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Appendix B:  
Physical Habitat Data Collected at Habitat Transects,  
Ipswich River Basin, Massachusetts, 1998–99

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**Appendix B. Physical habitat data collected at habitat transects, Ipswich River Basin, Massachusetts, 1998–99**

[Streambed substrate: CPOM, Coarse particulate organic matter; FPOM, fine particulate organic matter. **Habitat heterogeneity:** 1, 80–100 percent homogeneous, very homogeneous; 2, 60–80 percent homogeneous; 3, 40–60 percent homogeneous; 4, 20–40 percent homogeneous; 5, 0–20 percent homogeneous, very heterogeneous. ID, Identifier; MDFW, Massachusetts Division of Fisheries and Wildlife; USGS, U.S. Geological Survey; ft, foot; ft/s, foot per second; m, meter; >, actual value is greater than value shown; --, not applicable]

USGS habitat site ID	MDFW ID	Transect name	Stream name	Date	River meters (m)	Channel width (ft)	Bank width (ft)	Thalweg depth (ft)	Channel type	Mean velocity at thalweg (ft/s)	Streambed substrate
I2	11	Wetland reach between Woburn Street and I-93	Ipswich	8-12-98	55,980	11	--	4.4	glide	1.11	FPOM, sand
I8	1	reach downstream of Mill Street	Ipswich	8-25-98	53,190	29	40	1.1	glide/run	.42	sand, CPOM, FPOM
I9	3	Upstream of Route 28	Ipswich	8-26-98	51,920	19.6	28	1.7	glide	.23	sand, CPOM, gravel, FPOM
-	2	Downstream of Route 28	Ipswich	--	--	--	--	--	glide/run	--	--
I10	4	Upstream of power line	Ipswich	8-26-98	51,370	13	22	1.8	run	--	sand, gravel, FPOM
I11	7	Downstream of Martins Brook	Ipswich	8-26-98	50,690	24	27.5	3.1	glide	0	sand, gravel, FPOM
I12	6	Parrish Park (Downstream Chestnut Street)	Ipswich	8-27-98	50,340	30	30.5	1.6	riffle/run	.45	boulder, sand, gravel, FPOM
I14	23	Ipswich Park Pond downstream of Central Street	Ipswich	--	49,600	--	--	--	pool	0	--
I15	26	Ipswich Park Pond downstream of Central Street	Ipswich	--	49,600	--	--	--	pool	0	--
I17	14	Behind firehouse	Ipswich	9-01-98	48,650	20	59	3.5	glide/run	.26	sand, FPOM, gravel
I18	8	Downstream South Middleton Dam, upstream Russel Street	Ipswich	8-28-98	42,680	32	40	.9	riffle	.43	gravel, cobble, boulder, sand
I19	42	Downstream South Middleton Dam, upstream Russel Street	Ipswich	7-20-99	42,680	21	42	.7	riffle	0	--
I20	5	Just upstream South Middleton gage	Ipswich	8-28-98	42,500	38	43	2.1	glide	.16	sand, cobble, gravel, CPOM, FPOM, boulder
I23	9	Bluleys Corner	Ipswich	8-28-98	36,950	33	43	2.2	glide	.18	FPOM, sand
I24	10	Middleton Colony	Ipswich	9-24-98	35,250	51	60	2.2	glide	0	sand, cobble, gravel, FPOM
I25	12	Upstream Maple Street (Route 62)	Ipswich	9-28-98	34,000	30	200	2	glide	.17	sand, FPOM, gravel, cobble
I26	15	Upstream of Peabody Bridge	Ipswich	9-09-98	31,200	37	60	1.4	run/riffle	.67	sand., cobble, gravel, CPOM
I27	13	Downstream Thunder Bridge	Ipswich	9-11-98	29,550	49	58	2.1	glide	.08	sand, gravel, FPOM
I29	16	Upstream of Rowley Bridge Road (at Fish Brook)	Ipswich	9-14-98	27,300	16	18	2	run	.29	sand, FPOM, cobble, gravel
I31	17	Downstream of Salem Street	Ipswich	9-18-98	25,250	44	58	1.7	glide	.19	sand, cobble, boulder, gravel

**Appendix B.** Physical habitat data collected at habitat transects, Ipswich River Basin, Massachusetts, 1998–99—Continued

USGS habitat site ID	MDFW ID	Transect name	Stream name	Date	River meters (m)	Channel width (ft)	Bank width (ft)	Thalweg depth (ft)	Channel type	Mean velocity at thalweg (ft/s)	Streambed substrate
I32	24	Topsfield fair grounds	Ipswich	9-17-98	24,450	34.5	43	1.2	riffle	1.16	cobble, boulder, gravel, sand, FPOM
I33	19	Route 97 canoe launch	Ipswich	9-15-98	24,050	44.5	48.5	1.5	glide	.29	sand, FPOM, cobble, gravel
I34	22	Audubon canoe launch	Ipswich	9-17-98	21,020	29.5	38.5	2	glide	.42	sand, FPOM
I35	18	Downstream of Willowdale Dam, Ipswich gage	Ipswich	9-18-98	13,360	52	56	1	riffle	.52	cobble, gravel, sand, boulder
I36	20	Winthrop Road downstream of private bridge	Ipswich	--	12,500	--	--	--	run	--	--
I37	25	Winthrop riffle	Ipswich	9-29-98	11,350	66	78	1.2	riffle	.43	cobble, gravel, boulder, sand
I38	21	Downstream Mill Road	Ipswich	9-18-98	9,800	56	63	1.1	riffle	.58	cobble, boulder, gravel, sand
S39	45	Harold Parker Road	Skug River	7-21-99	--	1.7	16	.15	run/riffle	0	gravel, sand, cobble
M40	43	Upstream of Park Street	Martins Brook	7-20-99	250	9	22	1.6	glide	0	sand
N41	41	Norris Brook at power lines	Norris Brook	7-15-99	590	--	--	--	pool	--	sand, FPOM
B42	38	Upstream/downstream of Peabody Street	Boston Brook	7-14-99	--	6	24	.3	pool/glide/riffle	0	sand, CPOM
F43	44	Downstream of Lost Pond Road (downstream of Mosquito Brook)	Fish Brook	7-21-99	12,750	10.5	21	.4	riffle/glide	0	sand, gravel, cobble, boulder
F44	39	Endicot Street (Washington Street)	Fish Brook	7-19-99	800	16	40	1	glide/run	.79	sand, gravel, cobble, FPOM
F45	40	Lockwood Lane	Fish Brook	7-15-99	3,700	10	27	.8	riffle/run	0	cobble, gravel, boulder, sand
H46	35	East Street	Howlett Brook	--	--	--	--	--	glide	--	--
H47	37	Upstream Ipswich Road (riffle reach)	Howlett Brook	7-16-99	500	10	20	.25	riffle	.77	gravel, cobble
H48	36	Downstream Ipswich Road (Wetland reach)	Howlett Brook	7-15-99	400	8.5	17	.3	glide	0	sand, gravel, CPOM

**Appendix B.** Physical habitat data collected at habitat transects, Ipswich River Basin, Massachusetts, 1998–99—Continued

USGS habitat site ID	MDFW ID	Left bank				Right bank				Canopy opening
		Substrate (order of dominance)	Vegetation type (percent)	Riparian zone width (ft)	Substrate (order of dominance)	Vegetation type (percent)	Riparian zone width (ft)	Canopy opening		
I2	11	organic soil	100 percent wetland emergent	>100	peat/organic soil	100 percent wetland emergent	>100	open		
I8	1	sand,silt	100 percent wetland forest/ shrub	>100	sand, silt	100 percent wetland forest/ shrub	>100	closed		
I9	3	sand, soil	100 percent upland forest/shrub	30	sand, soil	100 percent upland forest/shrub	100	closed		
-	2	--	--	--	--	--	--	closed		
I10	4	sand, soil	100 percent upland forest/shrub	>100	sand, soil	100 percent upland forest/shrub	>100	closed		
I11	7	organic soil	100 percent wetland shrub/emergent	>100	organic soil	100 percent wetland shrub/emergent	>100	open		
I12	6	sand, boulder	100 percent upland forest	50	sand	100 percent upland forest	>100	closed		
I14	23	--	--	--	--	--	NA	open		
I15	26	--	--	--	--	--	NA	open		
I17	14	soil	100 percent upland forest/shrub	20	soil	100 percent upland forest/shrub	>100	partial		
I18	8	boulder, gravel, sand	100 percent upland forest	30	boulder, cobble, gravel	100 percent upland forest	40	closed		
I19	42	boulder, gravel, sand	100 percent upland forest	30	boulder, cobble, gravel	100 percent upland forest	40	closed		
I20	5	boulder, organic soil, sand	10 percent upland forest	>100	sand	100 percent upland forest	50	closed		
I23	9	organic soil	50 percent wetland forest/shrub, 50 percent wetland emergent	>100	organic soil	100 percent wetland forest/shrub	>100	partial/open		
I24	10	organic soil, muck, sand	20 percent wetland shrub/emergent, 80 percent emergent	>100	organic soil, muck	50 percent wetland forest/shrub, 50 percent wetland shrub/emergent	50	partial		
I25	12	organic soil	90 percent wetland emergent, 10 percent wetland/shrub	>100	sand, soil	90 percent upland forest, 10 percent upland shrub	75	partial		
I26	15	cobble, sand, soil	100 percent upland forest	>100	sand	100 percent wetland forest/shrub	>100	closed		
I27	13	soil, sand	100 percent upland forest	>100	sand, soil	100 percent upland forest	>100	closed		
I29	16	sand, soil	100 percent wetland forest/ shrub	>100	sand, soil	100 percent wetland forest/ shrub	>100	partial		
I31	17	sand	100 percent upland forest	>100	cobble, boulder	100 percent upland forest	40	partial/closed		

**Appendix B.** Physical habitat data collected at habitat transects, Ipswich River Basin, Massachusetts, 1998–99—Continued

USGS habitat site ID	MDFW ID	Left bank				Right bank			
		Substrate (order of dominance)	Vegetation type (percent)	Riparian zone width (ft)	Substrate (order of dominance)	Vegetation type (percent)	Riparian zone width (ft)	Canopy opening	
I32	24	sand	100 percent upland forest/shrub	100	boulder, sand	100 percent wetland forest	>100	closed	
I33	19	sand, soil	100 percent upland forest	50	sand, soil	100 percent wetland forest	>100	partial	
I34	22	organic soil, silt	100 percent wetland forest/shrub	>100	organic soil, silt	50 percent wetland forest/shrub, 50 percent wetland shrub/emergent	>100	partial	
I35	18	sand, cobble	100 percent upland forest	50	sand, cobble	100 percent upland forest	>100	open/closed	
I36	20	--	--	--	--	--	--	--	
I37	25	sand, boulder	90 percent upland forest, 10 percent upland shrub	40	sand	90 percent upland forest, 10 percent upland shrub	>100	partial	
I38	21	sand, gravel	100 percent upland forest	>100	sand, gravel	100 percent upland forest	>100	partial	
S39	45	sand, soil	100 percent upland forest	>100	sand, soil	100 percent upland forest	>100	closed	
M40	43	sand	100 percent wetland shrub/emergent	>100	soil	50 percent forest/shrub, 50 percent shrub/herbaceous	>100	closed	
N41	41	sand	--	--	sand	--	--	open	
B42	38	sand	100 percent upland forest/shrub	>100	sand	100 percent upland forest/shrub	>100	closed	
F43	44	sand, gravel, silt	100 percent upland forest/shrub	>100	cobble, gravel	100 percent upland forest/shrub	>100	closed	
F44	39	organic soil, sand	100 percent upland shrub/herbaceous	>100	organic soil, cobble	100 percent upland forest	5	closed	
F45	40	soil, sand	100 percent upland forest	>100	boulder, cobble, gravel	100 percent upland forest	>100	closed	
H46	35	--	--	--	--	--	--	--	
H47	37	sand, soil	100 percent upland forest/shrub	100	sand, soil	100 percent upland forest/shrub	>100	closed	
H48	36	organic soil	100 percent wetland emergent	>100	organic soil	100 percent wetland shrub/emergent	>100	partial	

**Appendix B.** Physical habitat data collected at habitat transects, Ipswich River Basin, Massachusetts, 1998–99—Continued

USGS habitat site ID	MDFW ID	Persistent instream habitat (in order of dominance)	Temporal instream habitat (in order of dominance)	Bank habitat (in order of dominance)	Hydraulic habitat (in order of dominance)	Habitat heterogeneity
I2	11	none	submerged and emergent vegetation	overhanging vegetation, undercut banks	side channels, deeper holes upstream and downstream	1
I8	1	boulder	small woody debris, submerged vegetation	overhanging vegetation, exposed roots	none	5
I9	3	large woody debris	small woody debris, submerged vegetation	exposed roots, overhanging vegetation, undercut banks	none	3
-	2	--	--	--	--	--
I10	4	large woody debris	small woody debris, moss	overhanging vegetation, undercut banks, exposed roots	none	4
I11	7	none	small woody debris, submerged vegetation	overhanging vegetation, undercut banks	deep hole	1
I12	6	boulder, large woody debris	small woody debris, moss	exposed roots, undercut banks	eddies, varying flow velocity, riffled surface	4
I14	23	deep pond	--	--	--	--
I15	26	--	--	--	--	--
I17	14	none	emergent and submerged vegetation, small woody debris	emergent vegetation, exposed roots, overhanging vegetation	small tributary	4
I18	8	boulder/cobble	small woody debris	overhanging vegetation	riffled surface, varied flow velocities	3
I19	42	--	--	--	none	3
I20	5	large woody debris, boulder/cobble	small woody debris, moss	overhanging vegetation, exposed roots	varied flow velocities	5
I23	9	boulder	emergent, floating, and submerged vegetation, small woody debris	overhanging vegetation, exposed roots	none	3
I24	10	boulder/cobble	submerged, floating, and emergent vegetation, small woody debris	overhanging vegetation	none	4
I25	12	boulder, large woody debris	submerged, floating, and emergent vegetation	overhanging vegetation	none	1
I26	15	boulder/cobble	small woody debris, submerged and emergent vegetation, small woody debris	overhanging vegetation	riffled surface	3
I27	13	large woody debris	small woody debris	overhanging vegetation, exposed roots	none	1
I29	16	large, woody debris, cobble	small woody debris	undercut banks, overhanging vegetation, exposed roots	tributary, riffled surface, side channel	1
I31	17	boulder/cobble, large woody debris	small woody debris, submerged vegetation	exposed roots	none	2

