Honeoye Lake Watershed Task Force Meeting
Honeoye Public Library
6:00 PM Thursday, January 24, 2019

Called to order by Terry Gronwall at 6:00 pm at the Honeoye Public Library.

Present: Terry Gronwall (Town of Canadice), Dorothy Gronwall (HVA), Steve Barnhoorn (Town of Richmond), Bruce Gilman (FLCC), Lindsay McMillan (HVA), Megan Webster (Ontario SWCD), Al Favro (Town of Bristol)

Approval of October 25th, 2018 minutes: Moved by LM, second by SB, carried.
Financial Report: Approval to accept Financial Report: Moved by SB, second by AF, carried.

New Business
Approval to pay OCSWCD 4Q18 Services Invoice in the amount of $462.00: Moved by AF, second by SB, carried.
Approval for 2019 LSL Water Quality Sample Testing not to exceed $2,700.00. Moved by LM, second by AF, carried.

Old Business
Total Maximum Daily Load Report:
TG Shared that the Honeoye Lake TMDL report has been released for public review and comment. He provided an update of Honeoye Lake Total Maximum Daily Load Report and the three TMDL deliverables.

1. DEC worked with Cadmus, a consulting firm, to complete CE-QUAL-W2 lake and watershed model. The DEC then took all data available for Honeoye Lake and applied that to the watershed model to make adjustments to the model. The final model showed ~8% of phosphorus entering the lake was coming from watershed, ~92% from the bottom sediments.
2. A target was then set to reduce external loading by 10% and reduce internal loading by 100% with a 15% margin for error. The EPA target for an impaired waterbody is to reduce chlorophyll A to 4 micrograms per liter. The model then showed that by reducing both internal and external loading Honeoye Lake will be able to achieve EPA requirements for Chlorophyll A.
3. The report then made a series of recommendations to address internal load using alum and/or aeration as well as a series of recommendations for reducing contributions from watershed. All recommendations for reducing both internal and external sources in the draft TMDL are in the HABs action plan.

Once EPA approves the final TMDL, Honeoye Lake will be eligible for 3 bonus points for any future grant applications that address recommendations made in the Honeoye Lake TMDL report.

DEC TMDL Information Meeting will be held February 4th, 2019 at 7PM at the Honeoye School

NYS HABs Action Plan Update: TG NYS DEC has retained a contractor to develop Aeration and Nutrient Inactivation Plans to be implemented in the Lake.

Custom Shoreline Barge Conveyor System: TG announced that WQIP for a custom conveyor system for our shoreline weed pick-up barge was funded. Betsy Landre from County Planning will give a presentation at the next meeting.

Honeoye Lake Shoreline Stabilization Project: MW provided update. Bids are being collected right now for engineering which will be funded by Sea Grant. The project is anticipated to be installed this

summer. It will be an important demonstration project for community members interested in nature based shoreline protection practices.

WQIP Round 11 Honeoye Lake Restoration 2018 Project: This grant has been completed and closed out. Final projects included sediment basins and forestry best management practices.

DEC WQIP Round 12 Inlet Restoration Project Update: Grant Extension requested to give time to place more material in inlet channel to reduce channel dimension and allow better access to the floodplain. Work is being completed in coordination with US Fish and Wildlife.

Finger Lakes Institute Nitrogen Research Project: TG Project completed and over the next couple months FLI & Wright State University researchers will be drafting final report. Summary findings are that ammonia is released in significant quantities from the bottom sediments. During lake mixing events that ammonia is brought to the surface and becomes available for blue green algae. Aeration is a possible mitigation option.

Climate Change on Shallow Lakes: BG Finished third summer season of examining temperature profiles in the lake to determine when lake is stratified and when/how it breaks down. Many partners analyzing data to determine correlation between when lake mixing occurs and changes in temperature and what happens in terms of blue green algae events. Several presentations and articles have been developed based on the data collected.

Active Water Resource Council Grants
Identification of algae communities in Honeoye Lake: No Update from FLI
Analyzing water quality impacts from lake sediment disturbances: TG Data was not able to be collected due to mechanical issues with the weed harvester last season. TG: Will collect more data summer 2019.
Sandy Bottom Park Natural Plant Garden: MW Planting will be included with the Honeoye Lake Shoreline Stabilization project at Sandy Bottom Park.

2019 HLWTF Projects – Updates by TG.
Educational outreach Newsletter: Approved and ready to be distributed.
Collect lake water quality data May-October: Approved, will continue program.
Blue-green Algae sample collection for NYSDEC: Will continue program.
Electronic Macrophyte Mapping for Harvesting Program: Will continue program.

