

Dreissenid Mussel Survey (2010): Onondaga Lake and the Seneca River



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Dreissenid Mussel Survey (2010): Onondaga Lake and the Seneca River

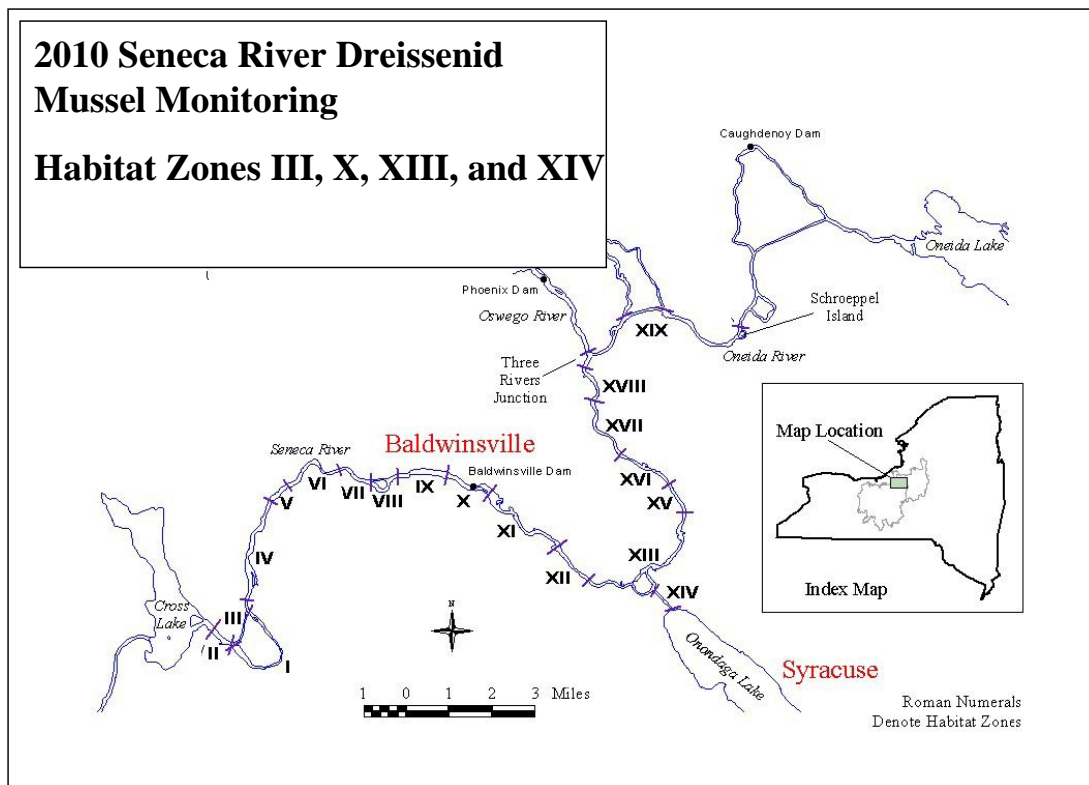
During the fall of 2010, OCDWEP staff completed the Onondaga Lake and Seneca River dreissenid mussel survey in support of the model development and/or validation needs for the Three Rivers Water Quality Model (TRWQM) and Onondaga Lake Water Quality Model (OLWQM). The survey included both zebra mussels (*Dreissena polymorpha*) and quagga mussels (*Dreissena bugensis*).

A6-1 Seneca River

The October 1, 2010, monitoring event included the collection and estimation of dreissenid mussels within habitat zones identified by Beak Consultants during the 1999 Seneca River Dreissenid Mussel Assessment Program, and key locations recommended by AnchorQEA to provide a measure of length frequency distribution, density (#/m²) and biomass (g/m²). The monitoring locations include the following four (4) habitat zones:

- Zone III – State Ditch Cut – 3 Transects, 3 samples per transect.
- Zone X – Near the Baldwinsville Dam – 3 Transects, 3 samples per transect.
- Zone XIII – Near Klein Island – 5 Transects, 3 samples per transect.
- Zone XIV – Onondaga Lake Outlet – 2 Transects, 3 samples per transect.

Map of General Seneca River Dreissenid Mussel Transect Locations



Three (3) samples were collected along each transect, consisting of a cross-section of the river. One (1) at approximately mid-channel (Middle), and one (1) between the channel marker buoy

and shoreline on each side of the river (Red and Green). A single grab sample was collected at each depth interval with a petit ponar dredge, which has a sample area of 35 in² (226 cm²).

Once at the surface, all substrate within the sampler was carefully placed into the wash bucket with a mesh screen. Lake water was used to rinse any remaining material into the wash bucket. Fine sediments were rinsed through the wash bucket, and all remaining material was placed in a labeled zip-lock bag. At each monitoring location technicians record the date, time, water depth (ft), general weather conditions, and GPS coordinates at the mid channel location. Following field sample collection, all samples were placed in a cooler with ice until transported to a refrigerator at the HCBF laboratory.

Thirty-nine (39) samples were collected from the Seneca River during the 2010 field effort.

A6-2 Onondaga Lake

The October 8, 2010, monitoring event on Onondaga Lake included the collection and estimation of dreissenid mussels within habitat zones identified by Stantec during the 2002 Onondaga Lake Zebra Mussel Assessment Program, and transects and water depth intervals recommended by AnchorQEA in 2005. The recent efforts provide a limited measure of length frequency distribution, density (#/m²) and biomass (g/m²) in Onondaga Lake. The monitoring locations include the following eight (8) habitat zones:

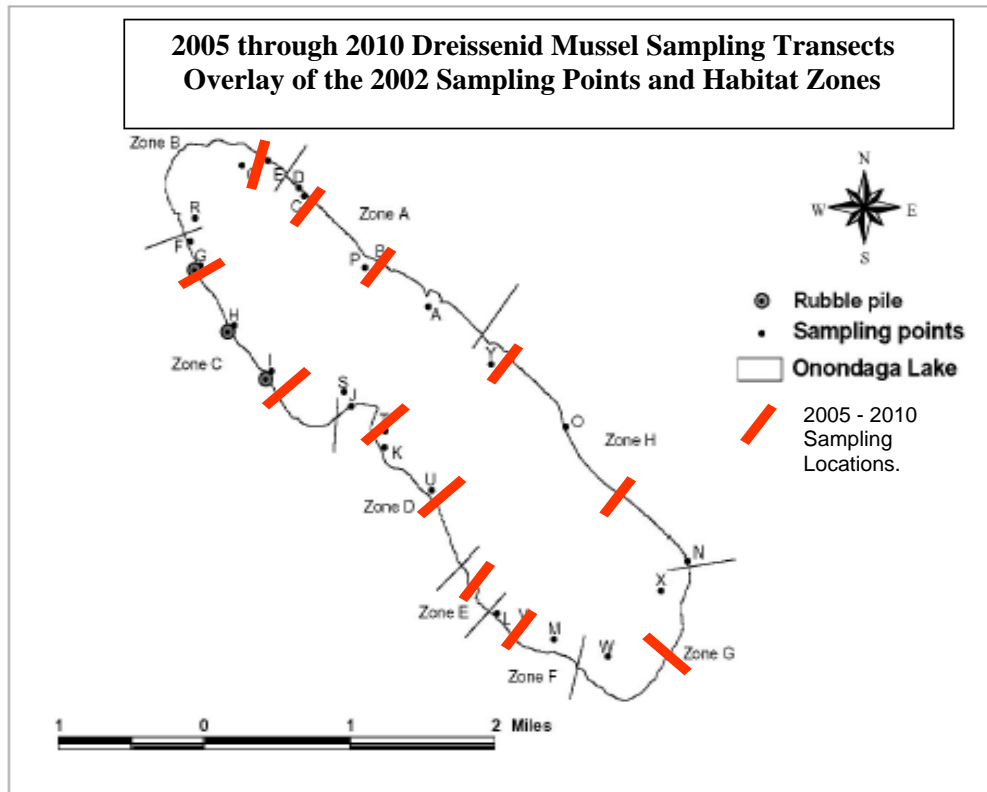
- Zone A – 2 Transects, 3 samples per transect, at 0-1.5 m, 1.5 – 3 m, and 3 – 4.5 m.
- Zone B – 1 Transect, 3 samples per transect, at 0-1.5 m, 1.5 – 3 m, and 3 – 4.5 m.
- Zone C – 2 Transects, 3 samples per transect, at 0-1.5 m, 1.5 – 3 m, and 3 – 4.5 m.
- Zone D – 2 Transects, 3 samples per transect, at 0-1.5 m, 1.5 – 3 m, and 3 – 4.5 m.
- Zone E – 1 Transect, 3 samples per transect, at 0-1.5 m, 1.5 – 3 m, and 3 – 4.5 m.
- Zone F – 1 Transect, 3 samples per transect, at 0-1.5 m, 1.5 – 3 m, and 3 – 4.5 m.
- Zone G – 1 Transect, 3 samples per transect, at 0-1.5 m, 1.5 – 3 m, and 3 – 4.5 m.
- Zone H – 2 Transects, 3 samples per transect, at 0-1.5 m, 1.5 – 3 m, and 3 – 4.5 m.

Three (3) samples were collected along each transect at water depths between 0 to 1.5 meters, 1.5 to 3.0 meters, and 3.0 to 4.5 meters. A single grab sample was collected at each depth interval with a petit ponar dredge, which has a sample area of 35 in² (226 cm²).

Once at the surface, all substrate within the sampler was carefully placed into the wash bucket with a mesh screen. Lake water was used to rinse any remaining material into the wash bucket. Fine sediments were rinsed through the wash bucket, and all remaining material was placed in a labeled zip-lock bag. At each monitoring location the technicians recorded the date, time, actual water depth (ft), general weather conditions, and GPS coordinates. Following field sample collection, all samples were placed in a cooler with ice until transported to refrigerator at the HCBF laboratory.

Thirty-six (36) samples were collected in Onondaga Lake during the 2010 field effort.

Map of General Onondaga Dreissenid Mussel Transect Locations



A6-3 River and Lake Biological Laboratory Processing

At the HCBF biological laboratory, all mussels in the sample were carefully removed from the substrate material. Laboratory measurements of the collected samples were completed within two (2) weeks of sample collection. The entire sample was sorted to separate the live mussels from the shell fragments. Care was taken to distinguish between zebra and quagga mussels that are similar in appearance for young-of-year mussels. The mussels were then blotted dry with paper towels.

A6-3.1 Length Frequency

Technicians randomly select 100 mussels from the sample for length measurement. Using the digital caliper, the technicians recorded the length of each mussel (nearest 1 mm) on the Log Sheet for Mussel Length. If a sample results in less than 150 mussels for any given transect (because of the lack of mussels in some individual samples), additional randomly selected mussels were then measured in those samples within the transect with more than 100 mussels (if such were available), with the goal of at least 150 measurements per transect.

A6-3.2 Weight and Density Determination (Estimate)

Upon completion of the length measurements for the sample, technicians used the 100 randomly selected mussels (or using all the mussels samples that were measured for those sample locations that did not contain 100 mussels) for a batch weigh per sub-sample.

Technicians recorded the number of mussels in the sub-sample and the weight of the sub-sample on the Log Sheet for Weight and Density Determination (weight was recorded to the nearest 0.1 grams). The technicians then combined the sub-sample mussels with the remaining mussels in the sample for a total weight for the entire sample. The calculation for the estimated total number of mussels per sample as follows:

$$\text{Total \# of Mussels per Sample} = \frac{(\# \text{ mussels per sub-sample} * \text{weight per entire sample})}{\text{weight per sub-sample}}$$

A6-4 Seneca River Data

On October 1, 2010, OCDWEP technicians collected the dreissenid mussel samples at the designated locations. Samples were collected and measured in accordance with the standard procedures unless otherwise noted. In general, the locations sampled contained a significant quantity of dreissenid mussel shell fragments requiring considerable laboratory effort to distinguish between the dead and live mussels.

During 2010, the survey identified that all four (4) zones sampled contain zebra mussels, and three (3) of the four (4) zones sampled contained quagga mussels. Twenty-seven (27) of the thirty-nine (39) individual samples collected contained zebra mussels, and ten (10) of the thirty-nine (39) individual samples collected contained quagga mussels.

Zebra mussels were identified in all transects sampled in 2010. Zebra mussels represented nearly 60% (by number) and 17% (by biomass) of the Seneca River dreissenid mussels sampled, and nearly 39% (by number) and 6% (by biomass) of the Lake Outlet dreissenid mussels sampled.

Quagga mussels were identified in transects near Kline Island (Zone XIII B and XIII E), both of the Lake outlet transects (Zone XIV A and XIV B), and the State Ditch Cut (Zone III B). The Quagga mussels represented 40% (by number) and 83% (by biomass) of the Seneca River dreissenid mussels sampled, and nearly 61% (by number) and 94% (by biomass) of the Lake Outlet dreissenid mussels sampled.

The Seneca River and Onondaga Lake outlet monitoring has continued to identify fluctuating dreissenid mussel densities (refer to Table A6-2), particularly in the Onondaga Lake outlet. While the zebra mussel is the most prevalent species in the Seneca River by numbers, it is being displaced by the quagga mussel in the Onondaga lake outlet. Since quagga mussels were first observed in the lake outlet in 2007 they have increased from 4% of the total of the total population to 61% in 2010. This shift in dominance is most apparent in biomass estimates in which quagga mussels have comprised over 94% of the total biomass since 2009. Additionally, zebra mussel densities reported in 2010 from the State Ditch Cut (Zone III) were the lowest since 2004. Zebra mussels that were collected were small averaging 3.4 mm in length.

The observed dreissenid mussel population variations in the lake outlet and the Seneca River are difficult to attribute to anyone factor. Nutrient levels, water flows, changes in water quality, sampling gear, and annual variability in populations are all possible contributing factors.

Note: The 2004 data utilized scuba divers for sample collection, and the 2005 through 2010 data utilized the petit ponar dredge for sample collection.

A6-5 Onondaga Lake Data

On October 8, 2010, OCDWEP technicians collected the dreissenid mussel samples at the designated locations. Samples were collected and measured in accordance with the procedures unless otherwise noted. In general, most locations sampled contained a significant quantity of dreissenid mussel shell fragments requiring considerable laboratory effort to distinguish between the dead and live mussels.

During 2010, the survey identified that all eight (8) zones sampled contain zebra mussels, and seven (7) of the eight (8) zones sampled contained quagga mussels. Thirty (32) of the thirty-six (36) individual samples collected contained zebra mussels, and twenty-five (25) of the thirty-six (36) individual samples collected contained quagga mussels.

Zebra mussels were identified in all transects, and represented nearly 55% (by number) and 13% (by biomass) of the Onondaga Lake dreissenid mussels sampled. Quagga mussels were identified in all transects except one (1), which encompassed the southern most portion of Onondaga Lake (Zone G). The Quagga mussels represented 45% (by number) and 87% (by biomass) of the Onondaga Lake dreissenid mussels sampled.

The Onondaga Lake monitoring has continued to identify fluctuating dreissenid mussel densities (refer to Table A6-5a and Table A6-5b), and a shift in 2010 from quagga mussels as the most abundant *Dreissena* sp. to zebra mussels. Zebra mussels were the most abundant species reported in 2007 and 2008, however, in 2009 quagga mussels displaced the zebra mussel as the most abundant species (Table A6-5a). Sampling efforts in 2009 and 2010 reported biomass estimates of quagga mussels 5 – 7 times greater than those reported for zebra mussels (Table A6-5b).

Quagga mussel densities and biomass in 2010 were highest in Zones A, E and F located on the northeast and southwest sides of Onondaga Lake. In contrast zebra mussel densities were highest in zones A, B and C located at the north end on Onondaga Lake (Table A6-5a and Table A6-5b). Lake wide biomass estimates of dreissenid mussels in 2010 was 26,066 (g) per m², lower than those reported in 2009 which were reported to be 35,317 (g) per m². Yet the 2010 biomass estimates observed were the second highest reported since 2002.

The observed dreissenid mussel population variations in Onondaga Lake are difficult to attribute to any one factor. Nutrient levels, wave action, changes in water quality, sampling gear, and annual variability in populations are all possible contributing factors.

Note: The 2002 data utilized scuba divers for sample collection, and the 2005 through 2010 data utilized the petit ponar dredge for sample collection.

