LAKE CHAMPLAIN 2001-2002
ZEBRA MUSSEL MONITORING PROGRAM

Final Report
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A Report Prepared for the
Lake Champlain Basin Program

Cathi Eliopoulos and Peter Stangel
Vermont Department of Environmental Conservation
103 So. Main St.
Building 10 North
Waterbury, Vermont 05671-0408
(802) 241-3777

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ACKNOWLEDGMENTS

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INTRODUCTION

The Vermont Department of Environmental Conservation (VTDEC), in cooperation with the Lake Champlain Basin Program, initiated the Lake Champlain Zebra Mussel Monitoring Program in 1994 to track zebra mussel distribution in the lake. Annual reports have been provided each year (Kamman 1994, Stickney 1996, Eliopoulos and Stangel 1997, 1998, 1999, 2000 and 2001). This report presents veliger, juvenile, and adult zebra mussel distributions during 2001 and 2002 in comparison with previous years of monitoring.

GOALS AND OBJECTIVES

Zebra mussel monitoring included veliger (larvae), settled juvenile, and adult life stages at open-water and nearshore lake stations, lake tributaries, and inland lakes. Greater emphasis was placed on veliger monitoring, as it is in their pelagic stage that zebra mussels are most easily spread and sampled in Lake Champlain. The goals of the Lake Champlain Zebra Mussel Monitoring Program include the following monitoring and technical assistance aspects:

(1) Monitor the distribution and abundance of zebra mussel larvae, juveniles, and adults in Lake Champlain.

(2) Determine the occurrence of new zebra mussel colonization in Lake Champlain, its tributaries, and inland lakes with high boating activity and/or close proximity to Lake Champlain and incorporate this information into a database.

(3) Use the data to help determine the appropriate management response and assess the effectiveness of spread prevention or control measures.

(4) Inform the public, related water treatment facility operators, and marina managers of the presence of zebra mussels so that they may take appropriate spread prevention and control measures.

(5) Provide technical assistance to the groups listed above regarding the design and operation of zebra mussel monitoring programs.

(6) Document selected water quality parameters pertinent to zebra mussel survival at open-water sampling sites in Lake Champlain and its tributaries.

(7) Produce annual reports documenting the findings of the Lake Champlain Zebra Mussel Monitoring Program.

(8) Maintain the Lake Champlain Zebra Mussel Monitoring Program website.

FIELD SAMPLING METHODS

OPEN-WATER VELIGERS

Twelve open-water lake stations (Figure 1) were sampled for occurrence and density of veligers. These stations were co-located with stations of the Lake Champlain Long-Term Water Quality and Biological Monitoring Project (New York State Department of Environmental Conservation and Vermont Department of Environmental Conservation, 2001). Co-location of these stations allowed for relating zebra mussel monitoring results with other water quality and biological data in previous reports, and for improved overall sampling efficiency.

Open-water veliger samples were collected twice monthly starting in late April or early May using vertical plankton net tows as described in the Vermont Department of Environmental Conservation Field Methods Manual (1989, method 4.2.1). A 13 cm aperture size Wisconsin style plankton net with a 63 Fm (micron) net mesh size was towed vertically to the lake surface from a depth of ten meters, or one meter from the lake bottom in areas where the bottom depth was less than ten meters, at a 0.5 m/sec retrieval rate for optimal veliger entrapment (Marsden, 1992, method 3.5). To calculate veliger densities, a net efficiency of 95% was assumed and the volume of water filtered was estimated based on the length of tow and net aperture. Veliger samples consisted of five composited net tows of equal length. Volume of water filtered for each sample ranged from 0.13 m^3 to 0.66 m^3 depending on depth of station sampled. Length of net tow, surface water temperature, and Secchi disk transparency were recorded for each sample. Once out of the water, the net contents were concentrated and transferred to a 50 ml plastic container and preserved with a 95% ethanol solution in a 1:1 ratio of sample to ethanol solution. After sampling, the net was rinsed vigorously three times in the lake. Sampling was discontinued in October.

As described in Eliopoulos and Stangel (2000), plankton net efficiency is highly variable. Results obtained from plankton net sampling should be compared only within Lake Champlain and not with data from other monitoring programs using other techniques.

NEARSHORE VELIGERS

Occurrence and density of veligers were determined at 11 nearshore lake stations (Figure 1) located in shallow water near marinas or in bays. The nearshore stations were located on both the Vermont and New York sides of the lake.

Nearshore veliger samples were collected using horizontal plankton net tows twice a month beginning in late April or early May. The net was thrown from shore and slowly towed horizontally below the surface at a rate of 0.5 m/sec (Vermont Department of Environmental Conservation, 1989, method 4.2.2). Net tow samples and field duplicates were composites of five tows of equal length. Length of tow, surface water temperature, and Secchi disk transparency were recorded for each sample. Estimated volume of water filtered, net cleaning protocol, sample preservation, and storage were the same as for openwater veliger samples. Sampling was discontinued in October.

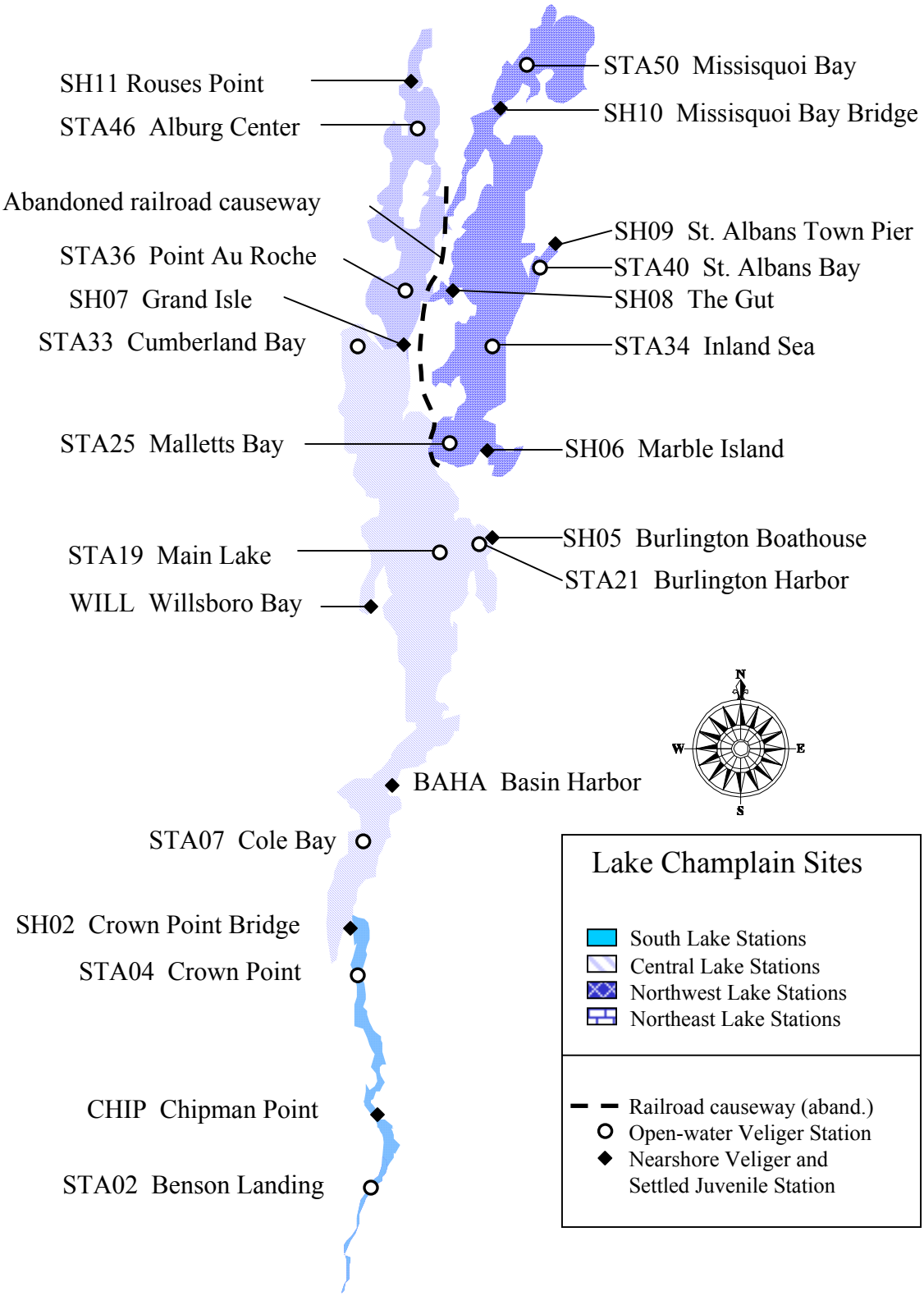


Figure 1. Open-water and nearshore sampling site locations for the Lake Champlain 2001-2002 Zebra Mussel Monitoring Program.

NEARSHORE SETTLED JUVENILES

Occurrence and density of settled juveniles were determined at the 11 nearshore stations (Figure 1) beginning in early-May by deploying an array of three 15X15 cm gray colored polyvinyl chloride (PVC) settling plates. The plates were arranged horizontally (Figure 2), along a stainless steel threaded eyebolt and separated with nuts and washers by approximately 3 cm. The plate array was suspended in the water column by attaching a rope to the eyebolt and to a dock, bridge abutment, or float. The plate array was submerged so that the top plate was 2-3 m below the lake surface. The bottom of the plate array was attached to a rope with a weight resting on the lake bottom. The top plate remained in the water for the entire sampling season to estimate seasonal accumulation. The middle and bottom plates were collected and replaced alternately every two weeks. This allowed plates to be available for settled juveniles for a total of four weeks.

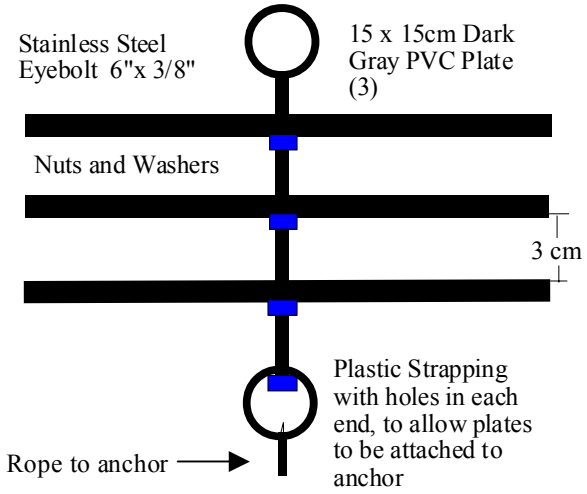


Figure 2. Settling plate array.

Each retrieved settling plate was stored in an airtight plastic container and treated with a minimal amount of 95% ethanol. Drenching the plates with ethanol could cause the mussels to detach, and was avoided. The plates were transported to the laboratory where they were stored in a refrigerator at 4EC. Since newly settled zebra mussel shells are fragile, plates were handled carefully to avoid damage.

ADULT DISTRIBUTION

Information on the distribution of adult zebra mussels in Lake Champlain was compiled from a variety of sources including observations by VTDEC staff biologists working on this and other related projects, researchers from the University of Vermont, and confirmed citizens' sightings. Adult mussel densities have been characterized by relative abundance at selected areas during snorkel surveys from 1997-2002. Snorkel surveys were conducted by two people for approximately fifteen minutes at each site. This information was used to track the extension of the adult zebra mussel distribution in Lake Champlain.

