Appendix G

Summary of Atlantic Tomcod Food Habits Study

APPENDIX G

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G.1 STUDY OBJECTIVE

The objective of the Atlantic tomcod food habits study was to examine the stomach contents of juvenile and adult Atlantic tomcod in order to detect differences in food habits throughout the Hudson River estuary and the possibility of cannibalism among Atlantic tomcod.

G.2 METHODS

A maximum of 100 juvenile and 25 adult Atlantic tomcod per river run were collected during the Fall Juvenile Survey. Up to 20 juvenile and 5 adult fish per river region (as defined below for the Atlantic tomcod food habits study) were preserved in 10 percent formalin and returned to the laboratory for analysis.

Atlantic Tomcod Food Habits River Regions

Region	River Miles	FJS Region Designations
21	0-23	BT, YK
22	24-38	TZ, CH
23	39-46	IP
24	47-76	WP, CW, PK
25	77-152	HP, KG, SG, CS, AL

In the laboratory, the entire stomach was removed from the fish and the contents carefully placed into a dissecting pan or petri dish. The contents were identified to family level for fish and to order for invertebrates, except for gammarid amphipods which were identified to family if possible. For each type of food item, a count and weight to the nearest hundredth gram were recorded on the laboratory data sheet. Other recorded information included sample number, region, and river run as well as fish length and life stage. Age, sex, and sexual condition were determined on Atlantic tomcod from river runs 9 through 11 only.

G.3 RESULTS

A total of 799 Atlantic tomcod stomachs, 759 juvenile fish and 40 adult fish, were analyzed in 2004 (Table G-1). Fish were captured from all of the 13 designated regions of the Hudson River estuary from July through December 2004, with 60 percent of the fish caught during the summer. Juvenile fish were collected mostly from the middle estuary regions between Indian Point and Hyde Park whereas adult fish were mainly collected in the lower and upper estuary regions. Of the Atlantic tomcod analyzed, 54 percent measured 90 mm or less and most of these were found in the middle estuary (Table G-2). Fish larger than 90 mm were found throughout all regions of the estuary.

The most abundant food item by weight found in juvenile Atlantic tomcod was gammarid amphipods (*Gammarus*), comprising 64 percent of the total weight of all food items found in this age group (Table G-3). The other food items that made up 83 percent of the juvenile Atlantic tomcod diet were sand shrimp (*Crangon*) and unidentified invertebrate remains. For adult Atlantic tomcod, *Gammarus* was also the most abundant food item by weight. The other food items that made up 82 percent of the adult Atlantic tomcod diet were grass shrimp species (*Palaemonetes* spp.), *Crangon*, polychaete worms (*Polychaeta*), and isopods (*Isopoda*). Several fish taxa were found in the stomachs of the analyzed Atlantic tomcod: Atlantic croaker (*Micropogonias undulatus*), tessellated darter (*Etheostoma olmstedi*), and a goby (Gobiidae). A complete listing of all food items by month and region is presented in Table G-4.

Consumption of the major food items were compared by month (Figure G-1, top graph), by region (Figure G-1, bottom graph), and by length (Figure G-2). *Gammarus* was the major food item throughout the summer and fall, but *Crangon* was consumed mainly in the summer and early fall while *Palaemonetes* was more predominant in the fall months. *Crangon* and *Palaemonetes* were the dominant food items in the lower estuary regions, but *Gammarus* dominated in regions from Croton-Haverstraw to the north. All but the largest Atlantic tomcod consumed more *Gammarus* than other food items. For Atlantic tomcod over 150 mm, *Palaemonetes* also comprised a large portion of the diet.

To ascertain whether fish size or location was more important in determining patterns in diet, a comparison of food items from the eight lower regions of the estuary investigated changes with region and length (Figure G-3). In the lower estuary (Battery through Tappan Zee regions), size may determine diet patterns with smaller fish consuming mainly *Crangon*, mid-range fish consuming a variety of organisms, and larger fish consuming mainly *Palaemonetes*. In the middle estuary (Croton-Haverstraw and above), location may determine food choice as evidenced by the consumption of mainly *Gammarus*.