**Appendix B.** Physical habitat data collected at habitat transects, Ipswich River Basin, Massachusetts, 1998–99—Continued

USGS habitat site ID	MDFW ID	Persistent instream habitat (in order of dominance)	Temporal instream habitat (in order of dominance)	Bank habitat (in order of dominance)	Hydraulic habitat (in order of dominance)	Habitat heterogeneity
I32	24	boulder/cobble, large woody debris	small woody debris, moss	exposed roots, overhanging vegetation, undercut banks	varied flow velocities, riffled surface, small eddy	5
I33	19	large woody debris, boulder	small woody debris, submerged vegetation	overhanging vegetation, exposed roots, undercut banks	none	2
I34	22	large woody debris	submerged and emergent vegetation, small woody debris	overhanging vegetation, exposed roots	none	4
I35	18	boulder/cobble, large woody debris	small woody debris	exposed roots, undercut banks	varied flow velocities, riffled surface	4
I36	20	--	--	--	--	--
I37	25	boulder/cobble, large woody debris	submerged vegetation, small woody debris	overhanging vegetation	varied flow velocities, riffled surface	4
I38	21	boulder/cobble, large woody debris	small woody debris, moss	overhanging vegetation	riffled surface, varied flow velocities, raceway	3
S39	45	large woody debris, cobble	small woody debris	overhanging vegetation, undercut banks	deep hole DS	3
M40	43	large woody debris	small woody debris	exposed roots, undercut banks, overhanging vegetation	none	2
N41	41	--	--	--	--	--
B42	38	large woody debris	small woody debris	overhanging vegetation, exposed roots, undercut banks	none	2
F43	44	boulder	moss	overhanging vegetation	none	3
F44	39	boulder/cobble	emergent vegetation, small woody debris	overhanging vegetation, riprap	riffled surface	2
F45	40	boulder/cobble	small woody debris	none	deep hole US and DS	2
H46	35	--	--	--	--	--
H47	37	large woody debris	small woody debris, moss	overhanging vegetation	none	4
H48	36	none	small woody debris, emergent vegetation	overhanging vegetation, exposed roots	none	2

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Appendix C:  
Length-Frequency Distributions by Species,  
Ipswich River Basin, Massachusetts, 1998–99

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**Appendix C. Length-frequency distributions by species, Ipswich River Basin, Massachusetts, 1998–99**

[mm, millimeter; --, when few fish were sampled, exact sizes are given instead of a range]

Size interval (mm)		Frequency	Percent	Cumulative		Size interval (mm)		Frequency	Percent	Cumulative	
Low	High			Frequency	Percent	Low	High			Frequency	Percent
<b>Ipswich River American Eel</b>						<b>Ipswich River Bluegill</b>					
50	70	0	0.0	0	0.0	20	30	1	0.5	1	0.5
70	90	5	.5	5	.5	30	40	1	.5	2	.9
90	110	30	2.9	35	3.4	40	50	0	.0	2	.9
110	130	38	3.7	73	7.1	50	60	10	4.7	12	5.6
130	150	29	2.8	102	9.9	60	70	18	8.5	30	14.1
150	170	31	3.0	133	13.0	70	80	36	16.9	66	31.0
170	190	40	3.9	173	16.9	80	90	27	12.7	93	43.7
190	210	54	5.3	227	22.1	90	100	29	13.6	122	57.3
210	230	79	7.7	306	29.8	100	110	27	12.7	149	70.0
230	250	100	9.7	406	39.6	110	120	18	8.5	167	78.4
250	270	84	8.2	490	47.8	120	130	18	8.5	185	86.9
270	290	111	10.8	601	58.6	130	140	10	4.7	195	91.5
290	310	114	11.1	715	69.7	140	150	4	1.9	199	93.4
310	330	127	12.4	842	82.1	150	160	3	1.4	202	94.8
330	350	70	6.8	912	88.9	160	170	4	1.9	206	96.7
350	370	45	4.4	957	93.3	170	180	3	1.4	209	98.1
370	390	18	1.8	975	95.0	180	190	2	.9	211	99.1
390	410	13	1.3	988	96.3	190	200	1	.5	212	99.5
410	430	10	1.0	998	97.3	200	210	0	.0	212	99.5
430	450	9	.9	1,007	98.1	210	220	0	.0	212	99.5
450	470	6	.6	1,013	98.7	220	230	0	.0	212	99.5
470	490	5	.5	1,018	99.2	230	240	0	.0	212	99.5
490	510	1	.1	1,019	99.3	240	250	0	.0	212	99.5
510	530	3	.3	1,022	99.6	250	260	0	.0	212	99.5
530	550	1	.1	1,023	99.7	260	270	0	.0	212	99.5
550	570	2	.2	1,025	99.9	270	280	0	.0	212	99.5
570	590	1	.1	1,026	100.0	280	290	0	.0	212	99.5
590	610	0	.0	1,026	100.0	290	300	1	.5	213	100.0
Total .....		1,026	100.0			Total .....		213	100.0		
<b>Ipswich River Banded Sunfish</b>						<b>Ipswich River Brown Bullhead</b>					
29	--	1	7.7	1	7.7	110	120	3	17.6	3	17.6
40	--	2	15.4	3	23.1	120	130	2	11.8	5	29.4
41	--	1	7.7	4	30.8	130	140	0	0.0	5	29.4
50	--	2	15.4	6	46.2	140	150	1	5.9	6	35.3
56	--	1	7.7	7	53.8	150	160	4	23.5	10	58.8
63	--	1	7.7	8	61.5	160	170	0	0.0	10	58.8
69	--	1	7.7	9	69.2	170	180	1	5.9	11	64.7
72	--	1	7.7	10	76.9	180	190	1	5.9	12	70.6
73	--	2	15.4	12	92.3	190	200	1	5.9	13	76.5
78	--	1	7.7	13	100.0	200	210	0	0.0	13	76.5
Total .....		13	100.0								

**Appendix C.** Length-frequency distributions by species, Ipswich River Basin, Massachusetts, 1998–99—*Continued*

Size interval (mm)		Frequency	Percent	Cumulative		Size interval (mm)		Frequency	Percent	Cumulative	
Low	High			Frequency	Percent	Low	High			Frequency	Percent
<b>Ipswich River Brown Bullhead—Continued</b>						<b>Ipswich River Chain Pickerel—Continued</b>					
210	220	0	0.0	13	76.5	340	350	1	.5	191	97.4
220	230	1	5.9	14	82.4	350	360	1	0.5	192	98.0
230	240	0	.0	14	82.4	360	370	1	.5	193	98.5
240	250	0	.0	14	82.4	370	380	0	.0	193	98.5
250	260	1	5.9	15	88.2	380	390	0	.0	193	98.5
260	270	0	.0	15	88.2	390	400	1	.5	194	99.0
270	280	0	.0	15	88.2	400	410	1	.5	195	99.5
280	290	0	.0	15	88.2	410	420	0	.0	195	99.5
290	300	0	.0	15	88.2	420	430	0	.0	195	99.5
300	310	1	5.9	16	94.1	430	440	0	.0	195	99.5
310	320	1	5.9	17	100.0	440	450	1	.5	196	100.0
Total .....		17	100.0			Total .....		196	100.0		
<b>Ipswich River Chain Pickerel</b>						<b>Ipswich River Creek Chubsucker</b>					
50	60	5	2.6	5	2.6	30	40	1	.9	1	0.9
60	70	5	2.6	10	5.1	40	50	2	1.7	3	2.6
70	80	21	10.7	31	15.8	50	60	2	1.7	5	4.3
80	90	26	13.3	57	29.1	60	70	0	.0	5	4.3
90	100	35	17.9	92	46.9	70	80	7	6.1	12	10.4
100	110	27	13.8	119	60.7	80	90	5	4.3	17	14.8
110	120	27	13.8	146	74.5	90	100	11	9.6	28	24.3
120	130	5	2.6	151	77.0	100	110	7	6.1	35	30.4
130	140	6	3.1	157	80.1	110	120	10	8.7	45	39.1
140	150	1	.5	158	80.6	120	130	4	3.5	49	42.6
150	160	2	1.0	160	81.6	130	140	7	6.1	56	48.7
160	170	1	.5	161	82.1	140	150	4	3.5	60	52.2
170	180	2	1.0	163	83.2	150	160	8	7.0	68	59.1
180	190	0	.0	163	83.2	160	170	8	7.0	76	66.1
190	200	1	.5	164	83.7	170	180	6	5.2	82	71.3
200	210	2	1.0	166	84.7	180	190	6	5.2	88	76.5
210	220	1	.5	167	85.2	190	200	1	.9	89	77.4
220	230	1	.5	168	85.7	200	210	6	5.2	95	82.6
230	240	2	1.0	170	86.7	210	220	3	2.6	98	85.2
240	250	4	2.0	174	88.8	220	230	0	.0	98	85.2
250	260	4	2.0	178	90.8	230	240	0	.0	98	85.2
260	270	1	.5	179	91.3	240	250	2	1.7	100	87.0
270	280	0	.0	179	91.3	250	260	2	1.7	102	88.7
280	290	3	1.5	182	92.9	260	270	4	3.5	106	92.2
290	300	1	.5	183	93.4	270	280	3	2.6	109	94.8
300	310	2	1.0	185	94.4	280	290	4	3.5	113	98.3
310	320	3	1.5	188	95.9	290	300	1	.9	114	99.1
320	330	1	.5	189	96.4	300	310	1	.9	115	100.0
330	340	1	.5	190	96.9	TOTAL		115	100.0		

**Appendix C.** Length-frequency distributions by species, Ipswich River Basin, Massachusetts, 1998–99—*Continued*

Size interval (mm)		Frequency	Percent	Cumulative	
Low	High			Frequency	Percent
<b>Ipswich River Fallfish</b>					
76	--	1	9.1	1	9.1
78	--	1	9.1	2	18.2
85	--	1	9.1	3	27.3
88	--	1	9.1	4	36.4
100	--	1	9.1	5	45.5
113	--	1	9.1	6	54.5
128	--	1	9.1	7	63.6
138	--	1	9.1	8	72.7
141	--	1	9.1	9	81.8
147	--	1	9.1	10	90.9
152	--	1	9.1	11	100.0
Total .....		11	100.0		
<b>Ipswich River Golden Shiner</b>					
50	60	3	7.0	3	7.0
60	70	4	9.3	7	16.3
70	80	1	2.3	8	18.6
80	90	1	2.3	9	20.9
90	100	5	11.6	14	32.6
100	110	4	9.3	18	41.9
110	120	2	4.7	20	46.5
120	130	4	9.3	24	55.8
130	140	3	7.0	27	62.8
140	150	6	14.0	33	76.7
150	160	4	9.3	37	86.0
160	170	2	4.7	39	90.7
170	180	2	4.7	41	95.3
180	190	0	0.0	41	95.3
190	200	2	4.7	43	100.0
Total .....		43	100.0		
<b>Ipswich River Green Sunfish</b>					
70	80	5	35.7	5	35.7
80	90	3	21.4	8	57.1
90	100	3	21.4	11	78.6
100	110	2	14.3	13	92.9
110	120	0	.0	13	92.9
120	130	0	.0	13	92.9
130	140	0	.0	13	92.9
140	150	0	.0	13	92.9
150	160	1	7.1	14	100.0
Total .....		14	100.0		

Size interval (mm)		Frequency	Percent	Cumulative	
Low	High			Frequency	Percent
<b>Ipswich River (including Ipswich Park Pond) Largemouth Bass</b>					
50	70	22	57.9	22	57.9
70	90	6	15.8	28	73.7
90	110	0	.0	28	73.7
110	130	1	2.6	29	76.3
130	150	1	2.6	30	78.9
150	170	3	7.9	33	86.8
170	190	0	.0	33	86.8
190	210	0	.0	33	86.8
210	230	1	2.6	34	89.5
230	250	3	7.9	37	97.4
250	270	0	.0	37	97.4
270	290	0	.0	37	97.4
290	310	0	.0	37	97.4
310	330	1	2.6	38	100.0
Total .....		38	100.0		
<b>Ipswich River Pumpkinseed Sunfish</b>					
40	50	4	.8	4	.8
50	60	47	9.6	51	10.4
60	70	110	22.5	161	32.9
70	80	120	24.5	281	57.5
80	90	91	18.6	372	76.1
90	100	32	6.5	404	82.6
100	110	19	3.9	423	86.5
110	120	20	4.1	443	90.6
120	130	15	3.1	458	93.7
130	140	16	3.3	474	96.9
140	150	10	2.0	484	99.0
150	160	4	.8	488	99.8
160	170	1	.2	489	100.0
Total .....		489	100.0		
<b>Ipswich River Redbreast Sunfish</b>					
30	40	1	.4	1	.4
40	50	9	3.8	10	4.3
50	60	29	12.4	39	16.7
60	70	39	16.7	78	33.3
70	80	47	20.1	125	53.4

**Appendix C.** Length-frequency distributions by species, Ipswich River Basin, Massachusetts, 1998–99—*Continued*

Size interval (mm)		Frequency	Percent	Cumulative	
Low	High			Frequency	Percent
<b>Ipswich River Redbreast Sunfish—Continued</b>					
80	90	18	7.7	143	61.1
90	100	12	5.1	155	66.2
100	110	14	6.0	169	72.2
110	120	22	9.4	191	81.6
120	130	15	6.4	206	88.0
130	140	9	3.8	215	91.9
140	150	9	3.8	224	95.7
150	160	7	3.0	231	98.7
160	170	2	.9	233	99.6
170	180	0	.0	233	99.6
180	190	0	.0	233	99.6
190	200	0	.0	233	99.6
200	210	1	.4	234	100.0
Total .....		234	100.0		
<b>Ipswich River Redfin Pickerel</b>					
50	60	1	.1	1	0.1
60	70	7	.5	8	0.6
70	80	76	5.2	84	5.8
80	90	132	9.1	216	14.9
90	100	223	15.3	439	30.2
100	110	344	23.7	783	53.9
110	120	299	20.6	1,082	74.4
120	130	143	9.8	1,225	84.3
130	140	35	2.4	1,260	86.7
140	150	16	1.1	1,276	87.8
150	160	26	1.8	1,302	89.5
160	170	21	1.4	1,323	91.0
170	180	35	2.4	1,358	93.4
180	190	36	2.5	1,394	95.9
190	200	28	1.9	1,422	97.8
200	210	14	1.0	1,436	98.8
210	220	7	.5	1,443	99.2
220	230	2	.1	1,445	99.4
230	240	4	.3	1,449	99.7
240	250	3	.2	1,452	99.9
250	260	2	.1	1,454	100.0
Total .....		1,454	100.0		