TRIBUTARY SAMPLING

Eleven Lake Champlain tributaries (Figure 3) were selected for sampling, including the Missisquoi River, Lamoille River, Winooski River and the Poultney River on the Vermont side of the lake, and the Great Chazy River, Little Chazy River, Saranac River, Salmon River, Little Ausable River, Ausable River, and the Bouquet River in New York. In 2002, Otter Creek and the Castleton River were also sampled. Plankton net samples were collected from each river and

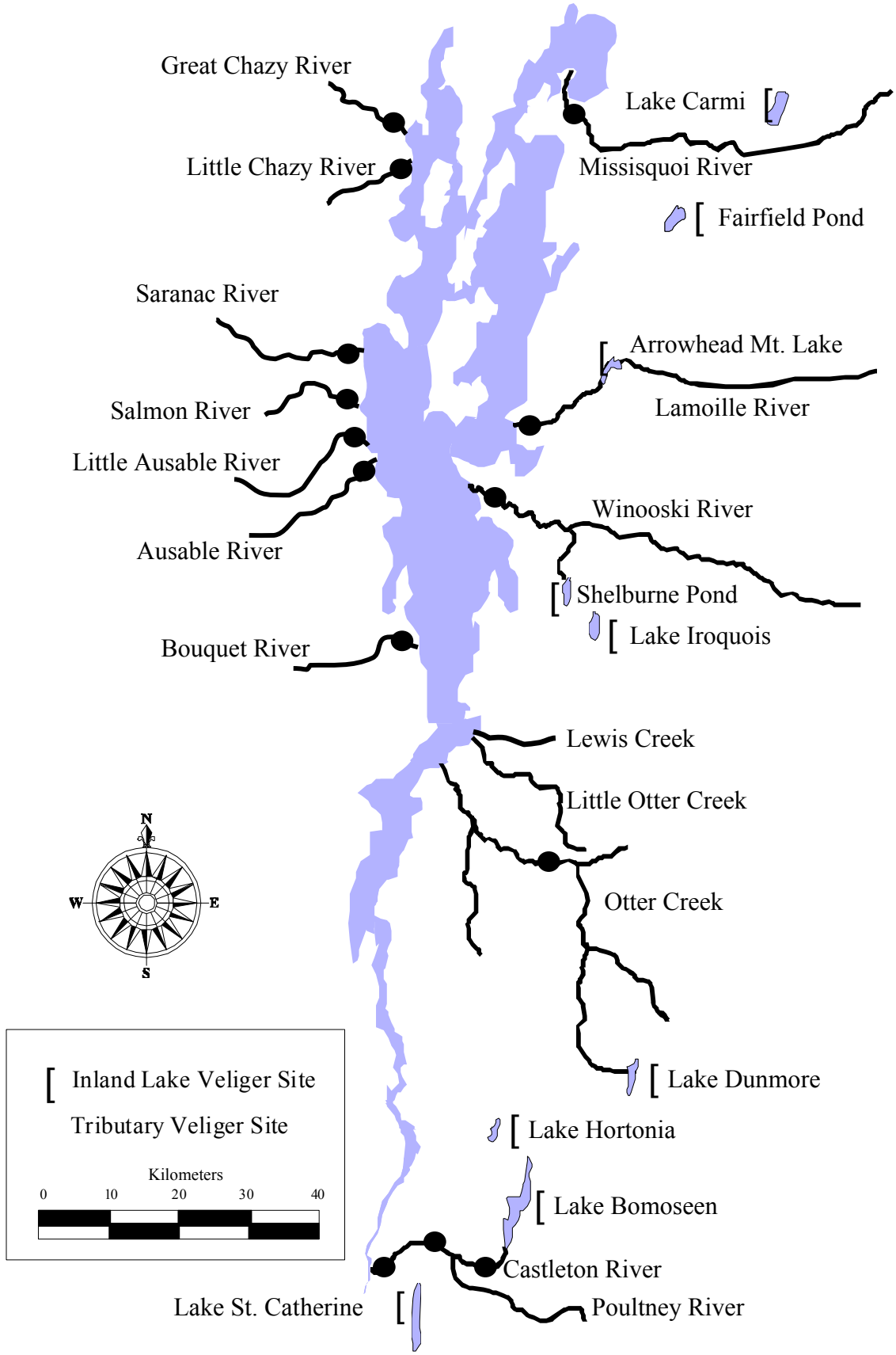


Figure 3. Inland lake and tributary sampling site locations for the Lake Champlain 2001- 2002 Zebra Mussel Monitoring Program.

analyzed for veligers. The net used for river sampling was not used in Lake Champlain. When traveling between sampling sites, the plankton net was stored in a 95% ethanol solution to kill any veligers remaining in the net. Net cleaning protocol and sample preservation were the same as for open-water veliger sampling.

INLAND LAKE SAMPLING

Nine Vermont inland lakes with high boating activity or close proximity to Lake Champlain were selected for sampling. These lakes included Arrowhead Mt. Lake, Lake Bomoseen, Lake Carmi, Lake Dunmore, Fairfield Pond, Lake Hortonia, Lake Iroquois, Shelburne Pond, and Lake St. Catherine (Figure 3). Horizontal plankton net tows were taken from the shore at public access areas or lake outlets during July and August. The net used in Lake Champlain was not used in inland lakes and was stored in 95% ethanol between sampling sites.

LABORATORY ANALYTICAL METHODS

VELIGERS

Analytical procedures and calibration followed methods detailed in Marsden (1992). A dissecting stereo-microscope at 30X magnification was used with a cross-polarization light technique (Johnson, 1995) to enhance veliger detection for counting purposes. Veliger identification was verified under a compound microscope with assistance of VTDEC Biomonitoring and Aquatic Studies Section taxonomists. For samples containing relatively few veligers (approximately #100 per sample), all veligers were counted. If veligers were too abundant to count in full (approximately >100 per sample), the sample was diluted quantitatively as necessary and three 1.0 ml sub-samples were extracted into 1.0 ml Sedgewick-Rafter cells, and the sub-sample counts were used to estimate the density of the entire sample. Densities were reported as number of veligers/m^3.

SETTLED JUVENILES

The 15X15 cm (225 cm^2) settling plate was placed under a dissecting stereo-microscope at 30X magnification and all juveniles on the underside of the plate were counted. If settled juvenile densities were too abundant to count accurately, five 1.0 cm^2 replicates were counted using a 1.0 cm^2 counting cell randomly placed on the plate. Juveniles were counted in each 1.0 cm^2 block, and plate density was estimated as number of juveniles/m^2 (method modified from Marsden, 1992). On plates with extremely dense encrustations and uniform distribution of individuals, ¼ of the plate area was counted.

QUALITY ASSURANCE PROCEDURES

A complete description of project quality assurance procedures is provided in the Lake Champlain Zebra Mussel Monitoring Program Work/QA plan (Eliopoulos and Stangel 2001). Data precision for 2001 was determined through field duplication of 9% of the veliger samples and 16% of juvenile settling plate samples. In addition, 8% of all veliger samples and 13% of juvenile sampling plates were reanalyzed as laboratory duplicates. Data precision for 2002 was determined through field duplication of 9% of the veliger samples and 17% of juvenile settling plate samples. In addition, 9% of all veliger samples and 17% of juvenile sampling plates were reanalyzed as laboratory duplicates. The relative percent difference (RPD) for both field and laboratory duplicates was calculated as follows:

RPD= *(count a - count b) / (count a + count b) / 2* x 100

Accuracy of veliger and settled juvenile identifications was accomplished by comparison with reference samples and through consultation with taxonomists in the Biomonitoring and Aquatic Studies Section of VTDEC. Data comparability was achieved by using standardized methods as defined in the Vermont Department of Environmental Conservation Field Methods Manual (1989) and in Marsden (1992).

RESULTS AND DISCUSSION

Zebra mussels in Lake Champlain continued to reproduce and settle successfully during 2001 and 2002, although densities declined at most stations compared to the previous years with the exception of some stations located in the Northeast Lake. Figure 4 shows the annual changes in zebra mussel distribution since 1993, the year of their discovery in Lake Champlain.

Comparisons of veliger and settled juvenile densities between lake stations and/or between years were based on seasonal time-weighted mean density estimates. Simpson's integral was used to calculate the area under the density vs. time plots for each year, and the areas were divided by the duration of the sampling season. Seasonal weighted mean estimates were based on equal sampling season lengths of 150 days starting and ending with zero density values at the beginning and end of the sampling seasons.

Seasonal weighted mean densities were considered more appropriate than geometric means, arithmetic means, or single peaks because of the extreme within-season variation in veliger and settled juvenile densities. Veliger production and juvenile settlement occur during discrete time periods, causing densities to increase from zero upwards over several orders of magnitude within a short time interval during a season at some stations. Mean values would therefore be too strongly biased by the number of samples obtained during non-reproductive periods. Seasonal time-weighted mean density values provide a better index of the overall larval and juvenile production at each site.

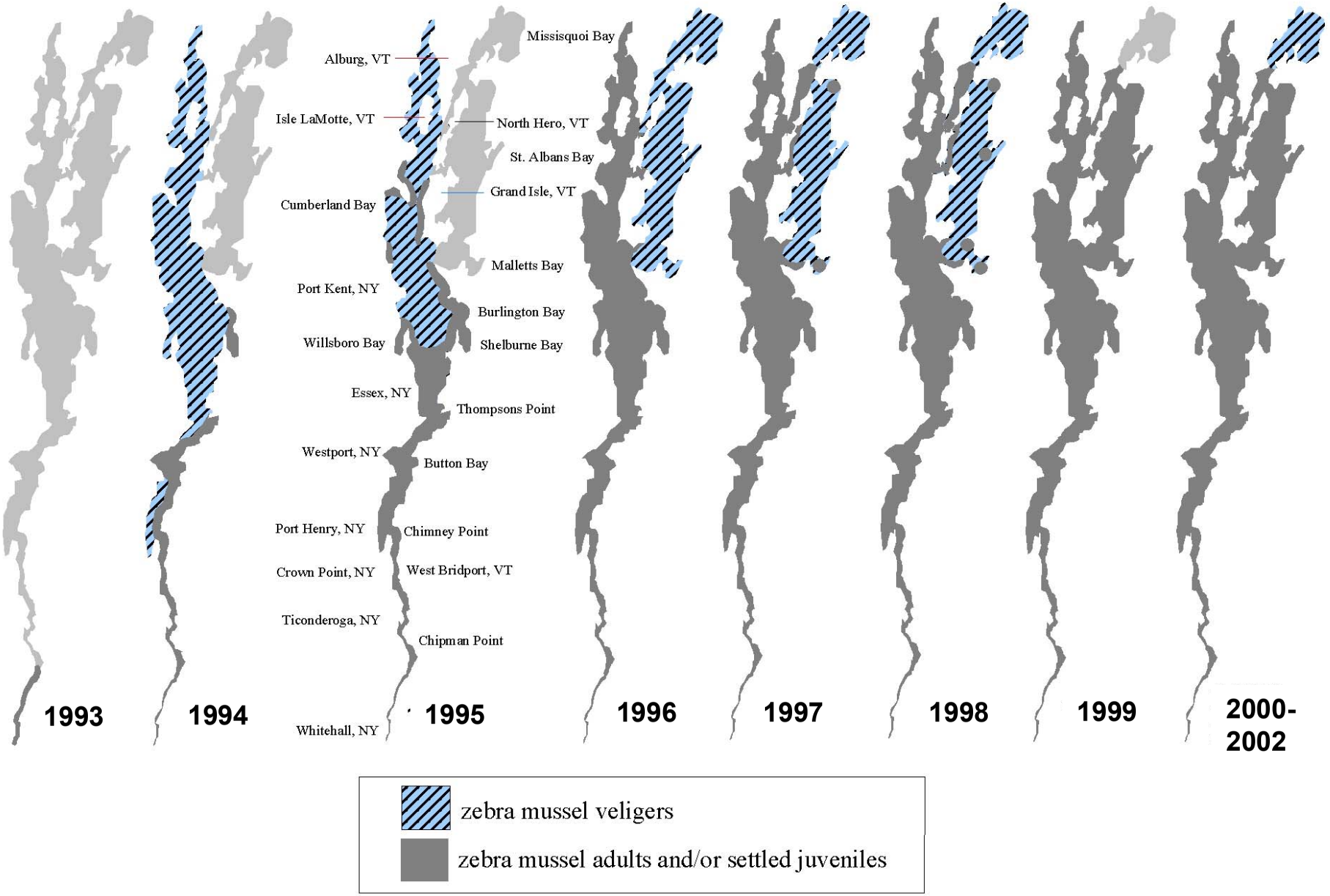


Figure 4. Annual changes in Lake Champlain zebra mussel distribution since 1993.

VELIGERS

Variations in veliger densities during the 2001-2002 sampling seasons are described for all regions of the lake in Figures 5-10. Veliger densities with temperature and Secchi depths for 2001 and 2002 are available in Appendix A. The 1994-2002 data are available on the Lake Champlain Basin Program website at http://www.anr.state.vt.us/champ/zmmonitoring.htm.

Veligers were first detected in 2001-2002 in the South Lake in mid-May as water temperatures rose above 11º C. The South Lake is shallow and narrow, and therefore the water tends to warm more quickly than other areas of the lake. Veligers were found two to five weeks later in the Central, Northeast, and Northwest lake regions. In 2001, the peak densities throughout the lake regions were found between July 6-16, with the highest peak of 134,105 veligers/m^3 at the South Lake station Benson Landing (STA02). In 2002, the timing of peak densities throughout the lake regions was highly variable, ranging from July 1 to August 21, with the highest peak of 86,013 veligers/m^3 at the Northwest Lake station Grand Isle Ferry Dock (SH07). Veligers were reduced to very low densities throughout the lake by early October in both years.

Peak densities in the Northeast Lake continued to be about two or three orders of magnitude lower in comparison to all other lake regions, although at least some veligers were recorded at all lake stations during both years. The highest veliger density recorded in the Northeast Lake for both years was at The Gut (SH08), with a density of 547 veligers/m^3 on July 6, 2001.

Changes in seasonal weighted mean veliger densities at each lake station during the period of 1994-2002 are shown in Figures 11 and 12. In 2001, seasonal weighted mean veliger densities decreased at 16 of 23 stations, compared to densities found in 2000. In 2002, seasonal weighted mean veliger densities again decreased at 16 of 23 stations, compared to densities found in 2001. The Northeast Lake sections had increases at 5 of 8 stations in 2001, although the changes were slight. In 2002, 4 stations in the Northeast Lake had increases, and 4 stations had decreases compared to 2001.