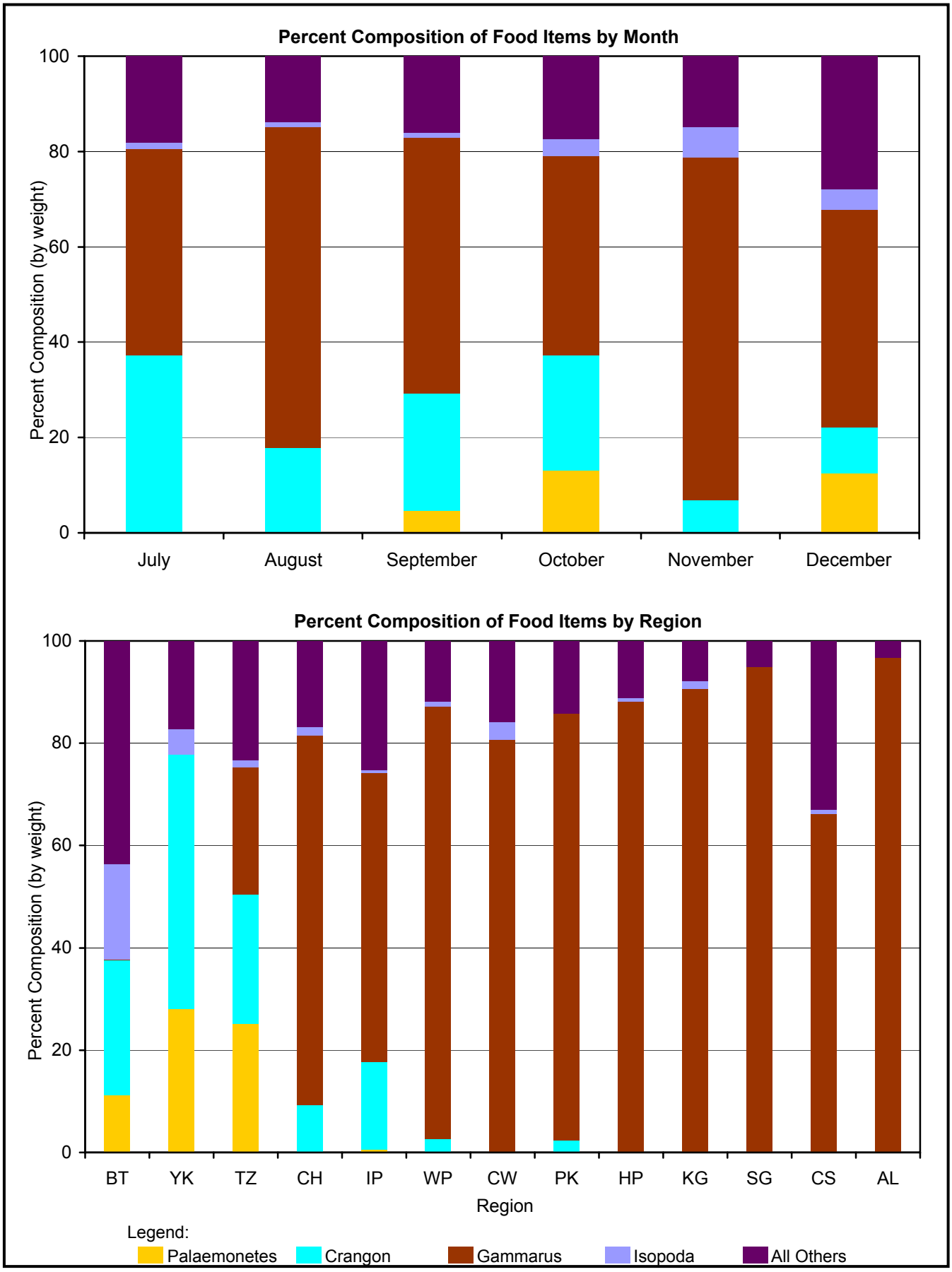

Figure G-1. Monthly and regional percent composition (by weight) of major food items from Atlantic tomcod food habit study, 2004.

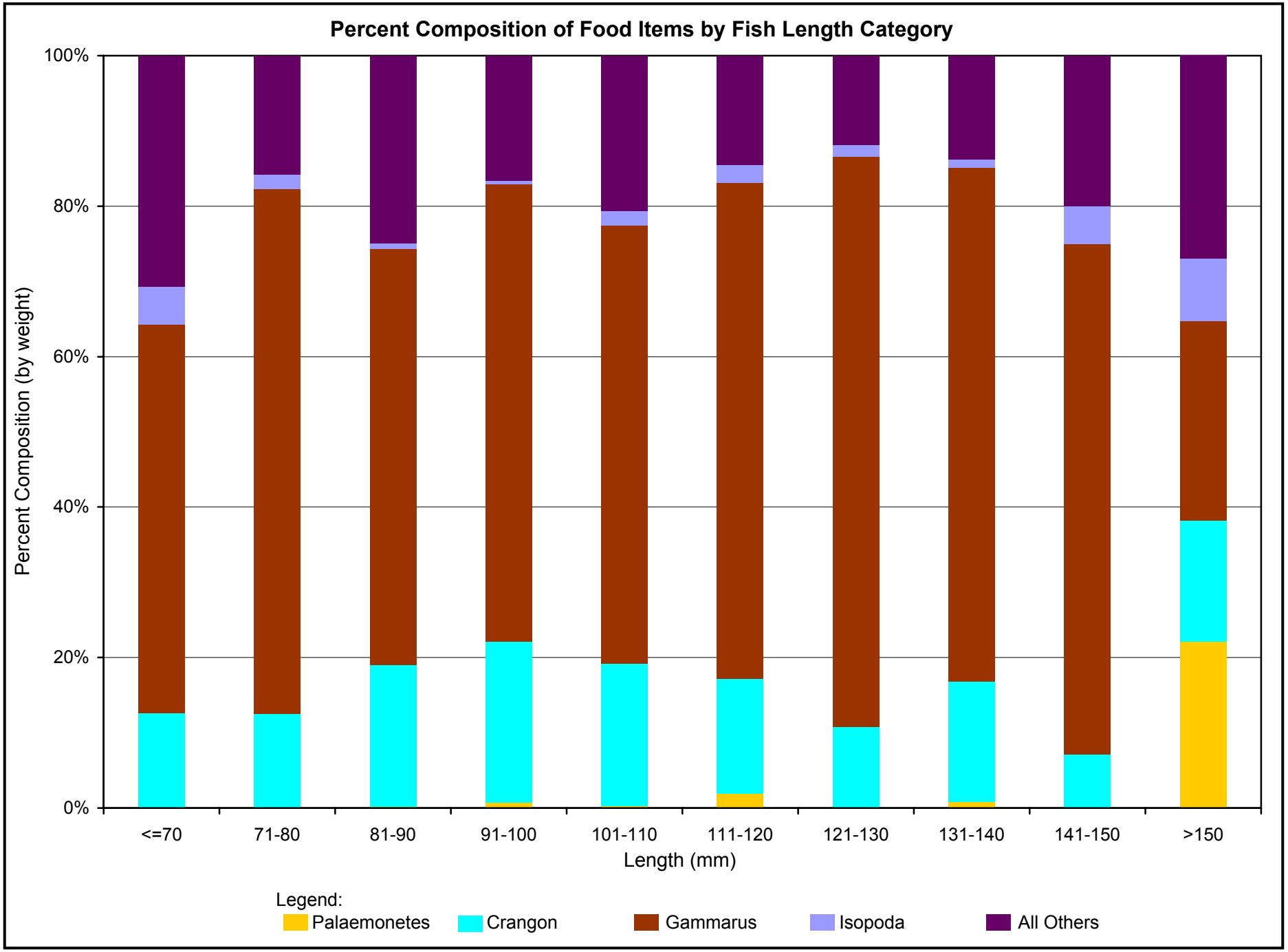

Figure G-2. Percent composition (by weight) of major food items by length category of Atlantic tomcod from food habit study, 2004.