Size interval (mm)		Frequency	Percent	Cumulative	
Low	High			Frequency	Percent
<b>Ipswich River (not including Ipswich Park Pond)</b>					
<b>Largemouth Bass</b>					
50	--	1	3.8	1	3.8
56	--	1	3.8	2	7.7
59	--	1	3.8	3	11.5
60	--	2	7.7	5	19.2
61	--	1	3.8	6	23.1
62	--	3	11.5	9	34.6
64	--	2	7.7	11	42.3
65	--	6	23.1	17	65.4
66	--	1	3.8	18	69.2
67	--	1	3.8	19	73.1
72	--	2	7.7	21	80.8
75	--	1	3.8	22	84.6
78	--	1	3.8	23	88.5
82	--	1	3.8	24	92.3
110	--	1	3.8	25	96.2
130	--	1	3.8	26	100.0
Total .....		26	100.0		

<b>Ipswich River (not including Ipswich Park Pond)</b>					
<b>White Sucker</b>					
40	--	3	4.8	3	4.8
43	--	1	1.6	4	6.3
49	--	1	1.6	5	7.9
50	--	1	1.6	6	9.5
52	--	1	1.6	7	11.1
54	--	3	4.8	10	15.9
58	--	1	1.6	11	17.5
59	--	3	4.8	14	22.2
60	--	4	6.3	18	28.6
61	--	2	3.2	20	31.7
62	--	3	4.8	23	36.5
63	--	1	1.6	24	38.1
64	--	1	1.6	25	39.7
65	--	1	1.6	26	41.3
66	--	3	4.8	29	46.0

**Appendix C.** Length-frequency distributions by species, Ipswich River Basin, Massachusetts, 1998–99—*Continued*

Size interval (mm)		Frequency	Percent	Cumulative	
Low	High			Frequency	Percent
<b>Ipswich River (not including Ipswich Park Pond)</b>					
<b>White Sucker—Continued</b>					
68	--	1	1.6	30	47.6
70	--	2	3.2	32	50.8
72	--	1	1.6	33	52.4
74	--	1	1.6	34	54.0
76	--	1	1.6	35	55.6
77	--	1	1.6	36	57.1
80	--	1	1.6	37	58.7
81	--	1	1.6	38	60.3
85	--	1	1.6	39	61.9
86	--	1	1.6	40	63.5
90	--	1	1.6	41	65.1
92	--	2	3.2	43	68.3
113	--	1	1.6	44	69.8
115	--	1	1.6	45	71.4
122	--	1	1.6	46	73.0
125	--	1	1.6	47	74.6
137	--	1	1.6	48	76.2
141	--	1	1.6	49	77.8
144	--	1	1.6	50	79.4
149	--	1	1.6	51	81.0
150	--	1	1.6	52	82.5
152	--	1	1.6	53	84.1
167	--	1	1.6	54	85.7
180	--	1	1.6	55	87.3
184	--	1	1.6	56	88.9
186	--	1	1.6	57	90.5
188	--	1	1.6	58	92.1
191	--	1	1.6	59	93.7
198	--	1	1.6	60	95.2
206	--	1	1.6	61	96.8
220	--	1	1.6	62	98.4
250	--	1	1.6	63	100.0
Total .....		63	100.0		
<b>Ipswich River Sea Lamprey</b>					
40	--	1	2.0	1	2.0
89	--	1	2.0	2	4.1
100	--	2	4.1	4	8.2
110	--	1	2.0	5	10.2
120	--	3	6.1	8	16.3

Size interval (mm)		Frequency	Percent	Cumulative	
Low	High			Frequency	Percent
<b>Ipswich River Sea Lamprey—Continued</b>					
125	--	1	2.0	9	18.4
130	--	7	14.3	16	32.7
140	--	13	26.5	29	59.2
141	--	1	2.0	30	61.2
150	--	9	18.4	39	79.6
152	--	1	2.0	40	81.6
160	--	4	8.2	44	89.8
170	--	3	6.1	47	95.9
180	--	2	4.1	49	100.0
Total .....		49	100.0		
<b>Ipswich River Swamp Darter</b>					
20	30	2	6.9	2	6.9
30	40	4	13.8	6	20.7
40	50	14	48.3	20	69.0
50	60	9	31.0	29	100.0
Total .....		29	100.0		
<b>Ipswich River (including Ipswich Park Pond)</b>					
<b>White Sucker</b>					
40	60	14	14.7	14	14.7
60	80	22	23.2	36	37.9
80	100	7	7.4	43	45.3
100	120	2	2.1	45	47.4
120	140	3	3.2	48	50.5
140	160	5	5.3	53	55.8
160	180	1	1.1	54	56.8
180	200	6	6.3	60	63.2
200	220	1	1.1	61	64.2
220	240	1	1.1	62	65.3
240	260	1	1.1	63	66.3
260	280	1	1.1	64	67.4
280	300	0	.0	64	67.4
300	320	1	1.1	65	68.4
320	340	1	1.1	66	69.5
340	360	1	1.1	67	70.5
360	380	0	.0	67	70.5
380	400	4	4.2	71	74.7
400	420	5	5.3	76	80.0
420	440	10	10.5	86	90.5

**Appendix C.** Length-frequency distributions by species, Ipswich River Basin, Massachusetts, 1998–99—*Continued*

Size interval (mm)		Frequency	Percent	Cumulative		Size interval (mm)		Frequency	Percent	Cumulative	
Low	High			Frequency	Percent	Low	High			Frequency	Percent
<b>Ipswich River (including Ipswich Park Pond)</b>						<b>Ipswich River Yellow Perch—Continued</b>					
<b>White Sucker—Continued</b>											
440	460	1	1.1	87	91.6	160	170	8	6.1	123	93.2
460	480	1	1.1	88	92.6	170	180	0	0.0	123	93.2
480	500	6	6.3	94	98.9	180	190	3	2.3	126	95.5
500	520	1	1.1	95	100.0	190	200	1	.8	127	96.2
						200	210	1	.8	128	97.0
Total .....		95	100.0			210	220	0	.0	128	97.0
<b>Ipswich River Yellow Bullhead</b>											
30	40	2	2.7	2	2.7	220	230	1	.8	129	97.7
40	50	3	4.1	5	6.8	230	240	1	.8	130	98.5
50	60	0	.0	5	6.8	240	250	0	.0	130	98.5
60	70	0	.0	5	6.8	250	260	0	.0	130	98.5
70	80	0	.0	5	6.8	260	270	0	.0	130	98.5
80	90	1	1.4	6	8.1	270	280	2	1.5	132	100.0
90	100	4	5.4	10	13.5	Total .....		132	100.0		
100	110	4	5.4	14	18.9	<b>Boston Brook American Eel</b>					
110	120	6	8.1	20	27.0	120	--	1	2.8	1	2.8
120	130	8	10.8	28	37.8	130	--	1	2.8	2	5.6
130	140	5	6.8	33	44.6	140	--	1	2.8	3	8.3
140	150	2	2.7	35	47.3	150	--	1	2.8	4	11.1
150	160	10	13.5	45	60.8	160	--	1	2.8	5	13.9
160	170	3	4.1	48	64.9	170	--	3	8.3	8	22.2
170	180	6	8.1	54	73.0	180	--	3	8.3	11	30.6
180	190	2	2.7	56	75.7	190	--	1	2.8	12	33.3
190	200	6	8.1	62	83.8	200	--	3	8.3	15	41.7
200	210	4	5.4	66	89.2	220	--	3	8.3	18	50.0
210	220	5	6.8	71	95.9	230	--	1	2.8	19	52.8
220	230	2	2.7	73	98.6	240	--	2	5.6	21	58.3
230	240	0	.0	73	98.6	250	--	3	8.3	24	66.7
240	250	1	1.4	74	100.0	260	--	2	5.6	26	72.2
Total .....		74	100.0			270	--	3	8.3	29	80.6
<b>Ipswich River Yellow Perch</b>											
60	70	9	6.8	9	6.8	300	--	1	2.8	30	83.3
70	80	19	14.4	28	21.2	320	--	2	5.6	32	88.9
80	90	6	4.5	34	25.8	330	--	2	5.6	34	94.4
90	100	0	.0	34	25.8	410	--	1	2.8	35	97.2
100	110	3	2.3	37	28.0	450	--	1	2.8	36	100.0
110	120	6	4.5	43	32.6	Total .....		36	100.0		
120	130	9	6.8	52	39.4	<b>Boston Brook Pumpkinseed Sunfish</b>					
130	140	22	16.7	74	56.1	55	--	1	3.4	1	3.4
140	150	27	20.5	101	76.5	59	--	1	3.4	2	6.9
150	160	14	10.6	115	87.1	81	--	1	3.4	3	10.3
						82	--	1	3.4	4	13.8
						83	--	1	3.4	5	17.2

**Appendix C.** Length-frequency distributions by species, Ipswich River Basin, Massachusetts, 1998–99—*Continued*

<b>Boston Brook Pumpkinseed Sunfish—Continued</b>						<b>Fish Brook American Eel</b>					
Size interval (mm)		Frequency	Percent	Cumulative		Size interval (mm)		Frequency	Percent	Cumulative	
Low	High			Frequency	Percent	Low	High			Frequency	Percent
85	--	1	3.4	6	20.7	90	--	1	0.9	1	0.9
86	--	2	6.9	8	27.6	100	--	2	1.8	3	2.7
88	--	3	10.3	11	37.9	110	--	1	.9	4	3.6
89	--	1	3.4	12	41.4	120	--	5	4.5	9	8.0
90	--	2	6.9	14	48.3	130	--	2	1.8	11	9.8
93	--	1	3.4	15	51.7	140	--	1	.9	12	10.7
94	--	1	3.4	16	55.2	150	--	2	1.8	14	12.5
95	--	1	3.4	17	58.6	160	--	5	4.5	19	17.0
97	--	1	3.4	18	62.1	170	--	5	4.5	24	21.4
98	--	1	3.4	19	65.5	180	--	8	7.1	32	28.6
99	--	1	3.4	20	69.0	190	--	2	1.8	34	30.4
100	--	2	6.9	22	75.9	200	--	5	4.5	39	34.8
102	--	1	3.4	23	79.3	210	--	9	8.0	48	42.9
103	--	1	3.4	24	82.8	220	--	6	5.4	54	48.2
105	--	1	3.4	25	86.2	230	--	8	7.1	62	55.4
108	--	1	3.4	26	89.7	240	--	6	5.4	68	60.7
110	--	1	3.4	27	93.1	250	--	6	5.4	74	66.1
119	--	1	3.4	28	96.6	260	--	4	3.6	78	69.6
122	--	1	3.4	29	100.0	270	--	7	6.3	85	75.9
Total .....		29	100.0			280	--	3	2.7	88	78.6
<b>Boston Brook Redfin Pickerel</b>						290	--	3	2.7	91	81.3
86	--	1	3.0	1	3.0	300	--	4	3.6	95	84.8
118	--	1	3.0	2	6.1	310	--	5	4.5	100	89.3
123	--	1	3.0	3	9.1	320	--	3	2.7	103	92.0
131	--	2	6.1	5	15.2	330	--	2	1.8	105	93.8
132	--	1	3.0	6	18.2	340	--	3	2.7	108	96.4
133	--	2	6.1	8	24.2	360	--	2	1.8	110	98.2
134	--	3	9.1	11	33.3	410	--	1	.9	111	99.1
135	--	3	9.1	14	42.4	450	--	1	.9	112	100.0
137	--	2	6.1	16	48.5	Total .....		112	100.0		
139	--	5	15.2	21	63.6	<b>Fish Brook Chain Pickerel</b>					
141	--	1	3.0	22	66.7	50	--	1	3.7	1	3.7
142	--	3	9.1	25	75.8	55	--	1	3.7	2	7.4
147	--	1	3.0	26	78.8	58	--	1	3.7	3	11.1
149	--	1	3.0	27	81.8	62	--	1	3.7	4	14.8
152	--	1	3.0	28	84.8	66	--	1	3.7	5	18.5
155	--	2	6.1	30	90.9	70	--	1	3.7	6	22.2
163	--	1	3.0	31	93.9	74	--	1	3.7	7	25.9
166	--	1	3.0	32	97.0	75	--	2	7.4	9	33.3
168	--	1	3.0	33	100.0	80	--	1	3.7	10	37.0
Total .....		33	100.0			81	--	1	3.7	11	40.7

**Appendix C.** Length-frequency distributions by species, Ipswich River Basin, Massachusetts, 1998–99—*Continued*

Size interval (mm)		Frequency	Percent	Cumulative		Size interval (mm)		Frequency	Percent	Cumulative	
Low	High			Frequency	Percent	Low	High			Frequency	Percent
<b>Fish Brook Chain Pickerel—Continued</b>						<b>Fish Brook Fallfish—Continued</b>					
85	--	3	11.1	14	51.9	131	--	2	1.5	113	85.0
88	--	2	7.4	16	59.3	132	--	1	.8	114	85.7
95	--	2	7.4	18	66.7	133	--	1	.8	115	86.5
102	--	1	3.7	19	70.4	134	--	1	.8	116	87.2
103	--	1	3.7	20	74.1	136	--	2	1.5	118	88.7
107	--	1	3.7	21	77.8	137	--	1	.8	119	89.5
110	--	1	3.7	22	81.5	140	--	1	.8	120	90.2
115	--	1	3.7	23	85.2	141	--	2	1.5	122	91.7
175	--	1	3.7	24	88.9	142	--	1	.8	123	92.5
181	--	1	3.7	25	92.6	143	--	1	.8	124	93.2
184	--	1	3.7	26	96.3	144	--	1	.8	125	94.0
230	--	1	3.7	27	100.0	146	--	3	2.3	128	96.2
Total .....		27	100.0			149	--	1	.8	129	97.0
<b>Fish Brook Fallfish</b>						155	--	1	.8	130	97.7
21	--	5	3.8	5	3.8	157	--	1	.8	131	98.5
22	--	2	1.5	7	5.3	165	--	1	.8	132	99.2
24	--	6	4.5	13	9.8	176	--	1	.8	133	100.0
25	--	10	7.5	23	17.3	Total .....		133	100.0		
26	--	7	5.3	30	22.6	<b>Fish Brook Pumpkinseed Sunfish</b>					
27	--	8	6.0	38	28.6	70	--	2	9.1	2	9.1
28	--	7	5.3	45	33.8	71	--	1	4.5	3	13.6
29	--	12	9.0	57	42.9	75	--	3	13.6	6	27.3
30	--	13	9.8	70	52.6	80	--	1	4.5	7	31.8
31	--	11	8.3	81	60.9	82	--	1	4.5	8	36.4
32	--	3	2.3	84	63.2	85	--	3	13.6	11	50.0
33	--	6	4.5	90	67.7	88	--	1	4.5	12	54.5
34	--	7	5.3	97	72.9	90	--	3	13.6	15	68.2
35	--	1	.8	98	73.7	95	--	1	4.5	16	72.7
36	--	1	.8	99	74.4	96	--	1	4.5	17	77.3
82	--	1	.8	100	75.2	100	--	3	13.6	20	90.9
107	--	1	.8	101	75.9	105	--	1	4.5	21	95.5
111	--	1	.8	102	76.7	115	--	1	4.5	22	100.0
114	--	1	.8	103	77.4	Total .....		22	100.0		
120	--	1	.8	104	78.2	<b>Fish Brook Redfin Pickerel</b>					
121	--	2	1.5	106	79.7	65	--	1	2.0	1	2.0
122	--	1	.8	107	80.5	70	--	1	2.0	2	3.9
126	--	2	1.5	109	82.0	74	--	1	2.0	3	5.9
127	--	1	.8	110	82.7	75	--	1	2.0	4	7.8
128	--	1	.8	111	83.5	80	--	1	2.0	5	9.8