SETTLED JUVENILES

Variations in juvenile densities during the 2001-2002 sampling season at all nearshore stations are described in Figures 7-10. Settled juvenile densities for 2001-2002 are available in Appendix B. The 1994-2002 data are available on the Lake Champlain Basin Program website at http://www.anr.state.vt.us/champ/zmmonitoring.htm

In 2001, settled juveniles were first detected in the South Lake on June 13, in the Central Lake on June 28, in the Northwest Lake on July 11, and in the Northeast Lake on August 29. The 2001 peak settled juvenile density was 258,000 juveniles/m^2 collected on July 27 in the South Lake at Chipman Point (CHIP). This result was ten times lower than the previous years' peak. The peak density in the Central Lake was 184,000 juveniles/m^2 at Burlington Boathouse (SH05) on August 1. Peak densities in the Northwest Lake were found at Rouses Point (SH11) on August 6 with a density of 26,000 juveniles/m^2. Peak densities in the Northeast Lake were

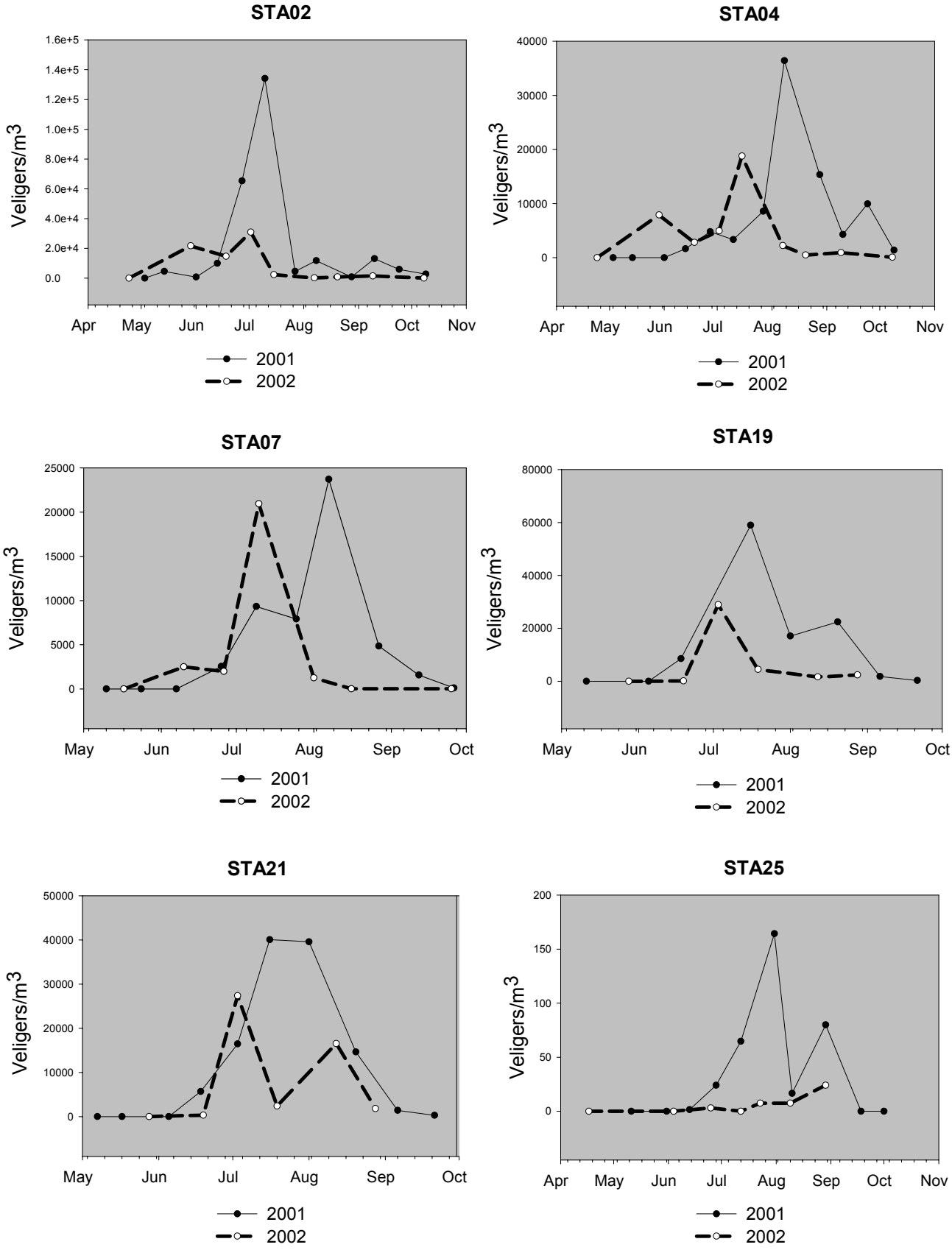


Figure 5. Veliger densities at openwater stations during 2001 and 2002.

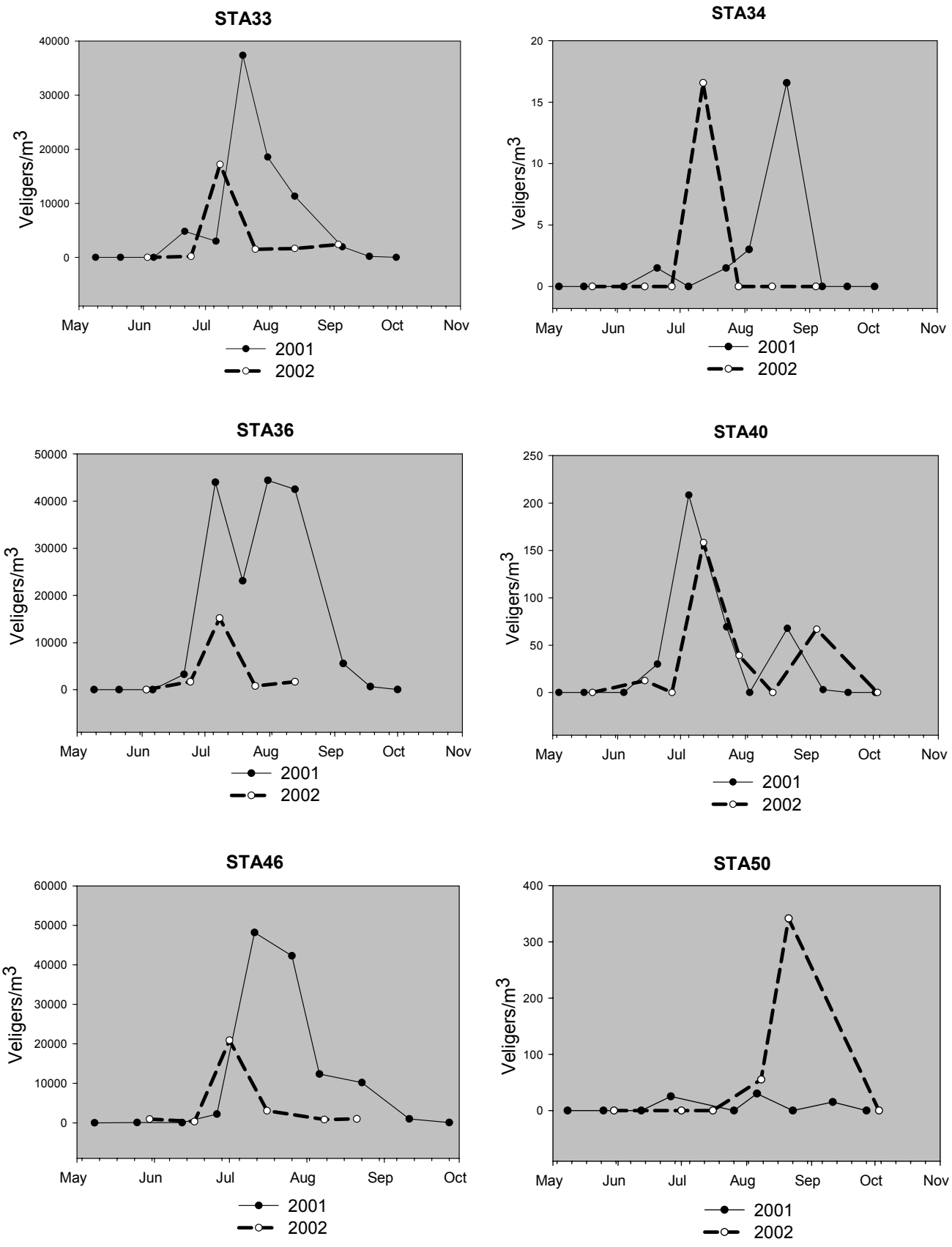


Figure 6. Veliger densities at openwater stations during 2001 and 2002.

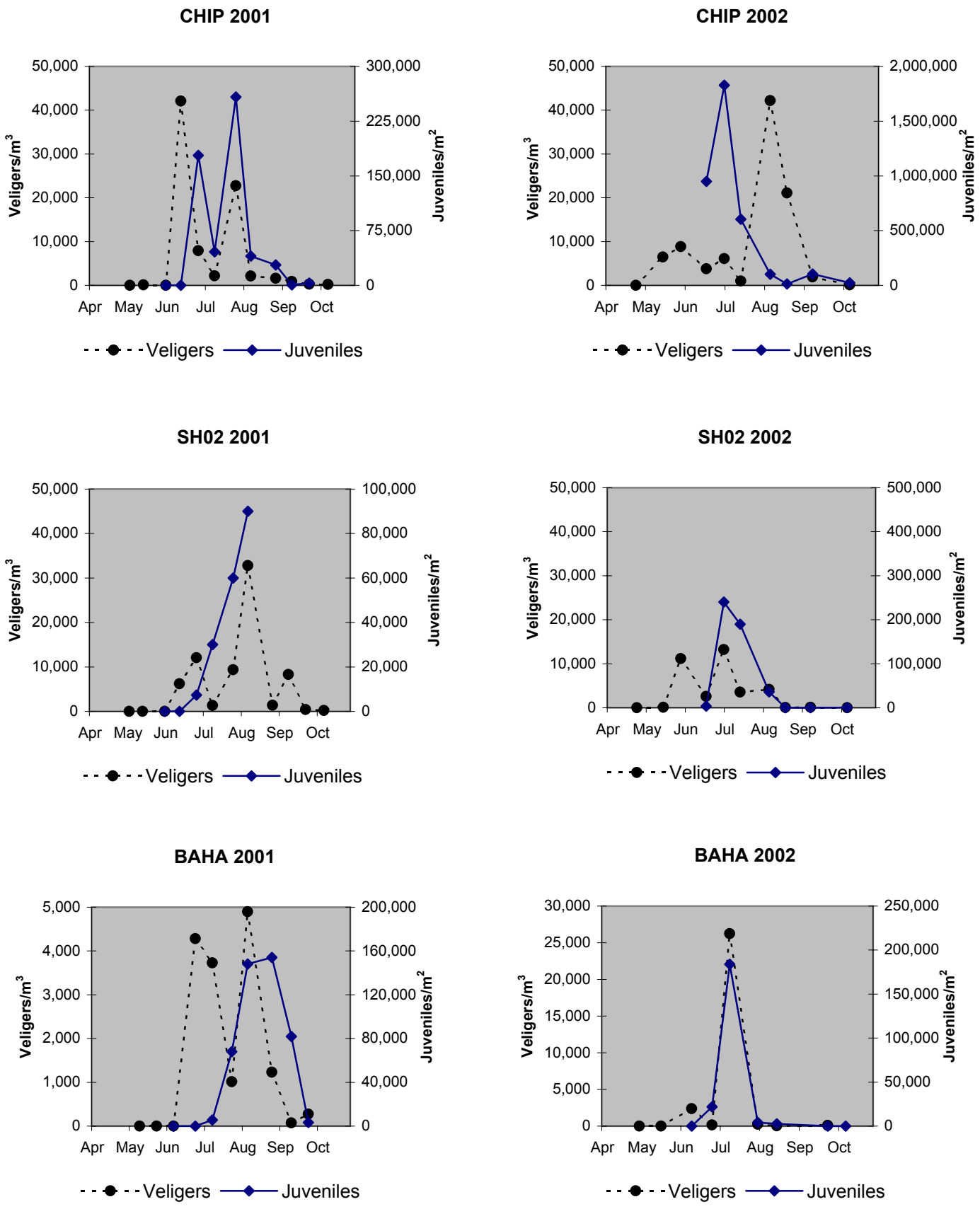


Figure 7. Veliger and settled juvenile densities at nearshore stations during 2001 and 2002.