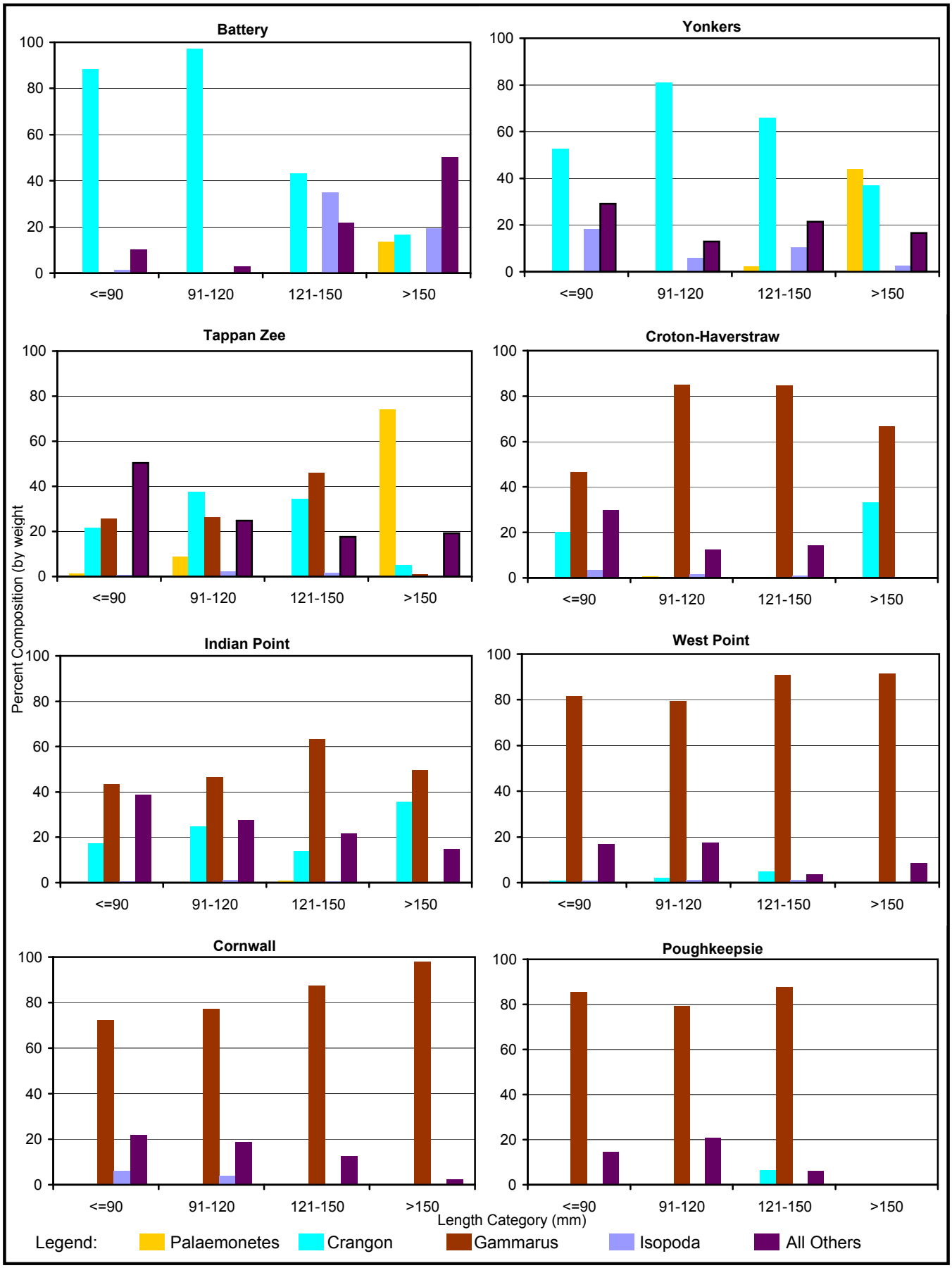

Figure G-3. Percent composition (by weight) of major food items by length category and region from Atlantic tomcod food habit study, 2004.

Table G-1 Number of Stomachs Analyzed for Atlantic Tomcod Food Habit Study, 2004

	July	August	September	October	November	December	Total
Juvenile							
Battery	29	1	1	--	1	4	36
Yonkers	1	2	6	12	1	2	24
Tappan Zee	7	--	23	14	3	11	58
Croton-Haverstraw	14	20	20	4	--	9	67
Indian Point	20	40	36	11	20	20	147
West Point	10	15	34	25	10	17	111
Cornwall	20	18	10	10	--	--	58
Poughkeepsie	10	17	5	5	14	--	51
Hyde Park	28	58	20	10	11	--	127
Kingston	2	1	2	10	22	--	37
Saugerties	2	1	1	17	5	--	26
Catskill	3	1	--	4	2	--	10
Albany	5	--	--	2	--	--	7
Total	151	174	158	124	89	63	759
Adult							
Battery	--	--	--	--	4	4	8
Yonkers	--	--	--	4	1	2	7
Tappan Zee	--	--	1	2	--	4	7
Croton-Haverstraw	--	--	--	1	--	--	1
Indian Point	--	--	--	--	--	--	0
West Point	--	--	--	--	--	--	0
Cornwall	--	--	--	--	1	--	1
Poughkeepsie	--	--	--	--	--	--	0
Hyde Park	--	--	--	--	3	--	3
Kingston	--	--	--	--	3	--	3
Saugerties	--	--	--	--	5	--	5
Catskill	--	--	--	--	2	--	2
Albany	--	--	--	--	3	--	3
Total	0	0	1	7	22	10	40
Total	151	174	159	131	111	73	799

-- = None collected.