Table A6-1. Seneca River Dreissenid Mussel Survey Fall 2010 - Length, Weight and Biomass Data Summary

Zone	Transect	Transect Coordinates	Channel Location	Water Depth (m)	Number of Mussels Per Sub-Sample	Weight Per Sub-Sample (g)	Weight Per Entire Sample (g)	Total Biomass (g/m ²)	Mean Biomass (g/m ²) per Transect	Median Mussel Length (mm)	Mean Mussel Length (mm)	Total Number of Mussels Per Sample	Estimated Total Number of Mussels per m ²	Mean Estimated Number of Mussels per m ² by Transect
III	A	N 43 06.493, W 76 26.437	Green	2.2	34 (0)	0.3 (0)	0.3 (0)	13.27 (0)	7.3 (0)	2 (0)	3.1 (0)	34 (0)	1504.4 (0)	797 (0)
			Middle	4.5	0 (0)	0 (0)	0 (0)	0 (0)		0 (0)	0 (0)	0 (0)	0 (0)	
			Red	2.1	20 (0)	0.2 (0)	0.2 (0)	8.84 (0)		3 (0)	3.5 (0)	20 (0)	885.0 (0)	
III	B	N 43 06.696, W 76 26.385	Green	2.3	24 (3)	0.1 (0.1)	0.1 (0.1)	4.4 (4.4)	8.8 (1.5)	2 (5)	2.5 (5.2)	24 (3)	1061.9 (132.7)	737 (44)
			Middle	4.7	1 (0)	0.1 (0)	0.1 (0)	4.4 (0)		5 (0)	5.2 (0)	1 (0)	44.2 (0)	
			Red	1.8	25 (0)	0.4 (0)	0.4 (0)	17.7 (0)		3 (0)	3.9 (0)	25 (0)	1106.2 (0)	
III	C	N 43 06.791, W 76 26.359	Green	2.7	8 (0)	0.2 (0)	0.2 (0)	8.8 (0)	8.8 (0)	4 (0)	3.8 (0)	8 (0)	354.0 (0)	664 (0)
			Middle	4.7	13 (0)	0.1 (0)	0.1 (0)	4.4 (0)		2 (0)	2 (0)	13 (0)	575.2 (0)	
			Red	2.3	24 (0)	0.3 (0)	0.3 (0)	13.3 (0)		3 (0)	3.5 (0)	24 (0)	1061.9 (0)	
X	A	N 43 09.640, W 76 20.687	Green	4.8	6 (0)	0.1 (0)	0.1 (0)	4.4 (0)	2.9 (0)	4 (0)	4 (0)	6 (0)	265.5 (0)	207 (0)
			Middle	4.6	0 (0)	0 (0)	0 (0)	0 (0)		0 (0)	0 (0)	0 (0)	0 (0)	
			Red	1.9	8 (0)	0.1 (0)	0.1 (0)	4.4 (0)		3 (0)	3.4 (0)	8 (0)	354.0 (0)	
X	B	N 43 09.503, W 76 20.412	Green	1.6	0 (0)	0 (0)	0 (0)	0 (0)	1.5 (0)	0 (0)	0 (0)	0 (0)	0 (0)	44 (0)
			Middle	5.1	0 (0)	0 (0)	0 (0)	0 (0)		0 (0)	0 (0)	0 (0)	0 (0)	
			Red	2.6	3 (0)	0.1 (0)	0.1 (0)	4.4 (0)		6 (0)	6 (0)	3 (0)	132.7 (0)	
X	C	N 43 09.321, W 76 19.715	Green	3.8	1 (0)	0.1 (0)	0.1 (0)	4.4 (0)	2.9 (0)	9 (0)	8.7 (0)	1 (0)	44.2 (0)	44 (0)
			Middle	5.2	0 (0)	0 (0)	0 (0)	0 (0)		0 (0)	0 (0)	0 (0)	0 (0)	
			Red	3.2	2 (0)	0.1 (0)	0.1 (0)	4.4 (0)		2 (0)	2.4 (0)	2 (0)	88.5 (0)	
XIII	A	N 43 07.429, W 76 16.726	Green	2.6	0 (0)	0 (0)	0 (0)	0 (0)	1.5 (0)	0 (0)	0 (0)	0 (0)	0 (0)	30 (0)
			Middle	6.9	0 (0)	0 (0)	0 (0)	0 (0)		0 (0)	0 (0)	0 (0)	0 (0)	
			Red	2.1	2 (0)	0.1 (0)	0.1 (0)	4.4 (0)		4 (0)	4.4 (0)	2 (0)	88.5 (0)	
XIII	B	N 43 07.453, W 76 16.145	Green	1.2	2 (0)	0.3 (0)	0.3 (0)	13.2 (0)	163.7 (165.5)	10 (0)	9.6 (0)	2 (0)	88.5 (0)	443 (207)
			Middle	5.5	0 (0)	0 (0)	0 (0)	0 (0)		0 (0)	0 (0)	0 (0)	0 (0)	
			Red	4.3	28 (14)	10.8 (11.2)	10.8 (11.2)	477.87 (496.6)		11 (14)	12.2 (15.2)	28 (14)	1238.9 (619.5)	
XIII	C	N 43 07.572, W 76 15.481	Green	1.8	145 (0)	8.5 (0)	8.5 (0)	376.1 (0)	126.8 (0)	7 (0)	7.3 (0)	145 (0)	6415.9 (0)	2212 (0)
			Middle	6.1	0 (0)	0 (0)	0 (0)	0 (0)		0 (0)	0 (0)	0 (0)	0 (0)	
			Red	1.0	5 (0)	0.1 (0)	0.1 (0)	4.4 (0)		3 (0)	2.6 (0)	5 (0)	221.2 (0)	
XIII	D	N 43 07.279, W 76 15.541	Green	3.1	0 (0)	0 (0)	0 (0)	0 (0)	1.5 (0)	0 (0)	0 (0)	0 (0)	0 (0)	885 (0)
			Middle	6.3	0 (0)	0 (0)	0 (0)	0 (0)		0 (0)	0 (0)	0 (0)	0 (0)	
			Red	1.8	6 (0)	0.1 (0)	0.1 (0)	4.42 (0)		2 (0)	3 (0)	6 (0)	2654.9 (0)	
XIII	E	N 43 07.477, W 76 15.088	Green	4.3	72 (100)	7.6 (69.3)	7.6 (203.3)	336.3 (8995.6)	657.8 (4485.2)	9 (17)	9.2 (16.1)	72 (293)	3185.8 (12964.6)	5177 (7139)
			Middle	5.7	100 (100)	14.3 (42.1)	34.6 (63.9)	1531.0 (2827.4)		7 (10)	8.3 (12.2)	242 (152)	10708.0 (6725.7)	
			Red	2.5	37 (39)	2.4 (36.9)	2.4 (36.9)	106.2 (1632.7)		7 (19)	7.3 (17.4)	37 (39)	1637.2 (1725.7)	
XIV	A	N 43 07.259, W 76 14.953	Green	2.2	4 (0)	0.7 (0)	0.7 (0)	30.97 (0)	79.6 (2277.3)	11 (0)	11 (0)	4 (0)	177.0 (0)	1932 (5738)
			Middle	5.6	88 (100)	3.6 (42.4)	3.6 (127.9)	159.3 (5659.3)		4 (16)	5.7 (13.9)	88 (302)	3893.8 (13362.8)	
			Red	2.6	39 (87)	1.1 (26.5)	1.1 (26.5)	48.4 (1172.6)		6 (12)	6 (11.5)	39 (87)	1725.7 (3849.6)	
XIV	B	N 43 07.073, W 76 14.746	Green	3.4	100 (100)	1.6 (34.2)	4.0 (118.7)	177.0 (5252.2)	233.0 (2793.5)	4 (14)	4.4 (13.4)	250 (347)	11061.9 (15354.0)	9558 (12463)
			Middle	6.2	115 (100)	5.0 (10.5)	5.0 (31.5)	221.2 (1393.8)		5 (7)	5.6 (7.5)	115 (300)	5088.5 (13274.3)	
			Red	2.8	100 (100)	2.4 (19.8)	6.8 (39.2)	300.9 (1734.5)		4 (8)	4.7 (8.9)	283 (198)	12522.1 (8761.1)	

Note: Petit Ponar Dredge Sample Area is 226 cm².
Results expressed as Zebra mussel (Quagga mussel).

Table A6.2. Seneca River Dreissenid Mussel Survey - Fall 2004 through Fall 2010 Comparison of Mean Biomass (g/m²) and Mean Density (#/m²)

Zone	Transect	Mean Biomass (g/m ²) per Transect ¹							Mean Estimated Number of Mussels per m ² by Transect ²						
		2004	2005	2006	2007	2008	2009	2010	2004	2005	2006	2007	2008	2009	2010
III	A	4025.8	140.7	808.0	8.8	435.1 (0)	421.8 (54.6)	7.3 (0)	11987	15433	5760	1608 (0)	11001 (0)	2891 (325)	797 (0)
III	B	2569.0	327.1	789.1	61.9	179.9 (0)	38.3 (2.9)	8.8 (1.5)	9691	5525	6638	4241 (74)	5663 (0)	2684 (30)	737 (44)
III	C	1392.2	66.2	413.0	10.3	131.3 (0)	97.4 (7.4)	8.8 (0)	17860	12133	6449	1740 (0)	4017 (0)	3569 (59)	664 (0)
X	A	549.0	284.4	236.0	1.5	5.9 (0)	119.5 (0)	2.9 (0)	1500	1796	546	15 (0)	74 (0)	575 (0)	207 (0)
X	B	444.9	176.5	311.2	8.8	22.1 (0)	2.9 (0)	1.5 (0)	1692	546	619	88.5 (15)	88 (0)	74 (0)	44 (0)
X	C	0.0	1.8	0.0	0	0 (0)	1.5 (0)	2.9 (0)	0	88	0	0 (0)	0 (0)	74 (0)	44 (0)
XIII	A	477.2	0.0	19.2	308.3	29.0 (0.3)	1.5 (0)	1.5 (0)	1909	0	44	959 (251)	221 (15)	15 (0)	29.5 (0)
XIII	B	563.3	151.9	272.9	1.5	10.3 (41.3)	929.2 (324.5)	163.7 (165.5)	2012	826	560	29 (0)	89 (74)	1903 (369)	443 (207)
XIII	C	0.0	14.4	35.4	19.2	4.4 (0)	1.5 (0)	126.8 (0)	0	162	2581	118 (0)	0 (0)	15 (0)	2212 (0)
XIII	D	308.6	0.3	2.9	1.5	5.9 (0)	0 (0)	1.5 (0)	1815	59	162	29 (0)	310 (0)	0 (0)	885 (0)
XIII	E	958.0	1272.8	986.7	427.7	1274.3 (0)	32.4 (1501.5)	657.8 (4485.2)	5042	3290	4869	2271 (413)	3586 (0)	89 (3186)	5177 (7139)
XIV	A	1532.1	0.0	23.6	2166.7	67.8 (23.6)	148.9 (2004.4)	79.6 (2277.3)	8157	0	3053	21211 (811)	2168 (177)	723 (6032)	1932 (5738)
XIV	B	3042.7	146.2	1991.2	4246.3	NA (NA)	203.5 (4199.1)	233 (2793.5)	15445	796	10041	24676 (929)	4199 (7242)	1091 (16121)	9558(12463)

¹⁾ The 2007 mean weights represent total Dreissenid sp., the 2008 through 2010 results are expressed as Zebra mussel (Quagga mussel).

²⁾ The 2007 through 2010 results are expressed as Zebra mussel (Quagga mussel).

Note: The 2004 data utilized scuba divers for sample collection, and the 2005 through 2010 data utilized the petit ponar dredge for sample collection.

Table A6-3a. Seneca River Dreissenid Mussel Survey Fall 2010 - Raw Zebra Mussel Length (mm) Data

Zone Transect Location	Zone III Transect A			Zone III Transect B			Zone III Transect C			Zone X Transect A			Zone X Transect B			Zone X Transect C			Zone XIII Transect A		
	Green	Middle	Red	Green	Middle	Red	Green	Middle	Red	Green	Middle	Red	Green	Middle	Red	Green	Middle	Red	Green	Middle	Red
Median Length	2	0	3	2	5	3	4	2	3	4	0	3	0	0	6	9	0	2	0	0	4
Mean Length	3.1	0.0	3.5	2.5	5.2	3.9	3.8	2.0	3.5	4.0	0.0	3.4	0.0	0.0	6.0	8.7	0.0	2.4	0.0	0.0	4.4
1	9.1		10.5	1.6	5.2	2.3	6.9	1.1	1.5	1.3		4.4			6.7	8.7		2.7			4.7
2	7.2		2.6	0.8		2.5	5.7	1.2	1.5	2.4		5.6			6.1			2.0			4.0
3	6.1		4.6	6.7		1.8	5.3	3.2	2.1	6.4		4.0		5.2							
4	7.1		3.2	4.1		1.2	4.4	1.8	1.4	3.3		3.0									
5	5.3		4.1	4.3		1.5	2.6	1.4	1.4	5.5		3.0									
6	5.1		4.5	4.7		2.2	2.1	3.9	1.2	4.9		2.0									
7	3.1		2.7	2.8		1.9	1.5	2.1	1.9			2.7									
8	5.7		4.3	1.6		1.9	1.9		1.8			2.8									
9	2.2		3.3	1.8		1.3			1.8	2.5											
10	3.9		3.0	2.2		6.9			2.2	3.2											
11	4.6		2.7	1.9		6.0			1.6	3.1											
12	8.7		2.0	2.2		4.7			2.5	2.9											
13	1.0		4.0	2.2		7.9			1.4	2.0											
14	2.6		2.9	1.6		5.4				2.4											
15	0.9		2.6	1.6		1.9				6.0											
16	1.8		2.5	2.1		5.5				6.7											
17	2.5		2.1	3.3		4.0				5.1											
18	2.1		2.5	2.1		2.7				6.6											
19	1.8		3.5	2.9		5.3				7.5											
20	1.3		2.1	1.9		7.6				7.1											
21	2.0			1.8		7.6				3.9											
22	1.7			1.9		5.2				3.1											
23	1.4			2.6		5.4				5.3											
24	1.9			2.2		2.7				2.8											
25	1.8					2.2															
26	1.4																				
27	2.0																				
28	1.9																				
29	1.7																				
30	1.3																				
31	2.2																				
32	2.1																				
33	1.5																				
34	1.2																				
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Table A6-3a. Seneca River Dreissenid Mussel Survey Fall 2010 - Raw Zebra Mussel Length (mm) Data

Zone	Zone III			Zone III			Zone III			Zone X			Zone X			Zone X			Zone XIII		
Transect	Transect A			Transect B			Transect C			Transect A			Transect B			Transect C			Transect A		
Location	Green	Middle	Red	Green	Middle	Red	Green	Middle	Red	Green	Middle	Red	Green	Middle	Red	Green	Middle	Red	Green	Middle	Red
52																					
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Table A6-3a. Seneca River Dreissenid Mussel Survey Fall 2010 - Raw Zebra Mussel Length (mm) Data

Zone	Zone III			Zone III			Zone III			Zone X			Zone X			Zone X			Zone XIII		
Transect	Transect A			Transect B			Transect C			Transect A			Transect B			Transect C			Transect A		
Location	Green	Middle	Red	Green	Middle	Red	Green	Middle	Red	Green	Middle	Red	Green	Middle	Red	Green	Middle	Red	Green	Middle	Red
105																					
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Table A6-3a. Seneca River Dreissenid Mussel Survey Fall 2010 - Raw Zebra Mussel Length (mm) Data