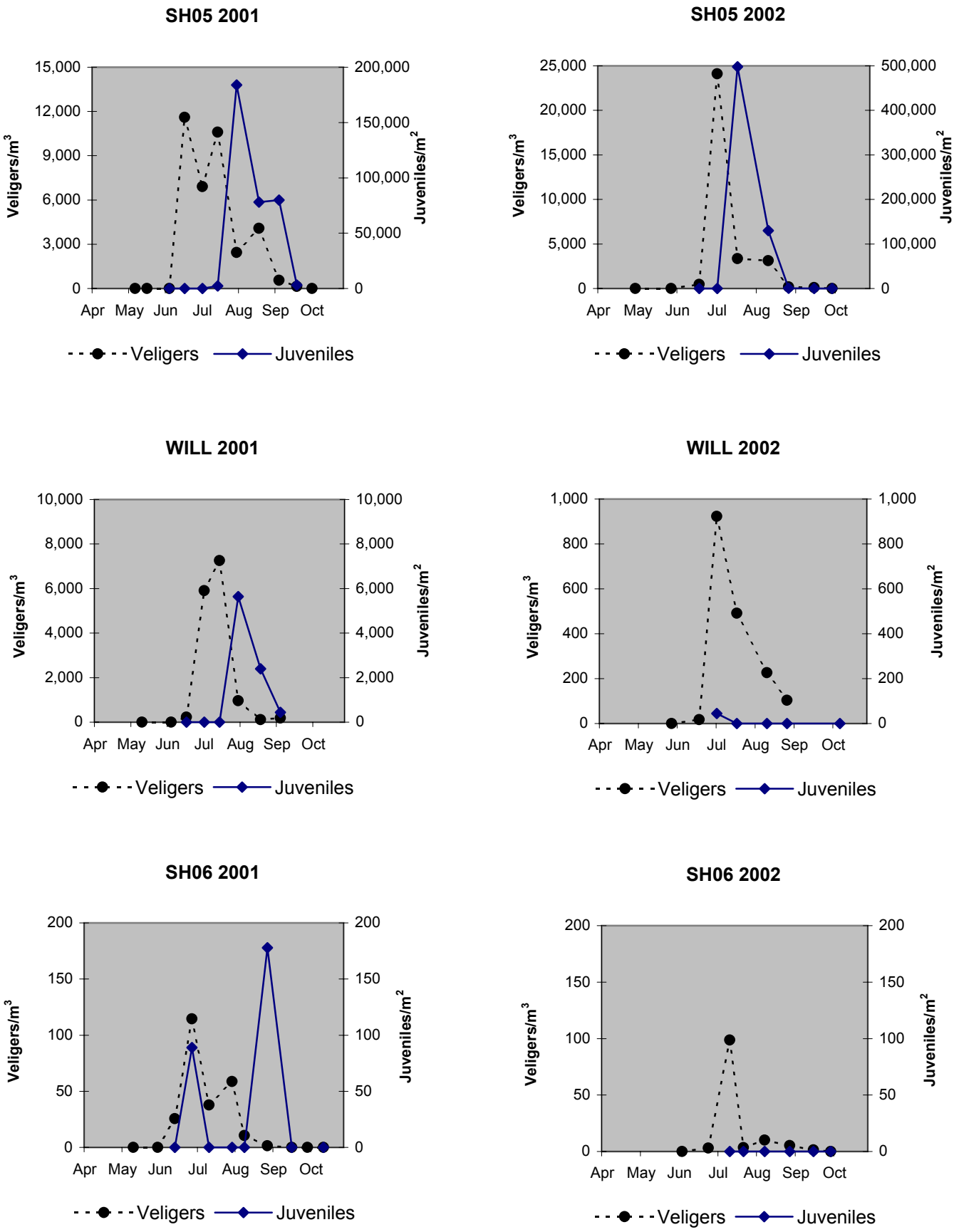


Figure 8. Veliger and settled juvenile densities at nearshore stations during 2001 and 2002.

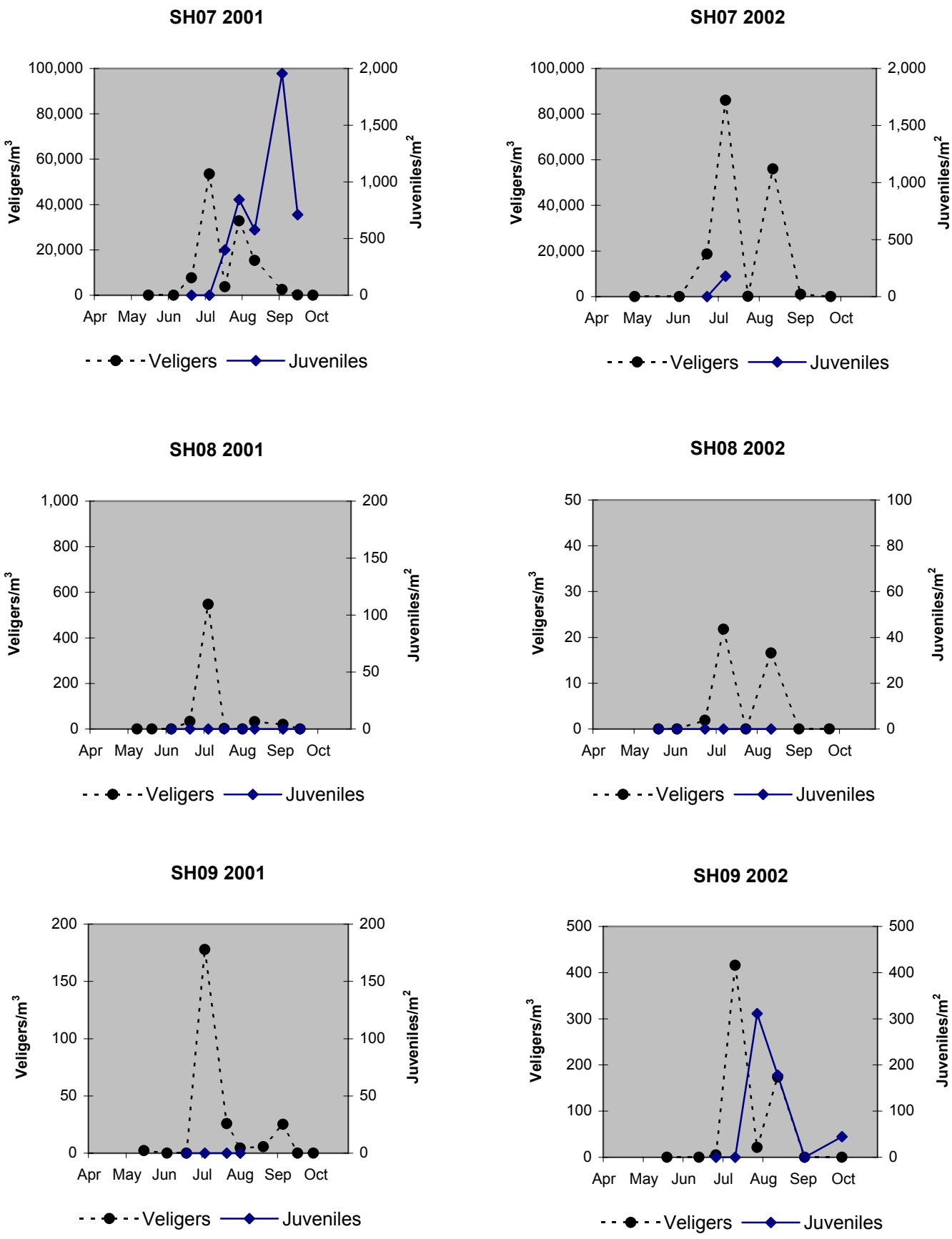


Figure 9. Veliger and settled juvenile densities at nearshore stations during 2001 and 2002.

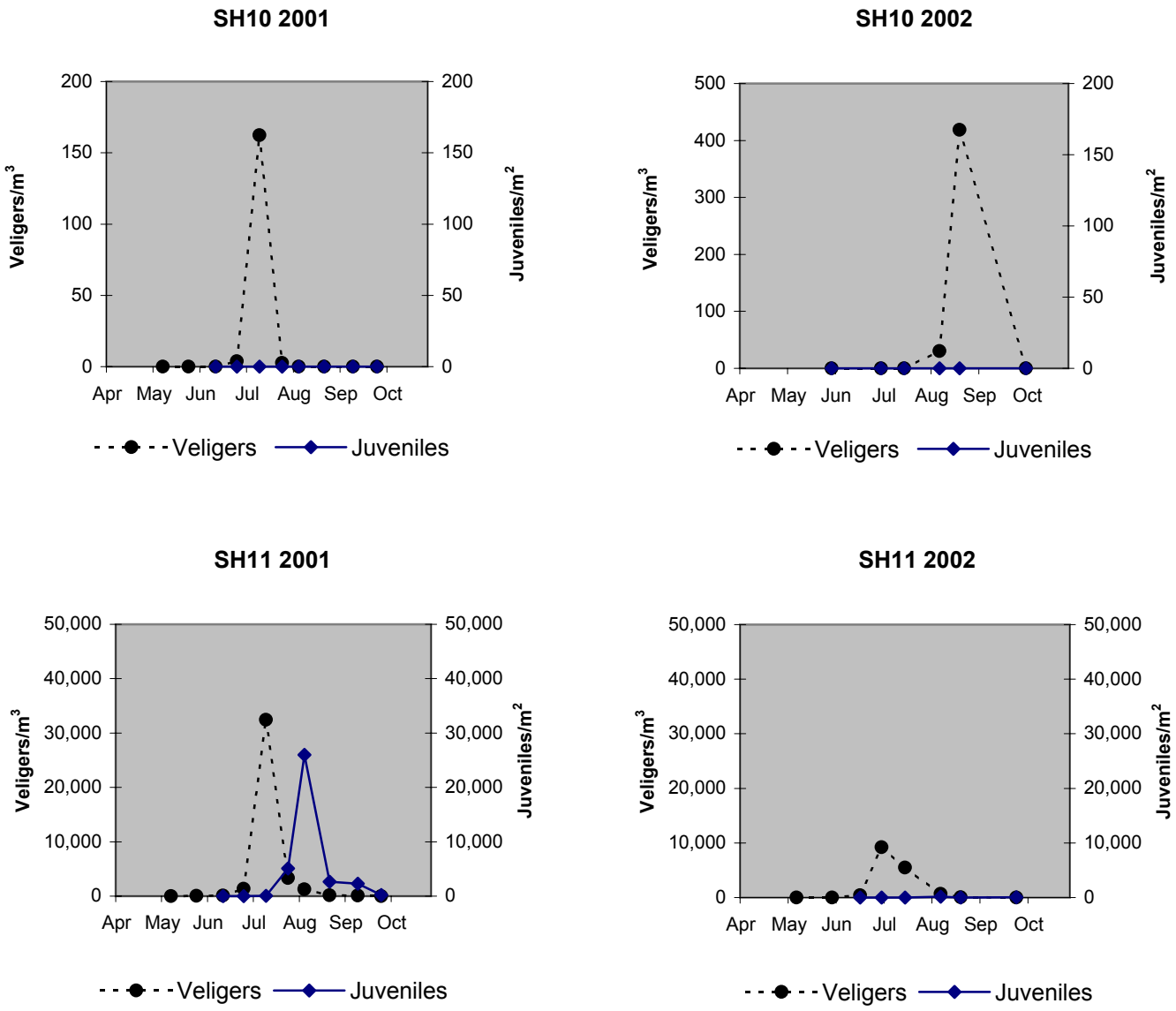
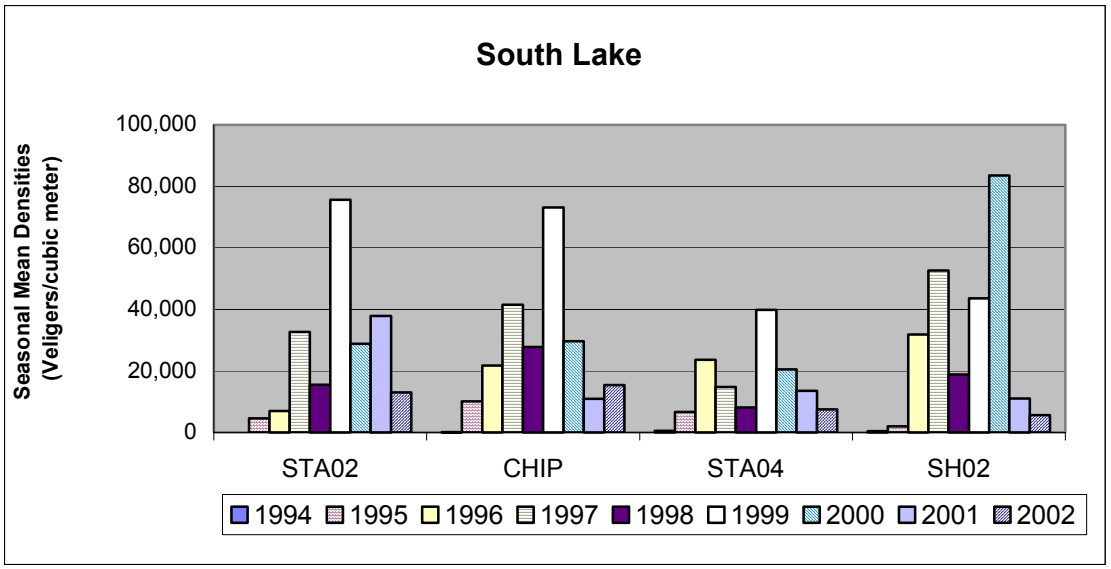


Figure 10. Veliger and settled juvenile densities at nearshore stations during 2001 and 2002.