Table G-2 Length Frequency Distribution of Atlantic Tomcod Analyzed for Food Habit Study, 2004

	Length Category (mm)									
	<=70	71-80	81-90	91-100	101-110	111-120	121-130	131-140	141-150	>150
Battery	1	12	9	5	2	--	1	2	1	11
Yonkers	--	1	2	4	5	3	3	2	2	8
Tappan Zee	8	9	7	8	4	8	8	4	2	7
Croton-Haverstraw	32	13	10	3	--	4	2	1	1	2
Indian Point	57	24	16	2	7	9	12	14	4	2
West Point	36	17	8	16	8	10	6	6	2	2
Cornwall	12	21	12	6	2	3	2	--	--	1
Poughkeepsie	1	11	9	7	11	4	3	4	1	--
Hyde Park	9	36	41	22	6	7	5	1	--	3
Kingston	--	2	1	2	1	2	9	9	8	6
Saugerties	--	1	2	--	4	1	7	7	4	5
Catskill	--	1	2	1	1	1	1	--	3	2
Albany	2	1	2	--	2	--	--	--	--	3
Total	158	149	121	76	53	52	59	50	28	52

-- = None collected.

Table G-3 Total Weight, Count, and Percent Composition of Food Items from Atlantic Tomcod Food Habit Study, 2004

Class	Order	Genus or Family	Species	Weight (g)[a]	Percent of Total Weight	Count	Percent of Total Count
Juvenile							
Malacostraca	Amphipoda	Gammarus		68.17	64.12	11,535	78.12
Malacostraca	Decapoda	Crangon		16.31	15.34	271	1.84
Invert remains				3.78	3.56	164	1.11
Malacostraca	Amphipoda			2.69	2.53	1746	11.83
Malacostraca	Isopoda			2.54	2.39	158	1.07
Osteichthyes	Perciformes	Micropogonias	undulatus	2.09	1.97	11	0.07
Malacostraca	Mysida	Neomysis		1.58	1.49	251	1.70
Malacostraca	Decapoda	Palaemonetes	sp.	1.42	1.34	14	0.09
Osteichthyes	Perciformes	Etheostoma	olmstedi	1.36	1.28	1	0.01
Detritus				1.17	1.10	74	0.50
Malacostraca	Decapoda	Rhithropanopeus	harrisii	1.16	1.09	26	0.18
Malacostraca	Isopoda	Cyathura		0.59	0.55	45	0.30
Malacostraca	Decapoda			0.50	0.47	31	0.21
Polychaeta				0.45	0.42	11	0.07
Hirudinea				0.45	0.42	8	0.05
Inorganic mat.				0.39	0.37	27	0.18
Malacostraca	Decapoda	Callinectes	sapidus	0.36	0.34	10	0.07
Plant remains				0.29	0.27	19	0.13
Malacostraca	Isopoda	Chirodotea		0.17	0.16	16	0.11
Osteichthyes	Perciformes	Gobiidae		0.15	0.14	1	0.01
Pelecypoda				0.13	0.12	41	0.28
Oligochaeta				0.12	0.11	4	0.03
Malacostraca	Decapoda	Xanthidae		0.11	0.10	4	0.03
Fish remains				0.07	0.07	2	0.01
Malacostraca	Cumacea			0.05	0.05	38	0.26
Bivalvia	Veneroida	Dreissena	polymorpha	0.04	0.04	15	0.10
Osteichthyes				0.03	0.03	1	0.01
Insecta	Trichoptera	(Juvenile)		0.03	0.03	23	0.16
Malacostraca	Isopoda	Asellus		0.03	0.03	8	0.05
Insecta	Diptera	Chironomidae	(Larvae)	0.02	0.02	134	0.91
Archnida				0.02	0.02	1	0.01
Malacostraca	Decapoda	Palaemonetes	pugio	0.02	0.02	3	0.02
Insecta	Ephemeroptera	Heptageniidae	(Juvenile)	0.01	0.01	1	0.01
Ectoprocta	(Bryozoa)			0.01	0.01	1	0.01
Empty stomach				< min.	0.00	22	0.15
Fish eggs				< min.	0.00	1	0.01
Gastropoda				< min.	0.00	5	0.03
Insecta	Diptera	Chironomidae	(Pupae)	< min.	0.00	6	0.04
Insecta	Odonata	Zygoptera		< min.	0.00	1	0.01
Insecta	Hymenoptera			< min.	0.00	1	0.01
Insecta	Hymenoptera	Formicidae		< min.	0.00	1	0.01
Insecta	Diptera	(Larvae)		< min.	0.00	3	0.02
Insecta	Diptera	(Pupae)		< min.	0.00	2	0.01
Insecta	Diptera			< min.	0.00	2	0.01
Insecta				< min.	0.00	2	0.01
Malacostraca	Amphipoda	Corophium		< min.	0.00	2	0.01
Maxillipoda	Arguloida	Argulus		< min.	0.00	1	0.01

Table G-3 (Continued)