**Appendix C.** Length-frequency distributions by species, Ipswich River Basin, Massachusetts, 1998–99—*Continued*

Fish Brook Redfin Pickerel— <i>Continued</i>						Howlett Brook American Eel— <i>Continued</i>					
Size interval (mm)		Frequency	Percent	Cumulative		Size interval (mm)		Frequency	Percent	Cumulative	
Low	High			Frequency	Percent	Low	High			Frequency	Percent
81	--	1	2.0	6	11.8	130	--	3	5.0	12	20.0
85	--	2	3.9	8	15.7	140	--	1	1.7	13	21.7
89	--	1	2.0	9	17.6	170	--	1	1.7	14	23.3
90	--	1	2.0	10	19.6	180	--	2	3.3	16	26.7
91	--	1	2.0	11	21.6	190	--	2	3.3	18	30.0
94	--	1	2.0	12	23.5	200	--	2	3.3	20	33.3
115	--	1	2.0	13	25.5	203	--	2	3.3	22	36.7
120	--	3	5.9	16	31.4	210	--	2	3.3	24	40.0
124	--	1	2.0	17	33.3	220	--	7	11.7	31	51.7
125	--	3	5.9	20	39.2	230	--	1	1.7	32	53.3
127	--	2	3.9	22	43.1	240	--	1	1.7	33	55.0
128	--	1	2.0	23	45.1	250	--	2	3.3	35	58.3
130	--	2	3.9	25	49.0	260	--	5	8.3	40	66.7
131	--	1	2.0	26	51.0	270	--	2	3.3	42	70.0
132	--	1	2.0	27	52.9	290	--	2	3.3	44	73.3
135	--	2	3.9	29	56.9	300	--	3	5.0	47	78.3
136	--	2	3.9	31	60.8	305	--	3	5.0	50	83.3
137	--	2	3.9	33	64.7	310	--	1	1.7	51	85.0
138	--	1	2.0	34	66.7	320	--	1	1.7	52	86.7
140	--	4	7.8	38	74.5	330	--	1	1.7	53	88.3
141	--	1	2.0	39	76.5	340	--	1	1.7	54	90.0
145	--	1	2.0	40	78.4	350	--	1	1.7	55	91.7
146	--	1	2.0	41	80.4	356	--	1	1.7	56	93.3
148	--	1	2.0	42	82.4	380	--	1	1.7	57	95.0
149	--	1	2.0	43	84.3	381	--	1	1.7	58	96.7
150	--	2	3.9	45	88.2	400	--	1	1.7	59	98.3
151	--	1	2.0	46	90.2	457	--	1	1.7	60	100.0
152	--	1	2.0	47	92.2	Total .....		60	100.0		
155	--	1	2.0	48	94.1	<b>Howlett Brook Largemouth Bass</b>					
158	--	1	2.0	49	96.1	25	--	3	4.6	3	4.6
162	--	1	2.0	50	98.0	35	--	1	1.5	4	6.2
166	--	1	2.0	51	100.0	38	--	4	6.2	8	12.3
Total .....		51	100.0			41	--	2	3.1	10	15.4
<b>Howlett Brook American Eel</b>						42	--	2	3.1	12	18.5
90	--	3	5.0	3	5.0	45	--	2	3.1	14	21.5
100	--	1	1.7	4	6.7	46	--	5	7.7	19	29.2
110	--	2	3.3	6	10.0	47	--	8	12.3	27	41.5
120	--	1	1.7	7	11.7	48	--	1	1.5	28	43.1
128	--	2	3.3	9	15.0	49	--	1	1.5	29	44.6

**Appendix C.** Length-frequency distributions by species, Ipswich River Basin, Massachusetts, 1998–99—*Continued*

Size interval (mm)		Frequency	Percent	Cumulative	
Low	High			Frequency	Percent
<b>Howlett Brook Largemouth Bass—Continued</b>					
50	--	1	1.5	30	46.2
51	--	5	7.7	35	53.8
52	--	10	15.4	45	69.2
53	--	3	4.6	48	73.8
54	--	5	7.7	53	81.5
55	--	6	9.2	59	90.8
56	--	2	3.1	61	93.8
57	--	2	3.1	63	96.9
60	--	1	1.5	64	98.5
140	--	1	1.5	65	100.0
Total .....		65	100.0		
<b>Howlett Brook Redfin Pickerel</b>					
75	--	1	1.5	1	1.5
76	--	1	1.5	2	2.9
89	--	1	1.5	3	4.4
114	--	2	2.9	5	7.4
115	--	2	2.9	7	10.3
116	--	1	1.5	8	11.8
119	--	1	1.5	9	13.2
120	--	2	2.9	11	16.2
121	--	3	4.4	14	20.6
122	--	4	5.9	18	26.5
123	--	1	1.5	19	27.9
124	--	4	5.9	23	33.8
125	--	3	4.4	26	38.2
126	--	2	2.9	28	41.2
127	--	2	2.9	30	44.1
128	--	13	19.1	43	63.2
130	--	1	1.5	44	64.7
131	--	4	5.9	48	70.6
132	--	1	1.5	49	72.1
133	--	3	4.4	52	76.5
134	--	1	1.5	53	77.9
135	--	3	4.4	56	82.4
137	--	1	1.5	57	83.8
140	--	5	7.4	62	91.2
147	--	1	1.5	63	92.6
151	--	1	1.5	64	94.1
152	--	1	1.5	65	95.6
155	--	1	1.5	66	97.1
163	--	1	1.5	67	98.5
187	--	1	1.5	68	100.0
Total .....		68	100.0		

Size interval (mm)		Frequency	Percent	Cumulative	
Low	High			Frequency	Percent
<b>Ipswich River (Ipswich Park Pond only) Largemouth Bass</b>					
65	--	1	8.3	1	8.3
66	--	1	8.3	2	16.7
68	--	1	8.3	3	25.0
75	--	1	8.3	4	33.3
150	--	1	8.3	5	41.7
161	--	1	8.3	6	50.0
162	--	1	8.3	7	58.3
222	--	1	8.3	8	66.7
240	--	1	8.3	9	75.0
241	--	1	8.3	10	83.3
242	--	1	8.3	11	91.7
311	--	1	8.3	12	100.0
Total .....		12	100.0		
<b>Ipswich River (Ipswich Park Pond only) White Sucker</b>					
277	--	1	3.1	1	3.1
310	--	1	3.1	2	6.3
325	--	1	3.1	3	9.4
353	--	1	3.1	4	12.5
387	--	1	3.1	5	15.6
396	--	2	6.3	7	21.9
398	--	1	3.1	8	25.0
402	--	1	3.1	9	28.1
404	--	1	3.1	10	31.3
411	--	2	6.3	12	37.5
418	--	1	3.1	13	40.6
422	--	2	6.3	15	46.9
426	--	2	6.3	17	53.1
428	--	2	6.3	19	59.4
430	--	1	3.1	20	62.5
433	--	1	3.1	21	65.6
435	--	2	6.3	23	71.9
440	--	1	3.1	24	75.0
463	--	1	3.1	25	78.1
480	--	1	3.1	26	81.3
485	--	1	3.1	27	84.4
492	--	2	6.3	29	90.6
494	--	1	3.1	30	93.8
496	--	1	3.1	31	96.9
508	--	1	3.1	32	100.0
Total .....		32	100.0		

**Appendix C.** Length-frequency distributions by species, Ipswich River Basin, Massachusetts, 1998–99—*Continued*

Size interval (mm)		Frequency	Percent	Cumulative		Size interval (mm)		Frequency	Percent	Cumulative	
Low	High			Frequency	Percent	Low	High			Frequency	Percent
<b>Martins Brook American Eel</b>						<b>Martins Brook Pumpkinseed Sunfish—Continued</b>					
140	--	4	16.0	4	16.0	58	--	2	2.0	7	7.0
150	--	1	4.0	5	20.0	59	--	2	2.0	9	9.0
160	--	1	4.0	6	24.0	60	--	1	1.0	10	10.0
170	--	2	8.0	8	32.0	61	--	4	4.0	14	14.0
180	--	1	4.0	9	36.0	62	--	2	2.0	16	16.0
200	--	1	4.0	10	40.0	64	--	1	1.0	17	17.0
210	--	1	4.0	11	44.0	65	--	4	4.0	21	21.0
240	--	1	4.0	12	48.0	66	--	1	1.0	22	22.0
260	--	2	8.0	14	56.0	67	--	5	5.0	27	27.0
280	--	1	4.0	15	60.0	68	--	3	3.0	30	30.0
300	--	2	8.0	17	68.0	69	--	2	2.0	32	32.0
310	--	1	4.0	18	72.0	70	--	10	10.0	42	42.0
340	--	1	4.0	19	76.0	71	--	12	12.0	54	54.0
350	--	1	4.0	20	80.0	72	--	5	5.0	59	59.0
360	--	2	8.0	22	88.0	73	--	3	3.0	62	62.0
420	--	2	8.0	24	96.0	74	--	5	5.0	67	67.0
450	--	1	4.0	25	100.0	75	--	6	6.0	73	73.0
Total .....		25	100.0			76	--	2	2.0	75	75.0
<b>Martins Brook Creek Chubsucker</b>						77	--	2	2.0	77	77.0
20	--	1	1.7	1	1.7	78	--	4	4.0	81	81.0
21	--	1	1.7	2	3.3	79	--	1	1.0	82	82.0
22	--	3	5.0	5	8.3	80	--	1	1.0	83	83.0
23	--	5	8.3	10	16.7	82	--	6	6.0	89	89.0
24	--	6	10.0	16	26.7	84	--	3	3.0	92	92.0
25	--	14	23.3	30	50.0	85	--	1	1.0	93	93.0
26	--	7	11.7	37	61.7	86	--	2	2.0	95	95.0
27	--	8	13.3	45	75.0	88	--	1	1.0	96	96.0
28	--	6	10.0	51	85.0	89	--	1	1.0	97	97.0
29	--	4	6.7	55	91.7	91	--	1	1.0	98	98.0
30	--	2	3.3	57	95.0	110	--	1	1.0	99	99.0
34	--	1	1.7	58	96.7	111	--	1	1.0	100	100.0
160	--	1	1.7	59	98.3	Total .....		100	100.0		
164	--	1	1.7	60	100.0	<b>Martins Brook Redfin Pickerel</b>					
Total .....		60	100.0			41	--	1	3.7	1	3.7
<b>Martins Brook Pumpkinseed Sunfish</b>						70	--	1	3.7	2	7.4
43	--	1	1.0	1	1.0	84	--	1	3.7	3	11.1
51	--	1	1.0	2	2.0	86	--	1	3.7	4	14.8
53	--	1	1.0	3	3.0	101	--	1	3.7	5	18.5
56	--	1	1.0	4	4.0						
57	--	1	1.0	5	5.0						

**Appendix C.** Length-frequency distributions by species, Ipswich River Basin, Massachusetts, 1998–99—*Continued*

Size interval (mm)		Frequency	Percent	Cumulative	
Low	High			Frequency	Percent
<b>Martins Brook Redfin Pickerel—Continued</b>					
115	--	1	3.7	6	22.2
120	--	1	3.7	7	25.9
125	--	1	3.7	8	29.6
128	--	1	3.7	9	33.3
133	--	1	3.7	10	37.0
136	--	1	3.7	11	40.7
138	--	1	3.7	12	44.4
140	--	1	3.7	13	48.1
143	--	4	14.8	17	63.0
144	--	3	11.1	20	74.1
146	--	1	3.7	21	77.8
149	--	1	3.7	22	81.5
150	--	1	3.7	23	85.2
170	--	1	3.7	24	88.9
175	--	1	3.7	25	92.6
191	--	1	3.7	26	96.3
205	--	1	3.7	27	100.0
Total .....		27	100.0		
<b>Norris Brook Golden Shiner</b>					
85	--	1	5.0	1	5.0
95	--	2	10.0	3	15.0
100	--	2	10.0	5	25.0
110	--	6	30.0	11	55.0
115	--	7	35.0	18	90.0

Size interval (mm)		Frequency	Percent	Cumulative	
Low	High			Frequency	Percent
<b>Norris Brook Golden Shiner—Continued</b>					
125	--	1	5.0	19	95.0
130	--	1	5.0	20	100.0
Total .....		20	100.0		
<b>Norris Brook Redfin Pickerel</b>					
65	--	2	8.3	2	8.3
90	--	1	4.2	3	12.5
100	--	1	4.2	4	16.7
110	--	3	12.5	7	29.2
115	--	3	12.5	10	41.7
120	--	7	29.2	17	70.8
125	--	1	4.2	18	75.0
130	--	2	8.3	20	83.3
135	--	3	12.5	23	95.8
140	--	1	4.2	24	100.0
Total .....		24	100.0		

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Appendix D:  
Length-Frequency Distributions by Site,  
Ipswich River Basin, Massachusetts, 1998–99

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**Appendix D.** Length-frequency distribution by site, Ipswich River Basin, Massachusetts, 1998–99

[ID, identifier; MDFW, Massachusetts Division of Fish and Wildlife; USGS, U.S. Geological Survey; --, not found]