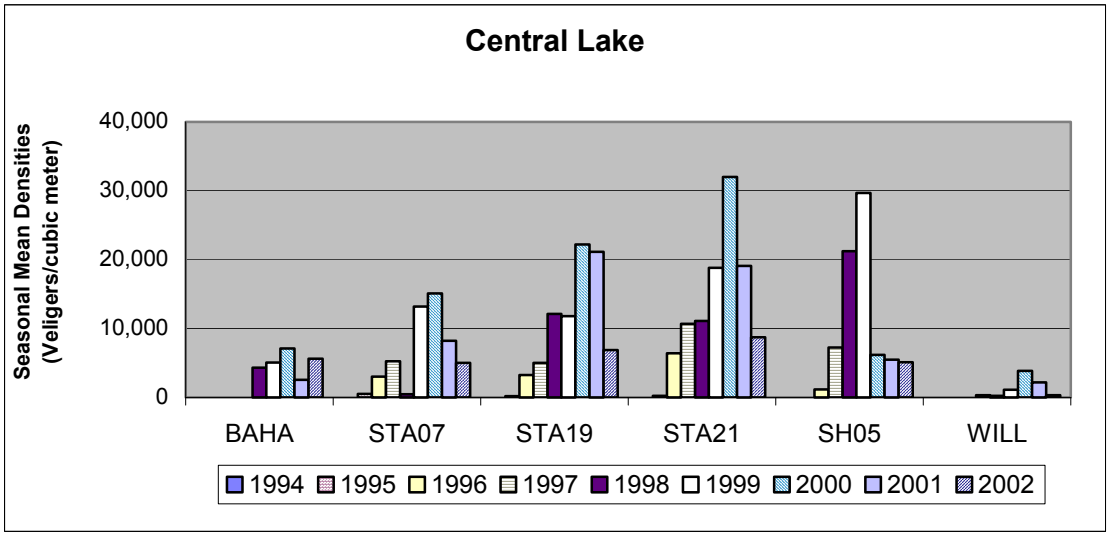
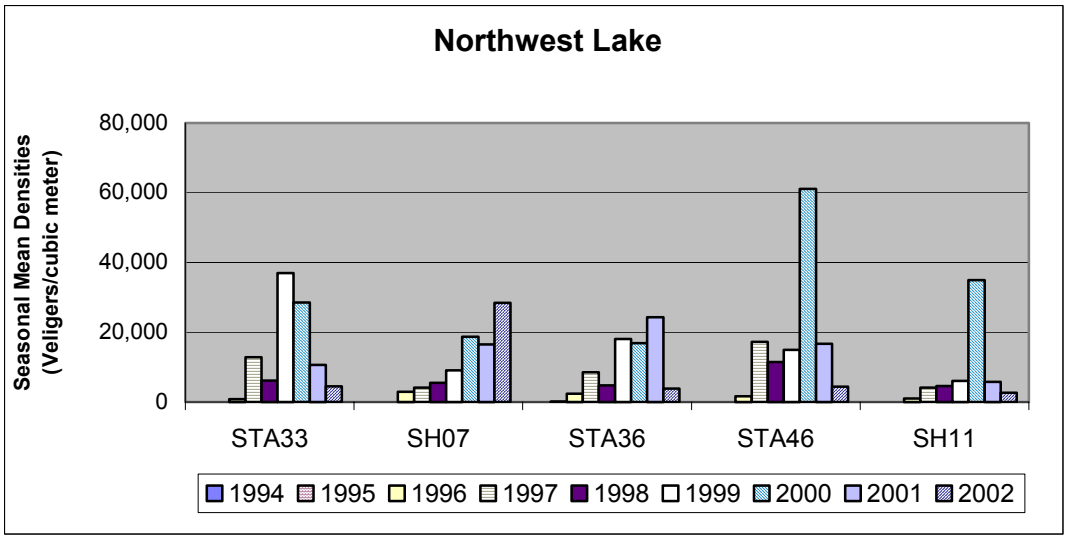


Figure 11. Seasonal weighted mean veliger densities for selected stations from 1994-2002.



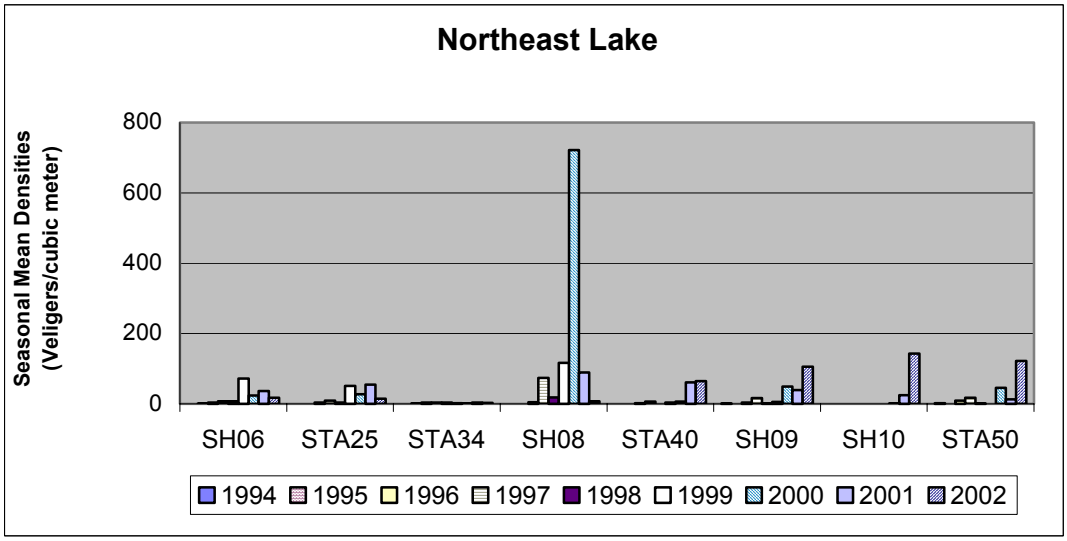


Figure 12. Seasonal weighted mean veliger densities for selected stations from 1994-2002.

found on the plate collected from Marble Island (SH06) on July 29 with densities of 178 juveniles/m^2. The settling plate arrays from Crown Point Bridge (SH02) and St. Albans Bay (SH09) were lost in August.

In 2002, settled juveniles were first detected in the South Lake on June 18, in the Central Lake on June 26, in the Northwest Lake on July 8 and in the Northeast Lake on July 29. The 2002 peak settled juvenile density was 1,828,000 juveniles/m^2 collected on July 2 in the South Lake at CHIP. This result was seven times higher than the previous years' peak. The peak density in the Central Lake was 498,000 juveniles/m^2 at SH05 on July 19. Peak densities in the Northwest Lake were found at SH07 on July 8 with a density of 178 juveniles/m^2. The settling plate array from SH07 was lost in late August. Peak densities in the Northeast Lake were found on the plate collected from SH09 on July 29 with densities of 311 juveniles/m^2.

Differences among seasonal weighted mean juvenile densities from 1998-2002 for selected nearshore stations are shown in Figures 13 and 14. Data from only 1998-2002 were used due to a lack of reliable data from some stations during previous years because of loss or vandalism of sampling plates. CHIP had the highest seasonal weighted mean juvenile densities during 2001 and 2002.

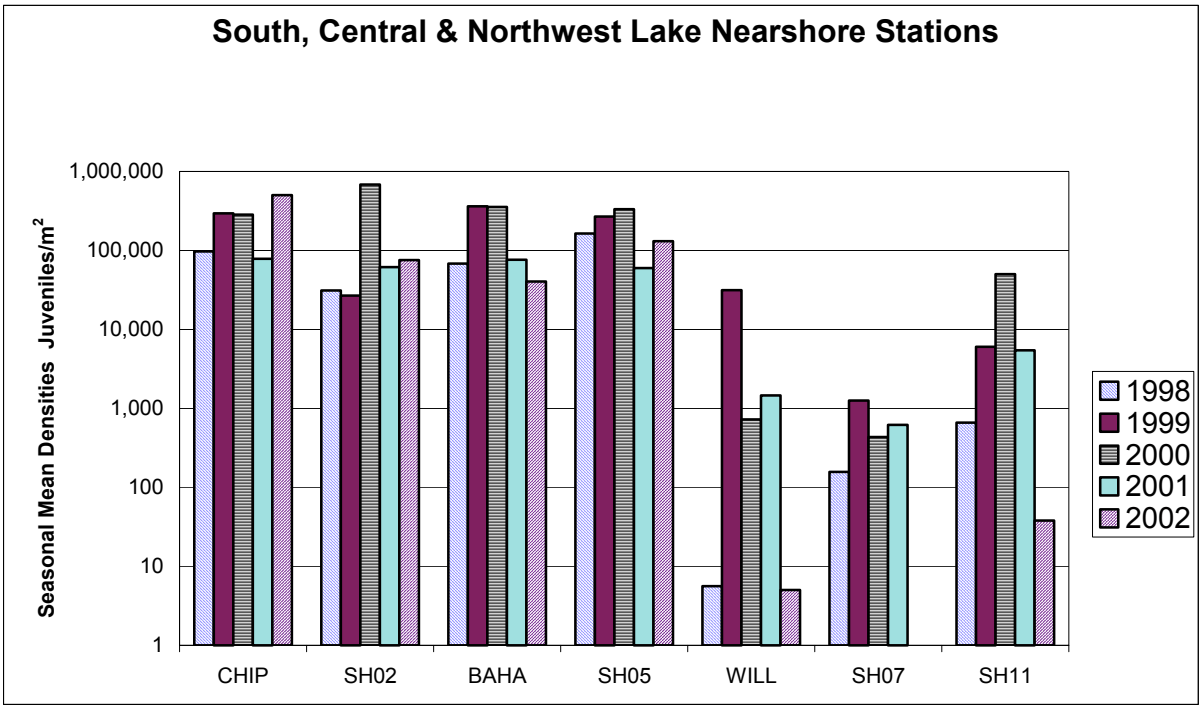


Figure 13. Seasonal weighted mean juvenile densities for selected nearshore stations in South, Central & Northwest Lake Champlain from 1998-2002.

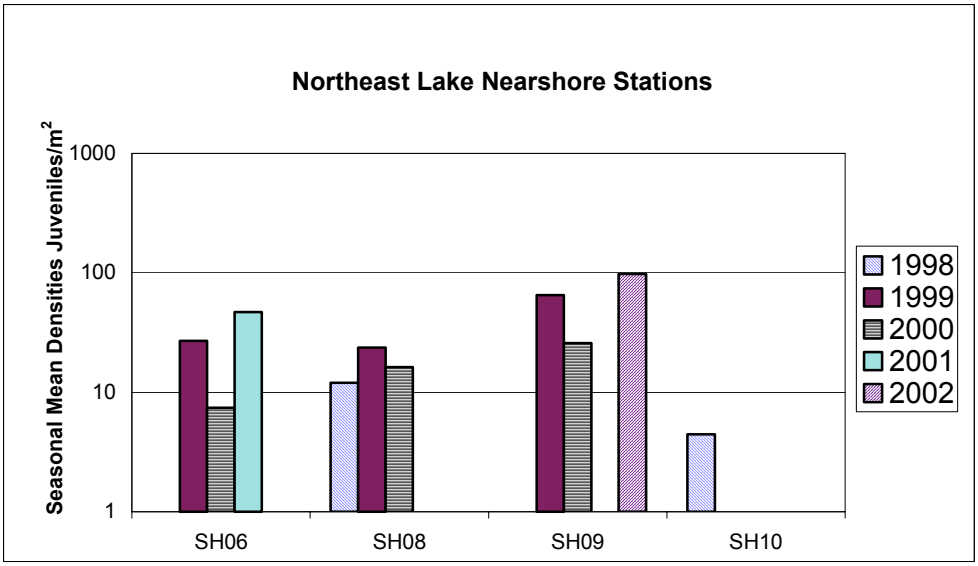


Figure 14. Seasonal weighted mean juvenile densities for selected nearshore stations in Northeast Lake Champlain from 1998-2002.

Only 3 of 11 stations had an increase in seasonal weighted mean settled juvenile densities in 2001 compared to 2000. No juvenile settlement was recorded at SH08, SH09 and Missisquoi Bay Bridge (SH10) in 2001. In 2002, 4 of 11 stations had an increase in seasonal weighted mean settled juvenile densities compared to 2001. In 2002, no settlement was recorded at SH06, SH08 or SH10.

Season juvenile settling plate densities and average juvenile size for selected nearshore stations from 1998-2002 are shown in Figure 15. The greatest season plate density during the 2001 season was recorded at Basin Harbor (BAHA), with 176,000 juveniles/m^2. Early settlers at CHIP grew to approximately 15 mm by October, compared to 6 mm in 2000. There was no second cohort on the CHIP plate for the second year in a row. Juveniles on the season plate at SH02 were smaller (12 mm) than those at CHIP. The average size of settled juveniles on season plates at all other nearshore stations with season settlement was 3-6 mm. In 2001, the settling plates at SH07 were again infested with the exotic snail, mud bythinia, (*Bythinia tentaculata),* which feed by grazing and filtering. The season plate at SH07 had no settlement, even though veliger densities had increased this year and settlement had occurred on the 4-week plates.