Class	Order	Genus or Family	Species	Weight (g)[a]	Percent of Total Weight	Count	Percent of Total Count
Maxillipoda (Continued)	Copepoda			< min.	0.00	8	0.05
Maxillipoda	Cyclopoida			< min.	0.00	1	0.01
Nemata				< min.	0.00	7	0.05
Invert eggs				< min.	0.00	2	0.01
Total				106.32	100	14,765	100
Adult							
Malacostraca	Amphipoda	Gammarus		9.77	24.73	1036	69.39
Malacostraca	Decapoda	Palaemonetes	sp.	9.49	24.02	35	2.34
Malacostraca	Decapoda	Crangon		5.41	13.69	34	2.28
Polychaeta				4.03	10.20	16	1.07
Malacostraca	Isopoda			3.48	8.81	82	5.49
Malacostraca	Mysida	Neomysis		1.78	4.51	51	3.42
Osteichthyes	Perciformes	Micropogonias	undulatus	1.12	2.83	6	0.40
Malacostraca	Amphipoda			1.00	2.53	155	10.38
Malacostraca	Decapoda	Xanthidae		0.75	1.90	13	0.87
Malacostraca	Isopoda	Chirodotea		0.49	1.24	16	1.07
Malacostraca	Decapoda			0.44	1.11	6	0.40
Malacostraca	Decapoda	Rhithropanopeus	harrisii	0.40	1.01	6	0.40
Osteichthyes	Perciformes	Sciaenidae		0.38	0.96	1	0.07
Invert remains				0.33	0.84	6	0.40
Detritus				0.14	0.35	5	0.33
Plant remains				0.12	0.30	5	0.33
Malacostraca	Decapoda	Callinectes	sapidus	0.11	0.28	1	0.07
Inorganic mat.				0.10	0.25	3	0.20
Pelecypoda				0.09	0.23	4	0.27
Ectoprocta	(Bryozoa)			0.07	0.18	2	0.13
Oligochaeta				0.01	0.03	6	0.40
Fish remains				< min.	0.00	2	0.13
Maxillipoda	Copepoda			< min.	0.00	1	0.07
Nemertea				< min.	0.00	1	0.07
Total				39.51	100	1,493	100

[a] For some food items, weights were less than the minimum weight measurable by instrumentation and are represented here as "< min."

Table G-4 Summary of Food Items from Atlantic Tomcod Food Habit Study by Month and Region, 2004

	Battery		Yonkers		Tappan Zee		Croton Haverstraw		Indian Point		West Point		Cornwall		Poughkeepsie		Hyde Park		Kingston		Saugerties		Catskill		Albany	
	Ct.	Wt.	Ct.	Wt.	Ct.	Wt.	Ct.	Wt.	Ct.	Wt.	Ct.	Wt.	Ct.	Wt.	Ct.	Wt.	Ct.	Wt.	Ct.	Wt.	Ct.	Wt.	Ct.	Wt.	Ct.	Wt.
July																										
Empty stomach	-	-	-	-	-	-	2	< min	-	-	-	-	1	< min	-	-	1	< min	-	-	1	< min	-	-	1	< min
Pelecypoda	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	< min	4	< min	-	-	-	-	-	-	-	-
Chironomidae (Larvae)	-	-	-	-	-	-	-	-	-	-	-	-	9	< min	3	< min	11	< min	1	< min	-	-	5	< min	7	< min
Chironomidae (Pupae)	-	-	-	-	-	-	-	-	-	-	-	-	1	< min	-	-	-	-	-	-	-	-	-	-	-	-
Trichoptera (Juvenile)	-	-	-	-	-	-	-	-	-	-	-	-	4	0.01	2	< min	3	< min	-	-	-	-	-	-	-	-
Diptera (Larvae)	-	-	-	-	-	-	-	-	-	-	2	< min	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Crangon	111	2.17	1	0.03	8	0.21	4	0.10	8	0.18	1	0.02	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Palaemonetes pugio	3	0.02	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Decapoda	-	-	-	-	1	< min	3	0.02	1	< min	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gammarus	-	-	-	-	2	< min	3	0.02	5	< min	15	0.10	182	0.73	171	0.64	426	1.24	55	0.16	2	0.01	27	0.14	35	0.10
Cyathura	-	-	-	-	-	-	-	-	-	-	-	-	1	< min	-	-	-	-	-	-	1	0.01	-	-	-	-
Cumacea	9	< min	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Neomysis	23	0.11	14	0.13	1	0.01	-	-	33	0.06	24	0.09	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Isopoda	2	0.02	-	-	1	< min	1	< min	1	0.01	-	-	13	0.04	-	-	5	0.02	-	-	-	-	-	-	-	-
Amphipoda	9	0.01	-	-	4	0.01	78	0.08	33	0.04	8	< min	94	0.17	-	-	-	-	-	-	1	< min	-	-	-	-
Xanthidae	1	0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Copepoda	-	-	-	-	-	-	-	-	5	< min	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ectoprocta (Bryozoa)	1	0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Detritus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	0.09	7	0.05	-	-	-	-	-	-	-	-
Invert remains	1	0.01	-	-	3	0.04	2	0.01	4	0.02	3	0.04	1	0.01	3	0.05	7	0.07	-	-	1	0.02	-	-	3	0.04
Inorganic mat.	-	-	-	-	-	-	-	-	-	-	-	-	2	0.03	2	0.02	2	0.02	-	-	1	0.01	-	-	-	-
August																										
Empty stomach	-	-	-	-	-	-	2	< min	4	< min	-	-	1	< min	-	-	1	< min	1	< min	-	-	-	-	-	-
Fish eggs	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	< min	-	-	-	-	-	-	-	-	-	-
Pelecypoda	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	< min	13	0.01	-	-	-	-	-	-	-	-
Chironomidae (Larvae)	-	-	-	-	-	-	-	-	-	-	-	-	6	< min	-	-	6	< min	-	-	-	-	-	-	-	-
Trichoptera (Juvenile)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	< min	-	-	-	-	-	-	-	-
Diptera (Larvae)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	< min	-	-	-	-	-	-	-	-	-	-
Diptera (Pupae)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	< min	-	-	-	-	-	-	-	-
Crangon	3	0.13	3	0.22	-	-	1	0.02	10	0.70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Decapoda	-	-	-	-	-	-	-	-	3	0.04	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gammarus	-	-	-	-	-	-	16	0.07	24	0.16	71	0.26	83	0.32	232	0.90	776	2.26	-	-	-	-	16	0.08	-	-
Cyathura	-	-	-	-	-	-	-	-	2	< min	-	-	1	< min	-	-	-	-	-	-	-	-	-	-	-	-
Cumacea	-	-	-	-	-	-	1	< min	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