The following presentations were given by Bruce Gilman:
Inventory of the Cultural Land Uses and Natural Land Covers in the Town of Richmond using Pictometry. How land use has changed in the Honeoye Lake Watershed.
Zebra and Quagga Mussel Survey. Please see attached report.

Next Meeting is April 25th, 2019

Adjournment: Motion to adjourn at 7:24 pm Moved by AF, second by SB, carried.

Minute Recorder: Megan Webster – Ontario County SWCD

Chairperson Terry Dronadell Date Approved 4/25/19

Honeoye Lake Population Study of Invasive Dreissenid Mussels

Year-old zebra mussel colony attached to thermistor array rope

Ontario County Water Resources Council - Special Project #3-2018

Final Project Report submitted by Honeoye Lake Watershed Taskforce

ABSTRACT

Invasive species populations often exhibit "boom and bust" cycles following colonization of new habitats. To test for this potential cyclical pattern, data from replicate benthic sampling of invasive mussels (*Dreissena* spp.) collected during July of 2002, 2014 and 2018 were compared. Sampling was conducted at three depths within each of four littoral stations in Honeoye Lake (N=12). Additionally, in 2018, three dredge samples were collected at deep water sites to determine if dreissenids were utilizing soft benthic substrates. Only zebra mussels (*Dreissena polymorpha*) were detected during all three study years; no quagga mussels (*Dreissena rostriformis bugensis*) were found. The 2018 population samples were processed by similar methods to previous years: tallying total number of live mussels, measuring up to 100 shell lengths per sample, and assessing sample total biomass weight. Shell length was used as a proxy for mussel age. In 2018, maximum length for first year growth was validated by shell lengths of mussels collected off a residential dock that is annually removed prior to complete winter ice formation across the lake surface. With few exceptions, zebra mussels grew to a maximum shell length of approximately 2.5 cm in 2018. Zebra mussel population density estimates ranged from 104 to 5336/m^2 in 2002, 0 to 6796/m^2 in 2014, and 0 to 7492/m^2 in 2018 with a mean density of 1646/m^2 in 2002, 1164/m^2 in 2014 and 2034/m^2 in 2018. Sample total biomass weight ranged from 29.32 to 615.48 g/m^2 in 2002, 0 to 612.59 g/m^2 in 2014, and 0 to 653.92 g/m^2 in 2018 with mean sample total biomass of 291.6 g/m^2 in 2002, 199.2 g/m^2 in 2014, and 234.7 g/m^2 in 2018. Mean individual mussel weight declined among the three study years from 0.177g in 2002 to 0.172g in 2014 and 0.102g in 2018. Overall, the data suggests a subtle "boom-bust" cycle of several years duration but variability within the limited data set may also be influenced by other factors including the degree of intraspecific aggregation within colonies, flux in suitable hard substrates, and differences in year to year sampling techniques rather than actual trends in their population structure.

METHODS

Four littoral sampling locations (Sandy Bottom beach, gravelly point south of Trident Marine, large embayment at Young's home south of California Point, and small embayment north of Forest View) were selected as representative of the range of environmental conditions within Honeoye Lake in 2002 as part of a comparative study that year with invasive zebra mussel populations in Canandaigua Lake. These Honeoye Lake locations were used in subsequent years. Samples were taken at three different depths from each location yielding twelve samples for each study year. Three additional samples were collected beyond the littoral zone in the north central basin, south central basin, and maximum depth zone (z_m = 9.2m) of the lake in 2018. Samples within a weighted quadrat frame (50.0 cm x 50.0 cm) were hand-picked by a SCUBA diver in 2002, collected with a standard PONAR dredge (22.9 cm x 22.9 cm) in 2014, and with a standard Ekman dredge (15.2 cm x 15.2 cm) in 2018. Sediment was separated from mussels by *in-situ* sieving with a wash frame each year. Water depth measurements were taken by staff gage for each sample each year. GPS coordinates were also taken at all sites in 2018 to facilitate future studies of invasive mussel population structure.

Samples were collected on July 8 in 2002 and on July 17 in 2014. For the current study year, dredge samples were collected on July 18, bagged, labeled and kept cool on the boat then later in the laboratory refrigerator. In the college laboratory the next day, all samples were rinsed in a 2 mm sieve and mussels were transferred to 500 ml glass jars and preserved with 90% ethanol. Jars were labeled and placed in temporary storage. Relevant sample data was transferred to a Microsoft Excel© file to expedite future analyses. On October 18, samples were processed by tallying total number, measuring up to 100 shell lengths per sample with digital calipers, and weighing total sample biomass on an Ohaus Pioneer PA64 balance. Additional organisms found in the samples were noted. On October 31, collected data were summarized by lake locations and depths at each location. Total count, mean sample density, mean total biomass, mean individual biomass and other statistical shell size class analyses were completed.