Zone	Zone XIII			Zone XIII			Zone XIII			Zone XIII			Zone XIV			Zone XIV		
Transect	Transect B			Transect C			Transect D			Transect E			Transect A			Transect B		
Location	Green	Middle	Red	Green	Middle	Red	Green	Middle	Red	Green	Middle	Red	Green	Middle	Red	Green	Middle	Red
Median Length	10	0	11	7	0	3	0	0	2	9	7	7	11	4	6	4	5	4
Mean Length	9.6	0.0	12.2	7.3	0.0	2.6	0.0	0.0	3.0	9.2	8.3	7.3	11.0	5.7	6.0	4.4	5.6	4.7
1	10.4		23.7	8.5		2.9			6.4	13.4	1.5	14.2	13.9	12.3	5.7	4.7	6.3	2.6
2	8.7		10.2	2.3		2.8			4.0	11.4	8.1	11.3	13.6	12.6	4.7	5.1	4.8	12.9
3			15.3	2.2		3.1			2.7	12.0	14.9	7.6	7.9	9.7	8.3	2.5	3.0	17.1
4			11.2	6.7		2.8			1.7	13.1	9.0	8.1	8.6	7.4	7.5	12.9	3.1	5.7
5			8.3	7.3		1.2			1.2	9.1	7.2	9.1		3.6	8.2	2.6	6.3	3.4
6			13.4	1.7					1.8	6.4	2.4	6.8		4.9	6.0	6.0	6.8	2.5
7			14.5	3.6						9.6	6.1	5.8		3.4	10.0	2.9	5.1	5.7
8			14.7	6.5						9.4	6.1	9.9		5.2	5.9	2.8	5.4	2.7
9			14.8	8.7						11.4	23.0	7.3		14.5	6.2	10.5	7.5	3.6
10			10.6	6.2						8.3	9.1	9.9		11.2	6.3	5.4	4.5	2.6
11			11.2	5.2						16.7	11.5	5.0		3.1	7.8	4.2	15.5	4.0
12			15.5	8.7						8.3	5.7	7.5		3.7	6.8	3.4	4.0	4.4
13			27.9	6.9						17.6	5.5	7.0		4.9	6.7	3.7	3.9	4.4
14			11.1	2.1						6.3	5.4	8.0		9.4	7.7	5.0	5.8	4.1
15			12.9	6.6						8.4	24.9	2.9		13.3	5.3	2.5	9.9	2.5
16			13.4	2.9						10.1	12.1	9.1		6.4	6.3	5.5	2.7	3.2
17			6.1	2.7						9.4	13.8	7.8		7.3	5.7	7.6	5.8	7.9
18			7.8	5.5						6.6	7.2	9.5		3.9	6.0	3.2	3.3	8.3
19			9.2	6.7						9.4	5.9	6.6		12.8	5.5	2.4	4.1	7.8
20			14.7	2.9						13.4	3.4	5.1		11.8	6.0	4.2	2.8	4.3
21			13.3	2.6						10.5	6.5	7.7		13.5	6.0	3.7	11.8	5.4
22			7.1	7.3						8.7	7.5	6.5		4.7	7.2	2.9	6.2	5.8
23			8.2	6.7						8.7	10.6	8.0		3.2	4.8	3.4	3.1	4.1
24			10.4	2.9						11.5	5.4	4.4		3.4	8.3	3.7	10.5	4.4
25			13.5	6.9						12.8	6.7	5.9		2.3	3.0	6.8	6.2	5.4
26			10.4	5.7						9.3	12.0	5.7		3.5	3.3	5.8	6.5	7.9
27			8.7	8.7						11.0	16.6	6.4		2.0	3.9	5.3	5.3	5.8
28			3.3	1.9						8.5	13.7	3.6		3.6	4.2	5.2	6.4	4.3
29				3.5						8.3	5.9	8.8		5.8	4.3	5.0	4.3	2.9
30				2.5						5.6	3.9	8.4		2.7	4.8	6.1	6.8	7.5
31				7.0						5.1	4.9	4.4		3.4	4.7	5.1	2.8	4.0
32				6.7						11.3	8.8	7.5		10.6	4.2	4.0	6.6	3.7
33				5.9						10.9	15.1	3.9		10.8	6.0	5.6	3.6	6.7
34				6.6						10.4	5.3	6.5		2.8	3.1	4.0	5.2	2.5
35				4.6						10.5	15.4	7.2		7.7	7.0	2.5	5.7	4.5
36				7.1						8.3	14.0	10.7		3.2	4.7	1.5	6.4	5.2
37				9.2						15.1	7.4	5.6		9.7	11.5	4.4	3.4	2.6
38				6.8						9.9	11.4			10.9	6.1	1.5	6.3	3.8
39				4.3						5.3	20.5			3.6	3.8	3.2	3.3	6.8
40				9.0						10.1	6.3			4.9		5.2	4.9	5.2
41				6.2						6.3	4.0			12.4		4.2	3.9	2.5
42				6.9						9.8	6.6			3.9		3.8	17.1	2.9
43				6.3						10.9	17.5			2.5		5.0	4.1	4.7
44				6.4						8.1	6.5			3.0		5.5	2.9	4.7
45				8.7						7.6	4.3			3.9		2.0	3.1	3.1
46				8.1						9.3	13.7			3.2		5.2	4.4	2.4
47				1.2						6.9	12.8			4.0		6.3	4.3	3.4
48				4.1						9.9	13.3			11.9		5.2	15.8	6.2
49				5.0						8.5	16.8			8.3		4.1	3.0	7.0
50				10.6						6.0	6.6			12.4		3.9	7.1	4.7
51				9.4						10.9	5.6			1.9		5.0	5.0	2.6

Table A6-3a. Seneca River Dreissenid Mussel Survey Fall 2010 - Raw Zebra Mussel Length (mm) Data

Zone	Zone XIII			Zone XIII			Zone XIII			Zone XIII			Zone XIV			Zone XIV		
Transect	Transect B			Transect C			Transect D			Transect E			Transect A			Transect B		
Location	Green	Middle	Red	Green	Middle	Red	Green	Middle	Red	Green	Middle	Red	Green	Middle	Red	Green	Middle	Red
52				5.7						5.1	2.6			3.4		3.9	3.2	3.9
53				6.3						8.3	6.9			2.3		5.9	5.2	4.3
54				7.9						13.0	3.5			3.9		4.0	6.5	3.2
55				6.8						9.0	4.1			8.6		1.9	9.7	4.1
56				8.5						5.1	5.9			3.7		3.7	8.8	11.5
57				7.2						8.1	7.4			3.8		4.1	3.4	5.1
58				8.7						7.1	5.9			3.0		3.1	7.7	9.3
59				7.8						7.7	3.7			3.8		3.5	3.6	8.5
60				4.6						7.3	3.4			3.6		2.8	5.3	11.5
61				8.0						8.7	7.8			3.4		3.2	4.8	3.0
62				6.2						9.4	4.9			4.1		2.9	6.2	3.7
63				8.2						10.5	2.4			11.4		4.3	3.0	5.2
64				7.4						9.1	6.3			7.9		2.9	12.7	5.7
65				9.8						7.5	6.5			8.0		6.2	4.5	3.4
66				6.0						3.4	4.4			2.9		6.6	6.5	2.4
67				10.4						8.4	5.3			3.4		4.0	3.3	5.4
68				2.8						9.4	4.8			3.8		2.5	3.6	3.8
69				7.4						6.5	3.3			3.6		3.7	4.0	3.1
70				10.7						10.2	14.3			3.9		3.2	4.7	3.1
71				7.8						8.5	12.7			6.0		5.1	4.6	4.6
72				6.6						6.3	5.2			3.9		5.3	13.6	4.1
73				10.9							9.7			5.5		5.2	14.6	2.0
74				9.0							7.8			6.7		4.2	9.7	2.2
75				7.0							8.2			2.2		1.8	3.2	3.7
76				6.8							5.1			9.6		3.8	7.9	1.9
77				6.9							5.8			2.6		6.8	6.5	2.7
78				8.5							12.2			3.9		5.6	7.9	5.9
79				8.1							6.4			3.2		8.6	3.4	7.0
80				4.5							5.2			1.9		2.3	4.2	6.1
81				6.2							2.4			3.9		4.9	6.4	8.3
82				2.9							5.1			3.4		4.2	4.3	7.3
83				5.0							6.0			3.0		3.3	4.8	6.0
84				9.7							12.6			2.4		8.2	4.2	3.6
85				5.0							6.0			2.9		4.2	3.2	1.8
86				9.6							6.6			3.9		4.7	3.3	3.3
87				9.4							15.5			2.0		5.4	3.0	7.1
88				9.2							4.5			2.4		5.7	3.3	3.7
89				7.9							6.5					8.5	17.8	1.9
90				7.9							6.7					3.2	5.9	4.1
91				10.0							5.1					2.6	2.0	2.1
92				10.5							7.8					5.6	3.9	2.0
93				8.0							6.6					6.1	4.8	3.2
94				9.3							7.9					2.7	4.5	2.7
95				9.1							6.8					3.6	4.2	4.4
96				11.5							13.2					3.4	5.5	2.5
97				8.6							20.7					1.9	4.1	3.3
98				6.1							12.0					5.4	6.6	5.8
99				4.0							8.2					3.3	5.2	4.3
100				6.9							4.5					4.1	7.0	3.6
101				9.7													6.7	
102				9.8													3.3	
103				9.7													2.4	
104				9.9													3.1	

Table A6-3a. Seneca River Dreissenid Mussel Survey Fall 2010 - Raw Zebra Mussel Length (mm) Data

Zone	Zone XIII			Zone XIII			Zone XIII			Zone XIII			Zone XIV			Zone XIV		
Transect	Transect B			Transect C			Transect D			Transect E			Transect A			Transect B		
Location	Green	Middle	Red	Green	Middle	Red	Green	Middle	Red	Green	Middle	Red	Green	Middle	Red	Green	Middle	Red
105				10.1														5.1
106				7.9														5.3
107				11.0														5.4
108				12.8														4.5
109				4.2														3.9
110				10.9														3.6
111				10.3														2.5
112				8.9														2.6
113				11.7														3.1
114				12.3														2.7
115				8.8														5.7
116				9.9														
117				9.5														
118				7.7														
119				10.7														
120				9.6														
121				9.2														
122				8.4														
123				5.9														
124				7.0														
125				5.7														
126				8.2														
127				8.1														
128				8.5														
129				10.6														
130				9.8														
131				8.5														
132				8.2														
133				6.9														
134				5.3														
135				6.6														
136				9.6														
137				6.0														
138				7.1														
139				11.3														
140				9.1														
141				9.0														
142				10.9														
143				7.5														
144				4.9														
145				2.2														
146																		
147																		
148																		
149																		
150																		

Table A6-3b. Seneca River Dreissenid Mussel Survey Fall 2010 - Raw Quagga Mussel Length (mm) Data

Transect Location	Zone III			Zone III			Zone III			Zone X			Zone X			Zone X		
	Green	Middle	Red	Green	Middle	Red	Green	Middle	Red	Green	Middle	Red	Green	Middle	Red	Green	Middle	Red
Median Length	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mean Length	0.0	0.0	0.0	5.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1				6.7														
2				5.1														
3				3.8														
4																		
5																		
6																		
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Table A6-3b. Seneca River Dreissenid Mussel Survey Fall 2010 - Raw Quagga Mussel Length (mm) Data

Zone	Zone III			Zone III			Zone III			Zone X			Zone X			Zone X		
Transect	Transect A			Transect B			Transect C			Transect A			Transect B			Transect C		
Location	Green	Middle	Red	Green	Middle	Red	Green	Middle	Red	Green	Middle	Red	Green	Middle	Red	Green	Middle	Red
50																		
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Table A6-3b. Seneca River Dreissenid Mussel Survey Fall 2010 - Raw Quagga Mussel Length (mm) Data

Zone	Zone XIII			Zone XIII			Zone XIII			Zone XIII			Zone XIII			Zone XIV			Zone XIV		
Transect	Transect A			Transect B			Transect C			Transect D			Transect E			Transect A			Transect B		
Location	Green	Middle	Red	Green	Middle	Red	Green	Middle	Red	Green	Middle	Red	Green	Middle	Red	Green	Middle	Red	Green	Middle	Red
Median Length	0	0	0	0	0	14	0	0	0	0	0	0	17	10	19	0	16	12	14	7	8
Mean Length	0.0	0.0	0.0	0.0	0.0	15.2	0.0	0.0	0.0	0.0	0.0	0.0	16.1	12.2	17.4	0.0	13.9	11.5	13.4	7.5	8.9
1						13.4							23.5	26.2	26.9		5.7	22.7	18.9	3.9	24.5
2						14.2							25.1	26.2	22.2		3.6	18.8	14.1	6.9	20.6
3						13.4							23.5	26.4	27.1		15.3	20.0	11.5	3.4	4.9
4						13.7							15.8	27.1	29.3		22.1	5.8	18.7	16.2	6.6
5						15.2							23.0	25.0	21.4		15.7	18.9	14.9	5.6	10.2
6						24.9							14.0	24.4	23.6		22.5	17.8	6.3	17.6	3.5
7						22.1							21.1	25.3	22.0		1.3	7.2	14.2	10.9	4.9
8						13.2							20.9	17.2	20.2		2.2	16.7	12.7	4.5	9.1
9						12.0							16.8	10.8	22.4		19.7	16.1	10.7	3.3	20.0
10						15.4							16.2	8.8	25.4		17.7	21.2	15.8	9.2	5.3
11						28.9							20.6	13.8	23.3		8.2	15.9	5.2	4.6	11.7
12						14.1							16.5	6.6	30.4		15.8	20.4	12.0	12.2	4.5
13						6.1							19.3	15.5	20.2		12.1	20.2	19.4	6.6	10.3
14						5.9							14.8	9.2	27.8		4.2	12.2	19.2	16.7	2.8
15													17.6	14.8	21.9		14.5	5.7	17.9	25.0	11.1
16													13.5	9.9	20.4		16.6	18.1	14.2	8.5	2.4
17													13.2	6.9	16.1		11.0	12.6	6.4	9.5	2.1
18													13.4	14.9	20.9		14.2	12.4	11.0	10.2	5.8
19													22.0	7.4	20.1		18.0	20.3	15.4	7.3	10.1
20													22.1	16.6	20.5		15.4	16.1	14.3	6.7	5.0
21													10.4	14.3	18.7		14.6	21.7	13.3	16.1	9.0
22													11.0	16.6	17.0		3.9	12.4	20.1	10.1	7.6
23													22.3	9.9	17.0		2.4	17.4	14.9	4.0	3.4
24													19.7	14.7	18.1		17.2	20.5	6.1	5.7	14.7
25													18.2	8.6	11.5		15.8	4.6	3.1	3.4	7.8
26													14.3	9.0	11.5		17.2	23.9	17.4	16.2	6.8
27													11.8	9.8	10.3		18.3	12.4	21.6	7.8	7.9
28													23.9	14.8	13.4		14.4	11.9	6.0	7.3	21.7
29													15.3	6.1	13.1		19.9	18.8	18.5	7.4	7.9
30													19.7	12.6	11.5		12.9	11.5	22.4	7.4	7.3
31													20.2	7.2	9.8		19.3	4.5	20.8	8.1	5.4
32													10.4	5.7	9.0		19.6	4.2	13.5	8.1	2.5
33													13.4	5.3	8.6		4.4	15.5	4.6	6.3	19.1
34													21.9	6.2	12.4		19.9	9.8	19.1	5.9	10.9
35													21.1	14.1	5.4		16.1	14.1	18.8	7.4	10.7
36													21.5	6.0	5.5		2.5	17.3	18.0	4.2	6.1
37													10.2	8.6	12.4		18.5	17.9	16.4	5.7	4.8
38													20.9	8.1	7.2		17.1	8.9	18.4	7.1	2.4
39													11.6	7.6	2.8		15.9	15.9	15.4	4.5	22.8
40													9.5	15.5			18.0	15.6	11.8	8.2	4.4
41													12.5	16.8			20.9	14.0	12.0	7.9	6.1
42													10.2	15.5			15.3	2.8	11.3	9.9	6.2
43													9.9	16.3			16.8	17.5	15.3	7.9	3.3
44													7.0	6.5			16.6	6.0	21.5	6.7	9.5
45													20.4	8.6			19.6	15.1	14.7	1.9	9.8
46													16.4	9.4			4.9	7.6	10.6	4.9	5.1
47													18.1	8.7			20.0	17.6	15.3	23.4	8.1
48													12.6	17.1			20.5	7.7	18.1	10.7	11.3
49													17.4	11.1			2.8	8.2	19.2	4.4	9.7

Table A6-3b. Seneca River Dreissenid Mussel Survey Fall 2010 - Raw Quagga Mussel Length (mm) Data

Zone	Zone XIII			Zone XIII			Zone XIII			Zone XIII			Zone XIII			Zone XIV			Zone XIV		
Transect	Transect A			Transect B			Transect C			Transect D			Transect E			Transect A			Transect B		
Location	Green	Middle	Red	Green	Middle	Red	Green	Middle	Red	Green	Middle	Red	Green	Middle	Red	Green	Middle	Red	Green	Middle	Red
50													17.7	22.6		5.1	14.4	7.8	3.8	6.5	
51													19.7	10.5		23.9	14.3	19.0	5.4	9.1	
52													4.7	8.0		21.6	13.4	13.9	2.7	9.6	
53													24.9	4.9		14.3	15.6	16.9	8.8	9.5	
54													21.1	8.0		17.1	14.1	14.2	3.4	4.4	
55													10.2	10.1		4.1	17.4	6.3	5.0	10.5	
56													11.9	26.7		16.1	12.3	18.5	7.5	7.9	
57													12.3	9.3		17.1	10.5	6.7	3.8	4.8	
58													8.2	9.6		19.5	7.4	13.5	5.4	9.0	
59													7.2	9.6		19.2	14.2	12.4	17.5	19.8	
60													19.5	16.7		14.4	9.6	16.8	5.7	11.1	
61													18.7	16.1		18.8	9.8	10.1	4.5	5.4	
62													11.1	7.3		18.6	7.1	17.9	6.6	11.7	
63													8.6	8.9		18.8	5.0	5.9	4.5	8.9	
64													21.2	7.4		3.5	8.8	12.7	3.9	23.4	
65													19.9	9.8		5.0	7.5	4.9	4.6	6.0	
66													19.7	17.0		13.8	5.1	10.2	6.1	10.1	
67													10.9	7.5		17.8	9.4	8.5	5.3	14.6	
68													6.6	26.7		6.7	3.0	16.1	16.9	5.1	
69													15.5	27.4		18.2	9.0	18.1	12.2	4.0	
70													21.5	5.4		19.1	4.2	16.5	6.3	3.2	
71													18.9	4.4		14.5	7.5	13.9	4.1	6.1	
72													18.2	9.1		14.7	4.6	11.8	2.2	9.9	
73													4.2	9.8		15.4	8.2	17.0	8.0	25.1	
74													21.9	7.9		7.3	9.3	10.9	2.6	18.8	
75													27.3	8.8		10.2	3.3	17.1	9.5	11.0	
76													21.8	12.8		12.1	6.9	15.9	6.4	9.4	
77													17.5	13.7		16.8	5.2	13.8	4.2	7.6	
78													11.1	15.3		18.1	5.2	10.3	6.7	10.9	
79													10.3	14.7		10.0	6.5	12.0	8.4	8.7	
80													13.8	10.4		8.6	7.1	15.0	5.3	9.5	
81													22.3	4.4		8.1	7.4	18.3	4.9	6.5	
82													9.8	7.0		14.9	4.1	15.1	7.8	9.7	
83													13.9	14.4		18.7	3.5	7.0	8.6	10.9	
84													10.9	6.5		4.8	4.3	11.9	6.4	11.1	
85													18.9	30.3		19.6	4.7	5.0	4.0	6.0	
86													23.3	6.6		14.8	3.9	12.2	4.0	3.5	
87													7.9	9.2		2.9	3.7	10.8	2.8	8.4	
88													11.9	20.1		16.3		19.9	14.4	5.1	
89													20.3	6.1		13.5		17.2	8.2	6.3	
90													19.9	6.1		18.2		10.2	3.2	7.3	
91													24.7	8.6		20.0		11.4	7.7	6.7	
92													22.1	7.9		16.2		6.8	2.8	2.9	
93													20.6	15.8		16.4		10.0	4.4	3.4	
94													13.4	7.3		6.7		9.6	10.9	7.6	
95													9.4	8.6		16.0		13.7	4.6	9.4	
96													9.0	7.7		14.7		9.0	17.1	18.7	
97													11.7	14.5		4.7		7.8	7.8	13.2	
98													6.9	3.9		15.2		13.2	5.6	5.0	
99													14.1	13.0		16.9		5.1	5.7	5.8	
100													19.4	5.0		12.6		7.1	8.1	5.6	

