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PREY SPECTRA OF PLEURONECTIDS (HIPPOGLOSSOIDES PLATESSOIDES, PLEURONECTES FERRUGINEUS, PLEURONECTES AMERICANUS) FROM SABLE ISLAND BANK

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PREY SPECTRA OF PLEURONECTIDS (Hippoglossoides platessoides, Pleuronectes ferrugineus, Pleuronectes americanus) FROM SABLE ISLAND BANK

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF ILLUSTRATIONS

ABSTRACT

Martell, D.J. and G. McClelland. 1992. Prey spectra of pleuronectids (Hippoglossoides platessoides, Pleuronectes ferrugineus, Pleuronectes americanus) from Sable Island Bank. Can. Tech. Rep. Fish. Aquat. Sci. 1895: vi + 20p.

Diets were documented for Hippoglossoides platessoides, Pleuronectes ferrugineus, and Pleuronectes americanus collected from southwest Sable Island Bank in February and June 1989. Diets varied seasonally and with species and length of fish. Of 239 species of prey consumed by flatfishes, 66 were found in the stomachs of at least 5% of each fish species sampled, frequently enough to be considered principal prey. Crustaceans, especially amphipods, were the prey most frequently exploited by all three flatfish species. Small Hippoglossoides platessoides fed on suprabenthic fauna, while larger fish exploited epifauna and hyperiid suprafauna. Pleuronectes ferrugineus exploited epibenthic fauna, with crustaceans and tunicates being consumed by smaller and polychaetes by larger fish. Pleuronectes americanus also preyed upon epifauna, although the smaller individuals exploited polychaetes and larger fish, crustaceans associated with ectoproct colonies. Feeding intensity declined dramatically in winter, food being found in the stomachs of only 36% of H. platessoides and 49% of P. ferrugineus sampled in February; stomachs of all P. americanus collected in February were empty. In contrast, 86% of H. platessoides, 94% of P. ferrugineus, and 96% of P. americanus sampled in June had food in their stomachs.

RÉSUMÉ

Martell, D.J. et G. McClelland. 1992. Spectre de prioes pleuronectidés (Hippoglossoides platessoides, Pleuronectes ferrugineus, Pleuronectes americanus) du banc de l'Île de Sable. Can. Tech. Rep. Fish. Aquat. Sci. 1895: vi + 20p.

On a documenté le régime alimentaire d'Hippoglossoides platessoides, de Pleuronectes ferrugineus et de Pleuronectes americanus prélevés dans le sud-ouest du banc de l'Île de Sable en février et en juin 1989. Le régime a varié selon la saison et selon l'espèce et la longueur des poissons. Des 239 espèces de proies consommées par les poissons plats, 66 ont été retrouvées dans l'estomac d'au moins 5% de chacune des espèces échantillonnées, soit une fréquence suffisante pour qu'elles soient considérées comme des proies principales. Les crustacés, et surtout les amphipodes, étaient les proies les plus fréquemment exploitées par les trois espèces de poissons plats. Les Hippoglossoies platessoides de petite taille se nourrissaient de la faune suprabenthique, tandis que les poissons de plus grande taille exploitaient l'épifaune et la suprafaune des hyperiidés. Les Pleurnectes ferrugineus exploitaient la faune épibenthique, les représentants de plus petit taille consommant des crustacés et des tuniqués et les représentants de plus grande taille, des polychètes. Les Pleuronectes americanus s'alimentaient également au dépens de l'épifaune, cette fois les individus de petite taille exploitant les polychètes et les poissons de plus grande taille, des crustacés associés aux colonies d'ectoproctes. L'intensité de l'alimentation a diminué de façon très marquée en hiver, des aliments ayant été observé chez seulement 36% des H. platessoides et 49% des P. ferrugineus échantillonnés en février; tous les P. americanus échantillonnés en février avaient l'estomac vide. Par comparison, 86% des H. platessoides, 94% des P. ferrugineus et 96% des P. americanus échantillonnés en juin avaient de la nourriture dans l'estomac.

INTRODUCTION

As part of a larger study of larval sealworm (Pseudoterranova decipiens) transmission to demersal fish on Sable Island Bank, a comparative survey of the diets of three common flatfish species was undertaken to provide indirect, if not direct, evidence leading to the identification of important invertebrate precursor hosts of the parasite (McClelland et al. 1990). Flatfish (Pleuronectiformes) found off Canada's east coast are generally considered to be benthic invertebrate predators (Grosslein et al. 1980, Hacunda 1981, Langton and Bowman 1981, Scott and Scott 1988). Diet studies have indicated that, at a broad taxonomic level, several of the common species of flatfish found on Sable Island Bank exploit similar prey (Scott 1975a, 1975b, 1976). This report presents the complete spectra of prey consumed by American plaice, yellowtail flounder, and winter flounder from southwestern Sable Island Bank. Statistical analyses of variations in abundances of principal prey in flatfish diets and identifications of invertebrate hosts of P. decipiens among flatfish prey are found in a thesis (Martell 1992) and will be dealt with in the future in primary literature.

MATERIALS AND METHODS

Samples of three species of flatfish, American plaice (Hippoglossoides platessoides), yellowtail flounder (Pleuronectes ferrugineus), and winter flounder (Pleuronectes americanus), were collected from a 1,870 square kilometre (km^2) area on Sable Island Bank (Fig. 1). Fish were taken from a series of replicated sets using a Western IIA otter trawl with a fine-mesh (1 cm) codend liner during Department of Fisheries and Oceans research cruises, on the "Alfred Needler", February 10-18, 1989 and on the "Lady Hammond", June 5-15, 1989. All tows were 30 minutes in duration and made at a speed of 6.5 kilometres per hour.