Shell length was used as a proxy for mussel age, with maximum length for first year growth validated by shell lengths of mussels collected off a residential dock that is annually removed prior to complete winter ice formation across the lake surface. A sample of 40 zebra mussels was collected on November 15, 2018 and measured by the same techniques as described above.

RESULTS

Zebra mussel population density estimates ranged from 104 to 5336 in 2002, 0 to 6796 in 2014, and 0 to 7492 in 2018. Variable density estimates are expected for organisms with a known, spatially clumped distribution pattern like that exhibited by dreissenid mussels. Some mussels occurred as individuals but most grew as variably layered colonies attached to sparsely distributed hard bottom materials or as "necklace" colonies on macrophyte stems of several different aquatic plant species including Eurasian water milfoil (*Myriophyllum spicatum*), coontail (*Ceratophyllum demersum*), water stargrass (*Heteranthera dubia*), pondweeds (*Potamogeton* spp.), elodea (*Elodea canadensis*) and eelgrass (*Vallisneria americana*). Among these common macrophytes, coontail stem fragments overwinter and may serve as an overwintering refugium from which zebra mussels colonize the next year. Mussels also successfully overwinter on gravel bottoms associated with major points along the lake shore. Zebra mussels were generally not detected below 5 meters of water depth, and most were found on macrophyte stems at water depths approximating 2 meters. Two zebra mussels were collected attached to a native pearly mussel (*Elliptio complanatus*) in the soft mud at the south basin deep water location. Banded mystery snails (*Viviparous georgianus*) and ram's horn snails (*Gyraulus* sp.) were often collected in the samples. Benthic sampling did not detect other invasive species like Asian clams (*Corbicula fluminea*) and quagga mussels (*Dreissena rostriformis bugensis)* in Honeoye Lake.

Mean zebra mussel population density comparisons among the three study years are presented in FIGURE 1. Each annual estimate is the mean of 12 samples, and the standard error bar documents the consistently high variability seen in each study year. A second order polynomial trend line is fit to the fluctuating data to suggest the "boom and bust" cycle.

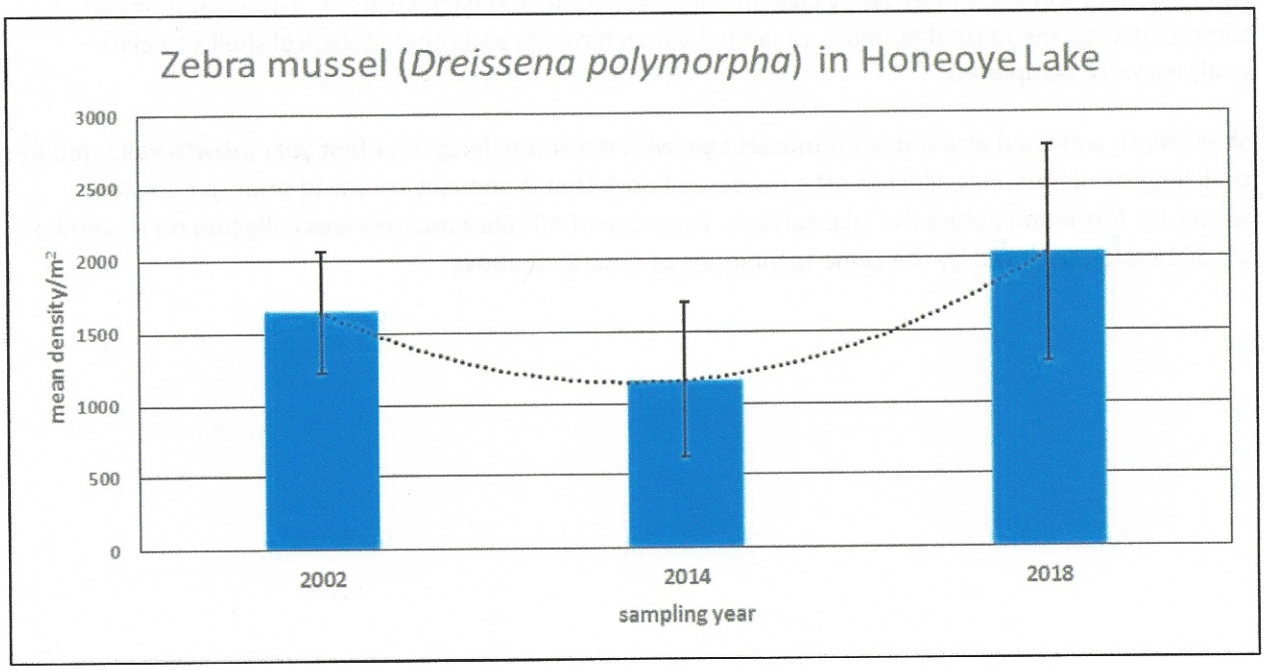

FIGURE 1 - Changes in estimates of zebra mussel mean population density (± SE).

