	2.8	0.3	1.7	4.1	3.8	0.9
Other Polychaeta	0.7	-	0.6	1.1	2.5	2.2	4.0	1.6	1.0	0.4	1.5
CRUSTACEA	88.3	78.5	81.0	28.4	83.0	49.7	57.6	37.9	42.1	35.0	38.5
Decapoda	51.3	10.3	42.9	16.5	51.9	39.0	44.0	31.5	38.4	32.3	34.4
Axius serratus	-	-	-	-	-	-	3.0	0.2	6.3	1.8	0.8
Cancer borealis	-	-	-	-	-	-	-	-	0.3	2.1	0.6
Cancer irroratus	-	-	-	-	<0.1	0.1	1.0	0.2	0.9	5.0	10.5
Geryon quinquedens	-	-	-	-	-	-	-	-	-	-	-
Hyas coarctatus	-	-	-	-	3.2	2.2	5.4	2.7	3.0	3.3	6.1
Pagurus acadianus	-	-	-	-	1.0	0.1	0.6	0.4	8.5	4.7	3.4
Dichelopandalus leptocerus	40.1	3.7	8.9	5.0	24.9	13.4	12.6	10.2	9.0	3.1	2.9
Pandalus montagui	-	-	-	3.4	7.3	4.2	3.0	6.8	1.7	8.5	3.2
Other Pandalidae	-	-	4.4	1.1	5.4	1.4	2.1	0.3	3.3	0.3	1.2
Other Decapoda	11.2	6.6	29.6	7.0	10.1	17.6	16.3	10.7	5.4	3.5	5.7
Other Crustacea	37.0	68.2	38.1	11.9	31.1	10.7	13.6	6.4	3.7	2.7	4.1
MOLLUSCA	-	-	-	-	-	3.8	8.3	7.1	10.9	14.7	22.2
Pelecypoda	-	-	-	-	-	1.8	0.1	3.7	6.3	10.5	11.8
Cyrtodaria siliqua	-	-	-	-	-	-	-	-	-	-	-
Pectinidae	-	-	-	-	-	-	-	3.7	5.5	9.5	11.8
Other Pelecypoda	-	-	-	-	-	1.8	0.1	-	0.8	1.0	<0.1
Cephalopoda	-	-	-	-	-	-	0.1	1.4	-	1.4	1.0
Loligo sp.	-	-	-	-	-	-	-	-	-	-	-
Other Cephalopoda	-	-	-	-	-	-	0.1	1.4	-	1.4	1.0
Other Mollusca	-	-	-	-	-	2.0	8.1	2.0	4.6	2.8	9.4
ECHINODERMATA	-	-	-	-	1.3	11.3	2.4	9.4	1.7	3.2	6.0
Ophiuroidea	-	-	-	-	0.1	4.9	2.4	5.6	1.4	2.3	4.7
Holothuroidea	-	-	-	-	-	5.3	-	3.8	0.3	0.7	0.5
Other Echinodermata	-	-	-	-	1.2	1.1	<0.1	-	<0.1	0.2	0.8
PISCES	6.3	5.6	1.8	65.8	3.7	15.8	16.1	31.3	29.0	39.0	25.0
Batrochoididae	-	-	-	-	-	-	-	-	-	-	-
Clupea harengus	-	-	-	-	-	-	-	-	2.7	4.7	-
Other Clupeidae	-	-	-	-	-	-	-	-	-	12.0	4.9
Gadus morhua	-	-	-	-	-	-	-	-	-	-	-
Melanogrammus aeglefinus	-	-	-	-	-	-	-	-	-	-	-
Merluccius bilinearis	-	-	-	-	-	-	-	-	-	-	-
Other Gadidae	-	-	-	-	-	-	-	-	-	-	-
Ammodytes americanus	-	-	-	-	-	6.7	-	14.5	9.9	13.3	1.3
Cottidae	-	-	-	-	-	-	0.2	0.4	0.2	0.2	<0.1
Scomber scombrus	-	-	-	-	-	-	-	-	1.6	-	1.8
Pomatomus saltatrix	-	-	-	-	-	-	-	-	-	-	-
Sebastes marinus	-	-	-	-	-	-	-	-	3.3	-	-
Hippoglossoides platessoides	-	-	-	-	-	-	-	-	-	-	-
Other Pleuronectiformes	-	-	-	-	-	-	4.8	-	0.1	-	0.1
Other Pisces	6.3	5.6	1.8	65.8	3.7	9.1	11.1	16.4	11.2	8.8	16.9
MISCELLANEOUS	3.0	15.9	11.2	4.6	9.1	13.2	9.7	10.2	4.6	2.8	4.2
SAND AND ROCK	1.7	-	5.4	0.1	0.4	0.7	1.2	0.6	5.5	0.3	1.0
Number of stomachs examined	35	83	51	41	81	116	120	117	139	115	126
Number of empty stomachs	8	14	10	7	6	9	10	8	6	14	13
Mean stomach content weight(g)	0.035	0.081	0.142	1.112	1.165	2.054	2.651	4.614	7.972	12.759	12.430
Mean fish FL (cm)	8	12	18	23	28	33	38	43	48	53	58

Table 4. (continued)

Stomach contents	Length category (cm) 61-65	66-70	71-75	76-80	81-85	86-90	91-95	96-100	101-105	106-110	>110
COELENTERATA	3.1	3.8	0.3	-	0.6	-	-	-	-	-	-
POLYCHAETA	1.1	0.5	1.0	0.8	0.1	0.8	-	2.4	-	0.1	0.3
Aphroditidae	0.4	0.3	0.6	0.6	<0.1	0.8	-	2.4	-	-	0.3
Other Polychaeta	0.7	0.2	0.4	0.2	0.1	<0.1	-	<0.1	-	0.1	-
CRUSTACEA	32.5	26.8	16.9	20.0	13.9	6.0	16.5	18.2	11.3	14.3	5.3
Decapoda	29.8	26.0	15.8	19.6	13.8	6.0	15.5	18.0	11.0	14.3	4.9
Axius serratus	3.1	0.2	0.1	-	0.1	-	11.1	-	2.0	-	-
Cancer borealis	1.3	0.9	0.7	1.0	0.8	-	3.7	5.5	-	4.1	4.7
Cancer irroratus	10.2	11.2	8.9	10.0	7.6	1.5	-	7.0	-	8.9	-
Geryon quinquedens	-	-	-	-	-	1.5	-	4.5	7.2	-	-
Hyas coarctatus	1.6	0.4	1.0	3.8	0.9	0.3	-	0.2	-	0.4	-
Pagurus acadianus	5.1	4.6	1.2	2.1	0.6	0.4	-	-	-	0.7	-
Dichelopandalus leptocerus	3.8	1.9	0.3	0.3	1.5	1.1	0.4	0.2	0.1	-	-
Pandalus montagui	0.9	0.3	0.1	0.2	0.2	0.5	0.3	-	-	-	-
Other Pandalidae	1.3	0.8	0.4	<0.1	0.8	-	<0.1	0.2	1.1	0.2	0.2
Other Decapoda	2.5	5.7	3.1	2.2	1.3	0.7	-	0.4	0.6	-	<0.1
Other Crustacea	2.7	0.8	1.1	0.4	0.1	<0.1	1.0	0.2	0.3	<0.1	0.4
MOLLUSCA	15.5	9.3	9.1	15.4	8.4	1.8	8.6	28.8	-	1.4	15.4
Pelecypoda	12.2	5.5	3.2	10.8	4.9	0.7	-	6.2	-	-	-
Cyrtodaria siliqua	-	-	-	-	3.0	-	-	4.1	-	-	-
Pectinidae	8.2	3.6	3.0	10.8	1.9	-	-	-	-	-	-
Other Pelecypoda	4.0	1.9	0.2	-	<0.1	0.7	-	2.1	-	-	-
Cephalopoda	-	0.5	4.5	1.4	2.2	<0.1	4.9	22.3	-	-	15.3
Loligo sp.	-	-	0.3	-	-	-	-	22.3	-	-	15.3
Other Cephalopoda	-	0.5	4.2	1.4	2.2	<0.1	4.9	<0.1	-	-	-
Other Mollusca	3.3	3.3	1.4	3.2	1.3	1.1	3.7	0.3	-	1.4	0.1
ECHINODERMATA	3.4	1.4	3.5	2.4	2.1	0.2	1.3	0.2	0.6	0.6	0.3
Ophiuroidea	2.2	0.7	2.3	0.3	1.5	-	-	0.2	-	-	-
Holothuroidea	0.7	0.5	1.2	2.0	0.2	0.2	1.3	-	0.6	0.4	-
Other Echinodermata	0.5	0.2	-	0.1	0.4	-	-	-	-	0.2	0.3
PISCES	40.0	54.2	64.4	58.8	68.0	88.9	72.4	49.2	87.5	81.5	78.5
Batrachoididae	-	-	-	-	-	-	-	-	-	-	7.1
Clupea harengus	3.4	-	9.3	-	-	4.0	-	-	35.1	-	-
Other Clupeidae	1.1	2.0	18.1	22.8	4.5	47.9	8.5	8.0	-	23.2	-
Gadus morhua	-	-	-	16.3	-	-	-	-	-	-	-
Melanogrammus aeglefinus	-	-	-	-	-	-	-	-	-	24.1	-
Merluccius bilinearis	9.5	0.6	-	-	14.0	0.8	9.6	-	-	-	-
Other Gadidae	1.0	10.4	-	-	2.8	0.2	-	0.9	-	-	-
Ammodytes americanus	4.0	16.1	0.6	1.9	-	-	-	-	-	-	-
Cottidae	0.1	0.2	0.5	-	8.4	7.1	-	-	3.3	5.1	-
Scomber scombrus	3.4	5.7	25.4	-	4.8	7.7	48.9	33.4	-	-	-
Pomatomus saltatrix	-	-	-	-	-	-	-	-	-	-	9.8
Sebastes marinus	5.0	5.4	-	2.2	-	-	1.7	-	-	-	19.1
Hippoglossoides platessoides	-	-	-	-	-	-	-	-	-	6.1	22.4
Other Pleuronectiformes	0.2	1.3	-	-	-	-	-	3.5	22.5	-	7.0
Other Pisces	12.3	12.5	10.5	15.6	33.5	21.2	3.7	3.4	26.6	23.0	13.1
MISCELLANEOUS	3.7	2.9	4.1	2.4	2.8	2.2	1.1	1.0	0.4	1.8	0.2
SAND AND ROCK	0.7	1.1	0.7	0.2	4.1	0.1	0.1	0.2	0.2	0.3	-
Number of stomachs examined	122	119	111	84	71	44	32	30	19	16	14
Number of empty stomachs	10	9	9	9	4	5	4	2	3	3	0
Mean stomach content weight(g)	22.413	28.836	28.526	38.681	45.193	57.401	70.366	146.907	122.095	165.948	188.910
Mean fish FL (cm)	62	67	72	77	82	88	92	97	102	108	124

Table 5. Composition of the stomach contents of haddock, expressed as a percentage of the total stomach contents weight versus fish length, for haddock collected in the Northwest Atlantic from 1973 through 1976.

Stomach contents	Length category (cm) 6-10	11-15	16-20	21-25	26-30	31-35	36-40	41-45
COELENTERATA	-	-	-	-	0.3	-	2.4	2.1
Ceriantharia	-	-	-	-	-	-	-	-
Other Anthozoa	-	-	-	-	0.3	-	2.4	2.1
POLYCHAETA	9.2	19.3	16.2	15.8	12.1	10.3	8.4	26.5
Sphonphanes bombyx	-	-	-	-	-	-	0.2	4.6
Other Sphonidae	-	-	0.5	-	-	-	-	-
Nicomache lumbricalis	-	-	-	-	-	-	-	-
Sabellidae	-	1.7	-	-	-	<0.1	-	0.4
Aphroditidae	-	-	-	-	0.1	2.2	2.4	1.3
Other Polychaeta	9.2	17.6	15.7	15.8	12.0	8.1	5.8	20.2
CRUSTACEA	76.9	57.4	50.4	41.4	31.5	31.1	32.1	16.5
Amphipoda	7.3	16.3	21.7	26.1	19.1	11.4	16.3	8.7
Unciola irrorata	-	5.5	8.8	10.7	7.0	3.8	4.7	3.9
Unciola serrata	-	-	-	-	-	0.3	-	-
Gammaridae	0.8	3.5	4.3	4.4	4.6	1.8	2.9	1.8
Leptocheirus pinguis	-	1.8	2.4	2.2	0.7	0.3	0.7	0.2
Other Amphipoda	6.5	5.5	6.2	8.8	6.8	5.2	8.0	2.8
Decapoda	-	15.9	21.1	5.3	10.8	13.4	9.6	5.3
Axius serratus	-	-	-	-	4.5	0.2	-	0.2
Dichelopandalus leptocerus	-	1.0	5.2	-	3.4	4.5	2.3	0.6
Paguridae	-	2.7	4.5	-	0.1	4.8	2.7	1.5
Other Decapoda	-	12.2	11.4	5.3	2.8	3.9	4.6	3.0
Euphausiacea	61.7	20.6	2.7	1.1	-	4.5	3.6	0.2
Meganyctiphanes norvegica	-	8.6	-	0.8	-	4.5	3.5	0.2
Other Euphausiacea	61.7	12.0	2.7	0.3	-	<0.1	0.1	-
Other Crustacea	7.9	4.6	4.9	8.9	1.6	1.8	2.6	2.3
MOLLUSCA	-	0.2	0.3	0.8	2.2	3.0	2.6	1.6
Pelecypoda	-	0.1	-	<0.1	0.8	2.3	1.7	1.1
Placopecten sp.	-	-	-	-	-	-	-	-
Other Pelecypoda	-	0.1	-	<0.1	0.8	2.3	1.7	1.1
Gastropoda	-	0.1	-	0.4	-	-	0.4	0.1
Cephalopoda	-	-	-	-	1.3	-	<0.1	-
Other Mollusca	-	-	0.3	0.4	0.1	0.7	0.5	0.4
ECHINODERMATA	-	2.6	8.0	0.6	21.0	17.7	25.0	19.0
Echinoidea	-	-	-	0.2	2.2	2.0	4.9	2.9
Strongylocentrotus droebachiensis	-	-	-	0.1	0.2	0.2	0.1	0.1
Echinarachnius parma	-	-	-	0.1	2.0	1.5	4.7	2.7
Other Echinoidea	-	-	-	-	-	0.3	0.1	0.1
Ophiuroidea	-	2.6	8.0	0.4	15.3	14.9	18.2	12.5
Ophiura sarsi	-	1.4	5.5	-	4.0	13.8	10.7	4.3
Ophiura sp.	-	0.3	<0.1	-	4.7	0.1	0.3	1.3
Amphiuridae	-	-	-	-	-	-	-	-
Ophiopholis aculeata	-	-	-	-	4.1	0.4	3.9	3.1
Other Ophiuroidea	-	0.9	2.5	0.4	2.5	0.6	3.3	3.8
Holothuroidea	-	-	-	-	-	<0.1	<0.1	0.9
Psolus sp.	-	-	-	-	-	-	-	0.9
Other Holothuroidea	-	-	-	-	-	<0.1	<0.1	-
Other Echinodermata	-	-	-	-	3.5	0.8	1.9	2.7
PISCES	-	2.8	1.8	0.8	0.7	0.5	5.0	0.7
Melanogrammus aeglefinus	-	-	-	-	-	-	-	-
Clupeidae	-	-	-	-	-	-	-	-
Other Pisces	-	2.8	1.8	0.8	0.7	0.5	5.0	0.7
MISCELLANEOUS	12.2	16.6	20.6	35.9	27.9	33.0	17.8	21.3
SAND AND ROCK	1.7	1.1	2.7	4.7	4.3	4.4	6.7	12.3
Number of stomachs examined	17	208	102	91	84	128	154	120
Number of empty stomachs	4	13	3	5	9	3	9	7
Mean stomach content weight(g)	0.031	0.078	0.132	0.344	0.629	1.063	1.346	2.562
Mean fish FL (cm)	9	13	16	22	28	33	37	43

Table 5. (continued)

Stomach contents	Length category (cm) 46-50	51-55	56-60	61-65	66-70	71-75	76-80	>80
COELENTERATA	<0.1	<0.1	2.2	0.1	-	5.8	7.4	-
Ceriantharia	-	-	-	0.1	-	5.8	7.4	-
Other Anthozoa	<0.1	<0.1	2.2	-	-	-	-	-
POLYCHAETA	9.6	21.4	12.4	11.8	11.7	12.9	48.1	27.6
Spionphanes bombyx	0.7	-	-	0.7	-	1.4	-	1.8
Other Spionidae	0.3	-	0.1	0.8	1.4	4.1	-	-
Nicomache lumbricalis	-	-	-	-	-	-	-	14.8
Sabellidae	0.1	0.7	0.1	0.2	0.1	2.8	1.7	-
Aphroditidae	0.2	0.8	0.8	0.7	3.0	0.4	-	7.0
Other Polychaeta	8.3	19.9	11.4	9.4	7.2	4.2	46.4	4.0
CRUSTACEA	17.5	11.2	12.2	12.9	22.7	15.9	1.9	11.5
Amphipoda	3.9	4.4	3.8	6.6	12.9	12.5	0.3	0.4
Unciola irrorata	1.0	1.5	1.8	2.0	10.1	3.1	0.1	0.3
Unciola serrata	0.3	-	-	0.1	<0.1	8.8	-	-
Gammaridae	1.6	1.2	0.9	1.9	1.0	<0.1	-	<0.1
Leptocheirus pinguis	0.4	1.1	0.5	1.5	1.4	0.5	0.2	-
Other Amphipoda	0.6	0.6	0.6	1.1	0.4	0.1	-	0.1
Decapoda	10.3	3.6	6.6	5.3	9.0	3.3	0.2	10.6
Axius serratus	<0.1	1.7	1.4	3.8	4.0	2.4	-	-
Dichelopandalus leptocerus	1.2	0.6	0.6	-	0.1	0.1	-	0.5
Paguridae	0.8	0.5	0.5	0.3	2.3	-	-	-
Other Decapoda	8.3	0.8	4.1	1.2	2.6	0.8	0.2	10.1
Euphausiacea	2.2	0.2	0.3	0.3	0.6	<0.1	1.4	0.3
Meganyctiphanes norvegica	2.2	0.2	0.3	0.3	0.6	-	1.4	0.3
Other Euphausiacea	<0.1	-	<0.1	-	-	<0.1	-	-
Other Crustacea	1.1	3.0	1.5	0.7	0.2	0.1	-	0.2
MOLLUSCA	15.3	3.2	6.9	2.1	3.6	0.2	0.5	0.3
Pelecypoda	2.0	2.9	2.6	-	3.4	0.1	0.4	0.3
Placopecten sp.	0.6	2.5	0.1	-	2.4	-	-	-
Other Pelecypoda	1.4	0.4	2.5	-	1.0	0.1	0.4	0.3
Gastropoda	0.3	0.2	3.6	0.6	<0.1	0.1	0.1	-
Cephalopoda	11.7	-	-	0.9	-	-	-	-
Other Mollusca	1.3	0.1	0.7	0.6	0.2	-	-	<0.1
ECHINODERMATA	26.2	38.1	27.2	40.5	38.0	27.9	19.8	5.9
Echinoidea	3.8	6.6	4.3	4.6	0.6	1.0	0.3	-
Stronglocentrotus drobachiensis	0.2	4.7	2.3	3.3	0.4	0.3	-	-
Echinarachnius parma	3.3	1.9	1.6	1.2	0.2	0.7	0.3	-
Other Echinoidea	0.3	<0.1	0.4	0.1	<0.1	<0.1	-	-
Ophiuroidea	18.9	28.5	20.6	29.0	29.3	24.7	18.9	5.9
Ophiura sarsi	3.5	4.3	3.5	7.9	14.2	7.3	1.1	0.2
Ophiura sp.	1.3	2.4	1.0	4.9	-	-	-	-
Amphiuridae	-	-	0.6	-	-	2.1	-	-
Ophiopholis aculeata	9.3	17.8	11.4	12.6	11.5	9.7	7.2	0.4
Other Ophiuroidea	4.8	4.0	4.1	3.6	3.6	5.6	10.6	5.3
Holothuroidea	2.6	0.8	0.5	1.7	3.1	2.0	-	-
Psolus sp.	0.6	0.7	-	1.2	2.5	-	-	-
Other Holothuroidea	2.0	0.1	0.5	0.5	0.6	2.0	-	-
Other Echinodermata	0.9	2.2	1.8	5.2	5.0	0.2	0.6	-
PISCES	0.2	1.1	6.5	0.2	0.3	-	-	21.9
Melanogrammus aeglefinus	-	-	6.1	-	-	-	-	-
Clupeidae	-	-	-	-	-	-	-	21.0
Other Pisces	0.2	1.1	0.4	0.2	0.3	-	-	0.9
MISCELLANEOUS	22.8	18.8	16.1	20.3	14.6	5.0	7.8	3.0
SAND AND ROCK	8.4	6.2	16.5	12.1	9.1	32.3	14.5	29.8
Number of stomachs examined	130	129	115	83	50	35	14	9
Number of empty stomachs	7	12	12	1	1	2	0	0
Mean stomach content weight(g)	3,520	4,216	5,530	7,438	9,595	20,607	20,099	24,021
Mean fish FL (cm)	47	52	57	63	67	73	78	83

Table 6. Composition of the stomach contents of silver hake, expressed as a percentage of the total stomach contents weight versus fish length, for silver hake collected in the Northwest Atlantic from 1973 through 1976.