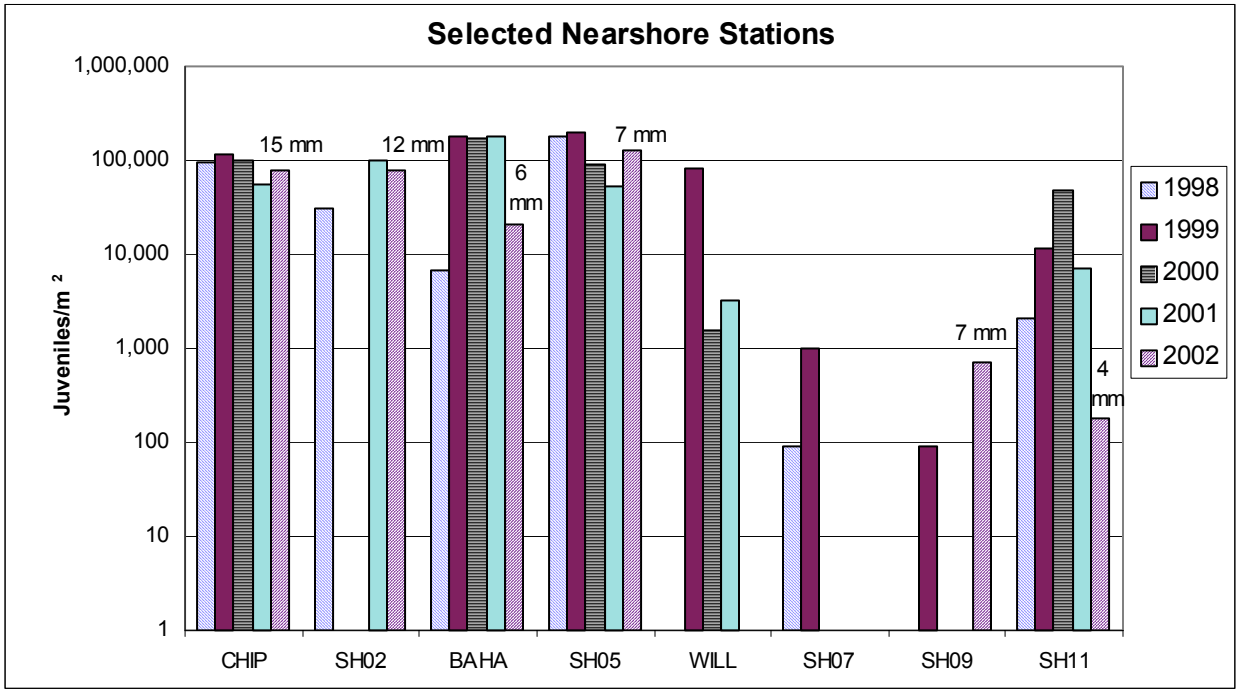


Figure 15. Season plate densities from 1998-2002. The 2002 average juvenile size (mm) is noted above the bars for selected nearshore stations in Lake Champlain.

The greatest season plate density during the 2002 season was recorded at SH05, with 128,000 juveniles/m^2. The settlers at CHIP in 2002 also grew to approximately 15 mm in October. Juveniles on the season plate at SH02 were smaller (12 mm) than those at CHIP. The average size of settled juveniles in 2002 on season plates at all other nearshore stations with season settlement was 4-7 mm. No season settlement occurred at Willsboro Bay (WILL), SH06, SH08 or SH10.

TRIBUTARIES AND INLAND LAKES

No veligers were found in any of the samples collected during 2001 and 2002 in Arrowhead Mt. Lake, Lake Carmi, Lake Dunmore, Fairfield Pond, Lake Hortonia, Lake Iroquois, Shelburne Pond, and Lake St. Catherine. Veligers were detected in all Lake Bomoseen samples collected in 2001 and 2002.

No veligers were found in samples taken from 2001 and 2002 from the Missisquoi River, Lamoille River, Winooski River, and the Poultney River on the Vermont side of the lake, and the Great Chazy River, Little Chazy River, Saranac River, Salmon River, Little Ausable River, Ausable River, and the Bouquet River in New York. In 2002, additional sampling was performed in the Castleton River downstream of the outlet of Lake Bomoseen to determine whether veligers from this lake have drifted. No veligers were found in these samples. Also, the Otter Creek was sampled below the falls in Vergennes. No veligers were found in these samples. Adult zebra mussels had been found in the LaPlatte River in 1997 and in Lewis Creek and Otter Creek in 1998. No sampling was conducted in these rivers or in Little Otter Creek during 2001. Veligers had been found in Little Otter Creek and the Winooski River in 1999.

Snorkel surveys conducted by researchers from Castleton State College confirmed the presence of adult zebra mussels at numerous locations in Lake Bomoseen in 2000 (A. Hampton, personal comm., 2000).

ADULT DISTRIBUTION

Adult zebra mussels continue to be common to very abundant on most firm substrates in the South, Central, and Northwest regions of Lake Champlain. In contrast, comparatively few adults were found in the Northeast Lake (Malletts Bay, north to Missisquoi Bay). The Northeast Lake is open to water exchange with the Central Lake only through openings in the railroad causeway as shown in Figure 1. These restrictions may slow the drift of veligers into the Northeast region of the lake. However, observations made during 1999-2002 indicated that zebra mussel adults are slowly expanding their range into some areas of the Northeast Lake, such as the Allen Point area along the northern end of the railroad causeway that crosses Malletts Bay, and are beginning to colonize St. Albans Bay. Expansion of adult zebra mussel populations in the Northeast Lake after the initial appearance of veligers has occurred more slowly than in the South, Central, and Northwest regions (Figure 4).

QUALITY ASSURANCE RESULTS

Mean relative percent differences (RPD) of field and laboratory duplicates were calculated for open-water and nearshore veliger and settled juvenile samples for 2001 and 2002 (Table 1). The RPD of field duplicates represents the combined field sampling and analytical variability, while the RPD of laboratory duplicates measures only the variability within the analytical procedure. The mean RPD values for all veliger and settled juvenile laboratory and field duplicate samples were within the acceptable data quality objective limits (Eliopoulos and Stangel, 2001).

Table 1. Mean relative percent differences for 2001 and 2002 laboratory and field zebra mussel veliger and juvenile duplicate samples.

	Sample Type	Number Counted	Mean RPD		Number of Duplicate Pairs	
			2001	2002	2001	2002
Laboratory RPD's	Veligers	0 - 100	5.2	1.8	16	4
		>100	1.6	2.8	4	12
	Juveniles	0 -100	0.1	0	8	2
		>100	3.5	1.2	8	10
Field RPD's	Veligers	0 -100	21.1	18.5	17	4
		>100	2.4	4.9	4	11
	Juveniles	0 - 100	23.8	10.0	6	5
		>100	21.6	8.9	14	13

SUMMARY AND CONCLUSIONS

The results of the 2001 Zebra Mussel Monitoring Program indicated that veliger densities in Lake Champlain decreased at 16 of 23 stations. Juvenile settlement decreased or remained the same at 8 of 11 stations. The Northeast Lake continued to have very little veliger and settled juvenile production compared to the rest of the lake, although most Northeast Lake station densities did slightly increase above 2000 levels.

The results of the 2002 Zebra Mussel Monitoring Program indicated that veliger densities in Lake Champlain decreased from the previous year again at 16 of 23 stations. Juvenile settlement increased at 4 stations and decreased at 3 stations. No settlement occurred at 3 stations. The Northeast Lake continued to have very little veliger and settled juvenile production compared to the rest of the lake.

Zebra mussel adults have been well established in the South, Central, and Northwest Lake since 1996. The expansion phase of the zebra mussel infestation may be over in these areas of the lake. In contrast, the range expansion in the Northeast Lake has been relatively slow. As of 2002, known adult zebra mussel distribution in the Northeast Lake includes Malletts Bay and the Inland Sea, though no adult zebra mussels have been confirmed in Missisquoi Bay. The slower range expansion and the lack of large zebra mussel populations in the Northeast Lake may be due to the restricted water exchange with other lake regions, or the lower calcium levels found in this section of the lake. As previously reported (Eliopoulos and Stangel 1998, 1999, 2000), calcium is critical to zebra mussel growth, reproduction and survival.

Adult zebra mussels continue to be found in Lake Bomoseen. No other lakes in Vermont were found to have zebra mussels. No new tributaries into Lake Champlain have been found to harbor zebra mussels.

RECOMMENDATIONS

The efficient combination of the Zebra Mussel Monitoring Program with the Long-Term Water Quality and Biological Monitoring Program provides a nationally unique lake database. Information on veliger and juvenile densities monitored consistently since the initial colonization is obtained concurrently with comprehensive water quality data. This information is critical for determining the effects of zebra mussels on the Lake Champlain ecosystem and for assessing the risk and impact of zebra mussel colonization of other water bodies. A meeting with interested parties should be convened before the 2003 field season to evaluate the program design and propose changes for the future. For the interim, the program should continue according to the following recommendations.

Veliger sampling

Zebra mussel colonization of Lake Champlain and other Vermont lakes should continue to be documented by collecting plankton samples and analyzing them for veligers. If time allows, an effort should be made to survey for adult zebra mussels in lakes where veligers are found.

Juvenile sampling

The project should continue to monitor juvenile settlement in Lake Champlain to document the establishment of zebra mussels in the Northeast lake.

Adult sampling

The project should continue to track the distribution and abundance of adult zebra mussels in Lake Champlain with the greatest effort employed in the Northeast lake where range expansion is still occurring.

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Appendix A: Zebra mussel veliger density data 2001-2002

Station	Date	Temp (C)	Secchi (m)	Secchi to bottom?	Density (n/m3)	Station	Date	Temp (C)	Secchi (m)	Secchi to bottom?	Density (n/m3)
BAHA	5/10/2001	12.3	2.1	No	0	SH02	5/14/2001	14.9	1.5	No	0
BAHA	5/24/2001			No	0	SH02	6/1/2001	14.8	2.1	No	2
BAHA	6/7/2001	15	3.8	No	0	SH02	6/13/2001	21	3	No	6,216
BAHA	6/25/2001	19.8	4.8	No	4,282	SH02	6/27/2001	25.6	1.3	No	12,079
BAHA	7/9/2001	19.9	4.5	No	3,730	SH02	7/10/2001	21	2.2	No	1,345
BAHA	7/25/2001	24.6	3.6	No	1,015	SH02	7/27/2001	19.7	3.2	No	9,355
BAHA	8/7/2001	25.5		Yes	4,894	SH02	8/8/2001	26.5	2.8	No	32,773
BAHA	8/27/2001	21.2	3.9	No	1,230	SH02	8/28/2001	21.8	2.5	No	1,384
BAHA	9/12/2001	19.5		Yes	72	SH02	9/10/2001	20.6	3.6	No	8,315
BAHA	9/26/2001	18.3		Yes	274	SH02	9/24/2001	19.2	2.3	No	431
BAHA	4/30/2002	7		No	0	SH02	10/9/2001	14.1	4.4	No	185
BAHA	5/17/2002	9	3.8	No	2	SH02	4/24/2002	11.1	1.3	No	0
BAHA	6/10/2002	15	4.8	No	2,372	SH02	5/15/2002	10.5		No	128
BAHA	6/26/2002	20.4	4.6	No	151	SH02	5/29/2002	17.5	1.7	No	11,141
BAHA	7/10/2002	21	3.6	No	26,249	SH02	6/18/2002	17.6	3.5	No	2,568
BAHA	8/1/2002	24		Yes	251	SH02	7/2/2002	24.7	2.9	No	13,237
BAHA	8/16/2002	24	4	No	37	SH02	7/15/2002	22.3	4.1	No	3,563
BAHA	9/25/2002			No	86	SH02	8/7/2002	21.5	3.8	No	4,184
CHIP	5/3/2001	15	0.8	No	0	SH02	8/20/2002	20.3	2.8	No	75
CHIP	5/14/2001	18.9	1.1	No	87	SH02	9/9/2002	20.4	3.8	No	113
CHIP	6/1/2001	18	1.6	No	9	SH02	10/8/2002	13.5	5	No	0
CHIP	6/13/2001	24	1.4	No	42,090	SH05	5/7/2001	6	4.8	No	0
CHIP	6/27/2001	26.8	1.4	No	7,886	SH05	5/17/2001	8.9	5.3	No	0
CHIP	7/10/2001	23.8	1.3	No	2,192	SH05	6/5/2001	13.7	4.6	No	0
CHIP	7/27/2001	24.2	1.6	No	22,753	SH05	6/18/2001	20.8	5	No	11,602
CHIP	8/8/2001	27	1.7	No	2,121	SH05	7/3/2001	19.5	4.8	No	6,906
CHIP	8/28/2001	23.2	1.1	No	1,594	SH05	7/16/2001	20.3		Yes	10,603
CHIP	9/10/2001	22	1.2	No	854	SH05	8/1/2001	23		Yes	2,436
CHIP	9/24/2001	20.3	1.7	No	281	SH05	8/20/2001	23.4		Yes	4,074
CHIP	10/9/2001	13.9	1.6	No	231	SH05	9/6/2001	19.3		Yes	552
CHIP	4/24/2002	13.8	0.7	No	0	SH05	9/21/2001	18.9		Yes	141
CHIP	5/15/2002	11		No	6,456	SH05	10/4/2001	17.5		Yes	2
CHIP	5/29/2002	19	1.4	No	8,855	SH05	4/30/2002	6.5		Yes	0
CHIP	6/18/2002	19.4	1.5	No	3,792	SH05	5/28/2002	11.7		Yes	0
CHIP	7/2/2002	26.3	1.6	No	6,116	SH05	6/19/2002	15.1		Yes	452
CHIP	7/15/2002	24.1	1.7	No	984	SH05	7/3/2002	24.6	3.5	No	24,109
CHIP	8/7/2002	23.3	1.3	No	42,190	SH05	7/19/2002	19.4		Yes	3,359
CHIP	8/20/2002	25.1	1.6	No	21,081	SH05	8/12/2002	22.8		Yes	3,132
CHIP	9/9/2002	21.8	1.4	No	1,936	SH05	8/28/2002	20		Yes	185
CHIP	10/8/2002	16	0.9	No	126	SH05	9/17/2002	19.6		Yes	107
SH02	5/3/2001	14.8	0.6	No	0	SH05	10/1/2002	17.5	4	No	5