Fish were chosen randomly from each tow and were stratified into seven 5 cm length groups (i.e., ≤15, 16-20, 21-25, 26-30, 31-35, 36-40, ≥41 cm) each containing a maximum of 30 fish (McClelland et al. 1983). Total length (TL) and sex of each fish were recorded and, after the stomach was removed, the body was tagged and frozen. The stomach was then placed in a 70% ethanol solution, and labeled with the tag number. Fish ≤15 cm TL were measured, sexed, tagged, and preserved whole in 70% ethanol with an incision in the abdominal wall to expose the viscera. On return to the laboratory, the contents of each stomach were removed, sorted, identified to species, when possible, and counted. Prey were identified using the following keys: Smith 1964, Barnard 1969, Shultz 1969, Gosner 1971, Bousfield 1973, Bowman 1973, Barnes 1974, Jones 1976, Lincoln 1979, Appy et al. 1980, Holdich and Jones 1983, Schneppenheim and Weigmann-Haass 1986, Scott and Scott 1988, Squires 1990.

For each flatfish species, prey occurrences were determined for only those fish with food in their stomachs. Prey species were stratified into <5%, 5-49%, and ≥50% levels of occurrence, with principal prey determined to have an occurrence of ≥5%.

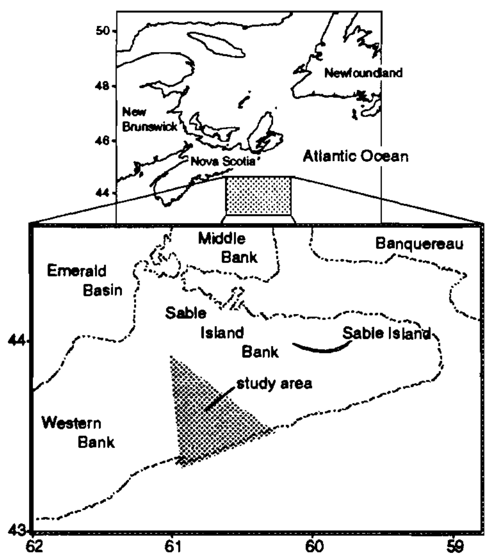

Fig. 1. Sampling area for flatfish diet study in February and June 1989.

RESULTS

A total of 801 flatfish were sampled, 387 in February and 414 in June 1989. Food was found in the stomachs of 147 (38%) of the fish collected in winter and in the stomachs of 379 (92%) of those sampled in summer (Table 1). Of

239 prey species, 66 consumed by ≥5% of each of those flatfish species that had food in their stomachs, were considered principal prey (Table 2).

Of 337 American plaice (Hippoglossoides platessoides) sampled, 183 specimens were taken in February and 154 in June. Although 100 species of prey were consumed by American plaice (52% crustaceans and 29% polychaetes), only 18 qualified as principal prey (Table 2). The most frequently exploited crustaceans were cumaceans, hyperiid and gammaridean amphipods, mysids, and pagurids (Tables 3 & 4). Anthozoans, molluscs, and echinoderms were also common prey. Food was absent in stomachs of 118 (64% of 183) of the plaice sampled in February while only 22 (14%) of those taken in June were empty (Table 1). During winter there was also a decrease in both diversity and quantity of prey consumed.

Yellowtail flounder (Pleuronectes ferrugineus) collected included 169 and 141 specimens from February and June respectively, for a total of 310. Of 239 species of prey consumed by the three flatfish species, 184 were exploited by yellowtail (Table 2). Yellowtail fed primarily upon polychaetes (83 species including phyllodocids, polynoids, spionids, orbiniids, cirratulids, and ampharetids), crustaceans (68 species with cumaceans and gammaridean amphipods predominant), and one species of tunicate (Tables 3 & 4). Overall, 43 (23%) species were principal prey and 3 (2%) species had been consumed by ≥50% of the yellowtail that had food in their stomachs. Stomachs of 85 (51%) of the yellowtail flounder collected in February were empty while prey were absent in stomachs of only 8 (6%) of those taken in June (Table 1). Similar to plaice, yellowtail consumed fewer species and lesser quantities of prey in February than in June.

Winter flounder (Pleuronectes americanus) specimens numbered 177, 47 collected in February and 130 in June. Of 140 species of prey exploited by winter flounder (Table 2), 67 (48%) were polychaetes, such as phyllodocids, spionids, and terebellids and 52 (37%) were crustaceans, including cumaceans and gammaridean and caprellid amphipods, and one, a species of tunicate (Tables 3 & 4). Forty species (29%) were principal prey but only one species of prey occurred in ≥50% of stomachs that contained food. Stomachs of all fish sampled in February were empty, although food was present in the intestines of some specimens. In contrast, 116 (96%) of the fish collected in June had food in their stomachs (Table 1).