Stomach contents	Length category (cm) 1-5	6-10	11-15	16-20	21-25	26-30	31-35	36-40	41-45	46-50	>50
POLYCHAETA	-	0.4	0.5	-	0.1	0.3	0.2	<0.1	0.1	-	-
CRUSTACEA	89.7	80.3	81.6	77.3	28.0	55.5	21.3	2.3	0.5	0.2	0.2
Amphipoda	58.7	18.9	6.1	1.2	1.7	1.3	0.7	<0.1	<0.1	-	<0.1
Ampeliscidae	11.0	4.9	0.1	0.5	0.6	0.5	0.2	<0.1	-	-	<0.1
Oedicerotidae	3.1	3.4	4.1	0.1	<0.1	0.2	0.1	<0.1	-	-	-
Parathemisto sp.	42.1	6.2	0.3	0.4	0.6	0.4	0.3	-	-	-	-
Other Amphipoda	2.5	4.4	1.6	0.2	0.5	0.2	0.1	<0.1	<0.1	-	-
Decapoda	11.8	23.9	31.1	7.0	16.2	20.0	10.5	1.6	0.3	0.1	0.1
Crangon septemspinosa	7.7	16.0	18.7	3.7	4.3	6.1	4.3	0.3	0.1	-	<0.1
Dichelopandalus leptocerus	-	1.7	5.3	2.1	10.7	12.0	4.3	1.2	0.2	-	0.1
Other Decapoda	4.1	6.2	7.1	1.2	1.2	1.9	1.9	0.1	-	0.1	-
Euphausiacea	1.9	5.7	23.7	64.4	7.8	26.4	8.8	0.6	0.2	0.1	-
Meganyctiphanes norvegica	1.9	5.7	23.7	64.4	7.8	26.4	8.8	0.6	0.2	0.1	-
Mysidacea	4.2	22.1	12.8	3.9	0.2	6.7	0.6	<0.1	<0.1	-	0.1
Neomysis americana	4.2	22.1	12.8	3.9	0.2	6.7	0.6	<0.1	<0.1	-	0.1
Cumacea	0.8	1.1	0.2	<0.1	0.2	<0.1	<0.1	-	-	-	-
Copepoda	1.7	<0.1	<0.1	-	<0.1	-	-	-	-	-	-
Other Crustacea	10.6	8.6	7.7	0.8	1.9	1.1	0.7	0.1	<0.1	<0.1	<0.1
MOLLUSCA	-	-	-	-	17.8	3.4	14.9	14.3	0.1	12.0	-
Loligo pealei	-	-	-	-	15.3	-	13.5	10.0	-	12.0	-
Other Cephalopoda	-	-	-	-	2.5	3.4	1.4	4.3	0.1	<0.1	-
PISCES	4.8	13.9	14.0	19.9	52.8	38.7	62.4	83.4	98.9	87.8	99.8
Scomberesox saurus	-	-	-	-	-	-	-	5.6	-	-	-
Clupeidae	-	-	-	-	-	-	3.5	3.5	8.0	-	-
Merluccius bilinearis	-	2.0	4.0	-	22.1	5.0	6.9	24.2	5.9	-	-
Phycis chesteri	-	-	-	-	-	-	1.2	-	-	-	-
Ammodytes americanus	-	6.3	2.0	-	-	<0.1	3.1	0.4	7.7	-	-
Scomber scombrus	-	-	-	-	-	-	7.8	8.8	6.1	6.8	15.5
Stenotomus chrysops	-	-	-	-	-	-	-	-	10.5	-	-
Peprilus triacanthus	-	-	-	-	-	-	2.7	3.4	-	-	20.6
Other Pisces	4.8	5.6	8.0	19.9	30.7	33.7	37.2	37.5	60.7	81.0	63.7
MISCELLANEOUS	5.5	5.4	3.9	2.8	1.3	2.1	1.2	<0.1	0.4	<0.1	-
Number of stomachs examined	344	603	216	86	243	444	428	147	61	28	22
Number of empty stomachs	60	75	38	26	108	192	189	63	29	11	12
Mean stomach content weight(g)	0.066	0.025	0.104	0.370	0.452	0.545	1.440	7.278	10.321	32.081	20.262
Mean fish FL (cm)	4	7	12	18	23	28	32	37	42	48	54

Table 7. Composition of the stomach contents of pollock, expressed as a percentage of the total stomach contents weight versus fish length, for pollock collected in the Northwest Atlantic from 1973 through 1976.

Stomach contents	Length category (cm) 16-20	21-25	26-30	31-35	36-40	41-45	46-50	51-55	56-60
CRUSTACEA	99.9	87.9	66.1	84.7	79.3	66.6	30.7	96.7	60.4
Decapoda	-	-	-	2.1	17.9	28.8	5.5	53.1	4.5
Dichelopandalus leptocerus	-	-	-	0.7	0.3	2.8	-	-	2.7
Pandalus borealis	-	-	-	-	-	-	-	6.9	-
Pasiphaea multidentata	-	-	-	-	17.3	19.1	-	44.1	-
Other Decapoda	-	-	-	1.4	0.3	6.9	5.5	2.1	1.8
Euphausiacea	91.3	10.8	53.0	75.0	60.1	37.1	22.7	43.0	49.7
Meganyctiphanes norvegica	84.2	3.6	47.7	64.1	57.4	33.7	9.8	43.0	49.3
Thysanoessa inermis	-	-	4.2	10.3	-	-	12.9	-	-
Other Euphausiacea	7.1	7.2	1.1	0.6	2.7	3.4	<0.1	-	0.4
Mysidacea	-	-	0.5	-	-	0.7	-	-	-
Neomysis americana	-	-	0.5	-	-	0.7	-	-	-
Other Crustacea	8.6	77.1	12.6	7.6	1.3	-	2.5	0.6	6.2
MOLLUSCA	-	-	-	-	1.1	-	-	-	1.0
Loligo sp.	-	-	-	-	-	-	-	-	-
Other Cephalopoda	-	-	-	-	1.1	-	-	-	1.0
PISCES	-	-	31.0	4.2	13.5	24.6	54.3	0.7	30.8
Clupeidae	-	-	-	-	-	-	-	-	-
Merluccius bilinearis	-	-	-	-	-	-	-	-	-
Merluccius sp.	-	-	-	-	-	-	-	-	25.2
Pollachius virens	-	-	-	-	-	-	-	-	-
Aethoprora metopoclampa	-	-	-	-	-	-	-	-	-
Scomber scombrus	-	-	-	-	-	-	-	-	-
Sebastes marinus	-	-	-	-	-	-	-	-	-
Other Pisces	-	-	31.0	4.2	13.5	24.6	54.3	0.7	5.6
MISCELLANEOUS	0.1	12.1	2.9	11.1	6.1	8.8	15.0	2.6	7.8
Number of stomachs examined	15	12	36	50	43	26	15	17	56
Number of empty stomachs	1	3	5	12	4	7	5	3	7
Mean stomach content weight(g)	1.006	0.392	1.506	1.231	2.631	3.235	0.817	3.619	2.904
Mean fish FL (cm)	17	22	28	33	38	42	48	53	58

Table 7. (continued)

Stomach contents	Length category (cm) 61-65	66-70	71-75	76-80	81-85	86-90	91-95	>95
CRUSTACEA	67.2	32.7	63.0	42.8	54.2	32.9	12.1	15.2
Decapoda	10.1	4.6	46.5	17.1	36.9	28.2	10.7	2.4
Dichelopandalus leptocerus	0.6	2.7	1.4	0.6	1.6	12.8	0.2	0.1
Pandalus borealis	-	1.3	<0.1	0.1	1.1	3.0	-	-
Pasiphaea multidentata	8.4	0.6	45.0	16.1	33.0	12.2	9.8	2.2
Other Decapoda	1.1	<0.1	0.1	0.3	1.2	0.3	0.7	0.1
Euphausiacea	55.5	24.8	16.0	23.1	15.8	4.4	1.1	12.8
Meganyctiphanes norvegica	55.2	22.4	14.0	18.4	14.7	3.8	1.1	12.8
Thysanoessa inermis	-	-	-	3.8	0.4	-	-	-
Other Euphausiacea	0.3	2.4	2.0	0.9	0.7	0.6	-	-
Mysidacea	-	-	-	-	-	-	-	-
Neomysis americana	-	-	-	-	-	-	-	-
Other Crustacea	1.6	3.3	0.5	2.6	1.5	0.2	0.3	-
MOLLUSCA	0.6	-	0.4	<0.1	2.6	0.3	12.0	75.6
Loligo sp.	-	-	-	-	-	-	10.7	75.6
Other Cephalopoda	0.6	-	0.4	<0.1	2.6	0.3	1.3	<0.1
PISCES	29.4	57.1	29.0	50.2	35.1	65.7	74.0	6.5
Clupeidae	-	9.1	14.6	11.5	-	-	-	-
Merluccius bilinearis	6.1	-	-	-	12.7	1.3	35.8	-
Merluccius sp.	-	-	-	-	-	-	-	-
Pollachius virens	-	-	-	15.0	-	27.9	-	-
Aethoprora metopoclampa	23.0	-	-	-	-	-	-	-
Scomber scombrus	-	-	-	-	-	-	9.9	-
Sebastes marinus	-	-	-	-	-	-	2.8	-
Other Pisces	0.3	48.0	14.4	23.7	22.4	36.5	25.5	6.5
MISCELLANEOUS	2.8	10.2	7.6	7.0	8.1	1.1	1.9	2.7
Number of stomachs examined	54	55	63	60	74	60	33	16
Number of empty stomachs	8	12	12	11	16	6	4	2
Mean stomach content weight(g)	6.686	6.360	8.372	12.060	14.536	33.342	43.649	37.601
Mean fish FL (cm)	63	67	73	78	83	87	92	100

Table 8. Composition of the stomach contents of red hake, expressed as a percentage of the total stomach contents weight versus fish length, for red hake collected in the Northwest Atlantic from 1973 through 1976.

Stomach contents	Length category (cm) 1-5	6-10	11-15	16-20	21-25	26-30	31-35	36-40	41-45	>45
POLYCHAETA	-	14.8	5.6	-	20.2	7.9	3.8	1.6	4.5	1.0
Aphrodita hastata	-	-	-	-	-	-	-	-	3.5	-
Other Polychaeta	-	14.8	5.6	-	20.2	7.9	3.8	1.6	1.0	1.0
SIPUNCULIDA	-	-	-	-	-	11.2	-	-	-	-
CRUSTACEA	48.7	77.2	83.8	84.3	52.8	40.4	50.8	38.3	36.4	12.4
Amphipoda	16.7	29.3	23.6	62.4	20.1	12.1	7.8	5.9	2.0	0.7
Aeginella sp.	-	-	-	-	-	-	1.9	1.5	0.6	-
Unciola irrorata	3.0	4.9	1.7	-	3.0	4.2	0.7	0.2	<0.1	<0.1
Gammaridae	7.0	8.0	5.2	32.9	10.0	1.1	1.6	<0.1	0.2	0.1
Leptocheirus pinguis	-	6.0	9.5	-	3.5	4.4	1.0	0.4	0.2	0.4
Other Amphipoda	6.7	10.4	7.2	29.5	3.6	2.4	2.6	3.8	0.1	0.2
Decapoda	3.0	36.6	24.3	10.5	22.0	20.8	34.3	27.9	32.5	10.2
Axius serratus	-	-	-	-	-	0.7	2.7	0.5	0.6	0.2
Cancer borealis	-	-	-	-	-	-	0.3	4.1	2.7	5.5
Cancer irroratus	-	-	-	-	1.1	<0.1	2.4	1.9	0.6	2.0
Crangon septemspinosa	1.3	5.4	12.4	2.2	5.7	7.2	4.7	2.1	3.0	-
Munida sp.	-	-	-	-	-	-	0.4	6.0	3.4	-
Pagurus acadianus	-	-	-	-	-	-	6.9	-	-	-
Dichelopandalus leptocerus	-	22.3	4.6	-	13.4	7.0	10.9	7.6	16.4	0.9
Other Decapoda	1.7	8.9	7.3	8.3	1.8	5.9	6.0	5.7	5.8	1.6
Isopoda	-	<0.1	-	-	1.5	0.5	3.1	0.2	0.2	-
Other Crustacea	29.0	11.3	35.9	11.4	9.2	7.0	5.6	4.3	1.7	1.5
MOLLUSCA	-	-	-	-	4.6	0.1	1.3	33.8	5.7	14.6
Gastropoda	-	-	-	-	0.1	-	-	3.9	0.6	14.6
Cephalopoda	-	-	-	-	4.5	-	1.1	29.4	5.1	-
Other Mollusca	-	-	-	-	-	0.1	0.2	0.5	<0.1	-
ECHINODERMATA	-	-	-	-	0.5	0.7	1.6	8.3	0.9	-
Holothuroidea	-	-	-	-	-	0.7	1.6	8.3	0.9	-
Other Echinodermata	-	-	-	-	0.5	-	-	-	-	-
PISCES	-	-	-	-	4.1	22.3	25.8	15.0	49.9	61.3
Clupeidae	-	-	-	-	-	-	-	-	0.1	20.4
Ophidiidae	-	-	-	-	-	-	-	-	5.3	-
Pleuronectiformes	-	-	-	-	-	10.5	-	-	4.9	3.4
Other Pisces	-	-	-	-	4.1	11.8	25.8	15.0	39.6	37.5
MISCELLANEOUS	51.3	8.0	10.6	15.7	17.8	17.4	16.7	3.0	2.6	10.7
Number of stomachs examined	76	73	44	15	50	103	96	73	40	18
Number of empty stomachs	18	12	4	2	7	20	21	17	8	4
Mean stomach content weight(g)	0.006	0.031	0.089	0.175	0.247	0.614	0.989	2.857	7.416	5.391
Mean fish TL (cm)	4	7	12	17	23	28	32	37	42	49

Table 9. Composition of the stomach contents of spotted hake, expressed as a percentage of the total stomach contents weight versus fish length, for spotted hake collected in the Northwest Atlantic from 1973 through 1976.

Stomach contents	Length category (cm) 1-5	6-10	11-15	16-20	21-25	26-30	31-35	>35
CRUSTACEA	100.0	76.6	85.5	89.9	81.1	34.9	23.0	0.8
Amphipoda	77.3	50.0	35.2	6.0	1.7	0.1	-	-
Decapoda	-	3.9	22.9	39.6	21.8	16.5	17.7	0.3
Cancer irroratus	-	-	-	0.9	2.2	0.6	4.2	-
Crangon septemspinosa	-	3.5	15.5	17.7	3.8	1.5	3.3	-
Munida iris	-	-	-	3.3	1.6	8.7	-	-
Munida sp.	-	-	-	0.2	2.7	0.1	7.0	0.3
Dichelopandalus leptocerus	-	-	3.4	11.7	8.6	4.5	0.9	-
Other Decapoda	-	0.4	4.0	5.8	2.9	1.1	2.3	-
Euphausiacea	-	13.1	18.7	36.8	54.3	16.1	0.2	0.5
Meganyctiphanes norvegica	-	0.7	12.0	36.5	54.2	16.0	0.2	0.5
Other Euphausiacea	-	12.4	6.7	0.3	0.1	0.1	-	-
Other Crustacea	22.7	9.6	8.7	7.5	3.3	2.2	5.1	-
MOLLUSCA	-	-	-	0.4	8.0	41.0	15.6	97.3
Cephalopoda	-	-	-	0.2	7.7	40.9	15.6	97.3
Other Mollusca	-	-	-	0.2	0.3	0.1	-	-
PISCES	-	21.2	7.4	3.1	9.1	17.3	55.2	1.9
Merluccius bilinearis	-	-	-	-	1.4	0.4	-	-
Ophidiidae	-	-	-	-	-	5.3	9.2	-
Other Pisces	-	21.2	7.4	3.1	7.7	11.6	46.0	1.9
MISCELLANEOUS	-	2.2	7.1	6.6	1.8	6.8	6.2	<0.1
Number of stomachs examined	2	53	50	139	167	82	37	11
Number of empty stomachs	0	10	7	11	24	15	12	4
Mean stomach content weight(g)	0.022	0.041	0.140	0.329	1.287	2.845	2.667	13.790
Mean fish TL (cm)	5	8	13	18	22	27	32	38

Table 10. Composition of the stomach contents of white hake, expressed as a percentage of the total stomach contents weight versus fish length, for white hake collected in the Northwest Atlantic from 1973 through 1976.