Appendix A: Zebra mussel veliger density data 2001-2002

Station	Date	Temp (C)	Secchi (m)	Secchi to bottom?	Density (n/m3)	Station	Date	Temp (C)	Secchi (m)	Secchi to bottom?	Density (n/m3)
SH06	5/11/2001	14.3	3.1	No	0	SH08	7/6/2001	18.4		Yes	547
SH06	5/31/2001	14.2	3.3	No	0	SH08	7/19/2001	23.8		Yes	2
SH06	6/13/2001	22.3	4.9	No	26	SH08	8/3/2001	22.5		Yes	0
SH06	6/28/2001	24.5	5	No	115	SH08	8/13/2001	24		Yes	32
SH06	7/12/2001	21.3	4.5	No	38	SH08	9/5/2001	20.4	2.4	No	20
SH06	7/31/2001	25.3	4.8	No	59	SH08	9/19/2001	19.1		Yes	0
SH06	8/10/2001	26.2	5.1	No	11	SH08	5/20/2002	8.9	4.2	No	0
SH06	8/29/2001	22.1	4.1	No	2	SH08	6/3/2002	12.7	3.9	No	0
SH06	9/18/2001	19.4	4.6	No	0	SH08	6/24/2002	16.2		Yes	2
SH06	10/1/2001	19	4.6	No	0	SH08	7/8/2002	19.7		Yes	22
SH06	10/14/2001	15.3	4.3	No	0	SH08	7/25/2002	21.7		Yes	0
SH06	6/4/2002	14.5	4.1	No	0	SH08	8/13/2002	22.3		Yes	17
SH06	6/25/2002	19.6	2.8	No	3	SH08	9/3/2002	19.5		Yes	0
SH06	7/12/2002	22.1	4	No	99	SH08	9/26/2002	19.5		Yes	0
SH06	7/23/2002	23.1	4	No	3	SH09	5/16/2001	11		Yes	0
SH06	8/9/2002	22.8	4.2	No	10	SH09	6/4/2001	17	1.9	No	0
SH06	8/29/2002	21.3	5	No	5	SH09	6/20/2001	24.2	1.3	No	0
SH06	9/17/2002			No	2	SH09	7/5/2001	21.2	2	No	178
SH06	10/1/2002	18		No	0	SH09	7/23/2001	25.5	1.9	No	26
SH07	5/16/2001	9		Yes	0	SH09	8/3/2001	26.3	1.5	No	4
SH07	6/6/2001	12.8		Yes	0	SH09	8/22/2001	24.5	0.9	No	6
SH07	6/21/2001	20.8		Yes	7,620	SH09	9/7/2001	21.9	0.6	No	25
SH07	7/6/2001	18.1		Yes	53,491	SH09	9/19/2001	20.8	1.4	No	0
SH07	7/19/2001	21.8		Yes	3,695	SH09	10/2/2001	17.6	1.6	No	0
SH07	7/31/2001	22.4		Yes	32,773	SH09	5/20/2002	10.4	1.5	No	0
SH07	8/13/2001	24		Yes	15,369	SH09	6/14/2002	18.8	0.6	No	0
SH07	9/5/2001	18.4		Yes	2,491	SH09	6/27/2002	21.9	1.9	No	5
SH07	9/18/2001	19		Yes	58	SH09	7/12/2002	20.3	1.6	No	416
SH07	10/1/2001	17.2		Yes	9	SH09	7/29/2002	22.8	1.6	No	21
SH07	4/30/2002	6.5		Yes	0	SH09	8/14/2002	26.1	0.6	No	173
SH07	6/3/2002	10.7		Yes	0	SH09	9/4/2002	21.7	0.7	No	0
SH07	6/24/2002	17.4		Yes	18,696	SH09	10/3/2002	16	1.5	No	0
SH07	7/8/2002	20		Yes	86,013	SH10	5/8/2001	13	1.3	No	0
SH07	7/25/2002	19.5		Yes	145	SH10	5/25/2001	18.2	1.9	No	0
SH07	8/13/2002	22.6		Yes	55,937	SH10	6/12/2001	21.3	2.2	No	0
SH07	9/3/2002	19.4		Yes	978	SH10	6/26/2001	25.2	2.4	No	4
SH07	9/26/2002	19		Yes	44	SH10	7/11/2001	22.4	1.6	No	162
SH08	5/9/2001	7		Yes	0	SH10	7/26/2001	24.3	2.4	No	3
SH08	5/21/2001	11		Yes	0	SH10	8/6/2001	27	2.4	No	0
SH08	6/6/2001	14.1	3	No	0	SH10	8/23/2001	24.7	1.2	No	0
SH08	6/21/2001	20.9		Yes	33	SH10	9/11/2001	21.2	1.6	No	0

Appendix A: Zebra mussel veliger density data 2001-2002

Station	Date	Temp (C)	Secchi (m)	Secchi to bottom?	Density (n/m3)	Station	Date	Temp (C)	Secchi (m)	Secchi to bottom?	Density (n/m3)
SH10	9/27/2001	19.7	0.9	No	0	STA02	7/15/2002	23.4	1.4	No	2,387
SH10	5/30/2002	16.5	1.2	No	0	STA02	8/7/2002	23.8	1.1	No	167
SH10	7/1/2002	24.3	1.8	No	0	STA02	8/20/2002	24.6	0.9	No	884
SH10	7/16/2002	22.1	2.1	No	0	STA02	9/9/2002	20.5	1.5	No	1,495
SH10	8/8/2002	21.5	1.8	No	30	STA02	10/8/2002	14.2	1.1	No	126
SH10	8/21/2002	24.5	1.1	No	419	STA04	5/3/2001	17	0.7	No	0
SH10	10/3/2002	15	1.2	No	0	STA04	5/14/2001	16	1.5	No	5
SH11	5/8/2001	9		Yes	0	STA04	6/1/2001	17	1.9	No	2
SH11	5/25/2001	13.2		Yes	33	STA04	6/13/2001	24	3.4	No	1,657
SH11	6/12/2001	18.3		Yes	110	STA04	6/27/2001	26	2.4	No	4,816
SH11	6/26/2001	23		Yes	1,362	STA04	7/10/2001	21	2.5	No	3,345
SH11	7/11/2001	21		Yes	32,446	STA04	7/27/2001	22.6	2.4	No	8,566
SH11	7/26/2001	24.3		Yes	3,345	STA04	8/8/2001	26.6	2.1	No	36,446
SH11	8/6/2001	24		Yes	1,256	STA04	8/28/2001	23.6	2	No	15,333
SH11	8/23/2001	24.1		Yes	157	STA04	9/10/2001	21.7	1.6	No	4,301
SH11	9/11/2001	21.1		Yes	118	STA04	9/24/2001	20	1.8	No	9,953
SH11	9/27/2001	18.7		Yes	9	STA04	10/9/2001	14.6	2	No	1,398
SH11	5/7/2002	9.2		No	0	STA04	4/24/2002	14.3	1.4	No	0
SH11	5/30/2002	13.3		Yes	22	STA04	5/29/2002	18	1.6	No	7,888
SH11	6/17/2002	14.8		Yes	422	STA04	6/18/2002	19.3	2.9	No	2,827
SH11	7/1/2002	22.4		Yes	9,208	STA04	7/2/2002	25.7	2.1	No	4,957
SH11	7/16/2002	18.3		Yes	5,508	STA04	7/15/2002	23	2	No	18,788
SH11	8/8/2002	21.6		Yes	663	STA04	8/7/2002	21.9	2.4	No	2,260
SH11	8/21/2002	23.1		Yes	62	STA04	8/20/2002	22.7	2.1	No	502
SH11	9/26/2002	20		Yes	0	STA04	9/9/2002	20.8	1.6	No	954
STA02	5/3/2001	19.2	1.2	No	0	STA04	10/8/2002	14.1	1.5	No	74
STA02	5/14/2001	18.8	1.2	No	4,520	STA07	5/10/2001	14.8	3.4	No	0
STA02	6/1/2001	18.5	1.4	No	735	STA07	5/24/2001	14	2.8	No	0
STA02	6/13/2001	21	0.2	No	9,965	STA07	6/7/2001	15.8	2.9	No	2
STA02	6/27/2001	25.2	0.8	No	65,294	STA07	6/25/2001	23	4	No	2,536
STA02	7/10/2001	23.8	0.5	No	134,105	STA07	7/9/2001	19.3	4.3	No	9,317
STA02	7/27/2001	24	0.6	No	4,520	STA07	7/25/2001	21.8	5.9	No	7,908
STA02	8/8/2001	28	0.8	No	11,753	STA07	8/7/2001	24.3	6.5	No	23,707
STA02	8/28/2001	23.3	0.6	No	884	STA07	8/27/2001	20.7	4.5	No	4,848
STA02	9/10/2001	22.5	0.6	No	13,059	STA07	9/12/2001	19.3	4.9	No	1,569
STA02	9/24/2001	19.9	0.7	No	5,860	STA07	9/26/2001	17.6	6	No	121
STA02	10/9/2001	14.1	0.8	No	2,762	STA07	5/17/2002	7.5	3.8	No	0
STA02	4/24/2002	12.7	0.8	No	0	STA07	6/10/2002	13.7	5.2	No	2,510
STA02	5/29/2002	18.4	1.3	No	21,754	STA07	6/26/2002	19.6	4.7	No	1,983
STA02	6/18/2002	18.8	1.7	No	14,706	STA07	7/10/2002	20.7	4	No	20,944
STA02	7/2/2002	25.8	1.4	No	30,965	STA07	8/1/2002	23.5	5.5	No	1,256

Appendix A: Zebra mussel veliger density data 2001-2002

Station	Date	Temp (C)	Secchi (m)	Secchi to bottom?	Density (n/m3)	Station	Date	Temp (C)	Secchi (m)	Secchi to bottom?	Density (n/m3)
STA07	8/16/2002	21.7	5	No	15	STA25	10/1/2001	17.2	7.2	No	0
STA07	9/25/2002	20	6.7	No	14	STA25	4/17/2002	7.4	4.9	No	0
STA19	5/11/2001	8.3	5	No	0	STA25	6/4/2002	14.1	5.5	No	0
STA19	6/5/2001	11.5	4.3	No	0	STA25	6/25/2002	18.9	1.8	No	3
STA19	6/18/2001	23.5	5.5	No	8,538	STA25	7/12/2002	21	2	No	0
STA19	7/16/2001	20	6.6	No	58,966	STA25	7/23/2002	22.4	3.8	No	8
STA19	8/1/2001	22.3	7	No	17,077	STA25	8/9/2002	21.9	4.9	No	8
STA19	8/20/2001	23.5	5	No	22,401	STA25	8/29/2002	20.9	4	No	24
STA19	9/6/2001	18.9	5.5	No	1,783	STA33	5/9/2001	10.2	4.9	No	0
STA19	9/21/2001	18.4	6.4	No	276	STA33	5/21/2001	12.2	4	No	0
STA19	5/28/2002	10.8	7.5	No	0	STA33	6/6/2001	11.7	4.7	No	0
STA19	6/19/2002	15.6	6.5	No	126	STA33	6/21/2001	22.1	4.2	No	4,816
STA19	7/3/2002	21.4	3.8	No	28,930	STA33	7/6/2001	18.2	4	No	3,003
STA19	7/19/2002	19.5	4.6	No	4,486	STA33	7/19/2001	22	6.3	No	37,368
STA19	8/12/2002	21.7	5.8	No	1,657	STA33	7/31/2001	23.2	8	No	18,534
STA19	8/28/2002	19.8	5.3	No	2,412	STA33	8/13/2001	24.5	6	No	11,307
STA21	5/7/2001	6	5	No	0	STA33	9/5/2001	19.4	4.9	No	1,959
STA21	5/17/2001	7.3	5.1	No	0	STA33	9/18/2001	18.7	6.2	No	193
STA21	6/5/2001	12.3	3.8	No	0	STA33	10/1/2001	17.1	5.5	No	3
STA21	6/18/2001	23.8	5.4	No	5,701	STA33	6/3/2002	11.3	5.4	No	0
STA21	7/3/2001	19.7	4	No	16,449	STA33	6/24/2002	16.7	3.8	No	193
STA21	7/16/2001	20.8	5.6	No	40,081	STA33	7/8/2002	20.1	3	No	17,177
STA21	8/1/2001	25	6.6	No	39,578	STA33	7/25/2002	21	4.5	No	1,519
STA21	8/20/2001	24.2	5.5	No	14,666	STA33	8/13/2002	22.7	4.3	No	1,657
STA21	9/6/2001	18.5	5.5	No	1,406	STA33	9/3/2002	19.4	4	No	2,387
STA21	9/21/2001	18.8	5.3	No	301	STA34	5/4/2001	7	4.5	No	0
STA21	5/28/2002	10.5	6.7	No	0	STA34	5/16/2001	10.1	5.2	No	0
STA21	6/19/2002	15.3	6.5	No	333	STA34	6/4/2001	13.2	3.6	No	0
STA21	7/3/2002	23.5	2.9	No	27,348	STA34	6/20/2001	21.3	5.3	No	2
STA21	7/19/2002	19.4	6	No	2,396	STA34	7/5/2001	19.1	5.3	No	0
STA21	8/12/2002	22.6	6	No	16,550	STA34	7/23/2001	21.5	5	No	2
STA21	8/28/2002	20	5.7	No	1,841	STA34	8/3/2001	24	4.9	No	3
STA25	5/11/2001	12	2.9	No	0	STA34	8/21/2001	23.5	4.7	No	17
STA25	5/31/2001	13.8	4.5	No	0	STA34	9/7/2001	20.3	4.1	No	0
STA25	6/14/2001	22.5	5.3	No	2	STA34	9/19/2001	19.6	5.1	No	0
STA25	6/28/2001	22.7	5.5	No	24	STA34	10/2/2001	18	4.8	No	0
STA25	7/12/2001	21	5	No	65	STA34	5/20/2002	8.3	4.8	No	0
STA25	7/31/2001	25	5.3	No	164	STA34	6/14/2002	15.4	4.6	No	0
STA25	8/10/2001	25.6	4.8	No	17	STA34	6/27/2002	17.3	5.3	No	0
STA25	8/29/2001	22.1	6.9	No	80	STA34	7/12/2002	20.5	4.5	No	17
STA25	9/18/2001	19.5	4.5	No	0	STA34	7/29/2002	21.2	2.9	No	0