DISCUSSION

In the present study a wide variety of prey was consumed by American plaice (Hippoglossoides platessoides), yellowtail flounder (Pleuronectes ferrugineus), and winter flounder (Pleuronectes americanus). Although the diets of these fish appeared to be superficially similar, closer inspection revealed differences in prey selection and, by inference, feeding behavior. In this study flatfish diets often consisted of polychaetes and crustaceans, with crustaceans, especially amphipods, being the most common principal prey (Tables 3 & 4). Crustaceans consumed included 19 species of amphipods, 17 of which were gammarideans. Coull and Bell (1983) report that sandy bottom invertebrate communities are dominated by crustaceans and that amphipods make up the majority of the macrofauna. Wildish et al. (1989), however, reported that polychaete species outnumbered crustacean species by 2.5 fold in grab samples of similar substrate (Sable Island sand and gravel) from Brown's Bank. Other diet studies have also revealed that crustaceans, particularly amphipods, were major components of flatfish diets (Powles 1965, Minet 1973, Hacunda 1981, Langton and Bowman 1981, Wakabara et al.1982, Langton 1983, Hahm and Langton 1984, Worobec 1984, Macdonald and Green 1986) and were also prominent in the diets of other demersal fish species (Tyler 1972, Kislalioglu and Gibson 1977, Grosslein et al. 1980, Hacunda 1981, Gibson and Ezzi 1987).

The most obvious variation in the diets of the three flatfish species from Sable Island Bank in the present study was the seasonal disparity in feeding intensity (Table 1). Similar declines in feeding intensity have been reported in studies of American plaice in the Gulf of St. Lawrence (Powles 1965), St. Margarets Bay, N.S. (MacKinnon 1972), St.

Pierre Bank (Minet 1973), the Grand Banks (Pitt 1973), and the Bay of Fundy (Macdonald and Green 1986). They have also been documented for yellowtail flounder off Cape Ann (Libey and Cole 1979), northeastern North American offshore (Langton 1983), Georges Bank (Collie 1987). Winter flounder in Long Pond, Conception Bay, Newfoundland (Kennedy and Steele 1971), St. Margarets Bay (Levings 1974), Gulf of Maine (Hacunda 1981), Passamaquoddy Bay (McLeese and Moon 1989), and various demersal marine fish species from the North Atlantic (Dawson and Grimm 1980, Hacunda 1981, Macdonald and Green 1986) also consume less food during winter. The decline in feeding intensity in February may have coincided with a reduction in the abundance of marine invertebrate fauna which typically occurs in northern benthic communities in winter as reported in studies of St. Margarets Bay, Nova Scotia (MacKinnon 1972), New England salt pond (Worobec 1984), and Long Island Sound (Biernbaum 1979). Wildish et al. (1989), however, reported that a seasonal decline in total benthic production did not occur on Brown's Bank, an area with sediments identical to those found on Sable Island Bank (i.e., Sable Island sand and gravel) (King 1970, Fader et al.1977). The apparent lack of such a decline in Wildish et al. (1989), however, may have been attributable to high sample variances.

The reduction in numbers and variety of invertebrates in winter diets of both plaice and yellowtail may have been indicative of a decline in availability of benthic fauna, as fish diets are reported to reflect the habitats that they exploit for food (McEachran et al. 1976, Ringler 1979, Stoner 1979, Macdonald and Green 1986, Delbeek and Williams 1988). However, prey availability for a predator is not only a function of the presence or absence of prey but also of prey size, behavior, and density within an exploited habitat (Moore and Moore 1976, Ringler 1979). All of these criteria act together to determine how a predator will select its food resources (Moore and Moore 1976). If, within a fishes' habitat, some available prey are too small or too large, inactive, or sparsely distributed, changes in diet may occur (Moore and Moore 1976, Ringler 1979). Such variations may also result from a change in prey habitats exploited by the fish (Jones 1952, Langton 1983, Macdonald and Green 1986, Collie 1987) although, in the present study, fish were collected, over identical habitats (King 1970).

Principal prey, which Hacunda (1981) defined as a primary food resource exploited by a fish, included 64 invertebrate and 2 chordate taxa in the present study. As other authors (Tyler 1972, Macdonald and Green 1983) have found, only a few of the prey species in each fish species' diet were principal prey. In the present study, American plaice consumed 18 species of principal prey, while yellowtail flounder and winter flounder exploited 43 and 41principal prey species, respectively. Plaice appeared to specialize upon crustaceans while the other two flatfish species had diets more typical of generalists (Schoener 1971, Crow 1978).

Prey were assigned to three functional classifications or guilds, infauna, epifauna, and suprabenthic fauna (Martell 1992). These categories were established according to the habitat requirements, feeding patterns, and activity levels of prey species (Barnes 1969, Bousfield 1973, Biernbaum 1979, Fauchald and Jumars 1979, Sainte-Marie and Brunel 1985, Wildish et al. 1992). The infaunal guild, composed of prey found free or living in tubes in the sediment or, at times venturing above the sediment to feed, may be deposit- (eg. the polychaete Aricidea suecica) or filter-feeders (eg. the amphipod Ampelisca macrocephala). Epifauna, live and feed at the sediment surface and may be found in tubes attached to a substrate (eg. the amphipod Ischyroceros anguipes), clinging to a substrate (eg. the caprellid Aeginina longicornis), or moving freely about the sediment surface (eg. the brittle star Amphipholis squamata). Some epifauna (eg. the sea anemone Actinauge longicornis, ectoprocts) are sedentary, attaching themselves to a substrate. Suprabenthic fauna (eg. cumaceans, hyperiid amphipods, and mysids), maintain a requisite association with the benthos, but also undertake vertical migrations of varying magnitudes (Sainte-Marie and Brunel 1985, Wildish et al. 1992).