Stomach contents	Length category (cm) 16-20	21-25	26-30	31-35	36-40	41-45	46-50	51-55
CRUSTACEA	85.1	94.1	94.1	83.4	55.0	28.7	26.7	16.2
Decapoda	7.6	27.1	35.0	25.6	22.8	13.3	19.4	12.8
Dichelopandalus leptocerus	-	-	13.3	8.4	5.4	3.8	5.0	6.7
Pandalus borealis	-	-	-	7.3	9.5	4.9	5.8	2.8
Other Decapoda	7.6	27.1	21.7	9.9	7.9	4.6	8.6	3.3
Euphausiacea	33.5	29.7	56.4	50.2	31.9	14.6	6.0	2.6
Meganyctiphanes norvegica	33.5	29.7	56.4	50.2	30.9	14.6	5.9	2.6
Other Euphausiacea	-	-	-	-	1.0	-	0.1	-
Other Crustacea	44.0	37.3	2.7	7.6	0.3	0.8	1.3	0.8
MOLLUSCA	-	-	0.2	-	1.5	1.8	6.7	-
PISCES	-	-	-	13.4	41.1	68.4	58.4	75.8
Argentina silus	-	-	-	-	-	-	-	-
Clupea harengus	-	-	-	-	-	-	-	-
Other Clupeidae	-	-	-	-	-	6.9	0.6	-
Merluccius bilinearis	-	-	-	-	-	17.1	-	5.0
Urophycis chuss	-	-	-	-	-	-	-	-
Urophycis tenuis	-	-	-	-	-	-	-	-
Other Gadidae	-	-	-	-	-	-	-	4.0
Scomber scombrus	-	-	-	-	-	-	7.0	-
Sebastes marinus	-	-	-	-	-	-	-	-
Pseudopleuronectes americanus	-	-	-	-	-	-	-	-
Other Pisces	-	-	-	13.4	41.1	44.4	50.8	66.8
MISCELLANEOUS	14.9	5.9	5.7	3.2	2.4	1.1	8.2	8.0
Number of stomachs examined	9	15	37	41	52	61	60	41
Number of empty stomachs	3	5	6	9	15	18	18	13
Mean stomach content weight(g)	0.197	0.373	1.306	4.065	3.019	9.463	8.572	9.754
Mean fish TL (cm)	19	24	28	32	38	42	47	53

Table 10. (continued)

Stomach contents	Length category (cm) 56-60	61-65	66-70	71-75	76-80	81-85	86-90	>90
CRUSTACEA	11.2	5.4	2.2	3.3	5.3	30.3	0.1	0.1
Decapoda	9.3	5.2	1.9	3.1	4.7	30.3	-	0.1
Dichelopandalus leptocerus	0.8	2.1	0.5	0.2	-	13.8	-	-
Pandalus borealis	5.8	1.8	0.5	-	2.6	-	-	-
Other Decapoda	2.7	1.3	0.9	2.9	2.1	16.5	-	0.1
Euphausiacea	0.2	0.2	0.2	0.1	0.4	-	0.1	<0.1
Meganyctiphanes norvegica	0.2	0.2	0.2	0.1	0.4	-	0.1	<0.1
Other Euphausiacea	-	-	<0.1	<0.1	-	-	-	-
Other Crustacea	1.7	<0.1	0.1	0.1	0.2	-	-	-
MOLLUSCA	-	-	0.4	-	<0.1	7.1	-	0.2
PISCES	88.1	84.5	97.3	96.6	93.7	62.6	99.9	99.7
Argentina silus	-	52.7	-	-	-	-	-	-
Clupea harengus	18.2	-	-	-	-	-	-	-
Other Clupeidae	-	-	13.8	0.6	-	-	-	-
Merluccius bilinearis	15.4	11.3	7.4	19.4	3.5	-	-	1.1
Urophycis chuss	-	-	4.7	1.9	-	-	-	-
Urophycis tenuis	-	0.7	-	-	-	-	-	87.3
Other Gadidae	-	11.4	-	0.6	3.2	-	-	-
Scomber scombrus	-	-	-	-	3.1	-	-	-
Sebastes marinus	-	-	-	2.6	3.8	-	-	-
Pseudopleuronectes americanus	-	-	-	-	-	-	-	11.2
Other Pisces	54.5	8.4	71.4	71.5	80.1	62.6	99.9	0.1
MISCELLANEOUS	0.7	10.1	0.1	0.1	1.0	<0.1	-	<0.1
Number of stomachs examined	47	38	44	42	25	11	5	7
Number of empty stomachs	14	20	12	10	7	7	3	1
Mean stomach content weight(g)	19.733	23.049	38.091	51.081	43.771	5.217	20.850	359.022
Mean fish TL (cm)	57	63	67	73	78	82	87	101

Table 11. Composition of the stomach contents of ocean pout, expressed as a percentage of the total stomach contents weight versus fish length, for ocean pout collected in the Northwest Atlantic from 1973 through 1976.

Stomach contents	Length category (cm) 11-15	16-20	21-25	26-30	31-35	36-40	41-45	46-50
POLYCHAETA	-	-	-	0.3	15.8	5.6	1.2	7.6
Aphroditidae	-	-	-	-	-	-	-	7.0
Other Polychaeta	-	-	-	0.3	15.8	5.6	1.2	0.6
CRUSTACEA	82.5	70.1	74.7	6.5	28.8	19.8	15.8	24.6
Amphipoda	82.5	53.0	74.7	4.8	27.8	7.4	7.8	9.6
Byblis serrata	-	-	-	-	-	-	-	-
Corophiidae	40.2	12.0	5.1	1.0	11.7	1.1	0.5	1.7
Other Amphipoda	42.3	41.0	69.6	3.8	16.1	6.3	7.3	7.9
Decapoda	-	17.1	-	1.5	0.3	10.1	8.0	14.9
Cancer irroratus	-	17.1	-	-	-	-	2.8	4.7
Other Cancridae	-	-	-	0.2	-	1.6	5.2	8.0
Other Decapoda	-	-	-	1.3	0.3	8.5	<0.1	2.2
Other Crustacea	-	-	-	0.2	0.7	2.3	<0.1	0.1
MOLLUSCA	-	-	-	0.1	5.4	5.9	4.4	5.0
Placopecten sp.	-	-	-	-	-	-	-	1.4
Other Mollusca	-	-	-	0.1	5.4	5.9	4.4	3.6
ECHINODERMATA	2.1	-	-	88.1	-	61.6	73.7	59.8
Echinoidea	-	-	-	88.1	-	61.6	73.2	56.8
Echinarachinus parma	-	-	-	88.1	-	10.5	35.0	32.5
Other Echinoidea	-	-	-	-	-	51.1	38.2	24.3
Ophiuroidea	2.1	-	-	<0.1	-	<0.1	0.5	-
Euryale sp.	-	-	-	-	-	-	-	-
Ophiopholis aculeata	-	-	-	-	-	-	-	-
Other Ophiuroidea	2.1	-	-	<0.1	-	<0.1	0.5	-
Other Echinodermata	-	-	-	-	-	-	-	2.9
MISCELLANEOUS	-	15.2	5.9	3.9	36.0	3.6	3.8	2.2
SAND AND ROCK	15.4	14.7	19.4	1.1	14.0	3.5	1.1	0.8
Number of stomachs examined	8	6	12	26	27	46	37	50
Number of empty stomachs	3	1	6	15	16	13	15	16
Mean stomach content weight (g)	0.012	0.061	0.051	0.736	0.061	1.210	1.504	1.625
Mean fish TL (cm)	14	17	22	28	33	37	42	48

Table 11. (continued)

Stomach contents	Length category(cm) 51-55	56-60	61-65	66-70	71-75	76-80	81-85	>85
POLYCHAETA	0.3	2.8	2.5	-	-	-	2.0	-
Aphroditidae	-	1.9	1.9	-	-	-	-	-
Other Polychaeta	0.3	0.9	0.6	-	-	-	2.0	-
CRUSTACEA	8.7	9.6	7.8	3.6	1.5	2.8	7.3	6.2
Amphipoda	2.6	6.2	2.5	0.2	<0.1	2.7	-	<0.1
Byblis serrata	-	2.5	0.8	<0.1	-	-	-	-
Corophiidae	0.4	0.2	0.7	0.1	<0.1	2.7	-	<0.1
Other Amphipoda	2.2	3.5	1.0	0.1	<0.1	<0.1	-	-
Decapoda	6.1	3.0	4.6	3.3	1.5	0.1	7.3	6.2
Cancer irroratus	<0.1	1.3	3.2	1.1	-	-	-	-
Other Cancridae	1.8	0.3	-	-	0.4	0.1	-	-
Other Decapoda	4.3	1.4	1.4	2.2	1.1	-	7.3	6.2
Other Crustacea	-	0.4	0.6	0.1	-	-	-	-
MOLLUSCA	0.8	1.9	0.2	0.4	-	-	-	30.2
Placopecten sp.	0.3	0.6	-	0.4	-	-	-	30.2
Other Mollusca	0.5	1.3	0.2	-	-	-	-	-
ECHINODERMATA	85.7	78.9	87.9	95.9	98.4	93.7	89.4	56.6
Echinoidea	78.7	78.7	82.0	95.6	98.4	92.2	7.6	28.6
Echinarachinus parma	68.1	65.6	72.6	87.1	89.2	45.1	-	-
Other Echinoidea	10.6	13.1	9.4	8.5	9.2	47.1	7.6	28.6
Ophiuroidea	<0.1	<0.1	1.6	0.1	-	-	81.8	28.0
Euryale sp.	-	-	-	-	-	-	-	20.1
Ophiopholis aculeata	-	<0.1	1.6	0.1	-	-	81.8	-
Other Ophiuroidea	<0.1	-	<0.1	-	-	-	-	7.9
Other Echinodermata	7.0	0.2	4.3	0.3	-	1.5	-	-
MISCELLANEOUS	3.0	4.7	1.4	0.1	0.1	0.1	1.3	0.6
SAND AND ROCK	1.5	2.1	0.2	-	-	3.4	-	6.4
Number of stomachs examined	54	61	42	26	16	11	2	10
Number of empty stomachs	12	19	10	6	4	4	0	4
Mean stomach content weight(g)	5.085	6.173	6.757	17.212	21.103	24.962	14.206	12.376
Mean fish TL (cm)	52	57	62	68	73	77	82	89

Table 12. Composition of the stomach contents of scup, expressed as a percentage of the total stomach contents weight versus fish length, for scup collected in the Northwest Atlantic from 1973 through 1976.

Stomach contents	Length category (cm) 6-10	11-15	16-20	21-25	26-30	>30
COELENTERATA	-	-	0.1	3.9	8.6	-
Cerianthidea	-	-	-	-	5.3	-
Anthozoa	-	-	0.1	3.9	3.3	-
NEMERTEA	0.5	0.1	-	4.0	-	-
POLYCHAETA	31.3	32.0	45.8	42.9	30.6	25.8
Maldanidae	1.2	2.0	1.1	0.8	<0.1	-
Opheliidae	2.5	0.1	0.9	0.3	<0.1	-
Scalibregmidae	-	-	-	2.9	18.8	25.8
Ampharetidae	1.2	2.3	2.5	0.1	-	-
Sabellidae	4.9	-	1.2	9.4	0.1	-
Glyceridae	1.2	0.4	8.0	6.7	3.4	-
Lumbrineridae	1.6	4.1	13.0	2.7	0.1	-
Nephtyidae	5.7	0.7	3.2	6.5	0.4	-
Sigalionidae	0.5	6.6	0.8	0.1	-	-
Other Polychaeta	12.5	15.8	15.1	13.4	7.9	-
CRUSTACEA	44.4	11.7	16.5	12.7	3.1	1.0
Amphipoda	15.7	6.4	7.1	8.9	1.4	1.0
Byblis serrata	0.4	1.0	0.7	0.9	0.1	-
Caprellidae	1.2	1.3	0.3	0.2	0.2	0.3
Unciola irrorata	3.6	1.2	2.8	0.7	0.3	-
Gammaridae	5.9	1.0	0.4	3.4	0.5	-
Leptocheirus pinguis	3.4	1.3	1.3	3.3	-	-
Other Amphipoda	1.2	0.6	1.6	0.4	0.3	0.7
Decapoda	9.6	2.1	7.0	0.6	1.7	-
Mysidacea	9.4	0.3	0.1	-	-	-
Other Crustacea	9.7	2.9	2.3	3.2	-	-
MOLLUSCA	0.1	17.9	1.4	9.7	26.8	49.0
Pelecypoda	-	0.4	0.4	1.4	6.2	-
Gastropoda	0.1	2.9	1.0	0.4	0.2	-
Acoela sp.	-	2.9	1.0	-	-	-
Other Gastropoda	0.1	-	<0.1	0.4	0.2	-
Cephalopoda	-	12.4	-	6.9	20.3	-
Other Mollusca	-	2.2	<0.1	1.0	0.1	49.0
ECHINODERMATA	-	0.9	0.1	0.8	2.5	-
PISCES	-	0.3	8.0	-	-	4.8
MISCELLANEOUS	23.7	37.0	28.0	23.4	20.6	-
SAND AND ROCK	-	0.1	0.1	2.6	7.8	19.4
Number of stomachs examined	154	213	163	138	42	11
Number of empty stomachs	52	84	61	49	17	8
Mean stomach content weight(g)	0.043	0.131	0.233	0.244	0.294	0.171
Mean fish FL (cm)	8	12	17	23	27	33

Table 13. Composition of the stomach contents of butterfish, expressed as a percentage of the total stomach contents weight versus fish length, for butterfish collected in the Northwest Atlantic from 1973 through 1976.

Stomach contents	Length category (cm) 1-5	6-10	11-15	16-20	21-25
COELENTERATA	-	1.5	1.5	9.1	60.4
Hydrozoa	-	-	-	9.0	-
Other Coelenterata	-	1.5	1.5	0.1	60.4
CTENOPHORA	-	-	3.2	2.2	-
NEMERTEA	-	-	-	1.6	-
POLYCHAETA	-	0.3	11.1	17.3	-
Glyceridae	-	-	1.1	-	-
Goniadidae	-	-	4.8	3.0	-
Lumbrineridae	-	-	0.2	1.3	-
Tomopteris helgolandica	-	-	2.2	4.8	-
Other Tomopteridae	-	-	1.0	8.1	-
Other Polychaeta	-	0.3	1.8	0.1	-
CRUSTACEA	-	4.8	13.1	3.7	0.2
Amphipoda	-	2.0	5.4	2.2	0.2
Parathemisto sp.	-	1.5	5.2	1.8	0.2
Other Amphipoda	-	0.5	0.2	0.4	-
Decapoda	-	0.1	1.4	1.0	-
Axiidae	-	-	1.4	0.9	-
Other Decapoda	-	0.1	<0.1	0.1	-
Copepoda	-	0.1	5.3	<0.1	-
Other Crustacea	-	2.6	1.0	0.5	-
MOLLUSCA	-	2.3	0.5	14.5	-
Loligo sp.	-	-	-	14.5	-
Other Mollusca	-	2.3	0.5	-	-
THALIACEA	-	12.0	21.8	17.2	32.5
Larvacea	-	7.6	12.8	2.9	32.5
Hemimyaria	-	-	3.0	13.9	-
Other Thaliacea	-	4.4	6.0	0.4	-
MISCELLANEOUS	100.0	79.1	48.8	34.4	6.9
Number of stomachs examined	23	160	551	330	15
Number of empty stomachs	2	23	156	129	6
Mean stomach content weight (g)	0.013	0.042	0.091	0.156	0.194
Mean fish FL (cm)	4	8	13	17	21

Table 14. Composition of the stomach contents of redfish, expressed as a percentage of the total stomach contents weight versus fish length, for redfish collected in the Northwest Atlantic from 1973 through 1976.

Stomach contents	Length category(cm) 6-10	11-15	16-20	21-25	26-30	31-35	36-40	>40
CRUSTACEA	41.2	96.0	98.7	23.8	94.1	83.7	95.3	99.8
Decapoda	41.2	22.7	36.6	21.7	20.3	21.7	37.4	42.2
Dichelopandalus leptocerus	-	-	36.6	-	10.7	3.8	5.3	-
Pandalus borealis	-	-	-	-	-	-	3.0	-
Other Pandalidae	-	-	-	-	-	-	5.6	-
Pasiphaea multidentata	-	-	-	-	3.7	16.7	13.6	17.3
Other Pasiphaeidae	-	-	-	-	-	0.2	4.8	24.9
Other Decapoda	41.2	22.7	-	21.7	5.9	1.0	5.1	-
Euphausiacea	-	60.0	3.8	1.7	69.5	59.9	53.8	53.8
Meganyctiphanes norvegica	-	57.8	3.8	-	53.8	59.7	52.0	53.8
Other Euphausiacea	-	2.2	-	1.7	15.7	0.2	1.8	-
Other Crustacea	-	13.3	58.3	0.4	4.3	2.1	4.1	3.8
PISCES	-	-	-	75.4	1.3	15.9	3.2	-
Merluccius bilinearis	-	-	-	-	-	4.6	-	-
Myoxocephalus octodecemspinosa	-	-	-	75.4	-	-	-	-
Other Pisces	-	-	-	-	1.3	11.3	3.2	-
MISCELLANEOUS	58.8	4.0	1.3	0.8	4.6	0.4	1.5	0.2
Number of stomachs examined	2	12	21	25	90	164	134	18
Number of empty stomachs	1	4	19	20	66	79	39	7
Mean stomach content weight(g)	0.017	0.053	0.040	0.229	0.412	1.087	1.100	2.017
Mean fish FL (cm)	9	12	18	24	28	32	37	42

Table 15. Composition of the stomach contents of longhorn sculpin, expressed as a percentage of the total stomach contents weight versus fish length, for longhorn sculpin collected in the Northwest Atlantic from 1973-1976.

