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Stomach Contents of Atlantic Wolffish (*Anarhichas lupus*) from the Northwest Atlantic

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Abstract

Stomach contents of Atlantic wolffish from various areas of the Northwest Atlantic from West Greenland to the Scotian Shelf were examined by volume and occurrence. Invertebrates and fish constituted about 85% and 15% of the food respectively. The most important invertebrate groups in descending order were molluscs (especially whelks and scallops), echinoderms (mainly brittle stars and sea urchins) and crustaceans (particularly crabs). Redfish was the main fish component of the food. Molluscs increased and echinoderms usually decreased in importance as food with increasing size of wolffish.

Introduction

Notes on the food of Atlantic wolffish (*Anarhichas lupus*) in the Northwest Atlantic were recorded by Verrill (1871) and by Bigelow and Schroeder (1953). Because little information was then available on the feeding of this species, occasional observations on the stomach contents were made during 1946-66. More recently, Albikovskaya (1983) studied the food of three species of wolffishes in the Labrador-Newfoundland region, including the Atlantic wolffish. The observations on a relatively small number of Atlantic wolffish in this paper are intended to supplement the sparse amount of information available for this species in the Northwest Atlantic.

Materials and Methods

Stomach contents of 149 Atlantic wolffish from various regions of the Northwest Atlantic were examined (Table 1), most of the specimens being from offshore waters around Newfoundland. The wolffish were caught mainly with bottom otter trawls during the course of research vessel surveys and were examined when time permitted during investigations directed toward other species. The distribution of wolffish samples was generally the same as that shown in a meristic study of the same species by Templeman (1984), although substantially fewer of the specimens were examined for food.

TABLE 1. Numbers of Atlantic wolffish stomachs from various areas of the Northwest Atlantic examined by volume and occurrence of food items.

Area	NAFO Div.	Number with food: By volume (Table 2)	Number with food: Occurrence (Table 3)[a]	No. of stomachs examined
West Greenland	1B	1	1	1
Labrador	2H	—	—	4
East Newfoundland	3KL	5	22	46
Flemish Cap	3M	1	1	12
South Grand Bank	3NO	5	17	20
St. Pierre Bank	3Ps	17	30	47
Gulf of St. Lawrence	4R	—	2	13
Scotian Shelf	4VWX	3	3	6
Total		32	76	149

[a] Occurrence includes all stomachs analyzed by volume of contents.

Classification of the food components was limited in detail to species or groups which could be readily identified in the field without further investigation. Volumetric measurements of different food items in 32 stomachs were made by displacement of water in a graduated cylinder. Of the remaining 117 stomachs, 44 were examined qualitatively by noting the incidence of the different food items and 73 were empty. The wolffish were measured, to the nearest centimeter, as greatest total length with the mouth closed. The data were too scanty for analysis by the different areas.

Results and Discussion

The contents of Atlantic wolffish stomachs, which were analyzed quantitatively by volume (Table 2), consisted of bottom invertebrates (85%) and fish (15%). The principal invertebrate components were whelks (22%), brittle stars (16%), scallops (12%), hermit crabs (11%), other crabs (12%) and sea urchins (10%). The main fish component was redfish (12%).

From the qualitative analysis of 149 stomachs, 51% contained food (Table 3). Invertebrates were again dominant, with whelks (46%), sea urchins (30%), brittle stars (20%), hermit crabs (20%), other crabs (13%) and scallops (12%) being the dominant food types in terms of frequency of occurrence. Redfish were present in 9% of the stomachs.

TABLE 2. Quantitative analysis of the stomach contents of Atlantic wolffish from the Northwest Atlantic, as percent volume of various foods items in stomachs containing food.

			% composition by fish size (cm)			
Phylum	Taxon	Species, type, etc.	30–59	60–89	90–127	30–127
Cnidaria	Anthozoa	Sea anemones (Actiniaria)	—	0.3	—	0.2
Bryozoa	—	Branched type	—	0.1	—	0.1
Mollusca	Cephalopoda	Octopuses	—	2.8	—	1.5
	Gastropoda	Whelks	10.7	14.9	31.4	22.1
	Bivalvia	Clams	—	0.1	0.8	0.3
		Scallops (*Chlamys islandica*)	—	13.4	10.4	11.7
Annelida	Polychaeta	Tube worms	—	0.1	—	0.1
Arthropoda	Amphipoda	Unidentified	0.8	—	—	0.1
(Crustacea)	Decapoda	Hermit crabs (*Pagurus* sp.)	0.4	17.7	3.0	10.7
	(Anomura)	Stone crabs (*Lithodes maia*)	5.3	—	—	0.2
	Decapoda	Toad crabs (*Hyas coarctatus*)	—	2.4	—	1.3
	(Brachyura)	Spider crabs (unidentified)	1.0	0.4	—	0.3
		Unidentified crabs	1.8	—	23.1	10.3
Echinodermata	Asteroidea	Sea stars (*Ctenodiscus crispatus*)	9.9	0.9	—	0.8
	Ophiuroidea	Brittle stars	67.2	17.0	11.1	15.8
	Echinoidea	Sea urchins (*Strongylocentrotus*)	—	—	6.6	2.9
		Heart urchins	2.0	0.1	—	0.1
		Unidentified urchins	1.0	12.4	—	6.6
Chordata	Scorpaenidae	Redfish (*Sebastes* sp.)	—	14.9	9.4	12.0
(Pisces)	Heterosomata	American plaice (*Hippoglossoides*)	—	—	4.3	1.9
		Unidentified fish remnants	—	2.7	—	1.4
Total invertebrates (%)			100.0	82.4	86.4	84.7
Total fish (%)			—	17.6	13.6	15.3
Number of stomachs analyzed quantitatively for food items			6	17	9	32
Total volume of stomach contents (ml)			51	949	800	1800