NOTE: All weights are in grams. For some food items, weights were less than the minimum weight measurable by instrumentation and are represented here as "< min."

Table G-4 (Continued)

	Battery		Yonkers		Tappan Zee		Croton Haverstraw		Indian Point		West Point		Cornwall		Poughkeepsie		Hyde Park		Kingston		Saugerties		Catskill		Albany	
	Ct.	Wt.	Ct.	Wt.	Ct.	Wt.	Ct.	Wt.	Ct.	Wt.	Ct.	Wt.	Ct.	Wt.	Ct.	Wt.	Ct.	Wt.	Ct.	Wt.	Ct.	Wt.	Ct.	Wt.	Ct.	Wt.
Neomysis	1	0.01	1	0.01	-	-	10	0.04	8	0.02	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Isopoda	-	-	-	-	-	-	-	-	-	-	-	-	3	0.05	-	-	1	0.01	-	-	-	-	-	-	-	-
Amphipoda	-	-	-	-	-	-	67	0.07	169	0.23	28	0.01	22	0.01	1	< min	2	< min	-	-	-	-	-	-	-	-
Copepoda	-	-	-	-	-	-	-	-	-	-	1	< min	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nemata	-	-	-	-	-	-	-	-	-	-	2	< min	-	-	-	-	1	< min	-	-	-	-	-	-	-	-
Plant remains	-	-	-	-	-	-	-	-	-	-	-	-	1	< min	-	-	-	-	-	-	-	-	-	-	-	-
Detritus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	0.01	5	0.07	-	-	-	-	-	-	-	-
Invert eggs	-	-	-	-	-	-	1	< min	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Invert remains	-	-	-	-	-	-	-	-	8	0.04	2	< min	5	0.04	4	0.09	4	0.08	-	-	1	< min	-	-	-	-
Inorganic mat.	-	-	-	-	-	-	-	-	1	0.02	-	-	3	0.03	-	-	-	-	-	-	-	-	-	-	-	-
September																										
Empty stomach	-	-	-	-	-	-	1	< min	2	< min	1	< min	-	-	-	-	1	< min	-	-	-	-	-	-	-	-
Osteichthyes	-	-	-	-	-	-	-	-	-	-	1	0.03	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pelecypoda	-	-	-	-	-	-	-	-	1	0.01	-	-	-	-	-	-	3	0.03	-	-	-	-	-	-	-	-
Chironomidae (Larvae)	-	-	-	-	-	-	1	< min	18	< min	-	-	5	< min	-	-	20	< min	3	< min	-	-	-	-	-	-
Chironomidae (Pupae)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	< min	1	< min	-	-	-	-	-	-
Trichoptera (Juvenile)	-	-	-	-	-	-	-	-	-	-	-	-	3	0.01	1	< min	1	< min	-	-	-	-	-	-	-	-
Diptera (Pupae)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	< min	-	-	-	-	-	-	-	-
Diptera	-	-	-	-	-	-	-	-	2	< min	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Decapoda Palaemonetes	-	-	-	-	5	0.47	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Crangon	4	0.39	16	0.78	19	1.12	6	0.18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Callinectes sapidus	-	-	-	-	-	-	-	-	6	0.12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rhithropanopeus harrisii	-	-	-	-	-	-	1	< min	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Decapoda	-	-	-	-	1	0.02	-	-	3	0.02	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gammarus	-	-	-	-	111	0.59	114	0.60	184	0.89	441	1.59	139	0.36	22	0.07	254	1.08	14	0.05	36	0.17	-	-	-	-
Cyathura	-	-	-	-	-	-	-	-	3	0.01	-	-	1	< min	2	0.04	2	0.05	-	-	-	-	-	-	-	-
Neomysis	-	-	1	0.01	5	0.02	-	-	3	0.02	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Isopoda	-	-	-	-	5	0.02	4	0.05	-	-	2	0.02	-	-	-	-	1	< min	1	0.01	-	-	-	-	-	-
Amphipoda	-	-	27	0.05	124	0.18	101	0.15	150	0.21	2	< min	1	< min	-	-	3	< min	-	-	-	-	-	-	-	-
Nemata	-	-	-	-	1	< min	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Polychaeta	-	-	-	-	1	0.02	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Detritus	-	-	-	-	-	-	-	-	1	< min	1	0.01	-	-	1	0.01	3	0.03	-	-	1	0.01	-	-	-	-
Invert remains	-	-	-	-	1	0.01	1	0.01	2	0.04	3	0.05	1	0.02	4	0.24	8	0.14	1	0.04	-	-	-	-	-	-
Inorganic mat.	-	-	-	-	-	-	-	-	-	-	1	0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-
October																										
Fish remains	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	0.02	-	-	-	-	-	-	-	-	-	-

NOTE: All weights are in grams. For some food items, weights were less than the minimum weight measurable by instrumentation and are represented here as "< min."