Stomach contents	Length category(cm) 1-5	6-10	11-15	16-20	21-25	26-30	31-35	>35
POLYCHAETA	0.6	0.2	0.2	0.6	2.0	0.9	1.0	1.0
CRUSTACEA	84.0	91.4	78.7	92.3	87.7	83.2	92.3	99.0
Amphipoda	26.3	29.5	14.9	0.9	4.9	4.2	5.2	0.1
Unciola irrorata	7.0	2.2	0.2	0.2	2.6	0.7	0.8	-
Gammaridae	3.9	10.7	6.5	0.3	0.1	0.6	1.2	-
Anonyx liljeborgi	-	-	-	-	-	1.0	-	-
Other Lysianassidae	-	4.5	-	-	0.1	0.5	-	-
Leptocheirus pinguis	2.4	1.9	3.0	0.2	1.8	0.3	0.8	-
Other Amphipoda	13.0	10.2	5.2	0.2	0.3	1.1	2.4	0.1
Decapoda	49.5	50.7	60.0	86.8	75.3	65.1	83.9	98.9
Axius serratus	-	-	0.1	0.5	-	-	2.1	-
Cancer borealis	-	-	-	0.5	4.5	2.4	1.6	-
Cancer irroratus	-	0.1	0.6	65.2	15.6	25.6	48.2	98.9
Other Cancridae	-	1.5	0.4	1.3	4.2	1.9	8.4	-
Crangon septemspinosa	20.2	29.1	17.2	1.2	9.9	7.1	1.0	-
Hyas araneus	-	-	-	-	-	0.4	1.2	-
Hyas coarctatus	-	-	-	0.2	0.1	3.4	2.5	-
Pagurus acadianus	-	0.3	-	-	4.5	2.5	2.4	-
Pagurus sp.	-	0.3	16.2	-	2.5	3.8	0.6	-
Other Paguridae	-	-	0.3	-	0.3	1.5	1.7	-
Dichelopandalus leptocerus	-	7.3	11.0	5.5	19.7	12.2	7.7	-
Other Pandalidae	-	3.1	-	2.9	1.1	0.2	0.9	-
Other Decapoda	29.3	9.0	14.2	9.5	12.9	4.1	5.6	-
Isopoda	4.8	2.5	0.9	0.1	0.1	0.7	0.5	-
Mysidacea	-	1.5	0.3	-	5.4	11.7	-	-
Neomysis americana	-	1.5	0.3	-	5.4	11.7	-	-
Other Crustacea	3.4	7.2	2.6	4.5	2.0	1.5	2.7	-
PISCES	-	1.6	-	4.6	3.0	8.8	4.4	-
Rajidae	-	-	-	-	-	1.2	-	-
Pisces eggs	-	-	-	-	-	4.9	-	-
Other Pisces	-	1.6	-	4.6	3.0	2.7	4.4	-
MISCELLANEOUS	15.4	6.7	19.0	2.0	5.6	4.2	2.2	-
SAND AND ROCK	-	0.1	2.1	0.5	1.7	2.9	0.1	-
Number of stomachs examined	36	163	40	54	134	224	56	2
Number of empty stomachs	8	34	4	19	33	51	9	0
Mean stomach content weight(g)	0.009	0.050	0.244	0.374	0.535	1.266	2.302	3.768
Mean fish TL (cm)	4	7	12	18	23	27	31	37

Table 16. Composition of the stomach contents of fourspot flounder, expressed as a percentage of the total stomach contents weight versus fish length, for fourspot flounder collected in the Northwest Atlantic from 1973 through 1976.

Stomach contents	Length category (cm) 11-15	16-20	21-25	26-30	31-35	>35
CRUSTACEA	100.0	66.5	75.9	65.6	51.9	82.4
Amphipoda	-	0.9	0.8	0.6	-	-
Decapoda	100.0	39.8	55.4	53.3	47.7	82.4
Cancer irroratus	-	-	6.5	5.0	8.8	-
Other Cancridae	-	1.0	6.0	2.4	11.4	14.3
Crangon septemspinosa	100.0	15.8	10.7	4.6	7.4	44.8
Other Crangonidae	-	0.8	2.2	0.1	-	23.3
Munida iris	-	-	2.9	1.1	4.9	-
Munida sp.	-	15.9	2.3	0.8	9.2	-
Dichelopandalus leptocerus	-	-	17.6	30.6	5.5	-
Other Pandalidae	-	1.7	1.0	2.6	-	-
Other Decapoda	-	4.6	6.2	6.1	0.5	-
Mysidacea	-	22.6	11.1	6.8	3.2	-
Neomysis americana	-	22.6	11.1	6.7	3.2	-
Other Mysidacea	-	-	-	0.1	-	-
Other Crustacea	-	3.2	8.6	4.9	1.0	-
MOLLUSCA	-	0.3	8.4	12.4	44.6	-
Cephalopoda	-	0.3	8.2	12.4	44.6	-
Rossia sp.	-	-	-	10.1	-	-
Other Cephalopoda	-	0.3	8.2	2.3	44.6	-
Other Mollusca	-	-	0.2	-	-	-
PISCES	-	28.3	12.8	14.9	2.0	-
MISCELLANEOUS	-	4.9	2.9	7.1	1.5	17.6
Number of stomachs examined	4	40	165	132	36	6
Number of empty stomachs	3	18	58	44	18	3
Mean stomach content weight(g)	0.014	0.134	0.185	0.367	0.783	0.047
Mean fish TL (cm)	15	18	23	27	32	42

Table 17. Composition of the stomach contents of witch flounder, expressed as a percentage of the total stomach contents weight versus fish length, for witch flounder collected in the Northwest Atlantic from 1973 through 1976.

Stomach contents	Length category (cm) <20	21-25	26-30	31-35	36-40	41-45	46-50	51-55	56-60	>60
COELENTERATA	0.2	-	-	-	<0.1	5.9	-	<0.1	3.8	0.6
Ceriantharia	-	-	-	-	-	-	-	-	3.8	0.6
Anthozoa	0.2	-	-	-	<0.1	5.9	-	<0.1	-	-
POLYCHAETA	19.2	65.4	45.1	65.6	60.4	66.2	62.3	60.3	64.2	97.7
Spionidae	-	0.5	-	-	0.1	-	1.8	1.0	2.1	0.1
Maldanidae	-	-	0.5	0.8	0.1	0.4	0.5	1.7	0.2	-
Sternaspidae	-	1.7	0.6	3.8	2.5	3.7	2.0	2.4	2.4	-
Capitellidae	-	0.2	-	2.9	0.7	0.9	0.9	1.6	0.6	<0.1
Ampharetidae	2.3	1.1	1.3	1.5	1.0	1.8	1.5	1.1	0.3	<0.1
Sabellidae	0.4	-	1.2	0.4	0.2	2.7	0.9	2.5	0.6	-
Arabellidae	-	-	-	-	-	2.6	-	0.9	0.1	-
Eunice pennata	-	-	-	-	-	-	3.8	2.0	6.7	-
Goniadidae	-	0.2	-	0.4	2.5	3.1	3.7	4.2	0.1	-
Lumbrineris sp.	-	7.6	1.6	1.5	1.7	0.3	0.6	1.9	0.5	-
Other Lumbrineridae	1.3	13.5	4.2	10.1	5.8	8.7	2.6	7.3	7.1	<0.1
Nephtyidae	6.4	-	3.6	1.3	2.7	4.0	1.8	1.6	2.6	-
Onuphis eremita	-	-	-	-	-	0.3	1.9	2.1	-	-
Onuphis opalina	-	-	7.7	-	0.4	3.0	0.6	0.7	-	-
Onuphis sp.	-	1.7	0.3	1.1	3.5	3.0	1.3	0.1	1.8	-
Other Onuphidae	-	-	2.4	7.1	4.6	5.9	3.3	2.6	0.8	0.3
Eteone sp.	-	-	-	-	-	-	-	0.1	-	-
Other Phyllodocidae	-	-	-	-	0.4	<0.1	1.4	<0.1	2.0	-
Other Polychaeta	8.8	38.9	21.7	34.7	34.2	25.8	33.7	26.5	36.3	97.3
CRUSTACEA	73.5	15.3	37.1	1.2	10.8	6.5	2.7	3.9	3.6	0.5
Amphipoda	2.1	14.1	1.4	0.8	2.0	1.7	1.8	1.0	0.9	0.1
Gammaridae	1.5	1.1	1.1	0.6	0.7	0.8	0.7	0.6	0.2	0.1
Other Amphipoda	0.6	13.0	0.3	0.2	1.3	0.9	1.1	0.4	0.7	<0.1
Euphausiacea	69.8	-	34.9	0.1	8.5	3.1	-	1.2	1.7	-
Meganyctiphanes norvegica	69.8	-	34.9	0.1	8.5	3.1	-	1.2	1.7	-
Other Crustacea	1.6	1.2	0.8	0.3	0.3	1.7	0.9	1.7	1.0	0.4
MOLLUSCA	0.1	1.8	0.5	1.7	2.6	0.8	1.5	1.5	2.0	-
Yoldia sp.	-	-	<0.1	0.9	2.1	0.3	0.5	0.9	1.0	-
Other Mollusca	0.1	1.8	0.5	0.8	0.5	0.5	1.0	0.6	1.0	-
ECHINODERMATA	-	0.1	4.8	5.7	9.8	12.1	18.2	18.0	7.9	-
Ophiuroidea	-	0.1	-	-	-	-	0.9	0.5	3.5	-
Ophiura sarsi	-	-	-	-	-	-	0.6	0.1	3.4	-
Other Ophiuroidea	-	0.1	-	-	-	-	0.3	0.4	0.1	-
Holothuroidea	-	-	4.8	5.7	9.8	12.0	17.3	15.3	4.4	-
Havelockia scabra	-	-	-	-	-	0.2	1.5	0.1	-	-
Dendrochirotida	-	-	-	-	-	-	1.9	0.7	-	-
Other Holothuroidea	-	-	4.8	5.7	9.8	11.8	13.9	14.5	4.4	-
Other Echinodermata	-	-	-	-	-	0.1	-	2.2	-	-
ASCIDIACEA	-	1.2	1.1	1.4	0.6	0.1	2.9	0.6	0.5	-
MISCELLANEOUS	7.0	16.2	11.4	24.4	15.7	8.1	12.3	14.9	15.8	1.2
SAND AND ROCK	-	-	-	-	0.1	0.3	0.1	0.8	2.2	<0.1
Number of stomachs examined	44	22	32	63	95	147	199	154	74	7
Number of empty stomachs	4	1	6	9	8	20	17	10	5	0
Mean stomach content weight(g)	0.130	0.186	0.228	0.223	0.347	0.417	0.566	0.908	1.003	5.957
Mean fish TL (cm)	12	22	28	33	37	43	48	52	57	66

Table 18. Composition of the stomach contents of American plaice, expressed as a percentage of the total stomach contents weight versus fish length, for American plaice collected in the Northwest Atlantic from 1973 through 1976.

Stomach contents	Length category (cm) 6-10	11-15	16-20	21-25	26-30	31-35	36-40	41-45	46-50	>50
POLYCHAETA	65.5	38.2	37.9	11.8	5.3	6.2	6.5	0.8	0.3	0.4
CRUSTACEA	25.3	28.5	27.8	34.3	33.1	24.4	25.5	3.7	0.9	0.3
Decapoda	-	0.4	0.1	24.7	26.4	13.0	21.3	1.7	0.8	<0.1
Dichelopandalus leptocerus	-	-	-	11.2	9.9	-	13.5	1.7	-	-
Pandalus borealis	-	-	-	-	-	5.7	2.6	-	-	-
Other Decapoda	-	0.4	0.1	13.5	16.5	7.3	5.2	-	0.8	<0.1
Euphausiacea	-	13.3	16.7	5.5	2.8	9.0	4.2	1.9	0.1	0.2
Meganyctiphanes norvegica	-	12.3	16.7	5.5	2.8	8.9	4.1	1.9	0.1	0.2
Other Euphausiacea	-	1.0	-	-	-	0.1	0.1	-	-	-
Other Crustacea	25.3	14.8	11.0	4.1	3.9	2.4	<0.1	0.1	-	0.1
MOLLUSCA	0.5	12.6	18.5	30.9	8.4	6.2	10.0	5.6	0.8	0.4
Pelecypoda	0.5	12.5	15.2	19.3	7.6	3.5	10.0	4.3	0.7	0.4
Cerastoderma pinnulatum	-	-	-	-	-	-	3.0	3.5	-	-
Other Pelecypoda	0.5	12.5	15.2	19.3	7.6	3.5	7.0	0.8	0.7	0.4
Other Mollusca	-	0.1	3.3	11.6	0.8	2.7	-	1.3	0.1	<0.1
ECHINODERMATA	-	11.1	4.3	17.9	49.8	51.5	53.5	81.2	96.4	97.5
Echinoidea	-	-	-	12.5	25.2	23.9	14.3	31.1	78.7	90.5
Strongylocentrotus drobachiensis	-	-	-	-	-	3.2	0.4	3.2	<0.1	0.3
Echinarachnius parma	-	-	-	12.3	23.3	15.7	13.8	27.7	69.5	52.1
Echinarachnius sp.	-	-	-	-	-	-	-	-	4.9	36.9
Other Echinoidea	-	-	-	0.2	1.9	5.0	0.1	0.2	4.3	1.2
Ophiuroidea	-	11.1	4.1	5.0	22.7	26.2	32.8	43.3	11.8	6.0
Ophiura sarsi	-	6.9	3.5	3.2	16.1	22.4	21.4	39.8	9.8	5.7
Other Ophiuroidea	-	4.2	0.6	1.8	6.6	3.8	11.4	3.5	2.0	0.3
Other Echinodermata	-	-	0.2	0.4	1.9	1.4	6.4	6.8	5.9	1.0
MISCELLANEOUS	8.5	9.0	10.7	4.9	2.6	4.5	3.4	3.9	0.8	0.7
SAND AND ROCK	0.2	0.6	0.8	0.2	0.8	7.2	1.1	4.8	0.8	0.7
Number of stomachs examined	138	214	156	151	172	198	176	134	76	78
Number of empty stomachs	59	76	59	66	85	84	85	54	27	28
Mean stomach content weight(g)	0.004	0.031	0.063	0.170	0.268	0.648	0.928	1.172	4.678	9.310
Mean fish TL (cm)	8	13	18	23	28	33	37	42	47	56

Table 19. Composition of the stomach contents of yellowtail flounder, expressed as a percentage of the total stomach contents weight versus fish length, for yellowtail flounder collected in the Northwest Atlantic from 1973 through 1976.

Stomach contents	Length category(cm) 1-5	6-10	11-15	16-20	21-25	26-30	31-35	36-40	41-45	>45
COELENTERATA	-	-	-	-	-	1.1	0.7	4.3	8.1	2.6
NEMERTEA	-	-	-	0.5	<0.1	0.5	0.9	0.3	0.2	0.6
POLYCHAETA	-	22.5	11.9	13.6	32.7	31.4	48.9	46.5	47.9	31.0
Spionphanes bombyx	-	11.7	-	-	5.8	0.9	10.3	12.0	12.0	10.6
Other Spionidae	-	-	-	-	0.6	1.8	2.7	4.9	9.8	-
Flabelligeridae	-	-	-	6.2	1.2	0.1	1.2	0.4	<0.1	-
Maldanidae	-	-	-	-	3.6	0.4	1.0	1.0	0.2	-
Ampharetidae	-	-	-	-	0.6	1.7	1.3	0.2	-	-
Sabellidae	-	-	-	-	2.0	1.0	3.3	0.9	0.2	-
Lumbrineridae	-	-	-	-	0.5	3.1	3.5	1.1	0.1	1.5
Nephtyidae	-	-	-	-	0.5	0.3	2.8	0.9	0.2	0.3
Other Polychaeta	-	10.8	11.9	7.4	17.9	22.1	22.8	25.1	25.4	18.6
CRUSTACEA	100.0	61.0	61.8	50.8	32.3	37.7	20.7	15.4	8.6	5.5
Amphipoda	-	32.7	13.6	31.5	22.1	25.5	14.2	13.3	8.4	5.4
Byblis serrata	-	1.7	-	2.0	0.6	1.2	1.2	2.4	2.5	1.6
Other Ampeliscidae	-	14.7	0.8	1.8	0.7	2.4	2.3	1.4	0.6	0.6
Unciola irrorata	-	2.2	3.6	15.3	12.9	11.9	5.3	3.4	0.3	<0.1
Gammaridae	-	3.8	5.0	1.5	1.6	4.2	2.1	1.4	2.8	1.3
Leptocheirus pinguis	-	-	-	8.5	4.8	3.8	1.9	3.1	2.0	-
Other Amphipoda	-	10.3	4.2	2.4	1.5	2.0	1.4	1.6	0.2	1.9
Decapoda	41.4	9.1	47.5	14.7	5.8	8.6	5.7	1.6	0.1	-
Crangon septemspinosa	41.4	9.1	12.0	-	3.3	7.1	2.5	0.7	0.1	-
Dichelopandalus leptocerus	-	-	31.8	-	-	0.6	2.0	0.7	-	-
Other Decapoda	-	-	3.6	14.7	2.6	0.8	1.2	0.2	-	-
Other Crustacea	58.6	19.2	0.7	4.6	4.4	3.6	0.8	0.5	0.1	0.1
MOLLUSCA	-	0.2	-	-	0.1	0.3	0.6	0.3	1.8	-
Bivalvia	-	0.2	-	-	0.1	0.3	0.6	0.3	1.8	-
UROCHORDATA	-	-	-	-	0.2	0.7	1.4	0.3	-	-
Ascidiacea	-	-	-	-	0.2	0.7	1.4	0.3	-	-
MISCELLANEOUS	-	0.9	0.6	1.7	10.2	8.2	10.2	17.1	22.7	34.5
SAND AND ROCK	-	15.4	25.7	33.4	24.5	20.1	16.6	15.8	10.7	25.8
Number of stomachs examined	39	77	21	23	63	186	337	191	60	20
Number of empty stomachs	22	25	6	9	16	63	108	62	20	4
Mean stomach content weight(g)	0.001	0.021	0.072	0.103	0.230	0.241	0.375	0.563	0.950	3.166
Mean fish TL (cm)	3	8	12	18	23	28	32	37	42	48

Table 20. Food of fishes representing generalized dietary categories in the Middle Atlantic. Data are expressed as a percentage of the total stomach contents weight.

Stomach contents	Middle Atlantic Fishes				
	Silver hake	Spotted hake	Fourspot flounder	Butterfish	Scup
POLYCHAETA	0.1	-	-	9.5	41.4
Aphrodita sp.	-	-	-	-	-
Other Polychaeta	0.1	-	-	9.5	41.4
CRUSTACEA	7.3	43.3	64.5	6.3	7.5
Amphipoda	0.5	1.4	0.5	4.9	2.0
Unciola irrorata	-	-	-	-	0.3
Leptocheirus pinguis	-	-	-	-	-
Gammarus annulatus	-	-	-	-	-
Other Amphipoda	0.5	1.4	0.5	4.9	1.7
Decapoda	4.9	16.4	52.2	0.1	3.7
Axius serratus	-	-	-	-	-
Cancer sp.	-	1.4	12.1	-	-
Geryon quinquedens	-	-	-	-	-
Pagurus sp.	-	-	-	-	-
Crangon septemspinosa	2.4	3.3	7.7	-	-
Dichelopandalus leptocerus	1.8	4.7	19.7	-	-
Pandalus borealis	-	-	-	-	-
Pasiphaea multidentata	-	-	-	-	-
Other Decapoda	0.7	7.0	12.7	0.1	3.7
Euphausiacea	1.2	22.6	-	-	-
Meganyctiphanes norvegica	1.2	22.4	-	-	-
Thysanoessa inermis	-	-	-	-	-
Other Euphausiacea	-	0.2	-	-	-
Mysidacea	0.3	-	7.1	-	-
Neomysis americana	0.3	-	7.1	-	-
Other Mysidacea	-	-	<0.1	-	-
Other Crustacea	0.4	2.9	4.7	1.3	1.8
MOLLUSCA	4.3	37.1	19.2	10.1	12.9
Loligo pealei	2.9	-	-	9.6	-
Other Cephalopoda	1.4	36.9	19.1	-	6.4
Scallop viscera	-	-	-	-	-
Other Mullusca	-	0.2	0.1	0.5	6.5
THALIACEA	-	-	-	25.2	-
ECHINODERMATA	-	-	-	-	1.2
Echinoidea	-	-	-	-	-
Ophiuroidea	-	-	-	-	-
Holothuroidea	-	-	-	-	-
Other Echinodermata	-	-	-	-	1.2
PISCES	87.5	15.9	11.9	-	0.3
Merluccius bilinearis	20.8	0.5	-	-	-
Clupeidae	3.2	-	-	-	-
Scomber scombrus	-	-	-	-	-
Ammodytes americanus	1.7	-	-	-	-
Stenotomus chrysops	-	-	-	-	-
Peprilus triacanthus	1.4	-	-	-	-
Sebastes marinus	-	-	-	-	-
Hippoglossoides platessoides	-	-	-	-	-
Gadus morhua	-	-	-	-	-
Melanogrammus aeglefinus	-	-	-	-	-
Pollachius virens	-	-	-	-	-
Urophycis tenuis	-	-	-	-	-
Other Pisces	60.4	15.4	11.9	-	0.3
MISCELLANEOUS	0.8	3.7	4.4	48.9	36.7
Number of fish examined	789	531	366	678	450
Number of empty stomachs	180	82	138	203	192
Mean stomach content weight(g)	1.544	1.404	0.301	0.115	0.119

Table 21. Food of fishes representing generalized dietary categories in Southern New England. Data are expressed as a percentage of the total stomach contents weight.