USGS ID	MDFW ID	Species	Mean length	Standard deviation	Number of measurements	Frequency	Percent of total	Percent of sample
<b>IPSWICH RIVER</b>								
<b>Wetland reach between Woburn Street and I-93</b>								
2	11	Redfin pickerel	101.11	9.15	114	186	9.56	97.89
2	11	Banded sunfish	72.50	.71	2	2	15.38	1.05
2	11	Pumpkinseed	108.00	--	1	1	.20	.53
2	11	Yellow bullhead	156.00	--	1	1	1.35	.53
2	11	American eel	--	--	0	0	--	--
2	11	Black crappie	--	--	0	0	--	--
2	11	Bluegill	--	--	0	0	--	--
2	11	Brown bullhead	--	--	0	0	--	--
2	11	Brown trout	--	--	0	0	--	--
2	11	Chain pickerel	--	--	0	0	--	--
2	11	Creek chubsucker	--	--	0	0	--	--
2	11	Fallfish	--	--	0	0	--	--
2	11	Golden shiner	--	--	0	0	--	--
2	11	Green sunfish	--	--	0	0	--	--
2	11	Largemouth bass	--	--	0	0	--	--
2	11	Rainbow trout	--	--	0	0	--	--
2	11	Redbreast sunfish	--	--	0	0	--	--
2	11	Sea lamprey	--	--	0	0	--	--
2	11	Swamp darter	--	--	0	0	--	--
2	11	White sucker	--	--	0	0	--	--
2	11	Yellow perch	--	--	0	0	--	--
<b>Downstream of Mill Street</b>								
8	1	Redfin pickerel	100.40	19.28	100	131	6.74	80.86
8	1	Pumpkinseed	81.33	18.85	15	15	3.07	9.26
8	1	White sucker	58.00	20.49	5	5	5.26	3.09
8	1	American eel	346.67	46.19	3	3	.29	1.85
8	1	Chain pickerel	100.00	14.14	2	2	1.02	1.23
8	1	Swamp darter	35.00	7.07	2	2	6.90	1.23
8	1	Yellow perch	70.00	.00	2	2	1.52	1.23
8	1	Creek chubsucker	90.00	--	1	1	.90	.62
8	1	Golden shiner	110.00	--	1	1	2.33	.62
8	1	Banded sunfish	--	--	0	0	--	--
8	1	Black crappie	--	--	0	0	--	--
8	1	Bluegill	--	--	0	0	--	--
8	1	Brown bullhead	--	--	0	0	--	--
8	1	Brown trout	--	--	0	0	--	--
8	1	Fallfish	--	--	0	0	--	--
8	1	Green sunfish	--	--	0	0	--	--
8	1	Largemouth bass	--	--	0	0	--	--
8	1	Rainbow trout	--	--	0	0	--	--
8	1	Redbreast sunfish	--	--	0	0	--	--
8	1	Sea lamprey	--	--	0	0	--	--
8	1	Yellow bullhead	--	--	0	0	--	--

**Appendix D.** Length-frequency distribution by site, Ipswich River Basin, Massachusetts, 1998–99—*Continued*

USGS ID	MDFW ID	Species	Mean length	Standard deviation	Number of measurements	Frequency	Percent of total	Percent of sample
<b>IPSWICH RIVER—Continued</b>								
<b>Upstream of Route 28</b>								
9	3	Redfin pickerel	105.17	9.55	77	77	3.96	67.54
9	3	White sucker	57.33	6.44	18	18	18.95	15.79
9	3	Pumpkinseed	62.57	5.56	7	7	1.43	6.14
9	3	Chain pickerel	93.60	14.60	5	5	2.55	4.39
9	3	American eel	345.67	137.37	3	3	.29	2.63
9	3	Swamp darter	30.00	1.41	2	2	6.90	1.75
9	3	Largemouth bass	64.00	--	1	1	2.63	.88
9	3	Yellow perch	69.00	--	1	1	.76	.88
9	3	Banded sunfish	--	--	0	0	--	--
9	3	Black crappie	--	--	0	0	--	--
9	3	Bluegill	--	--	0	0	--	--
9	3	Brown bullhead	--	--	0	0	--	--
9	3	Brown trout	--	--	0	0	--	--
9	3	Creek chubsucker	--	--	0	0	--	--
9	3	Fallfish	--	--	0	0	--	--
9	3	Golden shiner	--	--	0	0	--	--
9	3	Green sunfish	--	--	0	0	--	--
9	3	Rainbow trout	--	--	0	0	--	--
9	3	Redbreast sunfish	--	--	0	0	--	--
9	3	Sea lamprey	--	--	0	0	--	--
9	3	Yellow bullhead	--	--	0	0	--	--
<b>Downstream of Route 28</b>								
	2	Redfin pickerel	100.00	8.73	22	22	1.13	62.86
	2	Swamp darter	35.00	10.00	4	4	13.79	11.43
	2	American eel	276.67	161.97	3	3	.29	8.57
	2	Chain pickerel	100.00	14.14	2	2	1.02	5.71
	2	Creek chubsucker	85.00	7.07	2	2	1.80	5.71
	2	Pumpkinseed	85.00	7.07	2	2	.41	5.71
	2	Banded sunfish	--	--	0	0	--	--
	2	Black crappie	--	--	0	0	--	--
	2	Bluegill	--	--	0	0	--	--
	2	Brown bullhead	--	--	0	0	--	--
	2	Brown trout	--	--	0	0	--	--
	2	Fallfish	--	--	0	0	--	--
	2	Golden shiner	--	--	0	0	--	--
	2	Green sunfish	--	--	0	0	--	--
	2	Largemouth bass	--	--	0	0	--	--
	2	Rainbow trout	--	--	0	0	--	--
	2	Redbreast sunfish	--	--	0	0	--	--
	2	Sea lamprey	--	--	0	0	--	--
	2	White sucker	--	--	0	0	--	--
	2	Yellow bullhead	--	--	0	0	--	--
	2	Yellow perch	--	--	0	0	--	--

**Appendix D. Length-frequency distribution by site, Ipswich River Basin, Massachusetts, 1998–99—Continued**

USGS ID	MDFW ID	Species	Mean length	Standard deviation	Number of measurements	Frequency	Percent of total	Percent of sample
<b>IPSWICH RIVER—Continued</b>								
<b>Upstream of power line</b>								
10	4	Redfin pickerel	112.57	10.94	28	28	1.44	70.00
10	4	White sucker	123.00	56.54	4	4	4.21	10.00
10	4	Pumpkinseed	68.00	4.36	3	3	.61	7.50
10	4	American eel	255.00	162.63	2	2	.19	5.00
10	4	Chain pickerel	216.00	--	1	1	.51	2.50
10	4	Swamp darter	53.00	--	1	1	3.45	2.50
10	4	Yellow perch	71.00	--	1	1	.76	2.50
10	4	Banded sunfish	--	--	0	0	--	--
10	4	Black crappie	--	--	0	0	--	--
10	4	Bluegill	--	--	0	0	--	--
10	4	Brown bullhead	--	--	0	0	--	--
10	4	Brown trout	--	--	0	0	--	--
10	4	Creek chubsucker	--	--	0	0	--	--
10	4	Fallfish	--	--	0	0	--	--
10	4	Golden shiner	--	--	0	0	--	--
10	4	Green sunfish	--	--	0	0	--	--
10	4	Largemouth bass	--	--	0	0	--	--
10	4	Rainbow trout	--	--	0	0	--	--
10	4	Redbreast sunfish	--	--	0	0	--	--
10	4	Sea lamprey	--	--	0	0	--	--
10	4	Yellow bullhead	--	--	0	0	--	--
<b>Downstream of Martins Brook</b>								
11	7	Redfin pickerel	123.73	20.49	40	40	2.06	52.63
11	7	American eel	240.56	73.33	9	9	.88	11.84
11	7	Bluegill	130.00	83.59	6	6	2.82	7.89
11	7	Swamp darter	43.67	7.58	6	6	20.69	7.89
11	7	Pumpkinseed	83.80	17.09	5	5	1.02	6.58
11	7	Yellow perch	99.60	39.10	5	5	3.79	6.58
11	7	Chain pickerel	76.00	11.17	4	4	2.04	5.26
11	7	Largemouth bass	130.00	--	1	1	2.63	1.32
11	7	Banded sunfish	--	--	0	0	--	--
11	7	Black crappie	--	--	0	0	--	--
11	7	Brown bullhead	--	--	0	0	--	--
11	7	Brown trout	--	--	0	0	--	--
11	7	Creek chubsucker	--	--	0	0	--	--
11	7	Fallfish	--	--	0	0	--	--
11	7	Golden shiner	--	--	0	0	--	--
11	7	Green sunfish	--	--	0	0	--	--
11	7	Rainbow trout	--	--	0	0	--	--
11	7	Redbreast sunfish	--	--	0	0	--	--
11	7	Sea lamprey	--	--	0	0	--	--
11	7	White sucker	--	--	0	0	--	--
11	7	Yellow bullhead	--	--	0	0	--	--



**Appendix D.** Length-frequency distribution by site, Ipswich River Basin, Massachusetts, 1998–99—*Continued*

USGS ID	MDFW ID	Species	Mean length	Standard deviation	Number of measurements	Frequency	Percent of total	Percent of sample
<b>IPSWICH RIVER—Continued</b>								
<b>Parrish Park (downstream of Chestnut Street)</b>								
12	6	Pumpkinseed	79.95	13.01	19	19	3.89	29.69
12	6	American eel	252.00	85.87	15	15	1.46	23.44
12	6	Redfin pickerel	132.75	31.95	12	12	.62	18.75
12	6	White sucker	70.40	15.37	10	10	10.53	15.63
12	6	Bluegill	87.33	23.89	6	6	2.82	9.38
12	6	Chain pickerel	115.00	--	1	1	.51	1.56
12	6	Swamp darter	50.00	--	1	1	3.45	1.56
12	6	Banded sunfish	--	--	0	0	--	--
12	6	Black crappie	--	--	0	0	--	--
12	6	Brown bullhead	--	--	0	0	--	--
12	6	Brown trout	--	--	0	0	--	--
12	6	Creek chubsucker	--	--	0	0	--	--
12	6	Fallfish	--	--	0	0	--	--
12	6	Golden shiner	--	--	0	0	--	--
12	6	Green sunfish	--	--	0	0	--	--
12	6	Largemouth bass	--	--	0	0	--	--
12	6	Rainbow trout	--	--	0	0	--	--
12	6	Redbreast sunfish	--	--	0	0	--	--
12	6	Sea lamprey	--	--	0	0	--	--
12	6	Yellow bullhead	--	--	0	0	--	--
12	6	Yellow perch	--	--	0	0	--	--
<b>Ipswich Park Pond, downstream of Central Street</b>								
14	23	Pumpkinseed	94.21	33.88	82	82	16.77	25.39
14	23	Bluegill	100.24	32.11	71	71	33.33	21.98
14	23	Creek chubsucker	160.54	44.18	52	52	46.85	16.10
14	23	Yellow perch	133.68	30.92	38	38	28.79	11.76
14	23	Chain pickerel	227.96	116.10	26	26	13.27	8.05
14	23	Redfin pickerel	158.00	51.16	18	18	.93	5.57
14	23	Largemouth bass	166.92	84.97	12	12	31.58	3.72
14	23	Golden shiner	96.64	52.48	11	11	25.58	3.41
14	23	American eel	330.00	34.06	6	6	.58	1.86
14	23	Black crappie	171.67	41.93	3	3	100.00	.93
14	23	Brown bullhead	210.50	21.92	2	2	11.76	.62
14	23	White sucker	462.00	48.08	2	2	2.11	.62
14	23	Banded sunfish	--	--	0	0	--	--
14	23	Brown trout	--	--	0	0	--	--
14	23	Fallfish	--	--	0	0	--	--
14	23	Green sunfish	--	--	0	0	--	--
14	23	Rainbow trout	--	--	0	0	--	--
14	23	Redbreast sunfish	--	--	0	0	--	--
14	23	Sea lamprey	--	--	0	0	--	--
14	23	Swamp darter	--	--	0	0	--	--
14	23	Yellow bullhead	--	--	0	0	--	--

**Appendix D.** Length-frequency distribution by site, Ipswich River Basin, Massachusetts, 1998–99—*Continued*

USGS ID	MDFW ID	Species	Mean length	Standard deviation	Number of measurements	Frequency	Percent of total	Percent of sample
<b>IPSWICH RIVER—Continued</b>								
<b>Ipwich Park Pond, downstream of Central Street</b>								
15	26	White sucker	419.97	53.84	30	30	31.58	30.93
15	26	Yellow perch	154.64	34.40	28	28	21.21	28.87
15	26	Creek chubsucker	264.24	26.96	17	17	15.32	17.53
15	26	Golden shiner	156.50	16.68	12	12	27.91	12.37
15	26	Chain pickerel	324.80	69.48	5	5	2.55	5.15
15	26	Brown bullhead	290.67	32.32	3	3	17.65	3.09
15	26	Pumpkinseed	133.00	--	1	1	.20	1.03
15	26	Redfin pickerel	233.00	--	1	1	.05	1.03
15	26	American eel	--	--	0	0	--	--
15	26	Banded sunfish	--	--	0	0	--	--
15	26	Black crappie	--	--	0	0	--	--
15	26	Bluegill	--	--	0	0	--	--
15	26	Brown trout	--	--	0	0	--	--
15	26	Fallfish	--	--	0	0	--	--
15	26	Green sunfish	--	--	0	0	--	--
15	26	Largemouth bass	--	--	0	0	--	--
15	26	Rainbow trout	--	--	0	0	--	--
15	26	Redbreast sunfish	--	--	0	0	--	--
15	26	Sea lamprey	--	--	0	0	--	--
15	26	Swamp darter	--	--	0	0	--	--
15	26	Yellow bullhead	--	--	0	0	--	--
<b>Behind North Reading Fire Station</b>								
17	14	Redfin pickerel	134.79	32.09	52	52	2.67	43.33
17	14	Pumpkinseed	84.41	29.15	29	29	5.93	24.17
17	14	American eel	279.09	86.54	11	11	1.07	9.17
17	14	Yellow perch	148.56	18.37	9	9	6.82	7.50
17	14	Creek chubsucker	64.13	18.57	8	8	7.21	6.67
17	14	Bluegill	107.20	10.52	5	5	2.35	4.17
17	14	Swamp darter	47.67	3.06	3	3	10.34	2.50
17	14	Chain pickerel	91.50	.71	2	2	1.02	1.67
17	14	White sucker	74.00	--	1	1	1.05	.83
17	14	Banded sunfish	--	--	0	0	--	--
17	14	Black crappie	--	--	0	0	--	--
17	14	Brown bullhead	--	--	0	0	--	--
17	14	Brown trout	--	--	0	0	--	--
17	14	Fallfish	--	--	0	0	--	--
17	14	Golden shiner	--	--	0	0	--	--
17	14	Green sunfish	--	--	0	0	--	--
17	14	Largemouth bass	--	--	0	0	--	--
17	14	Rainbow trout	--	--	0	0	--	--
17	14	Redbreast sunfish	--	--	0	0	--	--
17	14	Sea lamprey	--	--	0	0	--	--
17	14	Yellow bullhead	--	--	0	0	--	--