Trophic classifications of polychaetes and amphipods according to their habitat requirements and feeding have been well documented. Fauchald and Jumars (1979) grouped polychaete taxa into several guilds, which may be further categorized into four basic types, the mobile carnivores (eg. Nephtys sp.), the burrowers (eg. Ophelina acuminata), the surface deposit-feeders (eg. Ampharete sp.), and the filter-feeders (eg. Exogone hebes) (Martell 1992). Information describing basic lifestyles and habitat requirements of gammaridean amphipods (Bousfield 1973, Biernbaum 1979) and criteria established by other investigators (Sainte-Marie and Brunel 1985, Wildish et al.1992, Mills pers. comm.) were used here to create the free-swimming (eg. Stenopleustes inermis), burrowing (eg. Monoculodes edwardsi), nestling (Biernbaum 1979) (eg. Photis sp.), and tubaceous (infaunal and epifaunal) (eg. Erichthonius rubricornis) amphipod guilds (Martell 1992).

Diets of plaice, herein, showed variation with fish length only during summer, but trends in prey guild exploitation were apparent from the diets of February and June specimens. The diets of the smallest fish (<21 cm TL) were composed of suprabenthic (eg. mysids) and epibenthic crustaceans (eg. tubaceous amphipods) and, but for the inclusion of hyperiid amphipods during summer (Tables 3 & 4), were similar to those of small plaice from the southern Gulf of St. Lawrence (Powles 1965). Suprafauna, with the addition of hyperiid amphipods during summer, were again prominent in the diets of fish 21-30 cm TL, although mysid exploitation declined for larger fish of this length stratum. In winter, large fish (≥31 cm TL) usually consumed epibenthic prey of a sedentary (eg. Actinauge longicornis) or slow-moving (eg. Pagurus sp.) nature but, like the smaller fish, frequently preyed upon suprafauna, such as hyperiids, during summer. Plaice appear to progress through two feeding stanzas, exploiting suprafauna when small and larger epifauna as they matured.

In the present study, small yellowtail flounder (≤30 cm TL) consumed epifauna, consisting primarily of cumaceans and some amphipods during both winter and summer (Tables 3 & 4). In winter, tubaceous amphipods, such as corophids and aorids, were common prey, although consumption of most of these crustaceans declined in larger fish. Increased fish length was accompanied by greater exploitation of epifauna (echinoderms), infauna (polychaetes and amphipods). Libey and Cole (1979) also found that cumaceans were a major component of yellowtail flounder diets, but they failed to document variations in prey consumption with fish length. Despite being included among suprabenthic fauna, cumaceans are filter-feeders that often inhabit the top layer of sediment (Barnes 1974, Jones 1976). Amphipods (Langton 1983) and, specifically, tubaceous forms (eg. Unciola irrorata) (Collie 1987) are often identified as common prey of small yellowtail flounder. Hacunda (1981) reported that yellowtail foraged at the sediment surface, consuming epifauna and available infauna (usually polychaetes) and, perhaps as Libey and Cole (1979) suggest, ingesting the upper sediment layers to find food. Collie (1987) also related that yellowtail often consumed portions of epifaunal prey such as the tentacles of polychaetes which were exposed at the sediment surface.

Large yellowtail consume suprabenthic fauna, such as Mysis mixta and Crangon septemspinosa (Hacunda 1981, Langton 1983, Collie 1987). In the present study, large yellowtail exploited cumaceans and mysids in winter, but, in summer, they fed mainly on infaunal polychaetes, particularly surface deposit-feeders (eg. Spiophanes bombyx) (also found by Hacunda 1981), and burrowers (eg. Ophelina acuminata) and also exploited epifaunal polychaetes (eg. Phyllodoce sp.), tunicates (Molgula sp.), and tubaceous amphipods. Yellowtail of Sable Island Bank seemed to progress through two feeding stanzas, exploiting small epifauna or infauna when small and larger infauna (polychaetes and tubaceous amphipods) as they matured.

Winter flounder, in the present study, primarily exploited epifauna, including cumaceans which, as Kennedy and Steele (1971) pointed out, were probably epi- or infaunal when consumed. Small surface deposit-feeding polychaetes (eg. Ampharete lindstroemi) and nestling (eg. Metopa bruzelli) and free-swimming amphipods (eg. Pontogeneia inermis) were also ingested but were replaced by tubaceous amphipods in the diets of larger fish (Tables 3 & 4). As Worobec (1984) also observed, epifauna ingested by larger fish were probably consumed incidentally with tunicates.

Polychaetes consumed by large winter flounder in this study and in a Gulf of Maine study (Hacunda 1981), were mobile epifaunal carnivores, such as Phyllodoce sp. This group of winter flounder consumed greater quantities of ectoprocts and associated tubaceous amphipods (Erichthonius rubricornis and Ischyroceros anguipes) and clinging caprellids (Aeginina longicornis). Kennedy and Steele (1971) attributed similar ingestion of hydrozoans and algae as incidental to the consumption of sought-after clinging and encrusting fauna including amphipods living in constructed tubes firmly attached to ectoproct stalks.

Generally, feeding stanzas of winter flounder of Sable Island Bank changed from exploitation of small, exposed infauna and epifauna by younger fish to consumption of larger epifauna by mature fish. Moreover, the forage of winter flounder changed from the sediment surface to ectoproct colonies as the fish grew. Olla et al.. (1969) and Keats (1990) both describe P. americanus as a visual predator that characteristically feeds during daylight hours.

There is a tendency for fish to become discriminant feeders and, because of structural or behavioral differences among species, segregate food resources efficiently (Tyler 1972, McEachran et al. 1976, Ringler 1979, Wakabara et al. 1982). At broad taxonomic levels (Table 2), the three flatfish species, herein, appeared to feed upon similar prey, but as other diet studies of these or related fish species have shown, little or no overlap exists with respect to principal prey consumption (Skalkin 1959, Tyler 1972, Kislalioglu and Gibson 1977, Hacunda 1981, Wakabara et al. 1982, Martell 1992).