Stomach contents	Southern New England Fishes						
	Silver hake	Red hake	Little skate	Butterfish	Scup	Yellowtail flounder	Ocean pout
POLYCHAETA	0.1	3.9	15.5	20.3	32.4	47.7	2.7
Aphrodita sp.	-	1.4	2.4	-	-	-	1.9
Other Polychaeta	0.1	2.5	13.1	20.3	32.4	47.7	0.8
CRUSTACEA	7.3	34.0	61.4	12.0	22.2	24.9	6.3
Amphipoda	0.2	5.1	22.9	0.9	12.9	19.0	3.6
Unciola irrorata	-	0.6	2.4	-	2.9	6.9	-
Leptocheirus pinguis	-	0.9	7.9	-	3.6	3.3	-
Gammarus annulatus	-	-	4.1	-	-	-	-
Other Amphipoda	0.2	3.6	8.5	0.9	6.4	8.8	3.6
Decapoda	2.6	25.0	30.5	3.4	3.8	4.7	2.6
Axius serratus	-	0.6	4.3	3.3	-	-	-
Cancer sp.	-	4.3	11.4	-	-	-	1.0
Geryon quinquedens	-	-	-	-	-	-	-
Pagurus sp.	-	0.9	2.5	-	-	-	-
Crangon septemspinosa	1.0	3.0	5.9	-	-	2.2	-
Dichelopandalus leptocerus	1.2	7.8	2.7	-	-	1.9	-
Pandalus borealis	-	-	-	-	-	-	-
Pasiphaea multidentata	-	-	-	-	-	-	-
Other Decapoda	0.4	8.4	3.7	0.1	3.8	0.6	1.6
Euphausiacea	3.4	-	-	-	-	-	-
Meganyctiphanes norvegica	3.4	-	-	-	-	-	-
Thysanoessa inermis	-	-	-	-	-	-	-
Other Euphausiacea	-	-	-	-	-	-	-
Mysidacea	0.7	-	-	-	1.3	-	-
Neomysis americana	0.7	-	-	-	-	-	-
Other Mysidacea	-	-	-	-	1.3	-	-
Other Crustacea	0.4	3.9	8.0	7.7	4.2	1.2	0.1
MOLLUSCA	13.7	13.9	4.8	<0.1	10.5	0.6	0.8
Loligo pealei	13.0	-	-	-	-	-	-
Other Cephalopoda	0.7	10.6	-	-	8.4	-	-
Scallop viscera	-	-	-	-	-	-	-
Other Mollusca	-	3.3	4.8	<0.1	2.1	0.6	0.8
THALIACEA	-	-	-	8.5	-	-	-
ECHINODERMATA	-	3.0	-	-	0.4	-	88.3
Echinoidea	-	-	-	-	-	-	88.2
Ophiuroidea	-	-	-	-	-	-	-
Holothuroidea	-	3.0	-	-	-	-	-
Other Echinodermata	-	<0.1	-	-	0.4	-	0.1
PISCES	78.4	37.7	4.8	-	5.3	-	-
Merluccius bilinearis	7.9	-	-	-	-	-	-
Clupeidae	1.3	2.7	-	-	-	-	-
Scomber scombrus	6.0	-	-	-	-	-	-
Ammodytes americanus	0.4	-	-	-	-	-	-
Stenotomus chrysops	4.1	-	-	-	-	-	-
Peprilus triacanthus	2.2	-	-	-	-	-	-
Sebastes marinus	-	-	-	-	-	-	-
Hippoglossoides platessoides	-	-	-	-	-	-	-
Gadus morhua	-	-	-	-	-	-	-
Melanogrammus aeglefinus	-	-	-	-	-	-	-
Pollachius virens	-	-	-	-	-	-	-
Urophycis tenuis	-	-	-	-	-	-	-
Other Pisces	56.5	35.0	4.3	-	5.3	-	-
MISCELLANEOUS	0.5	7.5	13.5	59.2	29.2	26.3	1.9
Number of fish examined	918	481	486	394	262	502	239
Number of empty stomachs	357	97	35	108	76	163	78
Mean stomach content weight (g)	1.315	1.532	0.310	0.087	0.219	0.323	3.959

Table 22. Food of fishes representing generalized dietary categories on Georges Bank. Data are expressed as a percentage of the total stomach contents weight.

Stomach contents	Georges Bank Fishes						
	Silver hake	Atlantic cod	Little skate	Longhorn sculpin	Haddock	Yellowtail flounder	Ocean pout
POLYCHAETA	0.1	1.7	8.7	1.1	25.4	40.6	0.1
Aphrodita sp.	-	1.4	1.5	-	1.1	-	-
Other Polychaeta	0.1	0.3	7.2	1.1	24.3	40.6	0.1
CRUSTACEA	16.4	28.0	72.0	86.4	17.1	13.8	6.4
Amphipoda	0.4	-	10.1	2.9	10.7	10.3	2.0
Unciola irrorata	-	-	0.3	0.7	4.2	2.8	-
Leptocheirus pinguis	-	-	2.6	0.6	0.8	1.6	-
Gammarus annulatus	-	-	-	-	-	-	-
Other Amphipoda	0.4	-	7.2	1.6	5.7	5.9	2.0
Decapoda	6.5	27.1	56.6	74.0	4.9	2.9	4.1
Axius serratus	-	<0.1	<0.1	0.6	0.7	-	-
Cancer sp.	-	17.1	12.0	38.9	-	-	1.9
Geryon quinquedens	-	-	-	-	-	-	-
Pagurus sp.	-	3.8	26.3	6.5	0.3	-	-
Crangon septemspinosa	1.3	-	8.6	6.3	-	1.8	-
Dichelopandalus leptocerus	4.4	1.6	3.4	11.5	0.3	0.4	-
Pandalus borealis	-	-	-	-	-	-	-
Pasiphaea multidentata	-	-	-	-	-	-	-
Other Decapoda	0.8	4.6	6.3	10.2	3.6	0.7	2.2
Euphausiacea	7.9	-	-	-	0.1	-	-
Meganyctiphanes norvegica	7.9	-	-	-	0.1	-	-
Thysanoessa inermis	-	-	-	-	-	-	-
Other Euphausiacea	-	-	-	-	<0.1	-	-
Mysidacea	1.2	-	-	7.3	-	-	-
Neomysis americana	1.2	-	-	7.3	-	-	-
Other Mysidacea	-	-	-	-	-	-	-
Other Crustacea	0.4	0.9	5.3	2.2	1.4	0.6	0.3
MOLLUSCA	6.7	13.4	0.7	-	3.3	0.6	3.6
Loligo pealei	6.7	2.3	-	-	-	-	-
Other Cephalopoda	<0.1	0.3	-	-	<0.1	-	-
Scallop viscera	-	7.3	-	-	1.2	-	3.1
Other Mollusca	-	3.5	0.7	-	2.1	0.6	0.5
THALIACEA	-	-	-	-	-	-	-
ECHINODERMATA	-	1.3	-	-	18.5	-	86.6
Echinoidea	-	-	-	-	1.0	-	79.4
Ophiuroidea	-	0.8	-	-	16.6	-	4.5
Holothuroidea	-	0.3	-	-	0.7	-	-
Other Echinodermata	-	0.2	-	-	0.2	-	2.7
PISCES	76.4	50.2	6.8	6.6	0.4	-	-
Merluccius bilinearis	0.4	0.2	-	-	-	-	-
Clupeidae	5.0	29.1	-	-	-	-	-
Scomber scombrus	21.1	3.5	-	-	-	-	-
Ammodytes americanus	4.8	0.4	-	-	-	-	-
Stenotomus chrysops	-	-	-	-	-	-	-
Peprilus triacanthus	8.9	-	-	-	-	-	-
Sebastes marinus	-	<0.1	-	-	-	-	-
Hippoglossoides platessoides	-	0.9	-	-	-	-	-
Gadus morhua	-	-	-	-	-	-	-
Melanogrammus aeglefinus	-	-	-	-	-	-	-
Pollachius virens	-	-	-	-	-	-	-
Urophycis tenuis	-	-	-	-	-	-	-
Other Pisces	36.2	16.1	6.8	6.6	0.4	-	-
MISCELLANEOUS	0.4	5.4	11.8	5.9	35.3	45.0	3.3
Number of fish examined	915	591	579	692	642	502	423
Number of empty stomachs	268	31	62	159	33	169	140
Mean stomach content weight (g)	1.080	29.254	1.234	0.732	3.893	0.512	5.603

Table 23. Food of fishes representing generalized dietary categories in the Gulf of Maine. Data are expressed as a percentage of the total stomach contents weight.

Stomach contents	Gulf of Maine Fishes						
	White hake	Atlantic cod	Pollock	Redfish	Witch flounder	Haddock	American plaice
POLYCHAETA	-	0.6	-	-	67.3	3.6	4.0
Aphrodita sp.	-	0.4	-	-	-	0.8	-
Other Polychaeta	-	0.2	-	-	67.3	2.8	4.0
CRUSTACEA	9.3	9.7	37.0	89.5	3.5	6.4	7.7
Amphipoda	-	-	-	-	0.9	0.6	-
Unciola irrorata	-	-	-	-	0.1	0.4	-
Leptocheirus pinguis	-	-	-	-	0.1	-	-
Gammarus annulatus	-	-	-	-	-	-	-
Other Amphipoda	-	-	-	-	0.7	0.2	-
Decapoda	5.7	8.4	24.7	27.8	-	3.1	6.6
Axius serratus	-	<0.1	-	-	-	2.7	-
Cancer sp.	-	0.9	-	-	-	-	-
Geryon quinquedens	-	3.5	-	-	-	-	-
Pagurus sp.	-	<0.1	-	-	-	<0.1	-
Crangon septemspinosa	-	-	-	-	-	-	-
Dichelopandalus leptocerus	1.4	0.9	0.7	3.5	-	0.1	1.4
Pandalus borealis	1.9	-	1.7	1.1	-	-	1.4
Pasiphaea multidentata	-	-	21.9	18.2	-	-	-
Other Decapoda	2.4	3.1	0.4	5.0	-	0.3	3.8
Euphausiacea	3.1	-	10.9	58.4	1.7	2.0	0.7
Meganyctiphanes norvegica	3.1	-	10.1	55.1	1.7	1.7	0.6
Thysanoessa inermis	-	-	<0.1	-	-	-	-
Other Euphausiacea	<0.1	-	0.8	3.3	-	0.3	0.1
Mysidacea	-	-	<0.1	-	-	-	-
Neomysis americana	-	-	<0.1	-	-	-	-
Other Mysidacea	-	-	-	-	-	-	-
Other Crustacea	0.5	1.3	1.4	3.3	0.9	0.7	0.4
MOLLUSCA	0.5	17.9	8.5	-	0.8	0.6	5.4
Loligo pealei	-	15.6	7.3	-	-	-	-
Other Cephalopoda	-	2.1	1.2	-	-	-	-
Scallop viscera	-	-	-	-	-	-	-
Other Mollusca	0.5	0.2	-	-	0.8	0.6	5.4
THALIACEA	-	-	-	-	-	-	-
ECHINODERMATA	-	1.9	-	-	11.8	74.8	76.6
Echinoidea	-	-	-	-	-	2.2	3.7
Opniuroidea	-	1.3	-	-	1.6	59.1	58.5
Holothuroidea	-	0.2	-	-	10.2	0.9	-
Other Echinodermata	-	0.4	-	-	-	12.6	14.4
PISCES	88.6	68.8	49.4	9.2	-	0.9	-
Merluccius bilinearis	8.9	5.4	2.3	2.0	-	-	-
Clupeidae	4.2	13.2	1.8	-	-	-	-
Scomber scombrus	0.7	10.9	3.1	-	-	-	-
Ammodytes americanus	-	9.4	-	-	-	-	-
Stenotomus chrysops	-	-	-	-	-	-	-
Peprilus triacanthus	-	-	-	-	-	-	-
Sebastes marinus	0.9	3.5	0.9	-	-	-	-
Hippoglossoides platessoides	-	-	-	-	-	-	-
Gadus mornua	-	-	-	-	-	-	-
Melanogrammus aeglefinus	-	-	-	-	-	-	-
Pollachius virens	-	-	14.4	-	-	-	-
Urophycis tenuis	20.4	-	-	-	-	-	-
Other Pisces	53.5	26.4	26.9	7.2	-	0.9	-
MISCELLANEOUS	1.6	1.1	5.1	1.3	16.6	13.7	6.3
Number of fish examined	470	418	374	466	426	87	714
Number of empty stomachs	149	54	65	232	33	12	328
Mean stomach content weight(g)	22.987	27.821	12.400	0.875	0.614	3.951	0.429

Table 24. Food of fishes representing generalized dietary categories in Western Nova Scotia. Data are expressed as a percentage of the total stomach contents weight.

Stomach contents	Western Nova Scotia Fishes				
	Atlantic cod	Pollock	Haddock	Witch flounder	American plaice
POLYCHAETA	1.0	-	11.2	55.2	2.1
Aphrodita sp.	0.6	-	1.5	-	-
Other Polychaeta	0.4	-	9.7	55.2	2.1
CRUSTACEA	17.2	42.1	15.6	9.5	7.3
Amphipoda	-	-	4.6	2.4	-
Unciola irrorata	-	-	1.9	-	-
Leptocheirus pinguis	-	-	0.8	-	-
Gammarus annulatus	-	-	-	-	-
Other Amphipoda	-	-	1.9	2.4	-
Decapoda	15.5	16.4	8.5	-	4.5
Axius serratus	3.0	-	2.8	-	-
Cancer sp.	1.9	-	-	-	-
Geryon quinquedens	-	-	-	-	-
Pagurus sp.	0.1	-	1.6	-	-
Crangon septemspinosa	-	-	-	-	-
Dichelopandalus leptocerus	2.5	9.9	1.1	-	2.3
Pandalus borealis	-	0.1	-	-	0.6
Pasiphaea multidentata	-	5.8	-	-	-
Other Decapoda	8.0	0.6	3.0	-	1.6
Euphausiacea	-	24.6	1.6	5.2	2.2
Meganyctiphanes norvegica	-	22.4	1.5	5.2	2.2
Thysanoessa inermis	-	1.5	-	-	-
Other Euphausiacea	-	0.7	0.1	-	<0.1
Mysidacea	-	<0.1	-	-	-
Neomysis americana	-	<0.1	-	-	-
Other Mysidacea	-	-	-	-	-
Other Crustacea	1.7	1.1	0.9	1.9	0.6
MOLLUSCA	6.0	10.0	5.1	2.5	3.0
Loligo pealei	-	9.8	-	-	-
Other Cephalopoda	1.2	0.2	2.8	-	-
Scallop viscera	-	-	-	-	-
Other Mollusca	4.8	-	2.3	2.5	3.0
THALIACEA	-	-	-	-	-
ECHINODERMATA	3.5	-	32.1	16.5	84.0
Echinoidea	-	-	5.7	-	74.0
Ophiuroidea	1.4	-	21.8	0.3	9.5
Holothuroidea	1.9	-	2.1	16.0	-
Other Echinodermata	0.2	-	2.5	0.2	0.5
PISCES	66.6	45.0	5.1	-	-
Merluccius bilinearis	-	21.6	-	-	-
Clupeidae	5.4	4.0	2.3	-	-
Scomber scombrus	7.1	-	-	-	-
Ammodytes americanus	-	-	-	-	-
Stenotomus chrysops	-	-	-	-	-
Peprilus triacanthus	-	-	-	-	-
Sebastes marinus	15.5	-	-	-	-
Hippoglossoides platessoides	5.9	-	-	-	-
Gadus morhua	5.2	-	-	-	-
Melanogrammus aeglefinus	6.3	-	2.0	-	-
Pollachius virens	-	-	-	-	-
Urophycis tenuis	-	-	-	-	-
Other Pisces	21.2	19.4	0.8	-	-
MISCELLANEOUS	5.7	2.9	30.9	16.3	3.6
Number of fish examined	669	295	747	386	784
Number of empty stomachs	77	50	44	41	288
Mean stomach content weight (g)	15.135	9.345	2.631	0.499	1.542

Table 25. Listing of predators arranged to illustrate differences and similarities in % BW of stomach contents, overall composition of diet, caloric value of diet, and gut measurements.

Species	%BW[1]	Major prey	Caloric value(Kcal) per gram food[2]	S/I[2,3]
Gadiformes				
Silver hake	1.43	Fish, squid, decapods	1.152	1.40
Spotted hake	1.09	Squid, euphausiids, decapods	1.056	1.14
White hake	1.02	Fish, decapods, euphausiids	1.173	0.73
Red hake	0.75	Fish, decapods, squid	1.050	0.68
Atlantic cod	0.73	Fish, decapods, squid	1.092	0.68
Ocean pout	0.51	Echinoids, decapods, ophiuroids	0.582	0.29
Pollock	0.41	Fish, decapods, euphausiids	1.084	0.48
Haddock	0.26	Ophiuroids, polychaetes, amphipods	0.809	0.40
Pleuronectiformes				
Fourspot flounder	0.28	Decapods, squid, fish	1.114	2.14
Yellowtail flndr	0.25	Polychaetes, amphipods, decapods	0.921	0.67
American plaice	0.23	Echinoids, ophiuroids, decapods	0.600	0.30
Witch flounder	0.14	Polychaetes, holothurians euphausiids	0.831	0.60
Other Fishes				
Longhorn sculpin	0.71	Decapods, mysids, fish	1.059	1.05
Little skate	0.44	Decapods, amphipods, polychaetes	1.019	1.46
Butterfish	0.24	Thaliaceans, polychaetes, squid	0.351	0.47
Scup	0.23	Polychaetes, squid, amphipods	0.636	0.17
Redfish	0.10	Euphausiids, decapods, fish	0.963	0.53

[1]Average of all fish length categories except 1-5 cm group.