Sample total biomass weight ranged from 29.32 to 615.48 g/m^2 in 2002, 0 to 612.59 g/m^2 in 2014, and 0 to 653.92 g/m^2 in 2018 with mean sample total biomass of 291.6 g/m^2 in 2002, 199.2 g/m^2 in 2014, and 234.7 g/m^2 in 2018. Comparative data is presented in FIGURE 2. Each annual estimate is the mean of 12

samples and, as with density estimates, the standard error bar documents the consistently high variability seen in each study year. A second order polynomial trend line is fit to the fluctuating data and, again, suggests a "boom and bust" cycle.

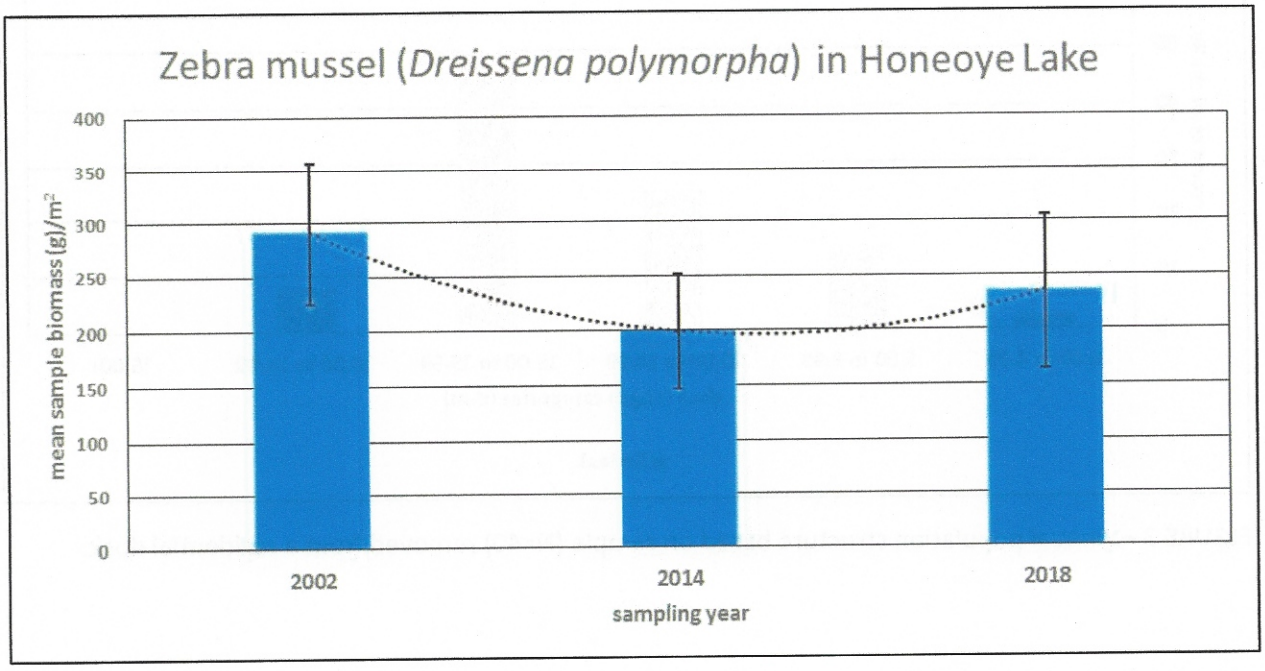

FIGURE 2 – Changes in zebra mussel mean total biomass (± SE).

Maximum sample total biomass were similar each year, approximately 600-650 g/m^2, hinting at a potential areal carrying capacity for zebra mussel biomass within the littoral zone of Honeoye Lake. Mean individual mussel weight declined over the three study years, from 0.177g in 2002, to 0.172g in 2014 and 0.102g in 2018. As individual weight declined, mussel density increased. The reduction in mean individual mussel weight appears related to an increase in the number of mussels present that are competing for limited resources (e.g., palatable phytoplankton, hard substrates, macrophyte stem density, dissolved calcium, etc.) or impacted by varying levels of fish predation. Zebra mussels have been noted in stomach contents of several Honeoye Lake fish species.