Table A6.4. Onondaga Lake Dressenid Mussel Survey Fall 2010 - Length, Weight, and Biomass Data Summary

Zone	Transect	Transect Coordinates	Water Depth at Sample Collection (m)	Water Depth Section/Range (m)	Number of Mussels Per Sub-Sample	Weight Per Sub-Sample (g)	Weight Per Entire Sample (g)	Total Biomass (g/m ²)	Mean Biomass (g/m ²) per Zone	Mean Weight (g/m ²) per Zone	Median Mussel Length (mm)	Mean Mussel Length (mm)	Total Number of Mussels Per Sample	Estimated Total Number of Mussels per m ²	Mean Estimated Number of Mussels per m ² by Transect	Mean Estimated Number of Mussels per m ² by Zone
A	1	N 43 06.238, W 76 13.174	1.2	0-1.5	13 (4)	.5 (2)	5 (2)	22.1 (8.8)	222.7 (1910)	351 (1148.9)	7 (9)	6.5 (8.7)	13 (4)	575.2 (177.0)	3702 (5590)	6844 (4653)
		N 43 06.238, W 76 13.180	2.9	1.5-3.0	100 (88)	4.1 (2.6)	8.0 (2.6)	354.0 (115.0)			7 (7)	6.8 (6.7)	195 (88)	8628.3 (3893.8)		
		N 43 06.238, W 76 13.189	3.8	3.0-4.5	43 (100)	6.6 (44.1)	6.6 (126.7)	292.0 (5606.2)			10 (15)	10.1 (15)	43 (287)	1902.7 (12699.1)		
A	2	N 43 06.615, W 76 13.684	1.1	0-1.5	0 (3)	0 (.1)	0 (.1)	0 (4.4)	146 (387.9)	175.5 (8.8)	0 (8)	0 (7.7)	0 (3)	0 (132.7)	9985 (3717)	
		N 43 06.615, W 76 13.716	1.9	1.5-3.0	100 (93)	5.3 (4.6)	25.3 (4.6)	1119.5 (203.5)			6 (7)	6.7 (7.7)	477 (93)	21106.2 (4115)		
		N 43 06.615, W 76 13.734	3.8	3.0-4.5	100 (100)	3.6 (13.9)	7.2 (21.6)	318.6 (955.8)			5 (6)	5.9 (6.3)	200 (156)	8849.6 (6902.7)		
B	1	N 43 06.894, W 76 14.244	1.3	0-1.5	24 (3)	1.3 (.5)	1.3 (.5)	57.5 (22.1)	175.5 (8.8)	175.5 (8.8)	6 (9)	6.4 (10.7)	24 (3)	1061.9 (132.7)	4513 (89)	4513 (89)
		N 43 06.894, W 76 14.252	2.2	1.5-3.0	121 (3)	4.6 (0.1)	10.5 (0.1)	464.6 (4.4)			7 (5)	6.4 (6.1)	277 (3)	12256.6 (132.7)		
		N 43 06.894, W 76 14.255	4.0	3.0-4.5	5 (0)	0.1 (0)	0.1 (0)	4.42 (0)			4 (0)	4.4 (0)	5 (0)	221.2 (0)		
C	1	N 43 06.348, W 76 14.599	1.2	0-1.5	0 (0)	0 (0)	0 (0)	0 (0)	171.1 (799.4)	140.85(405.6)	0 (0)	0 (0)	0 (0)	0 (0)	7566 (2463)	5133 (1291)
		N 43 06.348, W 76 14.554	1.8	1.5-3.0	100 (17)	2.2 (4.4)	10.1 (4.4)	446.9 (194.7)			5 (14)	5.4 (12.2)	460 (17)	20354 (752.2)		
		N 43 06.348, W 76 14.529	3.1	3.0-4.5	53 (133)	1.5 (44.1)	1.5 (49.8)	66.4 (2203.5)			6 (15)	5.8 (15.3)	53 (150)	2345.1 (6637.2)		
C	2	N 43 05.551, W 76 13.854	1.0	0-1.5	39 (4)	3.6 (0.7)	3.6 (0.7)	159.3 (31.0)	110.6 (11.8)	36.83(20.6)	8 (12)	8.1 (11.8)	39 (4)	1725.7 (177)	2699.1 (118)	
		N 43 05.551, W 76 13.833	2.9	1.5-3.0	100 (4)	2.7 (0.1)	3.3 (0.1)	146.0 (4.4)			5 (7)	5.8 (7.0)	122 (4)	5398.2 (177)		
		N 43 05.551, W 76 13.830	4.3	3.0-4.5	22 (0)	0.6 (0)	0.6 (0)	26.5 (0)			5 (0)	5.6 (0)	22 (0)	973.5 (0)		
D	1	N 43 05.253, W 76 13.058	1.1	0-1.5	0 (0)	0 (0)	0 (0)	0 (0)	26.5 (38.3)	36.83(20.6)	0 (0)	0 (0)	0 (0)	0 (0)	634 (351)	501 (190)
		N 43 05.253, W 76 13.040	1.9	1.5-3.0	39 (15)	1.7 (1.7)	1.7 (1.7)	75.2 (75.2)			7 (10)	6.8 (10.3)	39 (15)	1725.7 (663.7)		
		N 43 05.253, W 76 13.024	3.4	3.0-4.5	4 (9)	0.1 (0.9)	0.1 (0.9)	4.4 (39.8)			5 (12)	6.3 (10.4)	4 (9)	177 (389.2)		
D	2	N 43 04.877, W 76 12.590	1.4	0-1.5	1 (0)	0.1 (0)	0.1 (0)	4.4 (0)	47.16(2.9)	110.6 (3799.4)	9 (0)	9.4 (0)	1 (0)	44.2 (0)	369 (30)	
		N 43 04.877, W 76 12.588	2.0	1.5-3.0	24 (2)	3.1 (0.2)	3.1 (0.2)	137.1 (8.8)			8 (11)	9.1 (11.3)	24 (2)	1061.9 (88.5)		
		N 43 04.877, W 76 12.585	3.1	3.0-4.5	0 (0)	0 (0)	0 (0)	0 (0)			0 (0)	0 (0)	0 (0)	0 (0)		
E	1	N 43 04.318, W 76 12.193	0.9	0-1.5	26 (2)	1.4 (0.3)	1.4 (0.3)	61.9 (13.3)	110.6 (3799.4)	110.6 (3799.4)	7 (12)	7.3 (11.6)	26 (2)	1150.4 (88.5)	2330 (10059)	2330 (10059)
		N 43 04.318, W 76 12.182	1.7	1.5-3.0	41 (14)	2.9 (1.2)	2.9 (1.2)	128.3 (53.1)			8 (10)	7.7 (9.7)	41 (14)	1814.2 (619.5)		
		N 43 04.318, W 76 12.168	3.3	3.0-4.5	91 (136)	3.2 (52.3)	3.2 (256.1)	141.6 (11331.9)			5 (15)	5.5 (13.3)	91 (666)	4026.5 (29469)		
F	1	N 43 04.095, W 76 11.534	1.2	0-1.5	41 (33)	2.4 (15.3)	2.4 (15.3)	106.2 (677.0)	147.4 (2193.2)	147.4 (2193.2)	5 (14)	6.1 (14.1)	41 (33)	1814.2 (1460.2)	3245 (4440)	3245 (4440)
		N 43 04.095, W 76 11.519	2.0	1.5-3.0	100 (35)	3.7 (4.8)	4.7 (4.8)	207.9 (212.4)			6 (9)	6.2 (9.5)	128 (35)	5663.7 (1548.7)		
		N 43 04.095, W 76 11.500	3.2	3.0-4.5	51 (100)	2.9 (55.2)	2.9 (128.6)	128.3 (5690.3)			5 (17)	6.3 (16.1)	51 (233)	2256.6 (10309.7)		
G	1	N 43 04.037, W 76 10.857	1.4	0-1.5	1 (0)	0.1 (0)	0.1 (0)	4.4 (0)	11.76 (0)	11.76 (0)	5 (0)	4.7 (0)	1 (0)	44.2 (0)	516.2 (0)	516.2 (0)
		N 43 04.037, W 76 10.871	2.1	1.5-3.0	8 (0)	0.2 (0)	0.2 (0)	8.8 (0)			6 (0)	5.7 (0)	8 (0)	354 (0)		
		N 43 04.037, W 76 10.966	3.2	3.0-4.5	26 (0)	0.5 (0)	0.5 (0)	22.1 (0)			5 (0)	4.9 (0)	26 (0)	1150.4 (0)		
H	1	N 43 04.874, W 76 11.085	1.2	0-1.5	102 (27)	3.5 (2.5)	6.7 (2.5)	296.5 (110.6)	147.5 (45.7)	114.3 (23.6)	6 (7)	6.2 (7.7)	196 (27)	8672.6 (1194.7)	3599 (546)	2935 (280)
		N 43 04.874, W 76 11.104	2.0	1.5-3.0	9 (6)	0.4 (0.3)	0.4 (0.3)	17.7 (13.3)			6 (8)	7 (7.8)	9 (6)	398.2 (265.5)		
		N 43 04.874, W 76 11.144	3.8	3.0-4.5	39 (4)	2.9 (0.3)	2.9 (0.3)	128.3 (13.3)			8 (10)	8 (9.7)	39 (4)	1725.7 (177)		
H	2	N 43 05.623, W 76 12.015	1.2	0-1.5	7 (0)	0.8 (0)	0.8 (0)	35.4 (0)	81.1 (1.5)	114.3 (23.6)	7 (0)	8.3 (0)	7 (0)	309.7 (0)	2271 (15)	
		N 43 05.623, W 76 12.053	1.6	1.5-3.0	138 (1)	4.6 (0.1)	4.6 (0.1)	203.5 (4.4)			6 (6)	6.5 (6.4)	138 (1)	6106.2 (44.2)		
		N 43 05.623, W 76 12.078	4.1	3.0-4.5	9 (0)	0.1 (0)	0.1 (0)	4.4 (0)			4 (0)	4.3 (0)	9 (0)	398.2 (0)		

Note: Petit Ponar Dredge Sample Area is 226 cm².
Results expressed as Zebra mussel (Quagga mussel).

Table A6.5a. Onondaga Lake Dreissenid Mussel Survey - Fall 2002, and Fall 2005 through Fall 2010 Comparison of Density (#/m²)

Zone	Water Depth Section/Range (m)	Mean Estimated Total Number of Mussels per m ² by Depth							Mean Estimated Number of Mussels per m ² by Zone							
		2002	2005	2006	2007	2008	2009	2010	2002 (0-4.5 M)	2005 (0-4.5 M)	2006 (0-4.5 M)	2007 (0-4.5 M)	2008 (0-4.5 M)	2009 (0-4.5 M)	2010 (0-4.5 M)	
A	0 - 1.5	2036.2	66.4	774.4	17704.0 (199.1)	486.7 (0)	6416.0 (4601.8)	287.6 (154.9)	1834	1187	5465	14559 (229)	2721 (1328)	4019 (2301)	6844 (4653)	
	1.5 - 3.0	3465.5	3385.0	6216.4	21084.2 (398.3)	2854.0 (2566.4)	3119.5 (2101.8)	14867.3 (4004.4)								
	3.0 - 4.5	0.0	110.6	9403.5	4889.4 (88.5)	4823.0 (1415.9)	2522.1 (199.1)	5376.2 (9800.9)								
B	0 - 1.5	0.0	0.0	13877.7	14896.8 (0)	5044.2 (575.2)	4867.3 (13495.6)	1061.9 (132.7)	0	133	4803	12148	2522 (4558)	1814 (8909)	4513 (88)	
	1.5 - 3.0	0.0	221.2	531.0	21238.9 (0)	1283.2 (6858.4)	0 (0)	12256.6 (132.7)								
	3.0 - 4.5	0.0	177.0	0.0	309.7 (0)	1238.9 (6238.9)	575.2 (13230.1)	221.2 (0)								
C	0 - 1.5	754.7	44.8	3340.7	4002.3 (0)	4535.4 (508.9)	110.6 (575.2)	862.9 (88.5)	514	1003	1991	12396 (2522)	5627 (2980)	501.5 (9226)	5133 (1291)	
	1.5 - 3.0	788.6	2013.3	2522.2	16017.7 (1305.3)	6615.1 (2566.4)	309.8 (7123.9)	12876.1 (464.6)								
	3.0 - 4.5	0.0	951.3	110.6	17455.8 (2477.9)	5730.1 (5862.9)	1084.1 (19977.9)	1659.3 (3318.6)								
D	0 - 1.5	3941.9	1017.7	199.1	4911.5 (132.8)	2920.4 (2035.4)	110.6 (22.1)	22.1 (0)	1356	907	774	18791 (281)	1460 (1092)	5479 (4034)	501 (190)	
	1.5 - 3.0	124.8	774.4	221.2	4292.1 (132.8)	1305.4 (885.0)	15951.4 (66.4)	1393.8 (376.1)								
	3.0 - 4.5	0.0	929.2	1902.7	47168.2 (575.2)	154.9 (354.0)	376.1 (12013.3)	88.5 (194.6)								
E	0 - 1.5	225.0	575.2	2522.1	20452.3 (0)	7212.4 (7831.9)	0 (0)	1150.4 (988.5)	1460	752	1549	7806	5782 (12448)	723 (6268)	2330 (10359)	
	1.5 - 3.0	4154.5	442.5	619.5	619.5 (0)	4469.0 (7876.1)	132.7 (2566.4)	1814.2 (619.5)								
	3.0 - 4.5	0.0	1238.9	1504.4	2345.1 (0)	5663.7 (21637.2)	2035.4 (16238.9)	4026.5 (29469.0)								
F	0 - 1.5	3069.8	929.2	88.5	6761.5 (0)	8185.8 (442.5)	3097.3 (442.5)	1814.2 (1460.2)	1141	3319	59	13211	7965 (6785)	2522 (12065)	3245 (4440)	
	1.5 - 3.0	351.7	8274.3	88.5	26737 (0)	5000.0 (2920.4)	2256.6 (15973.5)	5663.7 (1548.7)								
	3.0 - 4.5	0.0	752.2	0.0	6134.4 (0)	10708.0 (16991.2)	2212.4 (19778.8)	2256.6 (10309.7)								
G	0 - 1.5	0.0	0.0	0.0	354 (0)	3008.8 (221.2)	44.2 (0)	44.2 (0)	0	15	0	2383	2522 (501)	177 (0)	516 (0)	
	1.5 - 3.0	0.0	44.2	0.0	6795.2 (0)	3451.3 (0)	486.7 (0)	354 (0)								
	3.0 - 4.5	0.0	0.0	0.0	0 (0)	1106.2 (1283.2)	0 (0)	1150.4 (0)								
H	0 - 1.5	2650.6	22.1	2500.0	3473.5 (0)	464.6 (22.1)	3163.8 (1039.8)	4491.2 (597.4)	1102	789	1667	2463	8120 (244)	3717 (5221)	2935 (280)	
	1.5 - 3.0	655.9	2256.7	1371.7	1283.2 (0)	17190.3 (420.4)	6615.1 (12610.6)	3252.2 (154.9)								
	3.0 - 4.5	0.0	88.5	1128.3	2632.7 (0)	6703.5 (287.6)	1371.7 (2013.3)	1062 (88.5)								
Total 0-1.5 M		12678	2655	23302	72556 (332)	31858 (11637)	17810 (20177)	9734 (3422)								
Total 1.5 to 3.0 M		9541	17411	11570	98068 (1836)	42168 (24093)	28872 (40443)	52478 (7301)								
Total 3.0 to 4.5 M		0	4248	14049	80935 (3142)	36128 (54071)	10177 (83451)	15841 (53181)								
Total 0 to 3.0 M		22219	20067	34873	170624 (2168)	74027 (35730)	46682 (60620)	62212 (10723)	Mean	926	1013	2038	10469 (379)	4590 (3742)	2369 (6003)	3252 (2663)
Total 0 to 4.5 M		22219	24314	48922	251559 (5310)	110155 (89801)	56859 (144071)	78053 (63904)	Sum	7406	8104.817	16307	83757 (3032)	36719 (29936)	18953 (48024)	26018 (21301)

Note: Results expressed as Zebra mussel (Quagga mussel) when Quagga mussels are present.
 The 2002 data utilized scuba divers for sample collection, and the 2005 through 2010 data utilized the petit ponar dredge for sample collection.