[2]Taken from Edwards and Bowman 1979.

[3]Stomach tissue weight(s) divided by weight of intestine and pylorus (I).

Table 26. Fish prey consumed by Atlantic cod collected in the Northwest Atlantic during the years 1973-1976. Note the majority of fish consumed are juveniles.

Cruise	Number sampled	Mean length (cm)	Mean length of predators with fish prey (cm)	Percentage of predators with fish prey	Prey species	Length (cm) of prey species ( )=No. of prey
1973 Spring	172	49.7	78.4	19.2	Atl. herring	18
					Pearlsides	5
					L.H. sculpin	
					Flatfish	
					Rockeel	7.5, 7.5
					L.H. sculpin	
					Alligatorfish	
					Ocean pout	10
1973 Autumn	362	52.2	69.7	21.0	Herring	
					Flatfish	4,10.4
					Redfish	5.5,17,10
					Ocean pout	9
					Hookear sculpin	6
					Skate	14.7,14.7, 14.7, 9
					Sculpin	2.5, 8.5
					Yellowtail	6
					Unid. fish	6,17,18,15,5,6
1974 Spring	224	62.6	76.3	32.1	Atl. mackerel	18(12),16.5,16, 16(5), 18(8), 16(4),16.5, 17(18), 18(4)
					Herring	16(6), 20, 16
					Amer. plaice	
					Silver hake	18, 19(6)
					Gadids	17
					Redfish	14, 12(5)
					Flatfish	7, 6
					Unid. fish	16(17)
1974 Autumn	191	51.5	61.1	31.4	Windowpane	6
					Flatfish	3.5
					L. H. sculpin	4.8, 5.5
					Herring	20(3)
					Redfish	13, 17
					Unid. fish	5

Table 26. (continued)

Cruise	Number sampled	Mean length (cm)	Mean length of predators with fish prey (cm)	Percentage of predators with fish prey	Prey species	Lengths of prey species (cm) ( )=#
1975 Spring	178	60.7	66.9	22.5	Summer flounder	10,7,6,4
					Gadids	5-14(31)
					Atl. mackerel	18,17(8),19
					L.H. sculpin	4,8,4.8
					Silver hake	7.0(4), 6(14), 12,13
					Fish larvae	
					Unid. eel	1.6
					Unid. fish	15
1975 Autumn	200	48.9	54.7	26.5	Flatfish	2.5
					Unid. fish	33,9,3,18,6, 16,16,4,14,17,6
1976 Spring	213	45.5	69.3	13.6	Am. sand lance	12,17,14,18(4), 14
					L.H. sculpin	6.5, 19(2)
					Alligatorfish	12
					Hake	
					Flatfish	
					Atl. herring	28(5)
					Gadids	17
					Unid. fish	4.5,7.5
1976 Autumn	171	57.2	62.8	21.0	Am. sand lance	15,19(82)
					Sculpin	6.5
					Red hake	9.5
					Gadid	8.3(2)

Table 27. Number of species of fish prey identified in the stomach contents of fishes collected in the Northwest Atlantic during the years 1973-1976.

Predator	Number of prey fish species	Number of fish, eggs, larvae		
Little skate	10 species -	37		
	eggs and larvae		16	3
Silver hake	13 species	277		
Atlantic cod	30 species -	502		
	eggs and larvae		150,425	1
Haddock	10 species -	23		
	eggs		39	
Pollock	16 species -	184		
	larvae			1
White hake	15 species	124		
Red hake	5 species	21		
Spotted hake	7 species -	125		
	larvae			47
American plaice	3 species	12		
Fourspot flounder	2 species	11		
Yellowtail flounder	1 species	7		
Witch flounder	1 species -	1		
	eggs		625	
Butterfish	1 species -	4		
	larvae			4
Scup	1 species	4		
Redfish	4 species + larvae	8		10
L.H. sculpin	5 species + eggs	125	15	
Ocean pout	1 species	1		

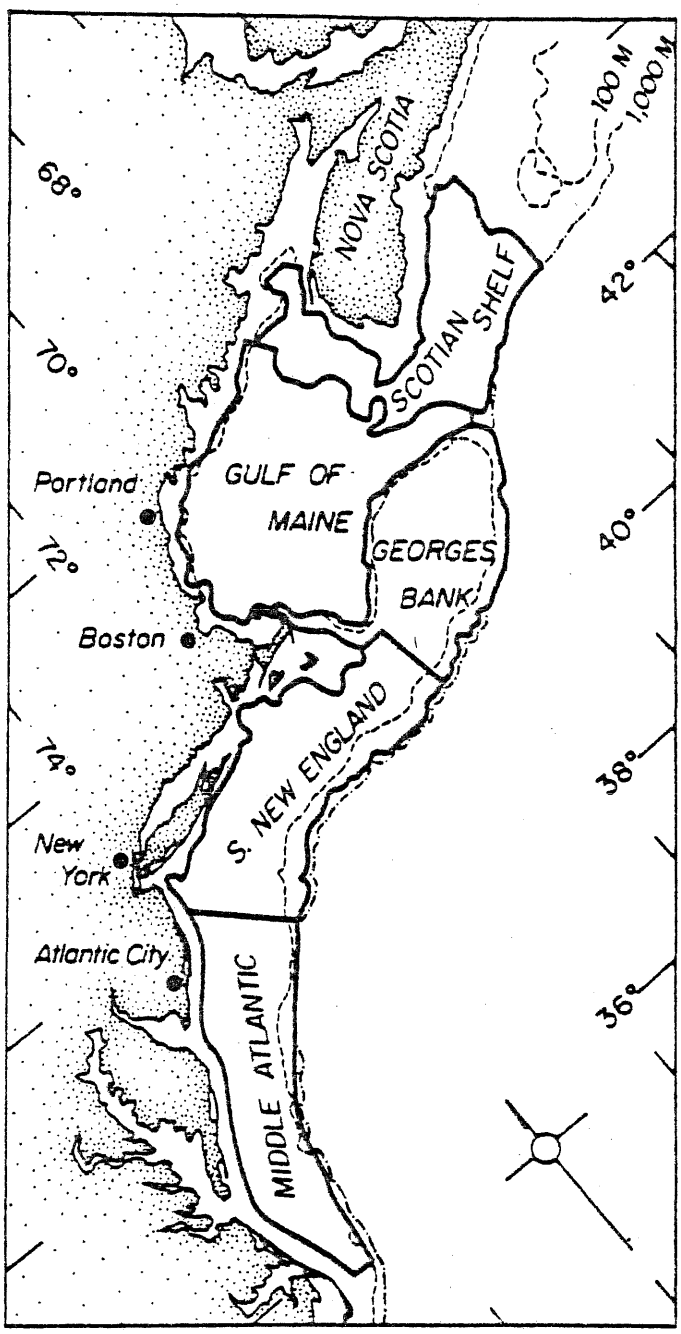

Figure 1. Geographic areas of the Northwest Atlantic sampled for fish feeding studies during 1973-1976.

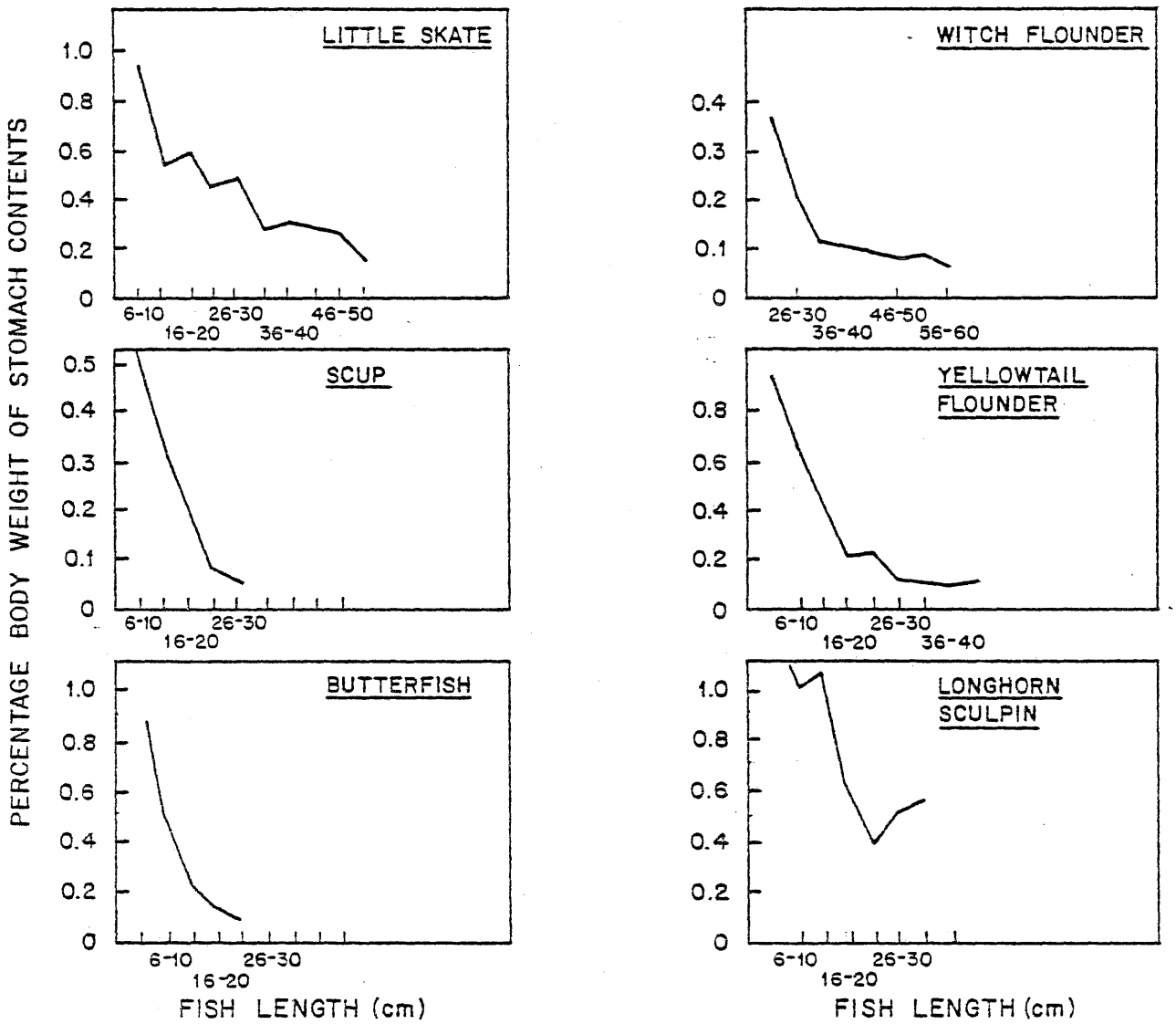

Figure 2. Average percentage total body weight of stomach contents versus fish length for seventeen species of fish sampled in the Northwest Atlantic during the years 1973-1976

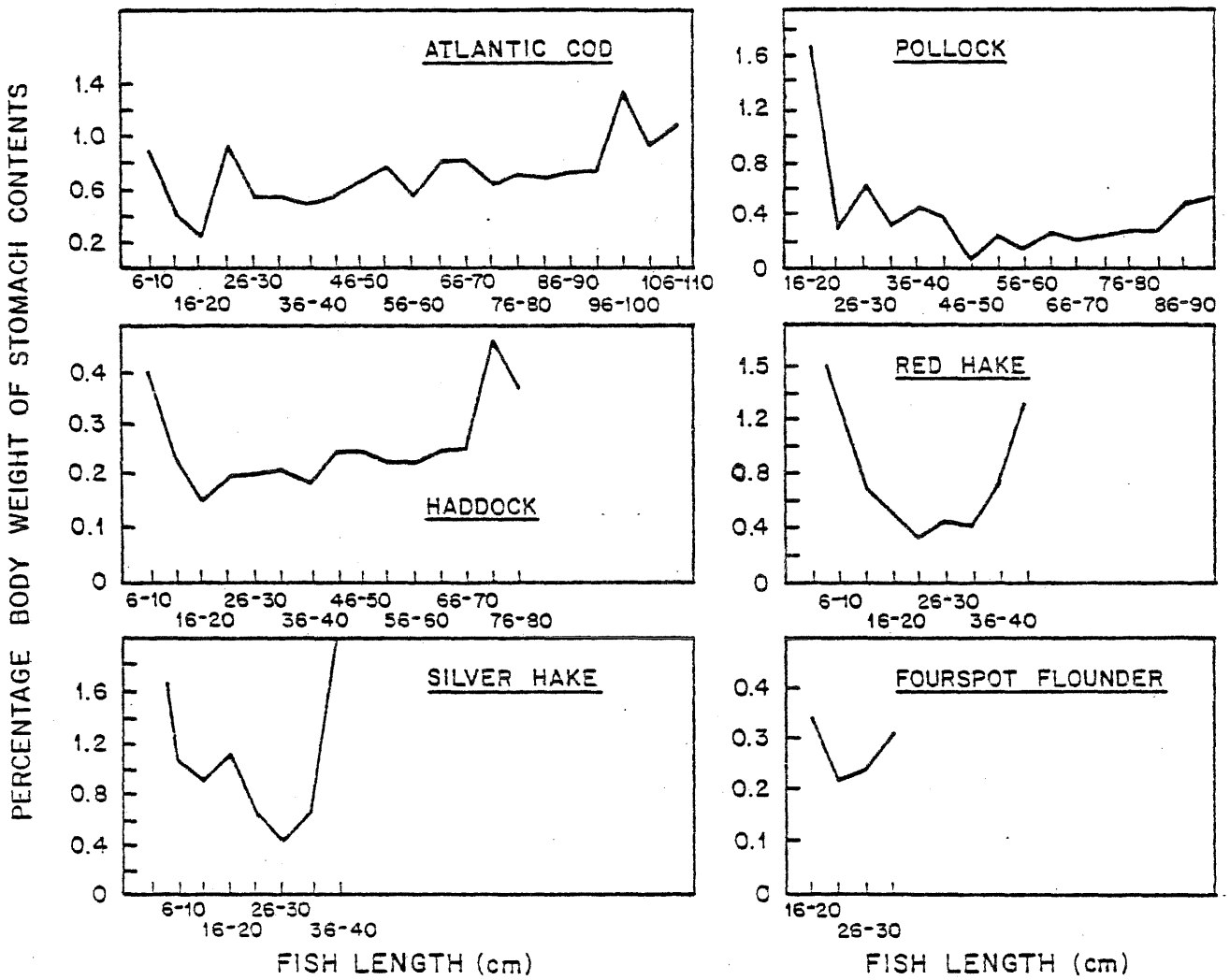

Figure 2. (continued)

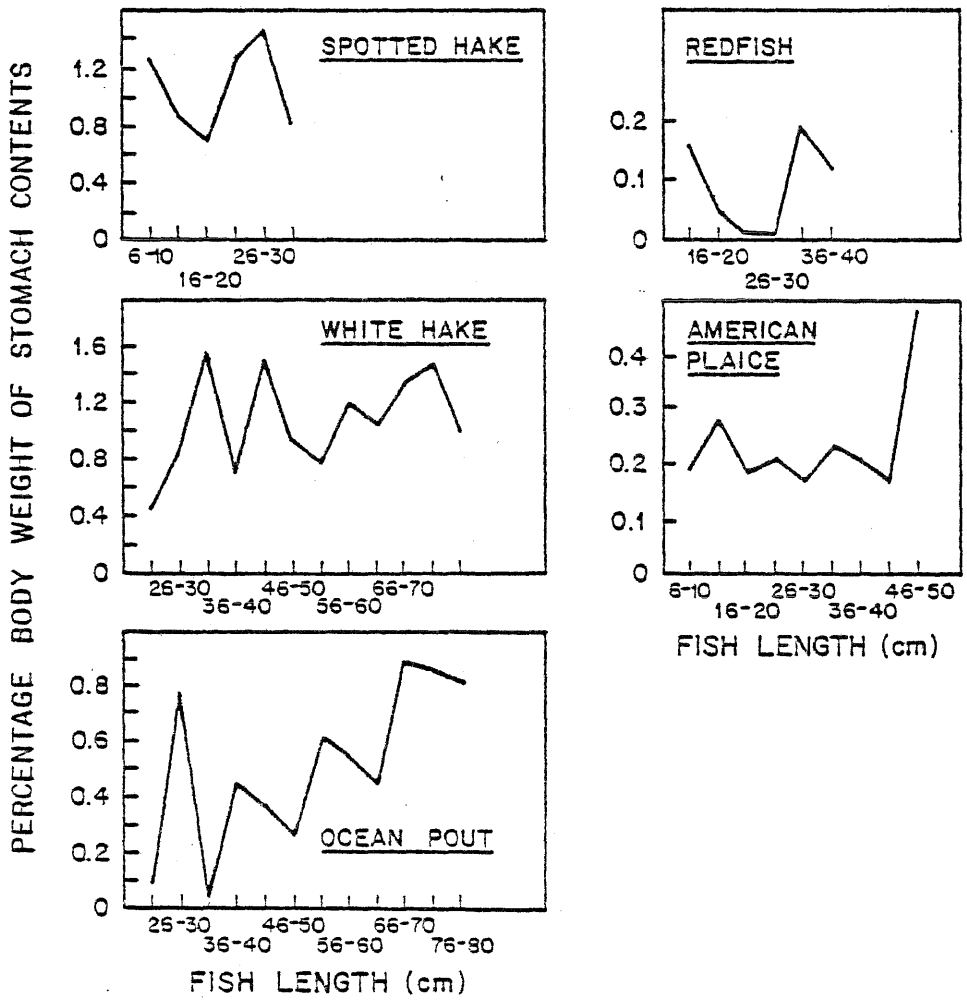

Figure 2. (continued)

APPENDIX A. Geographic breakdown of the stomach contents of little skate collected in Southern New England and on Georges Bank during the years 1973-1976 (data are expressed as a percentage weight).