Size class analysis, based on shell lengths of mussels collected off a residential dock annually removed prior to complete winter ice formation, is presented in FIGURE 3. In 2018, one-year-old zebra mussels had a maximum shell length of approximately 2.5 centimeters.

FIGURE 3 – Annual population structure based on sample (N=40) removed from a residential dock.

DISCUSSION

Comparing annual residential dock survey (FIGURE 3) to previous lake dredge survey data (FIGURE 4) appears to indicate that most Honeoye Lake zebra mussels, regardless of study year, only live one year. Their population density never reaches the nuisance levels seen elsewhere in the Finger Lakes region. While the muddy nature of most Honeoye Lake bottom substrates may be publicly perceived as undesirable, it clearly plays a positive role in limiting the population of zebra mussels by not providing suitable habitat for attachment. Additionally, the annual dieback of most macrophytes diminishes the overwintering survival of zebra mussels attached to aquatic plant stems.

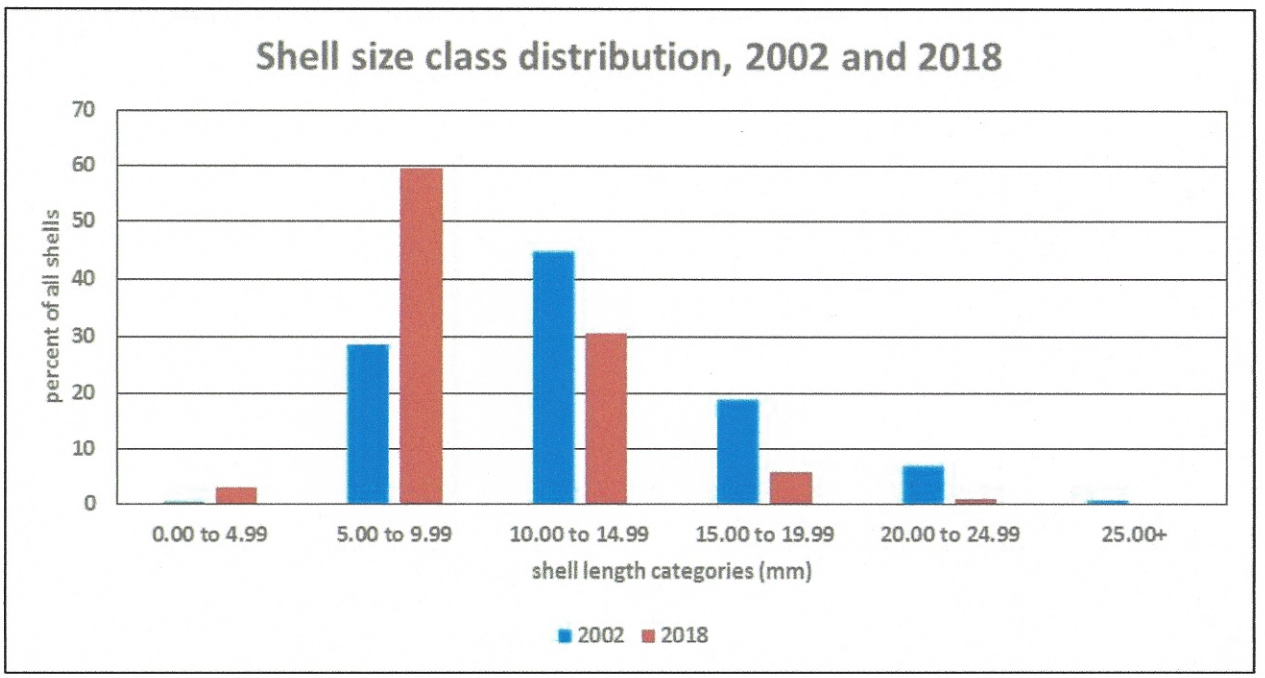

FIGURE 4 - Changes in zebra mussel population structure based on shell size class analyses.

The 2002 to 2018 change in zebra mussel population structure towards a greater number of smaller and presumably younger individuals (FIGURE 4) may be influenced by many factors including intraspecific competition for changing quality of planktonic resources (e.g., increasing dominance by unpalatable cyanobacteria which likely varies each year and monthly within any given year), the concentration of dissolved calcium in the water (required for their shell formation), the flux in suitable attachment substrates where they can connect and grow (e.g., declining numbers of native Unionidae bivalves, and shifts in numbers of overwintering macrophyte stems), or be related to some suspected but unstudied variable (e.g., increased predation by fishes on zebra mussels).