Table A6.5b. Onondaga Lake Dreissenid Mussel Survey - Fall 2002, and Fall 2005 through Fall 2010 Comparison of Biomass (g/m²)

Zone	Water Depth Section/Range (m)	Mean Estimated Biomass (g/m ²) by Depth							Mean Estimated Biomass (g/m ²) by Zone							
		2002	2005	2006	2007 *	2008 *	2009	2010	2002 (0-4.5 M)	2005 (0-4.5 M)	2006 (0-4.5 M)	2007 * (0-4.5 M)	2008 * (0-4.5 M)	2009 (0-4.5 M)	2010 (0-4.5 M)	
A	0 -1.5	1134.8	0.5	53.1	1648.2	73.0	1077.5 (694.7)	11.05 (6.6)	1078.5	41.9	716.8	1150.4	297.9	485.3 (321.6)	351.05 (1149)	
	1.5 - 3.0	2100.8	122.7	672.6	1721.2	544.3	336.3 (250.0)	736.8 (159.3)								
	3.0 - 4.5	0.0	2.4	1424.8	81.9	276.5	42 (19.9)	305.3 (3281)								
B	0 -1.5	0.0	0.0	110.6	893.8	323.0	699.1 (3053.1)	57.5 (22.1)	0.0	6.0	47.2	337.8	650.4	241.9 (1467.5)	175.5 (8.8)	
	1.5 - 3.0	0.0	12.8	31.0	106.2	854.0	0 (0)	464.6 (4.4)								
	3.0 - 4.5	0.0	5.3	0.0	13.3	774.3	26.5 (1349.6)	4.42 (0)								
C	0 -1.5	246.6	3.1	13.3	314.2	278.8	50.9 (170.4)	79.7 (15.5)	170.6	57.6	74.5	1747.8	855.5	109.1 (2000.8)	140.8 (405.6)	
	1.5 - 3.0	265.1	67.3	208.0	2146.0	847.4	92.9 (1820.8)	296 (99.6)								
	3.0 - 4.5	0.0	102.4	2.2	2783.2	1440.3	183.6 (4011.1)	46.5 (1101.8)								
D	0 -1.5	1076.1	81.6	28.8	2115.0	1015.5	11.1 (6.7)	2.2 (0)	361.6	45.1	70.1	1442.5	472.7	42.8 (894.6)	36.8 (20.6)	
	1.5 - 3.0	8.8	6.9	4.4	35.4	336.3	99.6 (2.2)	106.2 (42)								
	3.0 - 4.5	0.0	46.7	177.0	1473.5	66.4	17.7 (2674.8)	2.2 (19.9)								
E	0 -1.5	386.4	14.6	8.9	920.4	1385.0	0 (0)	61.9 (13.3)	971.9	16.8	26.6	348.1	1435.1	53.1 (949.9)	110.6 (3799.4)	
	1.5 - 3.0	2529.4	8.9	22.1	57.5	1097.3	4.4 (376.1)	128.3 (53.1)								
	3.0 - 4.5	0.0	27.0	48.7	66.4	1823.0	154.9 (2473.5)	141.6 (11331.9)								
F	0 -1.5	3363.7	62.8	17.7	1203.5	854.0	1070.8 (159.3)	106.2 (677.0)	1125.3	133.5	7.4	2585.5	1619.5	532.4 (3830.4)	147.5 (2193.2)	
	1.5 - 3.0	12.3	240.3	4.4	6283.2	1084.1	327.4 (5256.6)	207.9 (212.4)								
	3.0 - 4.5	0.0	97.4	0.0	269.9	2920.4	199.1 (6075.2)	128.3 (5690.3)								
G	0 -1.5	0.0	0.0	0.0	4.4	628.3	4.4 (0)	4.424 (0)	0.0	0.1	0.0	64.9	324.5	4.4 (0)	11.8 (0)	
	1.5 - 3.0	0.0	0.4	0.0	190.3	172.6	8.8 (0)	8.85 (0)								
	3.0 - 4.5	0.0	0.0	0.0	0.0	172.6	0 (0)	22.123 (0)								
H	0 -1.5	2356.2	0.2	26.5	617.3	64.2	502.2 (130.5)	166 (55.3)	800.6	22.6	94.4	457.2	272.1	405.6 (432.9)	114.3 (23.6)	
	1.5 - 3.0	45.7	59.3	88.5	247.8	526.6	668.2 (1013.3)	110.6 (8.85)								
	3.0 - 4.5	0.0	8.4	168.1	506.6	225.7	46.5 (154.9)	66.4 (6.7)								
Total 0-1.5 M		8564	163	259	7717	4622	3416 (4215)	489 (790)								
Total 1.5 to 3.0 M		4962	519	1031	10788	5463	1538 (8719)	2059.25 (579.65)								
Total 3.0 to 4.5 M		0	290	1821	5195	7699	670 (16759)	716.8 (21431.6)								
Total 0 to 3.0 M		13526	681	1290	18504	10084	4954 (12934)	548.22 (1369.15)	Mean	563.6	40.5	129.6	1016.8	741.0	234.3 (1237.22)	136.04 (950)
Total 0 to 4.5 M		13526	971	3111	23699	17784	5624 (29693)	3265 (22800.75)	Sum	4508.6	323.7	1036.9	6983.8	5927.7	1874.6 (9897.57)	1088.36 (7600)

Note: * Weights represent the combined *Dreissena* sp., Zebra and Quagga mussel.
 All other results expressed as Zebra mussel (Quagga mussel) when Quagga mussels are present.
 The 2002 data utilized scuba divers for sample collection, and the 2005 through 2010 data utilized the petit ponar dredge for sample collection.

Table A6.6a. Onondaga Lake Dreissenid Mussel Survey Fall 2010 - Zebra Mussel Raw Length (mm) Data.

Zone	Zone A			Zone A			Zone B			Zone C			Zone C			Zone D		
Transect	Transect 1			Transect 2			Transect 1			Transect 1			Transect 2			Transect 1		
Water Depth	0 - 1.5	1.5 - 3	3 - 4.5	0 - 1.5	1.5 - 3	3 - 4.5	0 - 1.5	1.5 - 3	3 - 4.5	0 - 1.5	1.5 - 3	3 - 4.5	0 - 1.5	1.5 - 3	3 - 4.5	0 - 1.5	1.5 - 3	3 - 4.5
Median Length	7	7	10	0	6	5	6	7	4	0	5	6	8	5	5	0	7	5
Mean Length	6.5	6.8	10.1	0.0	6.7	5.9	6.4	6.4	4.4	0.0	5.4	5.8	8.1	5.8	5.6	0.0	6.8	6.3
1	6.2	14.7	12.2		2.1	6.6	16.0	10.1	1.8		9.7	9.2	12.6	11.2	9.1		10.0	10.8
2	2.3	8.6	14.6		6.8	3.8	7.2	4.6	2.9		4.1	4.3	12.0	10.7	6.4		9.0	4.7
3	4.8	5.0	15.5		8.2	1.7	6.1	15.2	4.2		8.5	4.4	12.6	9.1	8.6		9.4	5.3
4	5.3	7.1	9.5		4.9	3.0	11.1	11.0	5.3		3.9	9.8	11.4	9.6	4.5		8.1	4.2
5	6.1	8.8	16.4		4.6	5.7	9.3	9.2	7.7		6.9	6.9	12.1	8.3	6.2		8.7	
6	8.2	8.8	11.5		4.5	3.1	6.1	3.9			3.9	5.7	11.3	8.6	8.1		7.3	
7	9.3	4.6	13.7		6.0	5.1	8.0	10.1			5.3	5.3	10.4	9.1	6.2		12.1	
8	6.5	5.0	14.5		6.2	4.8	7.9	8.0			3.2	7.7	11.1	8.7	5.3		8.6	
9	8.2	4.7	12.6		5.4	12.0	5.8	7.3			4.0	5.0	10.8	7.8	6.6		7.7	
10	9.1	5.6	11.0		2.9	4.1	5.2	6.2			6.4	6.8	10.0	5.6	3.1		8.8	
11	7.0	4.8	9.7		6.8	11.7	5.4	4.3			4.0	7.1	10.2	6.5	5.1		9.4	
12	7.0	5.8	8.3		5.2	5.8	4.4	5.5			6.1	3.1	9.5	5.1	5.9		7.0	
13	5.0	5.2	10.4		5.2	2.5	5.1	10.2			4.9	3.8	9.1	5.3	6.7		8.4	
14		9.6	11.8		3.5	3.9	7.4	5.5			6.8	5.6	9.4	3.0	5.1		7.3	
15		6.1	5.1		15.2	2.2	6.6	8.9			3.0	10.6	10.2	7.7	5.0		7.3	
16		4.5	12.9		4.9	6.9	3.8	3.9			3.9	4.7	8.8	7.8	4.5		6.7	
17		10.5	11.8		7.3	11.6	5.7	9.2			4.1	6.8	9.1	7.8	5.6		6.1	
18		6.4	12.5		5.5	3.9	4.8	6.3			2.5	3.0	8.3	7.7	4.6		6.8	
19		9.8	11.0		2.1	9.8	5.8	9.8			1.8	4.0	8.7	8.0	5.2		7.1	
20		6.4	8.4		2.6	11.4	4.9	7.3			9.3	7.6	7.9	6.4	6.0		7.9	
21		7.6	11.6		5.6	7.4	4.3	5.7			5.3	3.2	7.9	4.8	2.8		6.9	
22		7.3	10.9		8.4	3.1	3.6	8.9			6.8	8.2	8.2	6.1	3.5		6.0	
23		6	13.2		2.4	10.5	4.4	8.5			5.4	3.6	9.6	4.8			7.4	
24		7.8	11.6		6.1	11.1	3.9	5.6			4.0	4.8	7.1	4.3			5.4	
25		5.6	11.5		8.3	3.8		6.3			3.9	1.7	8.3	3.0			5.5	
26		5.2	12.6		10.0	7.2		6.1			2.4	9.7	7.9	5.2			5.3	
27		6.4	10.1		6.4	9.5		5.3			9.0	9.1	6.5	2.3			4.5	
28		7.6	7.0		8.9	3.9		8.9			6.8	6.8	6.7	5.4			6.1	
29		5.3	10.4		7.5	4.5		4.9			7.8	6.6	5.6	5.1			5.4	
30		3.6	7.2		7.2	7.4		6.5			4.3	6.8	6.0	3.9			5.4	
31		7.3	7.0		5.0	5.6		6.3			4.2	8.3	4.9	5.4			4.6	
32		6.6	6.2		4.4	5.3		5.3			6.9	3.3	4.5	4.3			5.4	
33		8.2	3.3		7.9	8.1		3.2			7.3	5.7	4.8	7.8			6.2	
34		4.9	9.7		4.8	1.7		6.6			6.7	6.9	4.1	5.6			5.1	
35		7.7	7.7		7.3	8.6		5.2			4.5	5.7	3.4	7.7			4.7	
36		3.1	10.2		4.7	11.5		11.9			3.9	3.5	4.4	6.0			4.2	
37		7.2	9.5		6.1	1.2		9.0			5.4	5.3	3.4	4.8			5.2	
38		5.6	7.7		3.7	7.6		2.5			3.4	5.3	2.6	7.0			3.7	
39		7.2	10.4		11.1	12.3		1.1			4.6	7.7	2.9	5.1			2.6	
40		6.8	4.4		5.9	4.2		7.9			3.8	3.8		6.9				
41		4.9	7.7		3.4	9.3		7.5			5.7	4.5		4.8				
42		4.8	4.5		4.2	1.8		7.1			6.5	5.5		5.1				
43		6.3	5.3		10.8	3.1		7.6			7.8	6.5		5.3				
44		5.9			4.6	3.2		4.5			5.6	5.6		3.7				
45		7.4			8.5	7.3		3.6			3.9	6.6		4.7				
46		7.0			8.4	4.3		8.5			2.6	5.9		5.1				
47		8.7			11.8	3.0		8.9			6.0	5.7		3.6				
48		7.1			12.9	11.2		4.2			6.0	7.2		6.2				
49		6.7			9.8	3.7		8.6			4.1	6.5		5.9				
50		7.4			7.8	2.2		3.9			3.9	5.3		5.6				
51		5.4			10.9	10.7		6.2			8.2	4.7		5.8				
52		5.3			10.2	5.5		5.0			4.4	4.2		4.5				

Table A6.6a. Onondaga Lake Dreissenid Mussel Survey Fall 2010 - Zebra Mussel Raw Length (mm) Data.

Zone	Zone A			Zone A			Zone B			Zone C			Zone C			Zone D		
Transect	Transect 1			Transect 2			Transect 1			Transect 1			Transect 2			Transect 1		
Water Depth	0 - 1.5	1.5 - 3	3 - 4.5	0 - 1.5	1.5 - 3	3 - 4.5	0 - 1.5	1.5 - 3	3 - 4.5	0 - 1.5	1.5 - 3	3 - 4.5	0 - 1.5	1.5 - 3	3 - 4.5	0 - 1.5	1.5 - 3	3 - 4.5
53		6.6			6.4	4.1		8.7		7.9	3.9		5.4					
54		4.2			6.9	9.7		6.1		4.5			5.3					
55		6.2			3.3	9.2		4.6		5.9			8.1					
56		4.3			4.0	4.0		5.5		6.8			7.3					
57		7.7			6.0	4.4		3.4		4.2			5.3					
58		7.2			2.3	6.3		7.9		6.7			8.0					
59		7.7			3.9	9.1		6.6		7.0			6.5					
60		6.9			8.8	2.7		9.5		9.5			6.5					
61		6.3			9.9	7.2		2.9		5.9			6.9					
62		6.7			6.2	7.9		4.7		5.6			7.3					
63		8.4			5.0	8.8		6.6		6.2			7.2					
64		7.6			11.0	3.5		2.9		4.6			4.9					
65		7.3			9.3	4.0		2.8		5.3			5.2					
66		5.7			5.1	5.4		5.7		5.1			3.4					
67		5.2			5.6	3.6		3.3		3.9			5.6					
68		7.7			12.8	1.9		4.2		6.9			3.7					
69		5.2			13.2	6.2		11.0		7.8			2.8					
70		4.5			5.2	2.4		7.9		1.9			4.4					
71		2.7			3.0	8.4		6.6		3.4			3.7					
72		2.6			4.0	8.1		7.3		5.4			3.9					
73		8.4			6.3	4.7		1.3		2.9			7.3					
74		8.3			8.4	7.3		3.9		7.6			4.8					
75		6.0			6.0	2.9		3.4		6.2			4.8					
76		4.2			8.3	8.5		5.6		6.6			4.7					
77		11.3			6.6	4.6		6.6		4.1			4.9					
78		7.3			9.2	4.3		6.9		4.3			6.0					
79		8.2			10.6	6.2		7.1		5.2			7.0					
80		7.4			7.6	9.5		5.2		4.3			2.4					
81		8.3			4.3	8.4		6.6		5.4			6.3					
82		6.2			6.2	3.0		7.4		11.6			6.0					
83		9.3			3.8	4.6		5.6		4.8			5.8					
84		9.6			9.8	5.3		8.2		8.2			6.0					
85		5.2			4.5	4.8		3.0		4.1			3.8					
86		5.9			7.0	3.6		4.4		3.3			6.8					
87		8.3			2.2	4.0		6.7		4.5			5.0					
88		5.4			6.4	9.0		5.5		4.5			4.8					
89		8.0			5.4	8.2		2.2		6.0			4.2					
90		7.5			12.4	5.0		5.1		6.1			2.8					
91		8.2			8.4	5.4		6.5		4.3			5.4					
92		9.0			11.3	7.9		6.7		6.8			5.4					
93		5.6			8.7	2.0		7.8		6.6			7.7					
94		7.0			5.0	2.7		7.0		6.5			6.4					
95		7.5			4.1	8.0		3.6		4.0			4.9					
96		10.1			1.8	4.6		8.2		4.6			5.8					
97		6.6			6.5	6.5		7.5		3.8			6.5					
98		5.0			9.8	4.6		6.6		6.2			3.5					
99		6.0			3.2	5.2		8.6		7.5			3.5					
100		12.6			7.8	5.8		7.2		1.8			4.0					
101																		
102																		

Table A6.6a. Onondaga Lake Dreissenid Mussel Survey Fall 2010 - Zebra Mussel Raw Length (mm) Data.