Table G-4 (Continued)

	Battery		Yonkers		Tappan Zee		Croton Haverstraw		Indian Point		West Point		Cornwall		Poughkeepsie		Hyde Park		Kingston		Saugerties		Catskill		Albany	
	Ct.	Wt.	Ct.	Wt.	Ct.	Wt.	Ct.	Wt.	Ct.	Wt.	Ct.	Wt.	Ct.	Wt.	Ct.	Wt.	Ct.	Wt.	Ct.	Wt.	Ct.	Wt.	Ct.	Wt.	Ct.	Wt.
Micropogonias undulatus	-	-	3	0.37	1	0.04	-	-	-	-	4	0.33	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dreissena polymorpha	-	-	-	-	-	-	-	-	-	-	8	0.02	1	< min	-	-	-	-	-	-	-	-	1	0.01	-	-
Pelecypoda	-	-	1	0.03	1	0.06	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	0.07	-	-	-	-
Chironomidae (Larvae)	-	-	-	-	-	-	-	-	-	-	3	< min	2	< min	1	< min	4	< min	2	< min	7	< min	-	-	-	-
Chironomidae (Pupae)	-	-	-	-	-	-	-	-	-	-	1	< min	-	-	-	-	1	< min	-	-	1	< min	-	-	-	-
Trichoptera (Juvenile)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	< min	1	< min	-	-	2	< min	-	-	-	-
Palaemonetes sp.	-	-	10	2.65	12	1.65	1	0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Crangon	-	-	40	4.61	20	2.24	2	0.17	10	0.94	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Callinectes sapidus	-	-	2	0.19	-	-	-	-	-	-	1	0.02	1	0.03	-	-	-	-	-	-	-	-	-	-	-	-
Rhithropanopeus harrisii	-	-	-	-	2	0.19	-	-	5	0.16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Decapoda	-	-	7	0.21	-	-	1	< min	3	0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gammarus	-	-	2	0.01	-	-	10	0.07	57	0.34	1046	3.55	301	1.39	93	0.53	91	0.45	194	1.40	844	4.58	128	0.99	95	0.45
Corophium	-	-	-	-	-	-	-	-	-	-	2	< min	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cyathura	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	0.04	7	0.04	4	0.04	-	-	-	-
Asellus	-	-	-	-	-	-	-	-	-	-	8	0.03	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Neomysis	-	-	33	0.26	42	0.35	1	< min	10	0.08	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Isopoda	-	-	36	0.77	7	0.13	-	-	2	0.03	5	0.04	6	0.07	2	< min	-	-	2	0.03	3	0.01	2	0.04	-	-
Amphipoda	-	-	24	0.02	55	0.06	43	0.07	68	0.09	4	0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Xanthidae	-	-	3	0.30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Argulus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	< min	-	-	-	-	-	-	-	-
Cyclopoida	-	-	-	-	1	< min	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nemata	-	-	2	< min	-	-	-	-	-	-	1	< min	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nemertea	-	-	-	-	1	< min	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Polychaeta	-	-	-	-	9	0.47	-	-	1	0.04	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hirudinea	-	-	-	-	-	-	-	-	1	0.04	6	0.41	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Plant remains	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6	0.11	-	-	-	-	-	-	-	-
Detritus	-	-	-	-	-	-	-	-	-	-	3	0.04	5	0.11	3	0.04	2	0.03	-	-	9	0.20	1	0.01	-	-
Invert eggs	-	-	-	-	1	< min	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Invert remains	-	-	1	0.02	3	0.04	2	0.03	4	0.06	8	0.16	4	0.24	2	0.04	7	0.22	5	0.10	1	0.06	-	-	-	-
Inorganic mat.	-	-	-	-	1	0.02	-	-	1	0.02	3	0.06	-	-	-	-	-	-	-	-	1	0.01	-	-	-	-
November																										
Empty stomach	1	< min	-	-	-	-	-	-	1	< min	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Etheostoma olmstedi	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1.36	-	-
Fish remains	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	< min	1	< min	-	-	-	-	-	-
Micropogonias undulatus	-	-	-	-	-	-	-	-	2	0.81	1	0.22	-	-	-	-	-	-	1	0.12	-	-	-	-	-	-

NOTE: All weights are in grams. For some food items, weights were less than the minimum weight measurable by instrumentation and are represented here as "< min."

Table G-4 (Continued)