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Table 1. Sample sizes of flatfish collections. Numbers of American plaice (*Hippoglossoides platessoides*), yellowtail flounder (*Pleuronectes ferrugineus*) and winter flounder (*Pleuronectes americanus*) stomachs which contained food (N_f) and total number of stomachs (N_t) collected from Sable Island Bank in February and June 1989.

Length groups (cm)	February						June					
	American plaice		yellowtail flounder		winter flounder		American plaice		yellowtail flounder		winter flounder	
	N_f	N_t	N_f	N_t	N_f	N_t	N_f	N_t	N_f	N_t	N_f	N_t
≤15	4	20	19	23	0	0	10	12	0	0	0	0
16-20	15	33	16	24	0	0	23	23	14	16	3	4
21-25	11	33	14	32	0	9	30	31	30	30	30	30
26-30	9	37	13	31	0	14	27	31	30	31	30	30
31-35	16	32	12	30	0	8	24	30	30	32	27	29
36-40	7	18	7	24	0	4	15	23	27	30	22	24
≥41	3	10	1	3	0	2	3	4	0	0	4	4
Totals	65	183	82	167	0	37	132	154	131	139	116	121

Table 2. Frequency of occurrence of all prey species consumed by American plaice (*Hippoglossoides platessoides*), yellowtail flounder (*Pleuronectes ferrugineus*), and winter flounder (*Pleuronectes americanus*) from all length groups and both sampling seasons collected from Sable Island Bank during February and June 1989. Occurrences based on proportion of stomachs that contained food in which a prey species occurred. Levels are represented as <5% ('+'), 5-49% ('++'), and >49% ('+++').

Prey taxa	American plaice	yellowtail flounder	winter flounder
CNIDERIA			
Anthozoa			
Octocorallia			
Alcyonacea			
unk. sp.		+	+
Zoantharia			
Zoanthidea			
Epizoanthus incrustatus			+
Actiniaria			
Athenaria			
unk. sp.			+
Thenaria			
unk. sp.	+	+	+
Actinauge longicornis	++	+	++
RHYNCHOCOELA			
unk. sp.		+	+
TARDIGRADA			
Heterotardigrada			
unk. sp.		+	
ECTOPROCTA			
unk. spp.	+	+	++
MOLLUSCA			
Gastropoda			
unk. sp. (foot)	+	+	+
Prosobranchia			
Archaeogastropoda			
Margarites costalis	+	+	
Mesogastropoda			
Polinices sp.		+	+
Neogastropoda			
Buccinium undatum	+		
Neptunea sp.	+	+	
Opisthobranchia			
Cephalaspidea			
Retusa obtusa	+	+	++
Cylichna gouldii		+	
Bivalvia			
Arctica islandica	+	++	+
Prionodesmata			
Protobranchia			
Nucula delphinodata		+	
Yoldia sapotilla		+	+
Pteriomorphia			
Pteroconchida			
Musculus discors		+	+
Chlamys islandicus	+		
Anomia sp.	+		

Table 2. (cont'd)

Prey taxa	American plaice	yellowtail flounder	winter flounder
Teleodesmata			
Heterodontida			
Cerasotoderma pinnulatum	+		
Clinocardium ciliatum	+	+	+
Petricola pholadiformis	+	+	
Abra sp.		+	
Solen viridis		+	
Hiatella sp.		+	
Ctyodaria siliqua		+	
ANNELIDA			
Polychaeta			
Phyllodocida			
Phyllodocidae			
unk. sp.		+	+
Eteone flava			+
Eteone heteropoda		+	+
Eteone longa		+	++
Eteone trilineata		+	
Eteone sp.		+	++
Phyllodoce sp.		++	++
Phyllodoce maculata			+
Phyllodoce mucosa	+	+	++
Polynoidae			
unk. sp.	+	++	++
Enipo sp.			+
Harmothoe extenuata			+
Harmothoe imbricata			+
Harmothoe sp.	+	+	++
Hartmania sp.		+	+
Sigalionidae			
Leanira (nr) *hystrices*		+	
Leanira sp.		+	
Neoleanira sp.		+	
Pholoe minuta		+	+
Glyceridae			
unk. sp.		+	
Glycera capitata		+	+
Goniadidae			
Gonaida maculata		++	+
Gonaida sp.		+	+
Nephtyidae			
Aglaophamus malmgreni	+	+	
Nephtys bucera		+	
Nephtys caeca			+
Nephtys neotena	+	+	+
Nephtys sp.	++	++	++
Syllidae			
unk. sp.		+	+
Autolytus sp.		+	+
Brania sp.		+	+
Exogone hebes	+	++	+
Streptosyllis arenae		+	

Table 2. (cont'd)