Zone	Zone D			Zone E			Zone F			Zone G			Zone H			Zone H		
Transect	Transect 2			Transect 1			Transect 1			Transect 1			Transect 1			Transect 2		
Water Depth	0 - 1.5	1.5 - 3	3 - 4.5	0 - 1.5	1.5 - 3	3 - 4.5	0 - 1.5	1.5 - 3	3 - 4.5	0 - 1.5	1.5 - 3	3 - 4.5	0 - 1.5	1.5 - 3	3 - 4.5	0 - 1.5	1.5 - 3	3 - 4.5
53						3.6			6.4				7.3					7.7
54						6.2			7.1				5.6					4.1
55						4.6			4.6				3.1					9.8
56						7.3			8.3				8.1					5.3
57						5.4			8.9				4.3					7.6
58						4.2			4.0				5.8					8.8
59						5.2			6.8				4.9					7.1
60						5.0			7.5				6.3					6.2
61						3.2			6.2				4.1					9.9
62						5.2			6.3				5.7					4.9
63						5.0			5.5				7.0					4.3
64						4.8			6.6				7.0					5.3
65						4.3			5.0				3.9					5.1
66						4.0			4.4				7.3					7.5
67						6.3			2.9				8.6					5.4
68						4.9			8.7				7.4					9.6
69						4.3			8.9				5.3					5.6
70						3.0			5.2				7.1					9.1
71						5.0			3.5				6.7					7.2
72						3.7			3.8				5.7					7.1
73						3.4			2.8				8.7					9.7
74						4.4			4.1				4.7					5.4
75						4.4			1.8				5.4					6.4
76						4.1			5.8				7.0					4.0
77						5.6			9.7				5.1					3.2
78						2.8			3.1				6.5					4.7
79						4.0			4.7				5.9					9.7
80						4.7			11.5				5.6					5.1
81						4.3			6.5				7.3					3.7
82						3.3			2.2				5.2					9.9
83						3.1			11.9				7.2					5.0
84						4.9			4.1				5.8					8.7
85						3.0			8.2				5.7					5.7
86						5.8			5.4				4.7					5.1
87						5.3			3.2				6.2					8.6
88						3.1			7.9				6.0					7.6
89						3.3			3.6				10.5					4.4
90						3.3			3.7				5.2					9.7
91						3.2			11.0				2.9					4.6
92									4.9				6.2					7.9
93									6.2				6.7					2.4
94									11.2				10.3					5.9
95									4.8				5.2					3.9
96									3.1				3.4					5.2
97									3.4				3.3					6.7
98									3.4				7.0					6.2
99									5.6				8.2					4.5
100									5.8				7.5					4.4
101													4.1					
102													3.9					

Table A6.6b. Onondaga Lake Dreissenid Mussel Survey Fall 2010 - Quagga Mussel Raw Length (mm) Data.

Zone Transect	Zone A Transect 1			Zone A Transect 2			Zone B Transect 1			Zone C Transect 1			Zone C Transect 2			Zone D Transect 1		
	0 - 1.5	1.5 - 3	3 - 4.5	0 - 1.5	1.5 - 3	3 - 4.5	0 - 1.5	1.5 - 3	3 - 4.5	0 - 1.5	1.5 - 3	3 - 4.5	0 - 1.5	1.5 - 3	3 - 4.5	0 - 1.5	1.5 - 3	3 - 4.5
Water Depth																		
Median Length	9	7	15	8	7	6	9	5	0	0	14	15	12	7	0	0	10	12
Mean Length	8.7	6.7	15.0	7.7	7.7	8.3	10.7	6.1	0.0	0.0	12.2	15.3	11.8	7.0	0.0	0.0	10.3	10.4
1	9.6	5.4	15.1	9.4	14.1	4.2	8.0	8.8				15.8	16.0	13.0	9.0		9.8	14.2
2	8.1	9.5	21.4	7.7	9.7	6.0	15.4	4.9				18.7	14.1	11.7	7.1		12.3	6.2
3	9.2	4.8	14.2	6.1	11.0	3.4	8.7	4.6				17.0	13.8	10.7	6.8		12.8	14.0
4	8.0	7.0	25.0		7.3	16.5						14.5	17.2	11.8	5.2		11.0	11.5
5		7.3	9.3		5.7	8.6						13.9	14.7				10.4	7.7
6		10.5	9.0		7.3	6.8						19.6	18.4				9.2	10.8
7		7.2	16.5		13.2	19.0						15.8	16.9				10.6	12.8
8		7.1	6.3		4.5	3.8						17.9	4.5				9.5	4.7
9		4.7	11.8		11.0	5.0						15.9	15.8				11.4	11.7
10		11.1	7.0		8.0	2.7						13.0	15.3					9.3
11		5.9	12.7		8.0	12.4						7.1	14.8					9.6
12		6.0	14.1		9.7	13.7						13.5	17.6					8.4
13		5.5	13.4		6.2	8.2						5.5	15.1					10.5
14		7.6	16.5		7.2	11.0						5.6	15.2					9.0
15		4.8	16.6		8.7	4.4						5.3	14.0					10.3
16		4.9	20.4		10.3	7.1						3.9	17.8					
17		5.4	16.3		5.5	14.6						3.8	14.9					
18		3.7	17.0		8.9	3.8							17.0					
19		3.5	20.2		11.3	19.9							15.4					
20		5.2	18.4		3.1	5.4							14.2					
21		9.7	5.3		7.2	3.3							14.2					
22		6.9	8.2		3.6	7.4							18.1					
23		9.3	19.7		5.5	10.0							19.4					
24		4.1	13.7		9.4	4.5							17.3					
25		7.7	15.9		9.0	17.2							13.8					
26		10.1	12.6		8.6	5.4							11.7					
27		10.2	14.3		9.1	17.6							14.9					
28		4.0	21.3		9.1	12.3							16.7					
29		8.1	12.9		8.9	19.3							15.2					
30		10.1	16.7		11.8	3.2							14.6					
31		9.3	15.0		9.4	7.2							17.6					
32		6.8	9.3		10.0	3.4							16.1					
33		11.8	21.6		13.3	9.3							17.1					
34		7.1	5.7		9.8	14.8							16.6					
35		9.8	12.7		6.1	2.6							15.9					
36		6.3	13.6		7.3	16.2							18.2					
37		6.6	7.9		11.8	4.6							15.5					
38		6.6	14.1		7.4	7.8							16.4					
39		5.5	17.3		11.1	6.5							16.2					
40		5.5	20.0		10.7	14.0							17.6					
41		7.3	17.9		6.0	7.6							17.3					
42		8.9	19.4		8.7	14.7							15.8					
43		6.7	15.4		9.0	3.4							16.9					
44		4.3	17.0		7.6	5.0							17.2					
45		3.9	16.3		10.7	4.0							15.8					
46		4.4	20.4		4.0	5.1							18.6					
47		4.5	18.4		8.1	5.7							12.9					
48		9.2	12.8		7.5	2.0							20.1					
49		8.5	13.6		8.2	6.3							14.9					
50		8.9	5.8		7.0	18.8							15.4					
51		5.4	22.2		5.1	8.5							15.9					
52		7.4	15.6		5.9	7.1							17.9					
53		8.8	17.5		4.8	3.4							15.7					
54		6.4	17.3		2.6	6.9							14.0					
55		8.1	19.7		6.2	14.7							14.2					
56		5.5	18.2		6.7	18.2							17.7					
57		5.3	15.0		13.9	10.2							17.2					
58		8.2	11.8		8.0	10.7							14.3					
59		5.9	13.0		10.8	1.7							16.8					
60		5.0	13.6		7.5	1.5							16.0					
61		5.4	14.2		7.3	16.2							13.8					
62		3.6	13.1		8.4	7.4							15.1					
63		5.8	14.3		6.9	6.3							15.7					
64		5.1	15.9		6.2	6.1							13.8					
65		8.2	18.0		5.4	3.8							15.5					
66		8.4	17.9		4.3	2.7							15.4					
67		9.7	14.1		7.3	3.3							16.0					

Table A6.6b. Onondaga Lake Dreissenid Mussel Survey Fall 2010 - Quagga Mussel Raw Length (mm) Data.

Zone Transect	Zone A			Zone A			Zone B			Zone C			Zone C			Zone D		
	Transect 1			Transect 2			Transect 1			Transect 1			Transect 2			Transect 1		
Water Depth	0 - 1.5	1.5 - 3	3 - 4.5	0 - 1.5	1.5 - 3	3 - 4.5	0 - 1.5	1.5 - 3	3 - 4.5	0 - 1.5	1.5 - 3	3 - 4.5	0 - 1.5	1.5 - 3	3 - 4.5	0 - 1.5	1.5 - 3	3 - 4.5
68		5.8	10.7		4.8	3.5												14.6
69		5.1	18.9		4.1	5.7												13.1
70		5.8	19.8		7.1	5.9												14.0
71		4.1	14.3		8.2	2.8												13.5
72			11.3	21.4		8.2	16.8											15.5
73		8.1	11.5		8.1	15.6												13.8
74		7.2	11.8		7.3	6.4												17.0
75		6.7	15.7		6.4	6.6												15.8
76		4.4	15.1		9.3	9.3												16.2
77		7.6	17.7		6.1	15.6												15.9
78		8.9	12.3		7.5	2.1												17.1
79		7.0	10.0		8.9	17.9												15.1
80		7.2	18.8		6.0	3.7												15.5
81		5.5	19.3		5.4	2.5												13.7
82		4.9	21.7		4.9	16.1												14.0
83		5.3	11.2		7.1	5.0												17.7
84		6.3	13.9		6.7	12.0												12.2
85		5.5	12.7		5.9	3.0												15.4
86		4.7	11.3		4.6	2.3												17.4
87		4.7	12.2		6.1	16.7												18.6
88		4.8	7.7		5.2	4.7												14.8
89			19.8		8.1	6.7												17.7
90			16.6		6.3	4.6												15.7
91			16.1		6.8	6.0												14.3
92			16.5		4.9	5.3												13.4
93			14.0		7.4	3.1												16.2
94			15.4			9.1												16.5
95			18.8			12.2												14.7
96			12.2			3.5												13.4
97			17.4			2.1												14.3
98			14.3			18.5												15.6
99			13.8			2.5												17.1
100			9.4			17.0												13.4
101																		14.6
102																		13.9
103																		16.2
104																		16
105																		13.9
106																		12.6
107																		14.5
108																		14.3
109																		14.9
110																		15.2
111																		11.2
112																		12.9
113																		16
114																		14.1
115																		16.6
116																		13.6
117																		17.9
118																		13.3
119																		16
120																		14.9
121																		13
122																		13.7
123																		15.7
124																		18.8
125																		11.2
126																		14.1
127																		11.1
128																		14.4
129																		14.9
130																		14.7
131																		16.6
132																		12.2
133																		14.4
134																		
135																		
136																		

Table A6.6b. Onondaga Lake Dreissenid Mussel Survey Fall 2010 - Quagga Mussel Raw Length (mm) Data.

Zone Transect	Zone D Transect 2			Zone E Transect 1			Zone F Transect 1			Zone G Transect 1			Zone H Transect 1			Zone H Transect 2		
	0 - 1.5	1.5 - 3	3 - 4.5	0 - 1.5	1.5 - 3	3 - 4.5	0 - 1.5	1.5 - 3	3 - 4.5	0 - 1.5	1.5 - 3	3 - 4.5	0 - 1.5	1.5 - 3	3 - 4.5	0 - 1.5	1.5 - 3	3 - 4.5
Water Depth	0	11	0	12	10	15	14	9	17	0	0	0	7	8	10	0	6	0
Median Length	0.0	11.3	0.0	11.6	9.7	13.3	14.1	9.5	16.1	0.0	0.0	0.0	7.7	7.8	9.7	0.0	6.4	0.0
Mean Length		12.8		13.4	11.2	18.4	18.7	19.5	19.0				22.5	9.4	12.8		6.4	
1		9.8		9.7	11.2	21.5	23.7	16.6	18.2				5.5	10.1	12.9			
2					12.2	18.0	21.8	14.0	14.4				15.6	9.2	6.0			
3					13.3	16.2	12.3	11.1	20.7				4.6	7.7	6.9			
4					9.6	15.1	13.1	5.1	13.7				5.0	5.7				
5					9.8	17.7	9.9	6.9	12.0				8.2	4.8				
6					9.2	19.9	9.6	10.6	18.6				6.5					
7					10.4	20.6	5.4	7.5	19.1				8.7					
8					12.6	14.2	8.1	2.9	18.1				6.0					
9					8.7	14.3	12.3	10.6	17.7				4.8					
10					7.8	17.0	11.5	4.4	19.8				6.5					
11					7.4	7.1	10.8	5.6	17.6				17.2					
12					6.2	7.3	12.2	4.2	17.5				3.8					
13					6.5	6.5	12.2	5.1	16.6				7.1					
14					9.2	12.7	13.4	18.2				6.4						
15					14.7	14.4	11.0	20.2				5.5						
16					18.4	14.2	13.1	18.8				4.1						
17					15.6	15.5	10.2	19.5				8.2						
18					17.8	14.2	8.4	17.3				4.2						
19					18.6	14.9	16.5	16.3				8.0						
20					10.9	11.7	9.5	17.7				4.9						
21					15.5	13.5	7.8	18.7				4.2						
22					10.3	13.8	12.7	21.6				8.4						
23					19.2	14.3	10.9	20.2				9.0						
24					14.6	14.3	4.6	21.4				5.0						
25					18.0	14.3	7.9	16.0				6.7						
26					17.9	14.6	7.7	18.8				10.2						
27					13.1	14.5	8.0	16.6										
28					20.8	19.3	4.1	16.4										
29					15.6	18.3	15.0	4.6										
30					4.6	15.7	9.4	14.2										
31					14.8	15.5	9.6	14.7										
32					13.6	16.9	11.8	19.2										
33					11.9		9.3	18.0										
34					16.3		6.3	16.6										
35					14.1			18.2										
36					16.4			19.7										
37					17.9			19.8										
38					14.6			16.0										
39					18.1			18.0										
40					15.2			8.9										
41					13.7			10.0										
42					16.8			16.4										
43					17.9			17.4										
44					10.8			18.1										
45					14.9			20.7										
46					5.7			16.0										
47					18.3			18.7										
48					16.4			15.2										
49					16.6			18.6										
50					21.1			18.5										
51					17.9			17.5										
52					6.7			22.0										
53					6.6			16.9										
54					18.1			15.6										
55					7.9			16.5										
56					17.6			16.6										
57					24.6			18.5										
58					15.4			16.6										
59					15.3			17.2										
60					13.2			18.5										
61					14.7			16.9										
62					14.6			17.4										
63					15.6			18.3										
64					15.0			18.7										
65					14.1			15.4										
66					14.0			19.7										
67																		

Table A6.6b. Onondaga Lake Dreissenid Mussel Survey Fall 2010 - Quagga Mussel Raw Length (mm) Data.

Zone Transect	Zone D Transect 2			Zone E Transect 1			Zone F Transect 1			Zone G Transect 1			Zone H Transect 1			Zone H Transect 2		
	0 - 1.5	1.5 - 3	3 - 4.5	0 - 1.5	1.5 - 3	3 - 4.5	0 - 1.5	1.5 - 3	3 - 4.5	0 - 1.5	1.5 - 3	3 - 4.5	0 - 1.5	1.5 - 3	3 - 4.5	0 - 1.5	1.5 - 3	3 - 4.5
Water Depth																		
68						8.0			22.9									
69						14.3			15.4									
70						10.2			17.9									
71						10.5			17.3									
72						15.4			15.5									
73						18.0			16.5									
74						16.2			13.2									
75						21.3			15.4									
76						18.7			14.1									
77						18.4			17.3									
78						18.4			13.4									
79						7.4			15.9									
80						17.6			12.3									
81						14.7			7.1									
82						9.5			13.2									
83						9.5			11.9									
84						11.1			10.5									
85						11.6			11.9									
86						7.5			11.0									
87						10.8			11.3									
88						5.6			7.8									
89						4.5			8.4									
90						17.8			4.6									
91						6.1			18.2									
92						6.9			7.0									
93						12.2			4.5									
94						17.8			8.5									
95						17.7			6.5									
96						17.0			19.1									
97						11.9			21.3									
98						10.4			20.5									
99						3.4			16.7									
100						4.9			19.3									
101						19.8												
102						14.1												
103						7.5												
104						4.2												
105						19												
106						15.6												
107						7.8												
108						7.9												
109						4.6												
110						6.4												
111						2.9												
112						4.7												
113						18												
114						4.9												
115						17.4												
116						19.4												
117						11.4												
118						19												
119						8.1												
120						7.2												
121						18												
122						6.7												
123						8.3												
124						8												
125						16.8												
126						10.2												
127						17.4												
128						14.3												
129						16.4												
130						15.3												
131						8.1												
132						10												
133						10												
134						7.2												
135						9												
136						7.7												

Figure A6.1 - Seneca River Dreissenid Mussel Survey – *Dreissena* sp. Length Frequency Distribution by Transect (04'-10')