**Appendix D.** Length-frequency distribution by site, Ipswich River Basin, Massachusetts, 1998–99—*Continued*

USGS ID	MDFW ID	Species	Mean length	Standard deviation	Number of measurements	Frequency	Percent of total	Percent of sample
<b>IPSWICH RIVER—Continued</b>								
<b>Downstream of South Middleton Dam, upstream of Russell Street</b>								
18	8	Pumpkinseed	76.55	20.63	76	76	15.54	30.40
18	8	American eel	235.74	107.54	54	54	5.26	21.60
18	8	Bluegill	91.00	23.39	22	22	10.33	8.80
18	8	Redfin pickerel	129.09	27.99	22	22	1.13	8.80
18	8	Yellow bullhead	154.21	39.06	19	19	25.68	7.60
18	8	Yellow perch	132.92	17.43	13	13	9.85	5.20
18	8	Golden shiner	98.45	14.18	11	11	25.58	4.40
18	8	White sucker	181.56	39.71	9	9	9.47	3.60
18	8	Redbreast sunfish	119.57	15.04	7	7	2.97	2.80
18	8	Brown bullhead	129.50	16.97	6	6	35.29	2.40
18	8	Creek chubsucker	97.40	2.61	5	5	4.50	2.00
18	8	Banded sunfish	64.00	19.80	2	2	15.38	.80
18	8	Largemouth bass	71.50	9.19	2	2	5.26	.80
18	8	Chain pickerel	283.00	--	1	1	.51	.40
18	8	Green sunfish	86.00	--	1	1	7.14	.40
18	8	Black crappie	--	--	0	0	--	--
18	8	Brown trout	--	--	0	0	--	--
18	8	Fallfish	--	--	0	0	--	--
18	8	Rainbow trout	--	--	0	0	--	--
18	8	Sea lamprey	--	--	0	0	--	--
18	8	Swamp darter	--	--	0	0	--	--
<b>Downstream of South Middleton Dam, upstream of Russell Street</b>								
19	42	Bluegill	104.20	40.09	41	41	19.25	28.28
19	42	Pumpkinseed	100.95	21.37	21	21	4.29	14.48
19	42	American eel	298.82	118.63	17	17	1.66	11.72
19	42	Largemouth bass	61.69	5.38	13	13	34.21	8.97
19	42	Redfin pickerel	135.64	13.63	11	11	.57	7.59
19	42	Yellow bullhead	127.10	66.01	10	10	13.51	6.90
19	42	Chain pickerel	88.33	29.70	9	9	4.59	6.21
19	42	Golden shiner	123.57	13.75	7	7	16.28	4.83
19	42	White sucker	134.60	15.76	5	5	5.26	3.45
19	42	Fallfish	149.50	3.54	2	2	18.18	1.38
19	42	Swamp darter	49.00	4.24	2	2	6.90	1.38
19	42	Yellow perch	211.00	35.36	2	2	1.52	1.38
19	42	Banded sunfish	63.00	--	1	1	7.69	.69
19	42	Brown bullhead	151.00	--	1	1	5.88	.69
19	42	Creek chubsucker	151.00	--	1	1	.90	.69
19	42	Green sunfish	104.00	--	1	1	7.14	.69
19	42	Sea lamprey	150.00	--	1	1	2.04	.69
19	42	Black crappie	--	--	0	0	--	--
19	42	Brown trout	--	--	0	0	--	--
19	42	Rainbow trout	--	--	0	0	--	--
19	42	Redbreast sunfish	--	--	0	0	--	--

**Appendix D.** Length-frequency distribution by site, Ipswich River Basin, Massachusetts, 1998–99—*Continued*

USGS ID	MDFW ID	Species	Mean length	Standard deviation	Number of measurements	Frequency	Percent of total	Percent of sample
<b>IPSWICH RIVER—Continued</b>								
<b>Upstream of South Middleton Gage</b>								
20	5	Pumpkinseed	75.23	17.55	35	35	7.16	26.52
20	5	Redfin pickerel	120.84	31.23	31	31	1.59	23.48
20	5	American eel	270.92	117.68	24	24	2.34	18.18
20	5	Redbreast sunfish	106.80	24.53	10	10	4.24	7.58
20	5	Yellow perch	121.00	13.08	7	7	5.30	5.30
20	5	Bluegill	101.67	21.70	6	6	2.82	4.55
20	5	Chain pickerel	211.40	54.43	5	5	2.55	3.79
20	5	White sucker	136.00	85.15	4	4	4.21	3.03
20	5	Sea lamprey	139.33	13.58	3	3	6.12	2.27
20	5	Green sunfish	124.50	45.96	2	2	14.29	1.52
20	5	Largemouth bass	92.50	24.75	2	2	5.26	1.52
20	5	Yellow bullhead	142.00	53.74	2	2	2.70	1.52
20	5	Creek chubsucker	91.00	--	1	1	.90	.76
20	5	Banded sunfish	--	--	0	0	--	--
20	5	Black crappie	--	--	0	0	--	--
20	5	Brown bullhead	--	--	0	0	--	--
20	5	Brown trout	--	--	0	0	--	--
20	5	Fallfish	--	--	0	0	--	--
20	5	Golden shiner	--	--	0	0	--	--
20	5	Rainbow trout	--	--	0	0	--	--
20	5	Swamp darter	--	--	0	0	--	--
<b>Biuleys Corner</b>								
23	9	Redfin pickerel	121.72	50.84	58	58	2.98	43.28
23	9	American eel	260.24	54.75	41	41	4.00	30.60
23	9	Redbreast sunfish	138.45	30.49	11	11	4.66	8.21
23	9	Pumpkinseed	80.29	29.12	7	7	1.43	5.22
23	9	Yellow bullhead	122.33	46.19	6	6	8.11	4.48
23	9	Creek chubsucker	109.75	2.87	4	4	100.00	2.99
23	9	Chain pickerel	74.33	16.01	3	3	1.53	2.24
23	9	Sea lamprey	150.00	14.14	2	2	4.08	1.49
23	9	Swamp darter	47.50	3.54	2	2	6.90	1.49
23	9	Banded sunfish	--	--	0	0	--	--
23	9	Black crappie	--	--	0	0	--	--
23	9	Bluegill	--	--	0	0	--	--
23	9	Brown bullhead	--	--	0	0	--	--
23	9	Brown trout	--	--	0	0	--	--
23	9	Fallfish	--	--	0	0	--	--
23	9	Golden shiner	--	--	0	0	--	--
23	9	Green sunfish	--	--	0	0	--	--
23	9	Largemouth bass	--	--	0	0	--	--
23	9	Rainbow trout	--	--	0	0	--	--
23	9	White sucker	--	--	0	0	--	--
23	9	Yellow perch	--	--	0	0	--	--

**Appendix D.** Length-frequency distribution by site, Ipswich River Basin, Massachusetts, 1998–99—*Continued*

USGS ID	MDFW ID	Species	Mean length	Standard deviation	Number of measurements	Frequency	Percent of total	Percent of sample
<b>IPSWICH RIVER—Continued</b>								
<b>Upstream of Route 62 near Middleton Colony</b>								
24	10	Redfin pickerel	124.50	46.77	119	156	8.02	67.53
24	10	American eel	260.00	63.36	42	42	4.09	18.18
24	10	Chain pickerel	94.94	61.07	18	18	9.18	7.79
24	10	Brown bullhead	162.50	10.61	2	2	11.76	.87
24	10	Creek chubsucker	113.00	4.24	2	2	1.80	.87
24	10	Pumpkinseed	95.00	19.80	2	2	.41	.87
24	10	Redbreast sunfish	143.00	11.31	2	2	.85	.87
24	10	Yellow bullhead	133.00	128.69	2	2	2.70	.87
24	10	Yellow perch	139.00	29.70	2	2	1.52	.87
24	10	Bluegill	101.00	--	1	1	.47	.43
24	10	Golden shiner	100.00	--	1	1	2.33	.43
24	10	Swamp darter	45.00	--	1	1	3.45	.43
24	10	Banded sunfish	--	--	0	0	--	--
24	10	Black crappie	--	--	0	0	--	--
24	10	Brown trout	--	--	0	0	--	--
24	10	Fallfish	--	--	0	0	--	--
24	10	Green sunfish	--	--	0	0	--	--
24	10	Largemouth bass	--	--	0	0	--	--
24	10	Rainbow trout	--	--	0	0	--	--
24	10	Sea lamprey	--	--	0	0	--	--
24	10	White sucker	--	--	0	0	--	--
<b>Upstream of Maple Street (Route 62)</b>								
25	12	Redfin pickerel	95.17	35.82	145	157	8.07	70.09
25	12	American eel	276.86	65.83	35	35	3.41	15.63
25	12	Chain pickerel	96.90	56.62	10	10	5.10	4.46
25	12	Redbreast sunfish	121.20	36.19	10	10	4.24	4.46
25	12	Bluegill	96.67	11.50	3	3	1.41	1.34
25	12	Largemouth bass	67.33	4.04	3	3	7.89	1.34
25	12	Yellow perch	200.00	7.07	2	2	1.52	.89
25	12	Creek chubsucker	112.00	-	1	1	.90	.45
25	12	Pumpkinseed	86.00	--	1	1	.20	.45
25	12	Swamp darter	45.00	--	1	1	3.45	.45
25	12	Yellow bullhead	195.00	--	1	1	1.35	.45
25	12	Banded sunfish	--	--	0	0	--	--
25	12	Black crappie	--	--	0	0	--	--
25	12	Brown bullhead	--	--	0	0	--	--
25	12	Brown trout	--	--	0	0	--	--
25	12	Fallfish	--	--	0	0	--	--
25	12	Golden shiner	--	--	0	0	--	--
25	12	Green sunfish	--	--	0	0	--	--
25	12	Rainbow trout	--	--	0	0	--	--
25	12	Sea lamprey	--	--	0	0	--	--
25	12	White sucker	--	--	0	0	--	--

**Appendix D.** Length-frequency distribution by site, Ipswich River Basin, Massachusetts, 1998–99—*Continued*

USGS ID	MDFW ID	Species	Mean length	Standard deviation	Number of measurements	Frequency	Percent of total	Percent of sample
<b>IPSWICH RIVER—Continued</b>								
<b>Upstream of Peabody Street</b>								
26	15	Redfin pickerel	115.19	32.39	100	163	8.38	55.82
26	15	American eel	257.82	65.81	78	78	7.60	26.71
26	15	Redbreast sunfish	81.13	23.87	16	16	6.78	5.48
26	15	Chain pickerel	86.69	13.08	13	13	6.63	4.45
26	15	Yellow perch	70.82	2.36	11	11	8.33	3.77
26	15	Sea lamprey	109.75	27.33	4	4	8.16	1.37
26	15	Banded sunfish	42.50	19.09	2	2	15.38	.68
26	15	Creek chubsucker	136.00	26.87	2	2	1.80	.68
26	15	Bluegill	77.00	--	1	1	.47	.34
26	15	Pumpkinseed	92.00	--	1	1	.20	.34
26	15	Yellow bullhead	215.00	--	1	1	1.35	.34
26	15	Black crappie	--	--	0	0	--	--
26	15	Brown bullhead	--	--	0	0	--	--
26	15	Brown trout	--	--	0	0	--	--
26	15	Fallfish	--	--	0	0	--	--
26	15	Golden shiner	--	--	0	0	--	--
26	15	Green sunfish	--	--	0	0	--	--
26	15	Largemouth bass	--	--	0	0	--	--
26	15	Rainbow trout	--	--	0	0	--	--
26	15	Swamp darter	--	--	0	0	--	--
26	15	White sucker	--	--	0	0	--	--
<b>Downstream of Thunder Bridge</b>								
27	13	Redfin pickerel	106.34	16.26	79	79	4.06	46.75
27	13	American eel	251.79	58.90	56	56	5.46	33.14
27	13	Redbreast sunfish	77.73	27.68	11	12	5.08	7.10
27	13	Green sunfish	79.57	7.57	7	7	50.00	4.14
27	13	Chain pickerel	98.83	9.09	6	6	3.06	3.55
27	13	Pumpkinseed	67.50	14.85	2	2	.41	1.18
27	13	Yellow bullhead	146.00	12.73	2	2	2.70	1.18
27	13	Bluegill	67.00	--	1	1	.47	.59
27	13	Brown bullhead	180.00	--	1	1	5.88	.59
27	13	Sea lamprey	130.00	--	1	1	2.04	.59
27	13	Swamp darter	51.00	--	1	1	3.45	.59
27	13	Yellow perch	70.00	--	1	1	.76	.59
27	13	Banded sunfish	--	--	0	0	--	--
27	13	Black crappie	--	--	0	0	--	--
27	13	Brown trout	--	--	0	0	--	--
27	13	Creek chubsucker	--	--	0	0	--	--
27	13	Fallfish	--	--	0	0	--	--
27	13	Golden shiner	--	--	0	0	--	--
27	13	Largemouth bass	--	--	0	0	--	--
27	13	Rainbow trout	--	--	0	0	--	--
27	13	White sucker	--	--	0	0	--	--