Prey taxa	American plaice	yellowtail flounder	winter flounder
Nereidae			
Nereis pelagica			+
Nereis zonata		+	
Capitellida			
Scalibregmidae			
Scalibregma sp.		+	
Maldanidae			
unk. sp.	+	++	++
Euclymene zonalis		+	+
Euclymene sp.		+	+
Meldanopsis elongata		+	
Nichomache lumbricalis		+	+
Petaloproctus sp.			+
Praxillella patermissa		+	
Praxillella sp.		+	+
Praxillura sp.	+	+	+
Opheliidae			
Ophelia bicornis		+	
Ophelia limacina	+	+	+
Ophelia sp.		+	
Ophelina acuminata	+	++	+
O. cylindricaudata			+
Ophelina sp.		+	
Travisia forbesi			+
Travisia sp.		+	
Spionida			
Spionidae			
unk. sp.	+	++	++
Polydora sp.	+	++	++
Prionospio steenstrupi		+	+
Prionospio sp.		+	+
Scolelepis squamata		+	
Spio sp.		+	+
Spiophanes bombyx		++	+
Paraonidae			
unk. sp.			+
Aricidea suecica	+	++	
Aricidea wassi		+	
Aricidea sp.	+	+	+
Paraonis sp.		+	
Eunicida			
Onuphidae			
Onuphis conchylega	+		
Lumbrinereidae			
Lumbriclymene sp.		+	
Lumbrineris acuta		+	
Dorvilleidae			
unk. sp.		+	
Ariciida			
Orbiniidae			
Scoloplos armiger		++	

Table 2. (cont'd)

Prey taxa	American plaice	yellowtail flounder	winter flounder
Cirratulida			
Cirratulidae			
unk. sp.	+	+	+
Cirratulus cirratus		+	++
Chaetozone setosa		++	+
Chaetozone sp.			+
Tharyx sp.		+	+
Oweniida			
Oweniidae			
Owenia fusiformis		+	+
Terebellida			
Pectinaridae			
Pectinaria granulata	+	++	++
Ampharetidae			
unk. sp.	+	+	+
Ampharete sp.	+	++	++
Ampharete acutifrons		+	
Ampharete baltica		+	
Ampharete lindstroemi	+	++	++
Asabellides sp.		+	
Sabellides (nr) *borealis*	+	+	+
Sabellides sp.			+
Samytha sexcirrata		+	
Terebellidae			
unk. sp.	+		++
Neoamphitrite sp.			+
Polycirrus eximius		+	
Thelepus cincinnatus			+
Trichobranchus glacialis	+		
Flabelligerida			
Flabelligeridae			
Brada villosa			+
Pherusa affinis	+	+	
Perusa plumosa		+	+
Sabellida			
Sabellidae			
unk. sp.		+	+
Chone duneri		+	
Chone sp.	+	+	+
Euchone incolor	+	++	+
Euchone sp.	+	+	
Potamilla reniformis	+	+	++
Potamilla sp.			+
Serpulidae			
Spirorbis sp.		+	
Oligochaeta			
unk. sp. (marine)		+	
SIPUNCULIDA			
unk. sp.		+	+

Table 2. (cont'd)

Prey taxa	American plaice	yellowtail flounder	winter flounder
ARTHROPODA			
Crustacea			
Copepoda			
unk. parasitic sp.	+		
Calanoida			
unk. sp.	++	+	+
Cyclopoida			
unk. sp.	+		+
Harpacticoida			
unk. sp.		+	+
Brachyura			
Cancridea			
Cancridae			
Cancer borealis		+	+
Malacostraca			
Peracarida			
Cumacea			
Bodotriidae			
Leptocuma minor	+	+++	++
Leuconidae			
Eudorellopsis deformis	+	++	
Lampropidae			
Lamprops quadrireplicata	+	++	++
Diastylidae			
Diastylis sculpta	+	+	+
Diastylis quadrispinosa	++	++	++
Pseudocumidae			
Petalosarsia declivis	+	+	
Tanaidacea			
Paratanaidae			
Leptognathia breviremis		++	+
Leptognathia caeca		+	
Isopoda			
Cryptoniscidae			
unk. sp.		+	+
Flabellifera			
Limnoridae			
Limnoria lignorum		+	
Valvifera			
Idoteidae			
Chiridotea sp.	++	++	
Idotea phosporea	+	+	
Edotea montosa	+	+	++
Asellota			
Janiridae			
Janira alta	+		
Amphipoda			
Hyperiidea			
Hyperiidae			
Themisto compressa	++	+	
Gammaridea			
Ampeliscidae			
Ampelisca macrocephala	+	++	++

Table 2. (cont'd)

Prey taxa	American plaice	yellowtail flounder	winter flounder
Ampithoidae			
Ampithoe rubricata		+	
Ampithoe valida		+	
Ampithoe sp.		+	
Aoridae			
Unciola irrorata	++	++	++
Argissidae			
Argissa hamatipes	+	+	++
Corophiidae			
Corophium bonelli	+		
Corophium crassicorne	++	++	++
Corophium volutator		+	
Erichthonius rubricornis	++	++	++
Erichthonius braziliensis			+
Eusiridae			
Rhachotropis lobata	+	+	
Rhachotropis oculata	+		
Gammaridae			
Elasmopus laevis		+	
Elasmopus pocillimanus		+	
Gammarus sp.		+	
Melita dentata		+	
Haustoriidae			
Amphiporeia lawrenciana		+	
Priscillina armata	+	++	+
Bathyporeia quoddyensis		++	
Ischyroceridae			
Ischyroceros anguipes	++	++	++
Leucothoidae			
Leucothoe spinicarpa			+
Lysianassidae			
Anonyx lilljeborgii	+	+	
Anonyx sarsi		+	
Hippomedon serratus	+	+	+
Orchomenella minuta		+	
Orchomenella pinguis		+	+
Tryphosella sp.		+	
Oedicerotidae			
Monoculodes edwardsi	++	++	++
Monoculodes intermedius	+	++	+
Photidae			
Leptocheirus pinguis	+	++	++
Leptocheirus plumosus		+	+
Podoceropsis nitida		+	+
Photis sp.	++	+++	++
Protomedeia fasciata	+	+	++
Phoxocephalidae			
Phoxocephalus holbolli		+	
Paraphoxus spinosus			+
Harpinia propinqua		+	
Pleustidae			
Pleustes panopla	+		+
Pleusymtes glaber	+		+
Stenopleustes gracilis			+