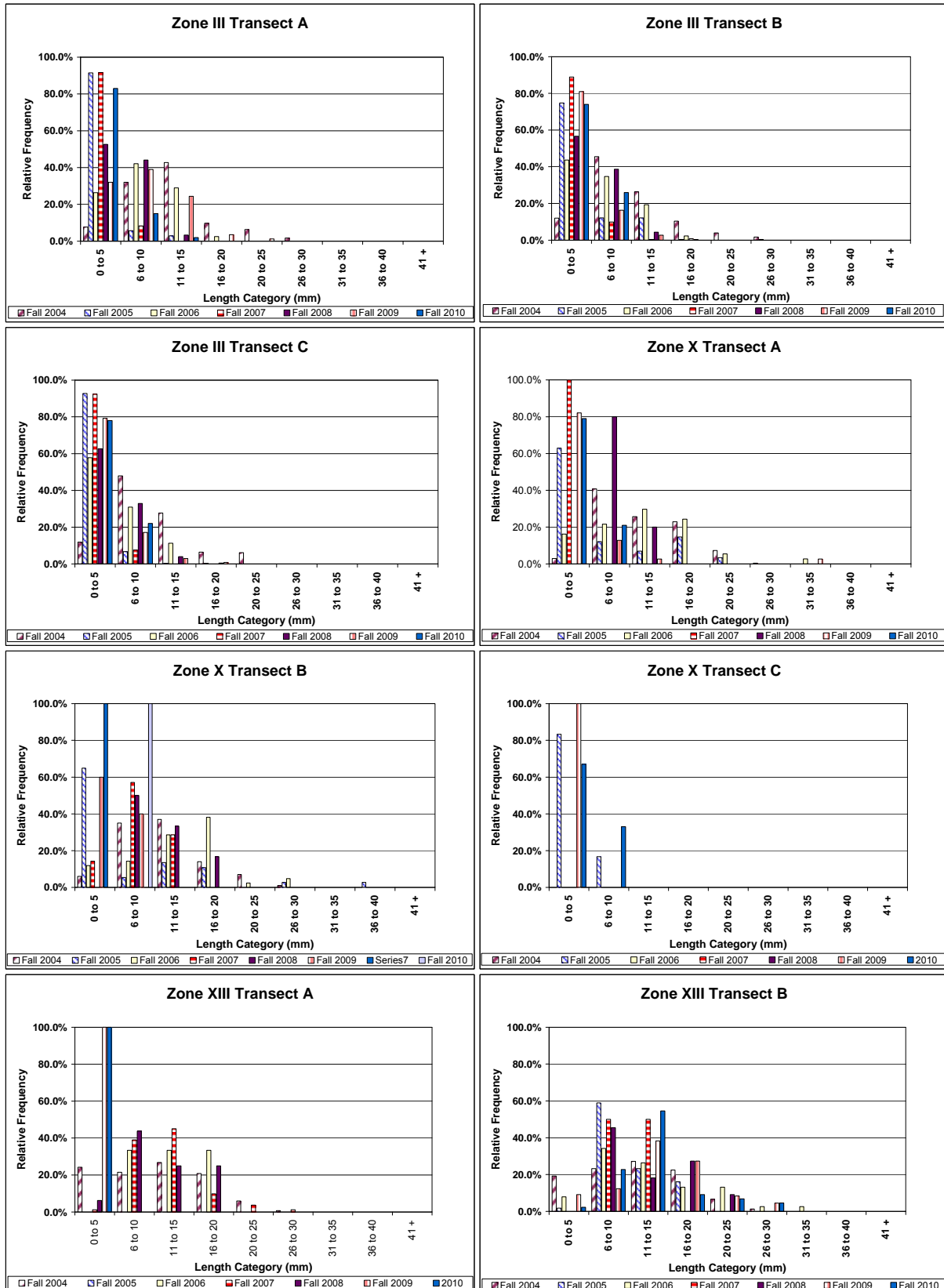


Figure A6.1 - Seneca River Dreissenid Mussel Survey – *Dreissena* sp. Length Frequency Distribution by Transect (04'-10') (continued)

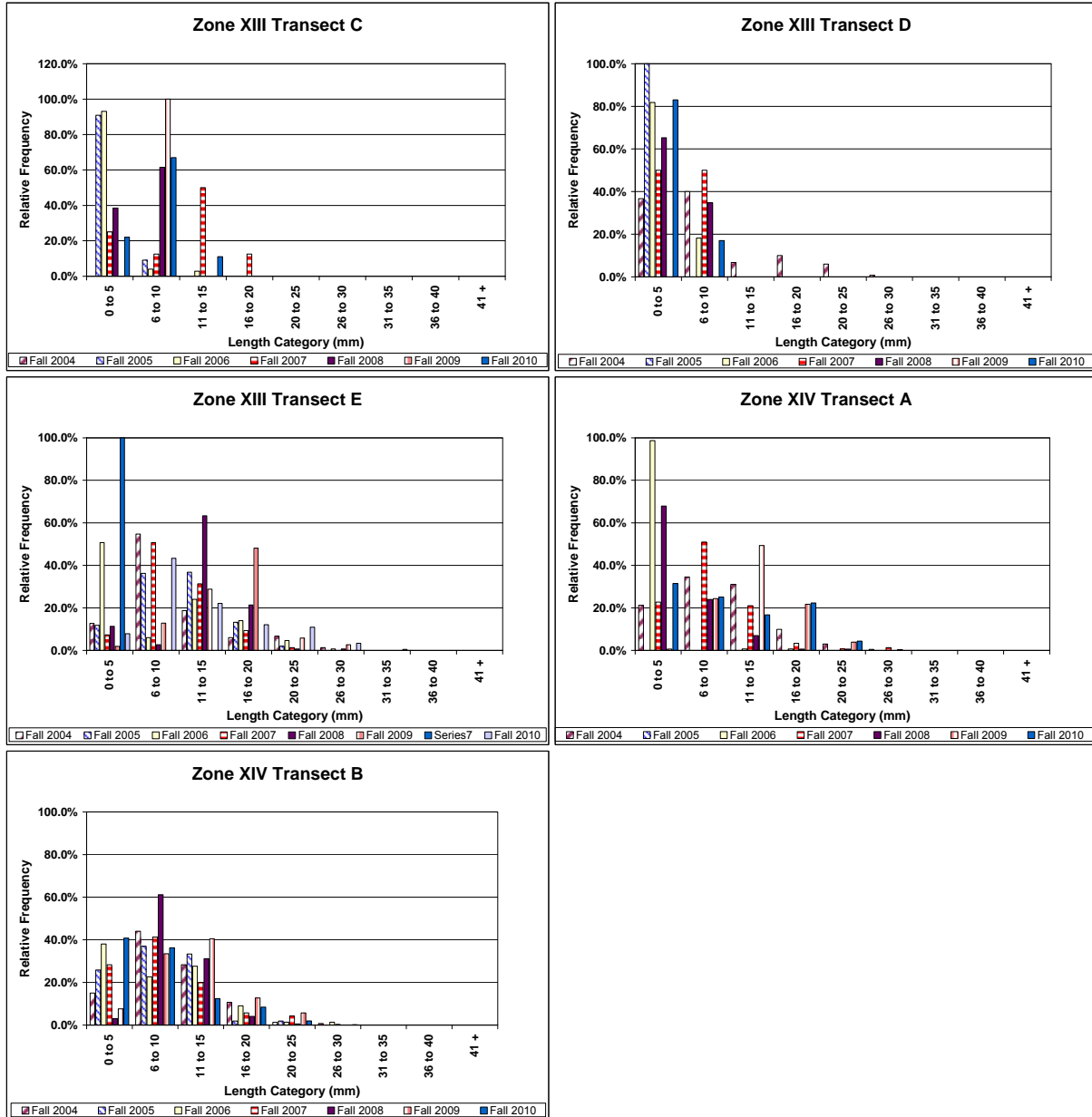


Figure A6.2 – Seneca River Dreissenid Mussel Survey Fall 2010 – Length Frequency Distribution by Transect for Zebra and Quagga Mussels

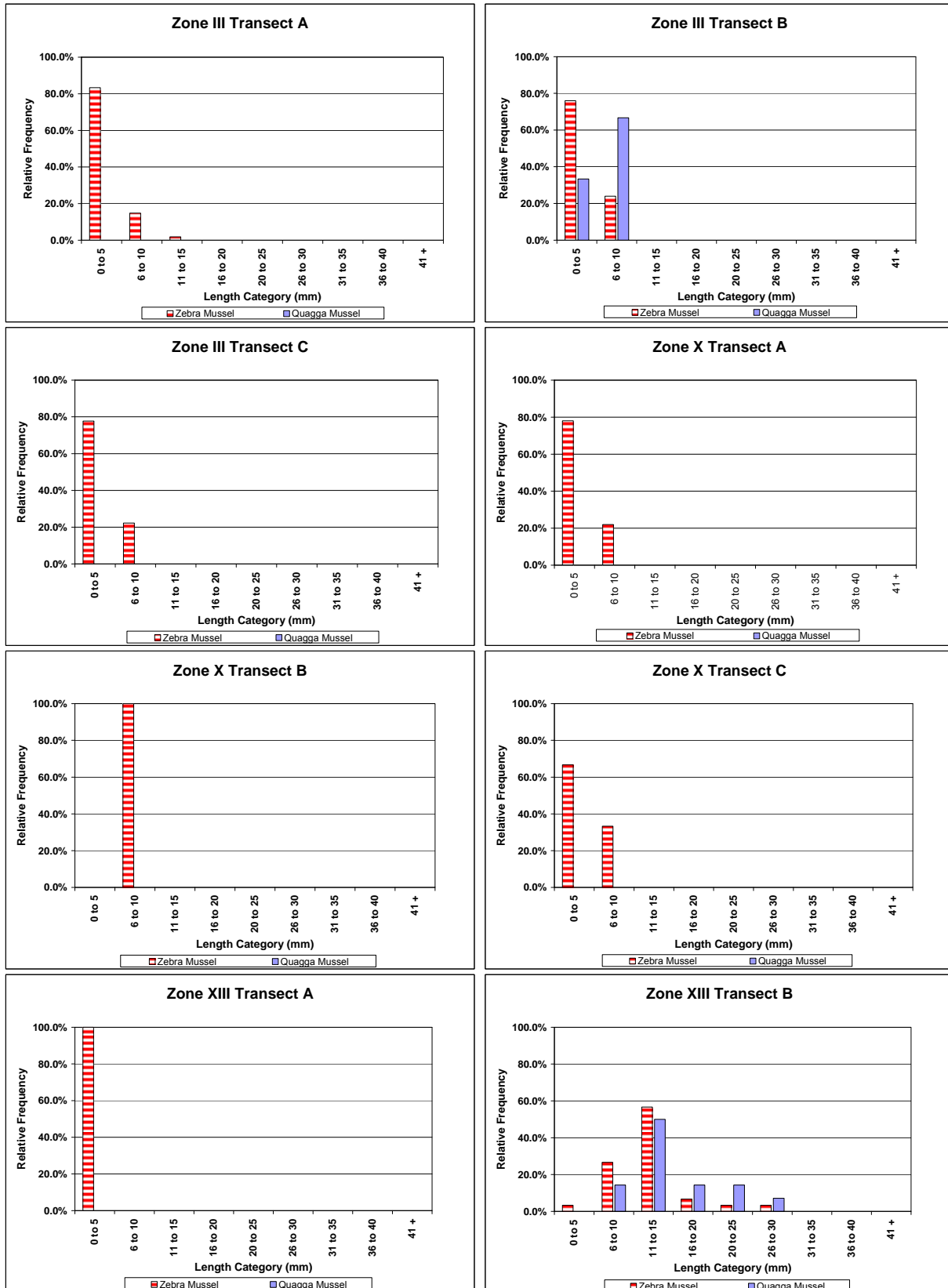


Figure A6.2 – Seneca River Dreissenid Mussel Survey Fall 2010 – Length Frequency Distribution by Transect for Zebra and Quagga Mussels (continued)

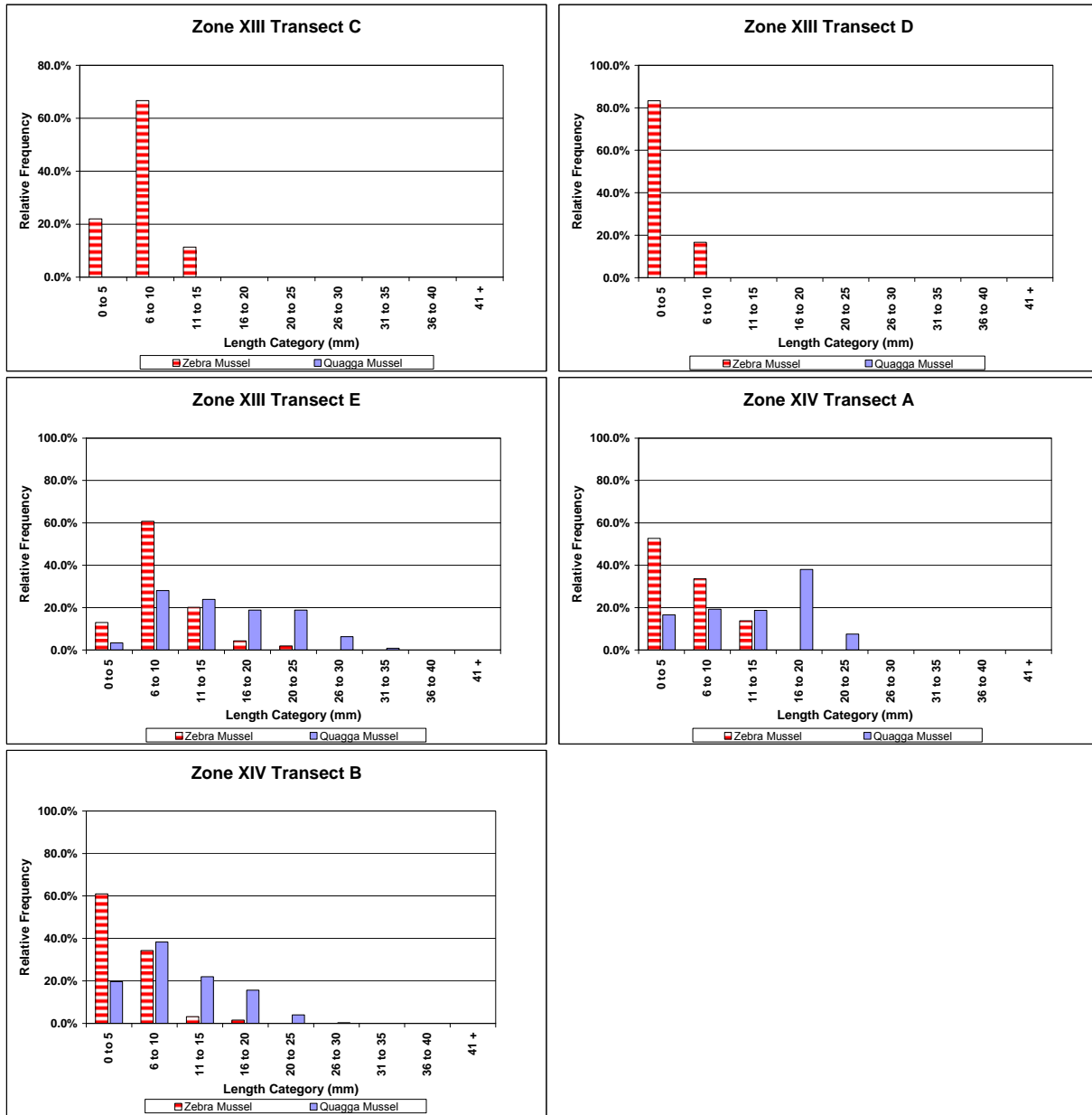


Figure A6.3 – Onondaga Lake Dreissenid Mussel Survey Fall 2010 – Length Frequency Distribution by Zone (All Transects) and Depth Range/Category (All Depths) for Zebra and Quagga Mussel