**Appendix D.** Length-frequency distribution by site, Ipswich River Basin, Massachusetts, 1998–99—*Continued*

USGS ID	MDFW ID	Species	Mean length	Standard deviation	Number of measurements	Frequency	Percent of total	Percent of sample
<b>IPSWICH RIVER—Continued</b>								
<b>Upstream of Rowley Bridge (at Fish Brook)</b>								
29	16	Redfin pickerel	115.71	12.02	98	374	19.23	88.00
29	16	American eel	255.20	60.22	25	25	2.44	5.88
29	16	Chain pickerel	114.82	12.90	11	11	5.61	2.59
29	16	Pumpkinseed	89.11	18.34	9	9	1.84	2.12
29	16	Sea lamprey	173.33	5.77	3	3	6.12	.71
29	16	Bluegill	102.00	4.24	2	2	.94	.47
29	16	Redbreast sunfish	56.00	--	1	1	.42	.24
29	16	Banded sunfish	--	--	0	0	--	--
29	16	Black crappie	--	--	0	0	--	--
29	16	Brown bullhead	--	--	0	0	--	--
29	16	Brown trout	--	--	0	0	--	--
29	16	Creek chubsucker	--	--	0	0	--	--
29	16	Fallfish	--	--	0	0	--	--
29	16	Golden shiner	--	--	0	0	--	--
29	16	Green sunfish	--	--	0	0	--	--
29	16	Largemouth bass	--	--	0	0	--	--
29	16	Rainbow trout	--	--	0	0	--	--
29	16	Swamp darter	--	--	0	0	--	--
29	16	White sucker	--	--	0	0	--	--
29	16	Yellow bullhead	--	--	0	0	--	--
29	16	Yellow perch	--	--	0	0	--	--
<b>Downstream of Salem Street</b>								
31	17	American eel	247.24	65.27	87	87	8.48	40.47
31	17	Redfin pickerel	118.13	21.71	72	72	3.70	33.49
31	17	Chain pickerel	112.00	27.08	18	18	9.18	8.37
31	17	Pumpkinseed	76.43	15.08	14	14	2.86	6.51
31	17	Bluegill	97.11	15.62	9	9	4.23	4.19
31	17	Redbreast sunfish	113.00	16.52	3	3	1.27	1.40
31	17	Yellow bullhead	156.33	81.13	3	3	4.05	1.40
31	17	Green sunfish	86.00	18.38	2	2	14.29	.93
31	17	Largemouth bass	65.00	.00	2	2	5.26	.93
31	17	Yellow perch	61.50	2.12	2	2	1.52	.93
31	17	Banded sunfish	40.00	--	1	1	7.69	.47
31	17	Sea lamprey	160.00	--	1	1	2.04	.47
31	17	Swamp darter	52.00	--	1	1	3.45	.47
31	17	Black crappie	--	--	0	0	--	--
31	17	Brown bullhead	--	--	0	0	--	--
31	17	Brown trout	--	--	0	0	--	--
31	17	Creek chubsucker	--	--	0	0	--	--
31	17	Fallfish	--	--	0	0	--	--
31	17	Golden shiner	--	--	0	0	--	--
31	17	Rainbow trout	--	--	0	0	--	--
31	17	White sucker	--	--	0	0	--	--

**Appendix D. Length-frequency distribution by site, Ipswich River Basin, Massachusetts, 1998–99—Continued**

USGS ID	MDFW ID	Species	Mean length	Standard deviation	Number of measurements	Frequency	Percent of total	Percent of sample
<b>IPSWICH RIVER—Continued</b>								
<b>Downstream of Route 1, near Topsfield Fairgrounds</b>								
32	24	American eel	224.40	80.34	75	75	7.31	42.86
32	24	Redfin pickerel	104.89	12.62	46	46	2.37	26.29
32	24	Pumpkinseed	70.04	6.80	24	24	4.91	13.71
32	24	Sea lamprey	145.00	10.69	8	8	16.33	4.57
32	24	Chain pickerel	107.86	6.47	7	7	3.57	4.00
32	24	Fallfish	85.50	11.00	4	4	36.36	2.29
32	24	Bluegill	73.00	7.94	3	3	1.41	1.71
32	24	Redbreast sunfish	94.50	75.66	2	2	.85	1.14
32	24	Yellow perch	64.50	2.12	2	2	1.52	1.14
32	24	Banded sunfish	41.00	--	1	1	7.69	.57
32	24	Largemouth bass	64.00	--	1	1	2.63	.57
32	24	White sucker	77.00	--	1	1	1.05	.57
32	24	Yellow bullhead	93.00	--	1	1	1.35	.57
32	24	Black crappie	--	--	0	0	--	--
32	24	Brown bullhead	--	--	0	0	--	--
32	24	Brown trout	--	--	0	0	--	--
32	24	Creek chubsucker	--	--	0	0	--	--
32	24	Golden shiner	--	--	0	0	--	--
32	24	Green sunfish	--	--	0	0	--	--
32	24	Rainbow trout	--	--	0	0	--	--
32	24	Swamp darter	--	--	0	0	--	--
<b>Route 97 canoe launch</b>								
33	19	American eel	271.38	78.21	58	58	5.65	31.87
33	19	Pumpkinseed	75.60	12.23	58	58	11.86	31.87
33	19	Bluegill	94.08	27.05	25	25	11.74	13.74
33	19	Redfin pickerel	130.84	43.48	19	19	.98	10.44
33	19	Redbreast sunfish	95.44	26.03	9	9	3.81	4.95
33	19	Chain pickerel	105.67	10.63	6	6	3.06	3.30
33	19	Yellow bullhead	160.00	55.66	4	4	5.41	2.20
33	19	Sea lamprey	180.00	--	1	1	2.04	.55
33	19	Swamp darter	47.00	--	1	1	3.45	.55
33	19	Yellow perch	64.00	--	1	1	.76	.55
33	19	Banded sunfish	--	--	0	0	--	--
33	19	Black crappie	--	--	0	0	--	--
33	19	Brown bullhead	--	--	0	0	--	--
33	19	Brown trout	--	--	0	0	--	--
33	19	Creek chubsucker	--	--	0	0	--	--
33	19	Fallfish	--	--	0	0	--	--
33	19	Golden shiner	--	--	0	0	--	--
33	19	Green sunfish	--	--	0	0	--	--
33	19	Largemouth bass	--	--	0	0	--	--
33	19	Rainbow trout	--	--	0	0	--	--
33	19	White sucker	--	--	0	0	--	--



**Appendix D.** Length-frequency distribution by site, Ipswich River Basin, Massachusetts, 1998–99—*Continued*

USGS ID	MDFW ID	Species	Mean length	Standard deviation	Number of measurements	Frequency	Percent of total	Percent of sample
<b>IPSWICH RIVER—Continued</b>								
<b>Audubon canoe launch</b>								
34	22	Redfin pickerel	117.20	18.43	138	138	7.10	61.61
34	22	American eel	260.00	68.00	43	43	4.19	19.20
34	22	Chain pickerel	124.87	35.61	23	23	11.73	10.27
34	22	Bluegill	94.33	10.39	6	6	2.82	2.68
34	22	Pumpkinseed	81.40	8.32	5	5	1.02	2.23
34	22	Redbreast sunfish	87.00	38.58	5	5	2.12	2.23
34	22	Creek chubsucker	146.50	9.19	2	2	1.80	.89
34	22	Banded sunfish	69.00	--	1	1	7.69	.45
34	22	Yellow bullhead	167.00	--	1	1	1.35	.45
34	22	Black crappie	--	--	0	0	--	--
34	22	Brown bullhead	--	--	0	0	--	--
34	22	Brown trout	--	--	0	0	--	--
34	22	Fallfish	--	--	0	0	--	--
34	22	Golden shiner	--	--	0	0	--	--
34	22	Green sunfish	--	--	0	0	--	--
34	22	Largemouth bass	--	--	0	0	--	--
34	22	Rainbow trout	--	--	0	0	--	--
34	22	Sea lamprey	--	--	0	0	--	--
34	22	Swamp darter	--	--	0	0	--	--
34	22	White sucker	--	--	0	0	--	--
34	22	Yellow perch	--	--	0	0	--	--
<b>Downstream of Willowdale Dam, Ipswich Gage, upstream of Winthrop Street</b>								
35	18	American eel	269.50	81.78	100	100	9.75	43.10
35	18	Redbreast sunfish	83.41	26.89	51	51	21.61	21.98
35	18	Pumpkinseed	82.54	17.36	24	24	4.91	10.34
35	18	Yellow bullhead	159.40	41.27	15	15	20.27	6.47
35	18	Redfin pickerel	147.77	32.91	13	13	.67	5.60
35	18	Sea lamprey	145.71	5.35	7	7	14.29	3.02
35	18	Brown trout	258.75	11.76	4	4	66.67	1.72
35	18	Creek chubsucker	108.25	16.54	4	4	3.60	1.72
35	18	White sucker	87.50	5.74	4	4	4.21	1.72
35	18	Fallfish	127.33	14.01	3	3	27.27	1.29
35	18	Yellow perch	93.33	34.39	3	3	2.27	1.29
35	18	Banded sunfish	61.50	16.26	2	2	15.38	.86
35	18	Largemouth bass	82.00	--	1	1	2.63	.43
35	18	Swamp darter	52.00	--	1	1	3.45	.43
35	18	Black crappie	--	--	0	0	--	--
35	18	Bluegill	--	--	0	0	--	--
35	18	Brown bullhead	--	--	0	0	--	--
35	18	Chain pickerel	--	--	0	0	--	--
35	18	Golden shiner	--	--	0	0	--	--
35	18	Green sunfish	--	--	0	0	--	--
35	18	Rainbow trout	--	--	0	0	--	--

**Appendix D.** Length-frequency distribution by site, Ipswich River Basin, Massachusetts, 1998–99—*Continued*

USGS ID	MDFW ID	Species	Mean length	Standard deviation	Number of measurements	Frequency	Percent of total	Percent of sample
<b>IPSWICH RIVER—Continued</b>								
<b>Winthrop Road, downstream of private bridge</b>								
36	20	American eel	326.40	88.88	25	25	2.44	39.68
36	20	Redbreast sunfish	63.00	16.47	16	16	6.78	25.40
36	20	Pumpkinseed	68.21	8.73	14	14	2.86	22.22
36	20	Bluegill	57.50	43.13	2	2	.94	3.17
36	20	Redfin pickerel	104.00	2.83	2	2	.10	3.17
36	20	Yellow bullhead	171.00	2.83	2	2	2.70	3.17
36	20	Brown bullhead	150.00	--	1	1	5.88	1.59
36	20	Sea lamprey	170.00	--	1	1	2.04	1.59
36	20	Banded sunfish	--	--	0	0	--	--
36	20	Black crappie	--	--	0	0	--	--
36	20	Brown trout	--	--	0	0	--	--
36	20	Chain pickerel	--	--	0	0	--	--
36	20	Creek chubsucker	--	--	0	0	--	--
36	20	Fallfish	--	--	0	0	--	--
36	20	Golden shiner	--	--	0	0	--	--
36	20	Green sunfish	--	--	0	0	--	--
36	20	Largemouth bass	--	--	0	0	--	--
36	20	Rainbow trout	--	--	0	0	--	--
36	20	Swamp darter	--	--	0	0	--	--
36	20	White sucker	--	--	0	0	--	--
36	20	Yellow perch	--	--	0	0	--	--
<b>Upstream of Mill Street, at riffle</b>								
37	25	American eel	263.52	97.10	105	105	10.23	40.08
37	25	Redbreast sunfish	71.78	19.40	58	58	24.58	22.14
37	25	Pumpkinseed	74.41	11.45	32	32	6.54	12.21
37	25	Redfin pickerel	112.59	23.04	27	27	1.39	10.31
37	25	Creek chubsucker	100.64	16.73	11	11	9.91	4.20
37	25	Chain pickerel	101.00	13.62	9	9	4.59	3.44
37	25	Sea lamprey	128.89	10.54	9	9	18.37	3.44
37	25	Yellow bullhead	118.50	11.03	4	4	5.41	1.53
37	25	Bluegill	94.67	12.22	3	3	1.41	1.15
37	25	Yellow perch	84.00	4.24	2	2	1.52	.76
37	25	Brown bullhead	115.00	--	1	1	5.88	.38
37	25	Green sunfish	107.00	--	1	1	7.14	.38
37	25	Banded sunfish	--	--	0	0	--	--
37	25	Black crappie	--	--	0	0	--	--
37	25	Brown trout	--	--	0	0	--	--
37	25	Fallfish	--	--	0	0	--	--
37	25	Golden shiner	--	--	0	0	--	--
37	25	Largemouth bass	--	--	0	0	--	--
37	25	Rainbow trout	--	--	0	0	--	--
37	25	Swamp darter	--	--	0	0	--	--
37	25	White sucker	--	--	0	0	--	--

**Appendix D.** Length-frequency distribution by site, Ipswich River Basin, Massachusetts, 1998–99—*Continued*

USGS ID	MDFW ID	Species	Mean length	Standard deviation	Number of measurements	Frequency	Percent of total	Percent of sample
<b>IPSWICH RIVER—Continued</b>								
<b>Downstream of Mill Road</b>								
38	21	American eel	280.00	69.07	109	109	10.62	64.50
38	21	Redbreast sunfish	96.65	29.12	23	23	9.75	13.61
38	21	Redfin pickerel	123.10	22.08	10	10	.51	5.92
38	21	Chain pickerel	101.22	14.91	9	9	4.59	5.33
38	21	Sea lamprey	125.00	35.86	8	8	16.33	4.73
38	21	Brown trout	286.50	20.51	2	2	33.33	1.18
38	21	Creek chubsucker	117.00	35.36	2	2	1.80	1.18
38	21	Fallfish	111.50	37.48	2	2	18.18	1.18
38	21	White sucker	105.00	28.28	2	2	2.11	1.18
38	21	Banded sunfish	40.00	--	1	1	7.69	.59
38	21	Rainbow trout	304.00	--	1	1	100.00	.59
38	21	Black crappie	--	--	0	0	--	--
38	21	Bluegill	--	--	0	0	--	--
38	21	Brown bullhead	--	--	0	0	--	--
38	21	Golden shiner	--	--	0	0	--	--
38	21	Green sunfish	--	--	0	0	--	--
38	21	Largemouth bass	--	--	0	0	--	--
38	21	Pumpkinseed	--	--	0	0	--	--
38	21	Swamp darter	--	--	0	0	--	--
38	21	Yellow bullhead	--	--	0	0	--	--
38	21	Yellow perch	--	--	0	0	--	--
<b>TRIBUTARIES</b>								
<b>Skug River, in Harold Parker State Forest</b>								
39	45	Pumpkinseed	71.07	8.66	94	143	67.14	71.14
39	45	Bluegill	74.94	28.84	16	16	34.78	7.96
39	45	Banded sunfish	64.77	8.50	13	13	76.47	6.47
39	45	Redfin pickerel	118.09	35.19	11	11	5.19	5.47
39	45	Brown bullhead	104.13	13.87	8	8	61.54	3.98
39	45	Yellow perch	118.00	11.11	5	5	50.00	2.49
39	45	American eel	400.00	70.71	2	2	.82	1.00
39	45	Yellow bullhead	145.00	18.38	2	2	33.33	1.00
39	45	Swamp darter	58.00	--	1	1	12.50	.50
39	45	Brook trout	--	--	0	0	--	--
39	45	Brown trout	--	--	0	0	--	--
39	45	Chain pickerel	--	--	0	0	--	--
39	45	Creek chubsucker	--	--	0	0	--	--
39	45	Fallfish	--	--	0	0	--	--
39	45	Golden shiner	--	--	0	0	--	--
39	45	Green sunfish	--	--	0	0	--	--
39	45	Largemouth bass	--	--	0	0	--	--
39	45	Redbreast sunfish	--	--	0	0	--	--
39	45	Sea lamprey	--	--	0	0	--	--
39	45	White sucker	--	--	0	0	--	--