Stomach contents	Southern New England	Georges Bank	Total
COELENTERATA	1.4	0.2	0.6
NEMERTEA	0.5	1.1	0.9
POLYCHAETA	15.5	8.7	11.1
Flabelligeridae	0.6	0.3	0.4
Aphroditidae	2.4	1.5	1.8
Glyceridae	0.4	1.4	1.0
Nephtyidae	2.6	0.2	1.1
Nereidae	1.1	1.2	1.2
Other Polychaeta	8.4	4.1	5.6
CRUSTACEA	61.4	72.0	68.2
Amphipoda	22.9	10.1	14.7
Ampeliscidae	1.7	0.4	0.9
Unciola irrorata	2.4	0.3	1.0
Other Corophiidae	3.1	<0.1	1.1
Gammarus annulatus	4.1	-	1.5
Other Gammaridae	1.6	1.8	1.7
Leptocheirus pinguis	7.9	2.6	4.5
Monoculodes edwardsi	0.9	2.5	1.9
Other Oedicerotidae	0.1	1.6	1.1
Other Amphipoda	1.1	0.9	1.0
Decapoda	30.5	56.6	47.2
Axius serratus	4.3	<0.1	1.5
Cancer borealis	3.0	1.5	2.0
Cancer irroratus	4.8	5.8	5.4
Other Cancridae	3.6	4.7	4.4
Crangon septemspinosa	5.9	8.6	7.6
Other Crangonidae	1.1	0.7	0.8
Pagurus acadianus	0.9	16.3	10.8
Other Paguridae	1.6	10.0	7.0
Dichelopandalus leptocerus	2.7	3.4	3.3
Other Decapoda	2.6	5.6	4.4
Isopoda	2.0	0.9	1.3
Cirolanidae	2.0	0.9	1.3
Other Isopoda	<0.1	<0.1	<0.1
Other Crustacea	6.0	4.4	5.0
MOLLUSCA	4.8	0.7	2.2
Pelecypoda	2.9	0.5	1.4
Other Mollusca	1.9	0.2	0.8
PISCES	4.8	6.8	6.1
Ulvaria subbifurcata	-	3.2	2.1
Other Pisces	4.8	3.6	4.0
MISCELLANEOUS	11.6	10.5	10.9
Number of stomachs examined	486	579	1065
Number of empty stomachs	35	62	97
Mean stomach content weight(g)	0.810	1.234	1.041
Mean fish TL (cm)	38	38	38

APPENDIX B. Geographic breakdown of the stomach contents of Atlantic cod collected on Georges Bank, in the Gulf of Maine, and in Western Nova Scotia during the years 1973-1976 (data are expressed as a percentage weight).

Stomach contents	Georges Bank	Gulf of Maine	Western Nova Scotia	Total
COELENTERATA	0.8	<0.1	1.1	0.6
POLYCHAETA	1.7	0.6	1.0	1.2
Aphroditidae	1.4	0.4	0.6	0.9
Other Polychaeta	0.3	0.2	0.4	0.3
CRUSTACEA	28.0	9.7	17.2	19.7
Decapoda	27.1	8.4	15.5	18.5
Axius serratus	<0.1	<0.1	3.0	0.8
Cancer borealis	3.0	0.9	1.7	2.0
Cancer irroratus	14.1	-	0.2	6.3
Geryon quinquedens	-	3.5	-	1.0
Hyas coarctatus	0.9	0.8	2.4	1.3
Pagurus acadianus	3.8	<0.1	0.1	1.7
Dichelopandalus leptocerus	1.6	0.9	2.5	1.6
Pandalus montagui	0.4	0.4	2.0	0.8
Other Pandalidae	0.1	1.2	0.8	0.6
Other Decapoda	3.2	0.7	2.8	2.4
Other Crustacea	0.9	1.3	1.7	1.2
MOLLUSCA	13.4	17.9	6.0	12.8
Pelecypoda	8.2	-	4.3	4.8
Cyrtodaria siligua	-	-	2.7	0.7
Pectinidae	7.3	-	-	3.2
Other Pelecypoda	0.9	-	1.6	0.9
Cephalopoda	2.6	17.7	1.2	6.7
Loligo sp.	2.3	15.6	-	5.8
Other Cephalopoda	0.3	2.1	1.2	0.9
Other Mollusca	2.6	0.2	0.5	1.3
ECHINODERMATA	1.3	1.9	3.5	2.1
Ophiuroidea	0.8	1.3	1.4	1.1
Holothuroidea	0.3	0.2	1.9	0.7
Other Echinodermata	0.2	0.4	0.2	0.3
PISCES	50.2	68.8	66.6	60.0
Batrachoididae	-	4.8	-	1.4
Clupea harengus	1.7	9.5	-	3.6
Other Clupeidae	17.4	3.7	5.4	10.2
Gadus morhua	-	-	5.2	1.3
Melanogrammus aeglefinus	-	-	6.3	1.6
Merluccius bilinearis	0.2	5.4	-	1.7
Other Gadidae	1.1	1.8	1.5	1.4
Ammodytes americanus	0.4	9.4	-	3.0
Cottidae	2.4	<0.1	2.7	1.8
Scomber scombrus	3.5	10.9	7.1	6.6
Pomatomus saltatrix	4.5	-	-	2.0
Sebastes marinus	<0.1	3.5	15.5	5.1
Hippoglossoides platessoides	0.9	-	5.9	1.9
Other Pleuronectiformes	3.7	5.6	<0.1	3.3
Other Pisces	14.4	14.2	17.0	15.1
MISCELLANEOUS	3.1	1.1	3.9	2.8
SAND AND ROCK	1.5	<0.1	0.7	0.8
Number of stomachs examined	591	418	669	1678
Number of empty stomachs	31	54	77	162
Mean stomach content weight(g)	29.254	27.821	15.135	23.268
Mean fish TL (cm)	53	56	50	53

APPENDIX C. Geographic breakdown of the stomach contents of haddock collected on Georges Bank, in the Gulf of Maine, and in Western Nova Scotia during the years 1973-1976 (data are expressed as a percentage weight).

Stomach contents	Georges Bank	Gulf of Maine	Western Nova Scotia	Total
COELENTERATA	3.0	-	0.7	1.8
Ceriantharia	3.0	-	-	1.5
Other Anthozoa	<0.1	-	0.7	0.3
POLYCHAETA	25.4	3.6	11.2	18.1
Spionphanes bombyx	1.3	-	-	0.7
Other Spionidae	1.9	-	-	1.0
Nicomache lumbricalis	1.3	-	-	0.7
Sabellidae	1.4	0.1	0.3	0.9
Aphroditidae	1.1	0.8	1.5	1.2
Other Polychaeta	18.4	2.7	9.4	13.6
CRUSTACEA	17.1	6.4	15.6	15.7
Amphipoda	10.7	0.6	4.6	7.5
Unciola irrorata	4.2	0.4	1.9	3.0
Unciola serrata	2.5	-	0.1	1.3
Gammaridae	1.7	0.1	0.7	1.2
Leptocheirus pinguis	0.8	-	0.8	0.7
Other Amphipoda	1.5	0.1	1.1	1.3
Decapoda	4.9	3.1	8.5	6.2
Axius serratus	0.7	2.7	2.8	1.7
Dichelopandalus leptocerus	0.3	0.1	1.1	0.6
Paguridae	0.3	<0.1	1.6	0.8
Other Decapoda	3.6	0.3	3.0	3.1
Euphausiacea	0.1	2.0	1.6	0.9
Meganyctiphanes norvegica	0.1	1.7	1.5	0.8
Other Euphausiacea	<0.1	0.3	0.1	0.1
Other Crustacea	1.4	0.7	0.9	1.1
MOLLUSCA	3.3	0.6	5.1	3.8
Pelecypoda	2.2	0.5	1.2	1.7
Placopecten sp.	1.2	-	-	0.6
Other Pelecypoda	1.0	0.5	1.2	1.1
Gastropoda	1.0	0.1	0.3	0.6
Cephalopoda	<0.1	-	2.8	1.1
Other Mollusca	0.1	-	0.8	0.4
ECHINODERMATA	18.5	74.8	32.1	28.1
Echinoidea	1.0	2.2	5.7	3.0
Stronglocentrotus drobachiensis	0.4	2.2	2.9	1.6
Echinarachnius parma	0.5	-	2.6	1.3
Other Echinoidea	0.1	-	0.2	0.1
Ophiuroidea	16.6	59.1	21.8	21.8
Ophiura sarsi	5.3	16.1	5.3	6.1
Ophiura sp.	1.2	-	1.7	1.3
Ampniuridae	-	-	1.2	0.7
Ophiopholis aculeata	8.0	16.0	10.2	9.5
Other Ophiuroidea	2.1	27.0	3.4	4.2
Holothuroidea	0.7	0.9	2.1	1.3
Psolus sp.	-	-	1.5	0.6
Other Holothuroidea	0.7	0.9	0.6	0.7
Other Echinodermata	0.2	12.6	2.5	2.0
PISCES	0.4	0.9	5.1	2.4
Melanogrammus aeglefinus	-	-	2.0	0.8
Clupeidae	-	-	2.3	0.9
Other Pisces	0.4	0.9	0.8	0.7
MISCELLANEOUS	10.3	12.5	23.1	15.7
SAND AND ROCK	22.0	1.2	7.1	14.4
Number of stomachs examined	642	87	747	1476
Number of empty stomachs	33	12	44	89
Mean stomach content weight(g)	3.893	3.951	2.631	3.258
Mean fish FL (cm)	40	38	37	38

APPENDIX D. Geographic breakdown of the stomach contents of silver hake collected in the Middle Atlantic, Southern New England, and on Georges Bank during the years 1973-1976 (data are expressed as a percentage weight).

Stomach contents	Middle Atlantic	Southern New England	Georges Bank	Total
POLYCHAETA	0.1	0.1	0.1	0.1
CRUSTACEA	7.3	7.3	16.4	9.5
Amphipoda	0.5	0.2	0.4	0.3
Ampeliscidae	0.1	0.1	0.1	0.1
Oedicerotidae	0.2	<0.1	0.1	0.1
Parathemisto sp.	0.1	0.1	0.1	0.1
Other Amphipoda	0.1	<0.1	0.1	<0.1
Decapoda	4.9	2.6	6.5	4.1
Crangon septemspinosa	2.4	1.0	1.3	1.1
Dichelopandalus leptocerus	1.8	1.2	4.4	2.2
Other Decapoda	0.7	0.4	0.8	0.8
Euphausiacea	1.2	3.4	7.9	3.9
Meganyctiphanes norvegica	1.2	3.4	7.9	3.9
Mysidacea	0.3	0.7	1.2	0.7
Neomysis americana	0.3	0.7	1.2	0.7
Cumacea	-	0.1	<0.1	<0.1
Copepoda	<0.1	<0.1	<0.1	0.1
Other Crustacea	0.4	0.3	0.4	0.4
MOLLUSCA	4.3	13.7	6.7	8.9
Loligo pealei	2.9	13.0	6.7	8.2
Other Cephalopoda	1.4	0.7	<0.1	0.7
PISCES	87.5	78.4	76.4	80.8
Scomberesox saurus	-	-	6.1	1.6
Clupeidae	3.2	1.3	5.0	2.8
Merluccius bilinearis	20.8	7.9	0.4	10.0
Phycis chesteri	-	-	0.8	0.2
Ammodytes americanus	1.7	0.4	4.8	1.9
Scomber scombrus	-	6.0	21.1	8.0
Stenotomus chrysops	-	4.1	-	1.8
Peprilus triacanthus	1.4	2.2	8.9	3.7
Other Pisces	60.4	56.5	29.3	50.8
MISCELLANEOUS	0.8	0.5	0.4	0.7
Number of stomachs examined	789	918	915	2622
Number of empty stomachs	180	357	268	805
Mean stomach content weight(g)	1.544	1.815	1.080	1.477
Mean fish FL (cm)	17	22	20	20

APPENDIX E. Geographic breakdown of the stomach contents of pollock collected in the Gulf of Maine and Western Nova Scotia during the years 1973-1976 (data are expressed as a percentage weight).

Stomach contents	Gulf of Maine	Western Nova Scotia	Total
CRUSTACEA	37.0	42.1	38.9
Decapoda	24.7	16.4	21.6
Dichelopandalus leptocerus	0.7	9.9	4.1
Pandalus borealis	1.7	0.1	1.1
Pasiphaea multidentata	21.9	5.8	15.9
Other Decapoda	0.4	0.6	0.5
Euphausiacea	10.9	24.6	16.0
Meganyctiphanes norvegica	10.1	22.4	14.7
Thysanoessa inermis	<0.1	1.5	0.6
Other Euphausiacea	0.8	0.7	0.7
Mysidacea	<0.1	<0.1	0.1
Neomysis americana	<0.1	<0.1	0.1
Other Crustacea	1.4	1.1	1.2
MOLLUSCA	8.5	10.0	9.0
Loligo sp.	7.3	9.8	8.2
Other Cephalopoda	1.2	0.2	0.8
PISCES	49.4	45.0	47.7
Clupeidae	1.8	4.0	2.6
Merluccius bilinearis	2.3	21.6	9.5
Merluccius sp.	-	1.5	0.6
Pollachius virens	14.4	-	9.0
Aethoprora metopoclampa	-	3.0	1.1
Scomber scombrus	3.1	-	1.9
Sebastes marinus	0.9	-	0.6
Other Pisces	26.9	14.9	22.4
MISCELLANEOUS	5.1	2.9	4.4
Number of stomachs examined	374	295	669
Number of empty stomachs	65	50	115
Mean stomach content weight(g)	12.400	9.345	11.053
Mean fish FL (cm)	66	59	63

APPENDIX F. Stomach contents of red hake collected in Southern New England during the years 1973-1976 (data are expressed as a percentage weight).

Stomach contents	Southern New England		
POLYCHAETA	3.9		
Aphrodita hastata			1.4
Other Polychaeta			2.5
SIPUNCULIDA	1.0		
CRUSTACEA	34.0		
Amphipoda		5.1	
Aeginella sp.			0.9
Unciola irrorata			0.6
Gammaridae			0.6
Leptocheirus pinguis			0.9
Other Amphipoda			2.1
Decapoda		25.0	
Axius serratus			0.6
Cancer borealis			3.0
Cancer irroratus			1.3
Crangon septemspinosa			3.0
Munida sp.			3.1
Pagurus acadianus			0.9
Dichelopandalus leptocerus			7.8
Other Decapoda			5.3
Isopoda		0.4	
Other Crustacea		3.5	
MOLLUSCA	13.9		
Gastropoda			3.0
Cephalopoda			10.6
Other Mollusca			0.3
ECHINODERMATA	3.0		
Holothuroidea			3.0
Other Echinodermata			<0.1
PISCES	37.7		
Clupeidae			2.7
Ophidiidae			2.1
Pleuronectiformes			3.3
Other Pisces			29.6
MISCELLANEOUS	6.5		

Number of stomachs examined	481
Number of empty stomachs	97
Mean stomach content weight(g)	1.532
Mean fish TL (cm)	27

APPENDIX G. Stomach contents of spotted hake collected in the Middle Atlantic during the years 1973-1976 (data are expressed as a percentage weight).

Stomach contents	Middle Atlantic
CRUSTACEA	43.3
Amphipoda	1.4
Decapoda	16.4
Cancer irroratus	1.4
Crangon septemspinosa	3.3
Munida iris	3.4
Munida sp.	1.8
Dichelopandalus leptocerus	4.7
Other Decapoda	1.8
Euphausiacea	22.6
Meganyctiphanes norvegica	22.4
Other Euphausiacea	0.2
Other Crustacea	2.9
MOLLUSCA	37.1
Cephalopoda	36.9
Other Mollusca	0.2
PISCES	15.9
Merluccius bilinearis	0.5
Ophidiidae	2.9
Other Pisces	12.5
MISCELLANEOUS	3.7
Number of stomachs examined	531
Number of empty stomachs	82
Mean stomach content weight(g)	1.404
Mean fish TL (cm)	21

APPENDIX H. Stomach contents of white hake collected in the Gulf of Maine during the years 1973-1976 (data are expressed as a percentage weight).

Stomach contents	Gulf of Maine
CRUSTACEA	9.3
Decapoda	5.7
Dichelopandalus leptocerus	1.4
Pandalus borealis	1.9
Other Decapoda	2.4
Euphausiacea	3.1
Meganyctiphanes norvegica	3.1
Other Euphausiacea	<0.1
Other Crustacea	0.5
MOLLUSCA	0.5
PISCES	88.6
Argentina silus	4.3
Clupea harengus	1.6
Other Clupeidae	2.6
Merluccius bilinearis	8.9
Urophycis chuss	1.1
Urophycis tenuis	20.4
Other Gadidae	1.5
Scomber scombrus	0.7
Sebastes marinus	0.9
Pseudopleuronectes americanus	2.6
Other Pisces	44.0
MISCELLANEOUS	1.6
Number of stomachs examined	470
Number of empty stomachs	149
Mean stomach content weight(g)	22.987
Mean fish TL (cm)	53

APPENDIX I. Geographic breakdown of the stomach contents of ocean pout collected in Southern New England and on Georges Bank during the years 1973-1976 (data are expressed as a percentage weight).

Stomach contents	Southern New England	Georges Bank	Total
POLYCHAETA	2.7	0.1	1.1
Aphroditidae	1.9	-	0.8
Other Polychaeta	0.8	0.1	0.3
CRUSTACEA	6.3	6.4	6.4
Amphipoda	3.6	2.0	2.7
Byblis serrata	1.3	-	0.5
Corophiidae	0.2	0.8	0.6
Other Amphipoda	2.1	1.2	1.6
Decapoda	2.6	4.1	3.5
Cancer irroratus	0.1	1.5	0.9
Other Cancridae	0.9	0.4	0.6
Other Decapoda	1.6	2.2	2.0
Other Crustacea	0.1	0.3	0.2
MOLLUSCA	0.8	3.6	2.5
Placopecten sp.	-	3.1	1.9
Other Mollusca	0.8	0.5	0.6
ECHINODERMATA	88.3	86.6	87.3
Echinoidea	88.2	79.4	82.9
Echinarachnius parma	78.1	58.7	66.4
Other Echinoidea	10.1	20.7	16.5
Ophiuroidea	-	4.5	2.7
Euryale sp.	-	1.8	1.1
Ophiopholis aculeata	-	2.0	1.2
Other Ophiuroidea	-	0.7	0.4
Other Echinodermata	0.1	2.7	1.7
MISCELLANEOUS	1.7	1.1	1.3
SAND AND ROCK	0.2	2.2	1.4
Number of stomachs examined	239	184	423
Number of empty stomachs	78	62	140
Mean stomach content weight(g)	3.959	7.739	5.603
Mean fish TL (cm)	46	55	50

APPENDIX J. Geographic breakdown of the stomach contents of scup collected in the Middle Atlantic and Southern New England during the years 1973-1976 (data are expressed as a percentage weight).

Stomach contents	Middle Atlantic	Southern New England	Total
COELENTERATA	1.6	2.6	2.1
Cerianthidea	-	1.1	0.6
Anthozoa	1.6	1.5	1.5
NEMERTEA	0.1	-	<0.1
POLYCHAETA	41.4	32.4	36.6
Maldanidae	0.4	1.8	1.1
Opheliidae	-	0.5	0.3
Scalibregmidae	-	6.6	3.4
Ampharetidae	0.1	2.9	1.5
Sabellidae	<0.1	0.7	0.4
Glyceridae	6.6	4.1	5.3
Lumbrineridae	12.8	0.5	6.4
Nephtyidae	0.7	2.3	1.5
Sigalionidae	4.1	0.1	2.0
Other Polychaeta	16.7	12.9	14.7
CRUSTACEA	7.5	22.2	15.1
Amphipoda	2.0	12.9	6.9
Byblis serrata	0.5	1.1	0.8
Caprellidae	<0.1	1.2	0.6
Unciola irrorata	0.3	2.9	1.6
Gammaridae	0.6	3.0	1.1
Leptocheirus pinguis	-	3.6	1.9
Other Amphipoda	0.6	1.1	0.9
Decapoda	3.7	3.8	3.8
Mysidacea	-	1.3	0.7
Other Crustacea	1.8	4.2	3.7
MOLLUSCA	12.9	10.5	11.7
Pelecypoda	1.3	1.3	1.3
Gastropoda	2.3	0.2	1.2
Acoela sp.	2.2	-	1.1
Other Gastropoda	0.1	0.2	0.1
Cephalopoda	6.4	8.4	7.4
Other Mollusca	2.9	0.6	1.8
ECHINODERMATA	1.2	0.4	0.8
PISCES	0.3	5.3	2.9
MISCELLAENOUS	34.3	23.3	28.8
SAND AND ROCK	0.7	3.3	2.0
Number of stomachs examined	450	262	712
Number of empty stomachs	192	76	268
Mean stomach content weight(g)	0.119	0.219	0.156
Mean fish FL (cm)	15	16	15

APPENDIX K. Geographic breakdown of the stomach contents of butterfish collected in the Middle Atlantic and Southern New England during the years 1973-1976 (data are expressed as a percentage weight).