Table 2. (cont'd)

Prey taxa	American plaice	yellowtail flounder	winter flounder
Pleustidae (cont'd)			
Stenopleustes inermis	+	+	++
Podoceridae			
Dyopedos sp.	+	++	++
Pontogeneiidae			
Pontogeneia inermis	+	++	++
Stenothoidae			
Metopa alderi	+	+	+
Metopa borealis		+	+
Metopa bruzelii	+	++	++
Metopa propinqua		+	+
Metopa pusilla	+	+	+
Metopella augusta	+	+	+
Metopelloides sp.		+	
Parametopella cypris		+	+
Stenothoe brevicornis var. *canadensis*	+		+
Stenothoe gallensis			+
Stenothoe minuta			+
Caprellidea			
Caprellidae			
Aeginina longicornis	++		++
Mysidacea			
Mysida			
Erythrops erythropthalma	++	+	+
Mysis mixta	++	+	
Neomysis americana	+		
Decapoda			
Caridea			
Hippolytidae			
Spirontocaris lilljeborgii	+		
Pandalidae			
Dichelopandalus leptocerus	+	+	
Pandalus borealis	+	+	
Crangonidae			
Crangon septemspinosa	++	+	+
Paguroidea			
Paguridae			
unk. sp. (glaucothoe)	+		+
unk. sp. (late stage larva)	+	+	
Pagurus sp.	++	+	++
ECHINODERMATA			
Holothuroidea			
unk. sp.		+	
Dendrochirotida			
Cucumariidae unk. sp.			+
Molpadiida unk. sp.		+	+
Echinoidea			
Echinoida			
Strongylocentrotus droebachiensis	+	++	+
Echinarachnius parma	+	++	+

Table 2. (cont'd)

Prey taxa	American plaice	yellowtail flounder	winter flounder
Clypeasteroida			
Echinarachnius parma	+	++	+
Stellaroidea			
Ophiuroidea			
Ophiura sarsi		+	
Amphipholis squamata	++	++	+
CHORDATA			
Ascidiacea			
Pleurogona			
Molgula sp.	+	+++	+++
Osteichthyes			
Perciformes			
Stichaeidae			
unk. sp.		+	
Ammodytidae			
Ammodytes sp.	+	++	+

Table 3. Occurrence (O) of general prey taxa consumed by *Hippoglossoides platessoides* (Hp), and *Pleuronectes ferrugineus* (Pf) collected from Sable Island Bank in February 1989. Within each length group, occurrence is calculated as the proportion (percent) of stomachs that contain food in which a prey taxa was found.

	Predator length groups (cm)													
	≤15		16-20		21-25		26-30		31-35		36-40		≥41	
Prey group	Hp	Pf	Hp	Pf	Hp	Pf	Hp	Pf	Hp	Pf	Hp	Pf	Hp	Pf
Anthozoa	0	0	0	0	18	0	22	0	38	8	0	0	33	0
Ectoprocta	0	0	0	6	0	0	0	8	0	0	0	14	0	0
Mollusca														
Gastropoda	0	0	0	0	0	7	33	15	0	0	0	0	0	100
Bivalva	0	0	0	6	9	14	11	0	13	17	0	0	67	0
Polychaeta														
Phyllodocida	0	42	0	25	9	14	11	39	0	58	0	57	0	0
Capitellida	0	0	0	13	0	14	0	15	0	0	0	29	0	0
Spionida	0	21	0	6	0	7	0	23	0	42	0	43	0	0
Eunicida	0	0	0	0	0	0	0	0	6	0	0	0	0	0
Ariciida	0	0	0	0	0	7	0	0	0	8	0	0	0	0
Cirratulida	0	5	0	6	0	14	0	23	0	17	0	29	0	0
Oweniida	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Terebellida	0	37	7	25	0	14	11	46	13	25	0	0	0	0
Flabelligerida	0	0	0	0	0	0	0	31	6	8	0	0	0	0
Sabellida	0	5	0	6	0	0	0	8	6	0	0	0	0	0
Crustacea														
Copepoda	25	11	0	0	0	0	11	8	13	0	0	14	0	0
Brachyura	0	0	0	0	0	7	0	0	0	8	0	0	0	0
Cumacea	0	84	0	56	9	57	0	85	0	92	0	57	0	0
Tanaidacea	0	32	0	6	0	0	0	0	0	8	0	0	0	0
Isopoda	0	11	0	6	0	21	0	31	0	0	14	0	0	0
Amphipoda														
Hyperiidea	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gammaridea	75	95	33	88	55	93	44	92	50	100	0	100	0	0
Caprellidea	0	0	0	0	0	7	0	0	6	8	14	0	0	0
Mysidacea	75	0	73	0	91	0	11	0	31	0	14	43	0	0
Caridea	0	0	0	0	18	7	11	0	25	0	43	14	0	0
Paguroidea	0	0	0	0	0	0	22	0	13	0	0	0	33	0
Echinodermata														
Holothuroidea	0	0	0	0	0	0	0	8	0	0	0	0	0	0
Echinoidea	0	0	0	6	0	21	0	69	13	58	43	0	0	0
Stellaroidea	0	0	0	0	0	7	11	0	13	0	0	14	0	0
Chordata														
Ascidacea	0	0	0	6	0	7	11	15	0	0	0	0	33	0
Osteichthyes	0	5	0	0	0	0	0	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0	0	0	8	0	14	0	0

Table 4. Occurrence (O) of general prey taxa consumed by *Hippoglossoides platessoides* (Hp), *Pleuronectes ferrugineus* (Pf), and *Pleuronectes americanus* (Pa) collected from Sable Island Bank in June 1989. Within each length group, occurrence is calculated as the proportion (percent) of stomachs that contain food in which a prey taxa was found.