**Appendix D.** Length-frequency distribution by site, Ipswich River Basin, Massachusetts, 1998–99—*Continued*

USGS ID	MDFW ID	Species	Mean length	Standard deviation	Number of measurements	Frequency	Percent of total	Percent of sample
<b>TRIBUTARIES—Continued</b>								
<b>Martins Brook, upstream of Park Street</b>								
40	43	Creek chubsucker	30.36	25.00	59	59	81.94	42.45
40	43	Redfin pickerel	143.24	27.78	25	25	11.79	17.99
40	43	American eel	245.65	92.38	23	23	9.39	16.55
40	43	White sucker	144.07	16.24	15	15	78.95	10.79
40	43	Pumpkinseed	87.67	17.74	6	6	2.82	4.32
40	43	Chain pickerel	59.60	16.26	5	5	12.50	3.60
40	43	Swamp darter	50.33	4.16	3	3	37.50	2.16
40	43	Yellow bullhead	166.00	36.77	2	2	33.33	1.44
40	43	Bluegill	72.00	--	1	1	2.17	.72
40	43	Banded sunfish	--	--	0	0	--	--
40	43	Brook trout	--	--	0	0	--	--
40	43	Brown bullhead	--	--	0	0	--	--
40	43	Brown trout	--	--	0	0	--	--
40	43	Fallfish	--	--	0	0	--	--
40	43	Golden shiner	--	--	0	0	--	--
40	43	Green sunfish	--	--	0	0	--	--
40	43	Largemouth bass	--	--	0	0	--	--
40	43	Redbreast sunfish	--	--	0	0	--	--
40	43	Sea lamprey	--	--	0	0	--	--
40	43	Yellow perch	--	--	0	0	--	--
<b>Norris Brook, at power lines</b>								
41	41	Redfin pickerel	115.21	19.19	24	24	11.32	30.00
41	41	Golden shiner	109.75	10.45	20	20	39.22	25.00
41	41	Bluegill	75.26	25.30	19	19	41.30	23.75
41	41	Pumpkinseed	103.18	6.81	11	11	5.16	13.75
41	41	Largemouth bass	50.00	3.16	6	6	8.33	7.50
41	41	American eel	--	--	0	0	--	--
41	41	Banded sunfish	--	--	0	0	--	--
41	41	Brook trout	--	--	0	0	--	--
41	41	Brown bullhead	--	--	0	0	--	--
41	41	Brown trout	--	--	0	0	--	--
41	41	Chain pickerel	--	--	0	0	--	--
41	41	Creek chubsucker	--	--	0	0	--	--
41	41	Fallfish	--	--	0	0	--	--
41	41	Green sunfish	--	--	0	0	--	--
41	41	Redbreast sunfish	--	--	0	0	--	--
41	41	Sea lamprey	--	--	0	0	--	--
41	41	Swamp darter	--	--	0	0	--	--
41	41	White sucker	--	--	0	0	--	--
41	41	Yellow bullhead	--	--	0	0	--	--
41	41	Yellow perch	--	--	0	0	--	--

**Appendix D.** Length-frequency distribution by site, Ipswich River Basin, Massachusetts, 1998–99—*Continued*

USGS ID	MDFW ID	Species	Mean length	Standard deviation	Number of measurements	Frequency	Percent of total	Percent of sample
<b>TRIBUTARIES—Continued</b>								
<b>Boston Brook, upstream/downstream of Peabody Street</b>								
42	38	American eel	234.72	74.35	36	36	14.69	27.07
42	38	Redfin pickerel	138.94	14.69	33	33	15.57	24.81
42	38	Pumpkinseed	92.93	14.36	29	29	13.62	21.80
42	38	Bluegill	110.75	24.37	8	8	17.39	6.02
42	38	Green sunfish	110.50	13.84	8	8	53.33	6.02
42	38	Chain pickerel	153.00	13.19	5	5	12.50	3.76
42	38	Yellow perch	123.75	4.35	4	4	40.00	3.01
42	38	Brown bullhead	176.33	44.30	3	3	23.08	2.26
42	38	Fallfish	153.50	16.26	2	2	1.38	1.50
42	38	Sea lamprey	105.00	35.36	2	2	8.00	1.50
42	38	Yellow bullhead	146.00	62.23	2	2	33.33	1.50
42	38	Largemouth bass	106.00	--	1	1	1.39	.75
42	38	Banded sunfish	--	--	0	0	--	--
42	38	Brook trout	--	--	0	0	--	--
42	38	Brown trout	--	--	0	0	--	--
42	38	Creek chubsucker	--	--	0	0	--	--
42	38	Golden shiner	--	--	0	0	--	--
42	38	Redbreast sunfish	--	--	0	0	--	--
42	38	Swamp darter	--	--	0	0	--	--
42	38	White sucker	--	--	0	0	--	--
<b>Fish Brook, downstream of Lost Pond Road (downstream of Mosquito Brook)</b>								
43	44	Redfin pickerel	122.80	25.92	49	49	23.11	35.25
43	44	Golden shiner	91.23	15.52	31	31	60.78	22.30
43	44	Pumpkinseed	86.21	12.64	19	19	8.92	13.67
43	44	Chain pickerel	75.29	13.86	17	17	42.50	12.23
43	44	Creek chubsucker	87.46	7.15	13	13	18.06	9.35
43	44	American eel	312.50	46.46	4	4	1.63	2.88
43	44	Banded sunfish	80.00	0.00	2	2	11.76	1.44
43	44	Bluegill	76.50	20.51	2	2	4.35	1.44
43	44	Swamp darter	45.00	.00	2	2	25.00	1.44
43	44	Brook trout	--	--	0	0	--	--
43	44	Brown bullhead	--	--	0	0	--	--
43	44	Brown trout	--	--	0	0	--	--
43	44	Fallfish	--	--	0	0	--	--
43	44	Green sunfish	--	--	0	0	--	--
43	44	Largemouth bass	--	--	0	0	--	--
43	44	Redbreast sunfish	--	--	0	0	--	--
43	44	Sea lamprey	--	--	0	0	--	--
43	44	White sucker	--	--	0	0	--	--
43	44	Yellow bullhead	--	--	0	0	--	--
43	44	Yellow perch	--	--	0	0	--	--

**Appendix D. Length-frequency distribution by site, Ipswich River Basin, Massachusetts, 1998–99—Continued**

USGS ID	MDFW ID	Species	Mean length	Standard deviation	Number of measurements	Frequency	Percent of total	Percent of sample
<b>TRIBUTARIES—Continued</b>								
<b>Fish Brook, Endicot Street (Washington Street)</b>								
44	39	Fallfish	31.39	17.21	102	102	70.34	59.30
44	39	American eel	236.03	70.96	58	58	23.67	33.72
44	39	Chain pickerel	180.00	4.58	3	3	7.50	1.74
44	39	Green sunfish	115.67	52.25	3	3	20.00	1.74
44	39	Redfin pickerel	164.00	2.83	2	2	.94	1.16
44	39	Brown trout	220.00	--	1	1	50.00	.58
44	39	Pumpkinseed	96.00	--	1	1	.47	.58
44	39	Sea lamprey	150.00	--	1	1	4.00	.58
44	39	White sucker	41.00	--	1	1	5.26	.58
44	39	Banded sunfish	--	--	0	0	--	--
44	39	Bluegill	--	--	0	0	--	--
44	39	Brook trout	--	--	0	0	--	--
44	39	Brown bullhead	--	--	0	0	--	--
44	39	Creek chubsucker	--	--	0	0	--	--
44	39	Golden shiner	--	--	0	0	--	--
44	39	Largemouth bass	--	--	0	0	--	--
44	39	Redbreast sunfish	--	--	0	0	--	--
44	39	Swamp darter	--	--	0	0	--	--
44	39	Yellow bullhead	--	--	0	0	--	--
44	39	Yellow perch	--	--	0	0	--	--
<b>Fish Brook, Lockwood Lane</b>								
45	40	American eel	217.10	62.89	62	62	25.31	46.62
45	40	Fallfish	109.05	48.77	41	41	28.28	30.83
45	40	Sea lamprey	112.86	31.73	14	14	56.00	10.53
45	40	Chain pickerel	122.00	48.20	7	7	17.50	5.26
45	40	Green sunfish	78.50	7.00	4	4	26.67	3.01
45	40	Brook trout	228.50	.71	2	2	66.67	1.50
45	40	Pumpkinseed	94.00	8.49	2	2	.94	1.50
45	40	Yellow perch	139.00	--	1	1	10.00	.75
45	40	Banded sunfish	--	--	0	0	--	--
45	40	Bluegill	--	--	0	0	--	--
45	40	Brown bullhead	--	--	0	0	--	--
45	40	Brown trout	--	--	0	0	--	--
45	40	Creek chubsucker	--	--	0	0	--	--
45	40	Golden shiner	--	--	0	0	--	--
45	40	Largemouth bass	--	--	0	0	--	--
45	40	Redbreast sunfish	--	--	0	0	--	--
45	40	Redfin pickerel	--	--	0	0	--	--
45	40	Swamp darter	--	--	0	0	--	--
45	40	White sucker	--	--	0	0	--	--
45	40	Yellow bullhead	--	--	0	0	--	--

**Appendix D.** Length-frequency distribution by site, Ipswich River Basin, Massachusetts, 1998–99—*Continued*

USGS ID	MDFW ID	Species	Mean length	Standard deviation	Number of measurements	Frequency	Percent of total	Percent of sample
<b>TRIBUTARIES—Continued</b>								
<b>Howlett Brook, East Street</b>								
46	35	Redfin pickerel	127.86	16.79	50	50	23.58	64.94
46	35	American eel	220.00	60.58	21	21	8.57	27.27
46	35	White sucker	137.67	7.09	3	3	15.79	3.90
46	35	Banded sunfish	52.00	--	1	1	5.88	1.30
46	35	Sea lamprey	160.00	--	1	1	4.00	1.30
46	35	Swamp darter	47.00	--	1	1	12.50	1.30
46	35	Bluegill	--	--	0	0	--	--
46	35	Brook trout	--	--	0	0	--	--
46	35	Brown bullhead	--	--	0	0	--	--
46	35	Brown trout	--	--	0	0	--	--
46	35	Chain pickerel	--	--	0	0	--	--
46	35	Creek chubsucker	--	--	0	0	--	--
46	35	Fallfish	--	--	0	0	--	--
46	35	Golden shiner	--	--	0	0	--	--
46	35	Green sunfish	--	--	0	0	--	--
46	35	Largemouth bass	--	--	0	0	--	--
46	35	Pumpkinseed	--	--	0	0	--	--
46	35	Redbreast sunfish	--	--	0	0	--	--
46	35	Yellow bullhead	--	--	0	0	--	--
46	35	Yellow perch	--	--	0	0	--	--
<b>Howlett Brook, upstream/downstream of Ipswich Road (riffle reach)</b>								
47	37	Largemouth bass	49.98	5.15	55	55	76.39	54.46
47	37	American eel	227.93	90.05	29	29	11.84	28.71
47	37	Chain pickerel	106.67	57.14	3	3	7.50	2.97
47	37	Redbreast sunfish	90.33	9.07	3	3	100.00	2.97
47	37	Brown bullhead	110.00	--	2	2	15.38	1.98
47	37	Pumpkinseed	95.50	9.19	2	2	.94	1.98
47	37	Redfin pickerel	128.00	2.83	2	2	.94	1.98
47	37	Sea lamprey	150.00	14.14	2	2	8.00	1.98
47	37	Banded sunfish	49.00	--	1	1	5.88	.99
47	37	Brook trout	81.00	--	1	1	33.33	.99
47	37	Brown trout	236.00	--	1	1	50.00	.99
47	37	Bluegill	--	--	0	0	--	--
47	37	Creek chubsucker	--	--	0	0	--	--
47	37	Fallfish	--	--	0	0	--	--
47	37	Golden shiner	--	--	0	0	--	--
47	37	Green sunfish	--	--	0	0	--	--
47	37	Swamp darter	--	--	0	0	--	--
47	37	White sucker	--	--	0	0	--	--
47	37	Yellow bullhead	--	--	0	0	--	--
47	37	Yellow perch	--	--	0	0	--	--

**Appendix D.** Length-frequency distribution by site, Ipswich River Basin, Massachusetts, 1998–99—*Continued*

USGS ID	MDFW ID	Species	Mean length	Standard deviation	Number of measurements	Frequency	Percent of total	Percent of sample
<b>TRIBUTARIES—Continued</b>								
<b>Howlett Brook, downstream of Ipswich Road (wetland reach)</b>								
48	36	Redfin pickerel	128.44	13.47	16	16	7.55	38.10
48	36	American eel	277.10	109.12	10	10	4.08	23.81
48	36	Largemouth bass	48.20	33.96	10	10	13.89	23.81
48	36	Sea lamprey	91.80	34.59	5	5	20.00	11.90
48	36	Swamp darter	38.00	--	1	1	12.50	2.38
48	36	Banded sunfish	--	--	0	0	--	--
48	36	Bluegill	--	--	0	0	--	--
48	36	Brook trout	--	--	0	0	--	--
48	36	Brown bullhead	--	--	0	0	--	--
48	36	Brown trout	--	--	0	0	--	--
48	36	Chain pickerel	--	--	0	0	--	--
48	36	Creek chubsucker	--	--	0	0	--	--
48	36	Fallfish	--	--	0	0	--	--
48	36	Golden shiner	--	--	0	0	--	--
48	36	Green sunfish	--	--	0	0	--	--
48	36	Pumpkinseed	--	--	0	0	--	--
48	36	Redbreast sunfish	--	--	0	0	--	--
48	36	White sucker	--	--	0	0	--	--
48	36	Yellow bullhead	--	--	0	0	--	--
48	36	Yellow perch	--	--	0	0	--	--