Stomach contents	Middle Atlantic		Southern New England		Total	
COELENTERATA	9.3		-		6.5	
Hydrozoa		8.2		-		5.7
Other Coelenterata		1.1		-		0.8
CTENOPHORA	3.5		-		2.4	
NEMERTEA	0.8		0.6		0.7	
POLYCHAETA	9.5		20.3		12.8	
Glyceridae		0.7		-		0.5
Goniadidae		5.0		-		3.5
Lumbrineridae		0.9		0.2		0.7
Tomopteridae heloglandica		1.1		7.9		3.2
Other Tomopteridae		0.6		12.2		4.1
Other Polychaeta		1.2		<0.1		0.8
CRUSTACEA	6.3		12.0		8.0	
Amphipoda	4.9		0.9		3.7	
Parathemisto sp.		4.7		0.1		3.3
Other Amphipoda		0.2		0.8		0.4
Decapoda	0.1		3.4		1.1	
Axiidae		-		3.3		1.0
Other Decapoda		0.1		0.1		0.1
Copepoda	0.4		6.9		2.2	
Other Crustacea	0.9		0.8		1.0	
MOLLUSCA	10.1		<0.1		7.0	
Loligo sp.		9.6		-		6.7
Other Mollusca		0.5		<0.1		0.3
THALIACEA	25.2		8.5		20.2	
Larvacea		8.2		8.5		8.3
Hemimyaria		12.5		-		8.9
Other Thaliacea		4.5		<0.1		3.0
MISCELLANEOUS	35.3		58.6		42.4	
Number of stomachs examined	678		394		1072	
Number of empty stomachs	203		108		311	
Mean stomach content weight(g)	0.115		0.087		0.105	
Mean fish FL (cm)	13		14		13	

APPENDIX L. Stomach contents of redfish collected in the Gulf of Maine during the years 1973-1976 (data are expressed as a percentage weight).

Stomach contents	Gulf of Maine
CRUSTACEA	89.5
Decapoda	27.8
Dichelopandalus leptocerus	3.5
Pandalus borealis	1.1
Other Pandalidae	2.0
Pasiphaea multidentata	14.1
Other Pasiphaeidae	4.1
Other Decapoda	3.0
Euphausiacea	58.4
Meganyctiphanes norvegica	55.1
Other Euphausiacea	3.3
Other Crustacea	3.3
PISCES	9.2
Merluccius bilinearis	2.0
Myoxocephalus octodecemspinosa	1.1
Other Pisces	6.1
MISCELLANEOUS	1.3
Number of stomachs examined	466
Number of empty stomachs	232
Mean stomach content weight(g)	0.875
Mean fish FL (cm)	31

APPENDIX M. Stomach contents of longhorn sculpin collected on Georges Bank during the years 1973-1976 (data are expressed as a percentage weight).

Stomach contents	Georges Bank
POLYCHAETA	1.1
CRUSTACEA	86.4
Amphipoda	2.9
Unciola irrorata	0.7
Gammaridae	0.4
Anonyx liljeborgi	0.6
Other Lysianassidae	0.1
Leptocheirus pinguis	0.6
Other Amphipoda	0.5
Decapoda	74.0
Axius serratus	0.6
Cancer borealis	2.4
Cancer irroratus	32.7
Other Cancridae	3.8
Crangon septemspinosa	6.3
Hyas araneus	0.5
Hyas coarctatus	2.4
Pagurus acadianus	2.3
Pagurus sp.	2.9
Other Paguridae	1.3
Dichelopandalus leptocerus	11.5
Other Pandalidae	0.5
Other Decapoda	6.8
Isopoda	0.5
Mysidacea	7.3
Neomysis americana	7.3
Other Crustacea	1.7
PISCES	6.6
Rajidae	0.7
Pisces eggs	1.5
Other Pisces	4.4
MISCELLANEOUS	4.0
SAND AND ROCK	1.9
Number of stomachs examined	692
Number of empty stomachs	159
Mean stomach content weight(g)	0.732
Mean fish TL (cm)	19

APPENDIX N. Stomach contents of fourspot flounder collected in the Middle Atlantic during the years 1973-1976 (data are expressed as a percentage weight).

Stomach contents	Middle Atlantic
CRUSTACEA	64.5
Amphipoda	0.5
Decapoda	52.2
Cancer irroratus	6.4
Other Cancridae	5.7
Crangon septemspinosa	7.7
Other Crangonidae	0.7
Munida iris	2.6
Munida sp.	4.1
Dichelopandalus leptocerus	19.7
Other Pandalidae	1.5
Other Decapoda	3.8
Mysidacea	7.1
Neomysis americana	7.1
Other Mysidacea	<0.1
Other Crustacea	4.7
MOLLUSCA	19.2
Cephalopoda	19.1
Rossia sp.	4.4
Other Cephalopoda	14.7
Other Mollusca	0.1
PISCES	11.9
MISCELLANEOUS	4.4
Number of stomachs examined	366
Number of empty stomachs	138
Mean stomach content weight(g)	0.301
Mean fish TL (cm)	25

APPENDIX O. Geographic breakdown of the stomach contents of witch flounder collected in the Gulf of Maine and Western Nova Scotia during the years 1973-1976 (data are expressed as a percentage weight).

Stomach contents	Gulf of Maine	Western Nova Scotia	Total
COELENTERATA	0.1	3.4	1.5
Ceriantharia	0.1	1.4	0.7
Anthozoa	-	2.0	0.8
POLYCHAETA	67.3	55.2	62.2
Spionidae	1.9	-	1.1
Maldanidae	1.2	0.1	0.7
Sternaspidae	1.6	3.4	2.4
Capitellidae	1.6	0.4	1.1
Ampharetidae	1.8	0.4	1.2
Sabellidae	1.6	1.4	1.5
Arabellidae	1.2	-	0.7
Eunice pennata	1.1	4.8	2.7
Goniadidae	4.0	1.3	2.9
Lumbrineris sp.	1.1	1.6	1.3
Other Lumbrineridae	8.0	3.8	6.2
Nephtyidae	2.8	1.8	2.4
Onuphis eremita	0.3	2.4	1.2
Onuphis opalina	0.9	1.1	1.0
Onuphis sp.	0.7	2.3	1.4
Other Onuphidae	3.8	2.5	3.2
Eteone sp.	0.4	-	0.2
Other Phyllodocidae	0.1	1.2	0.6
Other Polychaeta	33.2	26.7	30.4
CRUSTACEA	3.5	9.5	6.0
Amphipoda	0.9	2.4	1.5
Gammaridae	0.4	0.9	0.6
Other Amphipoda	0.5	1.5	0.9
Euphausiacea	1.7	5.2	3.2
Meganyctiphanes norvegica	1.7	5.2	3.2
Other Crustacea	0.9	1.9	1.3
MOLLUSCA	0.8	2.5	1.5
Yoldia sp.	0.4	1.4	0.8
Other Mollusca	0.4	1.1	0.7
ECHINODERMATA	11.8	16.5	13.8
Ophiuroidea	1.6	0.3	1.1
Ophiura sarsi	1.2	0.2	0.8
Other Ophiuroidea	0.4	0.1	0.3
Holothuroidea	10.2	16.0	12.6
Havelockia scabra	1.3	-	0.7
Dendrochirotida	1.5	-	0.9
Other Holothuroidea	7.4	16.0	11.0
Other Echinodermata	-	0.2	0.1
ASCIDIACEA	0.8	1.4	1.1
MISCELLANEOUS	15.5	10.1	13.2
SAND AND ROCK	0.2	1.4	0.7
Number of stomachs examined	426	386	812
Number of empty stomachs	33	41	74
Mean stomach content weight(g)	0.614	0.499	0.559
Mean fish TL (cm)	43	44	43

APPENDIX P. Geographic breakdown of the stomach contents of American plaice collected in the Gulf of Maine and Western Nova Scotia during the years 1973-1976 (data are expressed as a percentage weight).

Stomach contents	Gulf of Maine	Western Nova Scotia	Total
POLYCHAETA	4.0	2.1	2.5
CRUSTACEA	7.7	7.3	7.4
Decapoda	6.6	4.5	4.9
Dichelopandalus leptocerus	1.4	2.3	2.1
Pandalus borealis	1.4	0.6	0.8
Other Decapoda	3.8	1.6	2.0
Euphausiacea	0.7	2.2	1.9
Meganyctiphnes norvegica	0.6	2.2	1.9
Other Euphausiacea	0.1	<0.1	<0.1
Other Crustacea	0.4	0.6	0.6
MOLLUSCA	5.4	3.0	3.5
Pelecypoda	5.2	2.4	3.0
Cerastoderma pinnulatum	3.4	-	0.7
Other Pelecypoda	1.8	2.4	2.3
Other Mollusca	0.2	0.6	0.5
ECHINODERMATA	76.6	84.0	82.6
Echinoidea	3.7	74.0	59.9
Strongylocentrotus drobachiensis	-	1.1	0.9
Echinarachnius parma	-	57.6	46.0
Echinarachnius sp.	1.7	12.2	10.1
Other Echinoidea	2.0	3.1	2.9
Ophiuroidea	58.5	9.5	19.4
Ophiura sarsi	41.6	7.7	14.6
Other Ophiuroidea	16.9	1.8	4.8
Other Echinodermata	14.4	0.5	3.3
MISCELLANEOUS	5.1	1.4	2.0
SAND AND ROCK	1.2	2.2	2.0
Number of stomachs examined	714	784	1498
Number of empty stomachs	328	288	616
Mean stomach content weight(g)	0.429	1.542	1.012
Mean fish TL (cm)	29	26	27

APPENDIX Q. Geographic breakdown of the stomach contents of yellowtail flounder collected in Southern New England and on Georges Bank during the years 1973-1976 (data are expressed as a percentage weight).

Stomach contents	Southern New England	Georges Bank	Total
COELENTERATA	1.9	3.5	2.9
NEMERTEA	0.6	0.5	0.5
POLYCHAETA	47.7	40.6	43.3
Spionphanes bombyx	4.4	13.2	9.8
Other Spionidae	4.4	3.1	3.6
Flabelligeridae	1.2	0.1	0.5
Malanidae	0.9	0.6	0.7
Ampharetidae	1.5	0.1	0.6
Sabellidae	3.3	0.3	1.5
Lumbrineridae	2.6	1.5	1.9
Nephtyidae	2.7	0.3	1.2
Other Polychaeta	26.7	21.4	23.5
CRUSTACEA	24.9	13.8	18.1
Amphipoda	19.0	10.3	13.6
Byblis serrata	2.2	1.4	1.7
Other Ampeliscidae	2.4	1.0	1.5
Unciola irrorata	6.9	2.8	4.4
Gammaridae	2.3	1.7	1.9
Leptocheirus pinguis	3.3	1.6	2.3
Other Amphipoda	1.9	1.8	1.8
Decapoda	4.7	2.9	3.7
Crangon septemspinosa	2.2	1.8	2.0
Dichelopandalus leptocerus	1.9	0.4	1.0
Other Decapoda	0.6	0.7	0.7
Other Crustacea	1.2	0.6	0.8
MOLLUSCA	0.6	0.6	0.6
Bivalvia	0.6	0.6	0.6
UROCHORDATA	0.8	0.4	0.6
Ascidiacea	0.8	0.4	0.6
MISCELLANEOUS	15.7	17.9	17.1
SAND AND ROCK	7.8	22.7	16.9
Number of stomachs examined	502	502	1004
Number of empty stomachs	163	169	332
Mean stomach content weight(g)	0.323	0.512	0.417
Mean fish TL (cm)	30	29	30

APPENDIX R. Length-weight equation parameters for various species of Northwest Atlantic fish. All measurements are in millimeters or grams. The length-weight equation is of the form $W = aL^b$.

Species	a	b	Source
Little skate	$.2662 \times 10^{-5}$	3.1200	Waring, 1978
Atlantic cod	$.6031 \times 10^{-5}$	3.0979	Wilk et al., 1978
Haddock	$.4284 \times 10^{-4}$	2.8053	Brown, 1971
Silver hake	$.3555 \times 10^{-5}$	3.1109	Wilk et al., 1978
Pollock	$.1542 \times 10^{-4}$	2.9393	Kohler et al., 1970
Red hake	$.2841 \times 10^{-5}$	3.1510	Wilk et al., 1978
Spotted hake	$.4118 \times 10^{-5}$	3.1406	Wilk et al., 1978
White hake	$.1927 \times 10^{-5}$	3.2351	Wilk et al., 1978
Ocean pout	$.6529 \times 10^{-6}$	3.3475	Wilk et al., 1978
Scup	$.9502 \times 10^{-5}$	3.1693	Wilk et al., 1978
Butterfish	$.1541 \times 10^{-4}$	3.0602	Wilk et al., 1978
Redfish	$.1962 \times 10^{-4}$	2.9621	Kohler et al., 1970
Longhorn sculpin	$.1008 \times 10^{-4}$	3.0260	Wilk et al., 1978
Fourspot flounder	$.7010 \times 10^{-5}$	3.0095	Wilk et al., 1978
Witch flounder	$.2123 \times 10^{-6}$	3.5617	Wilk et al., 1978
American plaice	$.1109 \times 10^{-5}$	3.3450	Lux 1969
Yellowtail flounder	$.4514 \times 10^{-5}$	3.1257	Wilk et al., 1978

APPENDIX S. Total body weight and % BW of stomach contents by fish length for seventeen fish species sampled in the Northwest Atlantic during the years 1973-1976.

Species	Median fish length(mm)																					
	25	75	125	175	225	275	325	375	425	475	525	575	625	675	725	775	825	875	925	975	1025	1075
Little skate																						
BW(g)		1.9	9.3	26.5	58.1	108.6	182.9	285.9	422.5	597.7	816.8											
% BW stom. cont.		0.95	0.55	0.60	0.44	0.48	0.29	0.31	0.30	0.27	0.17											
Atlantic cod																						
BW(g)		3.9	18.9	53.6	116.7	217.4	364.7	568.2	837.3	1181.7	1611.3	2135.8	2765.3	3509.8	4379.6	5384.7	6535.4	7842.2	93154.0	10966.0	12803.0	14839.0
% BW stom. cont.		0.90	0.43	0.26	0.95	0.54	0.56	0.47	0.55	0.67	0.79	0.58	0.81	0.82	0.65	0.72	0.69	0.73	0.76	1.34	0.95	1.10
Haddock																						
BW(g)		7.8	32.7	84.0	170.0	298.5	476.9	712.5	1012.2	1378.9	1831.1	2363.4	2986.3	3705.9	4528.5	5460.2						
% BW stom. cont.		0.40	0.24	0.16	0.20	0.21	0.22	0.19	0.25	0.25	0.23	0.23	0.25	0.26	0.46	0.37						
Silver hake																						
BW(g)	0.1	2.4	11.9	33.8	73.8	137.8	231.8	361.7	533.9	754.7												
% BW stom. cont.	82.50	1.03	0.88	1.10	0.61	0.40	0.62	2.01	1.93	4.25												
Pollock																						
BW(g)				60.4	126.4	228.0	372.6	567.5	819.8	1136.8	1525.6	1993.3	2546.9	3193.4	3939.8	4793.0	5759.9	6847.4	8062.4			
% BW stom. cont.				1.67	0.31	0.66	0.33	0.46	0.39	0.07	0.24	0.15	0.26	0.20	0.21	0.25	0.25	0.49	0.54			
Red hake																						
BW(g)	0.1	2.3	11.5	33.2	73.3	138.0	233.6	366.6	543.9													
% BW stom. cont.	8.31	1.35	0.77	0.53	0.34	0.45	0.42	0.78	1.36													
Spotted hake																						
BW(g)		3.2	15.8	45.5	100.4	188.9	319.6															
% BW stom. cont.		1.30	0.89	0.72	1.28	1.51	0.83															
White hake																						
BW(g)					78.4	150.1	257.7	409.4	613.7	879.5	1215.8	1631.9	2137.1	2741.3	3454.3	4286.1	5246.9					
% BW stom. cont.					0.48	0.87	1.58	0.74	1.54	0.97	0.80	1.21	1.08	1.39	1.49	1.02	0.10					
Ocean pout																						
BW(g)					48.8	95.6	167.3	270.0	410.6	595.8	832.9	1129.4	1493.0	1931.7	2453.7	3067.5						
% BW stom. cont.					0.10	0.77	0.04	0.45	0.37	0.27	0.61	0.55	0.45	0.89	0.86	0.81						
Scup																						
BW(g)		8.3	42.0	122.1	270.8	511.4																
% BW stom. cont.		0.52	0.31	0.19	0.09	0.06																
Butterfish																						
BW(g)	0.3	8.4	40.3	112.7	243.2																	
% BW stom. cont.	4.45	0.50	0.23	0.14	0.08																	
Redfish																						
BW(g)			3.19	86.5	182.0	329.8	540.9	826.5														
% BW stom. cont.			0.17	0.05	0.01	0.01	0.20	0.13														
Longhorn sculpin																						
BW(g)	0.2	4.8	22.3	61.8	132.2	242.6	402.2															
%BW stom. cont.	5.26	1.05	1.09	0.61	0.40	0.52	0.57															
Fourspot flounder																						
BW(g)				39.5	84.1	153.8	254.2															
% BW stom. cont.				0.34	0.22	0.24	0.31															
Witch flounder																						
BW(g)					50.7	103.5	187.7	312.5	488.1	725.3	1036.0	1432.4										
% BW stom. cont.					0.37	0.22	0.12	0.11	0.09	0.08	0.09	0.07										
American plaice																						
BW(g)		2.1	11.5	35.3	81.8	160.1	280.0	451.9	686.9	996.5												
% BW stom. cont.		0.19	0.27	0.18	0.21	0.17	0.23	0.21	0.17	0.47												
Yellowtail flounder																						
BW(g)	0.1	3.3	16.2	46.3	101.6	190.2	320.6	501.4	741.5													
% BW stom. cont.	0.95	0.64	0.45	0.22	0.23	0.13	0.12	0.11	0.13													