	Battery		Yonkers		Tappan Zee		Croton Haverstraw		Indian Point		West Point		Cornwall		Poughkeepsie		Hyde Park		Kingston		Saugerties		Catskill		Albany	
	Ct.	Wt.	Ct.	Wt.	Ct.	Wt.	Ct.	Wt.	Ct.	Wt.	Ct.	Wt.	Ct.	Wt.	Ct.	Wt.	Ct.	Wt.	Ct.	Wt.	Ct.	Wt.	Ct.	Wt.	Ct.	Wt.
Sciaenidae	1	0.38	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dreissena polymorpha	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	< min	-	-	-	-	-	-	-	-	-	-
Pelecypoda	-	-	-	-	-	-	-	-	5	0.01	-	-	-	-	1	< min	1	< min	-	-	-	-	-	-	-	-
Gastropoda	-	-	-	-	-	-	-	-	1	< min	-	-	-	-	1	< min	-	-	-	-	-	-	-	-	-	-
Chironomidae (Larvae)	-	-	-	-	2	< min	-	-	5	< min	-	-	-	-	-	-	2	< min	-	-	-	-	-	-	-	-
Heptageniidae (Juvenile)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	0.01	-	-	-	-	-	-
Trichoptera (Juvenile)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	< min	-	-	-	-	-	-	-	-	-	-
Insecta	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	< min	-	-	-	-	-	-	-	-
Archnida	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	0.02	-	-	-	-	-	-
Crangon	4	0.93	-	-	1	0.15	-	-	6	1.10	3	0.47	-	-	1	0.14	-	-	-	-	-	-	-	-	-	-
Rhithropanopeus harrisii	-	-	-	-	-	-	-	-	9	0.49	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Decapoda	-	-	-	-	1	0.01	-	-	3	0.07	1	0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gammarus	-	-	-	-	12	0.06	-	-	77	0.56	191	1.37	129	0.92	535	2.95	656	5.64	922	7.57	601	6.06	179	1.62	261	2.51
Cyathura	-	-	-	-	2	0.05	-	-	2	0.03	-	-	-	-	-	-	-	-	5	0.07	-	-	-	-	-	-
Neomysis	1	0.01	17	0.15	4	0.02	-	-	7	0.07	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Isopoda	54	2.35	2	0.03	-	-	-	-	2	0.02	1	0.02	-	-	-	-	4	0.05	6	0.10	-	-	-	-	-	-
Amphipoda	3	< min	9	0.01	16	0.03	-	-	144	0.22	2	< min	1	< min	1	< min	1	< min	-	-	-	-	-	-	-	-
Xanthidae	-	-	1	0.04	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Copepoda	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	< min	-	-	-	-	-	-	-	-	-	-
Oligochaeta	-	-	-	-	1	0.01	-	-	-	-	-	-	-	-	-	-	-	-	1	0.01	-	-	-	-	-	-
Hirudinea	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	< min	-	-	-	-	-	-
Ectoprocta (Bryozoa)	2	0.07	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Plant remains	1	0.02	-	-	-	-	-	-	1	0.01	-	-	-	-	-	-	1	0.03	4	0.06	2	0.04	-	-	2	0.05
Detritus	-	-	-	-	1	0.04	-	-	-	-	2	0.03	1	0.02	4	0.05	8	0.14	4	0.04	1	0.04	-	-	1	0.01
Invert remains	-	-	-	-	2	0.05	-	-	6	0.11	3	0.18	-	-	6	0.12	3	0.22	8	0.25	2	0.06	1	0.03	-	-
Inorganic mat.	1	0.05	-	-	-	-	-	-	-	-	-	-	-	-	3	0.04	1	0.01	3	0.04	-	-	-	-	-	-
December																										
Fish remains	-	-	-	-	-	-	1	0.05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Micropogonias undulatus	3	0.75	-	-	1	0.44	-	-	1	0.13	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gobiidae	-	-	-	-	1	0.15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dreissena polymorpha	-	-	-	-	-	-	-	-	-	-	1	0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pelecypoda	1	< min	-	-	2	< min	-	-	4	< min	2	< min	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gastropoda	1	< min	-	-	-	-	-	-	1	< min	1	< min	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chironomidae (Larvae)	-	-	-	-	4	0.01	5	0.01	1	< min	1	< min	-	-	-	-	-	-	-	-	-	-	-	-	-	-

NOTE: All weights are in grams. For some food items, weights were less than the minimum weight measurable by instrumentation and are represented here as "< min."

Table G-4 (Continued)

	Battery		Yonkers		Tappan Zee		Croton Haverstraw		Indian Point		West Point		Cornwall		Poughkeepsie		Hyde Park		Kingston		Saugerties		Catskill		Albany	
	Ct.	Wt.	Ct.	Wt.	Ct.	Wt.	Ct.	Wt.	Ct.	Wt.	Ct.	Wt.	Ct.	Wt.	Ct.	Wt.	Ct.	Wt.	Ct.	Wt.	Ct.	Wt.	Ct.	Wt.	Ct.	Wt.
Zygoptera	-	-	-	-	-	-	-	-	-	-	1	< min	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Trichoptera (Juvenile)	-	-	-	-	-	-	-	-	-	-	1	0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hymenoptera	-	-	-	-	-	-	-	-	1	< min	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Formicidae	-	-	-	-	-	-	1	< min	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Insecta	-	-	-	-	-	-	-	-	1	< min	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Palaemonetes sp.	8	2.55	6	1.90	6	1.59	-	-	1	0.09	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Crangon	11	2.34	12	2.38	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Callinectes sapidus	1	0.11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rhithropanopeus harrisii	4	0.11	-	-	6	0.37	1	0.04	4	0.20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Decapoda	5	0.31	-	-	3	0.18	-	-	1	0.04	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gammarus	7	0.02	-	-	360	3.02	367	3.02	901	7.66	1056	8.61	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chirodotea	-	-	16	0.49	-	-	-	-	16	0.17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cyathura	-	-	-	-	2	0.02	3	0.07	5	0.12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cumacea	27	0.05	1	< min	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Neomysis	53	1.78	9	0.08	1	0.03	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Isopoda	53	1.85	-	-	3	0.05	2	0.04	3	0.04	5	0.10	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Amphipoda	337	1.57	25	0.08	82	0.13	35	0.08	90	0.05	37	0.05	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Xanthidae	6	0.22	6	0.29	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Copepoda	1	< min	-	-	1	< min	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Oligochaeta	6	0.01	-	-	-	-	-	-	-	-	2	0.10	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Polychaeta	12	3.82	1	0.05	1	0.01	1	0.05	-	-	1	0.02	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Plant remains	-	-	-	-	1	< min	-	-	3	0.07	2	0.02	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Detritus	3	0.11	-	-	3	0.04	1	0.02	2	0.05	1	0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Invert remains	5	0.29	-	-	9	0.29	4	0.08	9	0.21	5	0.15	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Inorganic mat.	1	0.03	-	-	1	0.02	-	-	1	0.03	1	0.02	-	-	-	-	-	-	-	-	-	-	-	-	-	-

NOTE: All weights are in grams. For some food items, weights were less than the minimum weight measurable by instrumentation and are represented here as “< min.”