Appendix A: Zebra mussel veliger density data 2001-2002

Station	Date	Temp (C)	Secchi (m)	Secchi to bottom?	Density (n/m3)	Station	Date	Temp (C)	Secchi (m)	Secchi to bottom?	Density (n/m3)
STA34	8/14/2002	23.9	3.4	No	0	STA46	7/11/2001	21		Yes	48,187
STA34	9/4/2002	20.1	5	No	0	STA46	7/26/2001	24	4.9	No	42,287
STA36	5/9/2001	8.5	5.1	No	0	STA46	8/6/2001	24.7	5.7	No	12,344
STA36	5/21/2001	10.8	6	No	0	STA46	8/23/2001	24	2.8	No	10,174
STA36	6/6/2001	14	4.6	No	0	STA46	9/11/2001	20.9	5.5	No	994
STA36	6/21/2001	24	6.5	No	3,290	STA46	9/27/2001	18.7		Yes	48
STA36	7/6/2001	18.7	5.5	No	43,998	STA46	5/30/2002	13.3	6.4	No	924
STA36	7/19/2001	24	6	No	23,104	STA46	6/17/2002	14.8	2.6	No	309
STA36	7/31/2001	23	8	No	44,400	STA46	7/1/2002	20.7	3.5	No	20,884
STA36	8/13/2001	23.9	6.9	No	42,492	STA46	7/16/2002	18.4	3.6	No	3,051
STA36	9/5/2001	19.6	5.6	No	5,600	STA46	8/8/2002	21.6		Yes	803
STA36	9/18/2001	18.8	5.4	No	670	STA46	8/21/2002	24.4		Yes	991
STA36	10/1/2001	17.2	6	No	30	STA50	5/8/2001	14.3	1.6	No	0
STA36	6/3/2002	12.3	6.1	No	5	STA50	5/25/2001	18	2.2	No	0
STA36	6/24/2002	17.7	4.5	No	1,674	STA50	6/12/2001	20	2.4	No	0
STA36	7/8/2002	19.9	3.7	No	15,226	STA50	6/26/2001	23.8	3.1	No	25
STA36	7/25/2002	20.8	5	No	791	STA50	7/26/2001	24.3	2.6	No	0
STA36	8/13/2002	22.1	6.3	No	1,688	STA50	8/6/2001	26.2	2.7	No	30
STA40	5/4/2001	12	2.7	No	0	STA50	8/23/2001	23.8	1.3	No	0
STA40	5/16/2001	10.8	3.7	No	0	STA50	9/11/2001	20.4	2.1	No	15
STA40	6/4/2001	16.3	3	No	0	STA50	9/27/2001	19	1.9	No	0
STA40	6/20/2001	24	3	No	30	STA50	5/30/2002	15.8	1.9	No	0
STA40	7/5/2001	21.2	2.8	No	208	STA50	7/1/2002	22.1	1.6	No	0
STA40	7/23/2001	24.7	2.7	No	69	STA50	7/16/2002	22.1	2	No	0
STA40	8/3/2001	25.5	2.7	No	0	STA50	8/8/2002	22.2	1.9	No	55
STA40	8/21/2001	24.3	2	No	68	STA50	8/21/2002	24	2.3	No	342
STA40	9/7/2001	20.6	1.8	No	3	STA50	10/3/2002	14.6	1	No	0
STA40	9/19/2001	20.3	2.3	No	0	WILL	5/11/2001	13.3	6.3	No	0
STA40	10/2/2001	18.1	3.2	No	0	WILL	6/5/2001	11.2	3.9	No	0
STA40	5/20/2002	10	3.4	No	0	WILL	6/18/2001	17.2	5.7	No	221
STA40	6/14/2002	16.9	0.9	No	13	WILL	7/3/2001	19	4.8	No	5,904
STA40	6/27/2002	21.1	3.6	No	0	WILL	7/16/2001	20.7	7	No	7,258
STA40	7/12/2002	20.5	1.9	No	158	WILL	8/1/2001	23.3	6.3	No	964
STA40	7/29/2002	22.5	2.2	No	39	WILL	8/20/2001	22.9	5.7	No	116
STA40	8/14/2002	24.8	1.8	No	0	WILL	9/6/2001	19.6	5.8	No	181
STA40	9/4/2002	20.1	1.8	No	67	WILL	5/28/2002	11.6	5.4	No	0
STA40	10/3/2002	15.9	1.3	No	0	WILL	6/19/2002	14.1	5.7	No	18
STA46	5/8/2001	8.3	6.3	No	0	WILL	7/3/2002	21.8	4	No	923
STA46	5/25/2001	13	4.5	No	53	WILL	7/19/2002	19.5	5.6	No	491
STA46	6/12/2001	17		Yes	13	WILL	8/12/2002	20.8	7	No	226
STA46	6/26/2001	22.4	5.2	No	2,210	WILL	8/28/2002	20.4	6.6	No	104

Appendix B: Zebra mussel juvenile density data 2001-2002

Station	Date	Days in Lake	Density (n/m2)	Station	Date	Days in Lake	Density (n/m2)
BAHA	6/7/2001	28	0	SH02	8/7/2002	35	36,000
BAHA	6/25/2001	32	0	SH02	8/20/2002	35	0
BAHA	7/9/2001	33	5,600	SH02	9/9/2002	33	178
BAHA	7/25/2001	30	68,000	SH02	10/8/2002	48	444
BAHA	8/7/2001	29	148,000	SH02	10/8/2002	168	76,978
BAHA	8/27/2001	33	154,000	SH05	6/5/2001	29	0
BAHA	9/12/2001	33	82,000	SH05	6/18/2001	32	0
BAHA	9/26/2001	139	176,000	SH05	7/3/2001	28	0
BAHA	9/26/2001	30	3,289	SH05	7/16/2001	28	2,178
BAHA	6/10/2002	42	0	SH05	8/1/2001	29	184,000
BAHA	6/26/2002	40	21,867	SH05	8/20/2001	35	78,000
BAHA	7/10/2002	31	184,000	SH05	9/6/2001	36	80,000
BAHA	8/1/2002	35	4,178	SH05	9/21/2001	32	3,022
BAHA	8/16/2002	36	2,533	SH05	10/18/2001	165	51,733
BAHA	9/25/2002	56	0	SH05	10/18/2001	42	267
BAHA	10/9/2002	145	20,978	SH05	6/19/2002	51	0
BAHA	10/9/2002	55	0	SH05	7/3/2002	35	0
CHIP	6/1/2001	29	0	SH05	7/19/2002	31	498,000
CHIP	6/13/2001	30	89	SH05	8/12/2002	39	130,000
CHIP	6/27/2001	27	178,000	SH05	8/28/2002	40	533
CHIP	7/10/2001	27	46,000	SH05	9/17/2002	35	0
CHIP	7/27/2001	31	258,000	SH05	10/1/2002	153	128,000
CHIP	8/8/2001	29	40,000	SH05	10/1/2002	34	0
CHIP	8/28/2001	32	28,000	SH06	6/14/2001	34	0
CHIP	9/10/2001	33	533	SH06	6/28/2001	29	89
CHIP	9/24/2001	27	3,111	SH06	7/12/2001	28	0
CHIP	10/9/2001	159	55,822	SH06	7/31/2001	33	0
CHIP	6/18/2002	56	950,000	SH06	8/10/2001	29	0
CHIP	7/2/2002	34	1,828,000	SH06	8/29/2001	30	178
CHIP	7/15/2002	28	604,000	SH06	9/18/2001	39	0
CHIP	8/7/2002	36	102,000	SH06	10/14/2001	46	0
CHIP	8/20/2002	36	12,089	SH06	10/14/2001	166	0
CHIP	9/9/2002	33	104,000	SH06	7/12/2002	38	0
CHIP	10/8/2002	48	23,644	SH06	7/23/2002	29	0
CHIP	10/8/2002	168	76,622	SH06	8/9/2002	28	0
SH02	6/1/2001	28	0	SH06	8/29/2002	35	0
SH02	6/13/2001	30	0	SH06	9/17/2002	38	0
SH02	6/27/2001	27	7,289	SH06	10/1/2002	118	0
SH02	7/10/2001	27	30,000	SH06	10/1/2002	33	0
SH02	7/27/2001	31	60,000	SH07	6/21/2001	36	0
SH02	8/8/2001	29	90,000	SH07	7/6/2001	31	0
SH02	9/24/2001	116	99,022	SH07	7/19/2001	29	400
SH02	6/18/2002	56	3,822	SH07	7/31/2001	26	844
SH02	7/2/2002	34	240,000	SH07	8/13/2001	25	578
SH02	7/15/2002	28	190,000	SH07	9/5/2001	36	1,956

Appendix B: Zebra mussel juvenile density data 2001-2002

Station	Date	Days in Lake	Density (n/m2)
SH07	9/18/2001	35	711
SH07	10/18/2001	155	0
SH07	6/24/2002	55	0
SH07	7/8/2002	35	178
SH08	6/6/2001	28	0
SH08	6/21/2001	31	0
SH08	7/6/2001	31	0
SH08	7/19/2001	28	0
SH08	8/3/2001	28	0
SH08	8/13/2001	25	0
SH08	9/5/2001	33	0
SH08	9/19/2001	37	0
SH08	10/18/2001	153	0
SH08	6/24/2002	34	0
SH08	7/8/2002	35	0
SH08	7/25/2002	31	0
SH08	8/13/2002	35	0
SH08	9/3/2002	38	0
SH08	9/26/2002	43	0
SH08	9/26/2002	129	0
SH09	6/20/2001	42	0
SH09	7/5/2001	32	0
SH09	7/23/2001	34	0
SH09	8/3/2001	29	0
SH09	6/27/2002	38	0
SH09	7/12/2002	52	0
SH09	7/29/2002	32	311
SH09	8/14/2002	33	178
SH09	9/4/2002	37	0
SH09	10/3/2002	49	44
SH09	10/3/2002	136	711
SH10	6/12/2001	35	0
SH10	6/26/2001	32	0
SH10	7/11/2001	30	0
SH10	7/26/2001	31	0
SH10	8/6/2001	28	0
SH10	8/23/2001	28	0
SH10	9/11/2001	36	0
SH10	9/27/2001	35	0
SH10	9/27/2001	142	0
SH10	6/17/2002	34	0
SH10	7/1/2002	31	0
SH10	7/16/2002	30	0
SH10	8/8/2002	37	0
SH10	8/21/2002	35	0
SH10	10/3/2002	143	0
SH10	10/3/2002	56	0
SH11	6/12/2001	35	0
SH11	6/26/2001	32	0
SH11	7/11/2001	30	44
SH11	7/26/2001	31	5,111
SH11	8/6/2001	26	26,000
SH11	8/23/2001	27	2,667
SH11	9/11/2001	36	2,311
SH11	9/27/2001	142	7,067
SH11	9/27/2001	35	222
SH11	6/17/2002	34	0
SH11	7/1/2002	31	0
SH11	7/16/2002	30	0
SH11	8/8/2002	37	133
SH11	8/21/2002	35	0
SH11	9/26/2002	48	44
SH11	9/26/2002	135	178
WILL	6/18/2001	37	0
WILL	7/3/2001	28	0
WILL	7/16/2001	29	0
WILL	8/1/2001	29	5,644
WILL	8/20/2001	35	2,400
WILL	9/6/2001	17	89
WILL	9/6/2001	36	444
WILL	9/6/2001	118	3,200
WILL	7/3/2002	35	44
WILL	7/19/2002	30	0
WILL	8/12/2002	39	0
WILL	8/28/2002	39	0
WILL	10/9/2002	135	0
WILL	10/9/2002	57	0