Prey group	Predator length groups (cm)											
	≤15			16-20			21-25			26-30		
	Hp	Pf	Pa	Hp	Pf	Pa	Hp	Pf	Pa	Hp	Pf	Pa
Anthozoa	0	—	—	0	0	0	0	3	10	11	0	37
Ectoprocta	0	—	—	0	0	0	0	0	7	0	0	17
Mollusca												
Gastropoda	0	—	—	0	14	0	13	7	53	15	14	33
Bivalva	0	—	—	0	7	33	10	17	31	7	3	0
Polychaeta												
Phyllodocida	10	—	—	13	43	0	30	47	40	19	72	50
Capitellida	0	—	—	4	21	0	7	13	27	0	35	33
Spionida	0	—	—	0	29	0	13	33	20	7	35	20
Eunicida	0	—	—	0	7	0	0	7	0	0	0	0
Ariciida	0	—	—	0	0	0	0	3	0	0	0	0
Cirratulida	0	—	—	0	14	0	0	33	7	0	59	20
Oweniida	0	—	—	0	0	0	0	0	0	0	0	3
Terebellida	0	—	—	0	64	100	3	67	73	11	76	63
Flabelligerida	0	—	—	0	0	0	0	0	0	0	0	6
Sabellida	0	—	—	0	0	0	3	3	0	11	3	16
Crustacea												
Copepoda	0	—	—	0	0	0	13	3	3	7	3	7
Brachyura	0	—	—	0	0	0	0	0	0	0	0	7
Cumacea	90	—	—	78	86	100	73	90	83	59	90	60
Tanaidacea	0	—	—	0	0	0	0	0	0	0	0	3
Isopoda	10	—	—	13	7	0	7	31	7	11	3	3
Amphipoda												
Hyperiidea	30	—	—	48	7	0	40	0	0	22	0	0
Gammaridea	80	—	—	70	86	100	77	83	93	74	79	90
Caprellidea	0	—	—	4	0	0	7	0	13	7	3	27
Mysidacea	30	—	—	26	0	0	30	0	3	30	7	0
Caridea	0	—	—	9	14	0	7	10	3	19	3	3
Paguroidea	0	—	—	4	7	0	0	0	7	4	0	7
Echinodermata												
Holothuroidea	0	—	—	0	7	0	0	0	0	0	0	3
Echinoidea	0	—	—	0	0	0	0	7	3	0	7	13
Stellaroidea	0	—	—	39	0	0	63	3	0	30	0	0
Chordata												
Ascidacea	0	—	—	0	79	100	7	100	83	11	100	57
Osteichthyes	0	—	—	0	7	0	0	17	3	4	14	3
Other	0	—	—	0	7	0	0	7	0	0	31	0

Table 4. (cont'd)

Prey group	Predator length groups (cm)								
	31-35			36-40			≥41		
	Hp	Pf	Pa	Hp	Pf	Pa	Hp	Pf	Pa
Anthozoa	0	0	30	7	7	27	0	—	25
Ectoprocta	4	0	44	7	0	59	0	—	75
Mollusca									
Gastropoda	13	10	4	13	15	14	0	—	0
Bivalva	13	7	11	7	30	0	0	—	0
Polychaeta									
Phyllodocida	4	59	52	7	93	55	0	—	25
Capitellida	0	38	15	0	63	36	0	—	25
Spionida	4	55	30	0	89	27	0	—	25
Eunicida	0	3	0	0	4	0	0	—	0
Ariciida	0	3	0	0	33	0	0	—	0
Cirratulida	0	59	19	0	52	23	0	—	0
Oweniida	0	0	0	0	15	0	0	—	0
Terebellida	4	72	56	7	48	68	0	—	100
Flabelligerida	0	0	7	0	0	0	0	—	0
Sabellida	0	3	33	0	56	18	0	—	0
Crustacea									
Copepoda	8	0	0	13	0	5	0	—	0
Brachyura	0	0	4	0	0	0	0	—	0
Cumacea	50	69	33	47	93	59	0	—	50
Tanaidacea	0	10	0	0	4	0	0	—	0
Isopoda	21	10	11	27	22	5	0	—	0
Amphipoda									
Hyperiidea	46	0	0	87	30	0	67	—	0
Gammaridea	58	86	67	40	93	82	33	—	100
Caprellidea	13	0	37	20	15	64	0	—	100
Mysidacea	13	3	0	13	4	0	0	—	0
Caridea	29	3	7	13	4	0	33	—	0
Paguroidea	13	0	15	33	7	5	100	—	0
Echinodermata									
Holothuroidea	0	0	0	0	4	5	0	—	0
Echinoidea	4	17	4	7	37	5	33	—	0
Stellaroidea	42	0	0	7	52	5	0	—	0
Chordata									
Ascidacea	4	97	44	0	41	23	0	—	0
Osteichthyes	0	10	0	0	4	0	0	—	0
Other	0	14	4	0	22	9	0	—	25