TABLE 3. Qualitative analysis of the stomach contents of Atlantic wolffish from the Northwest Atlantic, as percent occurrence of various food items in stomachs containing food. (This analysis includes 32 specimens used for Table 2.)

			% composition by fish size (cm)			
Phylum	Taxon	Species, type, etc.	30–59	60–89	90–127	30–127
Cnidaria	Anthozoa	Sea anemones (Actiniaria)	—	3.0	—	1.3
Bryozoa	—	Branched type	—	3.0	—	1.3
Mollusca	Cephalopoda	Squids	4.2	—	—	1.3
		Octopuses	—	3.0	—	1.3
	Gastropoda	Whelks	25.0	45.5	73.7	46.1
	Bivalvia	Clams (*Cyrtodaria siliqua*)	—	—	5.3	1.3
		Clams (unidentified)	4.2	3.0	10.5	5.3
		Scallops (*Chlamys islandica*)	—	12.1	15.8	9.2
		Scallops (unidentified shells)	—	3.0	5.3	2.6
	—	Unidentified molluscs	12.5	—	—	3.9
Annelida	Polychaeta	Tube worms	—	3.0	—	1.3
Arthropoda	Amphipoda	Unidentified	4.2	—	—	1.3
(Crustacea)	Decapoda	Hermit crabs (*Pagurus* sp.)	4.2	15.2	10.5	10.5
	(Anomura)	Hermit crabs (unidentified)	—	12.1	15.8	9.2
		Stone crabs (*Lithodes maia*)	4.2	—	—	1.3
	Decapoda	Toad crabs (*Hyas coarctatus*)	—	3.0	—	1.3
	(Brachyura)	Spider crabs (unidentified)	8.3	3.0	5.3	5.3
		Unidentified crabs	8.3	3.0	5.3	5.3
	—	Crustacean remnants	—	—	5.3	1.3
Echinodermata	Asteroidea	Sea stars (*Ctenodiscus crispatus*)	4.2	3.0	—	2.6
		Sea stars (unidentified)	8.3	9.1	—	6.6
	Ophiuroidea	Brittle stars	25.0	18.2	15.8	19.7
	Echinoidea	Sea urchins (*Strongylocentrotus*)	—	—	5.3	1.3
		Heart urchins	4.2	3.0	—	2.6
		Unidentified urchins	54.2	21.2	—	26.3
		Sand dollars	—	3.0	—	1.3
Chordata	Scorpaenidae	Redfish (*Sebastes* sp.)	4.2	15.2	5.3	9.2
(Pisces)	Heterosomata	American plaice (*Hippoglossoides*)	—	3.0	—	1.3
	—	Unidentified fish remnants	—	3.0	—	1.3
Total number of stomachs examined			57	67	25	149
Percent stomachs containing food			42	49	76	51

Sea urchins and whelk shells in the stomachs were often crushed and some whelks were noted without their shells. Molluscs, especially whelks and scallops, generally increased in frequency of occurrence and echinoderms usually decreased in importance with increasing size of fish (Table 3). Echinoderms predominated in the smallest size-group of wolffish (30–59 cm) and hard-shelled molluscs in the larger fish (90–127 cm). Nevertheless, Atlantic wolffish evidently feed on a great variety of marine organisms which are closely associated with the bottom.

In addition to the reports of Verrill (1871), Bigelow and Schroeder (1953) and Albikovskaya (1983) on the stomach contents of Atlantic wolffish from the Northwest Atlantic, the feeding habits of this species off Iceland was studied by Pálsson (1983) and notes on its food in various regions of the Northeast Atlantic were recorded by Smith (1889, 1890, 1891, 1892), Scott (1902, 1903), Barsukov (1959), Jónsson (1982) and others. The results of their studies, especially those of Albikovskaya (1983) and Pálsson (1983), indicated that the food consisted mainly of benthic invertebrates with only a small amount of fish. The invertebrate food consisted chiefly of echinoderms (especially ophiuroids), molluscs (particularly gastropods) and crustaceans (mainly hermit crabs and other crabs). The predominance of these varieties of food, and the species involved, depended on their abundance in the different areas inhabited by the wolffish. The results in this paper, mainly for the Newfoundland area, were generally similar to those of previous studies, with molluscs (especially gastropods) being predominant, followed by echinoderms (especially echinoids and ophiuroids) and decapod crustaceans. However, the importance of each group varied with size of wolffish.

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