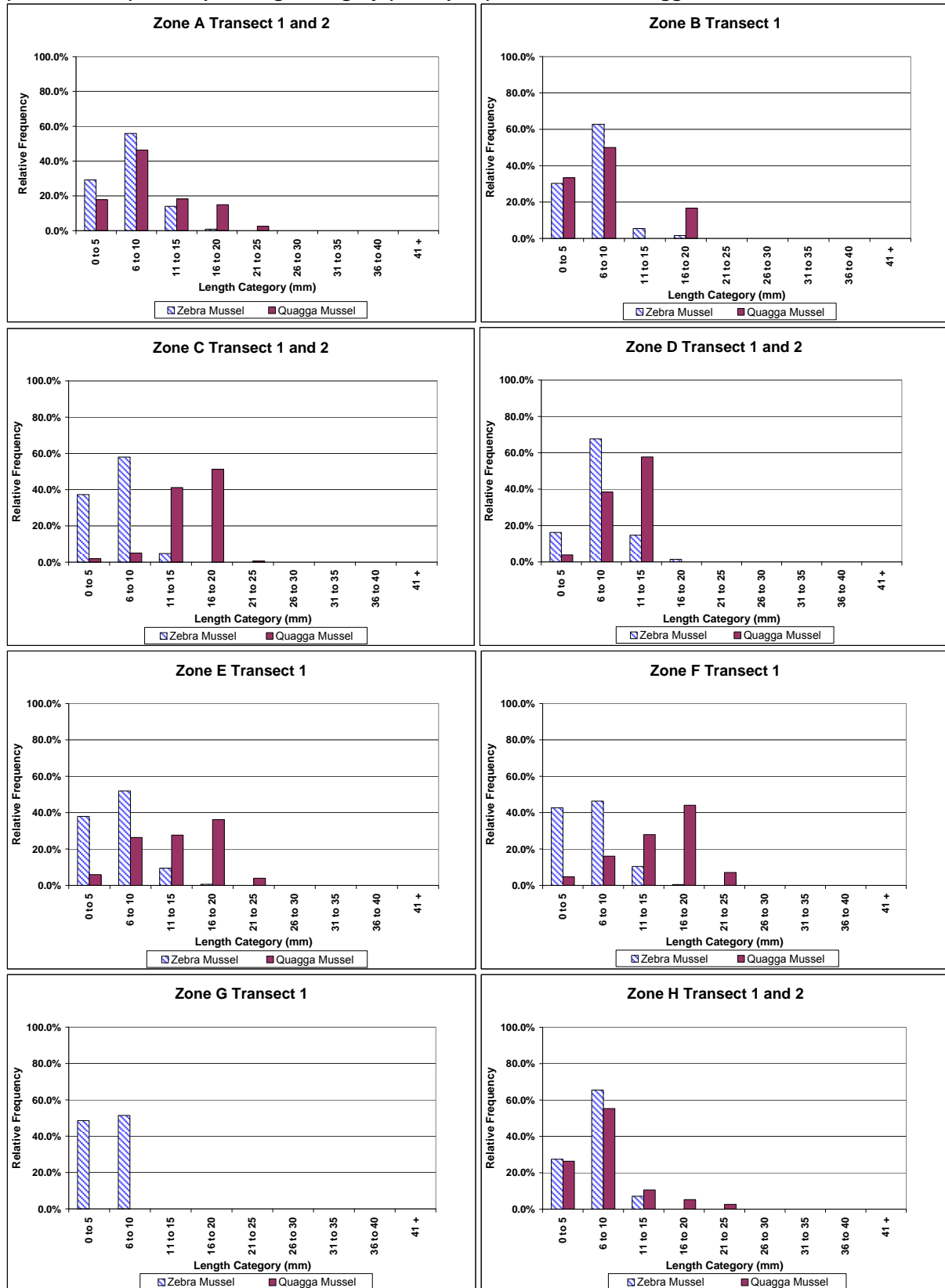


Figure A6.4 – Onondaga Lake Dreissenid Mussel Survey – Fall 2002, and 2005 through 2010 Comparison of *Dreissena* sp. Length Frequency Distribution by Zone (All Transects) and Depth Range/Category (All Depths)

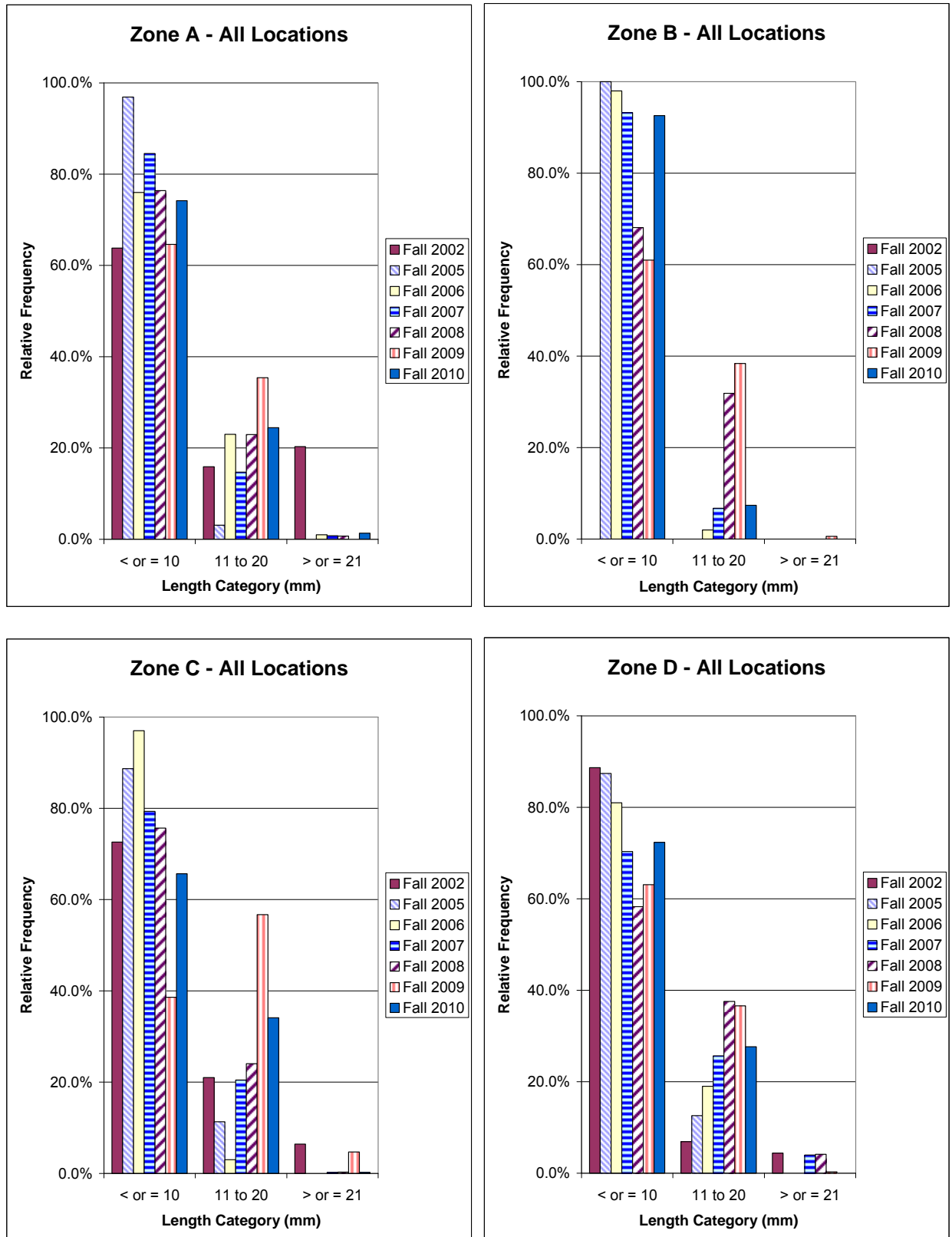


Figure A6.4 – Onondaga Lake Dreissenid Mussel Survey – Fall 2002, and 2005 through 2010 Comparison of *Dreissena* sp. Length Frequency Distribution by Zone (All Transects) and Depth Range/Category (All Depths) (continued)

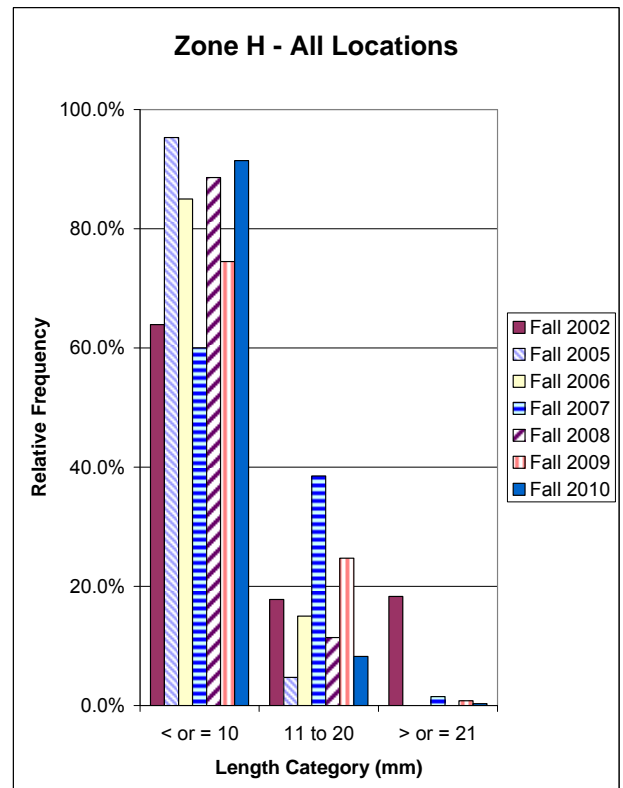
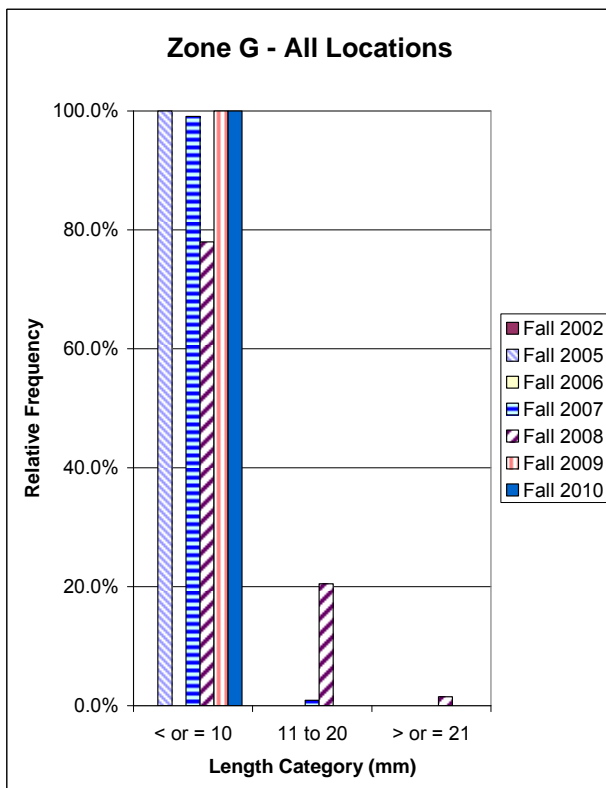
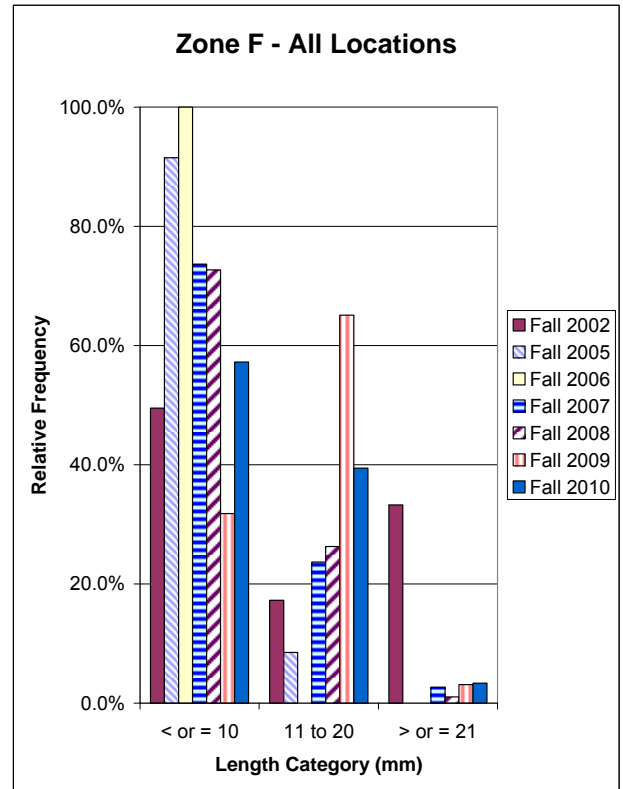
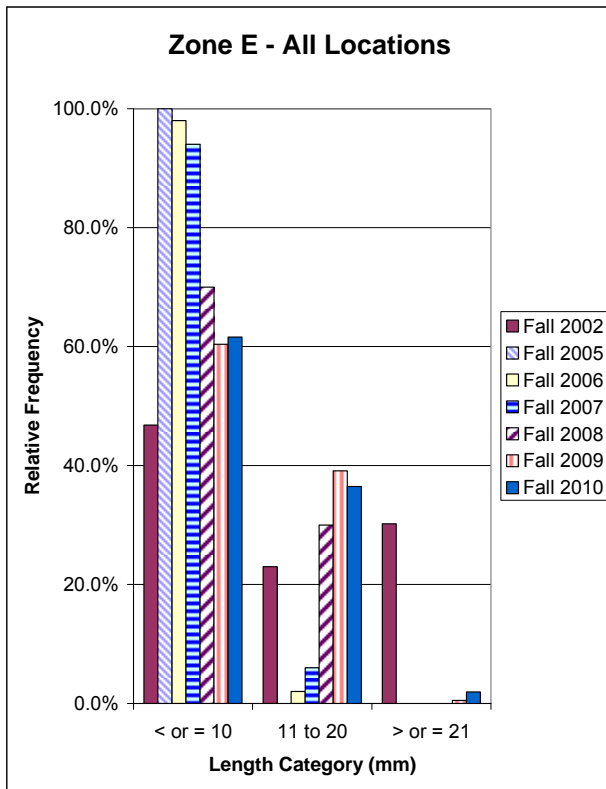


Figure A6.5 – Onondaga Lake Dreissenid Mussel Survey – Fall 2002, and 2005 through 2010 Comparison of *Dreissena* sp. Length Frequency Distribution by Zone (All Transects) and Depth Range/Category

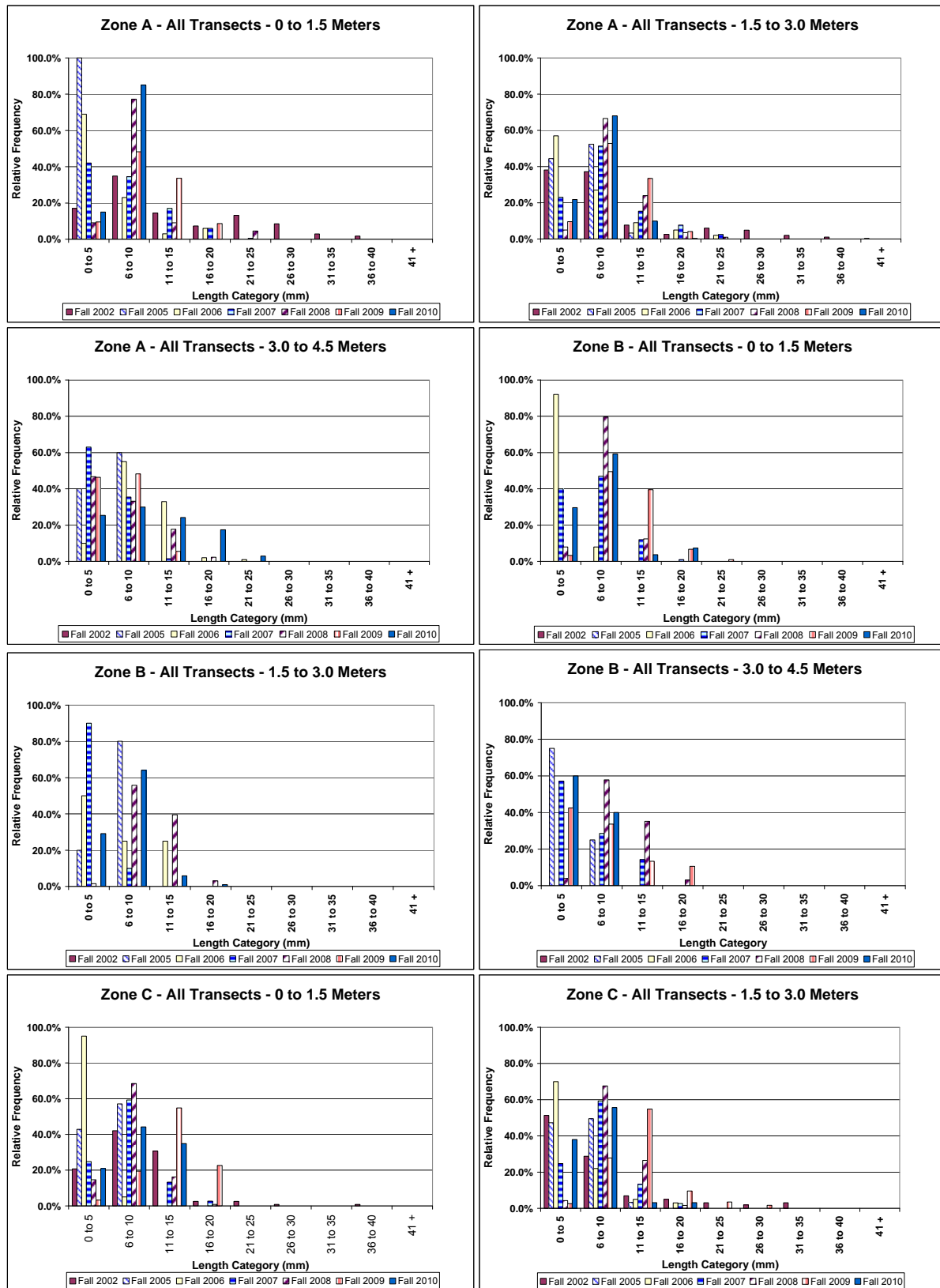


Figure A6.5 – Onondaga Lake Dreissenid Mussel Survey – Fall 2002, and 2005 through 2010 Comparison of *Dreissena* sp. Length Frequency Distribution by Zone (All Transects) and Depth Range/Category (continued)

